BT Cost Attribution Review

REDACTED VERSION FOR PUBLICATION

Version 3.1

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Version History

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Confidentiality

This is a non-confidential version of Cartesian's report for publication by Ofcom. Confidential data has been redacted from this version of the report according to Ofcom guidelines.

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Executive Summary

British Telecommunications plc (BT) is subject to regulatory financial reporting obligations. These have been imposed by Ofcom where BT has been found to have Significant Market Power (SMP) in a relevant market. Included within these obligations is the requirement for BT to produce and publish annual Regulatory Financial Statements (RFS) and to maintain and publish certain accounting documents setting out how BT prepares those statements.

In advance of changes to the principles under which the RFS is prepared, Ofcom engaged Cartesian to review and provide an opinion on cost attribution methodologies used by BT to attribute its Costs, Revenues, Assets and Liabilities to the regulated Markets and Services.

This confidential report contains Cartesian's findings.

BT's cost accounting system uses a multi-stage process to attribute costs to the Services and Markets that BT serves. The system encompasses hundreds of cost pools (termed "cost categories") and uses a variety of methods to attribute costs from the categories in one stage to the next. Further details can be found in BT's Detailed Attribution Methodologies (the "DAM").[1]

As agreed with Ofcom, the scope of the study was limited to the 2013/14 financial year (FY 2013/14) RFS and a defined set of cost categories (based on materiality) that provided approximately 90% coverage of costs across all regulated Markets. The costs of these regulated markets was approximately £5.3 billion (on a fully-allocated cost basis) in FY 2013/14. Within the scope of the study, Cartesian was requested to:

- Develop a detailed understanding of BT costing system and methods used for cost attribution;
- Document the description of cost attribution methodologies to facilitate Ofcom and the stakeholder's understanding BT's complex cost attribution system;
- Review the data and information provided by BT (including published information) to assess BT's cost attribution rules against the Regulatory Accounting Principles (RAP) published by Ofcom;
- Provide potential alternatives to attribution bases where sensible; and,
- Estimate (where possible) the impact of BT adopting the proposed alternative attribution base.

Cartesian was not expected to audit the data, accounting practices, or spreadsheets that BT uses to prepare the RFS.

By reviewing published documentation, coupled with regular working sessions with BT, Cartesian was able to develop an in-depth understanding of selected cost attribution methodologies used by BT within its cost attribution system. This detailed understanding enabled Cartesian to assess the attribution methodologies against the RAP.

Much of the detail regarding the attribution methodologies was obtained directly from BT through discussion and a process of written question and answer. In total, Cartesian and Ofcom submitted more than 170 questions to BT over a period of four weeks. Answers to some of these questions arrived too late to be included in the report.

1 http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2014/DAM2014.pdf

Cartesian also developed a model to simulate ASPIRE and its operation. The data used to build the model was provided by BT and hence the accuracy of the model is dependent on the quality of data provided by BT.

Overall, Cartesian is satisfied that BT's cost attribution system is free from bias. However there are areas of weakness that BT could improve on. This is perhaps unsurprising given the scale and complexity of BT's cost attribution system.

Cartesian's assessment identified a large number of concerns with the methodologies used to apportion costs. Cartesian found many apparent deviations from the RAP, most notably in accuracy, causality, objectivity (including transparency) and consistency of the RFS. Cartesian also identified a number of input and logic errors in the models used to derive the apportionment bases.

The majority of these concerns do not have a material impact on the costs of the regulated services. However, there are a few that would cause a notable change in either the total costs that BT attributes to regulated markets, or the apportionment of costs between regulated services. Cartesian has summarised all of the identified concerns in section 6.1.3 of this report and, where possible, quantified their impact in section 6.1.4.

Cartesian believes that the outputs of analyses in this report are directionally correct, however there may be some variation between Cartesian's estimates and the actual figures that BT's cost attribution system, ASPIRE, would produce. At no point in the project did Cartesian have access to ASPIRE. Analytical outputs have therefore not been validated by BT's system. The results from the analysis contained in this report are reliant of the information available at the time of writing this report and should not be relied upon in subsequent periods.

During the course of the project, BT confirmed seven issues in the FY 2013/14 RFS cost attribution model. Cartesian estimates that the collective impact of these issues is approximately £73m. The seven issues are as follows:

- BT did not attribute any costs of backhaul and core duct to 21C network fibre. Cartesian estimates that correcting this would lead to a £26m reduction in the costs of regulated markets. The majority of this reduction is to services within the Business Connectivity market.
- BT apportioned non-NGA access fibre costs using erroneous input data. BT has shared revised input data with Cartesian. An initial simulation shows a redistribution of approximately £18m (6.5%) of non-NGA access fibre costs among regulated services, mainly in the Fixed Access and Business Connectivity markets.
- BT attributed approximately £26m of costs for Phonebooks to the regulated markets. According to Ofcom's guidance, costs relating to Phonebooks should not be attributed to the regulated markets.
- When analysing the attribution method of Electricity costs, BT identified that it was over-attributing approximately £3m to AISBO markets. This error was a result of an incorrect selection of product cost categories, e.g. TV.
- In the 2014 DAM, BT explained that the duct valuations were annually indexed based on RPI, however Cartesian identified that BT had not indexed the valuations since a 1997/98 survey. Cartesian estimates that correcting this error will have a non-material impact to changes in costs for both the regulated and unregulated markets.

- BT also identified there were mathematical errors in methodologies used to attribute costs from Network Components to Services. These errors were identified for two Network Components relating to ISDN services. Cartesian estimates that correcting these errors will have a non-material impact to changes in the costs for both regulated and unregulated markets.

In addition to the issues identified and confirmed by BT above, Cartesian also attempted to quantify the impact of 16 other concerns that were not discussed with BT due to time limitations on the project. Some of these concerns relate to Cartesian's opinion of potential alternatives to BT's existing cost attribution methodologies while others are potential modelling errors. The three with greatest potential impact are as follows:

- BT apportions the costs of certain overheads on the basis of 'Pay and Return on Assets' and asserts that this reflects cost causality in terms of management of the employees and assets of the company. Cartesian simulated the impact on costs of apportioning these costs on the basis of pay only. Adopting this methodology leads to a reduction in the costs of regulated markets by approximately £300m (6% of total regulated market costs).

- In the 2013/14 RFS, Cartesian noted that BT attributed £106m of revenue generated by the sale of copper to unregulated markets. It may be appropriate to apportion some of this revenue to offset the cost of copper attributed to the regulated markets.

- Cartesian also identified that there is approximately £170m of unbalanced Transfer Charges attributed to regulated markets. Having discussed this with BT, Cartesian understands that these unbalanced Transfer Charges relate to non-core units and are included in BT's non-core ledger. However, Cartesian is concerned that these unbalanced transfer charges may be leading to an over-attribution of costs to the regulated markets. It was not possible to fully resolve this due to time limitations on the project.

One further item of particular concern is the apportionment of the costs of BT's next-generation network, 21CN. Specifically, the Excel model that BT uses to apportion the costs of this network is poorly structured and very complex. The current form of the model hinders the ability to audit and validate its accuracy. BT acknowledged this and indicated that it planned to improve the model to address these shortcomings.

A second issue relating to 21CN is that certain costs were found to have been attributed on the basis of "future benefits", i.e. where network equipment is not currently being used to support a service but is expected to do so in the future. Ofcom has determined that the future benefits principle cannot be applied in regulated markets. A detailed discussion of the 21CN model can be found in Section 6.2.20.

An addition to reviewing BT's current attribution methods, Cartesian also considered whether there are reasonable alternative methods that could be employed. These are presented alongside each current method in Section 6. For example, in section 6.3.2.5 Cartesian discusses the potential to attribute duct costs on the basis of service bandwidth rather than the space occupied by cables. This would avoid the need for the intermediate cost categories that are currently used to apportion duct costs to cable types.

1 Introduction

1.1 Context

British Telecommunications plc (BT) is subject to regulatory financial reporting obligations. These have been imposed by Ofcom where BT has been found to have Significant Market Power (SMP) in a relevant market. Included within these obligations is the requirement for BT to produce and publish annual Regulatory Financial Statements (RFS) and to maintain and publish certain accounting documents setting out how BT prepares those statements.

In advance of changes to the principles under which the RFS is prepared, Ofcom engaged Cartesian to review and provide an opinion on cost attribution methodologies used by BT to attribute its Costs, Revenues, Assets and Liabilities to the regulated Markets and Services.

This report is the final of the three reports from the project. The first report discussed:

- How BT uses its Regulatory Financial Reporting system (called ASPIRE) to attribute its Cost, Revenues, Assets and Liabilities across the regulated and unregulated Markets and Services; and,
- The filtering approach developed by Cartesian to identify key cost categories that will be the focus of this project's 'methodology review'.

The second report documented Cartesian's understanding of key attribution methodologies used by BT to attribute, Costs, Revenues, Assets and Liabilities. These methodologies were described for the set of cost categories which were agreed with Ofcom as part of the first report.

This final report combines the information provided to Ofcom in the first two reports and provides a consolidated view of:

- The system BT uses to attribute its costs from the General Ledger to Services and Market;
- The key methodologies used by BT at different stages of the cost attribution system (for the set of cost categories agreed with Ofcom based on materiality);
- Cartesian's assessment of BT's compliance of its cost attribution methodologies with the published Regulatory Accounting Principles (RAP);[2]
- Proposed alternative methodologies to those currently used by BT;
- And an assessment of the impact on Markets for a selected set of alternative methodologies.

1.2 Scope

This report documents the findings of Cartesian's review of cost attribution methodologies used by BT to attribute its Costs, Revenues, Assets and Liabilities to the regulated Markets and Services.

As agreed with Ofcom, the scope of the study was limited to a defined set of cost categories, based on materiality, that provided approximately 90% coverage of costs across all regulated Markets. Within the scope of the study, Cartesian was requested to:

- Develop a detailed understanding of BT's costing system and methods used for cost attribution;

2 http://stakeholders.ofcom.org.uk/binaries/consultations/bt-transparency/statement/financial-reporting-statement-may14.pdf

- Document the description of cost attribution methodologies to facilitate Ofcom and stakeholder understanding of BT's complex cost attribution system;
- Review the data and information provided by BT (including published information) to assess BT's cost attribution rules against the RAP published by Ofcom;
- Provide potential alternatives to attribution bases where sensible; and,
- Estimate (where possible) the impact of BT adopting the proposed alternative attribution base.

Cartesian was not expected to audit the data, accounting practices, or spreadsheets that BT uses to prepare the RFS.

Results from the analysis contained in this report are reliant of the information available at the time of writing this report and should not be relied upon in subsequent periods.

1.3 Report Structure

This report is structured in seven sections.

Section 1 provides an introduction to this report covering context, scope and approach.

Section 2 provides an overview of the BT cost attribution system.

Section 3 describes the methodology that Cartesian developed to identify and select cost categories for analysis in the study.

Section 4 provides a brief description of each of the regulated markets and illustrates the composition of each market in terms of cost groups. In addition to the regulated markets, the Wholesale Residual market is also analysed.

Section 5 of the report analyses the attribution of costs from BT's general ledger to markets and services via intermediate cost categories. Detailed financial information is provided for each significant step in the attribution process. A brief description of attribution methods is provided in the text accompanying the tables.

Section 6 describes, in detail, selected methodologies used by BT for attribution of costs to Markets and Services, and Cartesian's assessment of the methodologies against the RAP. Additionally, this section suggests potential alternative attribution methodologies which could be used and assesses, at high level, the impact these may have.

Section 7 of the report presents the results of impact assessments conducted against certain attribution scenarios. The scenarios include a subset of the alternative attribution methods identified in section 6.

Appendices include: a list of BT cost categories; a summary of the RAP; a glossary of terms; and, a compilation of questions submitted to BT and BT's answers, where received.

1.4 Approach

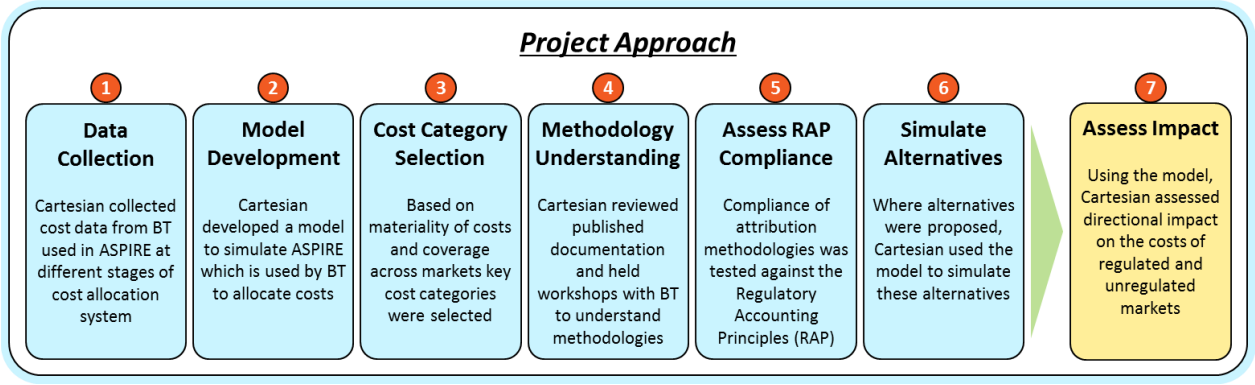
BT's cost accounting system uses a multi-stage process to attribute costs to the Services and Markets that BT serves. The system encompasses hundreds of cost pools (termed "cost categories") and uses a variety of methods to attribute costs from the categories in one stage to the next. A summary of BT's

cost attribution system is provided in Section 2. Further details can be found in BT's Detailed Attribution Methodologies (the "DAM").[3]

The scale and complexity of BT's cost attribution system makes it challenging for external parties to understand how the methodologies in the DAM drive the costs of BT's regulated services. This report attempts to make these relationships more accessible by: (i) focusing only on cost drivers that are material; and, (ii) grouping the cost drivers into common types, e.g. duct costs.

Cartesian used a six stage process to complete this project. These stages are summarised in the figure below.

Figure 1. ***Project Approach***



Source: Cartesian

In order to analyse the methodologies and their attribution of cost to markets, Cartesian developed a model to simulate ASPIRE and its operation. ASPIRE is BT's cost attribution system that attributes costs from the General Ledger to Services and Markets. The data used to build the model was provided by BT and hence the accuracy of the model depends on the quality of data provided by BT.

Due to the sheer number of costs items (hundreds), Cartesian used a methodical approach to identify important cost categories to focus on. The selection criteria used is based on cost materiality, interest from stakeholders and an objective to achieve at least 90% cost coverage across the regulated markets.

By reviewing published documentation, coupled with regular working sessions with BT, Cartesian was able to develop an in-depth understanding of selected cost attribution methodologies used by BT within its cost attribution system. This detailed understanding of the methodologies enabled Cartesian to identify issues, concerns and errors in some of the methodologies.

Cartesian assessed BT's cost attribution methodologies against the RAP published by Ofcom. Cases of potential non-compliance with the principles are documented in this report.

In addition, Cartesian proposed alternative methodologies for certain attributions and was able to simulate a selected set of these using the in-house model described above. The outputs of the analysis

3 http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2014/DAM2014.pdf

provide a directional view of the impact on the costs attributed to the regulated and unregulated markets.

The results of the impact assessment and wider findings from the study are documented in this report.

1.5 Limitations of the Analysis

Cartesian has endeavoured to deliver thorough and high-quality analysis in this study. Cartesian was however constrained by a number of parameters in the execution of the project. The most notable limitations and constraints are set out below.

Reliance on BT Data	Cartesian has based its understanding, and conducted its assessment of BT's cost attribution methodologies, on information published by BT in the RFS, DAM, PAD[4] and DVM[5] documents. This report is therefore reliant on the quality of this information. Cartesian has clarified and validated aspects of the published information through discussion with BT. However, Cartesian has not sought to independently audit BT's published data.
Workshops with BT	Cartesian has held (on average) two working sessions per week with BT to discuss methodologies, ask questions, clarify concerns and understand the data provided by BT. Even though both parties have applied due-diligence, there is a risk that the information provided may be (unintentionally) inaccurate or was not understood correctly. To avoid the latter scenario, Cartesian has attempted to ask clarifying questions during multiple sessions and shared a sample set of worked methodologies with BT to verify the accuracy of Cartesian's understanding. A compilation of questions and answers is presented in Appendix D.
Time	Cartesian conducted this study within a limited timeframe. Given the large amounts of data made available to Cartesian, the complexity of methodologies, and delays in supply of information (and responses to questions), there was a limit to the depth and breadth that could be achieved. In order to meet the specified project timelines, the Cartesian team has made considerable effort to cover as much detail as possible.
Excel Models	As part of data gathering exercise, Cartesian requested BT to provide the Excel models used by BT to determine its cost attributions, e.g. 21CN Model, Electricity Model, Access Rental Model, etc. Cartesian appreciates that these model were developed for internal use, however the versions shared with Cartesian have not always been fully functional (i.e. some models reference to external data sources). This has constrained Cartesian's ability to fully identify all the relationships (and calculations) set up in the models.

[4] http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2014/PrimaryAccountingDocuments2014.pdf
[5] http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2014/DetailedValuationMethodology2014.pdf

Return on MCE %	In the RFS, BT uses component-specific WACC values (as agreed with Ofcom) to determine the return on MCE as an input to the Fully Allocated Cost (FAC).[6] For simplification of the analysis in the study, Cartesian has used a standard WACC of 10% throughout to calculate a directional value of FAC ("Cartesian FAC"). This approach was agreed with Ofcom. Therefore at a FAC level, the costs in this report will not precisely match those in the RFS. This report only ever uses Cartesian FAC.
Limited Selection of AG and PGs	This report does not cover all the cost categories used by BT. The scope of this report was limited to a defined set of Activity Groups, Plant Groups, Network Components and associated methodologies. The primary reason for limiting the scope was to ensure this project could be feasibly delivered within the specified timeframe.
General Ledger Data	The lowest level data provided by BT to Cartesian was at F8/OUC Level. At this level BT groups General Ledger data into similar types of costs. Since Cartesian did not have access to actual General Ledger data, Cartesian is unable to comment on the accuracy of F8 groupings. This means that implications of initial inaccurate grouping cannot be identified by Cartesian.
Residual Markets	Cartesian has not specifically examined attributions to the Retail and Wholesale Residual Markets, as the focus of the study was on the regulated markets.

6 http://stakeholders.ofcom.org.uk/binaries/telecoms/ga/fixed-access-market-reviews-2014/statement-june-2014/annexes.pdf

2 Overview of BT Cost Attribution System

BT uses its cost attribution system to attribute all of its Costs, Assets, Revenues and Liabilities to markets and services. This includes the regulated markets where BT has Significant Market Power (SMP) and the unregulated Wholesale Residual and Retail Residual Markets. The table below lists the markets in which Ofcom has determined that BT has SMP, grouped by the Market Review in which they are assessed.

Table 1. ***Regulated Market Reviews and Markets***

Market Reviews	Markets
Fixed Access	• Wholesale Analogue Exchange Line Services • Wholesale Local Access • Wholesale ISDN2 Exchange Line Services • Wholesale Business ISDN30 Exchange Lines Services
Business Connectivity	• TISBO (up to and including 8Mbps) • TISBO (above 8Mbps up to an including 45Mbps) • TISBO (above 45Mbps up to and including 155Mbps) • Wholesale Regional Trunk Segments • Technical Areas (Point of Handover) • AISBO Non-WECLA • AISBO WECLA • MISBO non-WECLA
Narrowband	• Call Origination on FPN Networks • Fixed Call Termination • Technical Areas (Interconnect Circuits)
Wholesale Broadband Access	• Wholesale Broadband Access – Market 1 • Wholesale Broadband Access – Market 2

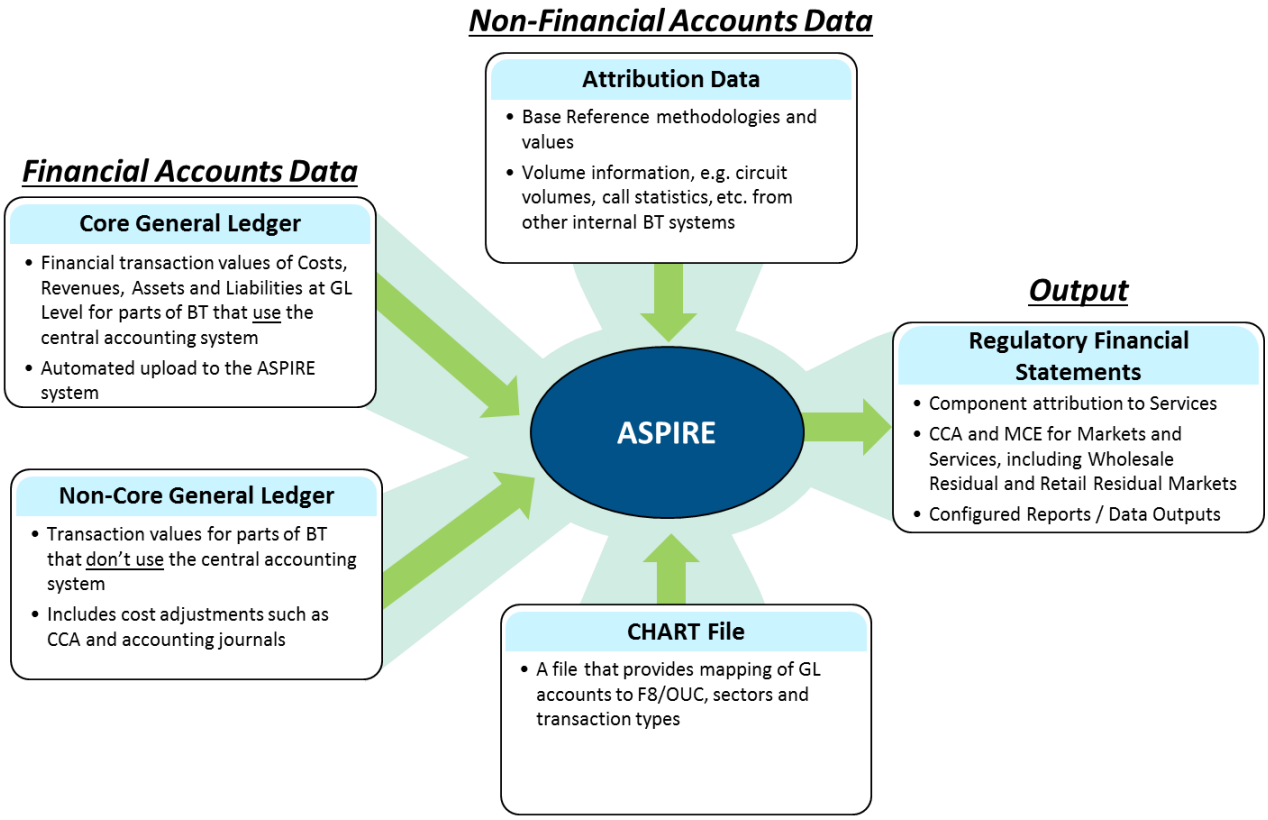
Source: Cartesian, BT

2.1 ASPIRE System Description

In preparing the FY 2013/14 RFS, BT used a Regulatory Financial Reporting system, called ASPIRE, to perform the attribution of Operational costs and MCE values for BT's Accounting Separation (AS) mandate. The system defines a set of cost categories, which are treated in a similar manner within the system. ASPIRE takes its feeds from various external sources such as: the General Ledger; transaction mapping of cost types; and cost attribution data, such as allocation and apportionment methodologies, to perform cost attributions. These inputs are used to determine cost attribution to various network components that are then attributed to Services. BT used ASPIRE to generate the RFS and to provide regulatory financial accounting information. Figure 2 below illustrates the inputs and outputs of ASPIRE.

As of 31st March 2014, ASPIRE has been superseded by a new system called REFINE. This new system will be used to produce annual regulatory financial statements for FY 2014/15 and onwards.

Figure 2. ***Inputs and Outputs of the ASPIRE System***



Source: Cartesian, BT

2.2 Cost Attribution Process

BT uses different levels of cost processing within its system whereby within each level a particular category of costs will be fully attributed to other cost categories. This creates a cascade model of costs being emptied (fully attributed) to cost categories at each stage of the system. Ultimately this leads to all costs, revenues, assets and liabilities being fully attributed to Services and Markets. This process of 'emptying' costs into different cost categories as we move from one level to another is known as the 'exhaustion' process.

During this attribution process, BT uses five main categories of cost:

- **F8/OUC:** Includes costs and asset values from the General Ledger (e.g. 002410/M – Call Control; 0095K0/MYB – Broadband Connection & Rental; 207183/BWA1 – Hospitality)
- **Activity Groups (AG):** Includes costs and asset values of support functions (e.g. Duct, Motor Vehicles, Group Property and Facilities Management)
- **Plant Groups (PG):** Includes costs and asset values of activities, equipment and infrastructure for the purposes of running and selling network services (e.g. Provision and maintenance activities, MSAN equipment, Copper infrastructure)
- **Network Components:** Includes costs and asset values representing discrete parts of BT's Network (e.g. MDF Equipment, Access Fibre Spine and ISDN30 Connections). Costs within these network components are attributed to various Services.

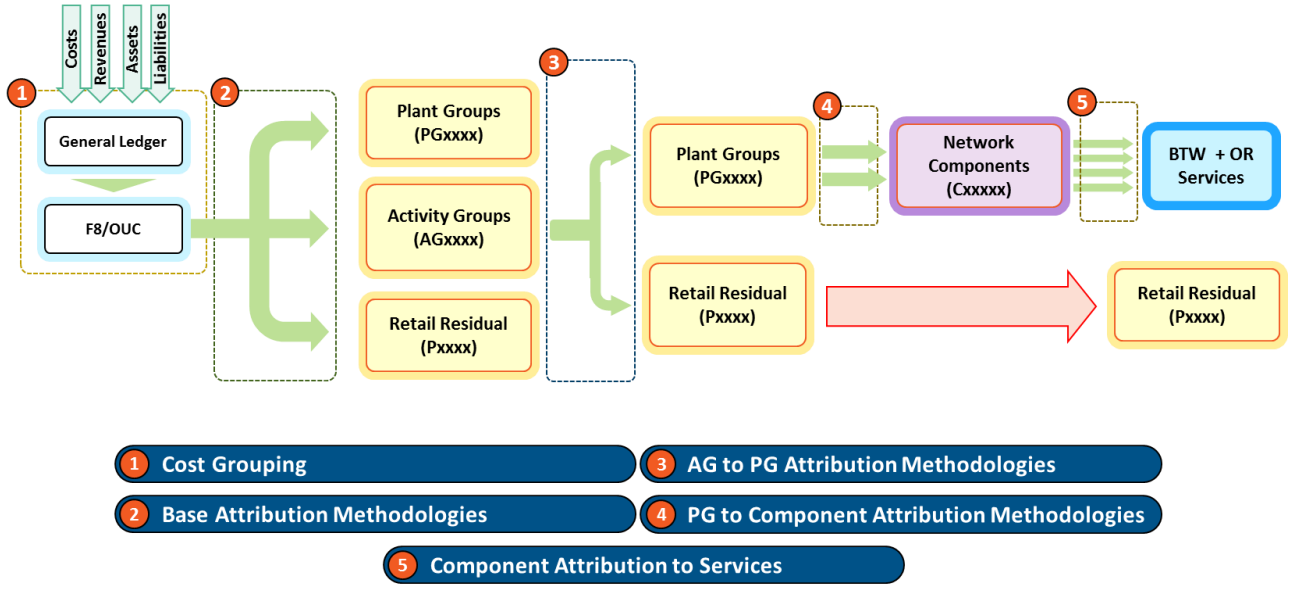
- **Retail Residual:** Includes cost and asset values not related to the supply of Network Services within UK, as well as costs for services attributable to BT Retail (e.g. Bad debts, Derivatives Financial Instruments)

These cost categories serve as holding pools to which BT applies different methodologies depending on cost type for attribution purposes. This cost attribution process can be summarised in five stages, as follows:

1. Similar General Ledger cost items are grouped into cost categories called F8/OUC combinations
2. These F8/OUC costs are then attributed to three new cost categories; AGs, PGs and Retail Residual
3. AGs are then exhausted into PGs, Wholesale Residual and Retail Residual Markets in various levels
4. Final costs within PGs are then attributed to Network Components
5. Finally, Network Component costs are attributed to Services and Markets based on a set of usage and volume factors

The process described above is illustrated in Figure 3.

Figure 3. ***BT's Cost Attribution Process***



Source: Cartesian, BT

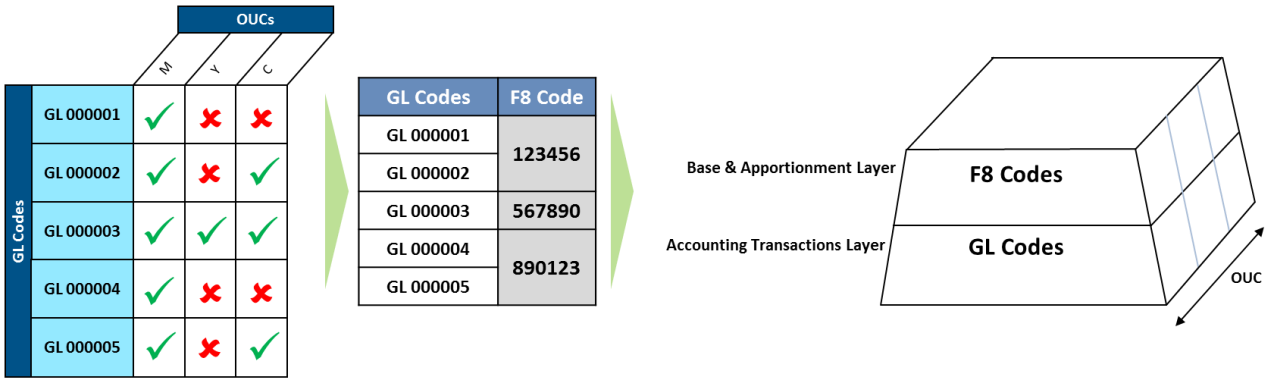
In the FY2013/14 there were approximately: 28,000 General Ledger codes; 18,000 F8 codes and 35,000 OUC codes.

Stage 1 – Cost Grouping

BT records the financial transactions of its core businesses within its core General Ledger (GL) system on a historical basis. This system has approximately 28,000 GL Codes. Similar GL Codes are grouped into a smaller set of F8 codes, where one or many GL Codes may be grouped into a single F8 code. GL records also include an operating unit code (OUC) to identify the relevant operating unit for the entry in the ledger, this provides a two-dimensional F8/OUC coding schema. For simplification and consolidation, BT

also groups OUCs. These groupings are essentially sum of costs within the OUC hierarchical structure to a higher level OUC, which is then used within ASPIRE.

Figure 4. ***GL / F8 / OUC Mapping Illustration***



Source: Cartesian, BT

BT uses the F8/OUC combinations as inputs to ASPIRE for attributing costs to regulatory Markets and Services. BT uses F8 codes in ASPIRE rather than the native GL codes, as ASPIRE has a limited capacity for the number of inputs.

Stage 2 – Base Attribution Methodologies

BT has defined a set of 'Base Reference' methodologies, in its Detailed Attribution Methodologies (DAM) document, to attribute F8/OUC costs to Plant Groups, Activity Groups and Retail Residual cost categories. These base reference methodologies (sub-divided by OUC) in some instances *allocate* 100% of the F8/OUC costs to a particular cost category and in other instances *apportion* the cost across multiple cost categories. It is important to differentiate between the terms 'Attribution', 'Apportionment' and 'Allocation' which are extensively used in this report.

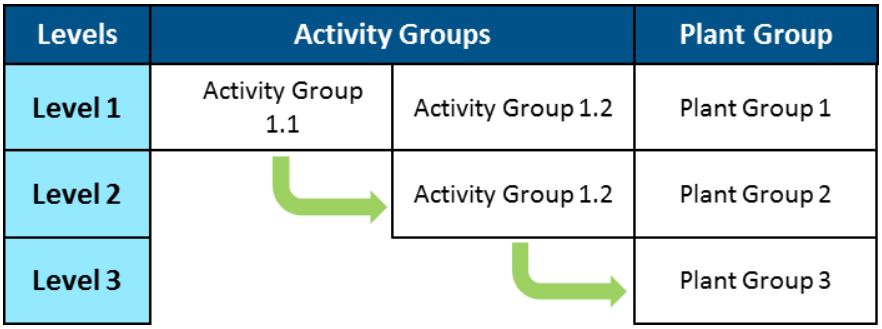
- **Attribution:** A general term used to cover both instances of 'Allocation' and 'Apportionment'
- **Apportionment:** This term is used where costs cannot be directly identified to be fully associated to a particular cost category, and hence the costs need to be distributed over more than one cost category
- **Allocation:** This term is used where costs are not divided and are directly "forwarded" to a particular cost category

The output of Stage 2, where all the F8/OUC combinations have been attributed to PGs, AGs, and Retail Residual using base references, is known as Level 1 within BT's cost attribution system. At this level there are 27 Activity Groups, 258 Plant Groups and one Retail Residual cost category.

Stage 3 – AG to PG Attribution Methodologies

Within the third stage of the cost attribution process, BT attributes the costs of all Activity Groups into Plant Groups and Retail Residual. This attribution/exhaustion process spans five levels (Level 2 to Level 6) within ASPIRE. In this process, at each level, one AG is exhausted to the remaining AGs, PGs and Retail Residual market. A simplified version of this process is illustrated in Figure 5, below.

Figure 5. ***Exhaustion Process of Activity Group Cost Category into AG and PG***



Source: Cartesian, BT

Stage 4 – PG to Component Attribution Methodologies

Level 7 within BT's cost exhaustion process attributes Plant Group costs to Network Components. These attributions are determined using apportionment percentages which are calculated externally and input to ASPIRE in tables. Approximately one third of Plant Groups have a direct allocation to Network Components and the remaining two-thirds use a methodology to apportion costs across multiple Network Components.

BT uses the outputs of various internal systems to determine the weights of apportionment to different Network Components. For example, the apportionment of costs from Access Fibre Spine (PG111C) is largely based on bearer volume data extracted from the CTCS system. Using this information, BT attributes the cost of PG111C to 14 different components (e.g. ISDN30 access, PC Rentals, Backhaul Extension Services, etc.)

Stage 5 – Network Component Attribution to Services

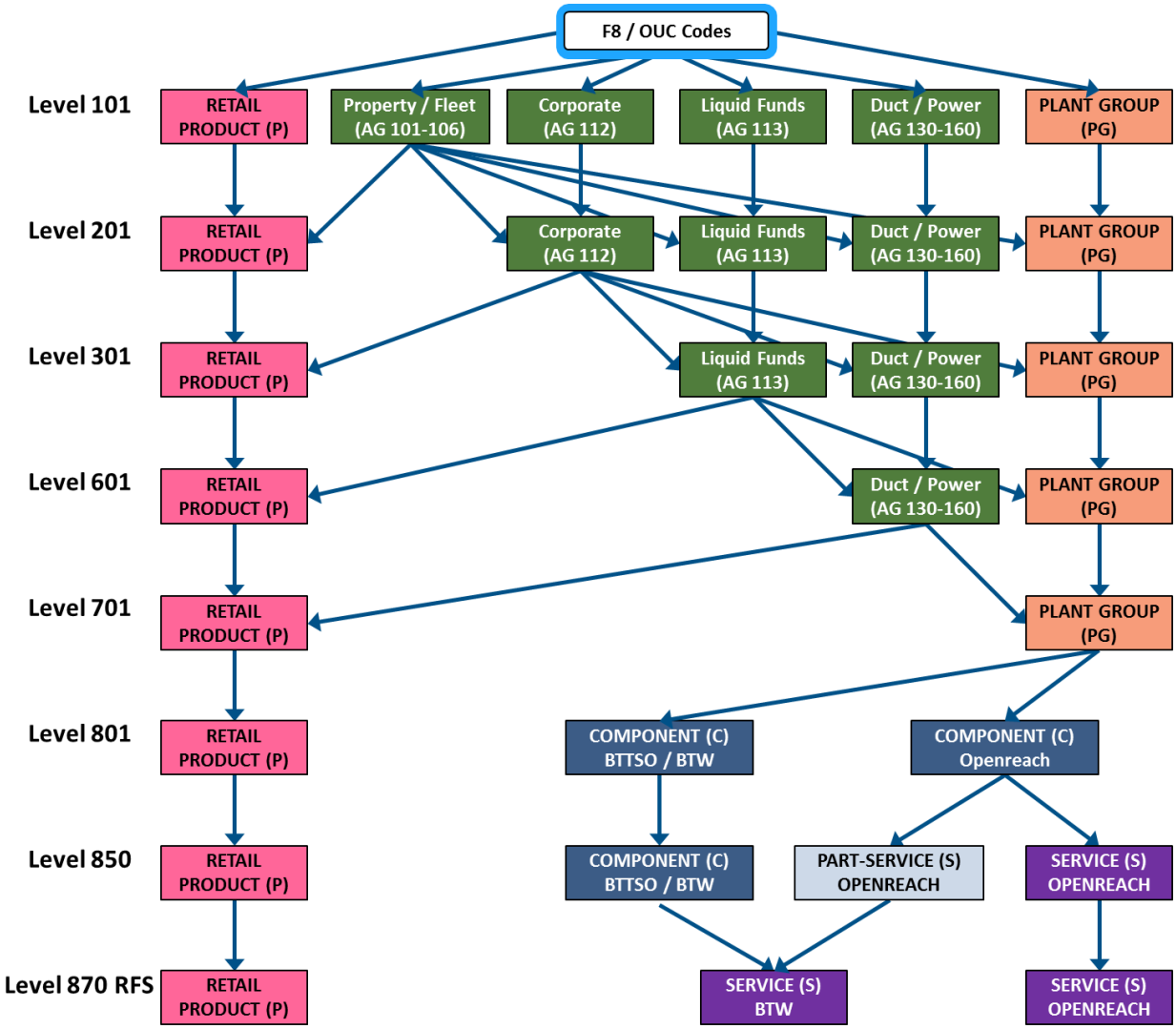
The final stage of cost attribution involves using volume information and usage/routing factor information to determine cost attribution to the standard services. Where regulated price exists, BT uses price times volume ($P \times V$) calculation; where 'P' is the list price and 'V' is the volume factor, to calculate transfer charge between businesses and for Standard Services. Standard Services are defined by BT as *segments of the network that represent a bundle of Network Components.* These services provide access to BT and other communications providers on equivalent terms.

At this stage all relevant network and non-network costs have been attributed to wholesale services (Openreach and BT Wholesale). These services are then grouped to represent different markets for regulatory purposes.

Sequence of Cost Category Exhaustion

Within ASPIRE, the order in which AGs are exhausted to PGs is important as some attributions are made on the basis of previously attributed costs. (As an example, some costs are attributed on the basis of pay costs.) The following figure shows the cost attribution process in greater detail and introduces the concept of "levels" which are the sequential stages of the attribution process.

Figure 6. ***Levels in BT's Cost Attribution Process***



Source: BT

3 Cost Category Selection Methodology

This section sets out how Cartesian selected the cost categories and attribution methodologies for analysis.

BT's cost attribution system is complex due to the scale of BT's business operations and the high number of cost categories and attribution methodologies. An exhaustive analysis was not feasible within the timeframe of the project. Therefore, a selection methodology was devised to narrow down the scope of analysis whilst still achieving good coverage across material and important cost items.

Cartesian explored a number of different selection approaches. After assessing the pros and cons of each, Cartesian and Ofcom agreed on the following:

1. Apply a cost criterion to select cost categories at level 7 (plant group) level that represent 90% of the overall CCA cost in BT's RFS
2. Add any PG not included in the top-90% list that relates to priority areas defined by Ofcom (see table below)
3. Exclude onward allocations from any PG that is 100% allocated to the Wholesale Residual Market (i.e. does not drive costs of regulated services).

This selection of PGs determines the subset of Network Components, Activity Groups (AGs) and consequently F8/OUC cost categories for assessment.

The selection methodology provides a good balance between cost coverage across all regulated markets and the number of cost categories to be analysed. Moreover, it covers all 17 regulated markets. Further detail on the selection methodology is provided below.

Step 1 – PG-driven Cost Category Selection

The first step selects cost categories at PG level representing 90% of the overall markets CCA costs. The resulting subset determines not only the PGs but also the Network Components and Activity Groups for detailed analysis, in particular their cost attribution methodologies.

The initial filter process resulted in cost coverage of between 56% and 100% by market. Three markets had less than 70% cost coverage. For these markets Cartesian supplemented the list with additional PG/Network Component cost categories to improve the coverage. For example, for market 'SW031-Wholesale ISDN2 Lines' adding one *Component - Plant Group* relationship to our analysis improved coverage for this market from 66% to 89%.

Following this process, 85 PGs were selected for analysis.

Step 2 – Additional Set of PGs to Cover Specified Priority Cost Items

Ofcom required certain priority cost groups to be included in the scope of the analysis. Coverage of these cost groups required the inclusion of additional PGs beyond the list generated in Step 1. The priority cost groups are:

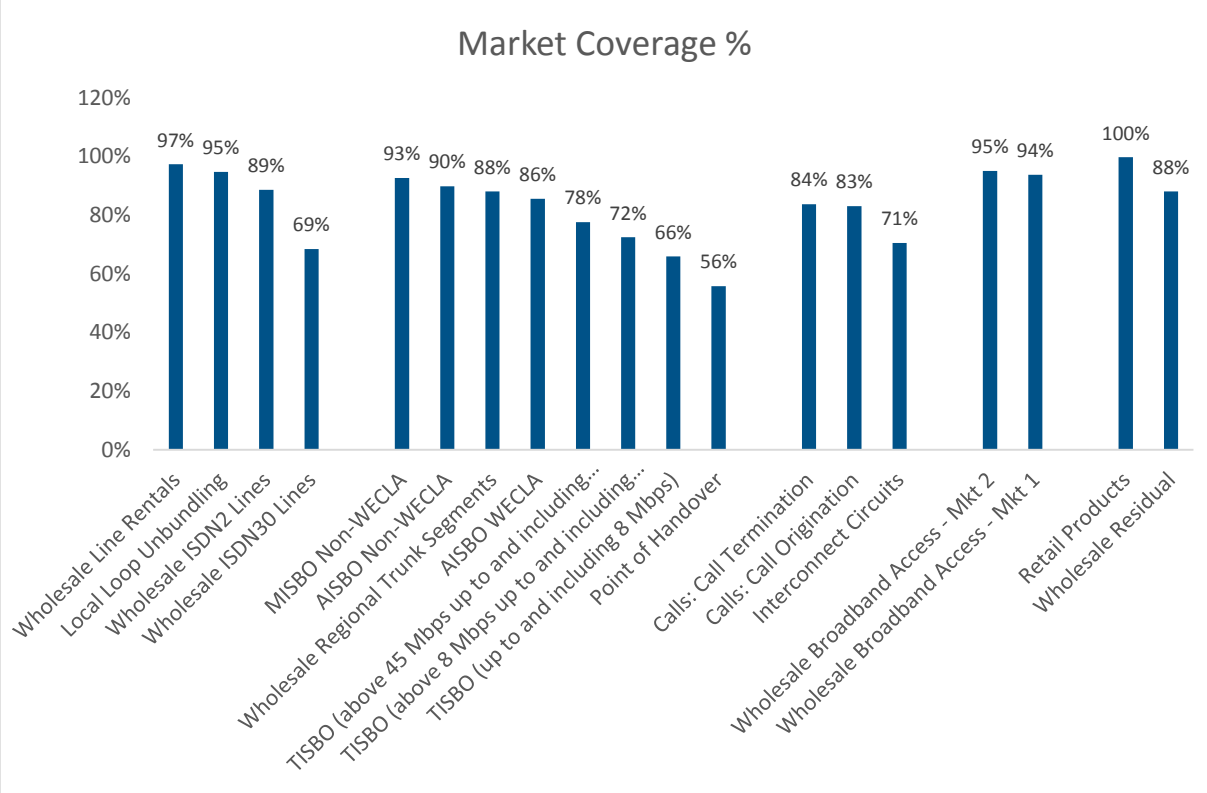
- General Overheads
- Duct
- Fibre

- Copper
- Property
- 21CN Components
- Next Generation Access

Within this report, cost categories which do not fit into any of the priority cost groups are grouped under an additional cost group, named 'Other'.

To improve coverage across the priority cost groups, an additional 31 PGs were added to the list of 85 PGs from Step 1. This resulted in a total of 116 PGs for analysis. The additional set of PGs increased the overall market-level cost coverage by 2.8%.

Figure 7. ***Cost Coverage % by Market***



Source: Cartesian

Figure 7 illustrates the share of costs covered by market at the end of Step 2.

Step 3 – Streamline of PGs to Components to Markets

The next step in the process involved pruning the selected cost categories to remove those which are not relevant to the costs of regulated services.

Of the selected PGs, 40% are fully allocated to a single Market and in turn, 34% are fully allocated to Wholesale Residual. As these costs are not attributed to the regulated markets, the onward (downstream) attribution from these PGs is not relevant to the analysis.[7]

Activity Groups to F8/OUC Cost Categories Selection

The list of selected PGs generated in Step 1 and 2 was used to derive an initial list of AGs for analysis. These PGs act as a first driver to set the priority of analysis at AG level and consequently at F8/OUC level (also referred to as Level 0).

However, the number of cost attribution methodologies at F8/OUC level (i.e. attribution of F8 costs into AGs and PGs) is still massive. As a result, a top-down approach was taken to select those methodologies at F8/OUC level related to the most significant cost items (e.g. duct, copper, fibre…) and with the highest costs.

7 Note: These PGs are still important from an upstream perspective, i.e. to determine which AGs to select and, moreover, to understand the cost attribution to the PGs. The key question at that stage is whether the correct share of cost is attributed to these PGs versus others that feed into regulated market costs.

4 Summary of Costs by Market

This section of the document provides a breakdown of costs for each market by 'cost group'. Cost groups have been defined by Cartesian to simplify the understanding of the composition of each market. The costs groups were created by grouping the 116 AGs and PGs at level 1 into simple to understand cost types (e.g. the duct-related cost categories AG135, AG148 and AG149 are grouped together in the cost group 'Duct'). The mapping of these cost categories to cost groups is defined in Appendix A.

Tables in this section show CCA costs, MCE and FAC by market. Throughout the study, Cartesian has applied a standard WACC of 10% to estimate FAC. As explained in Section 1.5, this is a simplified proxy for the FAC calculated by BT in the RFS. Consequently the FAC figures in this report will not match those of the RFS.

Furthermore, as explained in Section 3, above, the cost groups used in this report are specific to this study. They are not intended to be equivalent to terms within the RFS and hence financial data within this report at a cost-group-level may not directly correspond with categories in the RFS.

Note: Figures in the tables may not sum to 100% due to rounding and exclusion of non-material costs. All costs in the text are FAC unless otherwise specified.

4.1 Introduction

Table 2 below shows the composition of all markets (including Wholesale Residual) by cost group. Retail Residual has been excluded from the table below to focus the analysis on the Network.

The table shows that almost all of the copper costs are being attributed to the Fixed Access Market and 100% of NGA is attributed to Wholesale Residual market. Furthermore, Duct and Property also attribute their largest share of costs to Fixed Access Markets. In contrast, the Business Connectivity Market receives the largest share of Fibre costs.

Table 2. ***Distribution of costs within Cost Groups to Markets***

Cost Group	Fixed Access Market	Wholesale Residual	Business Connectivity Market	Wholesale Broadband Access Market	Narrowband Market	Total FAC (%) of Cost Group
Copper	95%	5%	0%	0%	0%	**100%**
General Overheads	38%	41%	14%	5%	2%	**100%**
Duct	71%	5%	19%	3%	2%	**100%**
Property	37%	25%	13%	11%	14%	**100%**
21CN	1%	70%	8%	18%	3%	**100%**
Fibre	7%	20%	71%	1%	1%	**100%**
NGA	0%	100%	0%	0%	0%	**100%**
Other	25%	56%	11%	5%	4%	**100%**
Out of Scope	22%	42%	25%	4%	7%	**100%**

Source: BT ASPIRE, Cartesian

Table 3 below shows the share of fully allocated costs for each cost group across Market Reviews and Wholesale Residual. The Retail Residual Market has been excluded from this analysis (i.e. the

denominator for the calculations in Table 3 below is based on total FAC excluding Retail Products). The table shows that costs within the 'Other' cost group make up approximately 30% of the total FAC across the regulated and Wholesale Residual Market. Copper and General Overheads make up the second two largest cost groups.

The table also shows that the majority of costs sit within the Fixed Access Market. The 'Out of Scope' costs are those that were filtered out by the cost category selection method described in Section 3 of this report.

Table 3. ***Share of Fully Allocated Costs by Market Review and Cost Group***

Cost Group	Fixed Access Market	Wholesale Residual	Business Connectivity Market	Wholesale Broadband Access Market	Narrowband Market	Cost Group FAC (%)
Copper	18%	1%	0%	0%	0%	**19%**
General Overheads	4%	5%	2%	1%	0%	**12%**
Duct	8%	1%	2%	0%	0%	**12%**
Property	3%	2%	1%	1%	1%	**9%**
21CN	0%	3%	0%	1%	0%	**4%**
Fibre	0%	1%	2%	0%	0%	**3%**
NGA	0%	2%	0%	0%	0%	**2%**
Other	7%	17%	3%	1%	1%	**30%**
Out of Scope	2%	4%	2%	0%	1%	**9%**
EOI-Costs	0%	0%	0%	2%	0%	**2%**
EOI-Revenue	0%	-2%	0%	0%	0%	**-2%**
Grand Total	**44%**	**33%**	**13%**	**7%**	**4%**	**100%**

Source: BT ASPIRE, Cartesian

4.2 Fixed Access Market

4.2.1 Description

The Fixed Access Market comprises of four main markets: Wholesale Line Rental (WLR), Local Loop Unbundling (LLU), Wholesale ISDN30 Lines and Wholesale ISDN2 Lines. The total FAC attributed to this market in FY 2013/14 was approximately £3.2bn, of which the majority of costs were attributed from the Copper and Duct cost groups.

4.2.2 Cost Stack

In the Fixed Access Market, 60% (£1.9bn) of the total (FAC) costs are attributed to WLR. More than half of the costs within this market are attributed from Copper (£879m, FAC) and Duct (£410m, FAC). As seen in Table 2 above, the Fixed Access Market receives the greatest share of Copper costs.

Table 4. ***Share of Fully Allocated Costs by Market and Cost Group within Fixed Access Market***

Cost Group	Wholesale Line Rentals	Local Loop Unbundling	Wholesale ISDN30 Lines	Wholesale ISDN2 Lines	Cost Group FAC (%)
Copper	27%	13%	0%	1%	**42%**
Duct	13%	5%	0%	0%	**19%**
General Overheads	6%	4%	0%	0%	**10%**
Property	4%	3%	0%	0%	**8%**
Fibre	0%	0%	0%	0%	**0%**
21CN	0%	0%	0%	0%	**0%**
Other	8%	8%	0%	0%	**17%**
Out of Scope	2%	2%	1%	0%	**5%**
Grand Total	**60%**	**35%**	**3%**	**2%**	**100%**

Source: BT ASPIRE, Cartesian

4.3 Business Connectivity Market

4.3.1 Description

The Business Connectivity Market (BCM) is composed of eight main markets, including AISBO, TISBO, Wholesale Trunks and Point of Handover. The total FAC attributed to this market in FY 2013/14 was approximately £952m. Excluding the 'Other' and 'Out of Scope' cost categories, Duct and Fibre attribute most costs to Business Connectivity Markets. The 'Other' cost category attributes almost a quarter of the total costs.

4.3.2 Cost Stack

In the BCM, more than half (55%, £519m) of the total (FAC) costs are attributed to the AISBO non-WECLA market. In addition, AISBO non-WECLA and TISBO (up to and including 8Mbps) account for 85% of the total FAC of BCM. Almost half of the costs within AISBO non-WECLA are attributed from Duct (£103m, FAC) and Fibre (£102m, FAC). Point of Handover receives the least amount of costs within BCM as shown in Table 5below.

Table 5. ***Share of Fully Allocated Costs by Market and Cost Group within Business Connectivity Markets***

Cost Group	AISBO Non-WECLA	TISBO (up to and including 8 Mbps)	MISBO Non-WECLA	AISBO WECLA	TISBO (above 45 Mbps up to and including 155 Mbps)	TISBO (above 8 Mbps up to and including 45 Mbps)	Wholesale Regional Trunk Segments	Point of Handover	Cost Group FAC (%)
Duct	11%	4%	0%	0%	0%	0%	1%	0%	**17%**
Fibre	11%	2%	0%	1%	0%	0%	0%	0%	**14%**
General Overheads	7%	4%	1%	1%	0%	0%	0%	0%	**13%**
Property	2%	6%	0%	0%	0%	0%	0%	0%	**9%**
21CN	2%	0%	0%	0%	0%	0%	0%	0%	**3%**
Copper	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
Other	17%	4%	3%	2%	0%	0%	0%	0%	**26%**
Out of Scope	6%	10%	0%	1%	0%	1%	0%	0%	**18%**
Grand Total	**55%**	**30%**	**5%**	**4%**	**2%**	**2%**	**2%**	**1%**	**100%**

Source: BT ASPIRE, Cartesian

4.4 Narrowband Market

4.4.1 Description

The Narrowband Market is composed of three main markets: Call Origination, Call Termination and Interconnect circuits. The total FAC attributed to this market in FY 2013/14 was approximately £273m, of which approximately half is Call Origination. The largest contributor of costs to this market is the Property cost group.

4.4.2 Cost Stack

In the Narrowband Market, almost half (48%, £131m) of the total FAC is attributed to Call Origination market and one-third of these costs are from the Property cost group. Table 6, below, also shows that across Call Origination and Call Termination, the cost are fairly evenly distributed.

Table 6. ***Share of Fully Allocated Costs by Market and Cost Group within Narrowband Markets***

Cost Group	Calls: Call Origination	Calls: Call Termination	Interconnect Circuits	Cost Group FAC (%)
Property	17%	15%	3%	**35%**
General Overheads	3%	3%	1%	**7%**
Duct	3%	2%	1%	**6%**
21CN	2%	2%	0%	**4%**
Fibre	0%	0%	0%	**0%**
Other	15%	12%	3%	**30%**
Out of Scope	8%	7%	3%	**18%**
Grand Total	**48%**	**41%**	**11%**	**100%**

Source: BT ASPIRE, Cartesian

4.5 Wholesale Broadband Access Market

4.5.1 Description

The Wholesale Broadband Access Market is composed of WBA Market 1 and WBA Market 2. The total FAC attributed to this market in FY 2013/14 was approximately £490m. The largest portion of costs within this market is from Property. Copper and NGA don't attribute any cost to this market.

As explained by BT in the 2014 CCFS[8], WBA Market 1 covers BT Exchange areas where only BT provides Wholesale Broadband Access, whereas Market 2 covers areas where two or three operators are present but BT's share is greater than or equal to 50% of the customers in the exchange area.

4.5.2 Cost Stack

Within the Wholesale Broadband Access Market, WBA Market 1 accounts for almost three-quarters of the total costs as shown in Table 7. This equates to approximately £360m (FAC).

Table 7. ***Share of Fully Allocated Costs by Market and Cost Group within Wholesale Broadband Access Market***

Cost Group	Wholesale Broadband Access - Mkt 1	Wholesale Broadband Access - Mkt 2	Cost Group FAC (%)
Property	12%	3%	15%
21CN	8%	4%	12%
General Overheads	6%	3%	9%
Duct	4%	1%	4%
Fibre	0%	0%	1%
EOI-Costs	20%	11%	31%
Other	18%	4%	22%
Out of Scope	5%	1%	6%
Grand Total	73%	27%	100%

Source: BT ASPIRE, Cartesian

8 http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2014/Current_Cost_Financial_Statement_2014.pdf

4.6 Wholesale Residual Market

4.6.1 Description

The Wholesale Residual Market comprises all the services and markets in Openreach and Wholesale which are not regulated. This market accounts for approximately £2.3bn fully allocated costs. Excluding the 'Other' category, the largest contributor to this market is General Overheads, which attributes approximately £355m FAC. Table 8, below, shows the share of costs by cost group within this market (including EOI revenue). The balancing EOI costs sit within the WBA market (as shown in Table 3, above).

Table 8. ***Share of Fully Allocated Costs by Market and Cost Group within Wholesale Residual Market***

Cost Group	Wholesale Residual
General Overheads	15%
21CN	9%
Property	7%
NGA	5%
Copper	3%
Duct	2%
Fibre	2%
Other	51%
Out of Scope	12%
EOI Revenue	-6%
Grand Total	**100%**

Source: BT ASPIRE, Cartesian

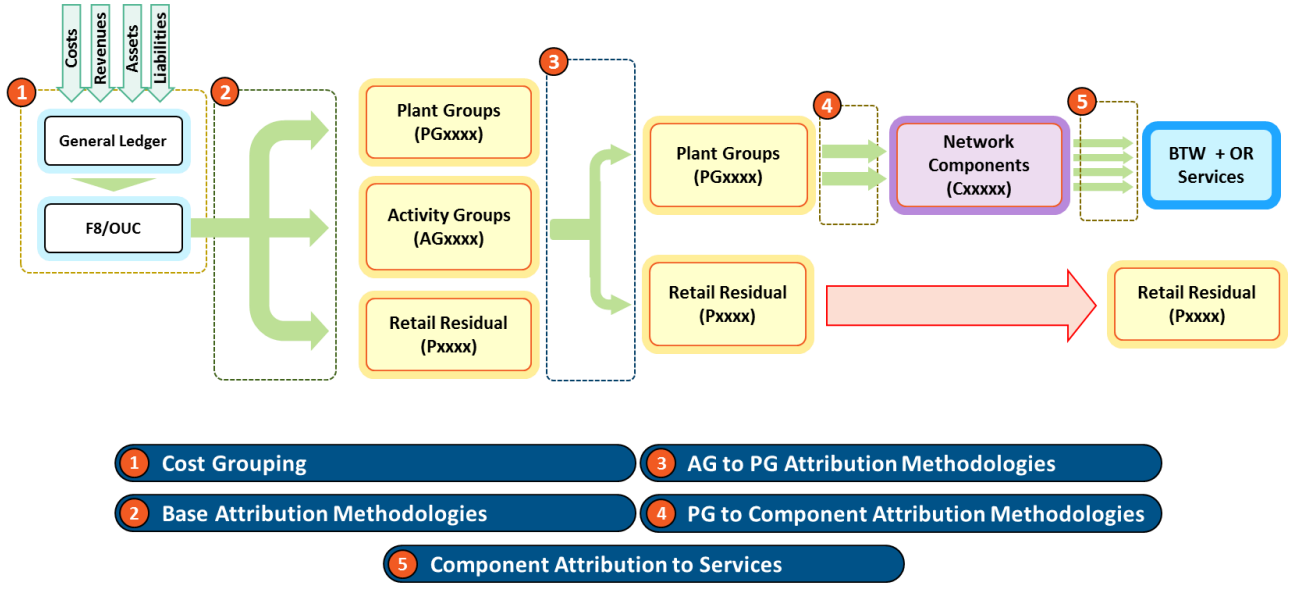
5 Attribution of Costs to Markets

5.1 Introduction

5.1.1 Structure of this Section of the Report

The analysis in this section is structured to provide the reader with an end-to-end view and understanding of how BT attributes costs to markets. To fully understand the scope of this section, we revisit an earlier figure (as shown below).

Figure 8. ***BT's Cost Attribution Process***



Source: Cartesian, BT

This section of the report discusses stages, 2, 3 and 4 as defined in the figure above.

The report examines the principal sources of cost for each of the defined cost groups, and the onward attribution of these costs to the regulated and residual markets. The methods used to attribute costs into the cost groups and from cost groups to components are then reviewed. Where multiple cost categories within a cost group share common attribution methods, these are considered collectively.

The section first considers the attribution of costs from the general ledger via AGs and PGs to network components. This is organised by cost group, as defined in Section 3.

Each of the cost categories is described under the same section headings, stepping through the attribution from general ledger to network components as follows:

1. Introduction
2. Composition by Cost Type and Organisational Unit
3. Cost Attribution to <cost category> from General Ledger
4. Cost Attribution to <cost category> from other Cost Categories

5. Cost Attribution from <cost category> to other Cost Categories
6. Contribution to costs at Network Component level

Following the discussion by cost group, the section then examines the attribution of cost from network component to Services and Markets. This is illustrated as 'Stage 5' in the figure above.

5.2 Cost Overview

The relative value of each cost group is shown in the table below. Note that the table shows Cartesian's estimated FAC, consistent with the rest of the report. Table in this section show costs by market in terms of CCA (Opex), MCE and FAC (excluding Retail Products).

Important notes regarding the data in the tables:

- As explained in Section 1.5, Cartesian has applied a standard WACC of 10%[9] to estimate FAC. Consequently the FAC figures in this report will not match those of the RFS.
- As explained in Section 4, above, the cost groups used in this report are specific to this study. They are not intended to be equivalent to terms within the RFS and hence financial data within this report at a cost-group-level may not directly correspond with categories in the RFS.
- Figures in the tables may not sum to 100% due to rounding and exclusion of non-material costs. All costs in the text are FAC unless otherwise specified.

Table 9. ***Share of CCA, MCE and FAC by Cost Group across all markets (excluding Retail Products)***

Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	CCA (%)	MCE (%)	FAC (%)
Copper	£977	£4,390	£1,416	18%	28%	20%
General Overheads	£1,073	£200	£1,093	19%	1%	15%
Duct	£316	£5,337	£849	6%	34%	12%
Property	£810	-£70	£803	15%	0%	11%
21CN	£246	£682	£314	4%	4%	4%
Fibre	£76	£1,132	£189	1%	7%	3%
NGA	£102	£293	£131	2%	2%	2%
Other	£1,399	£1,853	£1,584	25%	12%	22%
Out of Scope	£552	£1,528	£705	10%	10%	10%
EOI-Costs	£153	£0	£153	3%	0%	2%
EOI Revenue	-£153	£0	-£153	-3%	0%	-2%
EOI-Debtors	£0	£8	£1	0%	0%	0%
EOI-Creditors	£0	-£8	-£1	0%	0%	0%
Revenue Debt	£0	£270	£27	0%	2%	0%
Grand Total	**£5,550**	**£15,621**	**£7,112**	**100%**	**100%**	**100%**

Source: BT ASPIRE, Cartesian

[9] http://stakeholders.ofcom.org.uk/binaries/telecoms/ga/fixed-access-market-reviews-2014/statement-june-2014/annexes.pdf

Table 9 shows that Copper is the largest of the priority cost groups by FAC. This is driven by relatively large shares of CCA costs and MCE values within the Copper group.

The Duct cost group is the largest by MCE value, accounting for over one-third of total MCE.

General Overheads and Property both have significant shares of CCA costs, together these account for one-quarter of total CCA costs.

The Other cost groups contains 52 cost categories that were of secondary importance in the study. Collectively, these comprise 22% of FAC as a result of the large quantity of cost categories in this group.

As explained in Section 3, a number of cost categories were excluded from the scope of the study. These Out of Scope cost categories account for 10% of FAC. This indicates that the study assessed the attribution of 90% of costs by FAC.

Equivalence of Inputs (EOI) costs and revenues denote internal trades for regulated services supplied by Openreach to other divisions within BT.

5.3 General Overheads

5.3.1 Summary

The General Overheads cost group includes management costs incurred in overseeing the operations of the BT Group. Costs within General Overheads include central corporate costs, the cost of support functions with BT's TSO division, central costs apportioned on the basis of pay costs, and selling general and administrations (SG&A) costs. This cost group accounted for approximately £1.1bn FAC in FY 2013/14.

Of the total General Overhead costs, around £1bn is directly attributed from the General Ledger to activity groups and plant groups and the remaining £100m is attributed using base methodologies. It is important to note that the £1.1bn includes transfer charges, which in some instances form the largest portion of costs attributed by a base methodology. These transfer charges usually balance with each other, but that is not always the case (as seen in Corporate Costs section below).

Note: After this report was written, BT clarified that plant groups categorised as 'SG&A' are selling costs relating to BT Wholesale that include costs such as Call Centres and Product Management. BT also clarified that that similar cost categories exist for Openreach however the nomenclature used for those plant groups is different. Readers should be aware that the General Overheads cost group in this report includes these SG&A costs (CCA: £176m, MCE: £29m and FAC: £179m).

From General Overheads, the majority of costs are attributed to plant groups and network components using a combination of 'pay' and 'Pay and RoA' based attribution methodologies.

Analysis of the data reveals that most of the costs from General Overhead are attributed to Copper, Duct and Fibre cost categories.

The key findings within this section are:

1. Approximately half the costs in the General Overheads cost group are attributed to regulated markets
2. Over half of these costs are attributed using the Pay and Return on Asset methodology. This methodology is discussed in detail in section 6.5.6 of this report
3. Approximately ✂ of transfer-in charges are attributed to AG112. Since there is no corresponding transfer-out charge in this costs category, this transfer charge turns into a cost which may cause misattribution of cost

5.3.2 Contribution to Market Costs

Table 10 below shows how the costs in the General Overheads cost group are distributed across regulated and unregulated markets. Approximately half of these costs (53%) are attributed to the unregulated markets. Of the remainder, the majority (30%) is attributed to Fixed Access Markets, specifically WLR and LLU.

As would be expected for an overheads category, this cost group is dominated by operational costs.

Table 10. ***General Overhead costs by Markets (2014, £m)***

Market Review	Market	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC %
Fixed Access Markets	Wholesale Line Rentals	£182	£42	£186	17%
	Local Loop Unbundling	£118	£23	£121	11%
	Wholesale ISDN30 Lines	£10	£2	£10	1%
	Wholesale ISDN2 Lines	£7	£1	£7	1%
Fixed Access Markets Total		**£317**	**£68**	**£324**	**30%**
Business Connectivity Markets	AISBO Non-WECLA	£64	£12	£65	6%
	TISBO (up to and including 8 Mbps)	£39	-£0	£39	4%
	MISBO Non-WECLA	£5	£1	£5	0%
	AISBO WECLA	£5	£1	£5	0%
	TISBO (above 45 Mbps up to and including 155 Mbps)	£3	-£0	£3	0%
	TISBO (above 8 Mbps up to and including 45 Mbps)	£2	-£0	£2	0%
	Wholesale Regional Trunk Segments	£2	-£0	£2	0%
	Point of Handover	£1	£0	£1	0%
Business Connectivity Markets Total		**£121**	**£14**	**£122**	**10%**
Wholesale Broadband Access Markets	Wholesale Broadband Access - Market 1	£31	£6	£32	3%
	Wholesale Broadband Access - Market 2	£13	£3	£13	1%
Wholesale Broadband Access Markets Total		**£44**	**£9**	**£45**	**4%**
Narrowband Markets	Calls: Call Origination	£9	£1	£9	1%
	Calls: Call Termination	£7	£1	£7	1%
	Interconnect Circuits	£3	£0	£3	0%
Narrow Band Markets Total		**£19**	**£2**	**£19**	**2%**
Wholesale Residual	Wholesale Residual	£349	£58	£355	32%
Retail Products	Retail Products	£223	£51	£228	21%
Unregulated Markets Total		**£572**	**£109**	**£583**	**53%**
GRAND TOTAL		**£1,073**	**£200**	**£1,093**	**100%**

Source: BT ASPIRE, Cartesian

As can be seen in Table 11, General Overhead costs account for between 9% and 14% of total costs across each market. Exceptions include Retail Products for which General Overheads is only 2% of total costs. The share of General Overhead costs for Call Origination and Termination also appears low in comparison to other markets.

Table 11. ***General Overheads as a proportion of Market Costs (2014, %)***

Market Review	Market	General Overheads as a proportion of Market Costs
Fixed Access Markets	Wholesale ISDN30 Lines	11%
	Local Loop Unbundling	11%
	Wholesale Line Rentals	10%
	Wholesale ISDN2 Lines	9%
Business Connectivity Markets	TISBO (above 45 Mbps up to and including 155 Mbps)	14%
	TISBO (up to and including 8 Mbps)	14%
	TISBO (above 8 Mbps up to and including 45 Mbps)	13%
	Wholesale Regional Trunk Segments	13%
	AISBO Non-WECLA	12%
	Point of Handover	12%
	AISBO WECLA	12%
	MISBO Non-WECLA	11%
Wholesale Broadband Access Markets	Wholesale Broadband Access - Market 2	10%
	Wholesale Broadband Access - Market 1	9%
Narrowband Markets	Interconnect Circuits	11%
	Calls: Call Origination	7%
	Calls: Call Termination	6%
Wholesale Residual	Wholesale Residual	15%
Retail Products	Retail Products	2%

Source: BT ASPIRE, Cartesian

5.3.3 Composition by Cost Category

General Overheads is comprised of nine cost categories (AGs and PGs). The attribution of costs into and out from these categories are discussed in the following sections of the report.

Table 12 below shows the respective values of the individual cost categories and the section of the report in which they are discussed. As can be seen Corporate Costs, TSO Support Functions and Openreach Pay Driver are the most significant members of this group.

Note: As noted in Section 5.3.1, the General Overheads cost group in this report includes selling costs which are captured in the SG&A sub-group (CCA: £176m, MCE: £29m and FAC: £179m).

Table 12. ***Cost Components in the General Overheads group, values at Level 1***

Section	Cost Category		BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
5.3.4	**Corporate Costs**		AG112	[£600 to £700]	[£200 to £250]	[£600 to £700]
5.3.5	**TSO Support Functions**		AG103	[£100 to £150]	[-£50 to -£10]	[£100 to £150]
5.3.6	**Pay Drivers**	Openreach Pay Driver	AG401	[£100 to £150]	[-£50 to -£10]	[£100 to £150]
		Wholesale Pay Driver	AG406	[£10 to £50]	[£0 to £10]	[£10 to £50]
5.3.7	**SG&A**	SG&A Wholesale Residual	PG583N	[£50 to £100]	[-£50 to -£10]	[£50 to £100]
		SG&A Broadband	PG609N	[£10 to £50]	[£10 to £50]	[£50 to £100]
		SG&A Downstream Residual	PG585A	[£10 to £50]	[£50 to £100]	[£10 to £50]
		SG&A PPC (Wholesale)	PG506N	[£10 to £50]	[-£10 to £0]	[£10 to £50]
		SG&A Wholesale Other	PG584N	[£10 to £50]	[-£10 to £0]	[£10 to £50]
Total				**£ 1,074**	**£ 200**	**£ 1,093**

Source: BT ASPIRE, Cartesian

5.3.4 Corporate Costs (AG112)

5.3.4.1 Summary

This sub-group includes costs of senior management and support functions that are responsible for the on-going management and operations of BT. The majority of these costs relate to Group Corporate Headquarters.

The key findings within this section are:

- Over 40% of corporate costs are attributed to the Duct, Copper and Fibre cost categories
- Costs are attributed from AG112 using the 'Factorised Pay and Return on Asset' attribution methodology. BT's rationale for using a combination of pay and asset values as the driver is that corporate costs are incurred in the course of "managing the assets of the company to create a return".[10]

[10] DAM 2014

- Pay factorisation allows BT to weight the attribution on number of FTE instead of amount of pay in a division.

5.3.4.2 *Composition by Cost Type and Organisational Unit*

Table 13 below shows the costs in this category, split by cost type and BT division.

The vast majority (over ✂) of costs are attributed from two divisions: BT Group HQ and BT TSO. Pay costs from BT Group HQ and TSO contribute ✂ and ✂ of the total FAC, respectively. The largest single contributor is BT Group HQ 'Transfer Charges In' (✂). The two largest items within this transfer charge (making up ✂) relate to Insurance (✂ FAC) and Employee Broadband Offers (✂ FAC). It is not entirely clear why there is not an equivalent offsetting transfer-out charge within AG112. The ✂ Pay cost is a provision for Corporate and Divisional General Management.

Analysis of the data provided by BT shows that a vast majority of non-pay charges for Group Headquarters is composed of charges for outsourced HR services, the regulatory finance function and Ofcom administrative fees.

The ✂ (MCE value) TSO GBV in AG112 includes costs of general computers. The majority of this asset value is offset by the ✂ (accumulated) depreciation shown in Table 13 below.

Table 13. ***Costs apportioned to AG112 at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

Over 40 different teams attribute costs to AG112. Table 14 shows the top 10 teams from BT Group and BT TSO that contribute these costs. As the table shows, the Corporate Headquarters function accounts for over half (58%) of the total cost. Cartesian is unable to comment on the composition of the ✂ [£350m to £400m] CCA cost attributed by Corporate Headquarters as the information available to Cartesian did not provide further break down.

Table 14. ***Organisational Units contributing costs to AG112 at Level 1 (Top 10)***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
C	C	Corporate Headquarters	[£350 to £400]	[£50 to £100]	[£350 to £400]
	CFR	Group Regulatory Finance	[£10 to £50]	£0	[£10 to £50]
T	TT	BT TSO RESEARCH & INNOVATION	[£50 to £100]	[£150 to £200]	[£50 to £100]
	TA	BT TSO ARCHITECTURE & GLOBAL IT PLATFORMS	[£50 to £100]	[£10 to £50]	[£50 to £100]
	TM	BT TSO Chief Information Office for Group	[£50 to £100]	[£0 to £10]	[£50 to £100]
	TU	BT TSO RESEARCH & INNOVATION	[£10 to £50]	£0	[£10 to £50]
	TR	BT TSO Chief Information Office for Retail	[£0 to £10]	£0	[£0 to £10]
	TG	BT TSO Chief Information Office for Global Services	[£0 to £10]	£0	[£0 to £10]
	TC	BT TSO Group Customer Experience	[£0 to £10]	£0	[£0 to £10]
	TN	BT TSO Global Network Services Management and Support	[£0 to £10]	[-£10 to £0]	[£0 to £10]
Total			**£605**	**£243**	**£629**

Source: BT ASPIRE, Cartesian

5.3.4.3 *Cost Attribution to AG112 from General Ledger*

BT uses several base methodologies to attribute costs from the General Ledger to AG112, however these are all based on two underlying methods:

- Direct allocation
- Apportionment based on records in the TSO billing system

Table 15. ***Notable Methods for Cost Attribution to AG112 from General Ledger***

Underlying Method	Relevant BT Methodologies	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct Allocation	EXCEPT (C, E, YV, others)	£449	£283	£477	76%	6.2.1
	AG112 (Direct Allocation from F8/OUC)					
	SOFTDEP (C)					
	DTNHQ (C, F)					
	SOFTCAP (C)					
TSO Billing System	EXCEPT (TT, TA, TU, TR, TG, TC, TN)	£156	-£40	£152	24%	6.2.12
Total		**£605**	**£243**	**£629**	**100%**	

Source: BT ASPIRE, Cartesian

Direct allocation is used where BT is able to uniquely associate a cost item in the General Ledger with an activity group or a plant group. These relationships are manually configured in ASPIRE. An example includes Corporate Headquarters costs within AG112.

The TSO billing system methodology is used to apportion costs that TSO incurs in supporting other BT units. It uses project code, cost type and OUC to determine the weights and destination of cost attribution. For example, the EXCEPT-TA base uses the billing system data to apportion shared costs from TSO Architecture & Global IT platforms (OUC TA) which relate to development of BT's IT platforms, networks and infrastructure. Using this method, a portion of these costs is attributed to Corporate Costs (AG112).

Further detail on the TSO billing methodology by can be found in Section 6.2.12.

5.3.4.4 Cost Attribution to AG112 from other Cost Categories

Following the attribution of costs from the General Ledger, AG112 receives additional cost attributions from nine other AGs. This occurs in the cost exhaustion process at Level 3, prior to costs being apportioned from AG112 to different plant groups. The methodologies used to attribute costs from these AGs are explained in their respective report sections.

The following table shows the impact of these subsequent attributions.

Table 16 below shows AG102 (TSO Operational Costs) adds approximately ✂ [£10m to £50m] FAC and Group Property adds approximately ✂ [£10m to £50m] FAC to Corporate Costs.

Table 16. ***Impact of costs attributed to AG112 in cost exhaustion process, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Document Section Ref
Level 1	**Corporate Costs**	**AG112**	**£605**	**£243**	**£629**	**-**
Exhaustion Level	TSO Operational Costs	AG102	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]	5.10.11
	Group Property and Facilities Management	AG106	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]	5.6.4
	TSO Support Functions	AG103	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]	5.3.5
	Property Asset Driver	AG412	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	5.6.5
	Motor Transport	AG101	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.4
	TSO Stores driver	AG404	✂[£0 to £10]	£0	✂[£0 to £10]	-
	TSO Pay driver	AG402	£0	£0	£0	-
	Fleet Fuel Driver	AG415	£0	£0	£0	-
	Property Prov Driver	AG414	£0	✂[-£10 to £0]	✂[-£10 to £0]	5.6.6
Level 3	**Corporate Costs**	**AG112**	✂[£600 to £700]	✂[£250 to £300]	✂[£600 to £700]	**-**

Source: BT ASPIRE, Cartesian

At a business unit level, the attributions at this stage are summarised in Table 17 below. The table shows that TSO attributes over three-quarters of the total costs attributed during the cost exhaustion phase.

Table 17. ***Costs Apportioned to AG112 between Level 1 and 3, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
T	BT Technology, Service & Operation	[£10 to £50]	[£0 to £10]	[£10 to £50]
W	BT Property	[£0 to £10]	[£0 to £10]	[£0 to £10]
Y	Business Services	[£0 to £10]	[£0 to £10]	[£0 to £10]
F	BT Corporate Services	[£0 to £10]	£0	[£0 to £10]
Others		£0	[-£10 to £0]	£0
Total		[£50 to £100]	[£10 to £50]	[£50 to £100]

Source: BT ASPIRE, Cartesian

These attributions result in non-material changes to the mix of corporate costs (AG112), as shown by Table 18 below.

Table 18. ***AG112 Costs at Level 3, shown by OUC***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC %	FAC (£ m)	FAC %
C	BT Group Headquarters	[£350 to £400]	[55% to 65%]	[£350 to £400]	[50% to 60%]
T	BT TSO	[£250 to £300]	[35% to 50%]	[£300 to £350]	[40% to 55%]
E	Corporate Adjustments	[£0 to £10]	[0% to 5%]	[£0 to £10]	[0% to 5%]
W	BT Property	[-£50 to -£10]	[-10% to 0%]	[-£10 to £0]	[-5% to 0%]
Total		**[£600 to £700]**	**100%**	**[£600 to £700]**	**100%**

Source: BT ASPIRE, Cartesian

5.3.4.5 *Cost Attribution from AG112 to other Cost Categories*

The final stage of the cost attribution process for AG112 is to apportion all costs to other activity groups and plant groups. This apportionment is based on a weighted combination of the pay costs and net book value of assets. BT's rationale for using a combination of pay and asset values as the driver (as stated in the DAM) is that corporate costs are incurred in the course of "*managing the assets of the company to create a return*". The Pay figures used to determine this attribution are the Total Pay for each Division.

Factorised pay costs are used in place of actual pay to reflect the number of FTE in different business units. Factorised pay applies the BT average pay costs to the staff in each division. Both capitalised and non-capitalised pay costs are included.

BT does not sum pay and asset values directly; rather, the NBVs are first multiplied by a WACC (RoA percentage) to determine the annual value of return on assets. A single WACC of 10.8% is used throughout. This value is then combined with Pay to determine the attribution base. This method is explained in further detail with an illustrative example in Section 6.3.5.

Using this method, costs from AG112 (at Level 3) are apportioned to 226 AGs and PGs. The most significant recipient categories are shown in Table 19 below. As the table shows, with the exception of Retail Residual, Corporate Costs from AG112 are very thinly spread across a large number of AG and PGs. Over 40% of these costs are attributed to Duct, Copper and Fibre cost categories.

Table 19. ***Apportionment of AG112 costs to AGs and PGs (Top 10)***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Document Section Ref
Retail Residual	-	[£150 to £200]	[£50 to £100]	[£150 to £200]	-
Duct used by Access Cables	AG135	[£50 to £100]	[£10 to £50]	[£50 to £100]	5.4.4
D-side Copper Cable	PG118C	[£50 to £100]	[£10 to £50]	[£50 to £100]	5.7.10
Analogue Line Final Drop	PG149A	[£10 to £50]	[£10 to £50]	[£10 to £50]	5.7.13
D-side Copper Cable Maintenance	PG118M	[£10 to £50]	[£0 to £10]	[£10 to £50]	5.7.11
Access Distribution Fibre	PG959C	[£10 to £50]	[£0 to £10]	[£10 to £50]	5.5.4
MDF Hardware Jumpering	PG142A	[£10 to £50]	[£0 to £10]	[£10 to £50]	5.10.12
Specialised Accommodation Equipment - Non Main	AG162	[£10 to £50]	[£0 to £10]	[£10 to £50]	5.10.9
Duct used by Backhaul Cables	AG148	[£10 to £50]	[£0 to £10]	[£10 to £50]	5.4.5
FTTC Service Delivery & Development	PG197A	[£10 to £50]	[£0 to £10]	[£10 to £50]	5.10.15
Other (x 216)	-	[£200 to £250]	[£50 to £100]	[£200 to £250]	-
Total		[£600 to £700]	[£250 to £300]	[£600 to £700]	-

Source: BT ASPIRE, Cartesian

5.3.4.6 *Contribution to costs at Network Component level*

Although AG112 does not exhaust directly into Network Components, it is possible to determine the contribution of AG112 costs at the Network Component level. Following the onward attributions in BT's cost system reveals that 232 Network Components receive costs from AG112 (including Retail Residual).

Table 20 shows the top 10 Network Components receiving costs from AG112. It can be seen from the table that excluding Retail Residual, the bulk of the costs are weighted towards Copper related network components.

Table 20. ***AG112 costs apportioned to Network Components (Top 10)***

Cost Category	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
Retail Residual	-	[£150 to £200]	[£50 to £100]	[£150 to £200]
D side copper capital	CL173	[£50 to £100]	[£10 to £50]	[£50 to £100]
Dropwire capital & PSTN NTE	CL178	[£50 to £100]	[£10 to £50]	[£50 to £100]
D side copper current	CL174	[£10 to £50]	[£10 to £50]	[£10 to £50]

MDF Hardware jumpering	CL161	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]
E side copper capital	CL171	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]
Ethernet Access Direct Fibre	CW609	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]
FTTC development	CL197	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]
Analogue line drop maintenance	CL180	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]
Ethernet electronics	CO485	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]
Others (x223)	-	✂[£200 to £250]	✂[£50 to £100]	✂[£200 to £250]
Total		✂[£600 to £700]	✂[£250 to £300]	✂[£600 to £700]

Source: BT ASPIRE, Cartesian

5.3.5 TSO Support Functions (AG103)

5.3.5.1 Summary

This activity group (TSO Support Function, AG103) includes costs of support teams in TSO such as Finance, HR and Strategy. The total cost of TSO Support Functions in FY 2013/14 was approximately £120m (FAC). The majority of TSO Support Function Costs (86%) are attributed from the General Ledger to AG103 using TSO Billing System methodology.

The key finding within this section is:

- TSO Support Function costs are attributed to other cost categories using a combination of Pay and Return on Assets calculated using the NBV of assets.[11]

5.3.5.2 Composition by Cost Type and Organisational Unit

Table 21 below shows the costs, split by cost type and BT division, attributed to AG103. Pay costs from the TSO division account for approximately ✂ of the total FAC.

Table 21 below also shows a ✂ transfer-in charge for BT TSO. This charge relates to non-contract rental fleet and IT hardware costs. Since BT TSO is a cost recovery unit, it is not entirely clear why a negative transfer-in charge for fleet services is sitting within TSO. A partial offsetting ✂ transfer-out charge for rental fleet is also attributed to AG103 by Business Services in BT Group. Analysis of the data at a General Ledger level shows that the Non-Pay charges in the table below relate to IT Service Subcontract and Stores costs.

Table 21. ***Costs apportioned to AG103 at Level 1, by Division***

✂

[11] The Pay and Return on Assets attribution methodology is discussed in more detail in 6.3.6 of the report.

Source: BT ASPIRE, Cartesian

At a more detailed level, attributions to TSO Support Function costs are made by over 30 different teams in BT. The following table shows the top 10 teams which contribute the most costs.

Table 22. ***Top 10 Costs Apportioned to AG103 at Level 1, by OUC***

OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
TX	BT TSO Centre	[£50 to £100]	[-£50 to -£10]	[£50 to £100]
TH	BT TSO Human Resources & Communications	[£10 to £50]	£0	[£10 to £50]
TB	BT TSO Service, Strategy and Operations	[£10 to £50]	£0	[£10 to £50]
TF	BT TSO Finance	[£0 to £10]	£0	[£0 to £10]
TG	BT TSO Chief Information Office for Global Services	[£0 to £10]	£0	[£0 to £10]
TS	BT TSO General Infrastructure Services	[£0 to £10]	£0	[£0 to £10]
YL	BT Fleet	[£0 to £10]	£0	[£0 to £10]
TN	BT TSO Global Network Services Management and Support	[£0 to £10]	£0	[£0 to £10]
TT	BT TSO RESEARCH & INNOVATION	£0	[-£50 to -£10]	[-£10 to £0]
T	BT TSO	[-£10 to £0]	£0	[-£10 to £0]
Others	Others (x 24)	[£0 to £10]	[-£10 to £0]	[£0 to £10]
Total		**£125**	**-£47**	**£120**

Source: BT ASPIRE, Cartesian

5.3.5.3 *Cost Attribution to AG103 from General Ledger*

BT uses several methodologies to attribute costs from the General Ledger to AG103, however the majority (98%) of these are all based on two underlying methods:

1. Direct allocation
2. Apportionment based on records in the TSO billing system

Table 23. ***Notable Methods for Cost Attribution to AG103 from General Ledger***

Underlying Method	BT Methodology	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct	EXCEPT (T, TF, TT, TY, TZ)	£18	-£29	£15	13%	6.2.1
	AG103					
TSO Billing	EXCEPT (TX, TH, TG, TS, others)	£104	-£11	£103	86%	6.2.12
Others		£3	-£8	£2	2%	

Total	£125	-£47	£120	100%	

Source: BT ASPIRE, Cartesian

Direct allocation is used where BT is able to uniquely associate a cost item in the General Ledger with AG103, for example BT TSO Finance costs. These relationships are manually configured in ASPIRE either as direct allocations or using an EXCEPT base with a 100% allocation. It is not clear why BT uses two different approaches to achieve the same outcome.

[After this report was written, BT suggested that the two approaches may have arisen from different people working on the system at different times as BT's cost attribution system has grown organically over time.]

The TSO billing system is used to apportion costs that TSO incurs in supporting other BT units. It uses project code, cost category and OUC to determine the weights and destination of cost attribution. For example, the EXCEPT-TB base uses the TSO billing system data to apportion shared costs of second- and third-line support of BT platforms and strategic business planning activities from TSO Service, Strategy & Operations (OUC TB). Using this method, a portion of these costs is attributed to the TSO Support Function (AG103).

Further detail on the TSO billing methodology by can be found in section 6.2.12.

5.3.5.4 *Cost Attribution to AG103 from other Cost Categories*

No other cost categories feed into AG103 in the cost exhaustion process.

5.3.5.5 *Cost Attribution from AG103 to other Cost Categories*

The final stage of the cost attribution process for AG103 is to apportion all costs to other activity groups and plant groups. The apportionment is based on a weighted combination of the TSO pay costs and TSO-managed assets.

BT does not sum pay and asset values directly; rather, the NBVs are first multiplied by a WACC (RoA percentage) to determine the annual return on asset. This value is then combined with Pay to determine an apportionment base. A single WACC of 10.8% is used throughout.

The attribution base excludes fixed asset classes that are not managed by TSO, namely: Copper; Duct; Fibre; Land and Buildings; Vehicles; Office Machines; and, Materials Awaiting Installation.

In contrast to AG112, actual pay costs are used rather than factorised pay for the purposes of cost attribution. Both capitalised and non-capitalised pay costs are included. When discussed with BT the reason for the difference in methodology, Cartesian was informed that BT management believed that using 'Factorised Pay' (i.e. Pay that reflects number of FTE in each division) is a more causal and objective approach to attributing AG112 costs versus the standard 'Pay and RoA'. This method is explained in further detail with an illustrative example in Section 6.3.6.

Using this method, costs from AG103 (at Level 3) are apportioned to 221 AGs and PGs. The top 10 recipient categories are shown in the table below. Table 24 shows that even though the costs are thinly spread over a large number of cost categories, Corporate Costs, Specialised Accommodation Equipment and Back-up power equipment receive over ✂% of TSO Support Function costs. One-third of these costs are attributed to Retail Residual market.

Table 24. ***Apportionment of AG103 costs to AGs and PGs (Top 10)***

Plant Groups	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Document Section Ref.
Retail Products	-	[£10 to £50]	[-£50 to -£10]	[£10 to £50]	-
Corporate Costs	AG112	[£10 to £50]	[-£10 to £0]	[£10 to £50]	5.3.4
Specialised Accommodation Equipment - Non Maint	AG162	[£10 to £50]	[-£10 to £0]	[£0 to £10]	5.10.9
Back-up Power Equipment - Non Maint	AG164	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.10.9
Ethernet Access Equipment	PG447A	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.10.8
Ethernet Switches	PG901A	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.8.7
Openreach Systems & Development (Product)	PG772A	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.10.15
SG&A Broadband	PG609N	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.3.7
Broadband Line Testing Equipment (Openreach)	PG151B	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.10.16.4
Copper MSAN Combi Cards Broadband element	PG857A	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.8.5
Others (x211)	-	[£10 to £50]	[-£50 to -£10]	[£10 to £50]	-
Total		**£125**	**-£47**	**£120**	-

Source: BT ASPIRE, Cartesian

5.3.5.6 *Contribution to costs at Network Component level*

Although AG103 does not exhaust directly into network components, it is possible to determine the contribution of AG103 costs at the network component level. Following the onward attributions in BT's cost system reveals that 235 network components receive costs from AG103. The following table shows the top 10.

Table 25 shows that the attribution to the top 10 network components is fairly evenly spread (with the exception of Retail Products). The remaining 225 components each receive very small attributions.

Table 25. ***AG103 costs apportioned to Network Components (Top 10)***

Network Components	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
Retail Products	-	[£10 to £50]	[-£50 to -£10]	[£10 to £50]
Combi card broadband access	CN854	[£0 to £10]	[-£10 to £0]	[£0 to £10]
Ethernet electronics	CO485	[£0 to £10]	[-£10 to £0]	[£0 to £10]
D side copper capital	CL173	[£0 to £10]	[-£10 to £0]	[£0 to £10]
DSLAM overheads	CR188	[£0 to £10]	[-£10 to £0]	[£0 to £10]

Ethernet Switch BB	CN891	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]
Broadband MSAN access	CN890	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]
PSTN line cards	CL183	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]
SG&A Broadband	CO609	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]
Core/Metro (broadband)	CN860	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]
Others (x225)	-	✂[£50 to £100]	✂[-£50 to -£10]	✂[£10 to £50]
Total		**£125**	**-£47**	**£120**

Source: BT ASPIRE, Cartesian

5.3.6 Pay Drivers

5.3.6.1 Summary

Pay drivers are created by BT to attribute shared costs on the basis of pay. For example, the costs of the Openreach CEO's office and Openreach HR costs are amongst costs attributed to the Openreach Pay Driver (AG401). These costs are then apportioned from AG401 to other AGs and PGs on the basis of Openreach pay.

The other cost category in this sub-group is the Wholesale Pay Driver (AG406) which apportions shared costs on the basis of Wholesale pay.

The total cost of this sub-group (AG401 plus AG406) was approximately £165m (FAC) in FY 2013/14.

Although Openreach forms the bulk of costs within this cost sub-group, ✂ FAC TSO non-pay charges are attributed to Pay Drivers. This is the largest value of TSO non-pay attribution within General Overheads. These non-pay charges include IT Services sub-contracts and SG&A Software Applications.

The key findings within this section are:

1. The bulk of the costs (✂FAC) relate to Openreach
2. As the cost group names suggests, all the costs within Pay Drivers are attributed based on Pay
3. This cost sub-group has a large (✂) transfer charge transaction which relates to central overhead charges (including HR and Finance)

5.3.6.2 Composition by Cost Type and Organisational Unit

Openreach accounts for the largest portion of cost within Pay Drivers. The data in Table 26 shows a ✂ transfer charge from Corporate Headquarters and BT Property into Openreach. A significant portion of this transfer charge (✂ FAC) is the 'Corporate Overhead recharge' from BT Corporate HQ. Having discussed this with BT, it appears that this charge relates to central functions such as Openreach HR and Finance. It is not entirely clear why these costs are not attributed to specific HR (OUC BH) and Finance functions (OUC BF) within Openreach as opposed to being attributed to OUC BY which appears to be a generic Openreach OUC. Due to the limited time on the project, Cartesian was unable to discuss this in detail with BT.

The General Ledger data shows that a large amount of general use assets (e.g. software and computer costs) are being attributed to Pay Drivers (see GBV amount for Openreach). In addition to this, the majority of non-pay costs in TSO include charges for IT Services sub-contracts and software application costs. General Ledger data (not shown in this report) reveals that the ✂ MCE TSO non-pay includes 'pay recharges' cost line items. It is unclear what these pay-recharges are and why these are classified as non-pay.

Table 26. ***Costs apportioned to Pay Drivers at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

The bulk of the costs are within Openreach sit within OUC BY, as shown in the table below. This data is skewed due to the large transfer charge into Openreach from Corporate HQ as discussed earlier. Removing transfer charges from this cost sub-group makes TSO the largest division attributing costs to Openreach and Wholesale Pay drivers. These attributions include IT Services subcontracts, general management and software application costs. Since these costs are general costs, the assumption here is that BT TSO is able to identify a specific (causal) relationship with Openreach and Wholesale. Else, it is not clear why BT does not attribute these TSO general management costs to TSO Operational Cost activity group (AG102).

In the table below, the majority of BT Security Enterprises cost (✂ [£10m to £50m] FAC) relates to pay (including redundancy payment) and costs for BT Wholesale relate to P&L credit adjustments for software development.

Table 27. ***Top Cost Contributors to Pay Drivers at Level 1, by OUC***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	BY	Openreach Analysis Code	✂[£450 to £500]	✂[£10 to £50]	✂[£450 to £500]
	BH	Openreach Human Resources	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]
	BZ	Openreach Analysis Code	✂[-£10 to £0]	✂[-£100 to -£50]	✂[-£10 to £0]
B Total			✂[£450 to £500]	✂[-£50 to -£10]	✂[£450 to £500]
T	TA	BT TSO ARCHITECTURE & GLOBAL IT PLATFORMS	✂[£50 to £100]	✂[-£10 to £0]	✂[£50 to £100]
	TW	BT TSO Chief Information Office for BT Wholesale	✂[£0 to £10]	£0	✂[£0 to £10]
	TN	BT TSO Global Network Services Management and Support	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]
	TB	BT TSO Service, Strategy and Operations	✂[£0 to £10]	£0	✂[£0 to £10]
	TM	BT TSO Chief Information Office for Group	✂[£0 to £10]	£0	✂[£0 to £10]
T Total			✂[£50 to £100]	✂[-£10 to £0]	✂[£50 to £100]
V	**V**	**BT Security Enterprises**	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]

K	**K**	**BT Wholesale**	✂[-£50 to -£10]	✂[£0 to £10]	✂[-£10 to £0]
W	W	BT Property	£0	✂[-£10 to £0]	£0
	WP	Group Property Partners (Telereal)	✂[-£50 to -£10]	£0	✂[-£50 to -£10]
W Total			✂[-£50 to -£10]	✂[-£10 to £0]	✂[-£50 to -£10]
C	CW	Group Billing and Revenue Assurance	£0	£0	£0
	C	Corporate Headquarters	✂[-£450 to -£400]	✂[-£10 to £0]	✂[-£450 to -£400]
C Total			✂[-£450 to -£400]	✂[-£10 to £0]	✂[-£450 to -£400]
Others			£0	✂[-£10 to £0]	✂[-£10 to £0]
Grand Total			**£167**	**-£25**	**£165**

Source: BT ASPIRE, Cartesian

5.3.6.3 *Cost Attribution to Pay Drivers from General Ledger*

The largest attribution of cost is driven by EXCEPT (BY) base methodology for Pay Drivers cost sub-group as shown in Table 28. This holds true even after transfer charges are eliminated from the data in the table below.

If the transfer charges (both in and out) are removed from the data set in the table below, the direct allocation figure is reduced to £75m (FAC). The EXCEPT (TA) base attributes the second largest set of costs (approximately £64m FAC) using the TSO Billing system data. Furthermore, there are approximately ✂ (FAC) of adjustments for insurance claim credits and other miscellaneous provisions attributed to Pay Drivers by EXCEPT (BZ) base methodology. This detailed cost breakdown in not shown in the table below.

Table 28. ***Notable Methods for Cost Attribution to Pay Drivers from General Ledger***

Underlying Method	Relevant BT Methodologies	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct Allocation	EXCEPT (BY, BH, BZ)	£496	-£22	£494	299%	6.2.1
TSO Billing System	EXCEPT (TA, TW, TN, TM)	£91	£0	£90	55%	6.2.12
Internal Trades Analysis	Except (V)	£12	£1	£13	8%	-
Pay and Return on Asset	COMCOS	£2	£0	£2	1%	6.2.10
Others (including transfer out charges)		-£433	-£5	-£433	-262%	-
Total		**£167**	**-£25**	**£165**	**100%**	

Source: BT ASPIRE, Cartesian

The TSO billing system is used to apportion costs that TSO incurs in supporting other BT units. It uses project code information along with the type of project and OUC to determine the weights and destination of cost attribution. For example, the EXCEPT-TA base uses the billing system data to apportion certain joint costs from TSO Architecture & Global IT platforms (OUC TA) which relate to

development of BT's IT platforms, networks and infrastructure. Using this method, a portion of these costs is attributed to Pay Drivers.

Further detail on the TSO billing methodology by can be found in Section 6.2.12.

The Internal Trades Analysis methodology (EXCEPT-V) uses a similar methodology to TSO Billing system whereby BT Security conducts an internal trade analysis to determine the appropriate apportionment to each business unit. BT Security's remit includes both external security such as keeping BT buildings secure, but also internal security which includes networks and systems security.

Pay and Return on Asset based methodology (COMCOS) is discussed in detail in 6.2.10 of this report.

5.3.6.4 *Cost Attribution to Pay Drivers from other Cost Categories*

No other cost categories feed into Pay Drivers in the exhaustion process.

5.3.6.5 *Cost Attribution from Pay Drivers to other Cost Categories*

As the bulk of costs within Pay Drivers relate to Openreach, Table 29 below shows that most of the costs are being driven toward Openreach-related assets and network elements. Attributions to these cost categories are based on Openreach and Wholesale pay (as appropriate). This means that when costs within Pay Drivers are attributed, any activity groups and plant groups within the cost exhaustion system that has an element of pay within it, will receive a proportionate attribution from Pay Drivers. The table also shows that the majority of the costs from Pay Drivers is weighted towards Copper-related plant groups.

Table 29. ***Apportionment of Pay Driver costs to AGs and PGs (Top 10)***

Cost Category	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
Retail Products	-	[£10 to £50]	[£0 to £10]	[£10 to £50]
D-side Copper Cable Maintenance	PG118M	[£10 to £50]	[-£10 to £0]	[£10 to £50]
Analogue Line Final Drop	PG149A	[£10 to £50]	[-£10 to £0]	[£10 to £50]
MDF Hardware Jumpering	PG142A	[£10 to £50]	[-£10 to £0]	[£10 to £50]
D-side Copper Cable	PG118C	[£0 to £10]	[-£10 to £0]	[£0 to £10]
Access Distribution Fibre	PG959C	[£0 to £10]	[-£10 to £0]	[£0 to £10]
SG&A Broadband	PG609N	[£0 to £10]	[£0 to £10]	[£0 to £10]
SG&A Wholesale Residual	PG583N	[£0 to £10]	[£0 to £10]	[£0 to £10]
FTTC Service Delivery & Development	PG197A	[£0 to £10]	[-£10 to £0]	[£0 to £10]
Dropwire Maintenance Residential	PG122M	[£0 to £10]	[-£10 to £0]	[£0 to £10]
Others (x137)	-	[£50 to £100]	[-£50 to -£10]	[£50 to £100]
Total		**£167**	**-£25**	**£165**

Source: BT ASPIRE, Cartesian

5.3.6.6 *Contribution to costs at Network Component level*

Cost attributions from AG401 (Openreach Pay Driver) and AG406 (Wholesale Pay Driver) can be mapped to around 190 network components. Of these attributions Table 30 shows the top 10 attributions. The data in this table is consistent with the table above, where it was noted that most of the costs are attributed to copper-based cost categories.

Table 30. ***Pay Driver costs apportioned to Network Components (Top 10)***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
Retail Products	-	[£10 to £50]	[£0 to £10]	[£10 to £50]
D side copper current	CL174	[£10 to £50]	[-£10 to £0]	[£10 to £50]
Dropwire capital & PSTN NTE	CL178	[£10 to £50]	[-£10 to £0]	[£10 to £50]
D side copper capital	CL173	[£10 to £50]	[-£10 to £0]	[£10 to £50]
MDF Hardware jumpering	CL161	[£10 to £50]	[-£10 to £0]	[£10 to £50]
SG&A Broadband	CO609	[£0 to £10]	[£0 to £10]	[£0 to £10]
SG&A Wholesale residual	CO583	[£0 to £10]	[£0 to £10]	[£0 to £10]
Analogue line drop maintenance	CL180	[£0 to £10]	[-£10 to £0]	[£0 to £10]
FTTC development	CL197	[£0 to £10]	[-£10 to £0]	[£0 to £10]
Time related charges	CK981	[£0 to £10]	[-£10 to £0]	[£0 to £10]
Others (x180)	-	[£50 to £100]	[-£50 to -£10]	[£50 to £100]
Total		**£167**	**-£25**	**£165**

Source: BT ASPIRE, Cartesian

5.3.7 Sales, General and Administration (SG&A)

5.3.7.1 *Summary*

The SG&A cost sub-group is made up of five plant groups that include asset depreciation costs, subcontract costs and general management costs. Typical assets within this cost sub-group are software and general computers. In FY 2013/14, the SG&A sub-group accounted for approximately £179m FAC.

Table 31. ***Cost Components in the SG&A sub-group, values at Level 1***

Cost Category	BT Ref.	FAC (£ m)
SG&A Wholesale Residual	PG583N	[£50 to £100]
SG&A Broadband	PG609N	[£50 to £100]

Cost Category	BT Ref.	FAC (£ m)
SG&A Downstream Residual	PG585A	✂[£10 to £50]
SG&A PPC (Wholesale)	PG506N	✂[£10 to £50]
SG&A Wholesale Other	PG584N	✂[£10 to £50]
Total		**£179**

Source: BT ASPIRE, Cartesian

It is important to note that the £179m figure does not represent the entire SG&A costs of BT. Most SG&A cost are directly attributed to other activity groups and plant groups. Hence, it unclear why BT has created separate SG&A cost groups for Wholesale as discussed in the section below.

Note: As noted in Section 5.3.1, the General Overheads cost group in this report includes selling costs which are captured in the SG&A sub-group (CCA: £176m, MCE: £29m and FAC: £179m).

The key findings within this section are:

1. The majority of costs in this sub-group relate to BT Wholesale teams that provide managed services to mobile and other fixed line operators
2. Costs within SG&A plant group are all directly allocated to their associated network components

5.3.7.2 *Composition by Cost Type and Organisational Unit*

The majority (✂) of costs in the SG&A cost sub-group are BT Wholesale costs. These costs are primarily driven by pay costs, transfer-in charges and depreciation costs in Wholesale.

The SG&A cost sub-group carries net ✂ of transfer-in charges from other business units (i.e. these transfer charges do not have a corresponding balancing figure). These transfer-in charges include costs for Cisco devices and 'VCT SOS' Telecom Services. Cartesian in unclear what VCT SOS Telecom Services are, and was unable to discuss this with BT due to time constraints of the project.

There are also some charges from BT Property for electricity, and for vehicles from BT Fleet. Since there is no offsetting transfer-out charge in this cost sub-group, these transfer charges turn into cost, which can result in misattribution at a later stage in the cost exhaustion process.

Table 32 also shows a significant attribution of BT TSO charges. Analysing the data at a General Ledger level shows that the pay and non-pay charges for TSO relates to general management costs. These costs are attributed using different EXCEPT base methodologies.

Table 32. ***Costs apportioned to SG&A at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

BT Wholesale appears to carry a large capitalised liability on its accounts, as shown by ✂ [£250m to £300m] MCE value in Table 33. This charge is made up of ✂ of 'Expense Pre-payments' and other credit

adjustments. These 'Expense Pre-payments' are almost netted off by ✂ General Ledger entry of 'Expense Pre-Payments' from OUC K (not shown in the table). Since these General Ledger entries are categorised as 'non-pay' (and not transfer charges), it is unclear why there is an intra-division transfer of this charge. The impact of such transactions can be seen in the table below, where the attribution weight from OUC KU is higher than the attribution of costs from OUC K. Even though both OUCs relate to BT Wholesale, if OUC-specific attribution methodologies are applied (as is the case with EXCEPT methodologies), it will impact the ultimate attribution weights.

The data also shows ✂ of 'Group Billing and Revenue Assurance' (OUC CW) being attributed to SG&A. Cost for this function is attributed based on management assessment of billed revenue for BT Wholesale and BT Retail. The majority of costs (over ✂%) from Group Billing and Revenue Assurance function goes to Retail, however some costs are also attributed to Wholesale and Openreach.

OUC CW is known as the 'Billing Centre of Excellence' within BT. This team provides a central billing function to Wholesale, Retail and Openreach customers. In discussions, BT confirmed that Openreach does not have a separate billing function and hence this team provides billing capability to Openreach. According to BT, from a regulatory perspective, BT is allowed to use a non-Openreach function for billing purposes.

Table 33. ***Top Cost Contributors to SG&A at Level 1, by OUC***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
K	KU	Wholesale Markets	✂[£50 to £100]	✂[£250 to £300]	✂[£50 to £100]
	KK	Wholesale Customer Services	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]
	KB	Mobile Service Delivery & BT Managed Services Ltd	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]
	KD	Wholesale Product Management	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]
	KV	Wholesale Managed Services	✂[£0 to £10]	£0	✂[£0 to £10]
	KY	Wholesale White Label Managed Services	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]
	K	BT Wholesale	✂[£10 to £50]	✂[-£250 to -£200]	£0
K Total			✂[£100 to £150]	✂[£10 to £50]	✂[£100 to £150]
T	TW	BT TSO Chief Information Office for BT Wholesale	✂[£10 to £50]	£0	✂[£10 to £50]
	TA	BT TSO ARCHITECTURE & GLOBAL IT PLATFORMS	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]
	TN	BT TSO Global Network Services Management and Support	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]
	TB	BT TSO Service, Strategy and Operations	✂[£0 to £10]	£0	✂[£0 to £10]
	TS	BT TSO General Infrastructure Services	✂[£0 to £10]	£0	✂[£0 to £10]
T Total			✂[£10 to £50]	✂[-£50 to -£10]	✂[£10 to £50]
C	CW	Group Billing and Revenue Assurance	✂[£0 to £10]	£0	✂[£0 to £10]
	C	Corporate Headquarters	£0	✂[-£10 to £0]	£0

C Total			[£0 to £10]	[-£10 to £0]	[£0 to £10]
Y	YM	Group Procurement - BT Wholesale/Group	[£0 to £10]	£0	[£0 to £10]
	YL	BT Fleet	[-£10 to £0]	£0	[-£10 to £0]
Y Total			[£0 to £10]	£0	[£0 to £10]
W	W	BT Property	[-£10 to £0]	£0	[-£10 to £0]
	WP	Group Property Partners	[-£10 to £0]	£0	[-£10 to £0]
W Total			[-£10 to £0]	£0	[-£10 to £0]
Others			[£0 to £10]	[-£10 to £0]	£0
Grand Total			**£176**	**£29**	**£179**

Source: BT ASPIRE, Cartesian

5.3.7.3 *Cost Attribution to SG&A from General Ledger*

As shown in Table 34 below, costs from the General Ledger to SG&A are attributed using mainly the EXCEPT base methodologies. These methodologies are based on Pay, TSO Billing System and Value of Managed Services contracts.

Table 34. ***Notable Methods for Cost Attribution to SG&A from General Ledger***

Underlying Method	Relevant BT Methodologies	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
Direct Allocation	EXCEPT (KK, KY), PG506N	£16	-£2	£16	6.2.1
Pay	EXCEPT (KU, KD)	£78	-£16	£77	-
TSO Billing System	EXCEPT (TW, TA, TN, TB)	£40	£0	£40	6.2.12
Software Depreciation	SOFTDEP (K)	£33	£68	£40	6.2.21
Managed Services Contract Value	EXCEPT (KB, KV)	£20	-£9	£19	6.2.16
Previously Attributed (Pay)	FTQ (K, Y)	£19	-£11	£17	6.2.17
Others		-£30	-£1	-£30	-
Total		**£176**	**£29**	**£179**	

Source: BT ASPIRE, Cartesian

Approximately £77m (FAC) of costs for relationship management with other Communications Providers (CPs) is attributed to SG&A using a Pay-based attribution method (EXCEPT KU and KD). These OUCs provide services such as Wholesale Product Management, Customer Services and Managed Services. Attribution of costs to PGs is based on an annual activity survey data and uses factors such as resources working on different products, volumes and revenue. Activities are also divided between regulated and non-regulated markets.

As part of this exercise BT is able to separate out managed services contracts (i.e. OUC KV). All the costs are attributed based on pay, except for managed services. These managed services mainly relate to providing backhaul services to mobile operators. Since some of these costs are attributable to regulated

services, BT separates these costs and then, using the value of contract (in terms of revenue), attributes the costs to regulated and non-regulated markets.

The TSO Billing System is used to apportion costs that TSO incurs in supporting other BT units. It uses project code, cost category and OUC to determine the weights and destination of cost attribution. For example, the EXCEPT-TA base uses the billing system data to apportion the shared costs of developing BT's IT platforms, networks and infrastructure from TSO Architecture & Global IT platforms (OUC TA). Using this method, a portion of these costs is attributed to SG&A. More details on this methodology are covered in section 6.2.12.

Approximately £19m FAC is attributed to SG&A using an analysis of Managed Services Contracts (as described above). This is done using the EXCEPT (KB and KV) base methodology. These bases are used to attribute BT Wholesale costs that relate to service fulfilment for Mobile Customers and Managed Services.

The software depreciation methodology (SOFTDEP) and Previously Attributed Pay (FTQ) base methodologies are discussed in detail in Section 6 of this report.

5.3.7.4 Cost Attribution to SG&A from other Cost Categories

Following the cost exhaustion process, approximately ✂ FAC is attributed to SG&A plant groups. Of this amount, approximately half of the amount is attributed by Wholesale drivers (AG406 and AG409). This is expected since the majority of SG&A costs are related to BT Wholesale. Other activity groups attributing costs during the cost exhaustion process are shown in Table 35 below.

Table 35. ***Impact of costs attributed to SG&A in cost exhaustion process, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Document Section Ref.
Level 1	**SG&A**	**-**	**£176**	**£29**	**£179**	**-**
Exhaustion Levels	WS Pay driver	AG406	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]	5.3.6
	WS Pay plus % FA driver	AG409	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]	-
	Corporate Costs	AG112	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]	5.3.4
	TSO Operational Costs	AG102	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.11
	Group Property and Facilities Management	AG106	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	5.6.4
	TSO Support Functions	AG103	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	5.3.5
	Property Asset Driver	AG412	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	5.6.5
	Motor Transport	AG101	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.4
	Others	-	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	-
Level 7	**SG&A**	**-**	✂[£200 to £250]	✂[£50 to £100]	✂[£200 to £250]	**-**

Source: BT ASPIRE, Cartesian

Even though Wholesale Pay and Wholesale Pay plus % FA drivers (as seen in the Table 35 above) attribute a significant amount of costs, the table below shows that BT TSO attributes ✂% of the underlying costs. Other large amounts in Table 36 include the Group Consolidation Unit (Division G) MCE value (✂ [-£50m to -£10m]) which is partially offset by the MCE in Corporate Adjustments (Division E). Both of these divisions are part of BT Group. Analysing the data further shows that this charge (categorised as non-pay) includes cash costs for banks. This detailed data is not shown in the tables.

Table 36. ***Costs Apportioned to SG&A between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
T	BT TSO	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]
K	BT Wholesale	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
C	Corporate Headquarters	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
E	Corporate Adjustments	£0	✂[£10 to £50]	✂[£0 to £10]
V	BT Security Enterprises	✂[£0 to £10]	£0	✂[£0 to £10]
W	BT Property	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
Y	Group Business Services	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
F	BT Facilities Management	✂[£0 to £10]	£0	✂[£0 to £10]
G	Group Consolidation Units	£0	✂[-£50 to -£10]	✂[-£10 to £0]
Others		£0	✂[£0 to £10]	✂[£0 to £10]
Grand Total		✂[£50 to £100]	✂[£10 to £50]	✂[£50 to £100]

Source: BT ASPIRE, Cartesian

The mix of costs from different BT divisions that contribute costs to SG&A plant groups changes significantly between level 1 and level 7. For example, the share of BT Wholesale costs is reduced from ✂ [55% to 85%] to ✂ [40% to 65%]. This is due to the additional ✂ (FAC) TSO costs. These TSO costs are likely to be costs of TSO working for BT Wholesale.

Table 37. ***SG&A Costs at Level 7, shown by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
K	BT Wholesale	✂[£100 to £150]	✂ [55% to 85%]	✂[£100 to £150]	✂ [40% to 65%]
T	BT TSO	✂[£10 to £50]	✂ [5% to 30%]	✂[£50 to £100]	✂ [20% to 45%]

C	Corporate Headquarters	[£0 to £10]	[0% to 10%]	[£10 to £50]	[0% to 25%]
E	Corporate Adjustments	£0	0%	[£0 to £10]	[0% to 5%]
V	BT Security Enterprises	£0	0%	[£0 to £10]	[0% to 5%]
Y	Group Business Services	[£0 to £10]	[0% to 10%]	[£0 to £10]	[0% to 5%]
W	BT Property	[-£10 to £0]	[-10% to 0%]	[-£10 to £0]	[-5% to 0%]
G	Group Consolidation Units	[£0 to £10]	[55% to 85%]	[-£10 to £0]	[40% to 65%]
Total		**[£150 to £200]**	**100%**	**[£200 to £250]**	**100%**

Source: BT ASPIRE, Cartesian

5.3.7.5 *Cost Attribution from SG&A to Network Components*

Cost from SG&A plant groups are directly attributed to five network components (as shown in Table 38 below). Network components CO583, CO585 and CO584 are fully allocated to Wholesale Residual markets. SG&A Broadband and SG&A Private Partial Circuits attribute costs to the regulated markets.

Table 38. ***SG&A costs apportioned to Network Components***

Cost Categories	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
SG&A Wholesale residual	CO583	[£50 to £100]	[-£10 to £0]	[£50 to £100]
SG&A Broadband	CO609	[£50 to £100]	[£10 to £50]	[£50 to £100]
SG&A downstream residual	CO585	[£10 to £50]	[£50 to £100]	[£10 to £50]
SG&A partial private circuits	CO506	[£10 to £50]	[-£10 to £0]	[£10 to £50]
SG&A Wholesale other	CO584	[£10 to £50]	£0	[£10 to £50]
Total		[£200 to £250]	[£50 to £100]	[£200 to £250]

Source: BT ASPIRE, Cartesian

5.4 Duct

5.4.1 Summary

The Duct cost group represents the costs of building and maintaining BT's nationwide duct network. These conduits carry underground cables in the access, backhaul and core segments of BT's networks.

Duct is one of the biggest cost groups accounting for approximately £849m FAC at Level 1 of BT's cost attribution process. This corresponds to approximately 12% of BT's total FAC across all markets (excluding retail residual).

The key findings within this section are:

1. Duct costs are apportioned based on a duct survey from 1997 (with adjustments to reflect changes since then) rather than using more up-to-date records
2. The costs for used and unused duct costs are shared by all regulated markets and Wholesale Residual
3. Backhaul and core duct costs are not attributed to 21C network fibre plant groups, i.e. services on the 21C network do not receive an attribution of these duct costs

5.4.2 Contribution to Market Costs

Table 39 below shows the distribution of duct costs by each regulated and unregulated market. The majority of duct costs are apportioned to Fixed Access Markets, specifically to WLR and LLU services. AISBO Non-WECLA services within Business Connectivity Markets are also attributed a significant amount of duct costs.

MCE values in duct drive a significant portion of the total duct costs which is to be expected given duct requires considerable capital investment.

Table 39. ***Duct Costs by Markets (2014, £m)***

Market Review	Market	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)
Fixed Access Markets	Wholesale Line Rentals (WLR)	£153	£2,571	£410	48%
	Local Loop Unbundling (LLU)	£65	£1,089	£174	20%
	Wholesale ISDN2 Lines	£5	£80	£13	1%
	Wholesale ISDN30 Lines	£4	£59	£9	1%
Fixed Access Markets Total		**£227**	**£3,799**	**£606**	**70%**
Business Connectivity Markets	AISBO Non-WELCA	£39	£646	£103	12%
	TISBO (up to and including 8 Mbps)	£14	£234	£37	4%
	Wholesale Regional Trunk Segments	£2	£36	£5	1%
	TISBO (above 45 Mbps up to and including 155 Mbps)	£2	£30	£5	1%
	MISBO Non-WECLA	£1	£25	£4	0%
	TISBO (above 8 Mbps up to and including 45 Mbps)	£1	£23	£4	0%
	AISBO WECLA	£1	£21	£3	0%
	Point of Handover	£0	£2	£0	0%
Business Connectivity Markets Total		**£60**	**£1,017**	**£161**	**18%**
Wholesale Broadband Access Markets	Wholesale Broadband Access - Market 1	£7	£121	£19	2%
	Wholesale Broadband Access - Market 2	£1	£20	£3	0%
Wholesale Broadband Access Markets Total		**£8**	**£141**	**£22**	**2%**
Narrowband Markets	Calls: Call Origination	£3	£45	£7	1%
	Calls: Call Termination	£3	£43	£7	1%
	Interconnect Circuits	£1	£11	£2	0%
Narrowband Markets Total		**£7**	**£99**	**£16**	**2%**
Wholesale Residual	Wholesale Residual	**£16**	**£283**	**£44**	**5%**
TOTAL		**£316**	**£5,337**	**£849**	**100%**

Source: BT ASPIRE, Cartesian

Table 40 shows duct costs as a proportion of the total cost of each market. Some markets with high percentages receive a small attribution of the total of duct costs (see previous table). For instance, Wholesale Regional Trunk Segment market is attributed 1% FAC duct costs which consists of 35% of its overall attributed market costs.

Services within Fixed Access and Business Connectivity markets have the highest percentages of duct costs in their overall attributed costs.

Table 40. ***Duct costs as a proportion of Market Costs (2014, %)***

Market Review	Market	Duct costs as a proportion of Market Costs
Fixed Access Markets	Wholesale Line Rentals (WLR)	21%
	Wholesale ISDN2 Lines	16%
	Local Loop Unbundling (LLU)	15%
	Wholesale ISDN30 Lines	10%
Business Connectivity Markets	Wholesale Regional Trunk Segments	35%
	TISBO (above 45 Mbps up to and including 155 Mbps)	23%
	TISBO (above 8 Mbps up to and including 45 Mbps)	20%
	AISBO Non-WELCA	20%
	TISBO (up to and including 8 Mbps)	13%
	MISBO Non-WECLA	9%
	AISBO WECLA	8%
	Point of Handover	6%
Wholesale Broadband Access Markets	Wholesale Broadband Access – Market 1	5%
	Wholesale Broadband Access - Market 2	2%
Narrowband Markets	Calls: Call Termination	6%
	Interconnect Circuits	6%
	Calls: Call Origination	5%
Wholesale Residual	Wholesale Residual	2%

Source: BT ASPIRE, Cartesian

5.4.3 Composition by Cost Category

The duct cost group comprises three BT cost categories which together capture all duct related costs across BT's entire network - access, backhaul and core. Table 41 below shows the respective attributed costs and the section in which these cost categories are analysed. The most significant component is Access Duct (AG135) which accounts for ✂% of the duct costs.

Table 41. ***Cost Components of Duct at Level 1***

Section	Cost Components	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
5.4.4	**Access Duct**	AG135	✂[£250 to £300]	✂[£4000 to £4200]	✂[£600 to £700]
5.4.5	**Backhaul Duct**	AG148	✂[£50 to £100]	✂[£800 to £900]	✂[£100 to £150]
5.4.6	**Core Duct**	AG149	✂[£10 to £50]	✂[£250 to £300]	✂[£10 to £50]
Total			**£316**	**£5,337**	**£849**

Source: BT ASPIRE, Cartesian

5.4.4 Access Duct (AG135)

5.4.4.1 Summary

The costs of Access Duct assets and activities are captured in cost category AG135. Significant cost items in AG135 include asset depreciation, cost of capital based on gross book value, street works and pay.

The key findings within this section are:

- Cost of capital (given by a 10% WACC applied to the MCE) accounts for more than half of the FAC
- Costs are mainly incurred by the Openreach division
- Costs are onward apportioned to copper and fibre PGs based on a 1997 duct study – adjusted for investment since then – rather than from an up-to-date Geographic Information system (GIS)

5.4.4.2 Composition by Cost Type and Organisational Unit

Table 42 shows the costs apportioned to access duct at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

Openreach is the top contributor, accounting for nearly all of the ✂ FAC. BT Retail Northern Ireland (which encompasses Openreach-type activities in Northern Ireland) contributes only ✂%. Approximately two-thirds of the total costs are driven by cost of capital. This is to be expected given the construction of duct requires considerable capital investment.

The transfer charge in this AG recovers costs mainly for BT Property from Openreach and BT Retail Northern Ireland (not shown in the table). Overall the transfer charges in and out of this AG balance. The charges reflect the different internal trades occurring among different teams within BT Group. These transfers are mainly related to cumulo rates charges (from BT Property).

Despite the large capital cost associated with the GBV (✂), there is considerable accumulated depreciation (✂), and some CCA adjustment (positive and negative), which reduces the total MCE value. This applies both to Openreach and BT Retail Northern Ireland divisions. Other negative amounts are related to CCA adjustments e.g. current year CCA adjustments for depreciation or provision for assets in course of construction (AICC).

Table 42. ***Costs apportioned to Access Duct (AG135) at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

There are over 60 different teams that attribute access duct costs into AG135. Table 43 highlights the 10 most significant teams (by FAC). Several teams such as Openreach (B), Openreach Infrastructure Delivery (BL) and BT Northern Ireland (MJ) have a direct relationship with access and backhaul duct assets and activities. Openreach shared costs from teams such as Openreach Finance (BF) are attributed across AG135 and other cost categories that relate to Openreach activities.

Table 43. ***Organisational Units contributing costs to Access Duct (AG135) at Level 1 (Top 10)***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	B	Openreach	[£150 to £200]	[£4000 to £4200]	[£500 to £600]
	BY	Openreach Analysis Code	[£10 to £50]	£0	[£10 to £50]
W	W	BT Property	[£10 to £50]	[-£10 to £0]	[£10 to £50]
B	BL	Openreach Infrastructure Delivery	[£10 to £50]	[£50 to £100]	[£10 to £50]
M	MJ	BT Northern Ireland	[£0 to £10]	[£150 to £200]	[£10 to £50]
B	BF	Openreach Finance	[£0 to £10]	[£0 to £10]	[£0 to £10]
	BA	Openreach Learning and Development	[£0 to £10]	£0	[£0 to £10]
	BQ	Openreach Transformation	[£0 to £10]	[£0 to £10]	[£0 to £10]
	BR	Openreach Marketing and Sales	[£0 to £10]	£0	[£0 to £10]
	BK	Openreach Equivalence & Pub Affairs	[£0 to £10]	[-£10 to £0]	[£0 to £10]
Others			[-£50 to -£10]	[-£200 to -£150]	[-£100 to -£50]
Total			[£250 to £300]	[£4000 to £4200]	[£600 to £700]

Source: BT ASPIRE, Cartesian

5.4.4.3 *Cost Attribution to Access Duct (AG135) from General Ledger*

BT uses a total of 22 base methodologies and 18 transfer charges to attribute ledger level costs to AG135. Table 44 shows the most significant base methodologies. The cost drivers are diverse and direct (100%) allocation is not widely used. Note that backhaul and access duct costs are incurred by the same operational units and although there is a direct causal relationship, a methodology is required to apportion the access costs from backhaul costs.

Table 44. ***Notable Methods for Cost Attribution to Access Duct (AG135) from General Ledger***

Underlying Method	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Duct Valuation	PDTDUCT	B, M				85%	6.2.2
PWNRC	ORCUMNOR	B				7%	6.2.3
	CUMNORM	W				7%	
NGA Duct Depreciation	PDTLMD	B, M				4%	6.2.4
Pay and ROA	COMCOS	B				3%	6.2.10
Others		B, W				-5%	-

Underlying Method	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Total			✂	✂	✂	100%	-

Source: BT ASPIRE, Cartesian

There are two base methodologies that apportion costs based on duct valuation: PDTDUCT and PDTLMD. Together they account for approximately 90% of FAC attributed to AG135. The reason for the apportionment is that Openreach does not fully distinguish between access, backhaul and NGA duct costs in the GL (i.e., costs booked against the same CoW). These base methodologies are therefore required to apportion duct costs between the plant groups of these duct categories.

The PDTDUCT methodology attributes cost between access and backhaul ducts. The apportionment is based on BT's 1997 duct survey – adjusted for investment since then – rather than from an up-to-date GIS system. The PDTLMD methodology is used to split costs for NGA duct from those of non-NGA access duct on the basis of tie cable depreciation. (NGA duct refers to duct built between fibre street cabinet and copper street cabinet in FTTC deployments.) Only non-NGA costs are attributed to AG135.

Cumulo rates are apportioned on the basis of Profit Weighted Network Replacement cost (PWNRC) using the CUMNORM base methodology. Transfer charges for cumulo rates are attributed using the ORCUMNOR methodology. The transfer charge in received by Openreach balances with a transfer charge out from BT Property (W) – under 'Others'. No cumulo rebate is apportioned to AG135 (using CUMRBTE methodology).

The remaining material costs are Openreach shared costs (3%) which are apportioned on the basis of Openreach Pay and Return on Assets using the COMCOS base methodology

A more detailed description of these methodologies can be found in Section 6. Please refer to the table above for the appropriate section reference.

5.4.4.4 Cost Attribution to Access Duct from other Cost Categories

Following the attribution of costs from the general ledger at Level 1, AG135 receives additional cost attributions from 13 other activity groups. These activity groups contain shared costs across the whole of BT, of which there is an apportionment to access duct. This occurs in the cost exhaustion process prior to costs being attributed from AG135 to plant groups at Level 6.

The attribution methodologies of these AGs (those within the scope of this report) are explained in the relevant sections of this report. The two tables below show the main cost contributors by cost category and by division.

Table 45. ***Costs Apportioned to Access Duct (AG135) between Level 1 and 6, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section
Level 1	**Access Duct**	**AG135**	[£250 to £300]	[£4000 to £4200]	[£600 to £700]	-
[Exhausted between Level 1 and 6]	Corporate Costs	AG112	[£50 to £100]	[£10 to £50]	[£50 to £100]	5.3.4
	OR Pay plus % FA driver	AG410	[£0 to £10]	[£10 to £50]	[£10 to £50]	5.10.16.3
	TSO Operational Costs	AG102	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.10.11
	Group Property and Facilities Mgnt	AG106	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.6.4
	OR Fixed Asset driver	AG408	[£0 to £10]	[£0 to £10]	[£0 to £10]	-
	OR Pay driver	AG401	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.3.6
	TSO Support Functions	AG103	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.3.5
	Motor Transport	AG101	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.10.4
	Liquid Funds and Interest	AG113	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.10.16.6
	Property Asset Driver	AG412	£0	[£0 to £10]	[£0 to £10]	5.6.5
	OR Stores driver	AG403	[£0 to £10]	£0	[£0 to £10]	-
	Fleet Fuel Driver	AG415	[£0 to £10]	£0	[£0 to £10]	-
	Property Provision Driver	AG414	£0	[-£10 to £0]	£0	5.6.6
	Sub-Total		[£50 to £100]	[£50 to £100]	[£50 to £100]	-
Level 6	**Access Duct**	**AG135**	[£300 to £350]	[£4200 to £4400]	[£700 to £800]	-

Source: BT ASPIRE, Cartesian

Table 46 below provides a view of the above costs but at a business unit level. Openreach, which is the largest source of cost at Level 1, also contributes the greatest share of additional cost in the exhaustion process. All other divisions contributing cost at this stage are not present at Level 1 (see Table 42). These divisions only attribute indirect costs to AG135. Note that the negative CCA for BT TSO is due to the impact of transfers-charges-out from BT TSO in AG135 at Level 6.

Table 46. ***Costs Apportioned to Access Duct (AG135) between Level 1 and 6, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	Openreach	[£100 to £150]	[£10 to £50]	[£100 to £150]
C	Corporate Headquarters	[£10 to £50]	[£0 to £10]	[£10 to £50]
E	Corporate Adjustments	£0	[£50 to £100]	[£0 to £10]

Y	Group Business Services	[£0 to £10]	[£0 to £10]	[£0 to £10]
F	BT Facilities Management	[£0 to £10]	£0	[£0 to £10]
G	Group Consolidation Units	[£0 to £10]	[-£100 to -£50]	[-£10 to £0]
T	BT TSO	[-£100 to -£50]	[£10 to £50]	[-£100 to -£50]
Total		[£50 to £100]	[£50 to £100]	[£50 to £100]

Source: BT ASPIRE, Cartesian

Table 47 shows that the cost attribution to AG135 from other cost categories does not have a material impact on the relative mix of FAC by division between Level 1 and Level 6.

Table 47. ***Access Duct Costs at Level 6, shown by Division***

Division	Description	Level 1		Level 6	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC %
B	Openreach	[£600 to £700]	[85% to 105%]	[£700 to £800]	[90% to 110%]
C	Corporate Headquarters	£0	0%	[£10 to £50]	[0% to 10%]
M	BT Retail (Northern Ireland)	[£10 to £50]	[0% to 10%]	[£10 to £50]	[0% to 10%]
E	Corporate Adjustments	£0	0%	[£0 to £10]	[0% to 5%]
W	BT Property	[-£10 to £0]	[-5% to 0%]	[-£10 to £0]	[-5% to 0%]
G	Group Consolidation Units	£0	0%	[-£10 to £0]	[-5% to 0%]
T	BT TSO	£0	0%	[-£100 to -£50]	[-15% to - 5%]
Total		[£600 to £700]	**100%**	[£700 to £800]	**100%**

Source: BT ASPIRE, Cartesian

5.4.4.5 *Cost Attribution from AG135 to other Cost Categories*

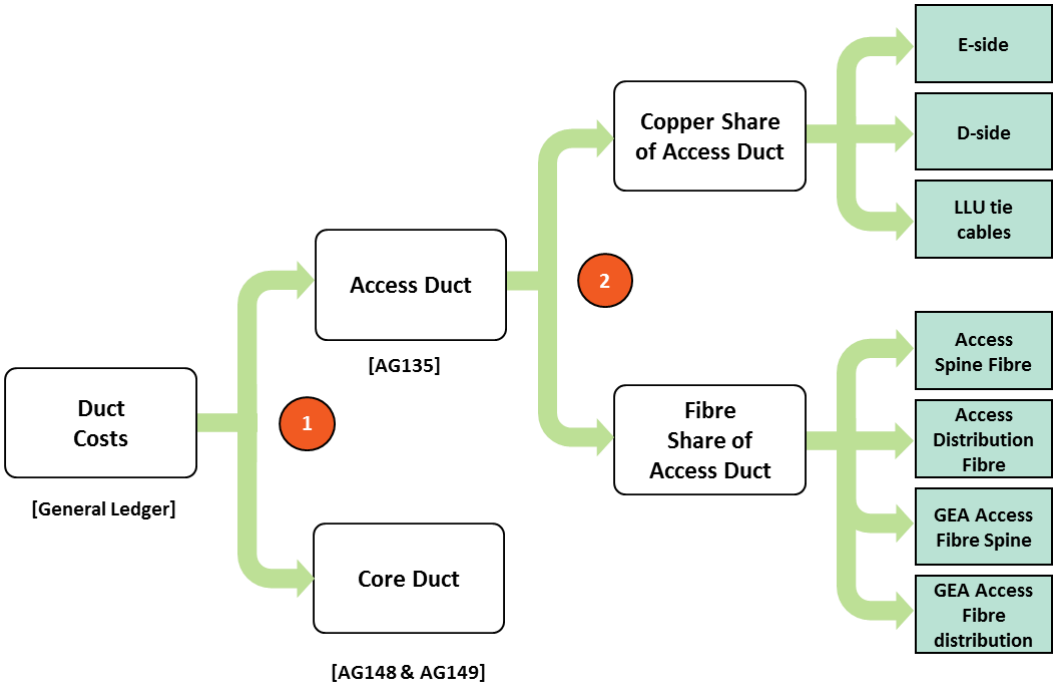
AG135 is exhausted at Level 6 in BT's attribution process, apportioning duct costs to seven plant groups, all relating to Copper or Fibre.

The apportionment method consists of two main steps as illustrated in Figure 1. The first step apportions duct costs between the two different cable types present in the access duct, i.e., copper and fibre. This apportionment uses the 1997 duct survey and the derived *Fibre:Copper* access ratio (from the Duct Valuation exercise).

The second step apportions the fibre and copper-related costs to technology-specific cable segments, i.e., E-side and D-side cables for copper; and, Spine and Distribution cables for fibre. The apportionment in this step is based on the depreciation costs of each of the different cable types.

This method is explained in further detail in Section 6.2.2.

Figure 9. ***Apportionment of Duct Costs Between Access and Core Duct (1) and Between Copper and Fibre (2)***



Source: Cartesian

AG135 costs are apportioned to seven PGs as shown in the table below. As can be seen, D-side copper cable is attributed with the highest percentage of the costs since copper occupies more access duct space than fibre, and D-Side cables are more numerous than E-Side cables and hence have a greater depreciation charge. The same is true for the access fibre cables.

Table 48. ***Apportionment of AG135 costs to PGs***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Document Section Ref
D-side Copper Cable	PG118C	✂[£250 to £300]	✂[£3400 to £3600]	✂[£600 to £700]	5.7.10
E-side Copper Cable	PG117C	✂[£10 to £50]	✂[£300 to £350]	✂[£50 to £100]	5.7.5
Access Distribution Fibre	PG959C	✂[£10 to £50]	✂[£250 to £300]	✂[£10 to £50]	5.5.4
Access Fibre Spine	PG111C	✂[£0 to £10]	✂[£50 to £100]	✂[£10 to £50]	5.5.5
GEA Distribution Fibre	PG951C	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	5.5.8

GEA Access Fibre Spine	PG950C	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	5.5.9
Intra-exchange Tie Cables	PG130A	£0	✂[£0 to £10]	£0	5.7.7
Total		✂[£300 to £350]	✂[£4200 to £4400]	✂[£700 to £800]	-

Source: BT ASPIRE, Cartesian

5.4.4.6 *Contribution of AG135 costs at Network Component Level*

As AG135 is an activity group, its costs are apportioned to Plant Groups rather than directly to Network Components. However it is possible to determine the contribution of AG135 costs at the Network Component level.

The analysis reveals a total of 20 Network Components, which represent both copper cables and circuit types in the access network. The associated attribution methodologies can be found in the Copper and Fibre Cost Group sections of this report.

Copper cable related Network Components (CL173 and CL171) receive over ✂% of the access duct FAC.

Table 49. ***Access Duct costs apportioned to Network Components (Top 10)***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
D side copper capital	CL173	✂[£250 to £300]	✂[£3400 to £3600]	✂[£600 to £700]
E side copper capital	CL171	✂[£10 to £50]	✂[£300 to £350]	✂[£50 to £100]
Ethernet Access Direct Fibre	CW609	✂[£10 to £50]	✂[£150 to £200]	✂[£10 to £50]
Wholesale & LAN extension services fibre etc.	CO450	✂[£0 to £10]	✂[£50 to £100]	✂[£10 to £50]
PC rentals 2Mbit/s local end fibre	CO439	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
GEA distribution fibre	CL951	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
ISDN30 access	CL189	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
Backhaul extension services fibre etc.	CO447	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
OR Managed Services for Retail	CK985	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
GEA access fibre spine	CL950	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
Others (10x)		£0	✂[£0 to £10]	✂[£0 to £10]
Total		✂[£300 to £350]	✂[£4200 to £4400]	✂[£700 to £800]

Source: BT ASPIRE, Cartesian

5.4.5 Backhaul Duct (AG148)

5.4.5.1 Summary

Backhaul duct costs are captured in AG148. Like AG135 and AG149, it captures costs related to duct assets and activities including depreciation, cost of capital, street work, pay, among others.

The key findings within this section are:

1. Backhaul duct costs are not apportioned to 21CN fibre
2. Cost of capital contributes to more than half of the total backhaul duct FAC
3. BT Openreach is the main cost contributor

5.4.5.2 Composition by Cost Type and Organisational Unit

Table 50 shows the costs apportioned to backhaul duct at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

The majority of backhaul duct costs are incurred by Openreach, which accounts for ✂% of the ✂ [£100m to £150m] FAC. Almost ✂ of total FAC is cost of capital. Current year asset depreciation costs, some positive CCA adjustments and transfer charges (in) complete the list of the top cost types being apportioned to AG148.

The transfer charges in this AG recover costs mainly for BT Property from Openreach and BT Retail Northern Ireland (not shown in the table). Overall the transfer charges in and out of this AG balance, being shown to reflect the different internal trades occurring among different teams within BT Group. These transfers are mainly related to cumulo rates charges (from BT Property).

Despite the large capital cost associated with the GBV, there is considerable accumulated depreciation and some CCA adjustment which reduce the overall MCE value. This applies both to Openreach and BT Retail Northern Ireland divisions. The negative amounts are related to other CCA adjustments e.g. current year CCA adjustments for depreciation or provision for assets in course of construction (AICC).

Table 50. ***Costs apportioned to Backhaul Duct (AG148) at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

There are almost 60 units incurring costs related with backhaul duct. Table 51 calls out the 10 most significant units. Openreach (OUC B) apportions direct costs to backhaul duct. Other units such as Openreach Analysis Code (BY) and BT Property (W) apportion cumulo liabilities and other shared costs as explained for Access Duct (AG135, above).

Table 51. ***Organisational Units contributing costs to Backhaul Duct (AG148) at Level 1 (Top 10)***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	B	Openreach	[£10 to £50]	[£800 to £900]	[£100 to £150]
	BY	Openreach Analysis Code	[£0 to £10]	£0	[£0 to £10]
W	W	BT Property	[£0 to £10]	£0	[£0 to £10]
B	BL	Openreach Infrastructure Delivery	[£0 to £10]	[£10 to £50]	[£0 to £10]
M	MJ	BT Northern Ireland	[£0 to £10]	[£10 to £50]	[£0 to £10]
B	BF	Openreach Finance	[£0 to £10]	[£0 to £10]	[£0 to £10]
	BA	Openreach Learning and Development	[£0 to £10]	£0	[£0 to £10]
	BQ	Openreach Transformation	[£0 to £10]	£0	[£0 to £10]
	BR	Openreach Marketing and Sales	[£0 to £10]	£0	[£0 to £10]
	BK	Openreach Equivalence & Pub Affairs	[£0 to £10]	[-£10 to £0]	£0
Others			[-£10 to £0]	[-£50 to -£10]	[-£50 to -£10]
Total			[£50 to £100]	[£800 to £900]	[£100 to £150]

Source: BT ASPIRE, Cartesian

5.4.5.3 *Cost Attribution to Backhaul Duct (AG148) from General Ledger*

Table 52 shows the most significant base methodologies used by BT to apportion ledger level costs to cost category AG148. In total, there are over 20 base methodologies and over 10 different transfer charges out.

Note that these base methodologies and cost attribution patterns are similar to those observed for access duct which shows consistency of treatment of similar costs.

Table 52. ***Notable Methods for Cost Attribution to Backhaul Duct (AG148) from General Ledger***

Driver	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Duct Valuation And Usage	PDTDUCT	B,M				85%	6.2.2
PWNRC	ORCUMNOR	B				7%	6.2.3
	CUMNORM	W				7%	
NGA Duct	PDTLMD	B, M				4%	6.2.4
Pay + ROA	COMCOS	B				3%	6.2.10
-	Others	-				-6%	-

Driver	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
		Total	✂	✂	✂	**100%**	-

Source: BT ASPIRE, Cartesian

The most significant methodology for apportioning backhaul duct costs (PDTDUCT) is based on a two-stage process that considers duct valuation and duct usage (a variation of the duct valuation method) as explained in the access duct section (see Section 5.4.4).

The first stage of the process defines the *access:core* duct ratio based on BT's duct valuation which is derived from the 1997 duct survey, and adjusted for investment since then. In the second stage, the core ratio is split between backhaul and 'true' core duct. This split is defined by the number of live circuits in the backhaul and core networks (i.e. duct usage). Note that core duct costs are attributed to the core duct (AG149) cost category (normally) using direct allocation. The resulting *access:backhaul* ratio is used to apportion Openreach and BT Retail Northern Ireland costs to access duct (AG135) and backhaul duct (AG148) using the PDTDUCT base methodology

Cumulo rates and Openreach shared costs are equally apportioned to AG148 (using CUMNORM and COMCOS methodologies respectively) as described for access duct (see Section 5.4.4).

These methodologies are described in more detail in Section 6. Please refer to the table above for the appropriate sub-section reference.

5.4.5.4 *Cost Attribution to Backhaul Duct (AG148) from other Cost Categories*

Following the attribution of costs from the general ledger at Level 1, AG148 receives additional cost attributions from 12 other activity groups. These activity groups contain shared costs across the whole of BT, of which there is an apportionment to backhaul duct. This occurs in the cost exhaustion process prior to costs being attributed from AG148 to plant groups at Level 6.

The attribution methodologies of these AGs (those within the scope of this report) are explained in the relevant sections of this report.

The two tables below show the main contributors by cost category and division.

Table 53. ***Costs Apportioned to Backhaul Duct (AG148) between Level 1 and 6, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
1	**Backhaul Duct**	**AG148**	✂[£50 to £100]	✂[£800 to £900]	✂[£100 to £150]	-
Exhausted between Level 1 and 6	Corporate Costs	AG112	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]	5.3.4
	OR Pay plus % FA driver	AG410	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.16.3
	TSO Operational Costs	AG102	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.11
	Group Property and Facilities Management	AG106	✂[£0 to £10]	£0	✂[£0 to £10]	5.6.4

	OR Fixed Asset driver	AG408	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	-
	OR Pay driver	AG401	✂[£0 to £10]	£0	✂[£0 to £10]	5.3.6
	TSO Support Functions	AG103	£0	£0	£0	5.3.5
	Motor Transport	AG101	£0	£0	£0	5.10.4
	Liquid Funds and Interest	AG113	£0	✂[£0 to £10]	£0	5.10.16.6
	Property Asset Driver	AG412	£0	✂[£0 to £10]	£0	5.6.5
	OR Stores driver	AG403	£0	£0	£0	-
	Fleet Fuel Driver	AG415	£0	£0	£0	-
	Sub-Total		✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]	-
6	**Backhaul Duct**	**AG148**	✂[£50 to £100]	✂[£800 to £900]	✂[£150 to £200]	

Source: BT ASPIRE, Cartesian

An additional ✂ [£10m to £50m] FAC is apportioned to AG148 by 12 different cost categories between Level 1 and 6. The majority of additional attributions are operational costs. The Openreach division is the largest source of cost by FAC.

Table 54. ***Costs Apportioned to Backhaul Duct (AG148) between Level 1 and 6, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	Openreach	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]
C	Corporate Headquarters	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
E	Corporate Adjustments	£0	✂[£10 to £50]	✂[£0 to £10]
Y	Group Business Services	✂[£0 to £10]	£0	✂[£0 to £10]
F	BT Facilities Management	£0	£0	£0
G	Group Consolidation Units	£0	✂[-£50 to -£10]	✂[-£10 to £0]
T	BT TSO	✂[-£50 to -£10]	✂[£0 to £10]	✂[-£10 to £0]
Total		✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]

Source: BT ASPIRE, Cartesian

The additional attributions do not have a material impact on the relative mix of FAC by division between Level 1 and Level 6, as shown in the table below. The mix of costs by division at Level 6 is similar to that of Access Ducts (AG135).

Table 55. ***Backhaul Duct (AG148) Costs at Level 6, shown by Division***

Division	Description	Level 1		Level 6	
		FAC (£ m)	FAC %	FAC (£ m)	FAC %
B	Openreach	[£100 to £150]	[70% to 110%]	[£150 to £200]	[95% to 130%]
C	Corporate Headquarters	£0	0%	[£0 to £10]	[0% to 10%]
M	BT Retail	[£0 to £10]	[0% to 10%]	[£0 to £10]	[0% to 10%]
E	Corporate Adjustments	£0	0%	[£0 to £10]	[0% to 10%]
W	BT Property	[-£10 to £0]	[-10% to 0%]	[-£10 to £0]	[-10% to 0%]
G	Group Consolidation Units	£0	0%	[-£10 to £0]	[-10% to 0%]
T	BT TSO	£0	0%	[-£50 to -£10]	[-35% to - 5%]
Total		**[£100 to £150]**	**100%**	**[£150 to £200]**	**100%**

Source: BT ASPIRE, Cartesian

5.4.5.5 *Cost Attribution from Backhaul Duct (AG148) to other Cost Categories*

Backhaul duct costs are directly allocated to a single plant group, Backhaul Fibre (PG170B). Unlike Access Duct (AG135), backhaul ducts only contain one type of cable (fibre).

Note however the corresponding fibre PG is solely related to fibre deployed in the 20C backhaul network. In the FY 2013/14 RFS, BT does not apportion any backhaul duct costs to the plant groups of fibre deployed in the 21C backhaul network. This issue is addressed in the RAP assessment in Section 6.3.1.

5.4.5.6 *Contribution of Backhaul Duct (AG148) costs at Network Component Level*

As AG148 is an activity group, its costs are apportioned to a plant group (PG170B) rather than directly to network components. However it is possible to determine the contribution of AG148 costs at Network Component level. The analysis reveals a total of 20 Network Components, with the top 10 breakdown in the table below. The majority of backhaul duct costs are apportioned to Ethernet Main links and 2Mbps Private Circuits as these are the two of the most common circuit types found in the network. The related attribution methodology (from PG170B to Network Component) is described in Fibre Cost Group section.

Table 56. ***Backhaul Duct (AG148) costs apportioned to Network Components (Top 10)***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
Ethernet main links	CO484	✂[£10 to £50]	✂[£450 to £500]	✂[£50 to £100]
OR PC rentals 2Mbit/s distribution	CF371	✂[£0 to £10]	✂[£100 to £150]	✂[£10 to £50]
Broadband backhaul circuits	CO681	✂[£0 to £10]	✂[£50 to £100]	✂[£10 to £50]
Remote - local transmission length	CO326	✂[£0 to £10]	✂[£50 to £100]	✂[£10 to £50]
OR PC rentals 34Mbit/s distribution	CF373	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
Local - tandem transmission length	CO340	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
OR PC rentals 64kbit/s link distribution	CF391	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
OR PC rentals 140Mbit/s distribution	CF375	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
ISDN30 access	CL189	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
Point of Handover electronics	CO379	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
Others (10x Network Components)		✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
Total		✂[£50 to £100]	✂[£800 to £900]	✂[£150 to £200]

Source: BT ASPIRE, Cartesian

5.4.6 Core Duct (AG149)

5.4.6.1 Summary

Core duct costs are apportioned to AG149 at Level 1. Like the other duct cost categories (AG135 and AG148), the core duct cost category AG149 captures costs related to duct assets and activities including asset depreciation, cost of capital, street works and pay, among others.

The key findings within this section are:

1. Core duct costs are not apportioned to 21CN fibre
2. Cost of capital contributes to more than half of the total backhaul duct FAC
3. BT TSO is the main cost contributor as the core duct assets are assigned to TSO; this contrasts with Access Duct and Backhaul Duct assets which are assigned to Openreach

5.4.6.2 Composition by Cost Type and Organisational Unit

Table 57 shows the costs apportioned to core duct at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

BT TSO is the main division incurring core duct related costs (✂ %). BT Property also attributes a small fraction (✂ %) of FAC. As in the other duct cost categories (AG135 and AG148), the total FAC

is driven by cost of capital which is approximately twice the operational costs. Although no BT TSO current year pay costs appear in the breakdown, a deeper analysis shows ✂ of capitalised pay in this cost category.

No transfer charges are attributed to this AG from BT Property to BT TSO (or *vice versa*) as is the case for access and backhaul duct cost categories.

Table 57. ***Costs apportioned to Core Duct (AG149) at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

At an organisation unit level, there is only one unit with a material contribution to this cost category: TT (BT TSO RESEARCH & INNOVATION) within BT TSO division. All the others units (approximately 20) attribute cost volumes lower than £0.5m FAC and therefore are not material for the analysis. Due to time limitations on the project Cartesian was unable to discuss the nature of OUC TT with BT.

5.4.6.3 *Cost Attribution to Core Duct from General Ledger*

Table 58 shows the most significant base methodologies used to attribute cost to AG149 from the general ledger. Direct allocation dominates as BT TSO costs related to duct are incurred exclusively in the core network and thus are 100% allocated to the corresponding cost category, AG149.

Table 58. ***Notable Methods for Cost Attribution to Core Duct (AG149) from General Ledger***

Cost Driver	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct Allocation	PDTDUCT	T	✂	✂	✂	88%	6.2.1
PWNRC	CUMNORM	W	✂	✂	✂	8%	6.2.3
Direct Allocation	PDTLMD	T	✂	✂	✂	4%	6.2.1
Total			✂	✂	✂	**100%**	-

Source: BT ASPIRE, Cartesian

Somewhat confusingly, the direct allocation is achieved using two base methodologies (PDTDUCT and PDTLMD) which previously (AG135 and AG148) used duct valuation to apportion costs.

Cumulo rates are apportioned on the basis of Profit Weighted Network Replacement Costs, as for the other duct cost categories. This methodology is described in more detail in Section 6.

5.4.6.4 *Cost Attribution to Core Duct from other Cost Categories*

Following the attribution of costs from the general ledger at Level 1, AG149 receives additional cost attributions from five other activity groups. These activity groups contain shared costs of there is an

apportionment to core duct. This occurs in the cost exhaustion process prior to costs being attributed from AG149 to plant groups at Level 6.

The attribution methodologies of these AGs (those within the scope of this report) are explained in the relevant sections of this report. The tables below shows the main contributors by cost category and division.

Table 59. ***Costs Apportioned to Core Duct (AG149) between Level 1 and 6, by Cost Categories***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section
1	**Core Duct**	**AG149**	[£10 to £50]	[£250 to £300]	[£10 to £50]	-
Exhausted between	Corporate Costs	AG112	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.3.4
	TSO Operational Costs	AG102	£0	£0	£0	5.10.11
	Group Property and Facilities Management	AG106	£0	£0	£0	5.6.4
	TSO Support Functions	AG103	£0	£0	£0	5.3.5
	Liquid Funds and Interest	AG113	£0	£0	£0	5.10.16.6
6	**Core Duct**	**AG149**	[£10 to £50]	[£250 to £300]	[£10 to £50]	-

Source: BT ASPIRE, Cartesian

Corporate Costs (AG112) are the only material costs being apportioned to AG149 in the exhaustion process.

From a division perspective, the table below reveals that Corporate Headquarters (C) and TSO (T) divisions are the largest contributors. The costs from both of these divisions are attributed to AG149 from AG112 (% FAC).

Table 60. ***Costs Apportioned to Core Duct (AG149) between Level 1 and 6, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
C	Corporate Headquarters	[£0 to £10]	[£0 to £10]	[£0 to £10]
T	BT TSO	[£0 to £10]	[£0 to £10]	[£0 to £10]
E	Corporate Adjustments	£0	[£0 to £10]	£0
G	Group Consolidation Units	£0	[-£10 to £0]	£0
Total		[£0 to £10]	[£0 to £10]	[£0 to £10]

Source: BT ASPIRE, Cartesian

Following the additional cost attribution, the Corporate Headquarters division now appears as a cost contributor. However with a [0% to 25%] share of FAC, its inclusion does not significantly change the cost mix from other divisions.

Table 61. ***Core Duct (AG149) Costs at Level 6, shown by Division***

Division	Description	Level 1		Level 6	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
T	BT TSO	✂[£10 to £50]	✂ [20% to 115%]	✂[£10 to £50]	✂ [20% to 105%]
W	BT Property	✂[£0 to £10]	✂ [0% to 25%]	✂[£0 to £10]	✂ [0% to 25%]
C	Corporate Headquarters	£0	0%	✂[£0 to £10]	✂ [0% to 25%]
E	Corporate Adjustments	£0	0%	£0	0%
Total		✂ **[0% to 25%]**	**100%**	✂ **[0% to 25%]**	**100%**

Source: BT ASPIRE, Cartesian

5.4.6.5 *Cost Attribution from Core Duct (AG149) to other Cost Categories*

Core duct costs are directly attributed to the Core Fibre plant group (PG350N) since there is only fibre cable in core ducts.

Note however that the corresponding fibre PG is solely related to fibre deployed in the 20C core network. In the FY 2013/14 RFS, BT does not apportion any core duct costs into plant groups related to fibre deployed in the 21C core network. This issues is addressed in the RAP assessment, Section 6.3.1.2.

5.4.6.6 *Contribution of Core Duct (AG149) costs at Network Component Level*

As explained above, AG149 costs are attributed to a plant group (PG350N) rather than directly to network components. However it is possible to determine the contribution of AG149 costs at Network Component level.

The analysis reveals a total of 22 Network Components, with the top 10 breakdown in the table below. Almost half of core duct costs are tied to internal circuit types interconnecting ATM switches (✂ [20% to 105%]) and tandem voice switches (✂ [0% to 25%]). 2Mbps and 140Mbps private circuit types in national and regional trunks are apportioned a further ✂% of FAC.

Table 62. ***Core Duct (AG149) costs apportioned to Network Components (Top 10)***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
Inter ATM transmissions	CO316	[£0 to £10]	[£100 to £150]	[£10 to £50]
Inter - tandem transmission length	CO370	[£0 to £10]	[£10 to £50]	[£0 to £10]
PC rentals 2Mbit/s regional trunk	CG101	[£0 to £10]	[£10 to £50]	[£0 to £10]
PC rentals 140Mbit/s national trunk	CG203	[£0 to £10]	[£10 to £50]	[£0 to £10]
PC rentals 140Mbit/s regional trunk	CG103	[£0 to £10]	[£10 to £50]	[£0 to £10]
PC rentals 2Mbit/s national trunk	CG201	[£0 to £10]	[£10 to £50]	[£0 to £10]
PC rentals 34Mbit/s national trunk	CG202	[£0 to £10]	[£10 to £50]	[£0 to £10]
PC rentals 34Mbit/s regional trunk	CG102	[£0 to £10]	[£0 to £10]	[£0 to £10]
PC rental 2Mbit/s link per km distribution	CR371	[£0 to £10]	[£0 to £10]	[£0 to £10]
PC rental 64kbit/s link per km transmission	CR391	£0	[£0 to £10]	[£0 to £10]
Others (12x)		[£0 to £10]	[£0 to £10]	[£0 to £10]
Total		[£10 to £50]	[£250 to £300]	[£10 to £50]

Source: BT ASPIRE, Cartesian

5.5 Fibre

Fibre is the key transmission medium used to connect all the local exchanges and main cross-connection nodes in BT's backhaul and core network. It's also used in the access network for business connectivity and next-generation broadband services.

The Fibre cost group accounts for approximately £189m FAC at Level 1, which is around 3% of BT's total FAC across all markets (excluding retail residual).

The key messages in this section are:

1. Backhaul and Core fibre are apportioned based on fibre length while Non-NGA and NGA access fibre are apportioned based on fibre GRC
2. Costs from other cost categories (in particular duct costs) form half of the costs attributed to Fibre PGs by Level 7
3. More than half of the fibre costs are attributed to services within Business Connectivity market

5.5.1 Contribution to Market Costs

Table 63 shows the attribution of fibre costs to regulated and unregulated markets. Services within the Business Connectivity markets are attributed more than two-thirds of the total fibre costs, in particular AISBO Non-WECLA and TISBO (up to 8Mbps) services which together account for 64% of FAC.

AISBO WECLA is attributed far less fibre cost than AISBO Non-WECLA (3% vs. 54%). This is primarily due to the difference on service volumes sold by BT. Also, economies of scale achieved by BT in WECLA region gives a lower unit cost.

WLR and LLU services (from the Fixed Access markets) are provided over copper only and thus no fibre costs are attributed to them. Note that 20% of the costs are attributed to Wholesale Residual. This is mainly associated with NGA fibre.

As in the case of duct, the majority of fibre costs are driven by the cost of capital due to the large asset value of fibre in the network.

Table 63. ***Fibre costs by Markets (2014, £m)***

Market Review	Market	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC %
Business Connectivity Markets	AISBO Non-WECLA	£42	£605	£102	54%
	TISBO (up to and including 8 Mbps)	£6	£132	£19	10%
	AISBO WECLA	£3	£30	£6	3%
	MISBO Non-WECLA	£1	£19	£3	2%
	TISBO (above 8 Mbps up to and including 45 Mbps)	£0	£10	£1	1%
	Wholesale Regional Trunk Segments	£0	£10	£1	1%
	Point of Handover	£0	£4	£1	0%
	TISBO (above 45 Mbps up to and including 155 Mbps)	-£0	£8	£1	0%
Business Connectivity Markets Total		**£52**	**£817**	**£134**	**71%**
Fixed Access Markets	Wholesale ISDN30 Lines	£6	£70	£13	7%
	Wholesale ISDN2 Lines	-£0	£0	£0	0%
	Wholesale Line Rentals (WLR)	N/A	N/A	N/A	N/A
	Local Loop Unbundling (LLU)	N/A	N/A	N/A	N/A
Fixed Access Markets Total		**£6**	**£70**	**£13**	**7%**
Wholesale Broadband Access Markets	Wholesale Broadband Access - Market 1	-£1	£29	£2	1%
	Wholesale Broadband Access - Market 2	-£0	£5	£0	0%
Wholesale Broadband Access Markets Total		**-£1**	**£34**	**£2**	**1%**
Narrowband Markets	Calls: Call Origination	-£1	£10	£0	0%
	Calls: Call Termination	-£1	£9	£0	0%
	Interconnect Circuits	-£0	£3	£0	0%
Narrowband Markets Total		**-£1**	**£22**	**£1**	**1%**
Wholesale Residual	Wholesale Residual	**£20**	**£190**	**£39**	**20%**
TOTAL		**£76**	**£1,132**	**£189**	**100%**

Source: BT ASPIRE, Cartesian

Table 64 shows the proportion of costs in each service that are due to fibre. AISBO Non-WECLA service has the highest share of fibre costs in its overall costs. Fibre is less significant for AISBO WECLA because average circuit lengths are shorter.

With the exception of Wholesale ISDN30 Lines, for which fibre costs make 14% of its costs, the proportion of FAC represented by fibre in Fixed Access, Wholesale Broadband Access and

Narrowband markets is small. Note that although Wholesale Residual is attributed with 20% of fibre costs (see previous table), it just corresponds to 2% of its overall costs.

Table 64. ***Proportion of Fibre costs in each Market (2014, %)***

Market Review	Market	Fibre costs as a proportion of Market Costs
Business Connectivity Markets	AISBO Non-WECLA	20%
	Point of Handover	15%
	AISBO WECLA	13%
	TISBO (up to and including 8 Mbps)	7%
	MISBO Non-WECLA	7%
	Wholesale Regional Trunk Segments	6%
	TISBO (above 8 Mbps up to and including 45 Mbps)	6%
	TISBO (above 45 Mbps up to and including 155 Mbps)	3%
Fixed Access Markets	Wholesale ISDN30 Lines	14%
	Wholesale ISDN2 Lines	0%
	Wholesale Line Rentals (WLR)	N/A
	Local Loop Unbundling (LLU)	N/A
Wholesale Broadband Access Markets	Wholesale Broadband Access - Market 1	1%
	Wholesale Broadband Access - Market 2	0%
Narrowband Markets	Interconnect Circuits	1%
	Calls: Call Termination	0%
	Calls: Call Origination	0%
Wholesale Residual	Wholesale Residual	2%

Source: BT ASPIRE, Cartesian

5.5.2 Composition by Cost Category

This section summarises the cost categories within the fibre cost group and provides an analysis on three dimensions:

- Most relevant cost contributors at BT division and OUC level (Who)
- Breakdown of the costs being apportioned to the cost categories by cost type (What)
- Description of the methodologies used to apportion costs to and from each cost category (How)

The fibre cost group comprises nine BT cost categories as shown in the table below.

The table shows the respective attributed costs and the section where these cost categories are analysed. Note that the cost categories related to access fibre costs are grouped into non-NGA and NGA access fibre to ease reading and understanding of the analysis.

The most significant component is non-NGA access Distribution Fibre (PG959C). Core and backhaul fibre costs are relatively small compared to access fibre costs. Note that overall fibre costs are mainly composed of cost of capital.

There are five PGs relating to 21C fibre, however these are outside the scope based on the selection methodology used in this study. Please refer to Section 3 for further explanation.

Table 65. ***Fibre Cost Components at Level 1***

Section	Cost Components		BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
5.5.3	Non-NGA Access Fibre	Distribution Fibre	PG959C	[£50 to £100]	[£500 to £600]	[£100 to £150]
		Spine Fibre	PG111C	[£0 to £10]	[£150 to £200]	[£10 to £50]
		Maintenance	PG111M	[£0 to £10]	[-£10 to £0]	[£0 to £10]
		Sub-Total		[£50 to £100]	[£700 to £800]	[£100 to £150]
5.5.7	NGA Access Fibre	Distribution Fibre	PG951C	[£0 to £10]	[£50 to £100]	[£10 to £50]
		Spine Fibre	PG950C	[£0 to £10]	[£10 to £50]	[£0 to £10]
		Maintenance	PG951M PG950M	[£0 to £10]	£0	[£0 to £10]
		Sub-Total		[£10 to £50]	[£100 to £150]	[£10 to £50]
5.5.11	20C Core Fibre		PG350N	[£0 to £10]	[£50 to £100]	[£0 to £10]
0	20C Backhaul Fibre		PG170B	[-£50 to -£10]	[£150 to £200]	[£0 to £10]
Total				**£77**	**£1,132**	**£188**

Source: BT ASPIRE, Cartesian

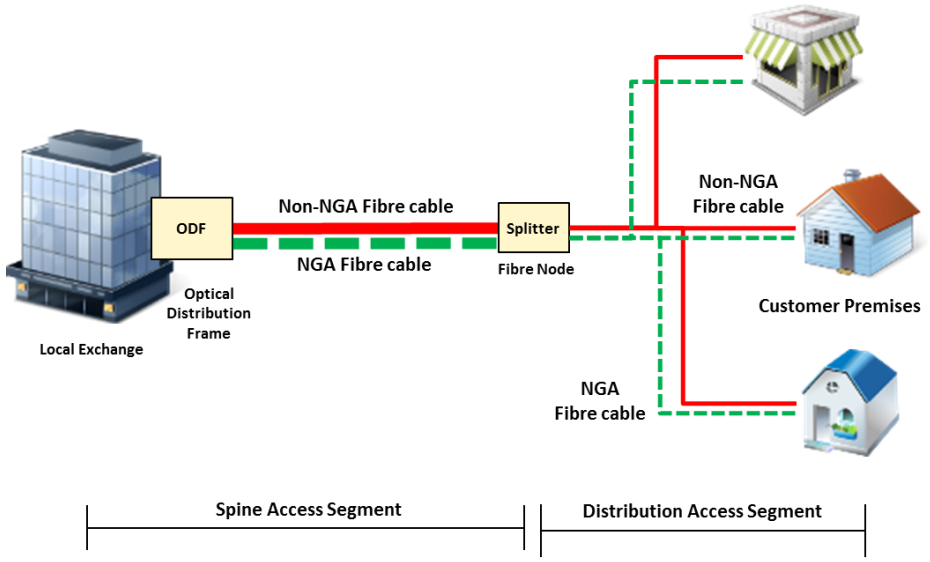
5.5.3 Non-NGA Access Fibre

Non-NGA Access Fibre refers to fibre deployed in access network that is not used by next generation access (NGA) products such as ISDN30 or 2Mbps private circuits. The costs are captured in three cost categories which are discussed in the following sections:

- Distribution Fibre (PG959C)
- Spine Fibre (PG111C)
- Access Fibre Maintenance (PG111M)

Significant cost items in Distribution Fibre (PG959C) and Spine Fibre (PG111C) include fibre depreciation costs, pay costs for fibre planning and installation, *cumulo* rates and property rental and electricity, among others. Maintenance costs incurred in both segments are captured in Access Fibre Maintenance (PG111M) cost category.

Figure 10. ***High level representation of BT's fibre access network***



5.5.4 Distribution Fibre (PG959C)

5.5.4.1 Summary

The PG959C cost category captures costs related to fibre deployed in the distribution segment of the access network. The distribution segment sits between the distribution points (located between the local exchange and the customer premises) and the customer premises.

The key findings within this section are as follows:

1. Cumulo liabilities or electricity charges are not attributed to Distribution Fibre at Level 1
2. Openreach is the main BT division contributing with costs at Level 1
3. Costs from other cost categories (in particular Access Duct AG135) form half of the costs attributed to Distribution Fibre by Level 7
4. Distribution Fibre costs are apportioned to exactly the same Network Components as Spine fibre costs
5. Costs are apportioned based on the bandwidth used by each circuit present in the access segment

5.5.4.2 Composition by Cost Type and Organisational Unit

Table 66 below shows the costs apportioned to distribution fibre at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

Due to the presence of negative costs, some individual items are greater in value than the sub-totals and totals. For example, Openreach cost of capital and pay costs represent ✂% of the total. Aside from Openreach, four other divisions contribute costs to this PG, but their impact on the overall total is small. BT Retail Northern Ireland (which encompasses Openreach-type activities in Northern Ireland) contributes only ✂%.

The total FAC at Level 1 is comprised of current and capital costs in approximately the same proportion.

Transfer charges in this PG recover costs for Group Business Services from Openreach and BT Retail Northern Ireland. A positive transfer out charge from BT Property is observed contrary to expectations. However, overall the transfer charges in and out of this PG balance. This is currently being investigated by BT.

The negative MCE depreciation costs represents the accumulated depreciation of the distribution fibre assets. The NBV of the Openreach assets can be calculated by adding this to the GBV cost. Other negative values are related with CCA adjustments e.g. provision for assets in course of construction – assets constructed but not yet paid.

Table 66. ***Costs apportioned to Distribution Fibre (PG959C) at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

There are approximately 50 different teams contributing costs to distribution fibre, however only four of these are material. The following table illustrates the 10 most significant teams (by FAC). The top three are those teams actually planning and deploying fibre in the ground: Openreach (B), Openreach Infrastructure Delivery (BL) and BT Retail Northern Ireland (MJ). Other teams, like Openreach Learning and Development (BA) or Openreach Finance (BF), apportion miscellaneous costs across PG959C and other cost categories that relate to Openreach activities for which there is no direct relationship.

Table 67. ***Organisational Units contributing costs to Distribution Fibre (PG959C) at Level 1 (Top 10)***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	B	Openreach	[£10 to £50]	[£450 to £500]	[£50 to £100]
	BL	Openreach Infrastructure Delivery	[£10 to £50]	[£100 to £150]	[£10 to £50]
M	MJ	Northern Ireland	[£0 to £10]	[£10 to £50]	[£0 to £10]
W	WP	Group Property Partners	[£0 to £10]	£0	[£0 to £10]
B	BA	Openreach Learning and Development	[£0 to £10]	£0	[£0 to £10]
	BF	Openreach Finance	[£0 to £10]	£0	[£0 to £10]
	BR	Openreach Marketing and Sales	[£0 to £10]	£0	[£0 to £10]
	BQ	Openreach Transformation	[£0 to £10]	£0	[£0 to £10]
	BJ	Openreach General Council	[£0 to £10]	£0	[£0 to £10]
G	G	Group Consolidation Units	[£0 to £10]	[-£10 to £0]	£0
Others			[-£50 to -£10]	[-£10 to £0]	[-£50 to -£10]
Total			**[£50 to £100]**	**[£500 to £600]**	**[£100 to £150]**

Source: BT ASPIRE, Cartesian

5.5.4.3 *Cost Attribution to Distribution Fibre (PG959C) from General Ledger*

The treatment of the inbound costs is determined by approximately 20 attribution methodologies and 19 different transfer charges. The top three methodologies account for more than 100% of the total costs due to the presence of negative cost items. Table 68 shows the cost breakdown by the most notable base methodologies. The cost drivers of these methodologies are diverse and direct allocation is not widely used.

Table 68. ***Notable Methods for Cost Attribution to Distribution Fibre (PG959C) from General Ledger***

Underlying Method	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Fibre GRC	PDTLFDC	B, M	✂	✂	✂	129%	6.2.8
	CCAFIB	B, M ,K	✂	✂	✂	-39%	
Previously Attributed costs (Pay)	FTQ	B, M	✂	✂	✂	26%	6.2.17
Pay and ROA	COMCOS	B	✂	✂	✂	4%	6.2.10
Previously Attributed Costs	CAPEXP	B, M	✂	✂	✂	-1%	6.2.17
PWNRC	ORCUMNOR	B	✂	✂	✂	-3%	6.2.3
	CUMRBTE	W	✂	✂	✂	-3%	
Asset Policy	DTNCAP2	B	✂	✂	✂	-7%	6.2.19
Others (including Transfer Charges)		W, Y	✂	✂	✂	-6%	-
Total			✂	✂	✂	**100%**	-

Source: BT ASPIRE, Cartesian

The most important cost drivers are Fibre GRC and Pay.

Fibre GRC is used to apportion costs between Non-NGA Distribution Fibre (PG959C, the PG we are focusing on this section) and NGA Distribution Fibre (PG951C). Costs for these two separate Plant Groups are booked against the same CoW (LFDC) and therefore a base methodology (PDTLFDC) is required.

The CCA adjustments are attributed to the different access fibre related cost categories in the same proportion to the fibre operational costs. Therefore, BT also uses the Fibre GRC method to apportion it across all access fibre cost categories.

Pay is used as the basis of apportioning certain Openreach common costs. Many other PGs and AGs share these costs which are apportioned using the FTQ base methodology.

The methodologies are described in more detail in Section 6. Please refer to the above table for appropriate section reference.

5.5.4.4 *Cost Attribution to Distribution Fibre (PG959c) from other Cost Categories*

Following the attribution of costs from the general ledger at Level 1, PG959C receives additional cost attributions from 14 other activity groups. These activity groups' costs that are shared across the whole of BT, of which a share is apportioned to distribution fibre. This occurs in the cost exhaustion process prior to costs being attributed from PG959C to network components at Level 7. These other cost categories contribute ✂% of the total costs in PG959C at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. Table 69 and Table 70 show the costs apportioned both by cost category and division.

Table 69. ***Costs Apportioned to Distribution Fibre (PG959C) between Level 1 and 7, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
1	**Distribution Fibre**	**PG959C**	✂[£50 to £100]	✂[£500 to £600]	✂[£100 to £150]	-
Exhausted between Level 1 and 7	Duct used by Access Cables	AG135	✂[£10 to £50]	✂[£250 to £300]	✂[£10 to £50]	5.4.4
	Corporate Costs	AG112	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]	5.3.4
	OR Pay driver	AG401	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	5.3.6
	Motor Transport	AG101	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.4
	OR Pay plus % FA driver	AG410	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.16.3
	Group Property and Facilities Mgmt.	AG106	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	5.6.4
	Fleet Fuel Driver	AG415	✂[£0 to £10]	£0	✂[£0 to £10]	-
	TSO Operational Costs	AG102	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.11
	Others (6x)	-	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	-
	Sub-total		✂[£50 to £100]	✂[£250 to £300]	✂[£100 to £150]	-
7	**Distribution Fibre**	**PG959C**	✂[£100 to £150]	✂[£800 to £900]	✂[£200 to £250]	-

Source: BT ASPIRE, Cartesian

The highest percentage of indirect fibre costs is Access Duct (AG135). As explained in Access Duct (Section 5.4.4), a share of access duct costs is apportioned to the PG of the fibre cables within them. Note that more than half the value of access duct costs apportioned are due to capital costs.

A significant amount is also apportioned from Corporate Costs (AG112). The absence of a direct causal relationship between corporate and distribution fibre costs obliges BT to use of a cost driver that apportion these costs across the company's activities and assets. AG112 is apportioned using a mix of company pay costs and return on assets (ROA).

Table 70 shows that Openreach, which is the largest source of cost at Level 1, also contributes the greatest share of additional cost in the exhaustion process. Contrary to the costs apportioned into PG959C at Level 1, the indirect costs are largely operational costs rather than cost of capital.

The table below also shows that BT TSO and Corporate Headquarters recover costs (✂ [-£10 to £0] and ✂ [-£50 to -£10]) through the exhaustion process (by attributing transfer charges). This is primarily driven by the apportionment of costs from Corporate Overheads (AG112).

Table 70. ***Costs Apportioned to Distribution Fibre (PG959C) between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	Openreach	[£50 to £100]	[£250 to £300]	[£100 to £150]
Y	Group Business Services	[£0 to £10]	[£0 to £10]	[£0 to £10]
E	Corporate Adjustments	£0	[£10 to £50]	[£0 to £10]
M	BT Retail	£0	[£0 to £10]	[£0 to £10]
F	BT Facilities Management	[£0 to £10]	£0	[£0 to £10]
W	BT Property	[-£10 to £0]	[-£10 to £0]	[-£10 to £0]
G	Group consolidation Units	£0	[-£50 to -£10]	[-£10 to £0]
T	BT TSO	[-£50 to -£10]	[£0 to £10]	[-£10 to £0]
C	Corporate Headquarters	[-£50 to -£10]	[£0 to £10]	[-£50 to -£10]
Total		[£50 to £100]	[£250 to £300]	[£100 to £150]

Source: BT ASPIRE, Cartesian

Table 71 shows that the most significant impact of cost attribution to PG959C from other cost categories is the cost attribution from BT TSO and Corporate Headquarters. This has the effect of reducing the costs contributed by these divisions (they become negative) and increasing the contribution of Openreach.

Table 71. ***Distribution Fibre (PG959C) Costs at Level 7, shown by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
B	Openreach	[£100 to £150]	[80% to 130%]	[£200 to £250]	[90% to 115%]
M	BT Retail	[£0 to £10]	[0% to 10%]	[£0 to £10]	[0% to 5%]
E	Corporate Adjustments	£0	0%	[£0 to £10]	[0% to 5%]
Y	Group Business Services	[-£50 to -£10]	[-45% to - 5%]	[-£10 to £0]	[-5% to 0%]
W	BT Property	[-£10 to £0]	[-10% to 0%]	[-£10 to £0]	[-5% to 0%]
G	Group Consolidation Units	£0	0%	[-£10 to £0]	[-5% to 0%]
T	BT TSO	£0	0%	[-£10 to £0]	[-5% to 0%]
C	Corporate Headquarters	£0	0%	[-£50 to -£10]	[-25% to 0%]
Total		**[£100 to £150]**	**100%**	**[£200 to £250]**	**100%**

Source: BT ASPIRE, Cartesian

5.5.4.5 *Cost Attribution from Distribution Fibre (PG959C) to Network Components*

Access Fibre costs such as those in PG959C are attributed to Network Components representing different circuit types in the network. The volumes of circuits and fibre used in cost attribution at this stage are extracted from BT's Core Transmission Costing System (CTCS) and INS. These are BT's network inventory systems, which keep records of all the circuits, cables and equipment deployed in the network and maps which circuits run over the fibres/bearers.

The apportionment of access fibre costs to circuits (i.e. Network Components) is determined based on the proportion of total fibre used by each circuit type. Apportionment percentages are calculated for each circuit type based on the number of fibres. In this case, the calculation is limited to the distribution segment/fibre. A detailed description of the model can be found in section 6.

Distribution fibre costs are apportioned to 14 different Network Components using the methodology described above. The following table shows the top 10 Network Components. The vast majority of fibre costs are attributed to the top three Network Components, in particular to Ethernet Access Direct Fibre circuit type. Note that attribution is heavily determined by the volume of the circuits in the network. Operational costs are dominant over capital costs.

Table 72. ***Distribution Fibre (PG959C) costs apportioned to Network Components (Top 10)***

Network Components	Code	CCA (£ m)	MCE (£ m)	FAC (£ m)
Ethernet Access Direct Fibre	CW609	✂[£50 to £100]	✂[£400 to £450]	✂[£100 to £150]
Wholesale & LAN extension services fibre etc.	CO450	✂[£10 to £50]	✂[£200 to £250]	✂[£50 to £100]
PC rentals 2Mbit/s local end fibre	CO439	✂[£10 to £50]	✂[£100 to £150]	✂[£10 to £50]
ISDN30 access	CL189	✂[£10 to £50]	✂[£50 to £100]	✂[£10 to £50]
OR Managed Services for Retail	CK985	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
Backhaul extension services fibre etc.	CO447	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
PC rentals 34Mbit/s local end	CO434	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
PC rentals 140Mbit/s local end	CO436	£0	✂[£0 to £10]	£0
Interconnect local end rental 2Mbit/s	CO452	£0	✂[£0 to £10]	£0
Protected path 140Mbit/s local end	CP436	£0	£0	£0
Others (4x)	-	£0	£0	£0
Total		✂[£100 to £150]	✂[£800 to £900]	✂[£200 to £250]

Source: BT ASPIRE, Cartesian

5.5.5 Spine Fibre (PG111C)

5.5.5.1 Summary

The PG111C cost category captures costs related to fibre deployed in the spine segment of the access network. The spine segment consists of the access link between a local exchange and a distribution node. The key findings in this section are:

1. More than ✂% of the costs are cost of capital
2. Openreach is the main contributor
3. Cumulo liabilities and electricity transfer charges are attributed to PG111C at Level 1 (this differs from Distribution Fibre, PG959C)
4. More than 50% of the cost apportioned to Network Components is due to other cost categories, in particular duct, property and corporate costs (as with Distribution Fibre, PG959C)

5.5.5.2 Composition by Cost Type and Organisational Unit

Table 73 shows the costs apportioned to spine fibre at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

The majority of FAC is driven by cost of capital. Openreach is the top contributor, accounting for nearly all of the total FAC. Note that most of Openreach pay cost is capitalised (✂%).

Other divisions contributing with costs at Level 1 include BT Retail (which performs Openreach-type activities in Northern Ireland), Group Business Services and BT Property. These are the same divisions that contribute costs at to Distribution Fibre (PG959C).

Note that the ✂m transfer charge (in) received by Openreach balances the transfer charges (out) passed by BT Property (✂) and Group Business services (✂) divisions.

The negative MCE depreciation costs represents the accumulated depreciation of the distribution fibre assets. The NBV of the Openreach spine fibre assets can be calculated by adding this to the GBV cost. Other negative values are related with CCA adjustments e.g. provision for assets in course of construction – assets constructed but not yet paid.

Table 73. ***Costs apportioned to Spine Fibre (PG111C) at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

Attribution of non-NGA Spine Fibre costs is made by over 40 teams. Table 74 shows the most relevant ones (top 10). Openreach (B) and Openreach Infrastructure Delivery (BL) are the main teams planning and deploying spine fibre. Openreach Analysis Code (BY) accounts for cumulo liabilities.

As explained for Distribution Fibre (PG959C), the contribution from other teams is due to methodologies apportioning common costs to spine fibre. BT Property ✂ FAC contribution is due

to cumulo rates costs. This already takes into account the rebates obtained on those rates (✂) due to increase of BT's access network unbundling.

Table 74. ***Organisational Units contributing costs to Spine Fibre (PG111C) at Level 1 (Top 10)***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	B	Openreach	✂[£0 to £10]	✂[£100 to £150]	✂[£10 to £50]
	BL	Openreach Infrastructure Delivery	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
	BY	Openreach Analysis Code	✂[£0 to £10]	£0	✂[£0 to £10]
W	W	BT Property	✂[£0 to £10]	£0	✂[£0 to £10]
B	BK	Openreach Equivalence & Pub Affairs	✂[£0 to £10]	£0	✂[£0 to £10]
M	MJ	Northern Ireland	£0	✂[£0 to £10]	✂[£0 to £10]
B	BA	Openreach Learning and Development	£0	£0	£0
	BF	Openreach Finance	£0	£0	£0
	BR	Openreach Marketing and Sales	£0	£0	£0
	BQ	Openreach Transformation	£0	£0	£0
Others			✂[-£50 to -£10]	£0	✂[-£50 to -£10]
Total			✂[£0 to £10]	✂[£150 to £200]	✂[£10 to £50]

Source: BT ASPIRE, Cartesian

5.5.5.3 *Cost Attribution to Spine Fibre (PG111C) from General Ledger*

BT uses a total of 20 different base methodologies and 17 transfer charges out. Direct allocated costs are non-material (<£0.1m). The methodologies used to attribute spine fibre costs are similar to those used for distribution fibre costs (PG959C). A more detailed description of these methodologies can be found in Section 6.

Table 75. ***Notable Methods for Cost Attribution to Spine Fibre (PG111C) from General Ledger***

Cost Driver	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Fibre GRC	PDTLFSC	B, M	✂	✂	✂	226%	6.2.8
	CCAFIB	B, M	✂	✂	✂	-161%	
PWNRC	CUMNORM	W	✂	✂	✂	23%	6.2.3
	ORCUMNOR	B	✂	✂	✂	15%	
	CUMRBTE	W	✂	✂	✂	-10%	
Pay	FTQ	B, M	✂	✂	✂	32%	6.2.17
Floor Space Utilisation	DTNASTR	B	✂	✂	✂	20%	6.2.13

Cost Driver	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Power Consumption	DTNELSP	B	✂	✂	✂	6%	6.2.15
Pay + ROA	COMCOS	B	✂	✂	✂	7%	6.2.10
-	Others	B, Y, W	✂	✂	✂	-57%	-
		Total	✂	✂	✂	**100%**	-

Source: BT ASPIRE, Cartesian

The most important cost drivers are Fibre GRC, PWNR and Pay.

Fibre GRC is used to apportion costs between Non-NGA Spine Fibre and NGA Spine Fibre. Costs for these two separate plant groups are booked against the same CoW (LFSC). Although there is a direct relationship between the teams incurring the costs and the activities or assets, a methodology (PDTLFSC) is required to apportion the costs to different cost categories.

The CCA adjustments are attributed to the different access fibre related cost categories in the same proportion to the fibre costs. BT uses the fibre GRC method for this end.

Spine fibre is one of the rateable assets within BT's cumulo assessment and therefore it must receive cumulo rate associated costs. These costs are attributed using Profit Weighted Network Replacement Cost (PWNRC) as the apportionment driver. The same basis is used to apportion rebates obtained on these cumulo rates – due to the increasing unbundling of BT networks. Note this results in a net cumulo costs of ✂ FAC (i.e. ✂cumulo liabilities minus ✂rebates). This amount is similar to the amount attributed using ORCUMNOR methodology which represents the transfer charge between Openreach (B) and Group Property (W). As explained before, this is done to show that all transactions between BT Group and Openreach are complete (regulatory obligation).

Pay is used as the basis of apportioning certain Openreach common costs. Many other PGs and AGs share these costs which are apportioned using the FTQ base methodology.

BT apportions floor space and electricity costs incurred by Openreach to fibre cables originating or terminating at an exchange building (e.g. same for the e-side copper cables (PG117C). BT uses the same methodology for both space and power.

These costs are in fact transfer charges. However, these charges set the ground for the actual underlying floor and electricity costs to be apportioned to PG111C at a later level in the attribution process (see apportionment method for Property (AG106) – Section 5.6.4.5).

The methodologies are described in more detail in Section 6. Please refer to the above table for appropriate section reference.

5.5.5.4 Cost Attribution to Spine Fibre (PG111C) from other Cost Categories

Following the attribution of costs from the general ledger at Level 1, PG111C receives additional cost attributions from 18 other activity groups. These activity groups contain shared costs of which there is an apportionment to spine fibre. This occurs in the cost exhaustion process prior to costs being attributed from PG111C to network components at Level 7. These other cost categories contribute to ✂% of the total costs in PG111C at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. Table 76 show the costs apportioned both by cost category and division.

Table 76. ***Costs Apportioned to Spine Fibre (PG111C) between Level 1 and 7, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
1	**Spine Fibre**	**PG111C**	[£0 to £10]	[£150 to £200]	[£10 to £50]	-
Exhausted between Level 1 and 7	Duct used by Access Cables	AG135	[£0 to £10]	[£50 to £100]	[£10 to £50]	5.4.4
	Group Property and Facilities Management	AG106	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.6.4
	Corporate Costs	AG112	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.3.45.6.5
	OR Pay driver	AG401	[£0 to £10]	£0	[£0 to £10]	5.3.6
	Motor Transport	AG101	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.10.4
	OR Pay plus % FA driver	AG410	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.10.16.3
	OR Stores driver	AG403	[£0 to £10]	£0	[£0 to £10]	-
	Fleet Fuel Driver	AG415	[£0 to £10]	£0	[£0 to £10]	-
	TSO Operational Costs	AG102	£0	£0	[£0 to £10]	5.10.11
	Others (9x)	-	[£0 to £10]	[£0 to £10]	[£0 to £10]	-
	Sub-Total		[£10 to £50]	[£50 to £100]	[£10 to £50]	-
7	**Spine Fibre**	**PG111C**	[£10 to £50]	[£200 to £250]	[£50 to £100]	-

Source: BT ASPIRE, Cartesian

Access duct (AG135) costs contribute % to PG111C total FAC at Level 7. These are mainly capital costs. Other significant indirect costs in include Property (AG106) and Corporate Overheads (AG112).

Table 77 provides a view of the additional costs at a business unit level. Openreach, which is the largest source of cost at Level 1, also contributes the greatest share of additional cost in the exhaustion process, followed by BT Property and Group Business Services. Note that access duct costs are incurred by Openreach which reinforces Openreach position as the overall contributor of spine fibre costs at Level 7.

As with Distribution Fibre (PG959C), BT TSO and Corporate Headquarters receive costs (and FAC) from PG111C through the exhaustion process. This is primarily driven by the apportionment of costs from Corporate Overheads (AG112). As a result, these divisions have a negative contribution to the costs of PG111C at Level 7.

Table 77. ***Costs Apportioned to Spine Fibre (PG111C) between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	Openreach	[£10 to £50]	[£50 to £100]	[£10 to £50]
W	BT Property	[£0 to £10]	£0	[£0 to £10]
Y	Group Business Services	[£0 to £10]	[£0 to £10]	[£0 to £10]
E	Corporate Adjustments	£0	[£10 to £50]	[£0 to £10]
F	BT Facilities Management	[£0 to £10]	£0	[£0 to £10]
M	BT Retail	£0	[£0 to £10]	£0
G	Group Consolidation Units	£0	[-£50 to -£10]	[-£10 to £0]
C	Corporate Headquarters	[-£10 to £0]	[£0 to £10]	[-£10 to £0]
T	BT TSO	[-£10 to £0]	[£0 to £10]	[-£10 to £0]
Total		[£10 to £50]	[£50 to £100]	[£10 to £50]

Source: BT ASPIRE, Cartesian

Table 78 shows that the cost attribution to PG111C from other cost categories does not have a material impact on the relative mix of FAC by division between Level 1 and Level 7. The FAC % variation between Level 1 to 7 of BT Property is due to the % FAC contribution by AG106 which is apportioning the actual electricity and floor space costs.

Table 78. ***Spine Fibre (PG111C) Costs at Level 7, shown by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
B	Openreach	[£10 to £50]	[45% to 240%]	[£50 to £100]	[90% to 190%]
M	BT Retail	[£0 to £10]	[0% to 50%]	[£0 to £10]	[0% to 20%]
E	Corporate Adjustments	£0	0%	[£0 to £10]	[0% to 20%]
F	BT Facilities Management	£0	0%	[£0 to £10]	[0% to 20%]
Y	Group Business Services	[-£10 to £0]	[-50% to 0%]	£0	0%
G	Group Consolidation Units	£0	0%	[-£10 to £0]	[-20% to 0%]
C	Corporate Headquarters	£0	0%	[-£10 to £0]	[-20% to 0%]

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
W	BT Property	[-£10 to £0]	[-50% to 0%]	[-£10 to £0]	[-20% to 0%]
T	BT TSO	£0	0%	[-£10 to £0]	[-20% to 0%]
Total		**[£10 to £50]**	**100%**	**[£50 to £100]**	**100%**

Source: BT ASPIRE, Cartesian

5.5.5.5 *Cost Attribution from Spine Fibre (PG111C) to Network Components*

The PG111C is exhausted at Level 7 in BT's attribution process, apportioning spine fibre costs to 14 different Network Components. These components represent the different circuit types present in the network. The apportionment method used is the same as that described for Distribution Fibre (PG959C) – i.e., based on the number of fibres used. A more detailed model description can be found in Section 6.

Table 79 shows the top 10 Network Components being attributed with non-NGA access fibre costs (PG111C). The top four Network Components are exactly the same as those for distribution fibre (PG959C), albeit the attributed FAC percentages are different. This is because the number of fibres in distribution is higher than in spine. According to BT's network model, all distribution bearers are double fibre. Note that, as mentioned above, the apportionment is defined by the number of fibres used.

Table 79. ***Spine Fibre (PG111C) costs apportioned to Network Components (Top 10)***

Network Components	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
Ethernet Access Direct Fibre	CW609	[£0 to £10]	[£50 to £100]	[£10 to £50]
Wholesale & LAN extension services fibre	CO450	[£0 to £10]	[£50 to £100]	[£10 to £50]
PC rentals 2Mbit/s local end fibre	CO439	[£0 to £10]	[£10 to £50]	[£0 to £10]
ISDN30 access	CL189	[£0 to £10]	[£10 to £50]	[£0 to £10]
Backhaul extension services fibre etc.	CO447	[£0 to £10]	[£10 to £50]	[£0 to £10]
OR Managed Services for Retail	CK985	[£0 to £10]	[£0 to £10]	[£0 to £10]
PC rentals 34Mbit/s local end	CO434	£0	[£0 to £10]	£0
PC rentals 140Mbit/s local end	CO436	£0	[£0 to £10]	£0
Interconnect local end rental 2Mbit/s	CO452	£0	£0	£0
Protected path 140Mbit/s local end	CP436	£0	£0	£0
Others (4x)	-	£0	£0	£0
Total		[£10 to £50]	[£200 to £250]	[£50 to £100]

Source: BT ASPIRE, Cartesian

5.5.6 Access Fibre Maintenance (PG111M)

5.5.6.1 Summary

The PG111M captures maintenance costs associated with access fibre cable in the access network. Both distribution and spine fibre maintenance costs are treated together. This includes costs of clearing existing duct for cable installation, among others.

The key findings in this sections are

1. Fibre maintenance costs are treated in a single plant group, in contrast to the separate fibre plant groups for spine and distribution costs (PG111C and PG959C)
2. Costs are apportioned to Network Components based on the same proportion defined to Spine Fibre (PG111C) and Distribution Fibre (PG959C) cost categories (i.e. based on the number of fibres used) rather than depreciation costs, as confirmed by BT and contrarily to the description found in the DAM

5.5.6.2 Cost Attribution to Access Fibre Maintenance (PG111M) from General Ledger

The majority of the costs are apportioned using the PDTLFCM methodology. All costs related with fibre maintenance are grouped and handled by this methodology which apportions costs among three different cost categories. The apportionment is based on the Fibre GRC method. This is the same method used to apportion the fibre asset related costs (see Section 6.2.8)

Pay is used as the basis of apportioning certain Openreach common costs. Many other PGs and AGs share these costs which are apportioned using the FTQ base methodology.

The methodologies are described in more detail in Section 6.

5.5.6.3 Cost Attribution from Access Fibre Maintenance (PG111M) to Network Components

The fibre maintenance costs in PG111M are apportioned in the same basis as (PG111C) and Distribution Fibre (PG959C) – based on the number of fibres used method.

Hence, the PG111M attributes its costs to the same set of network components as those defined for PG111C and PG959C. However, the FAC % are equal to those defined by the apportionment from Spine Fibre (PG111C) and not an average of both fibre segments as expected. This is assessed in the RAP Section 6

5.5.7 NGA Access Fibre

Generic Ethernet Access (GEA) is a fibre-based product on BT's next generation access (NGA) network. Like the non-NGA access fibre, costs associated with GEA are also attributed between Spine and Distribution segments.

NGA Access Fibre costs are captured by four cost categories:

- GEA Spine Fibre (PG950C)
- GEA Distribution Fibre (PG951C)
- GEA spine fibre maintenance (PG950M)
- GEA distribution fibre maintenance (PG951M)

The two fibre plant groups are analysed in the following sections. The maintenance cost categories are not analysed since the total FAC is immaterial.

The method and base methodologies used to apportion maintenance cost are the same as used in non-NGA maintenance costs. Moreover, these costs are 100% allocated to Wholesale Residual.

5.5.8 GEA Distribution Fibre (PG951C)

5.5.8.1 Summary

GEA Distribution Fibre (PG951C) captures similar costs to the cost category to for distribution fibre in the non-NGA access network (PG959C). The reason for distinguishing between NGA and non-NGA costs, is that NGA products are not subject to charge control.

The key findings can be summarised as follows:

1. NGA doesn't have its own CoW; costs are booked against the same CoW as non-NGA fibre costs and subsequently apportioned (single distribution CoW used for both non-NGA and NGA fibre costs)
2. The apportionment between NGA and Non-NGA distribution fibre is based on their relative GRC
3. NGA products are not subject to charge control, thus NGA fibre costs are 100% allocated to Wholesale Residual

5.5.8.2 Composition by Cost Type and Organisational Unit

Table 80 shows the costs apportioned to NGA distribution fibre at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

Due to the presence of negative values, Openreach cost of capital, and current and capital pay costs, account for over ✂% of the total. Current and capital costs contribute equally to the overall cost Note that the transfer out charge from Group Business Services is balanced by the Openreach transfer charge in. This is mainly around BT fleet rental fees.

Negative MCE depreciation means accumulated depreciation of the assets represented by the GBV MCE. Combining these two financial parameters results in NBV. Looking at Openreach NGA distribution fibre assets, the NBV sits slightly above ✂.

Table 80. ***Costs apportioned to NGA Distribution Fibre (PG951C) at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

Table 81 shows the cost contribution per top teams (by FAC). The contribution pattern observed is similar to other fibre related cost categories such as Non-NGA Distribution Fibre (PG959C) and Non-NGA Spine Fibre (PG111C). Please refer to the sections describing these cost categories for more detail.

Table 81. ***Organisational Units contributing costs to NGA Distribution Fibre (PG951C) at Level 1***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)
B	**B**	Openreach	✂	✂	✂	✂ [55% to 280%]
B	**BL**	Openreach Infrastructure Delivery	✂	✂	✂	✂ [0% to 60%]
M	**MJ**	Northern Ireland	✂	✂	✂	✂ [0% to 60%]
B	**BA**	Openreach Learning and Development	✂	✂	✂	0%
B	**BF**	Openreach Finance	✂	✂	✂	0%
B	**BR**	Openreach Marketing and Sales	✂	✂	✂	0%
B	**BQ**	Openreach Transformation	✂	✂	✂	0%
B	**BJ**	Openreach General Council	✂	✂	✂	0%
G	**G**	Group Consolidation Units	✂	✂	✂	0%
M	**MN**	BT Retail Products and Enterprises	✂	✂	✂	0%
		Others	✂	✂	✂	✂ [-60% to 0%]
Total			✂	✂	✂	**100%**

Source: BT ASPIRE, Cartesian

5.5.8.3 *Cost Attribution to NGA Distribution Fibre (PG951C) from General Ledger*

BT uses more than 10 different base methodologies to attribute costs into PG951C. These methodologies are the same used for non-NGA distribution fibre (PG959C). The table below shows the most significant base methodologies.

Table 82. ***Notable Methods for Cost Attribution to NGA Distribution Fibre (PG951C) from General Ledger***

Underlying Method	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Fibre GRC	PDTLFDC	B, M	✂	✂	✂	✂ [50% to 265%]	6.2.8
	CCAFIB	B, M	✂	✂	✂	✂ [-55% to 0%]	
Previously Attributed Cost (pay)	FTQ	B, M	✂	✂	✂	✂ [0% to 55%]	6.2.17
Pay and ROA	COMCOS	B	✂	✂	✂	✂ [0% to 55%]	6.2.10
Asset Policy	DTNCAP2	B	✂	✂	✂	✂ [-55% to 0%]	6.2.19
Others *(including Transfer Charges)*		Y	✂	✂	✂	✂ [-55% to 0%]	6.2.17
Total			✂	✂	✂	**100%**	-

Source: BT ASPIRE, Cartesian

Fibre GRC is used to apportion costs between Non-NGA Distribution Fibre and NGA Distribution Fibre. As explained earlier in the report, this is due to work on these two plant groups sharing a common CoW (LFDC). It is also used to apportion fibre CCA adjustments using the CCAFIB base methodology.

It is interesting to note that NGA distribution fibre doesn't get any *Cumulo* rates costs at Level 1 in contrast to the non-NGA distribution fibre cost category (PG959C) which is attributed with cumulo transfer charge (using ORCUMNOR) and cumulo rebates (using CUMRBTE).

A more detailed description of the base methodologies can be found in Section 6. Please refer to the above table for the appropriate section reference.

5.5.8.4 *Cost Attribution to NGA Distribution Fibre (PG951C) from other Cost Categories*

Following the attribution of costs from the general ledger at Level 1, PG951C receives additional cost attributions from 18 other activity groups. These activity groups contain costs that are shared across the whole of BT, of which a share is apportioned to NGA distribution fibre. This occurs in the cost exhaustion process prior to costs being attributed from PG951C to network components at Level 7. These other cost categories contribute to ✂ [25% to 150%] of the total costs in PG951C at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. The two tables below show the main cost contributors by cost category and by division.

Table 83. ***Costs Apportioned to NGA Distribution Fibre (PG951C) between Level 1 and 7, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
1	**NGA Distribution Fibre**	**PG951C**	✂	✂	✂	✂ [25% to 150%]	-
Exhausted between Level 1 and 7	Duct used by Access Cables	AG135	✂	✂	✂	✂ [0% to 30%]	5.4.4
	Corporate Costs	AG112	✂	✂	✂	✂ [0% to 30%]	5.3.4
	OR Pay driver	AG401	✂	✂	✂	✂ [0% to 30%]	5.3.6
	Motor Transport	AG101	✂	✂	✂	✂ [0% to 30%]	5.10.4
	OR Pay plus % FA driver	AG410	✂	✂	✂	✂ [0% to 30%]	5.10.16.3
	Group Property and Facilities Management	AG106	✂	✂	✂	✂ [0% to 30%]	5.6.4
	Others (12x)	-	✂	✂	✂	✂ [0% to 30%]	-
	Sub-total		✂	✂	✂	✂ **[25% to 150%]**	-
7	**NGA Distribution Fibre**	**PG951C**	✂	✂	✂	**100%**	-

Source: BT ASPIRE, Cartesian

As per other fibre related PGs, access duct (AG135) and corporate costs (AG112) are the main contributors of additional cost.

Table 84 provides a view of the additional costs by division. Openreach, which is the largest source of cost at Level 1, also contributes the greatest share of additional cost in the exhaustion process.

As for the other fibre cost categories, BT TSO (T) and Corporate Headquarters (C) both recover costs through this cost category.

Table 84. ***Costs Apportioned to NGA Distribution Fibre (PG951C) between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)
B	Openreach	✂	✂	✂	✂ [65% to 335%]
Y	Group Business Services	✂	✂	✂	✂ [0% to 70%]
E	Corporate Adjustments	✂	✂	✂	✂ [0% to 70%]
M	BT Retail	✂	✂	✂	0%
F	BT Facilities Management	✂	✂	✂	0%
W	BT Property	✂	✂	✂	0%
G	Group Consolidation Units	✂	✂	✂	✂ [-70% to 0%]
T	BT TSO	✂	✂	✂	✂ [-70% to 0%]
C	Corporate Headquarters	✂	✂	✂	✂ [-70% to 0%]
Total		✂	✂	✂	**100%**

Source: BT ASPIRE, Cartesian

Table 85 shows that the cost attribution to PG951C from other cost categories does not have a material impact on the relative mix of FAC by division between Level 1 and Level 7.

Table 85. ***NGA Distribution Fibre (PG951C) Costs at Level 7, shown by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
B	Openreach	✂	✂ [50% to 265%]	✂	✂ [25% to 150%]
M	BT Retail	✂	✂ [0% to 55%]	✂	✂ [0% to 30%]
E	Corporate Adjustments	✂	0%	✂	✂ [0% to 30%]
Y	Group Business Services	✂	✂ [-55% to 0%]	✂	0%

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
W	BT Property	✂	0%	✂	0%
G	Group Consolidation Units	✂	0%	✂	0%
T	BT TSO	✂	0%	✂	✂ [-30% to 0%]
C	Corporate Headquarters	✂	0%	✂	✂ [-30% to 0%]
Total		**✂ [£10 to £50]**	**100%**	**✂ [£10 to £50]**	**100%**

Source: BT ASPIRE, Cartesian

5.5.8.5 *Cost Attribution from NGA Distribution Fibre (PG951c) to Network Components*

GEA products are not subject to charge control. Therefore, the fibre cost associated with these products is 100% allocated to Wholesale Residual.

For PG951C, this is achieved by fully allocating costs to a single GEA related Network Component – CL951 GEA Distribution Fibre – which is then fully allocated to Wholesale Residual.

5.5.9 NGA Spine Fibre (PG950C)

5.5.9.1 Summary

NGA Spine Fibre (PG950C) captures similar costs to the cost category for spine fibre in the non-NGA access network (PG111C). The distinction between NGA and non-NGA costs is required by Ofcom, since NGA products are currently not subject to charge control.

The key findings in this section are similar to those highlighted in previous section for NGA distribution fibre (PG951C).

5.5.9.2 Composition by Cost Type and Organisational Unit

Table 86 shows the costs apportioned to NGA spine fibre at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

Openreach is the top contributor of costs to NGA Spine Fibre, which is consistent with other cost categories associated with access network assets and activities. Operational costs make the large percentage of spine fibre total costs, in contrast to non-NGA spine fibre. Note also that Openreach pay costs are quite small compared to the pay costs attributed to non-NGA spine fibre or even NGA distribution fibre.

There is a transfer charge (in) received by Openreach which balances the transfer charge (out) from BT Property. These transfer charges include cumulo rates passed to Openreach in a way to show all transactions between BT Group and Openreach for completeness purposes (regulatory obligation). They also include property rental and electricity charges albeit the amounts are not material.

The negative MCE depreciation costs represents the accumulated depreciation of the spine fibre assets. The NBV of the Openreach assets can be calculated by adding this to the GBV cost. Other negative values are related with CCA adjustments e.g. provision for assets in course of construction – assets constructed but not yet paid.

Table 86. ***Costs apportioned to NGA Spine Fibre (PG950C) at Level 1, by Division***

Division	Description	Cost Type	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)
B	Openreach	Transfer Charges In	✂	✂	✂	✂ [0% to 115%]
		GBV	✂	✂	✂	✂ [0% to 115%]
		CCA Uplift HCAD to CCAD	✂	✂	✂	✂ [0% to 115%]
		Pay	✂	✂	✂	✂ [0% to 115%]
		AICC Opening balance	✂	✂	✂	0%
		Non Pay	✂	✂	✂	0%
		CCA THG	✂	✂	✂	0%
		CCA Depn	✂	✂	✂	0%
		Depreciation	✂	✂	✂	✂ [-115% to 0%]
		AICC Registrations	✂	✂	✂	✂ [-115% to 0%]
		CCA Price	✂	✂	✂	✂ [-115% to 0%]
		CCA uplift GBV to GRC	✂	✂	✂	✂ [-115% to 0%]
B Total			✂	✂	✂	✂ **[110% to 560%]**
M	BT Retail	GBV	✂	✂	✂	0%
		CCA Uplift HCAD to CCAD	✂	✂	✂	0%
		Depreciation	✂	✂	✂	0%
		AICC Registrations	✂	✂	✂	0%
		CCA Price	✂	✂	✂	0%
		CCA uplift GBV to GRC	✂	✂	✂	0%
M Total			✂	✂	✂	**0%**
Y	Group Business Services	Non Pay	✂	✂	✂	0%
		Transfer Charges Out	✂	✂	✂	0%
Y Total			✂	✂	✂	**-0%**
W	BT Property	Non Pay	✂	✂	✂	✂ [0% to 115%]
		Transfer Charges Out	✂	✂	✂	✂ [-115% to 0%]
W Total			✂	✂	✂	✂ **[-115% to 0%]**
Total			✂	✂	✂	**100%**

Source: BT ASPIRE, Cartesian

The distribution of the top teams in terms of FAC differs from the previous fibre related cost categories (e.g. PG951C or PG959C). This is because the transfer charges associated with the Openreach cumulo rate costs are large compared to other PG950C costs (see table above).

The actual cumulo rate costs (✂ FAC) are incurred by BT Property (W), entered into the ledger and attributed to PG950C. At the same time, BT Property also attributes a transfer charge (✂ under Others) to Openreach (Openreach Analysis Code, BY) under the regulatory obligations as explained above. This is the reason for the top contribution from Openreach Analysis Code (OUC BY) to PG950C.

Table 87. ***Organisational Units contributing costs to NGA Spine Fibre (PG950C) at Level 1***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)
B	BY	Openreach Analysis Code	✂	✂	✂	✂ [0% to 115%]
W	W	BT Property	✂	✂	✂	✂ [0% to 115%]
B	B	Openreach	✂	✂	✂	✂ [0% to 115%]
B	BL	Openreach Infrastructure Delivery	✂	✂	✂	✂ [0% to 115%]
B	BK	Openreach Equivalence & Pub Affairs	✂	✂	✂	0%
M	MJ	Northern Ireland	✂	✂	✂	0%
B	BA	Openreach Learning and Development	✂	✂	✂	0%
B	BF	Openreach Finance	✂	✂	✂	0%
B	BQ	Openreach Transformation	✂	✂	✂	0%
B	BR	Openreach Marketing and Sales	✂	✂	✂	0%
		Others	✂	✂	✂	✂ [-115% to 0%]
Total			✂	✂	✂	**100%**

Source: BT ASPIRE, Cartesian

5.5.9.3 *Cost Attribution to NGA Spine Fibre (PG950C) from General Ledger*

BT uses a total of 19 base methodologies. The table below shows the most significant ones. Direct allocation is non-material.

Table 88. ***Notable Methods for Cost Attribution to NGA Spine Fibre (PG950C) from General Ledger***

Cost Driver	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Fibre GRC	PDTLFSC	B, M	✂	✂	✂	✂ [0% to 100%]	6.2.8
	CCAFIB	B, M	✂	✂	✂	✂ [-100% to 0%]	
PWNRC	ORCUMNOR	B	✂	✂	✂	✂ [0% to 100%]	6.2.3
	CUMNORM	W	✂	✂	✂	✂ [0% to 100%]	
Pay	FTQ	B	✂	✂	✂	✂ [0% to 100%]	6.2.17
Transfer Charge	Transfer Charge Out (247409)	W	✂	✂	✂	✂ [-100% to 0%]	-
	Other transfer charges	B, E, Y, W	✂	✂	✂	0%	
	Total		✂	✂	✂	**100%**	-

Source: BT ASPIRE, Cartesian

The methodologies used to apportion NGA fibre costs are similar to those used for non-NGA access fibre costs. A more detailed description of the methodologies can be found in Section 6.

Fibre GRC is used to apportion costs between Non-NGA Spine Fibre and NGA Spine Fibre. As explained in section above, this is due to work on these two plant groups sharing a common CoW (LFSC).

In contrast to NGA distribution fibre, *cumulo* rates costs are attributed to NGA spine fibre. These costs are attributed using the CUMNORM base methodology.

As for non-NGA, NGA Spine fibre is one of the rateable assets within BT's cumulo assessment and therefore it must receive cumulo rate associated costs. These costs (✂ FAC) are attributed using profit weighted network replacement cost (PWNRC) as the apportionment driver. The same basis is used to apportion the transfer charge between Openreach and Group Property (using ORCUMNOR base methodology). As explained before, this is done to show that all transactions between BT Group and Openreach are complete (regulatory obligation).

Other transfer charges include apportionments for floor space and electricity costs from BT Property.

A more detailed description of the base methodologies can be found in Section 6. Please refer to the above table for the appropriate section reference.

5.5.9.4 *Cost Attribution to NGA Spine Fibre (PG950C) from other Cost Categories*

Following the attribution of costs from the general ledger at Level 1, PG950C receives additional cost attributions from 18 other activity groups. These activity groups contain costs shared across the whole of BT, of which a share is apportioned to NGA spine fibre. This occurs in the cost exhaustion process prior to costs being attributed from PG950C to network components at Level 7. These other cost categories contribute to ✂ [0% to 75%] of the total costs in PG950C at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. Table 89 and Table 90 below show the main cost contributors by cost category and by division. The share of attributed costs due to other cost categories is smaller than that observed for non-NGA spine fibre (PG111C) ✂% vs. ✂% respectively.

Table 89. ***Costs Apportioned to NGA Spine Fibre (PG950C) between Level 1 and 7, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
1	**NGA Spine Fibre**	**PG950C**	✂	✂	✂	✂ **[0% to 75%]**	-
Exhausted between Level 1 and 7	Duct used by Access Cables	AG135	✂	✂	✂	✂ [0% to 75%]	5.4.4
	Group Property and Facilities Management	AG106	✂	✂	✂	✂ [0% to 75%]	5.6.4
	Corporate Costs	AG112	✂	✂	✂	✂ [0% to 75%]	5.3.4
	Others (15x)	-	✂	✂	✂	✂ [0% to 75%]	-
	Sub-total		✂	✂	✂	✂ **[0% to 75%]**	-

7	**NGA Spine Fibre**	**PG950C**	✂	✂	✂	**100%**	-

Source: BT ASPIRE, Cartesian

Table 90 below provides a view of the above costs at a business unit level. Openreach, which is the largest source of cost at Level 1, also contributes the greatest share of additional cost in the exhaustion process.

Table 90. ***Costs Apportioned to NGA Spine Fibre (PG950C) between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)
B	Openreach	✂	✂	✂	✂ [0% to 200%]
W	BT Property	✂	✂	✂	✂ [0% to 200%]
Y	Group Business Services	✂	✂	✂	0%
E	Corporate Adjustments	✂	✂	✂	0%
F	BT Facilities Management	✂	✂	✂	0%
M	BT Retail	✂	✂	✂	0%
G	Group Consolidation Units	✂	✂	✂	0%
C	Corporate Headquarters	✂	✂	✂	0%
T	BT TSO	✂	✂	✂	0%
Total		✂	✂	✂	**100%**

Source: BT ASPIRE, Cartesian

Despite the additional costs attributed from different cost categories, these result in minor changes to the mix of access fibre costs and its contributors, as shown by Table 91 below.

Table 91. ***NGA Spine Fibre (PG950C) Costs at Level 7, shown by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
B	Openreach	✂	✂ [110% to 560%]	✂	✂ [70% to 360%]
E	Corporate Adjustments	✂	0%	✂	0%
M	BT Retail	✂	0%	✂	0%
F	BT Facilities Management	✂	0%	✂	0%
G	Group Consolidation Units	✂	0%	✂	0%
C	Corporate Headquarters	✂	0%	✂	0%
T	BT TSO	✂	0%	✂	0%
W	BT Property	✂	✂ [-115% to 0%]	✂	✂ [-75% to 0%]
Total		✂	**100%**	✂	**100%**

Source: BT ASPIRE, Cartesian

5.5.9.5 *Cost Attribution from NGA Spine Fibre (PG950c) to Network Components*

GEA products are not subject to charge control. Therefore, the fibre cost associated with these products is 100% allocated to Wholesale Residual.

For PG950C, this is achieved by fully allocating costs to a single GEA related Network Component – CL950 GEA Access Fibre Spine – which is then fully allocated to Wholesale Residual.

5.5.10 20C Backhaul Fibre (PG170B)

5.5.10.1 Summary

The PG170B captures costs related to fibre deployed in BT's 20C backhaul network (as opposed to the 21C backhaul network). Significant cost items in PG170B include fibre depreciation, pay costs for backhaul fibre planning and installation, cumulo rates and property rental and electricity charges at Level 1. During the cost exhaustion process, PG170B receives apportionments of other costs such as backhaul duct and corporate overhead costs.

Key findings within this section are as follows:

1. Costs in PG170B are related to fibre deployed in 20C backhaul network only
2. Costs are apportioned between PG170B and 21C Backhaul based on relative fibre length
3. Costs apportioned into PG170B at Level 1 are mainly capital costs
4. PG170B costs at Level 7 are dominated by backhaul duct costs (apportioned from AG148)

5.5.10.2 Composition by Cost Type and Organisational Unit

Table 92 below shows the costs apportioned to backhaul fibre at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

The majority of costs attributed to PG170B at Level 1 are capital costs and these are mainly incurred by Openreach teams. Operational costs are negative due to CCA adjustments and rebates obtained on cumulo liabilities (Non Pay cost type from BT Property). The negative MCE depreciation costs represents the accumulated depreciation of the backhaul fibre assets.

The transfer charge (in) received by Openreach almost balances the transfer charge (out) from BT Property. We believe the small difference is due to rounding. However, in this case the transfer out is positive and the transfer in is negative which appears to imply a cumulo rate credit to Openreach.

Table 92. ***Costs apportioned to Backhaul Fibre (PG170B) at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

Table 93 shows the 10 most relevant teams contributing with costs into PG170B. Openreach (B) and Group Property Partners (WP) teams attribute the largest share of costs. 'Others' include teams like BT Property (W) attributing rebates obtained on cumulo rates or the transfer charge in amount related to OR cumulo rates received by Openreach (B).

Table 93. ***Organisational Units contributing costs to PG170B at Level 1 (Top 10)***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	B	Openreach	✂[£10 to £50]	✂[£250 to £300]	✂[£10 to £50]
W	WP	Group Property Partners	✂[£10 to £50]	£0	✂[£10 to £50]

B	BL	Openreach Infrastructure Delivery	[£0 to £10]	[£0 to £10]	[£0 to £10]
M	MJ	Northern Ireland	[£0 to £10]	[£0 to £10]	[£0 to £10]
B	BK	Openreach Equivalence & Pub Affairs	£0	£0	£0
	BA	Openreach Learning and Development	£0	£0	£0
	BF	Openreach Finance	£0	£0	£0
	BQ	Openreach Transformation	£0	£0	£0
	BR	Openreach Marketing and Sales	£0	£0	£0
	BJ	Openreach General Council	£0	£0	£0
Others			[-£50 to -£10]	[-£150 to -£100]	[-£100 to -£50]
Total			[-£50 to -£10]	[£150 to £200]	[£0 to £10]

Source: BT ASPIRE, Cartesian

5.5.10.3 *Cost Attribution to Backhaul Fibre (PG170B) from General Ledger*

The table below shows the most significant base methodologies used by BT to apportion ledger level costs to cost category PG170B. In total, there are over 30 base methodologies and over 15 different transfer charges out.

This tables shows a longer list of methodologies than in previous sections to highlight the mix of attributions happening at PG170B. These methodologies are described in more detail in Section 6.

Table 94. ***Notable Methods for Cost Attribution to PG170B from General Ledger***

Underlying Method	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct Allocation	PDTUJOF(B&M), PDTBHQ(B&M), PDTUJCC(B), PDTIVA (B&M), PDTUM(B&M)	B, M				38%	6.2.1
Fibre Length	PDTCJF(B&M), PDTMUC(B), PDTCJC(B&M)	B, M				415%	6.2.7
Transfer Charge	Transfer Charges	various				289%	-
PWNRC	CUMNORM	W				38%	6.2.3
	ORCUMNOR	B				-324%	
	CUMRBTE	W				-354%	
Previously Attributed Cost (pay)	FTQ	B, M				33%	6.2.17
Floor Space Utilisation	DTNASTR	B				17%	6.2.13
Power Consumption	DTNELSP	B				5%	
Pay and ROA	COMCOS	B				15%	6.2.10
Asset Policy	DTNCAP2	B				-6%	6.2.19
Previously Attributed Cost (Pan-division)	NCOFADA, CAPEXP	B, M, G				-68%	6.2.17

Underlying Method	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Others			✂	✂	✂	2%	-
Total			✂	✂	✂	100%	-

Source: BT ASPIRE, Cartesian

The most significant cost drivers are Fibre Length, PWNRC, Direct allocation and Pay.

BT allocates ✂ FAC directly into PG170B. This includes costs related to inland sub-sea fibre cables in the backhaul network.

Fibre length is used to apportion current (depreciation) and capital costs associated with backhaul fibre between 20C and 21C networks (PDTCJF, PDTMUC and PDTCJC methodologies). Only 20C backhaul fibre costs are attributed to PG170B. The apportionment is based on the fibre length deployed in 20C backhaul network over the total fibre length in both 20C and 21C backhaul networks.

Backhaul fibre is one of the rateable assets within BT's cumulo assessment and therefore it must receive cumulo rate associated costs. These costs (✂ FAC) are attributed using profit weighted network replacement cost (PWNRC) as the apportionment driver. The same basis is used to apportion rebates obtained on cumulo rates – due to the increasing unbundling of BT networks – and the transfer charge between Openreach and Group Property. As explained before, this is done to show that all transactions between BT Group and Openreach are complete (regulatory obligation).

Pay is used as the basis of apportioning certain Openreach common costs. Many other PGs and AGs share these costs which are apportioned using the FTQ base methodology.

Capitalised CoW is a method used to apportion field provision costs including a variety of customer related activities in proportion to the amounts capitalised to each capital CoW. Previously allocated costs pan-divisionally are system generated methods to apportion costs like purchase of non-current assets across multiple business units. Others include all those methodologies or transfer charges out apportioning costs with a FAC lower than 0.5%.

A more detailed description of the base methodologies can be found in Section 6. Please refer to Table 94 for the appropriate section reference.

5.5.10.4 Cost Attribution to Backhaul Fibre (PG170N) from other Cost Categories

Following the attribution of costs from the general ledger at Level 1, PG170B receives additional cost attributions from 18 other activity groups. These activity groups contain shared costs across the whole of BT, of which a share is apportioned to backhaul fibre. This occurs in the cost exhaustion process prior to costs being attributed from PG170B to network components at Level 7. These other cost categories contribute almost all (✂ %) of the total costs in PG170B at Level 7; the actual fibre costs at Level 1 are small by comparison.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. Table 95 and Table 96 below show the main contributors by cost category and division.

As per other fibre related PGs, the top contributors are duct and corporate costs, AG148 and AG112 respectively. The cost of capital of backhaul duct is the main driver of backhaul fibre costs at Level 7.

Table 95. ***Impact of costs attributed to PG170B in cost exhaustion process, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
1	**Backhaul Fibre**	**PG170B**	[-£50 to -£10]	[£150 to £200]	[£0 to £10]	-
Exhausted between Level 1 and 6	Duct used by Backhaul Cables	AG148	[£50 to £100]	[£800 to £900]	[£100 to £150]	5.4.5
	Corporate Costs	AG112	[£10 to £50]	[£0 to £10]	[£10 to £50]	5.3.4
	OR Pay plus % FA driver	AG410	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.10.16.3
	Group Property and Facilities Management	AG106	[£0 to £10]	£0	[£0 to £10]	5.6.4
	TSO Operational Costs	AG102	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.10.11
	OR Pay driver	AG401	[£0 to £10]	£0	[£0 to £10]	5.3.6
	OR Fixed Asset driver	AG408	[£0 to £10]	[£0 to £10]	[£0 to £10]	-
	Others (11x)	-	[£0 to £10]	[£0 to £10]	[£0 to £10]	-
	Sub-Total	-	[£50 to £100]	[£800 to £900]	[£150 to £200]	-
7	**Backhaul Fibre**	**PG170B**	[£50 to £100]	[£1000 to £1200]	[£150 to £200]	-

Source: BT ASPIRE, Cartesian

Table 96 below provides a view of the previous costs but at a business unit level. Openreach, which is the largest source of cost at Level 1, also contributes the greatest share of additional cost in the exhaustion process (due to the size of the duct costs).

Table 96. ***Costs Apportioned to PG170B between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	Openreach	[£50 to £100]	[£800 to £900]	[£150 to £200]
C	Corporate Headquarters	[£0 to £10]	[£0 to £10]	[£0 to £10]
M	BT Retail	[£0 to £10]	[£10 to £50]	[£0 to £10]
E	Corporate Adjustments	£0	[£10 to £50]	[£0 to £10]
Y	Group Business Services	[£0 to £10]	£0	[£0 to £10]
G	Group Consolidation Units	£0	[-£50 to -£10]	[-£10 to £0]
T	BT TSO	[-£50 to -£10]	[-£10 to £0]	[-£50 to -£10]

Total	[£50 to £100]	[£800 to £900]	[£150 to £200]

Source: BT ASPIRE, Cartesian

Table 97 shows that the cost attribution to PG170B from other cost categories have an impact on the top contributors. Although the Openreach contribution increases the most in absolute terms, its share of costs at Level 7 is smaller due to the negative attribution from Group Consolidation Units having less impact.

Table 97. ***Backhaul Fibre (PG170B) Costs at Level 7, shown by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
B	Openreach	[£10 to £50]	[140% to 715%]	[£150 to £200]	[85% to 120%]
M	BT Retail	[£0 to £10]	[0% to 145%]	[£0 to £10]	[0% to 10%]
C	Corporate Headquarters	£0	0%	[£0 to £10]	[0% to 10%]
E	Corporate Adjustments	£0	0%	[£0 to £10]	[0% to 10%]
G	Group Consolidation Units	[-£10 to £0]	[-145% to 0%]	[-£10 to £0]	[-10% to 0%]
T	BT TSO	£0	0%	[-£50 to -£10]	[-30% to - 5%]
Total		**[£0 to £10]**	**100%**	**[£150 to £200]**	**100%**

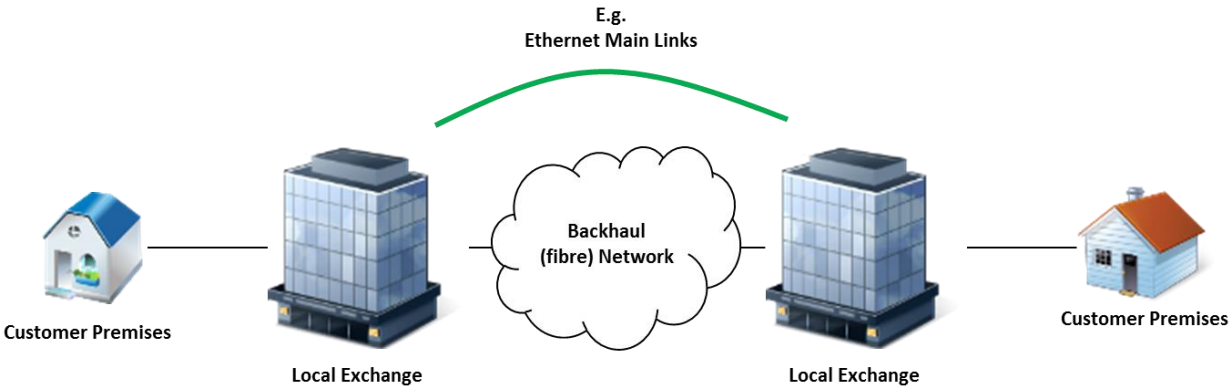
Source: BT ASPIRE, Cartesian

5.5.10.5 *Cost Attribution from Backhaul Fibre (PG170B) to Network Components*

Backhaul fibre costs are apportioned to Network Components using a similar model to Access Fibre (i.e. PG111C and PG959C, described above). However, in this case, BT accounts for circuits taking different routes. Therefore, the apportionment base is determined not only by the fibre bandwidth used (as per access fibre attribution) but also by the fibre length used by each circuit over the total length of individual fibres deployed in the backhaul network. A more detailed explanation of the model used to determine the apportionment percentages can be found in Section 6.

Backhaul fibre costs are apportioned to 20 different Network Components representing different circuit types in the network. Note that 'distribution' in the backhaul context (see table) means the link between exchanges or an exchange and an aggregation node, which is the equivalent to 'main link' used for Ethernet circuits.

Figure 11. ***High level representation of BT's fibre backhaul network and its circuits***



Ethernet Main Link is attributed with approximately half of the fibre costs (✂% of FAC). , which shows it is one of the circuits with higher presence in the network both due its bandwidth usage and volume throughout the network.

Table 98. ***Backhaul Fibre (PG170B) costs apportioned to Network Components (Top 10)***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
Ethernet main links	CO484	✂[£10 to £50]	✂[£500 to £600]	✂[£50 to £100]
OR PC rentals 2Mbit/s distribution	CF371	✂[£0 to £10]	✂[£100 to £150]	✂[£10 to £50]
Broadband backhaul circuits	CO681	✂[£0 to £10]	✂[£100 to £150]	✂[£10 to £50]
Remote - local transmission length	CO326	✂[£0 to £10]	✂[£100 to £150]	✂[£10 to £50]
OR PC rentals 34Mbit/s distribution	CF373	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
Local - tandem transmission length	CO340	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
OR PC rentals 64kbit/s link distribution	CF391	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
OR PC rentals 140Mbit/s distribution	CF375	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
ISDN30 access	CL189	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
Point of Handover electronics	CO379	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
Others (10x)		✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
Total		✂[£50 to £100]	✂[£1000 to £1200]	✂[£150 to £200]

Source: BT ASPIRE, Cartesian

5.5.11 20C Core Fibre (PG350N)

5.5.11.1 Summary

The PG350N captures costs related to fibre deployed in BT's 20C core network (as opposed to the 21C core network). Like in PG170B, significant cost items in PG350N at Level 1 include fibre depreciation, pay costs for fibre planning and installation, cumulo rates and property rental and electricity charges. At Level 7, the composition of costs is different due to the apportionment of costs from other cost categories such as duct and corporate costs.

The key findings within this section are:

1. Costs in PG350N are related to fibre deployed in 20C backhaul network only
2. Costs in PG350N at Level 1 are mainly fibre capital costs
3. Costs in PG350N at Level 7 are mainly composed of core duct costs
4. Costs incurred mainly by TSO division

5.5.11.2 Composition by Cost Type and Organisational Unit

Table 99 shows the costs apportioned to core fibre at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

Costs apportioned into PG350N are largely composed by capital costs; operational costs are not material. Contrary to access and backhaul fibre costs, core fibre costs are incurred mainly by BT TSO.

There is a transfer charge (in) received by Openreach which balances the transfer charge (out) from BT Property. These transfer charges include cumulo rates passed to Openreach in a way to show all transactions between BT Group and Openreach for completeness purposes (regulatory obligation). They also include property rental and electricity charges.

Table 99. ***Costs apportioned to Core Fibre (PG350N) at Level 1, by Division***

Source: BT ASPIRE, Cartesian

Table 100 shows the 10 most relevant teams contributing costs into PG170B. The *BT TSO RESEARCH & INNOVATION* code represents the main BT TSO team responsible for core fibre planning and deployment and therefore is responsible for the large majority of the apportioned costs in PG350N. The contribution of the other teams is almost negligible.

The negative FAC contributions relate to accumulated depreciation costs (Group Consolidation Units, G) and transfer charges cost items (BT Property, W).

Table 100. ***Organisational Units contributing costs to Core Fibre (PG350N) at Level 1 (Top 10)***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
T	TT	BT TSO RESEARCH & INNOVATION	[£0 to £10]	[£50 to £100]	[£10 to £50]
B	B	Openreach	[£0 to £10]	£0	[£0 to £10]
T	TB	BT TSO Service, Strategy and Operations	£0	£0	£0
	TBS3	Unknown	£0	£0	£0
	TBS2	Unknown	£0	£0	£0
	TN	BT TSO Global Network Services Management and Support	£0	[-£10 to £0]	£0
B	BY	Openreach Analysis Code	£0	£0	£0
W	WP	Group Property Partners	[-£10 to £0]	£0	[-£10 to £0]
G	G	Group Consolidation Units	[-£10 to £0]	[-£50 to -£10]	[-£10 to £0]
W	W	BT Property	[-£10 to £0]	£0	[-£10 to £0]
Total			[£0 to £10]	[£50 to £100]	[£0 to £10]

Source: BT ASPIRE, Cartesian

5.5.11.3 *Cost Attribution to Core Fibre (PG350N) from General Ledger*

The table below shows the most significant methods (by FAC) used to apportion ledger level costs into PG350N. These methodologies are similar to those for backhaul fibre costs (PG170B).

Table 101. ***Notable Methods for Cost Attribution to Core Fibre (PG350N) from General Ledger***

Cost Driver	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct Allocation	PDTBHQ(T), PDTIVP(T)	T				10%	6.2.1
Fibre length	PDTCJF(T&M), PDTMUC(T), PDTCJC(T)	T, M				151%	6.2.7
PWNRC	CUMNORM	W				14%	6.2.3
	CUMRBTE	W				-52%	
	ORCUMNOR	B				-1%	
Floor Space Utilisation	DTNASTR	B				6%	6.2.13
Power Consumption	DTNELSP	B				2%	6.2.15
Transfer charges	Transfer Charges (out)	W				-7%	6.2.17

Cost Driver	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Previously Attributed Costs	NCOFADA	G	✂	✂	✂	-23%	6.2.17
Total			✂	✂	✂	**100%**	-

Source: BT ASPIRE, Cartesian

Only a small percentage of costs (✂% FAC) is directly allocated into PG350N. The largest cost is attributed based on the fibre length method. These costs are mainly pay and fibre asset capital costs. These is done using the same methodologies used in backhaul fibre (PG170B) - PDTCJF, PDTMUC and PDTCJC methodologies. Only fibre costs related to 20C core network are attributed to PG350N.

Core fibre is one of the rateable assets within BT's cumulo assessment and therefore it must receive cumulo rate associated costs. These costs (✂ FAC) are attributed using profit weighted network replacement cost (PWNRC) as the apportionment driver. The same basis is used to apportion rebates obtained on cumulo rates – due to the increasing unbundling of BT networks – and the transfer charge between Openreach and Group Property. As explained before, this is done to show that all transactions between BT Group and Openreach are complete (regulatory obligation).

BT apportions floor space and electricity costs to fibre cables originating or terminating at an exchange building. BT uses the same methodology for both space and power. For further details see Section 6.

These methodologies are described in more detail in Section 6. Please refer to Table 101 for the appropriate section reference.

5.5.11.4 Cost Attribution to Core Fibre (PG350N) from other Cost Categories

Following the attribution of costs from the general ledger at Level 1, PG350N receives additional cost attributions from 12 other activity groups. These activity groups contain shared costs across the whole of BT, of which a share is apportioned to core fibre. This occurs in the cost exhaustion process prior to costs being attributed from PG350N to network components at Level 7. These other cost categories contribute to ✂% of the total costs in PG350N at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. Table 102 and Table 103 below show the main contributors by cost category and division.

As observed in Access and Backhaul fibre sections, duct (in this case, core duct - AG149) is the main contributor of indirect fibre costs, accounting for ✂% of the total costs to be apportioned to the Network Components. Corporate and property related costs account for almost all of the remainder attributed costs (✂% of FAC).

Table 102. ***Impact of costs attributed to Core Fibre (PG350N) in cost exhaustion process, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
1	**Core Fibre**	**PG350N**	[£0 to £10]	[£50 to £100]	[£0 to £10]	-
Exhausted between Level 1 and 7	Duct used by Core Cables	AG149	[£10 to £50]	[£250 to £300]	[£10 to £50]	5.4.6
	Corporate Costs	AG112	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.3.4
	Group Property and Facilities Management	AG106	[£0 to £10]	£0	[£0 to £10]	5.6.4
	Others (9x)	-	£0	£0	£0	-
7	**Core Fibre**	**PG350N**	[£10 to £50]	[£350 to £400]	[£50 to £100]	-

Source: BT ASPIRE, Cartesian

At a business unit level, the attribution is driven by BT TSO since this is the division responsible for BT's core network and associated ducts. The majority of the costs are capital costs.

Table 103. ***Costs Apportioned to Core Fibre (PG350N) between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
T	BT TSO	[£10 to £50]	[£250 to £300]	[£10 to £50]
W	BT Property	[£0 to £10]	£0	[£0 to £10]
C	Corporate Headquarters	[£0 to £10]	[£0 to £10]	[£0 to £10]
E	Corporate Adjustments	£0	[£0 to £10]	£0
G	Group Consolidation Units	£0	[-£10 to £0]	£0
Others		£0	[£0 to £10]	£0
Total		**[£10 to £50]**	**[£250 to £300]**	**[£50 to £100]**

Source: BT ASPIRE, Cartesian

These attributions result in very small changes in terms of the mix of contributors per division as shown in Table 104. Although the BT TSO contribution increases the most in absolute terms, its share of costs at Level 7 is smaller due to the negative attribution from Group Consolidation Units having less impact.

Table 104. ***Core Fibre (PG350N) Costs at Level 7, shown by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
T	BT TSO	✂[£10 to £50]	✂ [125% to 625%]	✂[£50 to £100]	✂ [85% to 175%]
C	Corporate Headquarters	£0	0%	✂[£0 to £10]	✂ [0% to 20%]
B	Openreach	✂[£0 to £10]	✂ [0% to 125%]	✂[£0 to £10]	✂ [0% to 20%]
E	Corporate Adjustments	£0	0%	£0	0%
G	Group Consolidation Units	✂[-£10 to £0]	✂ [-125% to 0%]	✂[-£10 to £0]	✂ [-20% to 0%]
Total		**✂[£0 to £10]**	**100%**	**✂[£50 to £100]**	**100%**

Source: BT ASPIRE, Cartesian

5.5.11.5 *Cost Attribution from Core Fibre (PG350N) to Network Components*

Core fibre costs are apportioned to network components based on the fibre bandwidth and fibre length using the same methodology described for backhaul fibre costs (PG170B). A detailed description of the methodology can be found in Section 6.

Costs in PG350N are apportioned to a total of 20 network components. The Inter ATM transmissions component is attributed with the greatest share of costs (✂%), driven by a combination of the fibre bandwidth required by the circuit and the coverage of the core ATM network. The ATM is a legacy transmission protocol using SDH technology networks for long-haul transport of both voice and data traffic (predecessor of IP technology).

Note that 'distribution' in the backhaul/core context (see table) means the link between exchanges or an exchange, an aggregation node or core node. The attribution of core fibre costs to PC rentals 2Mbps link per km distribution component (CR371) implies this circuit crosses part of the core network.

Table 105. ***Core Fibre (PG350N) costs apportioned to Network Components (Top 10)***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
Inter ATM transmissions	CO316	✂[£0 to £10]	✂[£100 to £150]	✂[£10 to £50]
Inter - tandem transmission length	CO370	✂[£0 to £10]	✂[£50 to £100]	✂[£0 to £10]
PC rentals 2Mbit/s regional trunk	CG101	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
PC rentals 140Mbit/s national trunk	CG203	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
PC rentals 140Mbit/s regional trunk	CG103	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]

PC rentals 2Mbit/s national trunk	CG201	[£0 to £10]	[£10 to £50]	[£0 to £10]
PC rentals 34Mbit/s national trunk	CG202	[£0 to £10]	[£10 to £50]	[£0 to £10]
PC rentals 34Mbit/s regional trunk	CG102	[£0 to £10]	[£10 to £50]	[£0 to £10]
PC rental 2Mbit/s link per km distribution	CR371	[£0 to £10]	[£0 to £10]	[£0 to £10]
PC rental 64kbit/s link per km transmission	CR391	[£0 to £10]	[£0 to £10]	[£0 to £10]
Others (12x)		[£0 to £10]	[£10 to £50]	[£0 to £10]
Total		**[£10 to £50]**	**[£350 to £400]**	**[£50 to £100]**

Source: BT ASPIRE, Cartesian

5.6 Property

5.6.1 Summary

The Property cost group includes costs related to the utilisation and management of all of BT's leased property as well as the ownership and rationalisation of BT's retained property assets (except motor vehicle buildings and BT Centre). The costs are incurred by BT Group Property which recovers them by charging other Group divisions based on their occupancy of space, consumption of electricity or on the basis of pay.

The Property cost group accounts for approximately £803m FAC at Level 1, which is around 9% of BT's total FAC across all markets (excluding retail residual).

The key findings within this section are:

1. This cost group does not include income from the sale of property; the income is all attributed to Retail Residual. BT does not consider such profits to be part of the normal cost of managing their estate and therefore does not believe it is cost causal to attribute them to AG106 Group Property and Facility Management. However, this is different to the treatment of the provisions for exiting leased properties (AG414).
2. Vacant space is billed to Openreach directly from Group Property (i.e., it's included in the transfer charges) and so the attributions for operational space used by Openreach take account of this (AG106).
3. It appears the attribution of leased office space (attribution to Retail Residual) is different to the attribution of BT retained office space (attribution to Regulated Markets) (AG414)

5.6.2 Contribution to Market Costs

Table 106 shows how the costs in the Property cost group are distributed across BT's markets and services. Property contributes c.38% of the costs to the Wholesale and Retail Residual markets. The remainder of the costs are attributed across the regulated services with the Fixed Access Market receiving the highest share (c.30%), specifically WLR and LLU.

It could be expected that this cost group would be dominated by capital costs due to its asset portfolio. However, due to the fact that BT leases most of their buildings, Property is actually dominated by operational costs. Therefore, the cost of capital is not a significant contributor to any of the markets.

Table 106. ***Property Costs by Markets (2014, £m)***

Market Review	Market	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC %
Fixed Access Markets	Wholesale Line Rentals (WLR)	£129	-£14	£128	16%
	Local Loop Unbundling (LLU)	£94	-£12	£93	12%
	Wholesale ISDN30 Lines	£13	£1	£13	2%
	Wholesale ISDN2 Lines	£11	-£1	£10	1%
Fixed Access Markets Total		**£247**	**-£26**	**£244**	**30%**
Business Connectivity Markets	AISBO Non-WECLA	£18	-£3	£17	2%
	AISBO WECLA	£1	£0	£1	0%
	MISBO Non-WECLA	£2	£0	£2	0%
	Point of Handover	£1	£0	£1	0%
	TISBO (above 45 Mbps up to and including 155 Mbps)	£4	£1	£4	0%
	TISBO (above 8 Mbps up to and including 45 Mbps)	£3	£1	£3	0%
	TISBO (up to and including 8 Mbps)	£53	15	54	7%
	Wholesale Regional Trunk Segments	£3	£1	£3	0%
Business Connectivity Markets Total		**£84**	**£15**	**£86**	**11%**
Wholesale Broadband Access Markets	Wholesale Broadband Access - Market 1	£59	-£6	£58	7%
	Wholesale Broadband Access - Market 2	£14	-£2	£14	2%
Wholesale Broadband Access Markets Total		**£73**	**-£8**	**£72**	**9%**
Narrowband Markets	Calls: Call Origination	£45	£3	£45	6%
	Calls: Call Termination	£42	£3	£42	5%
	Interconnect Circuits	£7	£4	£7	1%
Narrowband Markets Total		**£94**	**£10**	**£95**	**12%**
Wholesale Residual	Wholesale Residual	£165	£3	£165	21%
Retail Residual	Retail Residual	£148	-£63	£142	18%
Unregulated Markets Total		**£313**	**-£60**	**£307**	**38%**
GRAND TOTAL		**£810**	**-£70**	**£803**	**100%**

Source: BT ASPIRE, Cartesian

5.6.3 Composition by Cost Category

The Property group is comprised of three BT cost categories. The attribution of costs into and out from these categories are discussed in the following sections of the report.

Table 107 shows the respective values of the individual cost categories and the section of the report in which they are discussed. As can be seen, *Group Property and Facilities Management* is the most significant member of this group.

Table 107. ***Cost Components of Property at Level 1***

Section	Cost Components	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
5.6.4	Group Property and Facilities Management	AG106	[£700 to £800]	[-£150 to -£100]	[£700 to £800]
5.6.5	Property Asset Driver	AG412	[£10 to £50]	[£250 to £300]	[£50 to £100]
5.6.6	Property Provision Driver	AG414	[£0 to £10]	[-£250 to -£200]	[-£50 to -£10]
Total			**£810**	**-£70**	**£803**

Source: BT ASPIRE, Cartesian

Table 108 shows the proportion of costs in each service that are due to property. The services within Narrowband market have the highest share of property costs in their overall costs (26% to 35%). In contrast, the lowest impact of property costs is on AISBO and MISBO services within Business Connectivity market (c.3%) and the LLU and WLR services within Fixed Access market (c.7%). Unregulated markets are attributed 38% of total property FAC, however it only represents 8% of these markets overall costs.

The equipment volume and their usage of space, as well as power consumption, determine the attribution of property costs to each one of these services.

Table 108. ***Proportion of Property Costs in each Market (2014, %)***

Market Review	Market	Property costs as a proportion of Market Costs
Fixed Access Market	Wholesale ISDN30 Lines	14%
	Wholesale ISDN2 Lines	13%
	Local Loop Unbundling (LLU)	8%
	Wholesale Line Rentals (WLR)	7%
Business Connectivity Market	Wholesale Regional Trunk Segments	21%
	TISBO (above 45 Mbps up to and including 155 Mbps)	19%
	TISBO (up to and including 8 Mbps)	19%
	TISBO (above 8 Mbps up to and including 45 Mbps)	18%
	Point of Handover	11%
	MISBO Non-WECLA	3%
	AISBO WECLA	3%
	AISBO non-WECLA	3%
Wholesale Broadband Access Market	Wholesale Broadband Access - Market 1	16%
	Wholesale Broadband Access - Market 2	11%
Narrowband Market	Calls: Call Origination	35%
	Calls: Call Termination	37%
	Interconnect Circuits	26%
Wholesale Residual	Wholesale Residual	7%
Retail Residual	Retail Residual	1%

Source: BT ASPIRE, Cartesian

5.6.4 Group Property and Facilities Management (AG106)

5.6.4.1 Summary

AG106 captures costs from BT Group Property, BT TSO and BT Corporate Services. Costs included are Telereal rent, depreciation from owned BT property, electricity charges, facilities management costs and Telereal contract costs.

The key findings within this section are:

1. All vacant space is billed to Openreach from Group property, the apportionment of actual costs then takes this into account
2. This cost category contains a mixture of leased and owned building costs

5.6.4.2 Composition by Cost Type and Organisational Unit

Table 109 shows the costs apportioned to Group Property and Facilities Management at Level 1, by BT division. For each division, a breakdown of the cost types is provided.

The vast majority (✂ %) of costs are attributed from two divisions: BT Property and BT TSO. Further analysis of the data (and investigating costs in the ledger) reveals that Telereal rent and contract charges represent ✂% of the total, followed by ✂% relating to electricity charges (note that ✂% BT TSO Non-Pay is not just electricity costs) and ✂% relating to the facilities management cost.

The negative MCE for non-pay costs against BT Property refers to external rent payable, i.e., rent due but not yet paid (which means it is a liability), and also a provision for dilapidation.

Note that there is a ✂m transfer in charge recorded by BT Property that has no balancing transfer out charge.

Table 109. ***Costs Apportioned to AG106 at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

Attributions to Property Costs are made by about 40 different units. However, the majority (✂%) of these costs come from the BT Group Property, BT Energy and Carbon Unit and facilities management divisions. Table 110 shows the top 10 units that contribute these costs. As can be seen, the BT Property function accounts for nearly ✂ (✂ %) of the total.

Table 110. ***Organisational Units contributing costs to AG106 at Level 1***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
W	W	BT Property	✂[£350 to £400]	✂[-£50 to -£10]	✂[£350 to £400]
T	TSD	BT:TSO BT Energy and Carbon Unit	✂[£250 to £300]	✂[-£50 to -£10]	✂[£250 to £300]
F	F	BT Facilities Management	✂[£100 to £150]	✂[-£10 to £0]	✂[£100 to £150]
W	WP	Group Property Partners	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]
Others			✂[-£50 to -£10]	✂[£0 to £10]	✂[-£100 to -£50]
Total			✂[£700 to £800]	✂[-£150 to -£100]	✂[£700 to £800]

Source: BT ASPIRE, Cartesian

5.6.4.3 Cost Attribution to AG106 from General Ledger

BT defines a number of methodologies to attribute costs from the General Ledger to AG106, however these are all based on two underlying methods:

- Direct allocation; and
- Previously apportioned operating costs (excluding pay and depreciation) and capex additions

Table 111. ***Notable Methods for Cost Attribution to AG106 from General Ledger***

Underlying Method	Base Methodology	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct Allocation	AG106 (W,TSD)	✂	✂	✂	82%	6.2.1
	EXCEPT (WP,F)	✂	✂	✂	19%	
Previously Attributed Costs	OPEPST	✂	✂	✂	-1%	6.2.17
Others		✂	✂	✂	0%	-
Total		✂	✂	✂	**100%**	**-**

Source: BT ASPIRE, Cartesian

Direct allocation is used where BT is able to uniquely associate a cost item in the GL with AG106. These relationships are manually configured in ASPIRE. As BT Property manages the entire estate, costs such as Telereal rent, business rates and electricity for buildings are directly allocated to AG106. The exceptions are Motor-Vehicle-associated buildings and BT Centre, which are allocated to AG101 and AG112 respectively. Facilities Management costs (BT Corporate Services) and Telereal Corporate SV Contract costs (BT Property) are also 100% allocated to AG106.

Purchase costs are used to apportion creditors in relation to the purchase of electricity. This is likely to be 'electricity costs due but not paid', hence the negative MCE value. BT uses purchases by line of business to determine the weights and destinations of attribution. Using this methodology results in a large portion of creditors being attributed to AG106.

Further detail on the purchase cost (OPEPST) methodology can be found in Section 6.

5.6.4.4 Cost Attribution to AG106 from other Cost Categories

No other cost categories attributes costs to AG106. The activity group is exhausted at Level 2 in the cost attribution process.

5.6.4.5 Cost Attribution from AG106 to other Cost Categories

The final stage of the cost attribution process for AG106 is to apportion all costs to other Activity Groups and Plant Groups. These costs are apportioned in proportion to the transfer charges from BT Group Property to the other BT operational units and in a way that reflects the utilisation of the property assets by the units that ultimately generated the actual costs.

The apportionment is based on a three stage process where BT uses different transfer charges reflecting different property cost types, like rent or electricity charges, to attribute costs per operational unit. Once the costs have been divided between the units, BT then applies a number of previously-used base methodologies (to attribute these transfer charges and also ledger level costs) to further apportion the actual property costs to the different AGs and PGs. BT's rationale for using these methods is that the transfer charges for usage of space or electricity are representative of the actual costs incurred. A more detailed description of the methodology can be found in Section 6.

Using the above methodology, costs from AG106 (at Level 1) are apportioned to a total of 224 activity groups and plant groups. The most significant recipient categories are shown in Table 112 below. Note that although Retail Residual is not a plant group, it is also shown since the largest proportion of the costs are attributed there.

Table 112. ***Apportionment of AG106 costs to other AGs and PGs***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
Retail Products	RP	[£50 to £100]	[-£50 to -£10]	[£50 to £100]	-
Back-up Power Equipment - Non Maint	AG164	[£50 to £100]	[-£10 to £0]	[£50 to £100]	5.10.9
Main Distribution Frames Equipment	PG217E	[£50 to £100]	[-£10 to £0]	[£50 to £100]	5.10.10
Analogue Linecards	PG127A	[£50 to £100]	[-£10 to £0]	[£50 to £100]	5.10.6
DSLAM – Overheads	PG152N	[£10 to £50]	[-£10 to £0]	[£10 to £50]	5.10.10
E-side Copper Cable	PG117C	[£10 to £50]	[-£10 to £0]	[£10 to £50]	5.7.5
Non-Core Suspense	AG114	[£10 to £50]	[-£10 to £0]	[£10 to £50]	5.10.16.19
PDH Traffic Grooming	PG399T	[£10 to £50]	[-£10 to £0]	[£10 to £50]	5.10.16
LLU Co-mingling Recurring Costs (OR)	PG132B	[£10 to £50]	[-£10 to £0]	[£10 to £50]	5.10.10
LLU Co-mingling Recurring costs (TSO)	PG132N	[£10 to £50]	[-£10 to £0]	[£10 to £50]	5.10.10
Other AGs & PGs (215x)	-	[£300 to £350]	[-£100 to -£50]	[£300 to £350]	-
Total		[£700 to £800]	[-£150 to -£100]	[£700 to £800]	-

Source: BT ASPIRE, Cartesian

5.6.4.6 *Contribution of AG106 costs at Network Component Level*

As explained above, AG106 costs are apportioned to activity groups and plant groups rather than directly to network components. However it is possible to determine the contribution of AG106 costs at Network Component level.

The analysis reveals a total of 233 Network Components, which represent mainly network cables and equipment. The table below shows the top 10 components. The majority of the provision is attributed to Retail Residual as observed before. The percentage is higher than in the previous table due to some of those AGs and PGs attributing some of their costs to Retail at the exhaustion level.

Table 113. ***AG106 costs apportioned to Network Components (Top 10)***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
Retail Products	RP	[£100 to £150]	[-£50 to -£10]	[£100 to £150]
PSTN line cards	CL183	[£50 to £100]	[-£10 to £0]	[£50 to £100]
DSLAM overheads	CR188	[£50 to £100]	[-£10 to £0]	[£50 to £100]
Local exchanges general frames equipment	CL175	[£50 to £100]	[-£10 to £0]	[£50 to £100]
E side copper capital	CL171	[£10 to £50]	[-£10 to £0]	[£10 to £50]
Combi card broadband access	CN854	[£10 to £50]	[-£10 to £0]	[£10 to £50]
Local exchange processor set-up	CO212	[£10 to £50]	[-£10 to £0]	[£10 to £50]
Co-mingling power & vent	CT134	[£10 to £50]	[-£10 to £0]	[£10 to £50]
Local exchange concentrator set-up	CO214	[£10 to £50]	[-£10 to £0]	[£10 to £50]
Co-mingling rentals	CL132	[£10 to £50]	[-£10 to £0]	[£10 to £50]
Others AGs & PGs (224x)	-	[£300 to £350]	[-£50 to -£10]	[£300 to £350]
Total		[£700 to £800]	[-£150 to -£100]	[£700 to £800]

Source: BT ASPIRE, Cartesian

5.6.5 Property Asset Driver (AG412)

5.6.5.1 Summary

The Property asset driver (AG412) includes costs from BT Group Property. Costs included are the cost of capital of BT retained property (e.g. NBV) and current year depreciation costs.

The key findings within this section are:

1. Income from the sale of property is not attributed to AG412
2. Allocations out of this cost group are very similar to AG106
3. Some depreciation charges relating to BT retained buildings are still attributed to AG106

5.6.5.2 Composition by Cost Type and Organisational Unit

The table below shows the costs apportioned to AG412 at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

All costs are attributed from BT Property. The cost of capital in AG412 is driven by GBV (✂ %), which is partially net off by the return on cumulative depreciation charge (✂ %). In other words, the cost of capital is given by the NBV. In contrast, the operational costs are composed of in year depreciation.

Table 114. ***Costs Apportioned to AG412 at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

Attributions to Property Asset Driver Costs are made by about 30 different units. However, only BT Group Property contributions are material. Table 115 shows the top units that contribute these costs. As can be seen, the Group Property Partners accounts for practically all of the cost.

Table 115. ***Organisational Units contributing costs to AG412 at Level 1***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
W	WP	Group Property Partners	✂[£10 to £50]	✂[£250 to £300]	✂[£50 to £100]
	W	BT Property	£0	£0	£0
T	T	BT TSO (10 OUCs)	£0	✂[-£10 to £0]	£0
G	G	Group Consolidation Units	£0	✂[-£10 to £0]	£0
Total			**✂[£10 to £50]**	**✂[£250 to £300]**	**✂[£50 to £100]**

Source: BT ASPIRE, Cartesian

5.6.5.3 *Cost Attribution to AG412 from General Ledger*

BT defines a number of methodologies to attribute costs from the General Ledger to AG412, however these are dominated by one underlying method: direct allocation.

Table 116. ***Notable Methods for Cost Attribution to AG106 from General Ledger***

Cost Driver	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct Allocation	DTNFA	W	✂	✂	✂	100%	6.2.1
Others		-	✂	✂	✂	0%	-
Total			✂	✂	✂	**100%**	**-**

Note: Positive and negative attributions under 0.5% FAC are grouped under 'Others'

Source: BT ASPIRE, Cartesian

Although all BT Property Fixed assets costs are 100% allocated to AG412, BT uses a methodology for the attribution based on an analysis of the charges made to BT occupants.

As per AG106, this cost category doesn't include the NBV of retained Motor Vehicle workshops as these costs are allocated directly to AG101, using a different method.

5.6.5.4 *Cost Attribution to AG412 from other Cost Categories*

No other cost categories attributes costs to AG412. The activity group is exhausted at Level 2 in the cost attribution process.

5.6.5.5 *Cost Attribution from AG412 to other Cost Categories*

The final stage of the cost attribution process for AG412 is to apportion all costs to other activity groups and plant groups. The methodology to apportion costs from this cost category is the same as described for AG106, except that only transfer charges related to BT retained buildings are considered (i.e., no electricity, facilities management or rental cost types). Please refer to Section 6 for more details on the methodology.

Using this method, costs from AG412 (at Level 1) are apportioned to 204 AGs and PGs. The top 10 recipient categories are shown in the table below. The majority of the costs are attributed to Retail Residual, as per AG106. PDH traffic grooming (PG399T) has the second-highest FAC apportionment. The costs attributed to AG114 are related to BT non-core units (e.g. Subsidiaries, Overseas units, selected BT Global Services units) which are then attributed to Retail Residual at a later stage in the process.

Table 117. ***Apportionment of AG412 costs to other AGs and PGs***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
Retail Products	RP	✂[£0 to £10]	✂[£50 to £100]	✂[£10 to £50]	-

PDH Traffic Grooming	PG399T	[£0 to £10]	[£10 to £50]	[£0 to £10]	5.10.16
Back-up Power Equipment - Non Maintenance	AG164	[£0 to £10]	[£10 to £50]	[£0 to £10]	5.10.9
Corporate Costs	AG112	[£0 to £10]	[£10 to £50]	[£0 to £10]	5.3.4
Non-Core Suspense	AG114	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.10.16.19
PDH Metal 2Mbits/s Equipment	PG361T	[£0 to £10]	[£0 to £10]	[£0 to £10]	-
Specialised Accommodation Equipment - Non Maintenance	AG162	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.10.9
Ethernet Access Equipment	PG447A	£0	[£0 to £10]	[£0 to £10]	5.10.8
SG&A Wholesale Residual	PG583N	£0	[£0 to £10]	[£0 to £10]	5.3.7
PDH Optical 140Mbits/s Equipment	PG377T	£0	[£0 to £10]	[£0 to £10]	-
Other AGs and PGs (195x)	-	[£0 to £10]	[£50 to £100]	[£10 to £50]	
Total		[£10 to £50]	[£250 to £300]	[£50 to £100]	

Source: BT ASPIRE, Cartesian

5.6.5.6 *Contribution of AG412 costs at Network Component Level*

As explained above, AG412 costs are apportioned to activity groups and plant groups rather than directly to network components. However it is possible to determine the contribution of AG412 costs at Network Component level.

The analysis reveals a total of 233 Network Components, which represent mainly network cables and equipment. The table below shows the top 10 components. The majority of the provision is attributed to Retail Residual, as observed before. The percentage is higher than in the previous table due to some of those AGs and PGs attributing some of their costs to Retail at the exhaustion level (e.g. AG114).

Table 118. ***AG412 Costs apportioned to Network Components (Top 10)***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
Retail Products	RP	[£0 to £10]	[£50 to £100]	[£10 to £50]
Remote - local transmission link	CO325	[£0 to £10]	[£10 to £50]	[£0 to £10]
Inter - tandem transmission link	CO360	[£0 to £10]	[£10 to £50]	[£0 to £10]
OR PC rentals 2Mbit/s distribution	CF371	[£0 to £10]	[£0 to £10]	[£0 to £10]
D side copper capital	CL173	[£0 to £10]	[£0 to £10]	[£0 to £10]
PSTN line cards	CL183	[£0 to £10]	[£0 to £10]	[£0 to £10]
Ethernet electronics	CO485	£0	[£0 to £10]	[£0 to £10]
SG&A Wholesale residual	CO583	£0	[£0 to £10]	[£0 to £10]
DSLAM overheads	CR188	£0	[£0 to £10]	[£0 to £10]
E side copper capital	CL171	£0	[£0 to £10]	[£0 to £10]
Other Components (224x)	-	[£10 to £50]	[£100 to £150]	[£10 to £50]
Total		**[£10 to £50]**	**[£250 to £300]**	**[£50 to £100]**

Source: BT ASPIRE, Cartesian

5.6.6 Property Provision Driver (AG414)

5.6.6.1 Summary

BT Group Property is currently implementing a property rationalisation strategy by consolidating office space within the estate. The Property Provision Driver (AG414) includes the provision raised by Group Property against the cost of early termination of leases on office buildings that are no longer economical.

The key findings within this section are:

1. All transfer charges for leased offices are allocated to Retail Residual, whereas transfer charges for BT retained buildings are split across 35 plant groups (regulated and wholesale residual);
2. BT believes that all office space (leased or owned) should be attributed in the same way and are currently investigating why there is a difference;
3. Due to the method of attribution out of this cost group a large portion of the provision (or reduction to MCE) is attributed to the 35 plant groups, which in turn could reduce the regulated costs stack.

5.6.6.2 *Composition by Cost Type and Organisational Unit*

Table 119 shows the costs apportioned to Property Provision at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

The vast majority (✂ %) of costs are attributed from BT Property. The costs are all from the provision against the early termination of leased office contracts (labelled Non-Pay below).

Table 119. ***Costs Apportioned to AG414 at Level 1, by Division***

Division	Description	Cost Type	CCA (£ m)	MCE (£ m)	FAC (£ m)
W	BT Property	Non Pay	✂[£0 to £10]	✂[-£250 to -£200]	✂[-£50 to -£10]
T	BT TSO	Non Pay	£0	✂[-£10 to £0]	£0
Others			£0	✂[-£10 to £0]	£0
Total			✂[£0 to £10]	✂[-£250 to -£200]	✂[-£50 to -£10]

Source: BT ASPIRE, Cartesian

Attributions to Property Provision Driver Costs are made from around 30 different units. The majority of these costs come from the BT Group Property. The BT Property function accounts for nearly all (✂ %) of the total with ✂ [£0 to £10m] CCA and ✂ [-£250m to -£200m] MCE resulting in a ✂ [-£50m to -£10m] FAC. Other OUCs (e.g. BT TSO) contribute with ✂% (✂ [-£10m to £0] MCE).

5.6.6.3 *Cost Attribution to AG414 from General Ledger*

BT defines a number of methodologies to attribute costs from the General Ledger to AG414, however these are dominated by one underlying method: direct allocation.

Table 120. ***Notable Methods for Cost Attribution to AG414 from General Ledger***

Underlying Method	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct Allocation	PROPPROV	-	✂	✂	✂	99%	6.2.1
Other attribution methods	Others	-	✂	✂	✂	1%	-
Total		-	✂	✂	✂	**100%**	**-**

Source: BT ASPIRE, Cartesian

Although all of the provision is allocated to AG414, BT uses a base methodology for the attribution based on the analysis of current office space usage.

5.6.6.4 *Cost Attribution to AG414 from other Cost Categories*

No other cost categories attributes costs to AG414. The activity group is exhausted at Level 2.

5.6.6.5 *Cost Attribution from AG414 to other Cost Categories*

The final stage of the cost attribution process for AG414 is to apportion all costs to other Activity Groups and Plant Groups. The methodology to apportion costs from this cost category is the same as described for AG106, except that only transfer charges related to BT leased and retained buildings are considered (i.e., no electricity, facilities management or rental cost types). Note, however, that it may be inappropriate to include retained building transfer charges if costs captured in AG414 are related to early termination of leases on office buildings. This is assessed in more detail in Section 6.

Using this method, Costs from AG414 (at Level 1) are apportioned to 169 AGs and PGs. The most significant recipient categories are shown in Table 121.

Table 121. ***Apportionment of AG414 costs to other AGs and PGs***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
Retail Products	RP	[£0 to £10]	[-£150 to -£100]	[-£10 to £0]	-
Non-Core Suspense	AG114	£0	[-£50 to -£10]	[-£10 to £0]	5.10.16.19
Specialised Accommodation Equipment - Non Maintenance	AG162	£0	[-£10 to £0]	[-£10 to £0]	5.10.9
Corporate Costs	AG112	£0	[-£10 to £0]	[-£10 to £0]	5.3.4
SG&A Broadband	PG609N	£0	[-£10 to £0]	£0	5.3.7
Back-up Power Equipment - Non Maintenance	AG164	£0	[-£10 to £0]	£0	5.10.9
Ethernet Access Equipment	PG447A	£0	[-£10 to £0]	£0	5.10.8
Duct used by Access Cables	AG135	£0	[-£10 to £0]	£0	5.4.4
Ethernet Switches	PG901A	£0	[-£10 to £0]	£0	5.8.7
Analogue Line Final Drop	PG149A	£0	[-£10 to £0]	£0	5.7.13
Other AGs and PGs	-	[£0 to £10]	[-£100 to -£50]	[-£10 to £0]	-
Total		[£0 to £10]	[-£250 to -£200]	[-£50 to -£10]	-

Source: BT ASPIRE, Cartesian

5.6.6.6 *Contribution of AG414 costs at Network Component Level*

As explained above, AG414 costs are apportioned to activity groups and plant groups rather than directly to network components. However, it is possible to determine the contribution of AG414 costs at Network Component level.

The analysis reveals a total of 233 Network Components, which represent mainly network cables and equipment. Table 122 shows the top 10 components. The majority of the provision is attributed

to Retail Residual, as mentioned before. The percentage is higher than in the previous table due to some of those AGs and PGs attributing some of their costs to Retail at the exhaustion level.

Table 122. ***AG414 Costs apportioned to Network Components (Top 10)***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
Retail Products	RP	[£0 to £10]	[-£150 to -£100]	[-£10 to £0]
D side copper capital	CL173	£0	[-£10 to £0]	£0
SG&A Broadband	CO609	£0	[-£10 to £0]	£0
Combi card broadband access	CN854	£0	[-£10 to £0]	£0
Ethernet electronics	CO485	£0	[-£10 to £0]	£0
Dropwire capital & PSTN NTE	CL178	£0	[-£10 to £0]	£0
D side copper current	CL174	£0	[-£10 to £0]	£0
Broadband MSAN access	CN890	£0	[-£10 to £0]	£0
DSLAM overheads	CR188	£0	[-£10 to £0]	£0
Ethernet Switch BB	CN891	£0	[-£10 to £0]	£0
Other Components (224x)	-	[£0 to £10]	[-£100 to -£50]	[-£10 to £0]
Total		[£0 to £10]	[-£250 to -£200]	[-£50 to -£10]

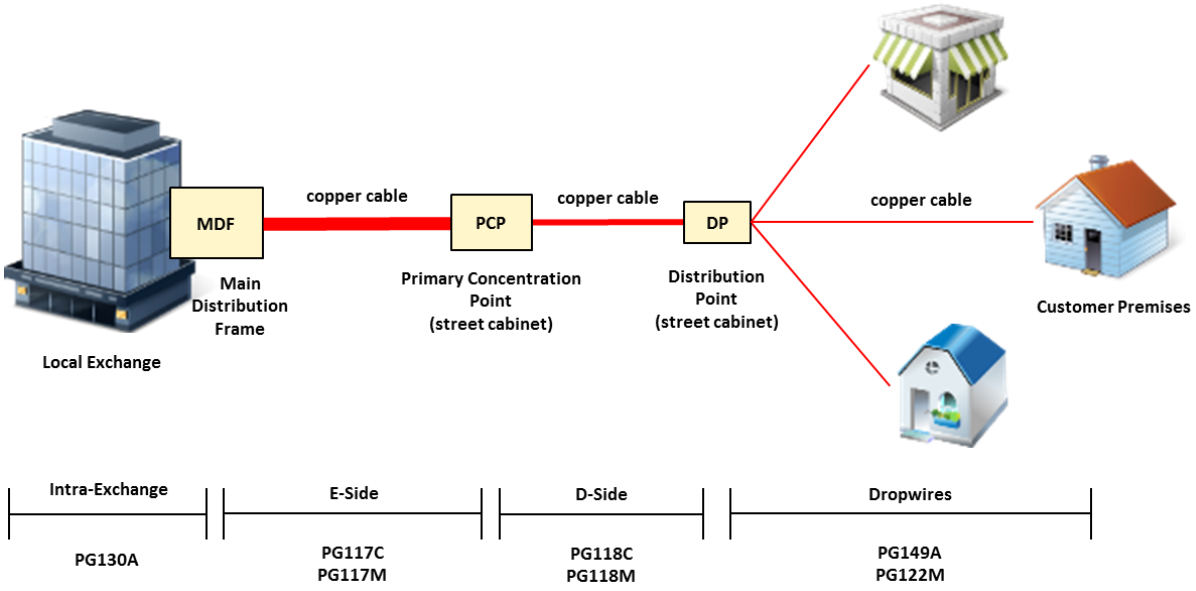
Source: BT ASPIRE, Cartesian

5.7 Copper

5.7.1 Summary

Copper cables are used in the access network to connect end-users to BT's local exchanges. The copper access network consists of three segments: Exchange side (E-side), Distribution side (D-side) and Dropwires, as illustrated in Figure 12.

Figure 12. ***High level representation of BT's copper access network showing the mapping to cost categories in the copper cost group***



Source: Cartesian

The Copper cost group accounts for approximately £1,416m FAC at Level 1, which represents around 19% of BT's total FAC across all markets (excluding retail residual).

The key findings within this section are:

1. Copper is only used by six out of the 19 regulated and unregulated markets
2. WLR and LLU services within fixed Access market are attributed with almost all the copper costs
3. No rebates on cumulo rates are attributed to D-side, E-side and dropwires cables
4. Current Pay is the major cost contributor factor

5.7.2 Contribution to Market Costs

Table 123 shows how copper costs are attributed across BT's regulated and unregulated markets and services. The majority of copper costs (c.95%) are attributed to services within the Fixed Access Market, specifically WLR and LLU services. These two services rely heavily on copper connectivity. In contrast, Wholesale ISDN30 has a non-material attribution. The same applies to TISBO service

within Business Connectivity market. The remaining 5% FAC is attributed to Wholesale Residual, with no costs being attributed to Retail Residual.

Table 123. ***Copper costs by Markets (2014, £m)***

Market Review	Market	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)
Fixed Access Markets	Wholesale Line Rentals (WLR)	£600	£2,790	£879	62%
	Local Loop Unbundling (LLU)	£306	£1,242	£430	30%
	Wholesale ISDN2 Lines	£20	£86	£28	2%
	Wholesale ISDN30 Lines	£2	£13	£3	0%
Fixed Access Markets Total		**£928**	**£4,132**	**£1,341**	**95%**
Business Connectivity Markets	TISBO (up to and including 8 Mbps)	£1	£8	£2	0%
Business Connectivity Markets Total		**£1**	**£8**	**£2**	**0%**
Wholesale Residual	Wholesale Residual	£47	£250	£72	5%
Unregulated Markets Total		**£47**	**£250**	**£72**	**5%**
GRAND TOTAL		**£977**	**£4,390**	**£1,416**	**100%**

Source: BT ASPIRE, Cartesian

Table 124 shows the proportion of costs in each service that are due to copper. The WLR service is the most impacted with almost half of its total costs consisting of copper costs (c.46%). WLR is followed by LLU (c.38%) and Wholesale ISDN2 (c.36%).

The TISBO service is attributed with a very small share of copper costs (see previous table), however this corresponds to 3% of its overall costs. In contrast, the 5% of FAC attributed to Wholesale Residual only represents 1% of total costs in that market.

Table 124. ***Proportion of Copper Costs in each Market (2014, %)***

Market Review	Market	Copper costs as a proportion of Market Costs
Fixed Access Markets	Wholesale Line Rentals (WLR)	46%
	Local Loop Unbundling (LLU)	38%
	Wholesale ISDN2 Lines	36%
	Wholesale ISDN30 Lines	3%
Business Connectivity Markets	TISBO (up to and including 8 Mbps)	3%
Wholesale Residual	Wholesale Residual	1%

Source: BT ASPIRE, Cartesian

5.7.3 Composition by Cost Category

The copper cost group comprises eight BT cost categories as shown in Table 125 below. Note that the cost categories are grouped into E-side, D-side and dropwires to ease understanding and reading of the analysis.

These cost categories capture mainly capital and operational costs associated with copper cables, such as asset depreciation, network materials stored in warehouses ("Stores"), pay and cumulo rates. They also include tie-cables used within the exchange, or between street cabinets in the case of FTTC.

The most significant cost contributor is D-side copper cable (PG118C), followed by dropwires (PG149A). This is to be expected due to the high volumes of these cables deployed in the access network. Overall, the copper cost group is mainly composed of operational costs, albeit capital costs are also significant.

Table 125. ***Cost Components in the Copper group, values at Level 1***

Section	Cost Category		BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
5.7.5	**E-Side**	**Copper Cable**	PG117C	[£50 to £100]	[£500 to £600]	[£100 to £150]
5.7.6		**Maintenance**	PG117M	[£50 to £100]	[-£10 to £0]	[£50 to £100]
5.7.7		**Intra-exchange Tie Cables**	PG130A	[£10 to £50]	[£150 to £200]	[£10 to £50]
5.7.8		**FTTC Copper Tie Cables**	PG192A	[£0 to £10]	[£100 to £150]	[£10 to £50]
E-Side Subtotal				[£100 to £150]	[£800 to £900]	[£200 to £250]
5.7.10	**D-side**	**Copper Cable**	PG118C	[£300 to £350]	[£2600 to £2800]	[£500 to £600]
5.7.11		**Maintenance**	PG118M	[£150 to £200]	[-£50 to -£10]	[£150 to £200]
D-Side Subtotal				[£500 to £600]	[£2400 to £2600]	[£700 to £800]
5.7.13	**Dropwire**	**Dropwires**	PG149A	[£250 to £300]	[£1000 to £1200]	[£350 to £400]
5.7.14		**Maintenance**	PG122M	[£50 to £100]	[-£50 to -£10]	[£50 to £100]
Dropwire Subtotal				[£300 to £350]	[£900 to £1000]	[£400 to £450]
Total				**£978**	**£4,389**	**£1,416**

Source: BT ASPIRE, Cartesian

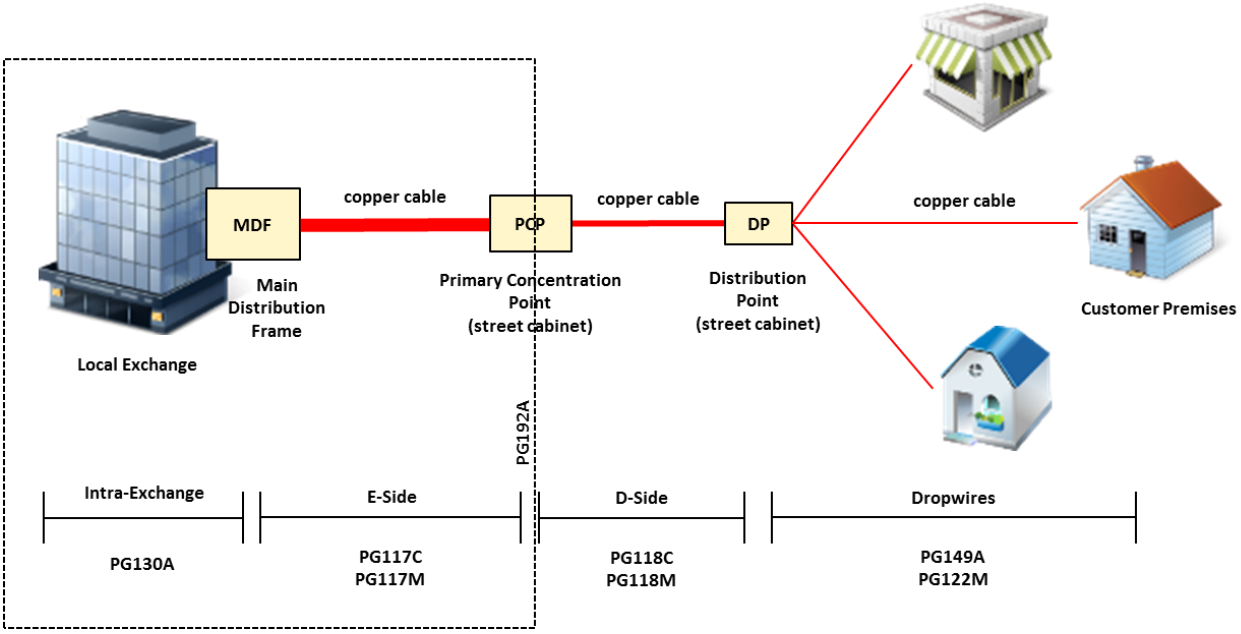
5.7.4 E-Side Copper Cables

BT defines four cost categories to capture E-side copper cable related costs. These are:

- PG117C for copper capital and current costs;
- PG117M for copper maintenance costs;
- PG130A for copper tie cables used within the local exchange buildings for local loop unbundling (connecting CP equipment to the MDF); and
- PG192A for copper tie cables used to connect fibre and copper street cabinets in FTTC deployments.

These cost categories are analysed in the following sections.

Figure 13. ***High level representation of BT's E-side access copper network showing the corresponding cost categories within the copper cost group***



Source: Cartesian

5.7.5 E-Side Copper (PG117C)

5.7.5.1 Summary

The PG117C cost category captures costs related to copper cables deployed in the E-side segment of the access network. The E-side segment sits between the local exchanges and the intermediate nodes called Primary Concentration Points (PCPs).

The key findings within this section are:

1. Floor space and electricity charges are attributed to PG117C
2. Rebates obtained on cumulo rates are not attributed to PG117C at level 1 (although the E-side segment is part of the unbundled loop)

5.7.5.2 Composition by Cost Type and Organisational Unit

Table 126 shows the costs apportioned to E-side copper at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

At Level 1, E-side copper total FAC is equally composed of current and capital costs, mainly incurred by Openreach. This is to be expected since Openreach is the primary division responsible for the assets and activities in the access network. BT Retail Northern Ireland (which encompasses Openreach-type activities in Northern Ireland) contributes ✂% only. Note that almost a third of Openreach pay cost is capitalised.

The transfer charges (in) received by Openreach and BT Retail Northern Ireland (not shown in table) balance with the transfer charges (out) from BT Property and Group Business Services divisions. These are mainly related to cumulo rates, floor space and electricity charges (from BT Property) and BT fleet fees (from Business Services). These transfer charges reflect internal trades occurring among different units within BT Group.

Some of the negative values observed in the table are due to CCA adjustments. The negative MCE depreciation cost, which represents the accumulated depreciation of the assets under PG117C, and the CCA Uplift HCAD to CCAD are two significant amounts bringing the total capital costs down.

Table 126. ***Costs apportioned to E-side Copper at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

There are approximately 48 different organisational units contributing costs to E-side copper, albeit only two of these are material. The Openreach (B) unit is the source of the majority of the costs, followed by Openreach Infrastructure Delivery (BL) unit – which actually builds the network by pulling cable on the ground. Table 127 illustrates the most significant units (FAC > 0.5%).

BT Property (W) attributes cumulo liabilities (labelled as non-Pay cost type in the table above) related to E-side copper. Other units such as Group Property Partners (WP) attribute transfer charges mainly related to floor space and electricity costs.

Table 127. ***Organisational Units contributing costs to E-side Copper at Level 1***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	B	Openreach	[£50 to £100]	[£500 to £600]	[£100 to £150]
	BL	Openreach Infrastructure Delivery	[£0 to £10]	[£10 to £50]	[£0 to £10]
	BK	Openreach Equivalence & Pub Affairs	[£0 to £10]	[-£10 to £0]	[£0 to £10]
M	MJ	Northern Ireland	[£0 to £10]	[£10 to £50]	[£0 to £10]
B	BY	Openreach Analysis Code	[£0 to £10]	£0	[£0 to £10]
W	W	BT Property	[£0 to £10]	£0	[£0 to £10]
B	BF	Openreach Finance	[£0 to £10]	£0	[£0 to £10]
	BA	Openreach Learning and Development	[£0 to £10]	£0	[£0 to £10]
Y	YL	BT Fleet	[-£10 to £0]	£0	[-£10 to £0]
W	WP	Group Property Partners	[-£50 to -£10]	£0	[-£50 to -£10]
Others			[£0 to £10]	[£0 to £10]	[£0 to £10]
Total			**[£50 to £100]**	**[£500 to £600]**	**[£100 to £150]**

Source: BT ASPIRE, Cartesian

5.7.5.3 *Cost Attribution to E-Side Copper Cables (PG117C) from General Ledger*

Table 128 below shows the most significant base methodologies used by BT to apportion ledger level costs to cost category PG117C. In total, there are over 15 base methodologies and several transfer charges out.

Table 128. ***Notable Methods for Cost Attribution to E-side Copper (PG117C) from General Ledger***

Cost Driver	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Cable Depreciation	PDTLMC	B, M				92%	6.2.5
Floor Space Utilisation	DTNASTR	B				25%	6.2.13
Previously Attributed Cost (pay)	FTQ	B, M				10%	6.2.17
Power Consumption	DTNELSP	B				7%	6.2.15

Cost Driver	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Pay and ROA	COMCOS	B	✂	✂	✂	3%	6.2.10
PWNRC	ORCUMNOR	B	✂	✂	✂	1%	6.2.3
	CUMNORM	W	✂	✂	✂	1%	
-	Others	-	✂	✂	✂	-39%	-
	Total		✂	✂	✂	**100%**	-

Source: BT ASPIRE, Cartesian

The most important cost drivers are Cable Depreciation, Floor Space Utilisation, Pay and Power Consumption.

Cable depreciation is used to apportion copper costs that are booked against a single CoW (LMC), i.e. copper cable costs (captured in PG117C); copper costs associated to tie cables (captured in PG130A and PG192A); and cables used to connect testing equipment (captured in PG151B – outside of this cost group). This methodology (PDTLMC) apportions the vast majority of the ledger level costs into PG117C.

BT apportions floor space and electricity costs to cables originating or terminating at an exchange building (the same treatment is applied to spine fibre (PG111C). Floor space utilisation is used by the DTNASTR methodology to apportion costs related to floor space occupied by E-side copper cables within BT's exchanges; power consumption specs of the exchange equipment is used by the DTNELSP methodology to apportion costs related to electricity consumption. These costs are apportioned as transfer charges and balanced by the transfer charges out from BT Property. The actual underlying costs are apportioned to PG117C at a later level in the attribution process in proportion to transfer charges (in) and other methodologies.

Openreach common/miscellaneous costs are commonly apportioned to Openreach related cost categories based on the Pay cost driver (FTQ). Many other PGs and AGs share these costs which are apportioned using this methodology. COMCOS is a similar methodology which uses a mix of pay and return on assets (ROA) to attribute costs to the cost categories associated with Openreach activities and assets.

Profit weighted Network Replacement cost (PWNRC) is the cost driver used to apportion cumulo rates via CUMNORM methodology. Costs attributed by ORCUMNOR relate to transfer charges (in) to Openreach which are balanced with a transfer charge out from BT Property (W) under 'Others'. Note the absence of CUMRBTE from the table above, indicating that no cumulo rebates are apportioned to E-side copper.

These methodologies are described in more detail in Section 6. Please refer to the table above for the appropriate section reference.

5.7.5.4 Cost Attribution to E-side Copper Cables (PG117C) from other Cost Categories

Following the attribution of costs from the general ledger at Level 1, PG117C receives additional cost attributions from 18 other activity groups. These activity groups contain shared costs of which there is an apportionment to E-side copper. This occurs in the cost exhaustion process prior to costs

being attributed from PG117C to network components at Level 7. Attributions from other cost groups in the exhaustion process make up ✂% of the total costs in PG117C at level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. The tables below show the costs apportioned both by cost category and division.

Most of these indirect costs are attributed by access duct (AG135), as observed in other access network cost categories. This accounts for ✂% of the total costs being apportioned further to network components.

Property costs contributes ✂% which includes, amongst others, the floor space and electricity costs mentioned before. The volume of the actual costs being apportioned is determined by the transfer charges attributed to PG117C using the DTNELSP and DTNASTR base methodologies (see previous section) at Level 1.

Table 129. ***Impact of costs attributed to PG117C in cost exhaustion process, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
1	**E-side Copper Cable**	**PG117C**	✂[£50 to £100]	✂[£500 to £600]	✂[£100 to £150]	-
Exhausted between Level 1 and 7	Duct used by Access Cables	AG135	✂[£10 to £50]	✂[£300 to £350]	✂[£10 to £50]	5.4.4
	Group Property and Facilities Management	AG106	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]	5.6.4
	Corporate Costs	AG112	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]	5.3.4
	OR Pay plus % FA driver	AG410	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.16.3
	OR Pay driver	AG401	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	5.3.6
	Motor Transport	AG101	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.4
	TSO Operational Costs	AG102	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.11
	Others (11x)	-	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	-
	Sub-total	-	✂[£50 to £100]	✂[£300 to £350]	✂[£100 to £150]	-
7	**E-side Copper Cable**	**PG117C**	✂[£100 to £150]	✂[£800 to £900]	✂[£200 to £250]	-

Source: BT ASPIRE, Cartesian

Table 130 provides a view of the above costs by division. Openreach, which is the largest source of cost at Level 1, also contributes the greatest share of additional cost in the exhaustion process since it is responsible for copper assets and activities in the access network.

The BT Property and BT Facilities Management divisions are the other two top contributors due to E-side copper using some space in exchange buildings.

Table 130. ***Costs Apportioned to PG117C between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	Openreach	[£50 to £100]	[£250 to £300]	[£50 to £100]
W	BT Property	[£10 to £50]	[£0 to £10]	[£10 to £50]
F	BT Facilities Management	[£0 to £10]	£0	[£0 to £10]
Y	Group Business Services	[£0 to £10]	[£0 to £10]	[£0 to £10]
E	Corporate Adjustments	£0	[£10 to £50]	[£0 to £10]
M	BT Retail	£0	[£10 to £50]	[£0 to £10]
C	Corporate Headquarters	[£0 to £10]	[£0 to £10]	[£0 to £10]
T	BT TSO	[£0 to £10]	[-£10 to £0]	[£0 to £10]
G	Group Consolidation Units	£0	[-£50 to -£10]	[-£10 to £0]
Total		**[£50 to £100]**	**[£300 to £350]**	**[£100 to £150]**

Source: BT ASPIRE, Cartesian

Table 131shows that the cost attribution to PG117C from other cost categories has a small impact on the mix of contributions by division. The greatest change is the reduction in the negative value of the contribution from BT Property. This has the effect of reducing the Openreach percentage contribution, although this increases in absolute terms.

Table 131. ***PG117C Costs at Level 7, by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
B	Openreach	[£100 to £150]	[85% to 135%]	[£200 to £250]	[85% to 115%]
F	BT Facilities Management	£0	0%	[£0 to £10]	[0% to 5%]
M	BT Retail	[£0 to £10]	[0% to 10%]	[£0 to £10]	[0% to 5%]
E	Corporate Adjustments	£0	0%	[£0 to £10]	[0% to 5%]
Y	Group Business Services	[-£10 to £0]	[-10% to 0%]	£0	0%
G	Group Consolidation Units	£0	0%	[-£10 to £0]	[-5% to 0%]
W	BT Property	[-£50 to -£10]	[-45% to - 5%]	[-£50 to -£10]	[-25% to 0%]

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
Total		[£100 to £150]	100%	[£200 to £250]	100%

Source: BT ASPIRE, Cartesian

5.7.5.5 *Cost Attribution from E-Side Copper Cables to Network Components*

Costs in PG117C are directly allocated to a single Network Component, E-side copper capital (CL171).

In contrast to fibre access links, E-side copper cables are not apportioned to multiple network components representing different circuit types. We believe this is because the attribution of copper lines can be made on the basis of service volumes directly without considering service bandwidths.

5.7.6 E-Side Maintenance (PG117M)

5.7.6.1 Summary

E-Side Maintenance (PG117M) captures operational costs relating to the maintenance of copper cables in the E-side of the access network. E-Side cable is the cable that links the local exchange to the primary cross connection point (PCP).

The key findings within this section are:

1. Current Pay costs make ✂% of the total FAC on copper maintenance
2. Maintenance costs also include costs associated to Special Fault Investigation (SFI) activities and Openreach Time Related Charges (TRC). However, these are treated separately (using their own cost categories, PG989A and PG981R respectively)

5.7.6.2 Composition by Cost Type and Organisational Unit

Table 132 shows the costs apportioned to E-side copper maintenance at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

The majority of costs in PG117M at Level 1 are attributed by Openreach and BT Retail Northern Ireland. Approximately ✂% FAC is made of current pay costs. The remainder is made of non-pay costs, such as training and stationery costs or hired engineering equipment.

A transfer charge from Group Business Services to Openreach and BT Retail Northern Ireland (not shown in the table) is associated with the use of BT Fleet for maintenance vehicles.

Table 132. ***Costs apportioned to PG117M at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

There are approximately 40 different organisational units contributing costs to E-side copper cable maintenance. The following table illustrates the most significant units (those with FAC > 0.5%).

The Openreach Service Delivery (BV) unit – responsible for service provisioning by connecting the cables to network equipment – and the Openreach Infrastructure Delivery (BL) unit – responsible for pulling cable in ducts the ground – incur the majority of the costs.

Table 133. ***Organisational Units contributing costs to PG117M at Level 1***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	BV	Openreach Service Delivery	✂[£10 to £50]	£0	✂[£10 to £50]
	BL	Openreach Infrastructure Delivery	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]
M	MJ	Northern Ireland	✂[£0 to £10]	£0	✂[£0 to £10]

B	**BF**	Openreach Finance	[£0 to £10]	£0	[£0 to £10]
	B	Openreach	£0	[-£10 to £0]	[-£10 to £0]
Y	**YS**	Supply Chain	[-£10 to £0]	£0	[-£10 to £0]
	YL	BT Fleet	[-£10 to £0]	£0	[-£10 to £0]
Total			**[£50 to £100]**	**[-£10 to £0]**	**[£50 to £100]**

Source: BT ASPIRE, Cartesian

5.7.6.3 *Cost Attribution to PG117M Cables from General Ledger*

BT uses a total of 16 different base methodologies to apportion ledger level costs into PG117M at Level 1. Table 134 below shows the most significant base methodologies. The most relevant cost drivers are Direct Allocation, SFI and TRC Equivalent Cost, and Pay.

Table 134. ***Notable Methods for Cost Attribution to PG177M from General Ledger***

Cost Driver	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct allocation	PG117M	B, M				12%	6.2.1
SFI/TRC Equivalent cost	PDTUEL	B, M,T				59%	6.2.6
Previously Attributed Cost (pay)	FTQ	B, M				39%	6.2.17
Pay and ROA	COMCOS	B				2%	6.2.10
Unknown	PDTCOPM	B				1%	-
Previously Attributed Costs	OPEPST	B				-1%	6.2.17
-	Others	Y				-14%	-
Total						**100%**	**-**

Source: BT ASPIRE, Cartesian

Some of the E-side copper maintenance costs (i.e., labour and repairing copper material costs) are directly allocated into PG117M, although this isn't the most significant attribution method.

The majority of costs are apportioned based on the equivalent cost of special fault investigation (SFI) and Openreach time related charges (TRC) activities. This is achieved using a methodology (PDUEL) which calculates the equivalent cost based on the time spent on these activities and Openreach standard man-hour cost. The remainder (i.e. the costs not related to SFI (PG989A) and TRC (PG981R) is attributed to PG117M.

Openreach shared costs are commonly apportioned to Openreach related cost categories based on the Pay cost driver (FTQ). Many other PGs and AGs share these costs which are apportioned using this methodology. COMCOS is a similar methodology which uses a mix between pay and return on

assets (ROA) to attribute these costs to cost categories associated with Openreach activities and assets

These methodologies are described in more detail in Section 6. Please refer to the above table for appropriate section references.

5.7.6.4 *Cost Attribution to PG117M from other Cost Categories*

Following the attribution of costs from the general ledger at Level 1, PG117M receives additional cost attributions from 16 other activity groups. These activity groups contain shared costs of which there is an apportionment to E-side maintenance. This occurs in the cost exhaustion process prior to costs being attributed from PG117M to network components at Level 7. These other cost categories contribute ✂% of the total costs in PG117M at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. The tables below show the costs apportioned both by cost category and division.

The high labour costs captured in PG117M at Level 1 are the main reason for the apportionment of corporate overheads (AG112) and Openreach shared costs (AG401). Note that these cost categories apportion costs (out) mainly based on pay costs.

Table 135. ***Impact of costs attributed to PG117M in cost exhaustion process, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Document Section Ref
1	**E-side Copper Cable Maintenance**	**PG117M**	✂[£50 to £100]	✂[-£10 to £0]	✂[£50 to £100]	-
Exhaustion between Level 1 and 7	Corporate Costs	AG112	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.3.4
	OR Pay driver	AG401	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	5.3.6
	Motor Transport	AG101	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.4
	Group Property and Facilities Management	AG106	✂[£0 to £10]	£0	✂[£0 to £10]	5.6.4
	Fleet Fuel Driver	AG415	✂[£0 to £10]	£0	✂[£0 to £10]	-
	OR Pay plus % FA driver	AG410	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.16.3
	TSO Operational Costs	AG102	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.11
	Others (9x)	-	✂[-£10 to £0]	✂[-£10 to £0]	✂[-£10 to £0]	-
	Sub-Total	-	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]	-
7	**E-side Copper Cable Maintenance**	**PG117M**	✂[£50 to £100]	✂[-£10 to £0]	✂[£50 to £100]	-

Source: BT ASPIRE, Cartesian

Table 136 provides a view of the above costs by division. Openreach, which is the largest source of cost at Level 1, also contributes the greatest share of additional cost in the exhaustion process since it is responsible for copper repair activities. BT TSO is second due to corporate costs (i.e., AG112), and Group Business Services third due to the motor transport (AG101) and fleet fuel (AG415) costs.

Table 136. ***Costs Apportioned to PG117M between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	Openreach	[£10 to £50]	£0	[£10 to £50]
T	BT TSO	[£0 to £10]	[£0 to £10]	[£0 to £10]
Y	Group Business Services	[£0 to £10]	[£0 to £10]	[£0 to £10]
E	Corporate Adjustments	£0	[£10 to £50]	[£0 to £10]
F	BT Facilities Management	£0	£0	£0
V	BT Security Enterprises	£0	£0	£0
W	BT Property	£0	£0	£0
G	Group Consolidation Units	£0	[-£10 to £0]	[-£10 to £0]
C	Corporate Headquarters	[-£10 to £0]	[£0 to £10]	[-£10 to £0]
Total		**[£10 to £50]**	**[£0 to £10]**	**[£10 to £50]**

Source: BT ASPIRE, Cartesian

Table 137 shows that the cost attribution to PG117M from other cost categories does have a small impact on the mix of contribution by division. Openreach and BT Retail Northern Ireland (which encompasses Openreach-type activities in Northern Ireland) contributions are diluted at Level 7 due to new entrants like BT TSO division which apportions a significant amount from other cost categories (e.g. AG112) as shown in the previous table. This is also observed in PG118M and PG122M which are associated with copper maintenance activities.

Table 137. ***PG117M Costs at Level 7, by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
B	Openreach	[£50 to £100]	[90% to 190%]	[£50 to £100]	[65% to 140%]
T	BT TSO	£0	0%	[£0 to £10]	[0% to 15%]
M	BT Retail	[£0 to £10]	[0% to 20%]	[£0 to £10]	[0% to 15%]
E	Corporate Adjustments	£0	0%	[£0 to £10]	[0% to 15%]

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
W	BT Property	£0	0%	[-£10 to £0]	[-15% to 0%]
G	Group Consolidation Units	£0	0%	[-£10 to £0]	[-15% to 0%]
Y	Group Business Services	[-£10 to £0]	[-20% to 0%]	[-£10 to £0]	[-15% to 0%]
C	Corporate Headquarters	£0	0%	[-£10 to £0]	[-15% to 0%]
Total		**[£50 to £100]**	**100%**	**[£50 to £100]**	**100%**

Source: BT ASPIRE, Cartesian

5.7.6.5 Cost Attribution from PG117M to Network Components

Costs in PG117M are directly allocated to a single Network Component, E-side copper current (CL172). No apportionment methodology is required.

5.7.7 Local Loop Unbundling (LLU) Tie Cables (PG130A)

5.7.7.1 Summary

The PG130A cost category captures costs associated with tie cables deployed within BT's exchanges. These cables are used to connect CP equipment (co-mingling in BT's exchange) to BT's main distribution frame (MDF) for LLU services. BT also uses tie cables for its own business operations.

The key findings within this section are:

1. LLU tie cables are not apportioned any cumulo rate costs
2. Costs associated with property and electricity charges are not attributed to LLU tie cables

5.7.7.2 Composition by Cost Type and Organisational Unit

Table 138 shows the costs apportioned to LLU tie cables at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

The vast majority of costs are incurred by Openreach and BT Retail Northern Ireland. Current and capital costs contribute a similar proportion to the total FAC attributed to PG130A. Depreciation costs are the main driver on the current cost side at Level 1.

The negative values observed in the table are related mainly to CCA adjustments. The negative MCE against the depreciation entry represents the accumulated depreciation of the assets under PG130A.

The transfer charge (in) received by Openreach balances the transfer charges (out) from Group Business Services division. These are mainly related to BT fleet charges (from Business Services). These transfer charges reflect the different internal trades occurring among different units within BT Group.

Table 138. ***Costs apportioned to PG130A at Level 1, by Division***

Source: BT ASPIRE, Cartesian

There are approximately 40 different organisational units contributing costs associated with intra-exchange tie cables. The following table illustrates the most significant units (by FAC).

The Openreach unit (B) attributes the majority of the costs as mentioned above, followed by Openreach Infrastructure Delivery (BL) – which builds the network by pulling cables. Other units such as BT Fleet (YL), attribute BT Fleet transfer charges.

Table 139. ***Organisational Units contributing costs to PG130A at Level 1***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	B	Openreach	[£10 to £50]	[£150 to £200]	[£10 to £50]
	BL	Openreach Infrastructure Delivery	[£0 to £10]	[£0 to £10]	[£0 to £10]
	BK	Openreach Equivalence & Pub Affairs	[£0 to £10]	£0	[£0 to £10]
M	MJ	Northern Ireland	£0	[£0 to £10]	[£0 to £10]
B	BF	Openreach Finance	£0	£0	£0
	BA	Openreach Learning and Development	£0	£0	£0
Y	YL	BT Fleet	[-£10 to £0]	£0	[-£10 to £0]
Others			£0	[£0 to £10]	£0
Total			**[£10 to £50]**	**[£150 to £200]**	**[£10 to £50]**

Source: BT ASPIRE, Cartesian

5.7.7.3 *Cost Attribution to PG130A Cables from General Ledger*

BT uses a total of 15 different base methodologies to apportion ledger level costs into PG130A at Level 1. Table 140 shows the most significant base methodologies.

Table 140. ***Notable Methods for Cost Attribution to PG130A from General Ledger***

Underlying Method	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Cable Depreciation	PDTLMC	B, M				84%	6.2.5
Previously Attributed Cost (pay)	FTQ	B, M				9%	6.2.17
MDF Asset Depreciation	PDTLMDF	B, M				9%	-
Pay and ROA	COMCOS	B				3%	6.3.6
Asset Policy	DTNCAP2	B				-1%	6.2.19
Others		-				-3%	-
Total						**100%**	**-**

Source: BT ASPIRE, Cartesian

The most significant cost drivers are Cable Depreciation, Pay and MDF Depreciation.

A large majority of ledger level costs are attributed to PG130A based on the YTD copper cable depreciation. The PDTLMC methodology is also used to attribute other copper costs (mainly to PG117C – see Section 5.7.6), since LMC CoW captures all costs associated with copper assets and activities in the E-side.

Similarly, the YTD depreciation of the MDF assets used by LLU tie cables and E-side copper cables is the basis of apportioning costs associated with the usage of the MDF due to LLU. This is given by the PDTLMDF methodology.

These methodologies are described in more detail in Section 6.

5.7.7.4 *Cost Attribution to PG130A from other Cost Categories*

Following the attribution of costs from the general ledger at Level 1, PG130A receives additional cost attributions from 18 other activity groups. These activity groups contain shared costs of which there is an apportionment to LLU tie cables. This occurs in the cost exhaustion process prior to costs being attributed from PG130A to network components at Level 7. These other cost categories contribute with c.19% of the total costs in PG130A at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. Table 141 show the costs apportioned both by cost category and division.

Corporate overheads (AG112) appears as the main contributor of indirect costs, accounting for c.8% of the total costs being apportioned to network components, followed by BT TSO Operational Costs and Openreach Pay cost types. Costs apportioned by other cost categories are minor.

Table 141. ***Impact of costs attributed to Intra-Exchange Tie Cables (PG130A) in cost exhaustion process, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
1	**Intra-exchange Tie Cables**	**PG130A**	[£10 to £50]	[£150 to £200]	[£10 to £50]	-
Exhausted between Level 1 and 7	Corporate Costs	AG112	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.3.4
	TSO Operational Costs	AG102	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.10.11
	OR Pay driver	AG401	[£0 to £10]	£0	[£0 to £10]	5.3.6
	OR Pay plus % FA driver	AG410	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.10.16.3
	Motor Transport	AG101	[£0 to £10]	£0	[£0 to £10]	5.10.4
	Group Property and Facilities Management	AG106	£0	£0	£0	5.6.4
	TSO Support Functions	AG103	£0	£0	£0	5.3.5
	Fleet Fuel Driver	AG415	£0	£0	£0	-
	Others (10x)	-	[-£10 to £0]	[-£10 to £0]	[-£10 to £0]	-
	Sub-total	**-**	[£0 to £10]	[£0 to £10]	[£0 to £10]	**-**
7	**Intra-exchange Tie Cables**	**PG130A**	[£10 to £50]	[£150 to £200]	[£10 to £50]	**-**

Source: BT ASPIRE, Cartesian

Table 142 provides a view of the above costs by division. Openreach, which is the largest source of cost at Level 1, also contributes the greatest share of additional cost in the exhaustion process. Group Business Services division also apportions a significant amount of costs into PG130A, mainly due to the motor transport and fleet fuel costs apportioned from AG101 and AG415 respectively.

Table 142. ***Costs Apportioned to Intra-Exchange Tie Cables (PG130A) between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	Openreach	[£0 to £10]	[£0 to £10]	[£0 to £10]
Y	Group Business Services	[£0 to £10]	£0	[£0 to £10]
E	Corporate Adjustments	£0	[£0 to £10]	[£0 to £10]
F	BT Facilities Management	£0	£0	£0
W	BT Property	£0	£0	£0
C	Corporate Headquarters	£0	[£0 to £10]	£0
G	Group Consolidation Units	£0	[-£10 to £0]	£0
T	BT TSO	[-£10 to £0]	[£0 to £10]	[-£10 to £0]
Total		[£0 to £10]	[£0 to £10]	[£0 to £10]

Source: BT ASPIRE, Cartesian

Table 143 shows that the cost attribution to PG130A from other cost categories does not have a material impact on the relative mix of FAC by division between Level 1 and Level 7.

Table 143. ***Intra-Exchange Tie Cables (PG130A) Costs at Level 7, by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
B	Openreach	[£10 to £50]	[25% to 140%]	[£10 to £50]	[20% to 110%]
M	BT Retail (Northern Ireland)	[£0 to £10]	[0% to 30%]	[£0 to £10]	[0% to 25%]
E	Corporate Adjustments	£0	0%	[£0 to £10]	[0% to 25%]
C	Corporate Headquarters	£0	0%	£0	0%
G	Group Consolidation Units	£0	0%	£0	0%
T	BT TSO	£0	0%	[-£10 to £0]	[-25% to 0%]
Y	Group Business Services	[-£10 to £0]	[-30% to 0%]	£0	0%

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
Total		**[£10 to £50]**	**100%**	**[£10 to £50]**	**100%**

Source: BT ASPIRE, Cartesian

5.7.7.5 *Cost Attribution from PG130A to Network Components*

Tie cables can be deployed for BT own business purpose (internal tie cables) or deployed to offer LLU to other OCPs (external tie cables). The costs associated with tie cables are apportioned to two different Network Components reflecting the two different uses of tie cables.

The apportionment is based on the volume of tie cables in use, which is retrieved from Openreach's management LLU volume report.

Tie cables for external use (i.e. by other CPs) are attributed to LLU services within the Fixed Access Market. In contrast, the internal cables are attributed to Wholesale Residual since they are used in BT's business operations.

Table 144. ***LLU Tie Cables (PG130A) costs apportioned to Network Components***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
Tie cables	CL133	[£10 to £50]	[£100 to £150]	[£10 to £50]
Internal tie cables	CL170	[£10 to £50]	[£50 to £100]	[£10 to £50]
Total		**[£10 to £50]**	**[£150 to £200]**	**[£10 to £50]**

Source: BT ASPIRE, Cartesian

5.7.8 FTTC Tie Cables (PG192A)

5.7.8.1 Summary

The PG192A cost category captures current and capital costs associated with copper tie cables that are used to connect fibre and copper street cabinets in FTTC deployments. BT also refers to PG192A as "NGA E-side Copper Capital".

The key finding within this section is:

1. Electricity charges are attributed to tie cables used in FTTC deployments contrarily to tie cables intra-exchange (PG130A)

5.7.8.2 Composition by Cost Type and Organisational Unit

Table 145 shows the costs apportioned to FTTC tie cables at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

Openreach and BT Retail Northern Ireland account for the majority of the costs. Current year depreciation is the main driver of operational costs. Current and capital costs contribute equally to the total FAC attributed to PG192A at Level 1.

The negative values observed are related to CCA adjustments. The negative MCE value for depreciation represents accumulated depreciation for the total FTTC tie cable assets.

The transfer charges out recover costs to BT Property and Group Business Services divisions from Openreach and BT TSO. These are mainly related to the electricity charges. Overall the transfer charges in and out of this PG balance.

Table 145. ***Costs apportioned to PG192A at Level 1, by Division***

Source: BT ASPIRE, Cartesian

There are approximately 35 different organisational units contributing costs to FTTC tie cables, however only four of these are material.

The following table illustrates the most significant units (FAC > 0.5%). Openreach (B) is responsible for assets and activities associated with tie cables in FTTC deployments. BT TSO General Infrastructure Services (TS) and BT TSO Centre (TX) units appear at the top due to the transfer charge in, which comprises electricity charges. These are recognised by BT Property in a different cost category (AG106, discussed in Section 5.6.4 within the Property cost group).

Other units, like Openreach Learning and Development (BA) and Openreach Finance (BF), apportion miscellaneous costs across PG192A and other cost categories that relate to Openreach activities, for which there is no direct relationship. BT Fleet and BT Property attributed costs are related to the transfer charges out recovered from BT TSO and Openreach.

Table 146. ***Organisational Units contributing costs to PG192A at Level 1***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)
B	B	Openreach	✂	✂	✂	✂ [50% to 265%]
T	TS	BT TSO General Infrastructure Services	✂	✂	✂	✂ [0% to 55%]
B	BL	Openreach Infrastructure Delivery	✂	✂	✂	✂ [0% to 55%]
T	TX	BT TSO Centre	✂	✂	✂	✂ [0% to 55%]
M	MJ	Northern Ireland	✂	✂	✂	✂ [0% to 55%]
B	BK	Openreach Equivalence & Pub Affairs	✂	✂	✂	✂ [0% to 55%]
	BA	Openreach Learning and Development	✂	✂	✂	0%
	BF	Openreach Finance	✂	✂	✂	0%
	BQ	Openreach Transformation	✂	✂	✂	0%
	BR	Openreach Marketing and Sales	✂	✂	✂	0%
	BV	Openreach Service Delivery	✂	✂	✂	0%
Y	YL	BT Fleet	✂	✂	✂	✂ [-55% to 0%]
W	WP	Group Property Partners	✂	✂	✂	✂ [-55% to 0%]
Total			✂	✂	✂	**100%**

Source: BT ASPIRE, Cartesian

5.7.8.3 *Cost Attribution to PG192A Cables from General Ledger*

BT uses a total of 10 different base methodologies to apportion ledger level costs into PG192A at Level 1. The table below shows the most significant base methodologies.

Table 147. ***Notable Methods for Cost Attribution to PG192A from General Ledger***

Underlying Method	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Cable Depreciation	PDTLMC	B, M	✂	✂	✂	✂ [50% to 250%]	6.2.5
	PDTLMD	B, M	✂	✂	✂	✂ [0% to 50%]	
Power Consumption	DTNELSP	T	✂	✂	✂	✂ [0% to 50%]	6.2.15
Previously Attributed Cost (pay)	FTQ	B, M	✂	✂	✂	✂ [0% to 50%]	6.2.17
Pay and ROA	COMCOS	B	✂	✂	✂	✂ [0% to 50%]	6.2.10
Others			✂	✂	✂	✂ [-50% to 0%]	-

Underlying Method	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Total			✂	✂	✂	100%	

Source: BT ASPIRE, Cartesian

The most significant cost drivers are Cable Depreciation and Power Consumption.

Cable depreciation costs are associated with the copper tie cables, and duct used by those cables, in FTTC deployments. The apportionment is done using two base methodologies: PDTLMC and PDTLMD. These methodologies have been described before in this report. In Section 5.7.5, where the PDTLMC methodology is used to attribute costs associated with E-side copper cables (PG117C) and in Section 5.4.4, where the PDTLMD methodology is used to attribute costs associated with access duct for NGA (AG135).

The power consumption driver is used to apportion electricity costs to tie cables used in FTTC deployments. These costs are associated with the transfer charge received by BT TSO and are attributed into PG192A by DTNELSP methodology. Although these costs are apportioned as transfer charges and balanced with the transfer charges out from BT Property, the actual underlying costs are apportioned to PG192A at a later level in the attribution process in proportion to these transfer charges, as determined by the DTNELSP methodology.

'Others' comprise mainly transfer charges. These methodologies are described in more detail in Section 6 of this report.

5.7.8.4 *Cost Attribution to PG192A from other Cost Categories*

Following the attribution of costs from the general ledger at Level 1, PG192A receives additional cost attributions from 16 other activity groups. These activity groups contain shared costs of which there is an apportionment to FTTC tie cables. This occurs in the cost exhaustion process prior to costs being attributed from PG192A to network components at Level 7. These other cost categories contribute ✂% of the total costs in PG192A at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. The tables below show the costs apportioned both by cost category and division.

The highest percentage of indirect costs is Property costs (AG106). As mentioned above, these costs are attributed to PG192A due to the transfer charge attributed by DTNELSP base methodology (see Table 148).

Table 148. ***Impact of costs attributed to PG192A in cost exhaustion process, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
1	FTTC Copper Tie Cables	PG192A	✂	✂	✂	✂ [30% to 175%]	-

Exhausted between Level 1 and 7	Group Property and Facilities Management	AG106	✂	✂	✂	✂ [0% to 35%]	5.6.4
	Corporate Costs	AG112	✂	✂	✂	✂ [0% to 35%]	5.3.4
	OR Pay plus % FA driver	AG410	✂	✂	✂	0%	5.10.16.3
	OR Pay driver	AG401	✂	✂	✂	0%	5.3.6
	Motor Transport	AG101	✂	✂	✂	0%	5.10.4
	Others (11x)	-	✂	✂	✂	✂ [0% to 35%]	-
	Sub-total	**-**	✂	✂	✂	✂ **[30% to 170%]**	**-**
7	**FTTC Copper Tie Cables**	**PG192A**	✂	✂	✂	**100%**	**-**

Source: BT ASPIRE, Cartesian

Table 149 provides a view of the above costs by division. Openreach, which is the largest source of cost at Level 1, also contributes the greatest share of additional cost in the exhaustion process. The indirect costs are largely operational costs rather than cost of capital.

Table 149. ***Costs Apportioned to PG192A between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)
B	Openreach	✂	✂	✂	✂ [0% to 95%]
W	BT Property	✂	✂	✂	✂ [0% to 95%]
F	BT Facilities Management	✂	✂	✂	✂ [0% to 95%]
Y	Group Business Services	✂	✂	✂	✂ [0% to 95%]
E	Corporate Adjustments	✂	✂	✂	0%
T	BT TSO	✂	✂	✂	0%
G	Group Consolidation Units	✂	✂	✂	0%
Total		✂	✂	✂	**100%**

Source: BT ASPIRE, Cartesian

Table 150 below shows that the most significant impact of cost attribution to PG130A from other cost categories is the addition of BT Facilities Management (F) division as one of the top contributors. The attributions also allow BT Property to recover additional costs.

Table 150. ***PG192A Costs at Level 7, by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
B	Openreach	✂	✂ [50% to 265%]	✂	✂ [30% to 170%]
T	BT TSO	✂	✂ [0% to 55%]	✂	✂ [0% to 35%]

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
F	BT Facilities Management	✂	0%	✂	✂ [0% to 35%]
M	BT Retail	✂	✂ [0% to 55%]	✂	✂ [0% to 35%]
E	Corporate Adjustments	✂	0%	✂	0%
G	Group Consolidation Units	✂	0%	✂	0%
W	BT Property	✂	✂ [-55% to 0%]	✂	✂ [-35% to 0%]
Total		✂	**100%**	✂	**100%**

Source: BT ASPIRE, Cartesian

5.7.8.5 *Cost Attribution from PG192A to Network Components*

The costs in PG192A (✂ FAC) are 100% allocated to a single Network Component, NGA E-side copper capital (CL192). Hence, no methodology is required.

5.7.9 D-Side Copper Cables

BT has defined two cost categories to capture D-side copper cable related costs:

- PG118C for D-Side Copper Cable capital and current costs; and
- PG118M for D-Side Copper Cable maintenance capital and current costs

The costs categories are analysed in the following sections.

5.7.10 D-Side Copper Cable (PG118C)

5.7.10.1 Summary

The PG118C cost category captures costs related to copper deployed in the D-side segment of the access network. The D-side segment consists in the link between the intermediate nodes called Primary Concentration Points (PCP) and the Secondary Concentration Points or Distribution Points (DPs) sitting closer to the customer premises.

The key finding within this section is:

- No Cumulo rebates are attributed to D-side copper

5.7.10.2 Composition by Cost Type and Organisational Unit

Table 151 shows the costs apportioned to D-side copper at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

The majority of costs in PG118C at Level 1 are attributed by Openreach which carries the major D-side copper related works. Despite the significant weight of capital costs on the total cost, operational costs are dominant, driven by current year depreciation costs. BT Retail Northern Ireland contributes approximately with ✂%.

The transfer charge in this PG recovers costs for BT Property and Group Business Services from Openreach and BT Retail Northern Ireland (not shown in the table). Overall the transfer charges in and out of this PG balance, reflecting internal trades occurring between units within BT. They also determine the attribution of the actual underlying costs as it is explained below. These transfers are mainly related to cumulo rates and property and electricity charges (from BT Property) and BT fleet (from Business Services).

Although there is a large GBV amount shown in Table 151, there is an equally large accumulated depreciation and a CCA adjustment which reduces the net capital costs. This applies both to Openreach and BT Retail Northern Ireland divisions.

Table 151. ***Costs Apportioned to D-side Copper Cable at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

There are approximately 50 different units contributing costs to D-side copper. Table 152 illustrates the 10 most significant units (by FAC).

Openreach (B) incurs the majority of the costs as mentioned above. BT Property (W) is attributing cumulo liabilities (non-Pay cost type) associated with D-side copper. Note this cost is significantly higher than previous cumulo liabilities observed in the fibre segments. Other units like Openreach Analysis Code (BY), Group Property Partners (WP) and BT Fleet (YL) are attributing the relevant transfer charges.

Table 152. ***Organisational Units contributing costs to PG118C at Level 1***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	B	Openreach	[£250 to £300]	[£2400 to £2600]	[£450 to £500]
	BL	Openreach Infrastructure Delivery	[£10 to £50]	[£100 to £150]	[£10 to £50]
M	MJ	Northern Ireland	[£10 to £50]	[£100 to £150]	[£10 to £50]
B	BY	Openreach Analysis Code	[£10 to £50]	£0	[£10 to £50]
W	W	BT Property	[£10 to £50]	£0	[£10 to £50]
B	BF	Openreach Finance	[£0 to £10]	[£10 to £50]	[£0 to £10]
	BA	Openreach Learning and Development	[£0 to £10]	£0	[£0 to £10]
	BLH	#N/A	[-£10 to £0]	£0	[-£10 to £0]
G	G	Group Consolidation Units	[£0 to £10]	[-£100 to -£50]	[-£10 to £0]
Y	YL	BT Fleet	[-£10 to £0]	£0	[-£10 to £0]
W	WP	Group Property Partners	[-£50 to -£10]	£0	[-£50 to -£10]
Others			[£0 to £10]	[£0 to £10]	[£0 to £10]
Total			**[£300 to £350]**	**[£2600 to £2800]**	**[£500 to £600]**

Source: BT ASPIRE, Cartesian

5.7.10.3 Cost Attribution to PG118C from General Ledger

Table 153 below shows the most significant base methodologies used by BT to apportion ledger level costs to cost category PG118C. In total, there are over 15 base methodologies and several transfer charges out.

The most significant cost drivers are Direct Allocation, Pay and PWNRC.

Table 153. ***Notable Methods for Cost Attribution to PG118C from General Ledger***

Cost Driver	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct allocation	Direct Allocation	B, M, G	✂	✂	✂	91%	6.2.1
Previously Attributed Cost (pay)	FTQ	B, M	✂	✂	✂	6%	6.2.17
PWNRC	ORCUMNOR	B	✂	✂	✂	5%	6.2.3
	CUMNORM	W	✂	✂	✂	5%	
Pay and ROA	COMCOS	B	✂	✂	✂	2%	6.2.10
Others (including Transfer Charges)		-	✂	✂	✂	-8%	6.2.17
Total			✂	✂	✂	**100%**	-

Source: BT ASPIRE, Cartesian

Direct allocation accounts for most costs into PG118C (over 90% of FAC). This means that majority of costs are booked to a CoW that is associated exclusively with D-side copper. These are mainly current year depreciation costs and non-pay (e.g. cleaning or managed services costs).

Openreach common/miscellaneous costs are commonly apportioned to Openreach related cost categories based on the Pay cost driver (FTQ). Many other PGs and AGs share these costs which are apportioned using this methodology. COMCOS is a similar methodology which uses a mix of pay and return on assets (ROA) to attribute costs to the cost categories associated with Openreach activities and assets.

Profit weighted Network Replacement cost (PWNRC) is the cost driver used to apportion cumulo rates using the CUMNORM methodology. Costs attributed by ORCUMNOR relate to transfer charges (in) to Openreach which are balanced with a transfer charge out from BT Property (W) under 'Others'. Note the absence of CUMRBTE from the table above, indicating that no cumulo rebates are apportioned to D-side copper.

Other methodologies comprise mainly transfer charges out which net off with transfer in charges attributed mainly using the ORCUMNOR but also FTQ and COMCOS for instance.

These methodologies are described in more detail in Section 6.

5.7.10.4 Cost Attribution to PG118C from other Cost Categories

Following the attribution of costs from the general ledger at Level 1, PG118C receives additional cost attributions from 18 other activity groups. These activity groups contain shared costs of which there is an apportionment to D-side copper. This occurs in the cost exhaustion process prior to costs being attributed from PG118C to network components at Level 7. These other cost categories contribute with ✂% of the total costs in PG118C at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. Table 154 shows the costs apportioned both by cost category and division.

As observed in Access Fibre (see Section 5.5), access duct (AG135) is the main contributor of indirect copper costs, accounting for ✂% of the total costs being apportioned to network components. Corporate costs form the remaining material ✂%.

Table 154. ***Impact of costs attributed to PG118C in cost exhaustion process, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref
1	**D-side Copper Cable**	**PG118C**	✂[£300 to £350]	✂[£2600 to £2800]	✂[£500 to £600]	-
Exhausted between Level 1 and 7	Duct used by Access Cables	AG135	✂[£200 to £250]	✂[£3400 to £3600]	✂[£500 to £600]	5.4.4
	Corporate Costs	AG112	✂[£50 to £100]	✂[£10 to £50]	✂[£50 to £100]	5.3.4
	OR Pay plus % FA driver	AG410	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]	5.10.16.3
	OR Pay driver	AG401	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]	5.3.6
	TSO Operational Costs	AG102	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.11
	Motor Transport	AG101	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.4
	Group Property and Facilities Management	AG106	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	5.6.4
	Others (11x)	-	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]	-
	Sub-total	-	✂[£350 to £400]	✂[£3400 to £3600]	✂[£700 to £800]	-
7	**D-side Copper Cable**	**PG118C**	✂[£600 to £700]	✂[£6000 to £6200]	✂[£1200 to £1400]	-

Source: BT ASPIRE, Cartesian

Table 155 provides a view of the above costs by division. Openreach, which is the largest source of cost at Level 1, also contributes the greatest share of additional cost in the exhaustion process since it is responsible for duct assets and activities in the access network.

Table 155. ***Costs Apportioned to D-side Copper (PG118C) between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	Openreach	✂[£400 to £450]	✂[£3400 to £3600]	✂[£700 to £800]
C	Corporate Headquarters	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]
M	BT Retail	✂[£0 to £10]	✂[£100 to £150]	✂[£10 to £50]
E	Corporate Adjustments	✂[£0 to £10]	✂[£100 to £150]	✂[£10 to £50]
Y	Group Business Services	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]
G	Group Consolidation Units	✂[£0 to £10]	✂[-£150 to -£100]	✂[-£50 to -£10]

T	BT TSO	[-£100 to -£50]	[£0 to £10]	[-£100 to -£50]
Total		[£350 to £400]	[£3400 to £3600]	[£700 to £800]

Source: BT ASPIRE, Cartesian

Table 156 shows that the cost attribution to PG118C from other cost categories does not have a material impact on the relative mix of FAC by division between Level 1 and Level 7.

Table 156. ***D-side Copper (PG118C) Costs at Level 7, by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
B	Openreach	[£500 to £600]	[85% to 105%]	[£1200 to £1400]	[90% to 110%]
M	BT Retail	[£10 to £50]	[0% to 10%]	[£10 to £50]	[0% to 5%]
C	Corporate Headquarters	£0	0%	[£10 to £50]	[0% to 5%]
E	Corporate Adjustments	£0	0%	[£10 to £50]	[0% to 5%]
G	Group Consolidation Units	[-£10 to £0]	[-5% to 0%]	[-£50 to -£10]	[-5% to 0%]
T	BT TSO	[£0 to £10]	[0% to 5%]	[-£100 to -£50]	[-10% to 0%]
Total		**[£500 to £600]**	**100%**	**[£1200 to £1400]**	**100%**

Source: BT ASPIRE, Cartesian

5.7.10.5 Cost Attribution from PG118C to Network Components

PG118C costs [£1200m to £1400m] FAC) are 100% allocated to a single network component, D-Side Copper Capital (CL173).

5.7.11 D-Side Copper Cable Maintenance (PG118M)

5.7.11.1 Summary

PG118M includes costs relating to repairing/maintenance of D-side copper cables.

The key findings within this section are:

1. Current Pay costs make almost the totality of FAC on copper maintenance
2. Maintenance costs also include costs associated to Special Fault Investigation (SFI) activities and Openreach time related charges. However, these are treated separately (via their own cost categories)

5.7.11.2 Composition by Cost Type and Organisational Unit

Table 157 shows the costs apportioned to D-side copper cable maintenance at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

The vast majority of costs are incurred by Openreach and BT Retail Northern Ireland. Current pay costs are the main driver of PG118M costs at Level 1, as would be expected in a cost category capturing mainly maintenance costs. The non-pay negative capital cost represents credits and pay recharges received.

The transfer charge (in) received by Openreach balances the transfer charges (out) from Group Business Services divisions (cost items with FAC <0.5% are not shown in the table). These are mainly related to BT fleet charges (from Business Services). These transfer charges reflect the internal trades occurring between units within BT.

Table 157. ***Costs Apportioned to D-side Copper Cable Maintenance at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

There are more than 45 different units contributing costs to copper cable in D-side, however only the top two are material. The following table illustrates the most significant units (FAC > 0.5%).

Openreach Service Delivery (BV) – responsible for service provisioning by connecting the cables to network equipment – and Openreach Infrastructure Delivery (BL) – responsible for building the network by pulling cable (and in this case for repairing/maintaining the copper cables in D-side) – are the source of the majority of the costs.

The negative CCA costs from BT fleet (YL) and Supply Chain (YS) are related to the costs recovered by the transfer charges out.

Table 158. ***Organisational Units contributing costs to AG112 at Level 1 (Top 10)***

OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
BV	Openreach Service Delivery	✂[£150 to £200]	✂[£0 to £10]	✂[£150 to £200]

BL	Openreach Infrastructure Delivery	[£10 to £50]	[£0 to £10]	[£10 to £50]
MJ	Northern Ireland	[£10 to £50]	[£0 to £10]	[£10 to £50]
MN	BT Retail Products and Enterprises	[£0 to £10]	£0	[£0 to £10]
B	Openreach	£0	[-£50 to -£10]	[-£10 to £0]
YS	Supply Chain	[-£10 to £0]	£0	[-£10 to £0]
YL	BT Fleet	[-£50 to -£10]	£0	[-£50 to -£10]
	Others	[£0 to £10]	[-£50 to -£10]	[£0 to £10]
Total		[£150 to £200]	[-£50 to -£10]	[£150 to £200]

Source: BT ASPIRE, Cartesian

5.7.11.3 *Cost Attribution to PG118M from General Ledger*

BT uses a total of 18 different base methodologies to apportion ledger level costs into PG149A at Level 1. The table below shows the most significant base methodologies.

Table 159. ***Notable Methods for Cost Attribution to PG118M from General Ledger***

Underlying Method	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct allocation	Direct Allocation	B, M				14%	6.2.1
SFI/TRC Equivalent Cost	PDTUDL	B, M				57%	6.2.6
Previously Attributed Cost (pay)	FTQ	B, M				39%	6.2.17
Pay and ROA	COMCOS	B				2%	6.2.10
Unknown	PDTCOPM	B				1%	-
Others		-				-13%	-
Total						**100%**	**-**

Source: BT ASPIRE, Cartesian

The most significant cost drivers are Direct Allocation, SFI/TRC equivalent cost and Pay.

Direct allocation is not the top method but it attributes a significant cost amount (c.14%) into PG118M. Direct allocation is used where BT is able to uniquely associate a cost item in the GL with PG118M. These relationships are manually configured in ASPIRE.

The equivalent cost of special fault investigation (SFI) and Openreach time related charges (TRC) activities is used to apportion the majority of ledger costs related to repairing/maintaining D-side copper cable. The equivalent cost is calculated based on the time spent on these activities and Openreach standard man-hour cost. The remainder is attributed to PG118M. The PDTUDL

methodology uses the same apportionment base as those in PG122M (PDTORSFI) and PG117M (PDTUEL).

Openreach common/miscellaneous costs are commonly apportioned to Openreach related cost categories based on the Pay cost driver (FTQ). Many other PGs and AGs share these costs which are apportioned using this methodology. COMCOS is a similar methodology which uses a mix of pay and return on assets (ROA) to attribute costs to the cost categories associated with Openreach activities and assets.

A more detailed description of these methodologies can be found in Section 6.

5.7.11.4 Cost Attribution to PG118M from other Cost Categories

Following the attribution of costs from the general ledger at Level 1, PG118M receives additional cost attributions from 17 other activity groups. These activity groups contain shared costs of which there is an apportionment to D-side cable maintenance. This occurs in the cost exhaustion process prior to costs being attributed from PG118M to network components at Level 7. These other cost categories contribute ✂% of the total costs in PG118M at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. The tables below show the costs apportioned both by cost category and division.

Table 160. ***Impact of costs attributed to PG118M in cost exhaustion process, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Document Section Ref
1	**D-side Copper Cable Maintenance**	PG118M	✂[£150 to £200]	✂[-£50 to -£10]	✂[£150 to £200]	**-**
Exhaustion Level	Corporate Costs	AG112	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]	5.3.4
	OR Pay driver	AG401	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]	5.3.6
	Motor Transport	AG101	✂[£0 to £10]	✂[£0 to £10]	✂[£10 to £50]	5.10.4
	Group Property and Facilities Management	AG106	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	5.6.4
	Fleet Fuel Driver	AG415	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	-
	OR Pay plus % FA driver	AG410	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.16.3
	TSO Operational Costs	AG102	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.11
	Others (10x)	-	✂[-£10 to £0]	✂[-£10 to £0]	✂[-£10 to £0]	-
7	**D-side Copper Cable Maintenance**	**PG118M**	✂[£250 to £300]	✂[-£50 to -£10]	✂[£200 to £250]	**-**

Source: BT ASPIRE, Cartesian

Table 161 provides a view of the above costs by division. Openreach, which is the largest source of cost at Level 1, also contributes the greatest share of additional cost in the exhaustion process. However, BT TSO and Group Business Services also apportion significant amount of costs into PG118M.

Table 161. ***Costs Apportioned to PG118M between Level 1 and 3, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	Openreach	[£50 to £100]	[£0 to £10]	[£50 to £100]
T	BT TSO	[£10 to £50]	[£0 to £10]	[£10 to £50]
Y	Group Business Services	[£10 to £50]	[£0 to £10]	[£10 to £50]
E	Corporate Adjustments	£0	[£10 to £50]	[£0 to £10]
F	BT Facilities Management	[£0 to £10]	£0	[£0 to £10]
V	BT Security Enterprises	£0	£0	£0
W	BT Property	[-£10 to £0]	[-£10 to £0]	[-£10 to £0]
G	Group Consolidation Units	£0	[-£50 to -£10]	[-£10 to £0]
C	Corporate Headquarters	[-£50 to -£10]	[£0 to £10]	[-£50 to -£10]
Total		[£50 to £100]	[£10 to £50]	[£50 to £100]

Source: BT ASPIRE, Cartesian

Table 162 shows that the cost attribution to PG118M from other cost categories has an impact on the top contributors. Openreach and BT Retail FAC contributions at Level 1 are diluted at Level 7 due to new entrants like BT TSO which apportions a significant amount via other cost categories, as shown in the previous table.

Table 162. ***PG118M Costs at Level 7, by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
B	Openreach	[£150 to £200]	[80% to 115%]	[£250 to £300]	[100% to 125%]
T	BT TSO	£0	0%	[£10 to £50]	[0% to 25%]
M	BT Retail	[£10 to £50]	[5% to 30%]	[£10 to £50]	[0% to 25%]
E	Corporate Adjustments	£0	0%	[£0 to £10]	[0% to 5%]

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
W	BT Property	[-£10 to £0]	[-10% to 0%]	[-£10 to £0]	[-5% to 0%]
G	Group Consolidation Units	[£0 to £10]	[0% to 10%]	[-£10 to £0]	[-5% to 0%]
Y	Group Business Services	[-£50 to -£10]	[-30% to - 5%]	[-£10 to £0]	[-5% to 0%]
C	Corporate Headquarters	£0	0%	[-£50 to -£10]	[-25% to 0%]
Total		**[£150 to £200]**	**100%**	**[£200 to £250]**	**100%**

Source: BT ASPIRE, Cartesian

5.7.11.5 *Cost Attribution from PG118M to Network Components*

D-side copper maintenance costs are 100% allocated to a single component, D-side copper current (CL174). Consequently, no methodology is required.

5.7.12 Dropwires

Dropwires are cables deployed between distribution points (DP) and customer premises (see Figure 12 at beginning of Copper section). These are also referred to as "analogue line final drop".

BT defines two cost categories to capture dropwire-related costs:

- PG149A for dropwires asset costs
- PG122M for dropwire maintenance costs (residential)

5.7.13 Analogue Line Final Drop (PG149A)

5.7.13.1 Summary

The PG149A cost category captures costs related to analogue drop wires, which are the copper lines between the distribution point (DP) and the customer premises. Significant cost items include asset depreciation and pay costs.

The key findings within this section are:

1. No duct costs are attributed to dropwires at Level 1 (although some are underground)
2. No discounts on cumulo rates are attributed to PG149A

5.7.13.2 Composition by Cost Type and Organisational Unit

Table 163 shows the costs apportioned to dropwires at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

The majority of costs in PG149A at Level 1 are attributed by Openreach and BT Retail Northern Ireland divisions. Despite the significant weight of capital costs on the total cost, operational costs dominate, driven by current year depreciation costs and pay costs. Note that more than two-thirds of pay costs are capitalised.

The transfer charge (in) received by Openreach is balanced by the transfer charges (out) from BT Property and Group Business Services divisions. These are mainly related to cumulo rates and property and electricity charges (from BT Property) and BT fleet (from Business Services). Although it is not shown in the table, BT Retail Northern Ireland division is also attributed with a share of the transfer charges from BT Property and Group Business Services. These transfer charges reflect the internal trades occurring between units within BT.

The (negative) accumulated depreciation of dropwires assets is quite significant (✂) which brings down the total capital cost of these assets. Other negative values in the table refer to various CCA adjustments.

Table 163. ***Costs Apportioned to Dropwires (PG149A) at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

There are approximately 50 different units contributing costs to drop wires. Table 164 illustrates the most significant units (by FAC > 0.5%). Openreach (B) incurs the majority of the costs followed by Openreach Service Delivery (BV) – responsible for service provisioning by connecting the cables to network equipment – and Openreach Infrastructure Delivery (BL) – which builds the network by pulling cable on the ground.

BT Property (W) attributes cumulo liabilities associated with dropwires. Other units like Openreach Analysis Code (BY), Group Property Partners (WP) and BT Fleet (YL) attribute transfer charges with the sole purpose of showing the different internal trades among units.

Table 164. ***Organisational Units contributing costs to PG149A at Level 1***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	B	Openreach	✂[£150 to £200]	✂[£800 to £900]	✂[£250 to £300]
	BV	Openreach Service Delivery	✂[£50 to £100]	✂[£150 to £200]	✂[£50 to £100]
	BL	Openreach Infrastructure Delivery	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]
M	MJ	Northern Ireland	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]
B	BY	Openreach Analysis Code	✂[£0 to £10]	£0	✂[£0 to £10]
W	W	BT Property	✂[£0 to £10]	£0	✂[£0 to £10]
B	BA	Openreach Learning and Development	✂[£0 to £10]	£0	✂[£0 to £10]
	BF	Openreach Finance	✂[£0 to £10]	£0	✂[£0 to £10]
Y	YS	Supply Chain	✂[-£10 to £0]	£0	✂[-£10 to £0]
W	WP	Group Property Partners	✂[-£10 to £0]	£0	✂[-£10 to £0]
Y	YL	BT Fleet	✂[-£50 to -£10]	£0	✂[-£50 to -£10]
Others			✂[£0 to £10]	✂[-£50 to -£10]	✂[£0 to £10]
Total			✂[£250 to £300]	✂[£1000 to £1200]	✂[£350 to £400]

Source: BT ASPIRE, Cartesian

5.7.13.3 *Cost Attribution to PG149A from General Ledger*

BT uses a total of 18 different base methodologies to apportion ledger level costs into PG149A at Level 1. Table 165 shows the most significant base methodologies.

Table 165. ***Notable Methods for Cost Attribution to PG149A from General Ledger***

Underlying Method	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct Allocation	Direct Allocation	B,M	✂	✂	✂	89%	6.2.1
Previously Attributed Cost (pay)	FTQ	B, M	✂	✂	✂	18%	6.2.17
Pay and ROA	COMCOS	B	✂	✂	✂	3%	6.2.10
PWNRC	ORCUMNOR	B	✂	✂	✂	1%	6.2.3
	CUMNORM	W	✂	✂	✂	1%	
Others			✂	✂	✂	-12%	-
Total			✂	✂	✂	**100%**	**-**

Source: BT ASPIRE, Cartesian

The most significant cost drivers are Direct Allocation and Pay.

Direct allocation is the dominant method of attributing drop wires ledger costs into PG149A, accounting for almost 90% of the total costs. This means that majority of costs are booked to a CoW that is associated exclusively with dropwires. These are mainly current year depreciation costs and non-pay (e.g. cleaning or managed services costs).

Openreach common/miscellaneous costs are commonly apportioned to Openreach related cost categories based on the Pay cost driver (FTQ). Many other PGs and AGs share these costs which are apportioned using this methodology.

Profit weighted Network Replacement cost (PWNRC) is the cost driver used to apportion cumulo rates using the CUMNORM methodology. Costs attributed by ORCUMNOR relate to transfer charges (in) to Openreach which are balanced with a transfer charge out from BT Property (W) under 'Others'. Note the absence of CUMRBTE from the table above, indicating that (as with PG118C) no cumulo rate discount amounts are apportioned to dropwires.

A more detailed description of these methodologies can be found in Section 6.

5.7.13.4 *Cost Attribution to PG149A from other Cost Categories*

Following the attribution of costs from the general ledger at Level 1, PG149A receives additional cost attributions from 17 other activity groups. These activity groups contain shared costs of which there is an apportionment to this plant group. This occurs in the cost exhaustion process prior to costs being attributed from PG149A to network components at Level 7. These other cost categories contribute with c.19% of the total costs in PG149A at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. Table 166 and Table 167 below show the costs apportioned both by cost category and division.

Corporate Costs is the main contributor of indirect drop wires costs, accounting for ✂% of the total costs being apportioned to network components. Costs apportioned by other cost categories are residual.

Contrary to what is observed in other cost categories associated with the access network (e.g. PG118C or PG959C), PG149A is not attributed any duct related costs. The reason is that there is no specific CoW for duct work on this network segment and therefore any duct cost is booked against D-side CoW. As each dropwire is associated with a D-side line, this should not present an issue.

Table 166. ***Impact of costs attributed to Dropwires (PG149A) in cost exhaustion process, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
1	**Analogue Line Final Drop**	**PG149A**	✂[£250 to £300]	✂[£1000 to £1200]	✂[£350 to £400]	-
Exhausted Between Level 1 and 7	Corporate Costs	AG112	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]	5.3.4
	OR Pay driver	AG401	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]	5.3.6
	Motor Transport	AG101	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.4
	OR Pay plus % FA driver	AG410	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.16.3
	Group Property and Facilities Management	AG106	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	5.6.4
	Fleet Fuel Driver	AG415	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	-
	TSO Operational Costs	AG102	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.11
	Others (10x)	-	✂[-£10 to £0]	✂[-£50 to -£10]	✂[-£10 to £0]	-
	Sub-Total	-	✂[£50 to £100]	✂[£10 to £50]	✂[£50 to £100]	-
7	**Analogue Line Final Drop**	**PG149A**	✂[£300 to £350]	✂[£1000 to £1200]	✂[£450 to £500]	-

Source: BT ASPIRE, Cartesian

The table below provides a view of the above costs by division. Openreach, which is the largest source of cost at Level 1, also contributes the greatest share of additional cost in the exhaustion process since is responsible for dropwire assets and activities. Group Business Services is second, mainly due to the motor transport and fleet fuel costs apportioned by AG101 and AG415 respectively.

Table 167. ***Costs Apportioned to Dropwires (PG149A) between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	Openreach	[£50 to £100]	[£0 to £10]	[£50 to £100]
Y	Group Business Services	[£10 to £50]	[£0 to £10]	[£10 to £50]
E	Corporate Adjustments	£0	[£50 to £100]	[£0 to £10]
F	BT Facilities Management	[£0 to £10]	£0	[£0 to £10]
W	BT Property	[-£10 to £0]	£0	[-£10 to £0]
T	BT TSO	[-£10 to £0]	[£0 to £10]	[-£10 to £0]
G	Group Consolidation Units	[£0 to £10]	[-£100 to -£50]	[-£10 to £0]
C	Corporate Headquarters	[-£50 to -£10]	[£0 to £10]	[-£50 to -£10]
Total		[£50 to £100]	[£10 to £50]	[£50 to £100]

Source: BT ASPIRE, Cartesian

Table 168 shows that the cost attribution to PG149A from other cost categories does not have a material impact on the relative mix of FAC by division between Level 1 and Level 7.

Table 168. ***Comparison of Dropwires (PG149A) Costs at Level 1 and Level 7, by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
B	Openreach	[£350 to £400]	[95% to 110%]	[£450 to £500]	[95% to 115%]
M	BT Retail	[£10 to £50]	[0% to 15%]	[£10 to £50]	[0% to 15%]
E	Corporate Adjustments	£0	0%	[£0 to £10]	[0% to 5%]
T	BT TSO	£0	0%	[-£10 to £0]	[-5% to 0%]
Y	Group Business Services	[-£50 to -£10]	[-15% to 0%]	[-£10 to £0]	[-5% to 0%]
G	Group Consolidation Units	[£0 to £10]	[0% to 5%]	[-£10 to £0]	[-5% to 0%]
C	Corporate Headquarters	£0	0%	[-£50 to -£10]	[-15% to 0%]
Total		**[£350 to £400]**	**100%**	**[£450 to £500]**	**100%**

Source: BT ASPIRE, Cartesian

5.7.13.5 *Cost Attribution from PG149A to Network Components*

Dropwires are 100% allocated to a single component, Dropwire Capital & PSTN NTE (CL178). Consequently, no methodology is required.

5.7.14 Dropwire Maintenance (PG122M)

5.7.14.1 Summary

The PG122M cost category captures costs related with the maintenance of the residential dropwires. This cost category is sometimes referred to by BT as "residential PSTN maintenance".

The key findings in this sections are:

1. Current Pay costs make almost the totality of FAC on copper maintenance
2. Maintenance costs also include costs associated to Special Fault Investigation (SFI) activities and Openreach time related charges. However, these are treated separately (via their own cost categories)

5.7.14.2 Composition by Cost Type and Organisational Unit

Table 169 shows the costs apportioned to dropwires maintenance at Level 1 by BT division. For each division, a breakdown of the cost types is provided.

The majority of costs in PG122M at Level 1 are attributed by Openreach and BT Retail Northern Ireland. Approximately ✂% FAC is due to current pay costs. The transfer charge in this PG recovers costs to Group Business Services from Openreach and BT Retail Northern Ireland. These transfers in and out balance and are mainly associated with costs of using BT Fleet for maintenance vehicles.

Table 169. ***Costs Apportioned to Dropwires Maintenance (PG122M) at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

There are approximately 40 different units contributing costs to dropwires maintenance. The following table illustrates the most significant units (by FAC > 0.5%).

Openreach Service Delivery (BV), which is responsible for service provisioning by connecting the cables to network equipment (and in this case for repairing maintaining the dropwires cables), is the source of the majority of the costs. Other notable units include BT Retail Northern Ireland (MJ) and Openreach Infrastructure Delivery (BL).

Table 170. ***Organisational Units contributing costs to Dropwires Maintenance at Level 1***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	BV	Openreach Service Delivery	✂[£50 to £100]	£0	✂[£50 to £100]
M	MJ	Northern Ireland	✂[£0 to £10]	£0	✂[£0 to £10]
B	BL	Openreach Infrastructure Delivery	✂[£0 to £10]	£0	✂[£0 to £10]
M	MN	BT Retail Products and Enterprises	£0	£0	£0

B	**BF**	Openreach Finance	[-£10 to £0]	£0	[-£10 to £0]
	B	Openreach	£0	[-£10 to £0]	[-£10 to £0]
Y	**YS**	Supply Chain	[-£10 to £0]	£0	[-£10 to £0]
	YL	BT Fleet	[-£10 to £0]	£0	[-£10 to £0]
Others			[£0 to £10]	[-£10 to £0]	[£0 to £10]
Total			[£50 to £100]	[-£50 to -£10]	[£50 to £100]

Source: BT ASPIRE, Cartesian

5.7.14.3 Cost Attribution to PG112M from General Ledger

BT uses a total of 18 different base methodologies to apportion ledger level costs into PG122M at Level 1. The table below shows the most significant base methodologies.

Table 171. ***Notable Methods for Cost Attribution to PG122M from General Ledger***

Cost Driver	Base Methodology	Division	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct Allocation	Direct Allocation	B				1%	6.2.1
SFI/TRC Equivalent cost	PDTORSFI (B&M), PDTCORES(B), PDTURSFI(B), PDTMTLUR (B)	B, M				72%	6.2.6
Previously Attributed Cost (pay)	FTQ	B, M				39%	6.2.17
Pay and ROA	COMCOS	B				2%	6.2.10
Others		-				-14%	-
Total						**100%**	-

Source: BT ASPIRE, Cartesian

The most significant cost drivers are Direct Allocation, SFI/TRC equivalent cost and Pay.

Direct allocation is used to apportion only a small fraction of the total costs (c.1%), yet it interesting to highlight as it reveals that the majority of costs are booked to CoW that are not associated exclusively with dropwire maintenance.

The equivalent cost of special fault investigation (SFI) and Openreach time related charges (TRC) activities is used to apportion the majority of ledger costs related to repairing/maintaining dropwires. BT uses four different CoWs to book operational costs associated with repairing/maintaining dropwires in different deployment scenarios (e.g. underground wires, over-head wires and residential wires). These CoWs also include costs related to special fault investigation (SFI) and Openreach time related charges (TRC) on those wires. However, the costs associated with these activities are treated at separated cost categories and therefore four base methodologies are required to apportion the costs

(PDTORSFI, PDTCORES, PDTURSFI and PDTMTLUR). The equivalent cost is calculated based on the time spent on these activities and Openreach standard man-hour cost. The remainder is attributed to PG122M.

Openreach common/miscellaneous costs are commonly apportioned to Openreach related cost categories based on the Pay cost driver (FTQ). Many other PGs and AGs share these costs which are apportioned using this methodology.

Other methodologies comprise mainly transfer charges. These methodologies are described in detail in Section 6.

5.7.14.4 Cost Attribution to PG112M from other Cost Categories

Following the attribution of costs from the general ledger at Level 1, PG122M receives additional cost attributions from 16 other activity groups. These activity groups contain shared costs of which there is an apportionment to dropwire maintenance. This occurs in the cost exhaustion process prior to costs being attributed from PG122M to network components at Level 7. These other cost categories contribute with ✂% of the total costs in PG122M at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. Table 172 and Table 173 show the costs apportioned both by cost category and division.

Corporate Costs appears are the main contributor of indirect drop wires maintenance costs, accounting for ✂% of the total costs being apportioned to network components, followed by Openreach pay and motor transport cost types. Costs apportioned by other cost categories are residual.

Table 172. ***Impact of costs attributed to PG122M in cost exhaustion process, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
1	**Dropwire Maintenance Residential**	**PG122M**	✂[£50 to £100]	✂[-£50 to -£10]	✂[£50 to £100]	-
Exhausted between Level 1 and 7	Corporate Costs	AG112	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.3.4
	OR Pay driver	AG401	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	5.3.6
	Motor Transport	AG101	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.4
	Group Property and Facilities Management	AG106	✂[£0 to £10]	£0	✂[£0 to £10]	5.6.4
	Fleet Fuel Driver	AG415	✂[£0 to £10]	£0	✂[£0 to £10]	-
	OR Pay plus % FA driver	AG410	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.16.3
	TSO Operational Costs	AG102	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.11
	Others (9x)	-	✂[-£10 to £0]	✂[-£10 to £0]	✂[-£10 to £0]	-
	Sub-Total	-	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]	-
7	**Dropwire Maintenance Residential**	**PG122M**	✂[£50 to £100]	✂[-£10 to £0]	✂[£50 to £100]	-

Source: BT ASPIRE, Cartesian

Table 173 provides a view of the above costs by division. Openreach, which is the largest source of cost at Level 1, also contributes the greatest share of additional cost in the exhaustion process since is responsible for drop wires assets and activities. BT TSO is second-placed due to corporate costs and Group Business Services third mainly due to the motor transport and fleet fuel costs apportioned by AG101 and AG415 respectively.

Table 173. ***Costs Apportioned to PG122M between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	Openreach	[£10 to £50]	£0	[£10 to £50]
T	BT TSO	[£0 to £10]	[£0 to £10]	[£0 to £10]
Y	Group Business Services	[£0 to £10]	[£0 to £10]	[£0 to £10]
E	Corporate Adjustments	£0	[£10 to £50]	[£0 to £10]
W	BT Property	£0	£0	[-£10 to £0]
G	Group Consolidation Units	£0	[-£50 to -£10]	[-£10 to £0]
C	Corporate Headquarters	[-£50 to -£10]	[£0 to £10]	[-£50 to -£10]
	Others (8x)	[£0 to £10]	£0	[£0 to £10]
Total		[£10 to £50]	[£0 to £10]	[£10 to £50]

Source: BT ASPIRE, Cartesian

Table 174 shows that the cost attribution to PG122M from other cost categories has an impact on the top contributors. The Openreach and BT Retail FAC contributions at Level 1 are diluted at Level 7 due to new entrants like BT TSO which apportions a significant amount via other cost categories (AG112) as shown in the previous table. This is also observed in PG117M and PG118M which are associated with copper maintenance activities.

Table 174. ***PG122M Costs at Level 7, by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
B	Openreach	[£50 to £100]	[70% to 145%]	[£50 to £100]	[50% to 105%]
T	BT TSO	£0	0%	[£0 to £10]	[0% to 15%]
M	BT Retail	[£0 to £10]	[0% to 15%]	[£0 to £10]	[0% to 15%]
E	Corporate Adjustments	£0	0%	[£0 to £10]	[0% to 15%]

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
W	BT Property	£0	0%	[-£10 to £0]	[-15% to 0%]
G	Group Consolidation Units	£0	0%	[-£10 to £0]	[-15% to 0%]
Y	Group Business Services	[-£10 to £0]	[-15% to 0%]	[-£10 to £0]	[-15% to 0%]
C	Corporate Headquarters	£0	0%	[-£50 to -£10]	[-55% to - 10%]
Others		£0	0%	£0	0%
Total		[£50 to £100]	**100%**	[£50 to £100]	**100%**

Source: BT ASPIRE, Cartesian

5.7.14.5 *Cost Attribution from PG122M to Network Components*

Dropwire maintenance costs are 100% allocated to a single Network Component, Analogue line drop maintenance (CL180). Consequently, no methodology is required.

5.8 21st Century Network

5.8.1 Summary

The 21CN cost group covers the costs of equipment and activities in BT's next-generation network. Over the past decade BT's strategy to develop and use 21CN has changed drastically. Initially, the 21CN was intended to deliver both voice and data services to the Retail and Wholesale markets. However in more recent years, BT has decided to use the 21CN to deliver purely data services.

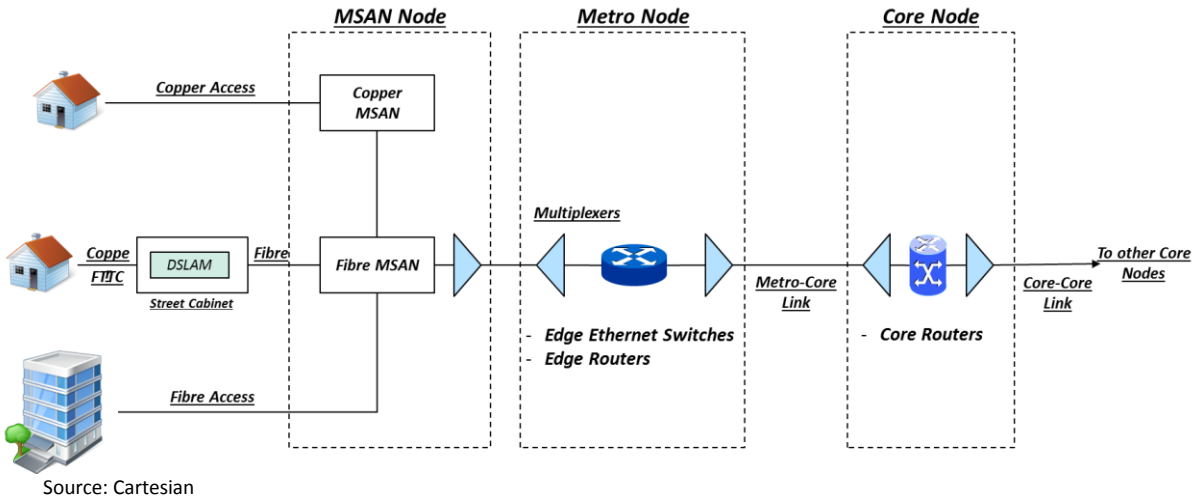
In FY 2013/14, 21CN accounted for approximately £314m FAC. The majority of these costs (around 70%) are attributed to the Wholesale Residual Markets. Of the costs attributed to the regulated markets, the majority are attributed to the Wholesale Broadband Access (WBA) Market.

The key findings in this section are:

1. Costs attributed by BT's 21CN model includes attributions based on future benefits
2. The 21CN model is poorly structured and very complex which presents difficulty in properly conducting a model audit and validating its accuracy
3. Approximately ✂ [£0 to 10m] FAC is attributed by 21CN to Narrowband Markets which appears high compared to the volume of voice traffic on 21CN. (21CN is not used to deliver voice services other than customers on the Pathfinder trial in Cardiff which has very low volumes)

Figure 14 presents the high-level network architecture, illustrating how the various network elements connect together to deliver 21CN services.

Figure 14. ***High Level Architecture of 21CN***



Source: Cartesian

Analysing the cost data confirms that most of the costs within 21CN relate to either hardware or capitalised project work, including software development. These costs are incurred by BT TSO. Other notable costs attributed to 21CN plant groups are electricity and cash/bank related charges from Corporate Adjustments.

Looking at the F8/OUC data it is not entirely clear what the Corporate Adjustment charges relate to. These charges are added to 21CN plant groups during the cost exhaustion process by AG113 (Liquid Funds and Interest) and are approximately ✂ [£0 to 10m] (FAC).

Finally, as discussed within the Ethernet Switches section below, BT attributes approximately ✂ [£10 to 50m] 20CN costs to the 21CN cost group and an additional ✂ [£0 to 10m] BT Retail Consumer costs are also attributed. For avoidance of doubt, these BT Consumer costs do not relate to BT Northern Ireland.

5.8.2 Contribution to Market Costs

21CN is primarily used to deliver data services. Table 175 shows that most of the regulated market costs of 21CN (approximately 18%) are attributed to the WBA markets and an additional 8% to the Business Connectivity Markets.

It can also be noted from the table below that Narrowband Markets have relatively high MCE costs when compared to the *CCA:MCE* ratio of other markets. This would suggest that costs within these Narrowband Markets are mainly asset related and have smaller proportion of operational costs such as pay.

Table 175. ***21CN costs by Markets (2014, £m) at Level 1***

Market Review	Market	CCA (£m)	MCE (£m)	FAC (£m)	FAC %
Wholesale Broadband Access Markets	Wholesale Broadband Access - Mkt 1	£30	£76	£37	12%
	Wholesale Broadband Access - Mkt 2	£15	£39	£19	6%
Wholesale Broadband Access Markets Total		**£45**	**£116**	**£57**	**18%**
Business Connectivity Markets	AISBO non-WECLA	£15	£44	£19	6%
	MISBO non-WECLA	£2	£6	£3	1%
	AISBO WECLA	£1	£4	£2	1%
	TISBO (up to and including 8 mbps)	£0	£0	£0	0%
	Point of Handover	£0	£0	£0	0%
	TISBO (above 8 mbps up to and including 45 mbps)	£0	£0	£0	0%
	TISBO (above 45 mbps up to and including 155 mbps)	£0	£0	£0	0%
Business Connectivity Markets Total		**£19**	**£55**	**£24**	**8%**
Narrowband Markets	Calls: Call Origination	£3	£19	£5	2%
	Calls: Call Termination	£3	£18	£5	2%
Narrowband Markets Total		**£6**	**£37**	**£10**	**3%**
Fixed Access Markets	Wholesale Line Rentals	£1	£3	£2	1%
	Wholesale ISDN30 Lines	£0	£1	£0	0%
Fixed Access Markets Total		**£2**	**£4**	**£2**	**1%**
Wholesale Residual		**£174**	**£471**	**£221**	**70%**
Grand Total		**£246**	**£682**	**£314**	**100%**

Source: BT ASPIRE, Cartesian

Cartesian understands that the amount of voice traffic delivered using the 21CN network is non-material. Therefore the amount of cost apportioned from 21CN to Narrowband Markets, whilst small, is nevertheless surprising.

Table 176 below shows that 21CN costs are most significant in the Wholesale Broadband Access markets. 21CN appears more significant in WBA Market 2 than Market 1 because the proportion of Property and 'Other' costs is less in WBA Market 2.

Table 176 below also shows that 21CN represents 4% of Narrowband Market costs. This appears higher than expected.

Table 176. ***Proportion of 21CN costs in each Market (2014, %)***

Market Review	Market	21CN costs as a proportion of Market Costs
Wholesale Broadband Access Markets	Wholesale Broadband Access - Mkt 2	15%
	Wholesale Broadband Access - Mkt 1	10%
Business Connectivity Markets	MISBO non-WECLA	7%
	AISBO WECLA	5%
	AISBO non-WECLA	4%
Narrowband Markets	Calls: Call Termination	4%
	Calls: Call Origination	4%
Fixed Access Markets	Wholesale ISDN30 Lines	1%
Wholesale Residual	Wholesale Residual	9%

Source: BT ASPIRE, Cartesian

5.8.3 Composition by Cost Category

The 21CN cost group contains 28 plant groups which all relate to the 21CN network elements. These plant groups are shown in Table 177, below. Of these plant groups, the most significant ones are Ethernet Switches (PG901A), Core-Core Link (PG866A) and MSAN Combi Cards (PG857A). These three plant groups together account for approximately 40% of 21CN costs.

Within this report, the 21CN plant groups have been divided into Metro Nodes, MSAN, 21CN Links, 21CN Ethernet Switches and iNode cost sub-groups. The composition of these sub-groups aligns with how BT has grouped these PGs within its 21CN cost model. It can be noted that 21CN costs are quite evenly distributed across four of these cost sub-groups (except for costs within iNodes). The table below also shows that 21CN Links have the highest MCE value when compared to other cost sub-groups, and Metro Nodes have the highest CCA costs.

Note: Tables shown in the 21CN sub-sections are aggregated to combine all the plant groups within a single sub-group. This is to help develop a high level understanding of how similar plant groups are being treated.

Table 177. ***Costs Categories within 21CN Cost Group at Level 1***

Section	Sub Group	Cost Category	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
5.8.4	Metro Nodes	Network Router Metro	PG896A	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]
		Metro-Edge Ethernet Bandwidth	PG887A	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]
		Network Router (large) Core	PG895A	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]
		Metro-Edge Ethernet Port	PG888A	✂[£0 to £10]	✂[£10 to £50]	✂[£10 to £50]
		Metro Broadband Edge Aggregator	PG880A	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
		Metro Broadband Remote Access Server	PG881A	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
		Multi Service Provider Edge Routers	PG893A	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
		Metro Broadband LNS	PG878A	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
		Core Directors	PG898A	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
		Metro Front End Router	PG882A	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
		Metro-Media Gateway	PG890A	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
		Metro-Sync Racks	PG892A	£0	£0	£0
		Metro BBL3	PG879A	£0	£0	£0
Metro Nodes Total				✂[£50 to £100]	✂[£100 to £150]	✂[£50 to £100]
5.8.5	MSAN	Copper MSAN Combi Cards Broadband element	PG857A	✂[£10 to £50]	✂[£50 to £100]	✂[£10 to £50]
		Copper MSAN Control Transport	PG860A	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]
		Copper MSAN Control Access	PG859A	✂[£0 to £10]	✂[£10 to £50]	✂[£10 to £50]
		Fibre MSAN Control Transport	PG869A	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
		Copper-Fibre MSAN Link	PG864A	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
		Copper MSAN Combi Cards Voice element	PG858A	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
		Copper MSAN ISDN30 cards	PG861A	£0	✂[£0 to £10]	£0
		Fibre MSAN TDM cards	PG872A	£0	£0	£0
MSANs Total				✂[£50 to £100]	✂[£150 to £200]	✂[£50 to £100]
5.8.6	21CN Links	Core-Core Link	PG866A	✂[£10 to £50]	✂[£50 to £100]	✂[£10 to £50]
		Metro-Core Link	PG886A	✂[£10 to £50]	✂[£50 to £100]	✂[£10 to £50]
		WDM-Metro Link	PG899A	✂[£10 to £50]	✂[£50 to £100]	✂[£10 to £50]
21CN Links Total				✂[£10 to £50]	✂[£200 to £250]	✂[£50 to £100]

5.8.7	**Ethernet Switches**	Ethernet Switches	PG901A	[£10 to £50]	[£100 to £150]	[£50 to £100]
		Ethernet Switch Access Cards	PG902A	[£0 to £10]	[£10 to £50]	[£0 to £10]
Ethernet Switches				[£50 to £100]	[£100 to £150]	[£50 to £100]
0	**iNode**	INODE Voice Call Set-Up	PG876A	[£0 to £10]	[£10 to £50]	[£0 to £10]
		INODE Network Features	PG875A	[£0 to £10]	[£0 to £10]	[£0 to £10]
iNode Total				[£0 to £10]	[£10 to £50]	[£10 to £50]
Grand Total				**£246**	**£682**	**£314**

Source: BT ASPIRE, Cartesian

5.8.4 Metro Nodes

5.8.4.1 Summary

The Metro Node cost sub-group is composed of 13 plant groups which cover costs for P Routers, Edge Routers and Metro Servers. Total fully allocated cost of Metro Nodes is ✂which is approximately ✂% of 21CN costs.

The key findings in this section are:

1. Almost all the Metro Node costs relate to TSO and over half of these costs are asset/hardware related costs
2. Costs from Metro Node plant groups are attributed to network components on the basis of 'Contended Bandwidth'

Table 178. ***Costs Categories within the Metro Node sub-group***

Cost Category	BT Ref	FAC (£ m)
Network Router Metro	PG896A	✂[£10 to £50]
Metro-Edge Ethernet Bandwidth	PG887A	✂[£10 to £50]
Network Router (large) Core	PG895A	✂[£10 to £50]
Metro-Edge Ethernet Port	PG888A	✂[£10 to £50]
Metro Broadband Edge Aggregator	PG880A	✂[£0 to £10]
Metro Broadband Remote Access Server	PG881A	✂[£0 to £10]
Multi Service Provider Edge Routers	PG893A	✂[£0 to £10]
Metro Broadband LNS	PG878A	✂[£0 to £10]
Core Directors	PG898A	✂[£0 to £10]
Metro Front End Router	PG882A	✂[£0 to £10]
Metro-Media Gateway	PG890A	✂[£0 to £10]
Metro-Sync Racks	PG892A	£0
Metro BBL3	PG879A	£0
Total		✂**[£50 to £100]**

Source: BT ASPIRE, Cartesian

5.8.4.2 Composition by Cost Type and Organisational Unit

The majority of costs in this sub-group are incurred by BT TSO as shown in Table 179 below. The single largest item is the Gross Book Value (GBV) of BT TSO assets, however this is mostly offset by the ✂ accumulated depreciation. The ✂ 'CCA Price' relates to CCA GRC adjustments to Metro and Core node valuations. At BT, 'CCA Price' is a 'holding gain' due to increase in price of an asset.

Table 179. ***Costs apportioned to Metro Nodes at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

Table 180 below demonstrates that OUC TT holds the Metro Node Assets. In the table below, it is also interesting to note that there is ✂ charge against TSO Finance. At a GL level this figure relates to current year depreciation. As depreciation of assets appears to typically sit within OUC TT, it is not entirely clear what these TSO Finance depreciations charges relate to.

Table 180. ***Organisational Units contributing costs to Metro Nodes at Level 1***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
T	TT	BT TSO RESEARCH & INNOVATION	✂[£50 to £100]	✂[£50 to £100]	✂[£50 to £100]
	TN	BT TSO Global Network Services Management and Support	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
	TS	BT TSO General Infrastructure Services	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
	TA	BT TSO ARCHITECTURE & GLOBAL IT PLATFORMS	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
	TB	BT TSO Service, Strategy and Operations	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
	TX	BT TSO Centre	✂[£0 to £10]	£0	✂[£0 to £10]
	TF	BT TSO Finance	✂[-£10 to £0]	✂[£0 to £10]	✂[-£10 to £0]
T Total			✂[£50 to £100]	✂[£100 to £150]	✂[£50 to £100]
W	W	BT Property	✂[-£10 to £0]	£0	✂[-£10 to £0]
	WP	Group Property Partners	✂[-£10 to £0]	£0	✂[-£10 to £0]
W Total			✂[-£10 to £0]	£0	✂[-£10 to £0]
Others			✂[£0 to £10]	£0	✂[£0 to £10]
Grand Total			✂[£50 to £100]	✂[£100 to £150]	✂[£50 to £100]

Source: BT ASPIRE, Cartesian

5.8.4.3 *Cost Attribution to Metro Nodes from General Ledger*

Most costs attributed from the general ledger to Metro Node plant groups use one of five similar bases. Table 181 below shows costs attributed by each of these bases.

Table 181. ***Notable Methods for Cost Attribution to Metro Nodes from General Ledger***

Underlying Method	Relevant BT Methodologies	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct Allocation	PGs within Metro Node cost sub-group	✂	✂	✂	1%	6.2.1
Depreciation	PDTMETAL (Alcatel-Lucent)	✂	✂	✂	46%	6.2.20
	PDTMETCI (Cisco)	✂	✂	✂	37%	
	PDTCORLU (Alcatel-Lucent)	✂	✂	✂	10%	
	PDTMETSI (Siemens)	✂	✂	✂	2%	
	PDTIPNCO	✂	✂	✂	3%	
Grand Total		✂	✂	✂	**100%**	

Source: BT ASPIRE, Cartesian

Direct allocation accounts for a very small (1%) share of costs in the Metro Node sub-group.

The majority of costs are apportioned on the basis of depreciation charges. There are four vendor-specific bases for apportioning the costs of network equipment (PDTMETAL, PDTMETCI, PDTCORLU and PDTMETSI). These bases apportion the costs and balance sheet of selected 21C elements to relevant PGs relating to metro and core nodes. The attribution of 21C network element costs to plant groups is achieved using BT's 21CN Model on the basis of network element depreciation charges.

Costs relating to provision and maintenance of IP network equipment are also apportioned based on depreciation, but using a methodology that is specific to capitalised projects (PDTIPNCO). BT uses a project ledger to determine capitalised project costs for the past three years and then using a useful life of three years, determines an annual depreciation charge for each project. Each of these projects are mapped to specific plant groups. This depreciation charge is then used by BT to determine an attribution base.

A detailed analysis of these methodologies can be found in Section 6 of this report.

5.8.4.4 Cost Attribution to Metro Nodes from other Cost Categories

Following the attribution of costs from the general ledger at Level 1, the Metro Node plant groups receive additional cost attributions from 18 other activity groups. These activity groups contain shared costs of which there is an apportionment to Metro Node plant groups. This occurs in the cost exhaustion process prior to costs being attributed to network components at Level 7. These other cost categories contribute ✂% of the total costs in the Metro Nodes sub-group at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. The tables below show the costs apportioned both by cost category and division.

Table 182. ***Impact of costs attributed to Metro Nodes in cost exhaustion process, by Cost Category***

Level	Cost Category	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
Level 1	**Metro Nodes**	-	[£50 to £100]	[£100 to £150]	[£50 to £100]	-
Exhaustion Levels	TSO Operational Costs	AG102	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.10.11
	Group Property and Facilities Management	AG106	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.6.4
	Corporate Costs	AG112	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.3.4
	TSO Support Functions	AG103	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.3.5
	Specialised Accommodation Equipment - Non Maint	AG162	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.10.9
	Back-up Power Equipment - Non Maint	AG164	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.10.9
	Others	-	[£0 to £10]	[£0 to £10]	[£0 to £10]	-
Level 7	**Metro Nodes**		[£100 to £150]	[£100 to £150]	[£100 to £150]	-

Source: BT ASPIRE, Cartesian

Table 182 shows that the most significant attribution is from TSO Operational Costs (AG102). Correspondingly, when looking at costs by division (Table 183), BT TSO is the largest contributor.

Table 183 also shows large capital attributions from Corporate Adjustments which are almost netted off by MCE attributions of Group Consolidation Units. Looking deeper into the GL level data, these attributions appear to be cash and bank borrowing related charges and are proportionately large when compared to similar charges across other 21C cost sub-groups.

Table 183. ***Costs Apportioned to Metro Nodes between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
T	BT TSO	[£10 to £50]	[£10 to £50]	[£10 to £50]
E	Corporate Adjustments	£0	[£10 to £50]	[£0 to £10]
C	Corporate Headquarters	[£0 to £10]	£0	[£0 to £10]
W	BT Property	[£0 to £10]	[-£10 to £0]	[£0 to £10]
F	BT Facilities Management	[£0 to £10]	£0	[£0 to £10]
Y	Group Business Services	£0	£0	£0
G	Group Consolidation Units	£0	[-£50 to -£10]	[-£10 to £0]
Others		£0	[£0 to £10]	£0

Grand Total	[£10 to £50]	[£10 to £50]	[£10 to £50]

Source: BT ASPIRE, Cartesian

Table 184 shows that the costs attributed to the Metro Node plant groups in the exhaustion process do not have a material impact on the share of costs by division.

Table 184. ***Metro Nodes Costs at Level 7, shown by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
T	BT TSO	[£50 to £100]	[55% to 115%]	[£100 to £150]	[85% to 135%]
E	Corporate Adjustments	£0	0%	[£0 to £10]	[0% to 10%]
C	Corporate Headquarters	£0	0%	[£0 to £10]	[0% to 10%]
F	BT Facilities Management	N/A	N/A	[£0 to £10]	[0% to 10%]
G	Group Consolidation Units	£0	0%	[-£10 to £0]	[-10% to 0%]
W	BT Property	[-£10 to £0]	[-15% to 0%]	[-£10 to £0]	[-10% to 0%]
Others		[£0 to £10]	[0% to 15%]	[£0 to £10]	[0% to 10%]
Grand Total		[£50 to £100]	**100%**	[£100 to £150]	**100%**

Source: BT ASPIRE, Cartesian

5.8.4.5 *Cost Attribution from Metro Nodes to Network Components*

The 13 plant groups within the Metro Nodes sub-group attribute costs to eight network components. The attribution method varies by plant group, with eight plant groups using direct allocation to a single component and the remaining five apportioning costs between multiple components on the basis of contended bandwidth.

The contended bandwidth method is implemented in BT's 21CN model. The contended bandwidth methodology attributes costs on the basis of total required bandwidth for each components as opposed to actual bandwidth. According to BT, "*Contended bandwidth is used because the network can be overbooked for capacity and the contention factor reserves or books spaces in the event of this happening*"[12]. This methodology therefore attributes more bandwidth to components than they are actually using.

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Table 185. ***Apportionment basis for Metro Node costs***

Cost Category	BT Ref	FAC (£ m)	Apportionment Basis
Network Router Metro	PG896A	✂[£10 to £50]	Contended Bandwidth
Metro-Edge Ethernet Bandwidth	PG887A	✂[£10 to £50]	
Network Router (large) Core	PG895A	✂[£10 to £50]	
Metro-Edge Ethernet Port	PG888A	✂[£10 to £50]	
Metro Broadband Edge Aggregator	PG880A	✂[£0 to £10]	Direct to CN860
Metro Broadband Remote Access Server	PG881A	✂[£0 to £10]	
Multi Service Provider Edge Routers	PG893A	✂[£0 to £10]	Contended Bandwidth
Metro Broadband LNS	PG878A	✂[£0 to £10]	Direct to CN904
Core Directors	PG898A	✂[£0 to £10]	Direct to CN878
Metro Front End Router	PG882A	✂[£0 to £10]	Direct to CN904
Metro-Media Gateway	PG890A	✂[£0 to £10]	Direct to CN869
Metro-Sync Racks	PG892A	£0	Direct to CN869
Metro BBL3	PG879A	£0	Direct to CN860

Source: BT ASPIRE, Cartesian

As a result of the above apportionments, the Core/Metro (Broadband) component (CN860) receives over half of the costs from the Metro Nodes sub-group, as shown in Table 186 below.

Table 186. ***Metro Node costs apportioned to Network Components***

Network Component	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
Core/Metro (broadband)	CN860	✂[£50 to £100]	✂[£50 to £100]	✂[£50 to £100]
Metro-switching IP/VPN	CN902	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]
Edge Ethernet ports broadband	CN884	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
21CN broadband service provider link	CN904	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
Core Directors	CN878	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
Multi Service Interconnect Link	CN905	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
Core/Metro (voice)	CN869	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
Edge Ethernet ports voice	CN883	£0	£0	£0
Total		**✂[£100 to £150]**	**✂[£100 to £150]**	**✂[£100 to £150]**

Source: BT ASPIRE, Cartesian

5.8.5 MSANs

5.8.5.1 Summary

The Multi-Service Access Node (MSAN) sub-group includes costs relating to copper and fibre access equipment. MSAN costs for FY 2013/14 were approximately ✂ at Level 1 and of these costs, the largest contributors were Copper MSAN Combi Cards for broadband and control transport.

Table 187. ***Costs Categories within the MSAN sub-group***

Cost Category	BT Ref	FAC (£ m)
Copper MSAN Combi Cards Broadband element	PG857A	✂[£10 to £50]
Copper MSAN Control Transport	PG860A	✂[£10 to £50]
Copper MSAN Control Access	PG859A	✂[£10 to £50]
Fibre MSAN Control Transport	PG869A	✂[£0 to £10]
Copper-Fibre MSAN Link	PG864A	✂[£0 to £10]
Copper MSAN Combi Cards Voice element	PG858A	✂[£0 to £10]
Copper MSAN ISDN30 cards	PG861A	£0
Fibre MSAN TDM cards	PG872A	£0
Total		✂ **£50 to £100]**

Source: BT ASPIRE, Cartesian

For MSANs, BT attributes General Ledger costs to plant groups on the basis of asset depreciation using the 21CN Model. Contended bandwidth and volume of connections is used to attribute costs from the plant groups into network components for broadband and voice services.

The key findings in this section are:

1. Almost all the MSAN costs relate to TSO and over three-quarters of these costs are asset related
2. Costs from the General Ledger are attributed to MSAN plant groups using a variety of base methodologies that attribute property, electricity and vendor-support contract costs
3. The cost exhaustion process results in an additional ✂ (FAC) TSO costs being attributed to MSANs
4. Cost are attributed to network components based on 'Contended Bandwidth' (for broadband-related components) or connection volumes (for voice-related components)

5.8.5.2 Composition by Cost Type and Organisational Unit

The majority of costs within the MSAN sub-group are driven by BT TSO as shown in Table 188 below. Most of these costs are capital costs. The data in the table shows the GBV of MSANs as ✂ and accumulated depreciation of ✂.

The BT Property transfer-out charge (✂) is balanced by the BT TSO transfer-in charges. This transfer relates to electricity costs.

Table 188. ***Costs apportioned to MSANs sub-group at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

The table above also shows large CCA adjustments for changes from GBV to GRC and from historic cost to current cost accumulated depreciation.

Table 189 shows that most of the asset related charges are accounted for within the OUC 'TT'. These costs make up for the bulk of the sub-group costs. The large attribution shown in the table below from Group Property Partners (Telereal) is a transfer-out charge for property. A balancing figure is recognised in the General Ledger for TSO General Infrastructure Services and TSO Centre (shown in table below).

Table 189. ***Top Cost Contributors to MSANs at Level 1, by OUC***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
T	TT	BT TSO RESEARCH & INNOVATION	✂[£50 to £100]	✂[£150 to £200]	✂[£50 to £100]
	TS	BT TSO General Infrastructure Services	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]
	TX	BT TSO Centre	✂[£0 to £10]	£0	✂[£0 to £10]
	TN	BT TSO Global Network Services Management and Support	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
	TB	BT TSO Service, Strategy and Operations	✂[£0 to £10]	£0	✂[£0 to £10]
	TF	BT TSO Finance	✂[-£10 to £0]	✂[£0 to £10]	✂[-£10 to £0]
T Total			✂[£50 to £100]	✂[£150 to £200]	✂[£100 to £150]
W	W	BT Property	✂[-£10 to £0]	£0	✂[-£10 to £0]
	WP	Group Property Partners	✂[-£50 to -£10]	£0	✂[-£50 to -£10]
W Total			✂[-£50 to -£10]	£0	✂[-£50 to -£10]
Others			✂[£0 to £10]	£0	✂[£0 to £10]
Grand Total			✂[£50 to £100]	✂[£150 to £200]	✂[£50 to £100]

Source: BT ASPIRE, Cartesian

5.8.5.3 *Cost Attribution to MSANs from General Ledger*

Costs attributed from the General Ledger to plant groups within the MSAN sub-group total ✂ FAC. Only 1% of this cost is directly allocated; the remainder is attributed using a combination of four different attribution methodologies. The bulk of these costs, ✂ are attributed using a depreciation-related base in the 21CN model.

There are ✂ of transfer-out charges which are balanced by an equivalent attribution of transfer-in charge by the Power Consumption and Floor Space utilisation base methodologies.

Table 190. ***Notable Methods for Cost Attribution to MSANs from General Ledger***

Underlying Method	Relevant BT Methodologies	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct Allocation	MSAN PGs, EXCEPT (TA) and PDTMSANF	✂	✂	✂	1%	6.2.1
Depreciation	PDTMSANF	✂	✂	✂	49%	6.2.20
	PDTMSANH	✂	✂	✂	48%	
Power Consumption	DTNELSP	✂	✂	✂	27%	6.2.14
Floor Space Utilisation	DTNASTR	✂	✂	✂	8%	6.2.13
Vendor Contract Value	PDTSCNM	✂	✂	✂	4%	6.2.18
Transfer Charges	240915, 241914	✂	✂	✂	-34%	-
Total		✂	✂	✂	**100%**	

Source: BT ASPIRE, Cartesian

The depreciation-related base methodologies (PDTMSANF and PDTMSANH) apportion costs using the BT 21CN model. In this model BT attributes the costs of 21C network elements to plant groups based on depreciation at a network element level.

Estimates of equipment power consumption are used to attribute Electricity charges using BT's Electricity model (base DTNELSP). The model uses network equipment volumes and associated power consumption based on either technical specifications or measured consumption.

The attribution of Property costs of leasing from Telereal Trillium is done on the basis floor space utilised by equipment (using the DTNASTR base methodology). BT first determines the physical dimension of each equipment and then applies an energy dissipation factor to account for the necessary cooling space required. This factorised dimension data is then used as an attribution base for cost attribution.

Network platform support contract costs are attributed on contract values and the attribution weights of other network platform bases (PDTSCNM).

These methodologies are discussed in more detail in Section 6 of this report

5.8.5.4 *Cost Attribution to MSANs from other Cost Categories*

Following the attribution of costs from the general ledger at Level 1, the MSAN plant groups receive additional cost attributions from 19 other activity groups. These activity groups contain shared costs of which there is an apportionment to MSAN plant groups. This occurs in the cost exhaustion process

prior to costs being attributed to network components at Level 7. These other cost categories contribute ✂ of the total costs in the Metro Nodes sub-group at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. The tables below show the costs apportioned both by cost category and division.

Group Property costs (AG106) are the most significant contributor of additional cost to the MSAN plant groups. This charge includes building rent, electricity and other operating costs. MSAN plant groups receive a high share of AG106 costs versus other 21C plant groups due to the relatively large amount of floor space occupied by MSAN equipment. For similar reasons, the MSAN PGs also pick up the largest proportion of specialised accommodation equipment (AG162) costs within the 21C plant groups. These costs are mainly to do with air-conditioning units used by BT for cooling purposes.

Table 191. ***Impact of costs attributed to MSAN in cost exhaustion process, by Cost Category***

Level	Cost Categories	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref
Level 1	**MSANs**	-	✂[£50 to £100]	✂[£150 to £200]	✂[£50 to £100]	-
Exhaustion Levels	Group Property and Facilities Management	AG106	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]	5.6.4
	TSO Operational Costs	AG102	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]	5.10.11
	Specialised Accommodation Equipment - Non Maint	AG162	✂[£0 to £10]	✂[£50 to £100]	✂[£10 to £50]	5.10.9
	Back-up Power Equipment - Non Maint	AG164	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	5.10.9
	TSO Support Functions	AG103	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	5.3.5
	Corporate Costs	AG112	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.3.4
	Specialised Accommodation Equipment - Maint	AG161	✂[£0 to £10]	£0	✂[£0 to £10]	-
	Back-up Power Equipment - Maintenance	AG163	✂[£0 to £10]	£0	✂[£0 to £10]	-
	Property Asset Driver	AG412	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.6.5
	Others	-	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	-
Level 7	**MSANs**	-	✂[£150 to £200]	✂[£300 to £350]	✂[£150 to £200]	-

Source: BT ASPIRE, Cartesian

When the above costs are aggregated, the division contributing most cost at this stage is BT TSO, as shown in Table 192. BT Property is the second largest contributor and beyond this no divisions contribute a material sum.

Table 192. ***Costs Apportioned to MSAN between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
T	BT TSO	[£50 to £100]	[£100 to £150]	[£50 to £100]
W	BT Property	[£10 to £50]	[-£10 to £0]	[£10 to £50]
F	BT Facilities Management	[£0 to £10]	£0	[£0 to £10]
C	Corporate Headquarters	[£0 to £10]	£0	[£0 to £10]
E	Corporate Adjustments	£0	[£10 to £50]	[£0 to £10]
M	BT Retail	[£0 to £10]	[£0 to £10]	[£0 to £10]
G	Group Consolidation Units	£0	[-£50 to -£10]	[-£10 to £0]
Others		[£0 to £10]	£0	[£0 to £10]
Total		[£50 to £100]	[£100 to £150]	[£100 to £150]

Source: BT ASPIRE, Cartesian

Although the contribution of costs from BT TSO increases in absolute terms between Level 1 and Level 7, the BT TSO share of costs at Level 7 appears diminished. This is due to the large negative value for BT Property being largely offset in the cost exhaustion process.

The BT Retail costs shown in the table below relates to stores and depreciation costs of OUC MJ (BT Retail Northern Ireland).

Table 193. ***MSAN Costs at Level 7, shown by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
T	BT TSO	[£100 to £150]	[135% to 205%]	[£150 to £200]	[80% to 110%]
F	BT Facilities Management	£0	0%	[£0 to £10]	[0% to 10%]
C	Corporate Headquarters	£0	0%	[£0 to £10]	[0% to 10%]
E	Corporate Adjustments	£0	0%	[£0 to £10]	[0% to 10%]
M	BT Retail	[£0 to £10]	[0% to 15%]	[£0 to £10]	[0% to 10%]
G	Group Consolidation Units	£0	0%	[-£10 to £0]	[-10% to 0%]
W	BT Property	[-£50 to -£10]	[-70% to - 10%]	[-£50 to -£10]	[-30% to - 5%]
Total		**[£50 to £100]**	**100%**	**[£150 to £200]**	**100%**

Source: BT ASPIRE, Cartesian

5.8.5.5 *Cost Attribution from MSANs to Network Components*

The eight plant groups within the MSANs sub-group attribute costs to six network components. The attribution method varies by plant group, with some plant groups using direct allocation to a single component and others apportioning costs between multiple components on the basis of contended bandwidth (for broadband-related components) or connection volumes (for voice-related components). These apportionments are implemented in BT's 21CN model.

Table 194. ***Apportionment basis of MSAN costs at Level 7***

Cost Category	BT Ref	FAC (£ m)	Apportionment Basis
Copper MSAN Combi Cards Broadband element	PG857A	✂[£10 to £50]	Direct allocation to CN854
Copper MSAN Control Transport	PG860A	✂[£10 to £50]	Contended bandwidth & Volume of voice connections
Copper MSAN Control Access	PG859A	✂[£10 to £50]	Voice Connections based on future migrations
Fibre MSAN Control Transport	PG869A	✂[£0 to £10]	Relative bandwidth based on future migrations & Volume of voice connections where actual migrated connections data is available
Copper-Fibre MSAN Link	PG864A	✂[£0 to £10]	Relative bandwidth based on future migrations & Volume of voice connections where actual migrated connections data is available
Copper MSAN Combi Cards Voice element	PG858A	✂[£0 to £10]	Directly allocated to CN853
Copper MSAN ISDN30 cards	PG861A	£0	Directly allocated to CN851
Fibre MSAN TDM cards	PG872A	£0	Directly allocated to CN881

Source: BT ASPIRE, Cartesian

Table 195 shows that ✂% of costs are attributed to broadband-related components (CN854 and CN890). Only ✂% of costs (✂ FAC) are attributed to voice-related components (CN853 and CN861), however, as previously mentioned, this figure appears high given the non-material volume of voice traffic on the 21C network.

Table 195. ***Metro Node costs apportioned to Network Components***

Network Component	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
Combi card broadband access	CN854	✂[£50 to £100]	✂[£150 to £200]	✂[£100 to £150]
Broadband MSAN access	CN890	✂[£50 to £100]	✂[£100 to £150]	✂[£50 to £100]
Combi card voice	CN853	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
MSAN - POSI Voice Link	CN861	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
21CN ISDN30	CN851	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
MSAN TDM card	CN881	£0	✂[£0 to £10]	£0
Total		✂[£150 to £200]	✂[£300 to £350]	✂[£150 to £200]

Source: BT ASPIRE, Cartesian

5.8.6 21CN Links

5.8.6.1 Summary

The 21CN Links cost sub-group includes costs for transmission electronics to connect 21C network locations. It is composed of three plant groups with a total FAC of ✂ [£50m to £100m] at Level 1.

Table 196. ***Costs Categories within the 21CN Links sub-group***

Cost Category	BT Ref	FAC (£ m)
Core-Core Link	PG866A	✂[£10 to £50]
Metro-Core Link	PG886A	✂[£10 to £50]
WDM-Metro Link	PG899A	✂[£10 to £50]
Total		✂**[£50 to £100]**

Source: BT ASPIRE, Cartesian

The majority of costs attributed to the plant groups from the general ledger are made on the basis of network equipment depreciation. Attributions from the plant groups to network components are made either on the basis of contended bandwidth or through direct allocation. Methods for attribution-in and attribution-out both employ BT's 21CN model.

The key findings in this section are:

1. Almost all the 21CN Link costs are TSO costs and relate to depreciation of assets and capitalised costs (including hardware such as WDM)
2. This cost sub-group receives approximately ✂ Cumulo rebate as well as its share of Electricity and Property costs
3. Attribution to network components is based on bandwidth (for broadband-related components) or connection volumes (for voice-related components)

5.8.6.2 Composition by Cost Type and Organisational Unit

Almost all of the costs within the 21CN Links sub-group are driven by BT TSO, specifically the capital costs of WDM hardware (as shown by the General Ledger data).

There is a ✂ electricity transfer charge out from BT Property that balances with a corresponding BT TSO transfer-in charge. The table also shows ✂ of WDM assets in the course of construction (AICC Registrations). This is the highest 'in-progress' asset development cost across all the 21C sub-groups.

Table 197. ***Costs apportioned to 21CN Links at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

As with other 21CN cost sub-groups, Table 198 shows that in TSO, OUC TT accounts for the largest cost. The ✂ [£200m to £250m] MCE for this OUC includes WDM hardware and valuation adjustments from GBV to GRC. TSO General Infrastructure Services (TS) picks up electricity charges from Telereal. TSO Global Network Services Management and Support (TN) covers capitalised pay as well as work in progress (WIP) developments.

Table 198. ***Top Cost Contributors to 21CN Links at Level 1, by OUC***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
T	TT	BT TSO RESEARCH & INNOVATION	✂[£10 to £50]	✂[£200 to £250]	✂[£50 to £100]
	TS	BT TSO General Infrastructure Services	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
	TN	BT TSO Global Network Services Management and Support	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
	TX	BT TSO Centre	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
	TA	BT TSO ARCHITECTURE & GLOBAL IT PLATFORMS	£0	✂[£0 to £10]	✂[£0 to £10]
	TB	BT TSO Service, Strategy and Operations	£0	✂[£0 to £10]	£0
T Total			✂[£50 to £100]	✂[£200 to £250]	✂[£50 to £100]
K	K	BT Wholesale	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
B	BL	Openreach Infrastructure Delivery	£0	£0	✂[£0 to £10]
W	W	BT Property	✂[-£10 to £0]	✂[-£10 to £0]	✂[-£10 to £0]
	WP	Group Property Partners	✂[-£10 to £0]	£0	✂[-£10 to £0]
W Total			✂[-£10 to £0]	✂[-£10 to £0]	✂[-£10 to £0]
Others			£0	£0	£0
Grand Total			✂[£10 to £50]	✂[£200 to £250]	✂[£50 to £100]

Source: BT ASPIRE, Cartesian

5.8.6.3 *Cost Attribution to 21CN Links from General Ledger*

As shown in Table 199, almost all of the costs from General Ledger that are attributed to 21CN Links are done so on the basis of equipment depreciation (PDTWDM21).This base apportions the costs and balance sheet items of Ciena multiplexors used between the WDM-Metro, Metro-Core and Core-Core transmission links. As with other 21C network equipment, this is achieved using the 21CN model.

Table 199. ***Notable Methods for Cost Attribution to 21CN Links from General Ledger***

Underlying Methodology	Base	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
Direct Allocation	21CN Link PGs	£0	£0	£0	6.2.1
Depreciation	PDTWDM21	✂[£10 to £50]	✂[£200 to £250]	✂[£50 to £100]	6.2.20
Electricity Consumption	DTNELSP	✂[£0 to £10]	£0	✂[£0 to £10]	6.2.14
Floor Space Utilisation	DTNASTR	✂[£0 to £10]	£0	✂[£0 to £10]	6.2.13
PWNRC	CUMRBTE	✂[-£10 to £0]	£0	✂[-£10 to £0]	6.2.3
Transfer Charges	241914, 240915	✂[-£10 to £0]	£0	✂[-£10 to £0]	-
Grand Total		✂[£10 to £50]	✂[£200 to £250]	✂[£50 to £100]	

Source: BT ASPIRE, Cartesian

Estimates of equipment power consumption are used to attribute Electricity charges using BT's Electricity model (base DTNELSP). The model uses network equipment volumes and associated power consumption based on either technical specifications or measured consumption.

The attribution of Property costs of leasing from Telereal Trillium is done on the basis floor space utilised by equipment (using the DTNASTR base methodology). BT first determines the physical dimension of each equipment and then applies an energy dissipation factor to account for the necessary cooling space required. This factorised dimension data is then used as an attribution base for cost attribution.

Rebates on cumulo rate taxation are attributed on the basis of Profit Weighted Net Replacement Cost (PWNRC) using CUMRBTE methodology. This methodology attributes Cumulo rebates in proportion to the profits generated by services, using the assets for which the Cumulo tax is being charged. The asset values used to determine the profit attribution over the assets is Net Replacement Cost (NRC) of assets.

A detailed analysis of these methodologies can be found in Section 6 of this report.

5.8.6.4 Cost Attribution to 21CN Links from other Cost Categories

Following the attribution of costs from the general ledger at Level 1, the 21C Links plant groups receive additional cost attributions from 21 other activity groups. These activity groups contain shared costs of which there is an apportionment to 21C Links plant groups. This occurs in the cost exhaustion process prior to costs being attributed to network components at Level 7. These other cost categories contribute ✂% of the total costs in the 21C Links sub-group at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. The tables below show the costs apportioned both by cost category and division.

During the cost exhaustion process, activity groups attribute ✂ fully allocated costs to 21CN Links, bringing the total to ✂ [£100m to £150m] fully allocated cost (an increase of ✂ %). The largest attributions are made by TSO Operational costs and Group Property as shown by Table 200 below.

Table 200. ***Impact of costs attributed to 21CN Links in cost exhaustion process, by Cost Category***

Levels	Cost Categories	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref
Level 1	**21CN Links**		✂[£10 to £50]	✂[£200 to £250]	✂[£50 to £100]	-
Exhaustion Levels	TSO Operational Costs	AG102	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]	5.10.11
	Group Property and Facilities Management	AG106	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]	5.6.4
	Corporate Costs	AG112	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.3.4
	Specialised Accommodation Equipment - Non Maint	AG162	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	5.10.9
	TSO Support Functions	AG103	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	5.3.5
	Back-up Power Equipment - Non Maint	AG164	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	5.10.9
	Specialised Accommodation Equipment – Maintenance	AG161	✂[£0 to £10]	£0	✂[£0 to £10]	-
	Back-up Power Equipment - Maintenance	AG163	✂[£0 to £10]	£0	✂[£0 to £10]	-
	Others	-	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	-
Level 7	**21CN Links**		✂[£100 to £150]	✂[£250 to £300]	✂[£100 to £150]	-

Source: BT ASPIRE, Cartesian

Table 201 shows over ✂% of attributions during the cost exhaustion process are made by TSO; these are mostly depreciation charges. Attributions by Corporate Adjustments almost nets off with attributions from Group Consolidation units. At a General Ledger level these costs relate to cash and bank charges.

Table 201. ***Costs Apportioned to 21CN Links between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
T	BT TSO	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]
W	BT Property	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]
C	Corporate Headquarters	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
E	Corporate Adjustments	£0	✂[£10 to £50]	✂[£0 to £10]
F	BT Facilities Management	✂[£0 to £10]	£0	✂[£0 to £10]

G	Group Consolidation Units	£0	[-£50 to -£10]	[-£10 to £0]
Others		[£0 to £10]	[£0 to £10]	[£0 to £10]
Grand Total		[£50 to £100]	[£50 to £100]	[£50 to £100]

Source: BT ASPIRE, Cartesian

Although the contribution of costs from BT TSO increases in absolute terms between Level 1 and Level 7, the BT TSO share of costs at Level 7 appears diminished. This is due to the large negative value for BT Property being largely offset in the cost exhaustion process. This is shown in the table below.

Table 202. ***21CN Links Cost at Level 7, shown by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
T	BT TSO	[£50 to £100]	[70% to 145%]	[£100 to £150]	[75% to 120%]
C	Corporate Headquarters	£0	0%	[£0 to £10]	[0% to 10%]
E	Corporate Adjustments	£0	0%	[£0 to £10]	[0% to 10%]
F	BT Facilities Management	£0	0%	[£0 to £10]	[0% to 10%]
G	Group Consolidation Units	£0	0%	[-£10 to £0]	[-10% to 0%]
W	BT Property	[-£10 to £0]	[-15% to 0%]	[-£10 to £0]	[-10% to 0%]
Total		**[£50 to £100]**	**100%**	**[£100 to £150]**	**100%**

Source: BT ASPIRE, Cartesian

5.8.6.5 *Cost Attribution from 21CN Links to Network Components*

The three plant groups within the 21C Links sub-group attribute costs to eight network components. The attribution method varies by plant group, with one plant groups using direct allocation to a single component and the remaining two apportioning costs between multiple components on the basis of bandwidth (for broadband-related components) or connection volumes (for voice-related components). These apportionments are implemented in BT's 21CN model.

Table 203. ***Apportionment basis of 21CN Link costs at Level 7***

Cost Category	BT Ref	FAC (£ m)	Apportionment Basis
Core-Core Link	PG866A	[£10 to £50]	Relative bandwidth based on future migrations & Volume of voice connections where actual migrated connections data is available
Metro-Core Link	PG886A	[£10 to £50]	Contended bandwidth based on future migrations & Volume of voice connections where actual migrated connections data is available

WDM-Metro Link	PG899A	✂[£10 to £50]	Directly allocated to CN616
Total		✂**[£50 to £100]**	

Source: BT ASPIRE, Cartesian

Table 204 that the largest cost attribution from the 21CN Links cost sub-group to network components is direct (✂ [£10m to £50m] FAC from PG899A to CN616 for WDM links used in Ethernet Backhaul Direct).

Table 204 below shows a breakdown of the costs that the network components receive from the 21CN Link plant groups.

Table 204. ***21CN Links cost apportioned to Network Components***

Network Component	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
Ethernet Backhaul Direct	CN616	✂[£10 to £50]	✂[£50 to £100]	✂[£10 to £50]
Core-Core Broadband Transmission	CN906	✂[£10 to £50]	✂[£50 to £100]	✂[£10 to £50]
Metro-core broadband transmission	CN903	✂[£10 to £50]	✂[£50 to £100]	✂[£10 to £50]
Metro-switching IP/VPN	CN902	✂[£10 to £50]	✂[£50 to £100]	✂[£10 to £50]
Ethernet Backhaul Direct resilience	CN618	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
MSAN - POSI Voice Link	CN861	£0	✂[£0 to £10]	✂[£0 to £10]
Ethernet Backhaul Direct extended reach	CN617	£0	✂[£0 to £10]	£0
POSI - POSI link voice	CN865	£0	£0	£0
Total		✂[£100 to £150]	✂[£250 to £300]	✂[£100 to £150]

Source: BT ASPIRE, Cartesian

5.8.7 Ethernet Switches

5.8.7.1 Summary

The Ethernet Switches cost sub-group consists of two plant groups and includes capital costs relating to Ethernet Switches and the Customer Access Cards within these switches. For FY 2013/14 the total cost of these switches (including access cards) was approximately ✂ [£50m to £100m] (FAC).

The majority of costs attributed to the plant groups from the general ledger are made on the basis of network equipment depreciation. Attributions from the plant groups to network components are made on the basis of contended bandwidth. Both of these methods employ BT's 21CN model.

Table 205. ***Costs Categories within the Ethernet Switches Links sub-group***

Cost Category	BT Ref	FAC (£ m)
Ethernet Switches	PG901A	✂[£50 to £100]
Ethernet Switch Access Cards	PG902A	✂[£0 to £10]
Total		✂**[£50 to £100]**

Source: BT ASPIRE, Cartesian

The key findings in this section are:

1. Almost all the costs in the Ethernet Switches cost sub-group are TSO costs; and one-third are categorised as 'Non-Pay'
2. This cost sub-group receives ✂ [£10 to £50m] FAC of '20CN Network Third Party' costs. Due to time limitations Cartesian wasn't able to discuss with BT the nature of these 20C costs being attributed to 21CN
3. Approximately ✂ [£0 to £10m] (FAC) of BT Retail 'Consumer' costs are also attributed to Ethernet Switches. Due to time limitations (and non-materiality) Cartesian was unable to discuss the nature of these Consumer costs with BT
4. In addition to Electricity and Floor space utilisation, this cost sub-group also receives ✂ [£0 to £10m] Cumulo rebate

5.8.7.2 Composition by Cost Type and Organisational Unit

Almost all of the costs within the Ethernet switches sub-group are driven by BT TSO, which includes the capital costs of the Ethernet equipment. A significant portion of cost (approximately ✂ FAC) relates to non-pay charges.

Even though the plant groups within Ethernet Switches is considered 21CN, there is approximately ✂ [£0 to £10m] (FAC) of '20CN Network Third Party' costs being attributed under the non-pay title. It is not entirely clear what these costs are and it was not possible to clarify this with BT within the time available.

Transfer charges out from BT Property in the table below relate to electricity and BT office space cost and these are balanced by transfer charges in to BT TSO.

Table 206. ***Costs apportioned to Ethernet Switches at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

The majority of capitalised hardware cost is associated to OUC TT, whereas most of capitalised pay, other payments and WIP assets relating to Ethernet are covered by OUC TN.

It is interesting to note that there are ✂ [£0 to £10m] of BT Retail (Consumer) costs within this cost sub-group. These costs relate to 'Core Routing Maintenance charges'. Based on the OUC information available these costs do not appear to be BT Retail Northern Ireland costs. It is not entirely clear if the costs here are mislabelled or if this is genuinely a Retail Consumer cost. If these costs are genuine Retail Consumer costs, then there is a risk that the base attribution methodology being used is not configured accurately. It was not possible to clarify this with BT due to the time constraints on the project.

Table 207. ***Top Cost Contributors to Ethernet Switches at Level 1, by OUC***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
T	TT	BT TSO RESEARCH & INNOVATION	✂[£10 to £50]	✂[£50 to £100]	✂[£10 to £50]
	TN	BT TSO Global Network Services Management and Support	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]
	TS	BT TSO General Infrastructure Services	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
	TA	BT TSO ARCHITECTURE & GLOBAL IT PLATFORMS	£0	✂[£0 to £10]	✂[£0 to £10]
	TX	BT TSO Centre	✂[£0 to £10]	£0	✂[£0 to £10]
	TZ	BT TSO Centre	£0	✂[£0 to £10]	✂[£0 to £10]
T Total			✂[£50 to £100]	✂[£100 to £150]	✂[£50 to £100]
S	M	BT Retail (BT Consumer)	✂[£0 to £10]	£0	✂[£0 to £10]
S Total			✂[£0 to £10]	£0	✂[£0 to £10]
W	W	BT Property	✂[-£10 to £0]	✂[-£10 to £0]	✂[-£10 to £0]
	WP	Group Property Partners	✂[-£10 to £0]	£0	✂[-£10 to £0]
W Total			✂[-£10 to £0]	✂[-£10 to £0]	✂[-£10 to £0]
Others			£0	✂[-£10 to £0]	£0
Grand Total			✂[£50 to £100]	✂[£100 to £150]	✂[£50 to £100]

Source: BT ASPIRE, Cartesian

5.8.7.3 *Cost Attribution to Ethernet Switches from General Ledger*

Cost attribution to the Ethernet Switches are almost exclusively done on an apportionment basis. As shown in the table below, direct allocation is insignificant for this sub-group.

Table 208. ***Notable Methods for Cost Attribution to Ethernet Switches from General Ledger***

Underlying Methodology	Base	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct Allocation	Ethernet Switches PGs, EXCEPT (TB) and PDTETHER (MJ)	✂	✂	✂	0%	6.2.1
Depreciation	PDTETHER	✂	✂	✂	72%	6.2.20
Vendor Contract Value	PDTSCNM	✂	✂	✂	30%	6.2.18
Power Consumption	DTNELSP	✂	✂	✂	4%	6.2.14
Floor Space Utilisation	DTNASTR	✂	✂	✂	1%	6.2.13
Previously Attributed Pan-Division	CAPEXP	✂	✂	✂	-1%	6.2.17
PWNRC	CUMRBTE	✂	✂	✂	-1%	6.2.3
Transfer Charges	240915, 241914	✂	✂	✂	-4%	-
Grand Total		✂	✂	✂	**100%**	

Source: BT ASPIRE, Cartesian

Over 70% of the costs are attributed using a depreciation based methodology (PDTETHER) which is implemented in the 21CN model. The other material attribution base is for support contracts which attributes approximately ✂ FAC from the GL on the basis of contract values and the attribution weights of other network platform bases (PDTSCNM). Estimates of equipment power consumption are used to attribute Electricity charges using BT's Electricity model (base DTNELSP). The model uses network equipment volumes and associated power consumption based on either technical specifications or measured consumption.

The attribution of Property costs of leasing from Telereal Trillium is done on the basis floor space utilised by equipment (using the DTNASTR base methodology). BT first determines the physical dimension of each equipment and then applies an energy dissipation factor to account for the necessary cooling space required. This factorised dimension data is then used as an attribution base for cost attribution.

Table 208 also shows a ✂ negative MCE entry which is attributed to Ethernet Switches using the CAPEXP methodology. This is the apportioned amount of capital creditors, i.e. the value of authorised invoices which remain unpaid at the accounting period end. BT apportions capital creditors relative to the non-pay capital attributed to plant groups within Ethernet switches cost sub-group.

Rebates received for cumulo rate taxation are attributed on the basis of Profit Weighted Net Replacement Cost (PWNRC) using a Cumulo rebate methodology (CUMRBTE). This methodology attributes Cumulo rebates in proportion to the profits generated by services, using the assets for which the Cumulo tax is being charged. The asset values used to determine the profit attribution over the assets is, Net Replacement Cost (NRC) of assets.

A detailed analysis of these methodologies can be found in Section 6 of this report.

5.8.7.4 *Cost Attribution to Ethernet Switches from other Cost Categories*

Following the attribution of costs from the general ledger at Level 1, the Ethernet Switches plant groups receive additional cost attributions from 19 other activity groups. These activity groups contain shared costs of which there is an apportionment to Ethernet Switches. This occurs in the cost exhaustion process prior to costs being attributed to network components at Level 7. These other cost categories contribute ✂% of the total costs in the Ethernet Switches sub-group at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. Table 209 and Table 210 below show costs apportioned both by cost category and division.

As with other cost sub-groups within 21CN, TSO Operational Costs and Group Property make the largest attributions to Ethernet Switches during the cost exhaustion process. During this process, activity groups add approximately ✂ FAC to Ethernet Switches.

Table 209. ***Impact of costs attributed to Ethernet Switches in cost exhaustion process***

Levels	Cost Categories	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Document Section Ref
Level 1	**Ethernet Switches**	-	✂[£50 to £100]	✂[£100 to £150]	✂[£50 to £100]	-
Exhaustion Levels	TSO Operational Costs	AG102	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]	5.10.11
	Group Property and Facilities Management	AG106	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	5.6.4
	Corporate Costs	AG112	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.3.4
	TSO Support Functions	AG103	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	5.3.5
	Specialised Accommodation Equipment - Non Maint	AG162	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.9
	Back-up Power Equipment - Non Maint	AG164	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.10.9
	Liquid Funds and Interest	AG113	£0	✂[£0 to £10]	✂[£0 to £10]	5.10.16.6
	Other	-	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	-
Level 7	**Ethernet Switches**	-	✂[£50 to £100]	✂[£150 to £200]	✂[£100 to £150]	-

Source: BT ASPIRE, Cartesian

At a division level, BT TSO (T) is that largest contributor of additional cost. Attributions from BT TSO during the cost exhaustion process are mainly asset related such as depreciation, capitalised software and network related costs. Corporate Adjustments (E) attributes MCE and is driven by Liquid Funds and Interest (AG113) which relates to bank and payment charges. These are almost offset by other cash related charges from AG113 in Group Consolidation Units (G). These costs are categorised by BT as non-pay in the General Ledger.

Table 210. ***Costs Apportioned to Ethernet Switches between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
T	BT TSO	[£10 to £50]	[£10 to £50]	[£10 to £50]
C	Corporate Headquarters	[£0 to £10]	[£0 to £10]	[£0 to £10]
E	Corporate Adjustments	£0	[£10 to £50]	[£0 to £10]
W	BT Property	[£0 to £10]	[-£10 to £0]	[£0 to £10]
F	BT Facilities Management	[£0 to £10]	£0	[£0 to £10]
G	Group Consolidation Units	£0	[-£50 to -£10]	[-£10 to £0]
Others		[£0 to £10]	[-£10 to £0]	[£0 to £10]
Grand Total		[£10 to £50]	[£10 to £50]	[£10 to £50]

Source: BT ASPIRE, Cartesian

Table 211 shows that the exhaustion process has limited impact on the mix of costs by division. At Level 7, BT TSO makes up % of total costs of the Ethernet Switches sub-group. The small (%) contribution of cost from BT Consumer (S) is unchanged.

Table 211. ***Ethernet Switches Cost at Level 7, shown by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
T	BT TSO	[£50 to £100]	[70% to 150%]	[£100 to £150]	[95% to 145%]
C	Corporate Headquarters	£0	0%	[£0 to £10]	[0% to 10%]
E	Corporate Adjustments	£0	0%	[£0 to £10]	[0% to 10%]
S	BT Consumer (BT Retail)	[£0 to £10]	[0% to 15%]	[£0 to £10]	[0% to 10%]
F	BT Facilities Management	£0	0%	[£0 to £10]	[0% to 10%]
G	Group Consolidation Units	£0	0%	[-£10 to £0]	[-10% to 0%]
W	BT Property	[-£10 to £0]	[-15% to 0%]	[-£10 to £0]	[-10% to 0%]
Others		£0	0%	[£0 to £10]	[0% to 10%]
Grand Total		[£50 to £100]	**100%**	[£100 to £150]	**100%**

Source: BT ASPIRE, Cartesian

5.8.7.5 *Cost Attribution from Ethernet Switches to Network Components*

The two plant groups within the Ethernet Switches sub-group attribute costs to five network components. Costs are apportioned between the components on the basis of contended. These apportionments are implemented in BT's 21CN model.

Table 212. ***Apportionment basis of Ethernet Switches at Level 7***

Cost Category	BT Ref	FAC (£ m)	Apportionment Basis
Ethernet Switches	PG901A	[£50 to £100]	Contended Bandwidth
Ethernet Switch Access Cards	PG902A	[£0 to £10]	Contended Bandwidth
Total		**[£50 to £100]**	

Source: BT ASPIRE, Cartesian

Table 213 shows the network components receiving costs from Ethernet Switch cost sub-group.

Table 213. ***Ethernet Switches cost apportioned to Network Components***

Network Component	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
Ethernet Switch BB	CN891	[£50 to £100]	[£50 to £100]	[£50 to £100]
Ethernet Switches	CN901	[£10 to £50]	[£10 to £50]	[£10 to £50]
Broadband MSAN access	CN890	[£0 to £10]	[£10 to £50]	[£0 to £10]
High band customer data card	CN882	[£0 to £10]	[£10 to £50]	[£0 to £10]
MSAN - POSI Voice Link	CN861	£0	£0	£0
Total		[£50 to £100]	[£150 to £200]	[£100 to £150]

Source: BT ASPIRE, Cartesian

5.8.8 iNode

5.8.8.1 Summary

The iNode cost sub-group includes costs relating to functionality within iNode to setup voice calls and manage network features (e.g. soft-switching, network intelligence, etc.). iNodes, unlike Metro, Core and Multi-Service Access Nodes (MSANs) are logical, IMS based nodes.

Table 214. ***Costs Categories within the iNode sub-group***

Cost Category	BT Ref	FAC (£ m)
INODE Voice Call Set-Up	PG876A	✂[£0 to £10]
INODE Network Features	PG875A	✂[£0 to £10]
Total		✂**[£10 to £50]**

Source: BT ASPIRE, Cartesian

The iNode cost sub-group is composed of two plant groups, iNode Network Features (PG875A) and iNode Voice call set-up (PG876A), which together account for ✂ [£10m to £50m] fully allocated costs in FY 2013/14 at Level 1.

The key findings in this section are:

1. Almost all the costs in the iNode costs sub-group are TSO costs and over half are capital costs
2. Almost all the costs are attributed from the General Ledger using a methodology that attributes costs on the basis of call-setup and call feature ratio
3. Costs from the plant groups in iNode are directly allocated to their respective network components

5.8.8.2 Composition by Cost Type and Organisational Unit

BT TSO attributes all material costs to the iNode plant groups. The majority of these are the capital costs and depreciation of the iNode assets.

Table 215. ***Costs apportioned to iNode at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

As TSO owns the network assets, OUC TT (as with other 21CN cost sub-groups) carries the asset related costs (including capitalised WIP activities) for iNode. An OUC level breakdown is shown in Table 216 below.

Table 216. ***Top Cost Contributors to iNode at Level 1, by OUC***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
T	TT	BT TSO RESEARCH & INNOVATION	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
	TN	BT TSO Global Network Services Management and Support	£0	✂[£0 to £10]	✂[£0 to £10]
T Total			✂[£0 to £10]	✂[£10 to £50]	✂[£10 to £50]
Others			£0	£0	£0
Grand Total			✂[£0 to £10]	✂[£10 to £50]	✂[£10 to £50]

Source: BT ASPIRE, Cartesian

5.8.8.3 *Cost Attribution to iNode from General Ledger*

All of the costs in this sub-group are apportioned using the same methodology (PDTINODE). Attribution to the two PGs is based on the split for similar activities within the System X and AXE local exchange PGs. Since the call features provided by the iNode are similar to those of System X and AXE10, BT believes that using splits from 20C local exchange equipment for operational costs of voice set-up and call features is a reasonable proxy.

Table 217. ***Notable Methods for Cost Attribution to Ethernet Switches from General Ledger***

Underlying Methodology	Base	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct Allocation	PG875A, PG876A	✂	✂	✂	0%	6.2.1
Call Set-up and Call Feature Ratio	PDTINODE	✂	✂	✂	100%	-
Other	Other (x12)	✂	✂	✂	0%	-
Grand Total		✂	✂	✂	**100%**	

Source: BT ASPIRE, Cartesian

5.8.8.4 *Cost Attribution to iNode from other Cost Categories*

Following the attribution of costs from the general ledger at Level 1, the iNode plant groups receive additional cost attributions from 17 other activity groups. These activity groups contain shared costs of which there is an apportionment to iNodes. This occurs in the cost exhaustion process prior to costs being attributed to network components at Level 7. These other cost categories contribute ✂% of the total costs in the iNodes sub-group at Level 7.

The attribution methodologies of these AGs (those within the scope of the study) are explained in the relevant sections of this report. The tables below show the costs apportioned both by cost category and division.

An additional ✂ [£0 to £10m] (FAC) is added during the cost exhaustion process to iNode cost sub-group. As with other cost sub-groups within 21CN, TSO is one of the significant contributors of costs to

iNodes. Although very small, there are also some attribution from BT Property and other activity groups to iNodes.

Table 218. ***Impact of costs attributed to iNode in cost exhaustion process, by Cost Category***

Levels	Cost Categories	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	Document Section Ref
Level 1	**I Node**	-	[£0 to £10]	[£10 to £50]	[£10 to £50]	-
Exhaustion Levels	TSO Operational Costs	AG102	[£0 to £10]	[£0 to £10]	[£0 to £10]	5.10.11
	Corporate Costs	AG112	[£0 to £10]	£0	[£0 to £10]	5.3.4
	TSO Support Functions	AG103	[£0 to £10]	£0	[£0 to £10]	5.3.5
	Group Property and Facilities Management	AG106	£0	£0	£0	5.6.4
	Others	-	£0	£0	£0	-
Level 7	**I Node**	-	[£10 to £50]	[£10 to £50]	[£10 to £50]	-

Source: BT ASPIRE, Cartesian

BT TSO contributes % of the costs attributed during the exhaustion process as shown in Table 219 below. These attributions are TSO depreciation and general management costs (including SG&A). The second most significant contributor is Corporate HQ.

Table 219. ***Costs Apportioned to iNode between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)
T	BT TSO	[£0 to £10]	[£0 to £10]	[£0 to £10]
C	Corporate Headquarters	£0	£0	£0
E	Corporate Adjustments	£0	[£0 to £10]	£0
Y	Group Business Services	£0	£0	£0
F	BT Facilities Management	£0	£0	£0
W	BT Property	£0	£0	£0
G	Group Consolidation Units	£0	[-£10 to £0]	£0
Grand Total		[£0 to £10]	[£0 to £10]	[£0 to £10]

Source: BT ASPIRE, Cartesian

The cost exhaustion process does not have a material impact on the mix of costs by division. A comparison of division costs between Level 1 and Level 7 is shown in Table 220 below.

Table 220. ***iNode Cost at Level 7, shown by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
T	BT TSO	[£10 to £50]	[90% to 455%]	[£10 to £50]	[60% to 315%]
C	Corporate Headquarters	[-£5 to -£0]	[-5% to 0%]	[£0 to £5]	[0% to 5%]
E	Corporate Adjustments	[-£5 to -£0]	[-5% to 0%]	[£0 to £5]	[0% to 5%]
W	BT Property	[-£5 to -£0]	[-5% to 0%]	[-£5 to -£0]	[-5% to 0%]
G	Group Consolidation Units	[-£5 to -£0]	[-5% to 0%]	[-£5 to -£0]	[-5% to 0%]
Grand Total		**[£10 to £50]**	**100%**	**[£10 to £50]**	**100%**

Source: BT ASPIRE, Cartesian

5.8.8.5 *Cost Attribution from iNode to Network Components*

The two iNode plant groups directly allocate costs (at Level 7) to their respective network components. The network components receiving costs from these plant groups are shown in Table 221 below.

Table 221. ***iNode costs apportioned to Network Components***

Plant Groups →	Network Component	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)
PG876A	iNode voice call set-up	CN868	[£0 to £10]	[£10 to £50]	[£10 to £50]
PG875A	iNode features	CN855	[£0 to £10]	[£0 to £10]	[£0 to £10]
Total			[£10 to £50]	[£10 to £50]	[£10 to £50]

Source: BT ASPIRE, Cartesian

5.9 Next Generation Access (NGA)

5.9.1 Summary

The Next Generation Access (NGA) cost group contains costs relating to NGA equipment (hardware) as well as pay related costs for provisioning and installation; maintenance and repair; and replacement of equipment. Within BT's network, NGA is used to provide high speed data access to customers. It includes fibre-to-the-cabinet (FTTC) and fibre-to-the-premises (FTTP) services. NGA is also known as Generic Ethernet Access (GEA). Costs relating to Fibre and Duct for NGA are covered in the Duct (5.4) and Fibre (5.5) sections of this report.

Openreach and BT Retail (Northern Ireland) are the largest contributors of costs to NGA, attributing over ✂ (FAC). Negative attributions (including transfer charges) by BT Group Business net off some of these costs to bring the total NGA costs to approximately £131m FAC.

The key findings in this section are:

1. All the costs of NGA are attributed to the Wholesale Residual Market
2. Over 80% (✂) of these costs are directly attributed from the General Ledger into the NGA cost group. The remaining 20% costs are attributed using over 15 base methodologies
3. Costs from all the plant groups within NGA cost group are directly allocated to their respective network components

5.9.2 Contribution to Market Costs

Since NGA services are currently not regulated by Ofcom, all NGA related costs are attributed to Wholesale Residual Market (SW500). The contribution from NGA (£131m) makes up approximately 6% of total Wholesale Residual Market Costs on a FAC basis.

5.9.3 Composition by Cost Category

Table 222 below shows the four plant groups in the NGA cost group. The largest two plant groups, PG953C and PG952C, include the costs of NGA equipment and costs incurred in deploying this equipment. Combined these two PGs account for ✂ [75% to 115%] of FAC in this cost group.

Table 222. ***Cost Components of NGA at Level 1***

Section	Cost Components		BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)
5.9.4	**GEA DSLAM & Cabinets**		PG953C	✂	✂	✂	✂ [35% to 80%]
5.9.5	**GEA Electronics**		PG952C	✂	✂	✂	✂ [5% to 40%]
5.9.6	**NGA Maintenance**	GEA FTTC Maintenance	PG955M	✂	✂	✂	✂ [0% to 10%]
		GEA FTTP Maintenance	PG956M	✂	✂	✂	0%
	Totals			**£102**	**£293**	**£131**	**100%**

Source: BT ASPIRE, Cartesian

5.9.4 GEA DSLAM & Cabinets (PG953C)

5.9.4.1 Summary

The GEA DSLAM & Cabinets plant group (PG953C) includes the costs of NGA Equipment such as DSLAM cabinets as well as pay costs for the provision of NGA equipment. In FY 13/14, approximately ✂ FAC was attributed to the GEA DSLAM & Cabinets plant group, of which the majority of costs were related to current year Opex. In addition, a large portion of costs within PG953C relate to the return on Gross Book Value of Access Fibre and Radio equipment and costs relating to electricity meters installed in the cabinet. The costs within this plant group are fully allocated to Wholesale Residual Market.

The key findings in this section are:

1. Almost 70% of the costs (✂FAC) within GEA DLSAM and Cabinets are directly allocated from the general ledger
2. ✂ of cumulo rate costs are attributed on the basis of Profit Weighted Net Replacement Cost methodology is used to attribute approximately ✂ FAC to this cost sub-group
3. Almost all directly allocated costs in this cost sub-group relate to Openreach

5.9.4.2 Composition by Cost Type and Organisational Unit

For GEA DSLAM and Cabinets, the majority of the costs (✂ %) are attributed from Openreach and the remaining ✂% is from BT Retail (Northern Ireland). Of these attributions, the largest proportion of FAC (✂ %) relates to capex (which include capitalised pay and hardware relating to NGA equipment). Table 223 below shows that there is a ✂ property transfer-out charge from BT Property which balances with the transfer-in charge for Openreach.

Table 223. ***Notable Costs apportioned to PG953C at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

Table 223 also shows ✂ of accumulated depreciation of the assets within the GEA DSLAM and Cabinets plant group, with an annual depreciation of ✂. This plant groups receives very low pay costs at Level 1, as demonstrated by the ✂ figure in the table above.

Table 224. ***Top Cost Contributors to PG953C at Level 1, by OUC***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)
B	B	Openreach	✂	✂	✂	✂ [60% to 125%]
	BY	Openreach Analysis Code	✂	✂	✂	✂ [10% to 65%]

	BL	Openreach Infrastructure Delivery	✂	✂	✂	✂ [0% to 15%]
	BA	Openreach Learning and Development	✂	✂	✂	✂ [0% to 15%]
	BF	Openreach Finance	✂	✂	✂	✂ [0% to 15%]
	BQ	Openreach Transformation	✂	✂	✂	0%
	BR	Openreach Marketing and Sales	✂	✂	✂	0%
B Total			✂	✂	✂	✂ **[60% to 125%]**
M	MJ	Northern Ireland	✂	✂	✂	✂ [0% to 15%]
Grand Total			✂	✂	✂	**100%**

Source: BT ASPIRE, Cartesian

5.9.4.3 *Cost Attribution to PG953C from General Ledger*

More than half of the costs within GEA DSLAM & Cabinets are attributed directly from the General Ledger. These include costs relating to Openreach and BT Retail in Northern Ireland (OUC: MJ). The scope of BT Retail in Northern Ireland encompasses services similar to those of Openreach in mainland UK. Approximately ✂ [60% to 125%] of the costs are directly attributed from the General Ledger to PG953C (as shown in Table 225 below.

Other than direct allocation, notable attribution methodologies used by BT to attribute costs to PG953C are based on:

- Profit Weighted Net Replacement Costs (PWNRC); and
- Asset Policy

Table 225. ***Notable Methods for Cost Attribution to PG953C from General Ledger***

Underlying Method	Relevant BT Methodologies	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct Allocation	PG953C (B, BL, MJ)	✂	✂	✂	✂ [60% to 125%]	6.2.1
Profit Weighted Net Replacement Cost (PWNRC)	ORCUMNOR, CUMNORM	✂	✂	✂	✂ [10% to 65%]	6.2.3
Asset Policy	PDTACPA	✂	✂	✂	✂ [10% to 65%]	6.2.19
Transfer Charges	247409	✂	✂	✂	✂ [-65% to - 10%]	-
Total		✂	✂	✂	**100%**	

Source: BT ASPIRE, Cartesian

In the table above, the ✂ transfer charge is the BT property transfer-out to Openreach, as noted earlier in the table above. The balancing transfer-in charge for Openreach is allocated directly to PG953C form the GL.

Direct allocation is used where BT is able to uniquely associate a cost item in the GL with a cost category (in this case, PG953C). These direct allocations are manually configured in ASPIRE. Examples include pay costs for Local Line Fibre Network modules and depreciation costs for Local

Network Service Module Equipment which are being allocated to PG953C directly from the General Ledger. This level of detail in not shown in the tables within this report.

BT attributes Cumulo charges, which are business taxes, on the basis of Profit Weighted Net Replacement Cost (PWRNC) methodology. This methodology attributes Cumulo costs in proportion to the profits generated by services, using the assets for which the Cumulo tax is being charged. The asset values used to determine the profit attribution over the assets is, Net Replacement Cost (NRC) of assets. This methodology is discussed in detail in Section 6 of this report.

As shown in Table 225 above, ✂ (FAC) is attributed to GEA DSLAM and Cabinets, using the PDTACPA base methodology. This methodology attributes costs based on 'Asset Policies' defined by BT (see section 6.2.19 for more details). The underlying driver of cost attribution for each of these asset policies is depreciation of capitalised costs. PDTACPA is one example of these methodologies which attributes costs for capital work done within TSO relating to racks, power and ventilation. It includes costs of activities relating to co-mingling and to meters installed at NGA cabinets. When using Asset Policies, BT uses an analysis of Fixed Asset Register (FAR), Life of Plant List and Capex data from Openreach to determine the attribution weights.

Further detail on the PWNRC and Asset Policy methodology by can be found in section 6.2.3 and section 6.2.19 of this report.

5.9.4.4 Cost Attribution to PG953C from other Cost Categories

Following the attribution of costs from the general ledger, PG935C receives additional costs from eight activity groups. This occurs during the cost exhaustion process, before the costs are attributed from PG935C to network components. Through the cost exhaustion process ✂FAC is added to this plant group (equivalent to ✂ [10% to 55%] of the total FAC at Level 7). Most of the additional costs are TSO Operational costs and BT Group's corporate costs.

Table 226. ***Impact of costs attributed to PG953C in cost exhaustion process, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC %	Document Section Ref
Level 1	**GEA DSLAM and Cabinets**		✂	✂	✂	✂ [50% to 105%]	-
Exhaustion Level	TSO Operational Costs	AG102	✂	✂	✂	✂ [0% to 15%]	5.10.11
	Corporate Costs	AG112	✂	✂	✂	✂ [0% to 15%]	5.3.4
	TSO Support Functions	AG103	✂	✂	✂	✂ [0% to 15%]	5.3.5
	Group Property and Facilities Management	AG106	✂	✂	✂	✂ [0% to 15%]	5.6.4
	OR Pay plus % FA driver	AG410	✂	✂	✂	✂ [0% to 15%]	5.10.16.3
	OR Stores driver	AG403	✂	✂	✂	✂ [0% to 15%]	-
	OR Pay driver	AG401	✂	✂	✂	✂ [0% to 15%]	5.3.6

	Liquid Funds and Interest	AG113	✂	✂	✂	✂ [0% to 15%]	5.10.16.6
Level 7	**GEA DSLAM and Cabinets**		✂	✂	✂	**100%**	-

Source: BT ASPIRE, Cartesian

At a business unit level, almost ✂ (✂ [55% to 280%]) of the additional costs are attributed from Openreach to this plant group, as shown in Table 227 below. The second largest attribution to this plant group (shown in the table below) is made by Division E (Corporate Adjustment) which almost balances out by attribution from Division G (Group Consolidation Units). These balancing attributions are a mechanism for BT to transfer costs from one unit to the other. In this case, the transfer charges relate to Liquid Funds and Interest (AG113). The occurrence of transfer charges in this plant group means that there will be some cash costs/bank related charges (AG113) attributed to this plant group. Cash costs are typically interest related bank payments made by BT.

Table 227. ***Costs Apportioned to PG953C between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)
B	Openreach	✂	✂	✂	✂ [55% to 280%]
E	Corporate Adjustments	✂	✂	✂	✂ [0% to 60%]
T	BT TSO	✂	✂	✂	✂ [0% to 60%]
Y	Group Business Services	✂	✂	✂	✂ [0% to 60%]
C	Corporate Headquarters	✂	✂	✂	✂ [0% to 60%]
G	Group Consolidation Units	✂	✂	✂	✂ [-60% to 0%]
Total		✂	✂	✂	**100%**

Source: BT ASPIRE, Cartesian

As shown by the table below, during the cost exhaustion process, the biggest movement in costs is for Openreach. Even though an additional ✂ [£10m to £50m] (FAC) is attributed to GEA DSLAM and Cabinets from Openreach, its overall share of costs is reduced within the cost category.

Table 228. ***PG953C Costs at Level 7, shown by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
B	Openreach	✂ [£50 to £100]	✂ [60% to 125%]	✂ [£50 to £100]	✂ [50% to 105%]
T	BT TSO	✂ [£0 to £10]	✂ [0% to 15%]	✂ [£0 to £10]	✂ [0% to 15%]
M	BT Retail	✂ [£0 to £10]	✂ [0% to 15%]	✂ [£0 to £10]	✂ [0% to 15%]
E	Corporate Adjustments	£0	0%	✂ [£0 to £10]	✂ [0% to 15%]

C	Corporate Headquarters	£0	0%	[£0 to £10]	[0% to 15%]
Y	Group Business Services	£0	0%	[£0 to £10]	[0% to 15%]
W	BT Property	£0	0%	[-£10 to £0]	[-15% to 0%]
G	Group Consolidation Units	N/A	N/A	[-£10 to £0]	[-15% to 0%]
Others		N/A	N/A	£0	0%
Total		[£50 to £100]	**100%**	[£50 to £100]	**100%**

Source: BT ASPIRE, Cartesian

5.9.4.5 *Cost Attribution from PG953C to other Network Components*

Costs from PG953C are fully allocated to the GEA DSLAM and Cabinet component, CL953, which fully attributes to Wholesale Residual Markets.

5.9.5 GEA Electronics (PG952C)

5.9.5.1 Summary

GEA Electronics includes costs relating to provision, recovery, replacement and renewal of NGA equipment. The largest proportion of costs within this plant group is 'non-pay' elements for Openreach. BT's definition for non-pay is quite broad as includes all the costs that are not pay or asset related. For example in this plant group, 'non-pay' includes different types of costs such as CCA costs for stores and payments for Circuit Provision Megastream Services (CPDM). All of the costs within this plant group are attributed to Wholesale Residual Market.

The key findings in this section are:

1. Approximately three-quarters of the costs (✂ FAC) relate to Openreach Service Delivery team
2. Almost all the costs in GEA Electronics are directly allocated from the General Ledger
3. The cost exhaustion process adds approximately ✂ FAC from BT 'Group Business Services' to GEA Electronics. These costs are mainly supply chain and stores management costs

5.9.5.2 Composition by Cost Type and Organisational Unit

As mentioned above, the largest cost type within GEA Electronics is 'non-pay'. This includes approximately ✂ (CCA) Openreach stores costs for Circuit Provision – ADSL (CPDSL); and approximately ✂ (CCA) payment costs for CPDM. Stores cost typically relates to customer termination modems and routers kept in storage (e.g. homehubs, etc.). In addition, there is approximately ✂ MCE for Access Fibre & Radio equipment which attributes approximately ✂ (FAC) to PG952C. These costs are attributed by Openreach into this GEA Electronics plant group, PG952C.

Cartesian requested more information from BT on why Openreach stores costs were being attributed to PG952C as opposed to attributing stores cost to AG403 (Openreach Stores Driver). BT stated that costs attributed to this plant group can be directly linked to GEA Electronics, whereas AG403 attributes 'supply chain' and 'management' costs on the basis of how Openreach 'stores' costs have been previously attributed. This means that during the cost exhaustion process, AG403 (Openreach Stores Driver) will attribute additional costs to this plant group.

Table 229. ***Notable Costs apportioned to PG952C at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

As shown by Table 230 below, at an OUC level Openreach Service Delivery attributes ✂ (✂, ✂ [20% to 110%]) of the cost sin PG952C. Detailed analysis of the data provided by BT shows that these costs include the stores and payment costs outlined above. There is also ✂ MCE of Access Fibre & Radio and ✂ (MCE) of Local Line Exchange Service Module costs (this level of detail is not shown in the tables). These are offset by accumulated depreciation charges for Access Fibre & Radio and Local Line Exchange Service Module, which then leaves the ✂ MCE for Openreach.

Table 230. ***Organisational Units contributing costs to PG952C at Level 1***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)
B	BV	Openreach Service Delivery	✂	✂	✂	✂ [20% to 110%]
	B	Openreach	✂	✂	✂	✂ [0% to 25%]
	BR	Openreach Marketing and Sales	✂	✂	✂	✂ [0% to 25%]
	BL	Openreach Infrastructure Delivery	✂	✂	✂	✂ [0% to 25%]
B Total			✂	✂	✂	✂ **[20% to 110%]**
M	MJ	Northern Ireland	✂	✂	✂	✂ [0% to 25%]
Others			✂	✂	✂	0%
Grand Total			✂	✂	✂	**100%**

Source: BT ASPIRE, Cartesian

5.9.5.3 *Cost Attribution to PG952C from General Ledger*

Almost all of the attributions from the General Ledger to PG952C are direct, however there are also costs (revenue) being attributed to PG952C using the OPEPST method which is one of many system generated attribution methodologies. This method apportions costs on the basis of how similar costs have been apportioned previously in the cost exhaustion system. Cartesian has called these methodologies Previously Attributed Cost methodologies. A brief description of this methodology is provided below.

Table 231. ***Notable Methods for Cost Attribution to PG952C from General Ledger***

Underlying Method	Relevant BT Methodologies	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Direct Allocation	PG952C (BV, B, MJ)	✂	✂	✂	✂ [20% to 110%]	6.2.1
Previously Attributed Costs	OPEPST (B, BV, BK, others)	✂	✂	✂	✂ [-25% to 0%]	6.2.17
Multiple	Others	✂	✂	✂	0%	-
Total		✂	✂	✂	**100%**	

Source: BT ASPIRE, Cartesian

Direct allocation is used by BT, where BT is able to identify a direct relationship between the cost item in the GL and PG952C. These allocations are directly configured in ASPIRE with PG953C and the relevant OUC code.

The previously attributed cost method attributes VAT related creditors based on previously apportioned trade payables to this plant group. For more details on Previously Attributed Costs methodology, see Section 6.

5.9.5.4 *Cost Attribution to PG952C from other Cost Categories*

During the cost exhaustion process, PG952C receives costs from four main cost categories, as shown in Table 232 below. These attributions are made between Level 1 and Level 7 of the cost exhaustion process. None of these attributions is particularly impactful. The largest contributor is Openreach Stores Driver (AG403, ✂ [0% to 20%] of FAC) which includes supply management costs of Openreach. PG952C receives a portion of these costs as there are Openreach stores costs attributed to the plant group at stage 2 of the process. This point has been described earlier in the report.

Table 232. ***Impact of costs attributed to PG952C in cost exhaustion process, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC %	Section Ref
Level 1	**GEA Electronics**	**PG952C**	✂	✂	✂	✂ [15% to 100%]	-
Exhaustion Level	OR Stores driver	AG403	✂	✂	✂	✂ [0% to 20%]	-
	Corporate Costs	AG112	✂	✂	✂	✂ [0% to 20%]	5.3.4
	Group Property and Facilities Management	AG106	✂	✂	✂	✂ [0% to 20%]	5.6.4
	Property Asset Driver	AG412	✂	✂	✂	0%	5.6.5
	Others	-	✂	✂	✂	✂ [0% to 20%]	-
Level 7	**GEA Electronics**	**PG952C**	✂	✂	✂	**100%**	-

Source: BT ASPIRE, Cartesian

At a business unit level, most of the costs attributed during the cost exhaustion process are from Group Business Services and Openreach. Costs attributed from Group Business Services include costs relating to freight, logistics and procurement services. Costs attributed from Openreach during the exhaustion process includes general accommodation charge for Openreach Service Design and Corporate overheads. Openreach Service Design is a BT TSO unit which provides an interface between the systems development team in TSO and the Openreach business unit.

Table 233. ***Costs Apportioned to PG952C between Level 1 and 7, by Division***

Division	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)
Y	Group Business Services	✂	✂	✂	✂ [0% to 200%]
B	Openreach	✂	✂	✂	✂ [0% to 200%]
E	Corporate Adjustments	✂	✂	✂	✂ [0% to 200%]
C	Corporate Headquarters	✂	✂	✂	0%
F	BT Facilities Management	✂	✂	✂	0%
W	BT Property	✂	✂	✂	0%
G	Group Consolidation Units	✂	✂	✂	✂ [-200% to 0%]

T	BT TSO	✂	✂	✂	✂ [-200% to 0%]
Others		✂	✂	✂	0%
Total		✂	✂	✂	**100%**

Source: BT ASPIRE, Cartesian

The table below shows the changes to FAC between Level 1 and Level 7. On an absolute basis, the attributions result in ✂ [£0 to £10m] additional FAC being attributed to this cost group. The most notable change in the composition of costs at a division level is the increase in costs from Group Business Services. Costs attributed to this plant group by Group Business Services are Openreach Stores management and supply chain costs.

Table 234. ***PG952C Costs at Level 7, shown by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
B	Openreach	✂ [£10 to £50]	✂ [20% to 110%]	✂ [£10 to £50]	✂ [15% to 100%]
Y	Group Business Services	£0	0%	✂ [£0 to £10]	✂ [0% to 20%]
M	BT Retail	✂ [£0 to £10]	✂ [0% to 25%]	✂ [£0 to £10]	✂ [0% to 20%]
E	Corporate Adjustments	£0	0%	✂ [£0 to £10]	✂ [0% to 20%]
T	BT TSO	£0	0%	✂ [-£10 to £0]	✂ [-20% to 0%]
G	Group Consolidation Units	£0	0%	✂ [-£10 to £0]	✂ [-20% to 0%]
Others		£0	0%	£0	0%
Total		✂ [£10 to £50]	**100%**	✂ [£50 to £100]	**100%**

Source: BT ASPIRE, Cartesian

5.9.5.5 Cost Attribution from PG952C to other Network Components

Costs from PG952C are fully allocated to GEA Electronics component CL952, which is then fully allocated to Wholesale Residual Markets.

5.9.6 NGA Maintenance (PG955M and PG956M)

5.9.6.1 Summary

This cost sub-group includes costs for the maintenance of NGA equipment and is comprised of two plant groups (PG955M and PG956M). Since these costs relate to maintenance activities, the majority of the costs within these two plant groups are pay related and are attributed directly. The tables in this section show all the costs on an aggregate basis for the two plant groups (PG955M and PG956M). As with other NGA related plant groups discussed earlier, costs from these plant groups are also fully attributed to Wholesale Residual Markets.

The key findings in this section are:

1. The costs in NGA Maintenance relate to Openreach engineering activities, however during the cost exhaustion process a small amount of costs (✂FAC) are attributed from TSO
2. Costs from plant groups in NGA maintenance are directly allocated to network components

5.9.6.2 *Composition by Cost Type and Organisational Unit*

As these cost categories relate to access network maintenance, Openreach pay accounts for the majority (✂ %) of FAC. There are also some transfer charges between Business Services and Openreach which relate to motor insurance and fleet charges.

Table 235. ***Notable Costs apportioned to NGA Maintenance at Level 1, by Division***

✂

Source: BT ASPIRE, Cartesian

At an OUC level it can be seen that most of the costs attributed to NGA Maintenance are Openreach engineers working on NGA related activities and are mainly pay costs. Table 236 below also shows the ✂ transfer charge from BT Fleet in Business Services to NGA Maintenance. The balancing transfer-in charge sits within OUC: BL in the table below, and relates to BT Fleet.

Table 236. ***Organisational Units contributing costs to NGA Maintenance at Level 1***

Division	OUC	Description	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)
B	BL	Openreach Infrastructure Delivery	✂	✂	✂	✂ [0% to 170%]
	BV	Openreach Service Delivery	✂	✂	✂	0%
	BA	Openreach Learning and Development	✂	✂	✂	0%
	BR	Openreach Marketing and Sales	✂	✂	✂	0%
	BF	Openreach Finance	✂	✂	✂	0%
	B	Openreach	✂	✂	✂	0%
B Total			✂	✂	✂	✂ **[0% to 170%]**
Y	Y	Group Business Services	✂	✂	✂	0%
	YS	Supply Chain	✂	✂	✂	0%
	YL	BT Fleet	✂	✂	✂	✂ [-170% to 0%]
Y Total			✂	✂	✂	✂ **[-170% to 0%]**
Others			✂	✂	✂	0%
Grand Total			✂	✂	✂	**100%**

Source: BT ASPIRE, Cartesian

5.9.6.3 Cost Attribution to NGA Maintenance from General Ledger

Of the total ✂ FAC, ✂ is directly allocated to NGA Maintenance from the General Ledger. The remaining ✂ is attributed using multiple base methodologies and transfer charges.

5.9.6.4 Cost Attribution to NGA Maintenance from other Cost Categories

In the cost exhaustion process, a further ✂ FAC is attributed to NGA Maintenance. As the table shows below, Corporate Costs (AG112) and Openreach Pay Driver (AG401) are the key attributors to NGA maintenance.

Table 237. ***Impact of costs attributed to NGA Maintenance in cost exhaustion process, by Cost Category***

Level	Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref
Level 1	NGA Maintenance	-	✂	✂	✂	✂ [0% to 145%]	-
Exhaustion Level	Corporate Costs	AG112	✂	✂	✂	✂ [0% to 145%]	5.3.4
	OR Pay driver	AG401	✂	✂	✂	✂ [0% to 145%]	5.3.6
Level 7	**NGA Maintenance**	-	✂	✂	✂	**100%**	-

Source: BT ASPIRE, Cartesian

The table below shows the difference in costs at a business unit level between Level 1 and Level 7 of NGA Maintenance. The most notable movement in costs is for BT TSO and Corporate Headquarters.

Attributions from division 'C' (Corporate Headquarters) (as shown in the table below) mainly include Corporate Overhead charges attributed by Openreach Pay Driver (AG401) during the cost exhaustion process. In addition to this, there are also some property, software and underlying TSO costs attributed to this cost sub-group.

Attributions from division 'T' (BT TSO) are mainly attributed from Corporate Costs (AG112) and Openreach pay Drivers (AG401). Costs attributed from this division includes General Computers, SG&A (IT Services) and general management costs. This data is not shown in the tables.

Table 238. ***NGA Maintenance Costs at Level 7, shown by Division***

Division	Description	Level 1		Level 7	
		FAC (£ m)	FAC (%)	FAC (£ m)	FAC (%)
B	Openreach	✂ [£0 to £10]	✂ [0% to 170%]	✂ [£0 to £10]	✂ [0% to 125%]
T	BT TSO	£0	0%	✂ [£0 to £10]	✂ [0% to 125%]
Y	Group Business Services	✂ [-£10 to £0]	✂ [-170% to 0%]	£0	0%

C	Corporate Headquarters	£0	0%	[-£10 to £0]	[-125% to 0%]
Others		£0	0%	£0	0%
Total		[£0 to £10]	**100%**	[£0 to £10]	**100%**

Source: BT ASPIRE, Cartesian

5.9.6.5 Cost Attribution from NGA Maintenance to other Network Components

The costs of both of the NGA Maintenance PGs are fully allocated to specific network components. Costs from PG955M are fully allocated to GEA FTTC Maintenance component CL955 and those of PG956M are allocated to GEA FTTP maintenance components CL956. These components are then fully allocated to Wholesale Residual Markets.

5.10 Other

5.10.1 Summary

The 'Other' cost group includes cost categories within the scope of the study that lie outside the named cost groups covered in the preceding sections.

The cost categories in this section were assigned a lower priority than the named groups and, as such, are assessed in less depth. Notably, this section does not analyse attributions by division, nor does it quantify the attributions to Network Components. However in both cases, important highlights are discussed qualitatively in the text.

The value of this cost group is approximately £1.6bn FAC. This cost is attributed to both regulated and un-regulated markets.

5.10.2 Contribution to Market Costs

The majority of costs in this cost group are attributed to the Wholesale Residual Market, as shown by Table 239. In the regulated markets, the Fixed Access Market receives the highest share of costs (c. £541m FAC); BCMR is the next largest, receiving less than half as much (£245m FAC).

Table 239. ***Other costs by Markets (2014, £m)***

Market Review	Market Name	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)
Fixed Access Market	Wholesale Line Rentals	£229	£335	£263	17%
	Local Loop Unbundling	£222	£341	£256	16%
	Wholesale ISDN30 Lines	£11	£23	£13	1%
	Wholesale ISDN2 Lines	£8	£21	£10	1%
Fixed Access Market Total		**£469**	**£720**	**£541**	**34%**
Business Connectivity Market	AISBO Non-WECLA	£146	£107	£157	10%
	TISBO (up to and including 8 Mbps)	£34	£27	£36	2%
	MISBO Non-WECLA	£22	£39	£25	2%
	AISBO WECLA	£17	£12	£18	1%
	TISBO (above 45 Mbps up to and including 155 Mbps)	£2	£11	£3	0%
	TISBO (above 8 Mbps up to and including 45 Mbps)	£2	£8	£2	0%
	Wholesale Regional Trunk Segments	£1	£7	£2	0%
	Point of Handover	£0	£1	£1	0%
Business Connectivity Market Total		**£224**	**£214**	**£245**	**15%**
Wholesale Broadband Access Market	Wholesale Broadband Access - Mkt 1	£66	£219	£88	6%
	Wholesale Broadband Access - Mkt 2	£16	£51	£21	1%
Wholesale Broadband Access Market Total		**£82**	**£269**	**£109**	**7%**
Narrowband Market	Calls: Call Origination	£31	£107	£42	3%
	Calls: Call Termination	£23	£103	£33	2%
	Interconnect Circuits	£7	£9	£8	0%
Narrowband Market Total		**£60**	**£219**	**£82**	**5%**
Wholesale Residual Total		**£1,188**	**£338**	**£1,222**	**77%**

Retail Products Total	**-£624**	**£93**	**-£615**	**-39%**
Grand Total	**£1,399**	**£1,853**	**£1,584**	**100%**

Source: BT ASPIRE, Cartesian

Within BCMR, 'Other' costs make up more than half of the MISBO Non-WECLA costs and almost half (44%) of AISBO WECLA costs.

Table 240. ***Proportion of Other costs in each Market (2014, %)***

Market Review	Market	'Other' costs as a proportion of Market Costs
Fixed Access Market	Local Loop Unbundling	23%
	Wholesale Line Rentals	14%
	Wholesale ISDN30 Lines	14%
	Wholesale ISDN2 Lines	13%
Business Connectivity Market	MISBO Non-WECLA	56%
	AISBO WECLA	44%
	AISBO Non-WECLA	30%
	TISBO (above 45 Mbps up to and including 155 Mbps)	17%
	TISBO (above 8 Mbps up to and including 45 Mbps)	14%
	TISBO (up to and including 8 Mbps)	13%
	Wholesale Regional Trunk Segments	13%
	Point of Handover	11%
Wholesale Broadband Access Market	Wholesale Broadband Access - Mkt 1	25%
	Wholesale Broadband Access - Mkt 2	16%
Narrowband Market	Calls: Call Origination	32%
	Calls: Call Termination	29%
	Interconnect Circuits	27%
Wholesale Residual	Wholesale Residual	51%

Source: BT ASPIRE, Cartesian

5.10.3 Composition by Cost Category

The cost group includes 52 costs categories. These are divided into 15 cost sub-categories as shown in the table below.

Table 241. ***Cost Categories in the Other cost group at Level 1***

Section Ref.	Cost Sub-group	Cost Category	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
5.10.4	**Vehicles**	Motor Transport	AG101	[£100 to £150]	[£50 to £100]	[£100 to £150]
5.10.5	**Systems**	IP Network Management	PG668A	[£10 to £50]	[£10 to £50]	[£10 to £50]
5.10.6	**20C Voice Equipment**	Analogue Linecards	PG127A	[£10 to £50]	[£50 to £100]	[£10 to £50]
		Local Exchange Processor (AXE10) Equipment	PG280C	[£0 to £10]	[£0 to £10]	[£0 to £10]
		Local Exchange Processor (Sys X) Equipment	PG285C	[£0 to £10]	[£10 to £50]	[£0 to £10]
		Local Exchange Concentrator (Sys X) Call	PG288A	[£0 to £10]	[£10 to £50]	[£10 to £50]
5.10.7	**IP Network**	IP Network Broadband	PG672A	[£10 to £50]	[£10 to £50]	[£10 to £50]
		IP VOIP Infrastructure	PG675A	[£10 to £50]	[£10 to £50]	[£10 to £50]
5.10.8	**Ethernet Access Equipment**	Ethernet Access Equipment	PG447A	[£50 to £100]	[£150 to £200]	[£100 to £150]
5.10.9	**Exchange Overhead Equipment**	Specialised Accommodation Equipment - Non Maintenance	AG162	[£50 to £100]	[£600 to £700]	[£100 to £150]
		Back-up Power Equipment - Non Maintenance	AG164	[£10 to £50]	[£250 to £300]	[£50 to £100]
5.10.10	**Co-Mingling, DSLAM Support & MDF**	LLU Co-mingling Recurring Costs (OR)	PG132B	[£0 to £10]	[£50 to £100]	[£10 to £50]
		LLU Co-mingling Recurring costs (TSO)	PG132N	[£0 to £10]	£0	[£0 to £10]
		DSLAM - Overheads	PG152N	[£0 to £10]	£0	[£0 to £10]
		Main Distribution Frames Equipment	PG217E	[£0 to £10]	[£10 to £50]	[£0 to £10]
		Main Distribution Frames Maintenance	PG217F	[£10 to £50]	[-£10 to £0]	[£10 to £50]
5.10.11	**TSO Operational Costs**	TSO Operational Costs	AG102	[£250 to £300]	[£150 to £200]	[£300 to £350]
5.10.12	**MDF Hardware Jumpering**	MDF Hardware Jumpering	PG142A	[£100 to £150]	[-£50 to -£10]	[£100 to £150]
5.10.13	**Openreach Provisioning Service Centre**	OR Service Centre Provision Analogue/ISD	PG570B	[£10 to £50]	[-£10 to £0]	[£10 to £50]
		OR Service Centre Provision Ethernet	PG573B	[£10 to £50]	[-£10 to £0]	[£10 to £50]
		OR Service Centre Provision LLU	PG572B	[£10 to £50]	[-£10 to £0]	[£10 to £50]

Section Ref.	Cost Sub-group	Cost Category	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
		OR Service Centre Provision NGA	PG574B	[£10 to £50]	£0	[£10 to £50]
		OR Service Centre Provision ISDN30	PG571B	[£0 to £10]	£0	[£0 to £10]
5.10.14	**TRC and SFI**	Time Related Charges	PG981R	[£50 to £100]	[-£10 to £0]	[£50 to £100]
		Special Fault Investigation	PG989A	[£10 to £50]	[-£10 to £0]	[£10 to £50]
5.10.15	**Openreach Product Development**	Openreach Systems & Development	PG772A	[£50 to £100]	[£150 to £200]	[£50 to £100]
		FTTC Service Delivery & Development	PG197A	[£10 to £50]	[£50 to £100]	[£10 to £50]
		FTTP Development	PG198A	£0	£0	£0
5.10.16	**Miscellaneous**	Interconnect Outpayments Inland	PG599A	[£600 to £700]	[-£250 to -£200]	[£600 to £700]
		Interconnect Outpayments International	PG561A	[£100 to £150]	£0	[£100 to £150]
		OR Pay plus % FA driver	AG410	[£50 to £100]	[£50 to £100]	[£50 to £100]
		Broadband Line Testing Equipment (Openreach)	PG151B	[£10 to £50]	[£150 to £200]	[£50 to £100]
		Openreach Contribution to Light User Scheme	PGT11M	[£50 to £100]	£0	[£50 to £100]
		Liquid Funds and Interest	AG113	[£10 to £50]	[£150 to £200]	[£10 to £50]
		DSLAM - Equipment	PG153N	[£10 to £50]	[£10 to £50]	[£10 to £50]
		Phonebooks	PG933A	[£10 to £50]	[-£10 to £0]	[£10 to £50]
		Broadband Boost	PG580B	[£10 to £50]	[-£10 to £0]	[£10 to £50]
		GEA Customer Site Installations	PG954C	[£10 to £50]	[£10 to £50]	[£10 to £50]
		Routing and Records	PG140A	[£10 to £50]	[-£10 to £0]	[£10 to £50]
		Private Circuits Megastream and IX Conns	PG413P	[£10 to £50]	[-£10 to £0]	[£10 to £50]
		Operator Services Inland	PG911A	[£10 to £50]	[-£10 to £0]	[£10 to £50]
		GEA FTTC Provision	PG958P	[£10 to £50]	[-£10 to £0]	[£10 to £50]
		MSH STM64 Equipment	PG385T	[£0 to £10]	[£10 to £50]	[£10 to £50]
		TISBO Excess Construction Adjustment Credit	PG002Y	[-£10 to £0]	[-£100 to -£50]	[-£10 to £0]

Section Ref.	Cost Sub-group	Cost Category	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
		AISBO Excess Construction Adjustment Credit	PG003Y	✂[-£10 to £0]	✂[-£200 to -£150]	✂[-£50 to -£10]
		Repayment Works	PG980R	✂[-£100 to -£50]	✂[-£50 to -£10]	✂[-£100 to -£50]
		Openreach Other Activities	PG986R	✂[-£150 to -£100]	✂[-£10 to £0]	✂[-£150 to -£100]
		Non-Core Suspense	AG114	✂[-£700 to -£600]	£0	✂[-£700 to -£600]
		Others (x 4)	-	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
Total				**£1,399**	**£1,853**	**£1,584**

Source: BT ASPIRE, Cartesian

5.10.4 Vehicles

5.10.4.1 Summary

The Vehicle cost group contains cost of the use of motor vehicles by all the BT units. These costs are incurred by BT Group (i.e. BT Fleet Management) which in turn recovers the costs by charging other BT units (i.e. LoBs/OUCs) for these motor-related activities at commercial rates.

It is worth noting that BT Fleet Management Unit offers external services to third parties in order to bring extra revenue to BT, i.e., the motor vehicles and associated products and services are not exclusively for BT's business operations. The costs of these external services are attributed to unregulated markets.

This cost group accounts for approximately ✂ [£100m to £150m] FAC at Level 1. Relevant costs in the general ledger are apportioned into a single cost category at Level 1 in the attribution process, Motor Transport (AG101).

Table 242. ***Cost Categories in the Vehicles cost sub-group at Level 1***

Cost Category	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
Motor Transport	AG101	✂[£100 to £150]	✂[£50 to £100]	✂[£100 to £150]
Total		✂[£100 to £150]	✂[£50 to £100]	✂[£100 to £150]

Source: BT ASPIRE, Cartesian

5.10.4.2 Cost Attribution to AG101 from General Ledger

The internal trades management system used by the Fleet Management holds details of every vehicle, the cost and the 'owner' (i.e. OUC) of the vehicle, which enables internal charges to be generated to the other BT units.

Almost all the costs attributed to Motor Transport activity group are NBV of Motor Transport fixed assets and are based on internal trades' analysis. Through this methodology BT separates out cost/income received from external parties (which goes to Retail Products).

5.10.4.3 Cost Attribution from AG101 to other Cost Categories

Costs in AG101 are attributed to each OUC using the internal transfer charge mechanism between BT Fleet Management and the OUCs. Then, for each OUC, there is an apportionment of costs to cost categories. This apportionment is based on the treatment of similar costs within the OUC. For example, pay costs attributed from AG101 to an OUC will be apportioned according to the pay cost attribution for that OUC.

Through this attribution method, vehicle-related costs are apportioned to many PGs. Some of these PGs are covered by cost groups within this report such as Copper (PG118M, PG118C, etc.), Fibre (PG959C, etc.), Duct (AG135, AG148 and AG149), General Overheads (AG112, etc.). The attribution methodologies from these PGs to Network Components are described in the respective cost group section of this document.

5.10.5 Systems

5.10.5.1 Summary

The Systems cost group includes cost of systems required to manage BT's IP network. This cost group contains one plant group (IP Network Management, PG668A) which accounts for approximately ✂ [£10m to £50m] FAC at Level 1. PG668A captures costs related to the systems, in particular OSS type, pay and storage costs.

Table 243. ***Cost Categories in the Systems cost sub-group at Level 1***

Cost Category	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
IP Network Management	PG668A	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]
Total		✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]

Source: BT ASPIRE, Cartesian

5.10.5.2 *Cost Attribution to PG668A from General Ledger*

Costs from the GL are attributed to PG668A using two key base methodologies; PDTIPNCO, which attributes approximately ✂ [£10m to £50m] FAC of IP Network costs to Systems and PDTSCNM, which attributes approximately ✂ [£0 to £10m] FAC of vendor support contract costs.

The base methodology (PDTIPNCO) attributes IP Network costs in two simple steps:

1. Each piece of equipment for the IP Network is mapped to a plant group
2. Using a fixed, three year depreciation life for IP related equipment, BT determines the annual depreciation charge. This charge is then attributed to the PGs that have been mapped to each equipment. In the case of our cost group this base methodology attributes ✂ [£10m to £50m] (FAC) to PG668A

The remaining ✂ [£0 to £10m] FAC is attributed using the base methodology that apportions vendor support contract costs (PDTSCNM). This methodology is explained in detail in section 6 of this report.

5.10.5.3 *Cost Attribution from PG668A to Network Components*

Costs are directly allocated to IP Network Management Network Component (CO668). These costs are then fully attributed to Wholesale Residual market.

5.10.6 20C Voice Equipment

5.10.6.1 *Summary*

The 20C Voice Equipment sub-group includes costs relating to System X and AXE10 voice switches. The total FAC for this cost sub-group is approximately ✂ [£50m to £100m]. The cost categories are shown in the Table 244.

Table 244. ***Cost Categories in the 20C Voice Equipment sub-group at Level 1***

Cost Categories	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
Analogue Linecards	PG127A	✂[£10 to £50]	✂[£50 to £100]	✂[£10 to £50]
Local Exchange Processor (AXE10) Equipment	PG280C	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]
Local Exchange Processor (Sys X) Equipment	PG285C	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
Local Exchange Concentrator (Sys X) Call	PG288A	✂[£0 to £10]	✂[£10 to £50]	✂[£10 to £50]
Total		✂[£10 to £50]	✂[£100 to £150]	✂[£50 to £100]

Source: BT ASPIRE, Cartesian

5.10.6.2 *Cost Attribution to 20C Voice Equipment from General Ledger*

From the GL approximately ✂ FAC is attributed to 20C Equipment plant groups using the BT Property Floor space utilisation methodology (DTNASTR) and ✂ [£50m to £100m] FAC is attributed

for Electricity using the power consumption methodology (DTNELSP). Since these base methodologies are based on transfer charges, there is a balancing figure in the accounts that almost nets off these costs. These methodologies are discussed in detail in Section 6.

Table 245. ***Notable base methodologies attributing costs to 20C Voice Equipment at Level 1***

Base	CCA (£ m)	MCE (£ m)	FAC (£ m)
DTNASTR	[£50 to £100]	£0	[£50 to £100]
DTNELSP	[£10 to £50]	£0	[£10 to £50]
PDTSYSXD	[£10 to £50]	[£100 to £150]	[£10 to £50]
PDTSCNM	[£10 to £50]	£0	[£10 to £50]
PDTLYX	[£0 to £10]	[£10 to £50]	[£0 to £10]

Source: BT ASPIRE, Cartesian

Note: the table above does not show all the attribution methodologies including transfer-out charges. These transfer-outs have balancing transfer-in figures being attributed by some base methodologies.

Using an Excel model ("BTW Switch model"), BT determines the apportionments for base methodology PDTSYSXD to attribute System X costs and PDTLYX to attribute AXE10 exchange costs.

The attribution methodologies use two main factors:

- Depreciation Charge
- Local Exchange Modernisation Programme 2 (LEMP2) outputs

BT use the LEMP2 planning tool and current traffic volumes to determine the dimensions of an efficiently-sized voice switch for each exchange. Based on the equipment volumes from the planning tool and the depreciation charges, BT then builds an apportionment basis on the relative value of equipment. This methodology is discussed in further detail in section 6.

5.10.6.3 Cost Attribution from 20C to Network Components

The BTW Switch model is also used to apportion costs from 20C Equipment plant groups to Network Components. The depreciation values of processor elements in conjunction with Call Setup, Call Duration and Common Cost percentages are used in this stage.

5.10.7 IP Network

5.10.7.1 Summary

The IP Network sub-group is composed of two cost categories: IP Network Broadband (PG672A) and IP VOIP Infrastructure (PG675A). These include equipment such as Broadband Access Routers,

Remote Authentication Servers (RAS) and Gigabit Routers. The value of this sub-group is approximately ✂ [£50m to £100m] FAC.

Table 246. ***Cost Categories in the IP Network sub-group at Level 1***

Cost Categories	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
IP Network Broadband	PG672A	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]
IP VOIP Infrastructure	PG675A	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]
Total		✂[£10 to £50]	✂[£50 to £100]	✂[£50 to £100]

Source: BT ASPIRE, Cartesian

5.10.7.2 Cost Attribution to IP Network from General Ledger

Costs are attributed to this cost sub-group using four key methodologies as shown in the table below.

Table 247. ***Notable base methodologies attributing costs to IP Network at Level 1***

Base	CCA (£ m)	MCE (£ m)	FAC (£ m)
PDTIPNCO	✂[£10 to £50]	✂[£50 to £100]	✂[£10 to £50]
PDTSCNM	✂[£0 to £10]	£0	✂[£0 to £10]
DTNELSP	✂[£0 to £10]	£0	✂[£0 to £10]
DTNASTR	✂[£0 to £10]	£0	✂[£0 to £10]

Source: BT ASPIRE, Cartesian

Note: the table above does not show all the attribution methodologies including transfer-out charges. These transfer-outs have balancing transfer-in figures being attributed by some base methodologies.

The base methodology PDTIPNCO, which attributes IP Network costs, follows two simple steps:

1. Each piece of equipment for the IP Network is mapped to a plant group.
2. Using a fixed three year depreciation life for IP related equipment, BT determines the annual depreciation charge. This charge is then attributed to the PGs that are mapped to each equipment type. In the case of our cost group this base methodology attributes ✂ [£10m to £50m] (FAC) to PG668A.

This cost sub-group also has ✂ [£0 to £10m] FAC of vendor support contract costs attributed to it using the PDTSCNM base methodology. This methodology is explained in detail in section 6.2.18 of this report.

IP Network also receives ✂ [£0 to £10m] of Electricity charges from the GL using the DTNELSP methodology; and ✂ [£0 to £10m] of property costs using the DTNASTR methodology. The property attributions are based on floor space utilisation which is described in section 6.2.13.

5.10.7.3 Cost Attribution from IP Network to Network Components

Costs from plant groups in IP Network are directly allocated to Network Components. These network components then feed directly into Wholesale Residual Market.

5.10.8 Ethernet Access Equipment

5.10.8.1 Summary

The Ethernet Access Equipment sub-group contains a single PG of the same name (PG447A) and includes costs relating to Short Haul Data Service (SHDS) equipment (i.e. Ethernet equipment in Access Network). SHDS is a LAN extension service and is used for WES, BES and EAD services.

Table 248. ***Cost Categories in the Ethernet Access Equipment cost sub-group at Level 1***

Cost Categories	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
Ethernet Access Equipment	PG447A	✂[£50 to £100]	✂[£150 to £200]	✂[£100 to £150]
Total		✂[£50 to £100]	✂[£150 to £200]	✂[£100 to £150]

Source: BT ASPIRE, Cartesian

5.10.8.2 Cost Attribution to Ethernet Access Equipment from General Ledger

As the table below shows, ✂ [£50m to £100m] FAC, which forms the majority of Ethernet Access Equipment cost is directly allocated from the GL to this plant group (Base PG447A).

Table 249. ***Notable base methodologies attributing costs to Ethernet Access Equipment at Level 1***

Base	CCA (£ m)	MCE (£ m)	FAC (£ m)
PG447A	✂[£50 to £100]	✂[£150 to £200]	✂[£50 to £100]
FTQ	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]
PDTDTTW	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
EXCEPT	✂[£0 to £10]	£0	✂[£0 to £10]

Source: BT ASPIRE, Cartesian

Note: the table above does not show all the attribution methodologies including transfer-out charges. These transfer-outs have balancing transfer-in figures being attributed by some base methodologies.

There are approximately ✂ [£10m to £50m] FAC attributed based on capitalised and current pay using the FTQ base methodology. FTQ is a system generated base methodology that attributes costs on the basis of previously attributes pay costs.

In addition to the above, ✂ [£0 to £10m] FAC Ethernet Electronics costs are also being directly allocated to PG447A using base methodology PDTDTTW.

Diving deeper into the data (not shown in the tables), it can be seen that BT attributes ✂ [£0 to £10m] TSO Strategy and Operational costs using the EXCEPT base methodology. This base methodology attributes costs on the basis of records held within the TSO billing system. This methodology is explained in more detail in section 6.2.12.

5.10.8.3 Cost Attribution from Ethernet Access Equipment to Network Components

Costs from this PG are directly allocated to Ethernet Electronics Network Component, CO485. This component then attributes to numerous products and services within the Business Connectivity Markets.

5.10.9 Exchange Overhead Equipment

5.10.9.1 Summary

The Exchange Overhead Equipment sub-group contains two cost categories: Specialised Accommodation Equipment, e.g. air conditioning units (AG162); and Back-up Power Equipment (AG164). These activity groups together account for approximately ✂ [£200 to £250m] fully allocated costs at Level 1.

Table 250. ***Cost Categories in the Exchange Overhead Equipment cost sub-group at Level 1***

Cost Categories	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
Specialised Accommodation Equipment - Non Maint	AG162	✂[£50 to £100]	✂[£600 to £700]	✂[£100 to £150]
Back-up Power Equipment - Non Maint	AG164	✂[£10 to £50]	✂[£250 to £300]	✂[£50 to £100]
Total		✂[£100 to £150]	✂[£900 to £1000]	✂[£200 to £250]

Source: BT ASPIRE, Cartesian

5.10.9.2 Cost Attribution to Exchange Overhead Equipment from General Ledger

As the table below shows, the majority of the costs within this cost sub-group are attributed directly from the GL (bases AG162 and AG164). These include large asset related costs for the accommodation plant equipment.

Table 251. ***Notable base methodologies attributing costs to Exchange Overhead Equipment at Level 1***

Base	CCA (£ m)	MCE (£ m)	FAC (£ m)
AG162	✂[£50 to £100]	✂[£600 to £700]	✂[£100 to £150]
AG164	✂[£10 to £50]	✂[£250 to £300]	✂[£50 to £100]
DTNASTR	✂[£10 to £50]	£0	✂[£10 to £50]
CUMNORM	✂[£0 to £10]	£0	✂[£0 to £10]

Source: BT ASPIRE, Cartesian

Note: the table above does not show all the attribution methodologies including transfer-out charges. These transfer-outs have balancing transfer-in figures being attributed by some base methodologies.

Specialised Accommodation Equipment and Back-Up Power equipment also receive a share of property costs (✂ [£10 to £50m] FAC). As described in section 6.2.13, the attribution is based on space utilization.

Cumulo rates (business taxes) are also attributed to these plant groups. Treatment of cumulo rates is described in section 6.2.3.

Note: Property costs are based on transfer charges which balance out in the total AG162 and AG162 costs at Level 1 and hence the impact of these costs cannot be seen at this level (as shown in the table above).

5.10.9.3 Cost Attribution from Exchange Overhead Equipment to Network Components

Costs from AG162 and AG164 are attributed to numerous plant groups. The attribution is based on electricity consumption on the basis that this is directly proportional to cooling and back-up power needs. The Electricity Model is described in section 6.2.15.

5.10.10 Co-Mingling, DSLAM Support and MDF

5.10.10.1 Summary

This cost sub-group, which accounts for approximately ✂ [£50m to £100m] FAC, includes costs for LLU co-mingling, maintenance costs for DSLAMs and MDF costs (including equipment and provisioning). The cost categories in this sub-group are listed in Table 252.

Table 252. ***Cost Categories in the Co-Mingling, DSLAM Support & MDF sub-group at Level 1***

Cost Categories	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
LLU Co-mingling Recurring Costs (OR)	PG132B	✂[£0 to £10]	✂[£50 to £100]	✂[£10 to £50]

LLU Co-mingling Recurring costs (TSO)	PG132N	✂[£0 to £10]	£0	✂[£0 to £10]
DSLAM – Overheads	PG152N	✂[£0 to £10]	£0	✂[£0 to £10]
Main Distribution Frames Equipment	PG217E	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
Main Distribution Frames Maintenance	PG217F	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]
Total		✂[£10 to £50]	✂[£50 to £100]	✂[£50 to £100]

Source: BT ASPIRE, Cartesian

5.10.10.2 *Cost Attribution to Co-Mingling, DSLAM Support & MDF from General Ledger*

Costs are attributed to this cost sub-group using multiple base methodologies; notable methodologies are shown in Table 253.

The largest two cost attributions are from BT Property (for floor space utilisation for Openreach, DTNASTR) and Electricity transfer charges (DTNELSP). These costs are attributed to MDF Equipment (PG217E) and DSLAM overheads (PG152N). DTNASTR and DTNELP are discussed in Section 6 in more detail.

Table 253. ***Notable base methodologies attributing costs to Co-Mingling, DSLAM Support & MDF at Level 1***

Base	CCA (£ m)	MCE (£ m)	FAC (£ m)
DTNASTR	✂[£50 to £100]	£0	✂[£50 to £100]
DTNELSP	✂[£50 to £100]	£0	✂[£50 to £100]
PDTMDF	✂[£10 to £50]	£0	✂[£10 to £50]
PDTACPA	✂[£0 to £10]	✂[£50 to £100]	✂[£10 to £50]
FTQ	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]
PDTLMDF	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]
PDTSCNM	✂[£0 to £10]	£0	✂[£0 to £10]

Source: BT ASPIRE, Cartesian

Note: the table above does not show all the attribution methodologies including transfer-out charges. These transfer-outs have balancing transfer-in figures being attributed by some base methodologies.

From the GL, approximately ✂ [£10m to £50m] of current account cost for MDF is attributed using the PDTMDF methodology. This base methodology is used to attribute pay and non-pay costs on the basis of time spent on Time Related Charges (TRC) and Special Fault Investigation (SFI). An 'implied' cost of these activities is derived by multiplying a standard man hour rate to by the number of man hours. This methodology is discussed in more detail in section 6.2.6.

Approximately ✂ [£10m to £50m] FAC is attributed using PDTACPA base methodology which attributes capital costs for racks, ventilation and accommodation based on Asset Policies defined by BT. As explained by BT, this base methodology involves activities relating to co-mingling and meters installed in NGA cabinets. BT uses an analysis of Fixed Asset Register, Life of Plant List and Capex data from Openreach to determine the attribution base. This methodology is discussed in more detail in section 6.2.19.

A further ✂ [£10m to £50m] FAC is attributed based on capitalised and current pay using the FTQ base methodology. FTQ is a system generated base methodology that attributes costs on the basis of previously attributed pay costs. This methodology is explained in more detail in Section 6 of this report.

The MDF plant group also receives ✂ [£0 to £10m] FAC from the GL for balance sheet costs of MDF using the PDTLMDF base methodology. The underlying attribution methodology is based on depreciation, whereby BT determines the total depreciation of MDF equipment and then apportions costs to the receiving plant groups based on depreciation figures within the relevant plant groups.

Finally, this cost sub-group also has ✂ [£0 to £10m] FAC for vendor support contracts. This cost attribution uses the PDTSCNM base methodology. This methodology is explained in detail in section 6.2.18 of this report.

5.10.10.3 Cost Attribution from Co-Mingling, DSLAM Support & MDF to Network Components

From this sub-group, cost are directly allocated from PGs to their respective Network Components.

5.10.11 TSO Operational Costs

5.10.11.1 Summary

The TSO Operational Costs sub-group contains a single AG of the same name (AG102). AG102 holds costs (e.g. IT, Switches, Transmission kit) for the TSO network management function which cannot be directly attributed to a single business unit at BT. These costs include pay, non-pay, depreciation and transfer charges.

As mentioned earlier in this report, BT TSO is responsible for running non-Openreach segment of BT's network in the UK which includes transmission and switches. TSO is also responsible for supporting the IT infrastructure which includes system development and maintenance. Operational costs in FY 2013/14 for TSO were approximately ✂ [£300m to £350m] FAC as shown in Table 254.

Table 254. ***Cost Categories in the TSO Operational Costs sub-group at Level 1***

Cost Categories	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
TSO Operational Costs	AG102	✂[£250 to £300]	✂[£150 to £200]	✂[£300 to £350]
Total		✂[£250 to £300]	✂[£150 to £200]	✂[£300 to £350]

Source: BT ASPIRE, Cartesian

5.10.11.2 *Cost Attribution to TSO Operational Costs from General Ledger*

The majority of the costs are attributed to this activity group using BT's EXCEPT base methodology as shown in Table 255.

Table 255. ***Selected base methodologies attributing costs to TSO Operational Costs at Level 1***

Base	CCA (£ m)	MCE (£ m)	FAC (£ m)
EXCEPT	£182	£0	£182
AG102	£105	£205	£125
OPGENACC	£21	£0	£21

Source: BT ASPIRE, Cartesian

Note: the table above does not show all the attribution methodologies including transfer-out charges. These transfer-outs have balancing transfer-in figures being attributed by some base methodologies.

Looking into the data provided by BT (not shown in this report), reveals that the cost attributed to AG102 using the EXCEPT base includes:

- ✂ [£50m to £100m] TSO's general management costs;
- ✂ [£10m to £50m] IT Services Subcontract costs;
- ✂ [£10m to £50m] software applications; and,
- ✂ [£10m to £50m] (FAC) IT hardware.

Other costs attributed by the EXCEPT base methodology to AG102 include costs incurred by several OUCs, as listed in the Table 256.

Table 256. ***EXCEPT base methodology variants attributing costs to AG102***

Two Digit OUC	Title	Notes
TA	Architecture & Global IT Platform	Cost for teams developing BT's IT Platform, Networks and Infrastructure
TN	Global Network Services (GNS) Management and Support	Costs to design, develop and operate BT's Network platforms
TB	Service, Strategy and Operations	Costs for providing 2nd and 3rd line support to different LoBs
TC	Group Customer Experience	Costs for initiatives to improve customer experience across BT

Two Digit OUC	Title	Notes
TSD	BT Energy and Carbon Unit	Costs for team responsible for managing energy and carbon emissions across BT
YW	Group Procurement supporting TSO	Costs for Group Procurement providing services to TSO
TG	Chief Information Officer – Global Services	Costs for CIO's team to support BT Global Services systems, networks and processes
TM	Chief Information Officer – Group	Costs for CIO's team to support BT Group systems, networks and processes

Source: BT ASPIRE, Cartesian

As the table above shows, approximately £125m FAC is attributed directly to AG102 from the GL. These costs typically include depreciation costs as well as capitalised cost of software and computers.

Data centre charges (approximately £21m FAC) for TSO are also attributed to TSO Operational costs using the base methodology OPGENACC. This base apportions costs of TSO office accommodation transfer charges from Group Property for data centres. The attribution is made using Data Centre budgeted data which attributes costs to each LoB. No further details are provided by BT.

5.10.11.3 Cost Attribution from TSO Operational Costs to Network Components

Attribution of AG102 costs to other activity groups and plant groups uses a system-generated apportionment base. This attribution follows the following three simple steps:

Step 1 – Identify the Net Book Value of all 'relevant' core fixed assets

In this step ASPIRE identifies the NBV of all the core fixed assets of BT (excluding Copper, Duct, Fibre, Land and Buildings, vehicles, office machines and materials awaiting installation)

Step 2 – Identify which destinations (AGs and PGs) those assets are attributing costs to

In this step ASPIRE determines the attribution destinations of each of the identified core assets.

Step 3 – Determine an attribution base using the NBV attributable to each identified AG and PG

In this step BT calculates the attribution weights by using the total NBV of core assets as the denominator and the NBV of assets of each AG and PG as the numerator.

The implication of using this methodology is that all the generic/non-LoB specific costs are attributed to cost categories that have asset costs attributed to them.

5.10.12 MDF Hardware Jumpering

5.10.12.1 Summary

The MDF Hardware Jumpering sub-group contains a single PG of the same name (PG142A). This PG receives costs and balance sheet items for jumpering activities for MDF connecting the Exchange switch equipment to E-side cable.

BT explains in the DAM, "*An MDF jumper is a copper connection that provides a flexible connection between two terminal ends, commonly used to connect the line side to the exchange side of the MDF*." Costs in FY 2013/14 for this plant group were approximately ✂ [£100m to £150m] (FAC).

Table 257. ***Cost Categories in the MDF Hardware Jumpering sub-group at Level 1***

Cost Categories	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
MDF Hardware Jumpering	PG142A	✂[£100 to £150]	✂[-£50 to -£10]	✂[£100 to £150]
Total		✂[£100 to £150]	✂[-£50 to -£10]	✂[£100 to £150]

Source: BT ASPIRE, Cartesian

5.10.12.2 Cost Attribution to MDF Hardware Jumpering from General Ledger

The majority of the costs attributed to MDF hardware jumpering were directly allocated from the GL as shown in Table 258.

Table 258. ***Notable base methodologies attributing costs to MDF Hardware Jumpering at Level 1***

Base	CCA (£ m)	MCE (£ m)	FAC (£ m)
PG142A	£88	£0	£88
FTQ	£53	-£8	£52
COMCOS	£3	£0	£3

Source: BT ASPIRE, Cartesian

Note: the table above does not show all the attribution methodologies including transfer-out charges. These transfer-outs have balancing transfer-in figures being attributed by some base methodologies.

The second largest attribution to MDF hardware jumpering relates to capital and current pay costs. FTQ attributes this Core Capital and Current Pay costs based on previously attributed pay costs to the destination plant groups. In the case of MDF hardware jumpering this cost equates to approximately £52m FAC. This methodology is explained in more detail in Section 6 of this report.

Openreach costs are also attributed to PG142A using the COMCOS base methodology. COMCOS apportions common Openreach costs using Pay and Return on Assets as an attribution base. This methodology is explain in more detail in Section 6.

5.10.12.3 Cost Attribution from MDF Hardware Jumpering to Network Components

Costs from this PG are directly allocated to the MDF Hardware Jumpering Network Component (CL161).

5.10.13 Openreach Provisioning Service Centre

5.10.13.1 Summary

This cost sub-group includes costs and balance sheet items of Openreach incurred for the order handling of WLR/ISDN, LLU, Ethernet and NGA. Costs of these provisioning activities in FY 2013/14 were approximately ✂ [£50m to £100m] FAC.

Table 259. ***Cost Categories in the Openreach Provisioning Service Centre sub-group at Level 1***

Cost Categories	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
OR Service Centre Provision Analogue/ISD	PG570B	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]
OR Service Centre Provision Ethernet	PG573B	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]
OR Service Centre Provision LLU	PG572B	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]
OR Service Centre Provision NGA	PG574B	✂[£10 to £50]	£0	✂[£10 to £50]
OR Service Centre Provision ISDN30	PG571B	✂[£0 to £10]	£0	✂[£0 to £10]
Total		✂[£50 to £100]	✂[-£10 to £0]	✂[£50 to £100]

Source: BT ASPIRE, Cartesian

5.10.13.2 Cost Attribution to Openreach Provisioning Service Centre from General Ledger

Costs from the GL are attributed to Openreach service provisioning centre using several methodologies.

The majority of costs (approximately ✂ [£100m to £150m] FAC) are attributed using BT's EXCEPT methodologies. These EXCEPT methodologies use a variety of methods that are specific to the OUC that the cost relates to. Of the ✂ [£100m to £150m] FAC, approximate ✂% of the costs are attributed on the basis of the TSO Billing System. This methodology identifies activities undertaken by TSO in the year for each business unit and attributes costs accordingly. This methodology is explained in more detail in Section 6 of this report.

Openreach service design costs being attributed to Openreach Provision and Assurance services feels high. It will be worth check with BT that there is a causal relationship within the TSO Billing system.

The remaining ✂% costs within the EXCEPT base methodology are apportions of P&L costs relating to provisioning and repair services undertaken by Openreach. This apportionment is made on the basis of Openreach headcount (FTE) working on activities within different service areas (e.g. Ethernet, LLU, NGA, etc.)

Table 260. ***Notable base methodologies attributing costs to Openreach Provisioning Service Centre at Level 1***

Base	CCA (£ m)	MCE (£ m)	FAC (£ m)
EXCEPT	✂[£100 to £150]	✂[-£10 to £0]	✂[£100 to £150]
SLGETH	✂[£10 to £50]	£0	✂[£10 to £50]
SLGWLR	✂[£10 to £50]	£0	✂[£10 to £50]
SOFTDEP	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]

Source: BT ASPIRE, Cartesian

Note: the table above does not show all the attribution methodologies including transfer-out charges. These transfer-outs have balancing transfer-in figures being attributed by some base methodologies.

BT also attributes Service Level Guarantee penalties for the provision and repair of Ethernet and WLR services to the regulated markets. These attributions are made using the SLGETH and SLGWLR methodologies respectively. The attribution weights for these costs are determined using volumes of faults by service and by type of fault (i.e. Provision or Assure). These methodologies attribute approximately ✂ [£10m to £50m] FAC to Openreach's provisioning activities.

5.10.13.3 Cost Attribution from Openreach Provisioning Service Centre to Network Components

Costs are allocated directly from the plant groups within Openreach Provisioning Service Centre to Network Components.

5.10.14 TRC and SFI

5.10.14.1 Summary

Time Related Charges (TRC, PG981R) includes costs resulting from time spent on planned and unplanned chargeable engineering jobs. BT has specified five Classes of Work (CoW) that attribute cost to this PG.

Special Fault Investigation (SFI, PG989A) is a chargeable product offered by BT to Communications Providers (CP) for resolving faults with CP ADSL and SDSL services. Costs from these plant groups are fully attributed to Wholesale Residual Markets.

Table 261. ***Cost Categories in the TRC and SFI cost sub-group at Level 1***

Cost Categories	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
Time Related Charges	PG981R	✂[£50 to £100]	✂[-£10 to £0]	✂[£50 to £100]
Special Fault Investigation	PG989A	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]
Total		✂[£50 to £100]	✂[-£50 to -£10]	✂[£50 to £100]

Source: BT ASPIRE, Cartesian

5.10.14.2 *Cost Attribution to TRC and SFI from General Ledger*

The largest cost attribution from the GL to this cost sub-group (✂ [£10m to £50m] FAC) is a direct allocation to the TRC plant group (PG981R) as shown in Table 262 below.

Table 262. ***Notable base methodologies attributing costs to TRC & SFI at Level 1***

Base	CCA (£ m)	MCE (£ m)	FAC (£ m)
PG981R	✂[£10 to £50]	£0	✂[£10 to £50]
FTQ	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]
PDTMG	✂[£10 to £50]	£0	✂[£10 to £50]
PDTCORES	✂[£0 to £10]	£0	✂[£0 to £10]
PDTUDL	✂[£0 to £10]	£0	✂[£0 to £10]
PDTMDSL	✂[£0 to £10]	£0	✂[£0 to £10]
COMCOS	✂[£0 to £10]	£0	✂[£0 to £10]
PDTMTLUR	✂[£0 to £10]	£0	✂[£0 to £10]

Source: BT ASPIRE, Cartesian

Note: the table above does not show all the attribution methodologies including transfer-out charges. These transfer-outs have balancing transfer-in figures being attributed by some base methodologies.

The second largest attribution is based on core capital and current pay, using base reference FTQ. This methodology is discussed in detail in section 6.2.17 of this report.

There is approximately ✂ [£10m to £50m] FAC attributed to TRC and SFI using base methodology PDTMG. This base methodology attributes miscellaneous network repair costs and support activities for engineers (e.g. training buddy) on the basis of pay.

BT also attributes costs to TRC and SFI for: repairing drop wires (✂ [£0 to £10m] FAC, using PDTCORES); repair and maintenance of D-side copper cable (✂ [£0 to £10m] FAC, using PDTUDL); and repair and maintenance of DSL lines (✂ [£0 to £10m] FAC, PDTMDSL). These attributions are made by determining the 'implied cost' of time spent on Time Related Charges (TRC) and Special Fault Investigation (SFI). This is discussed in detail in section 6.2.6 of the report.

5.10.14.3 Cost Attribution from TRC and SFI to Network Components

Costs from plant groups for Time Related Charges and Special Fault Investigations are attributed directly to their respective network components. These are then attributed to Wholesale Residual Markets.

5.10.15 Openreach Product Development

5.10.15.1 Summary

This cost sub-group includes costs for development of Openreach products and services, as well as system development to support the products. Generic Openreach product development costs for FY 2013/14 were approximately ✂ [£50 to £100m] FAC and those specific to FTTC were ✂ [£10 to £50m] as shown in Table 263 below.

Table 263. ***Cost Categories in the Openreach Product Development cost sub-group at Level 1***

Cost Categories	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
Openreach Systems & Development	PG772A	✂[£50 to £100]	✂[£150 to £200]	✂[£50 to £100]
FTTC Service Delivery & Development	PG197A	✂[£10 to £50]	✂[£50 to £100]	✂[£10 to £50]
FTTP Development	PG198A	£0	£0	£0
Total		✂[£50 to £100]	✂[£200 to £250]	✂[£100 to £150]

Source: BT ASPIRE, Cartesian

5.10.15.2 Cost Attribution to Openreach Product Development from General Ledger

The bulk of costs attributed to Openreach product development cost sub-group are incurred by TSO. These costs are attributed using the TSO Billing System methodology and are covered within the EXCEPT base methodology (as shown in Table 264 below). The TSO Billing System methodology is explained in more detail in section 6.2.12 of this report.

Table 264. ***Notable base methodologies attributing costs to Openreach Product Development at Level 1***

Base	CCA (£ m)	MCE (£ m)	FAC (£ m)
EXCEPT	£269	-£0	£269
SOFTDEP	£68	£192	£87

COMCOS	£7	£0	£7
PG197A	£0	£23	£2

Source: BT ASPIRE, Cartesian

Note: the table above does not show all the attribution methodologies including transfer-out charges. These transfer-outs have balancing transfer-in figures being attributed by some base methodologies.

Approximately £87m FAC, which relates to software depreciation, is attributed to Openreach product development. These depreciation costs are for software used by Openreach only. The methodology used to attribute costs uses weights based on current year depreciation figures. This methodology (SOFTDEP) is explained in detail in section 6.2.21 of this report.

Common Openreach costs (£7m FAC) are also attributed to Openreach product development. These costs are attributed on the basis of pay and return on assets. This methodology is explained in more detail in section 6.2.10.

Finally, there is £2m FAC directly allocated to PG197A. This allocation includes: Local Network Service Module assets for GEA DSLAMs; pay costs relating Local Line Fibre Cable; and stores costs.

5.10.15.3 Cost Attribution from Openreach Product Development to Network Components

Attribution from Openreach Systems & Development (PG772A) to Network Components is uses data from BT's Fixed Asset Register (FAR). Based on which product a development project relates to (e.g. LLU, Ethernet) and the associated depreciation value in the FAR for the present financial period, BT determines the attribution weights across the following Network Components:

- Openreach Systems and Development - Ethernet (CO772)
- Wholesale Access (CL144)
- Local Loop Unbundling Systems Development (CL139)

This attribution method follows the similar principles to those explained in Section 6 where BT attributes costs based on an asset policy.

Attribution of costs from PG197A and PG198A to Network Components is on a direct (100%) allocation basis. These Network Components are fully allocated to Wholesale Residual Markets.

5.10.16 Miscellaneous

5.10.16.1 Summary

The miscellaneous cost sub-group includes the remainder of cost categories within the scope of the study.

Table 265 shows the amounts attributed by these cost categories to both regulated and un-regulated markets. This section of the report addresses points discussed with BT in relation to these cost categories.

Table 265. ***Cost Categories in the Miscellaneous cost sub-group at Level 1***

Cost Categories	BT Ref	CCA (£ m)	MCE (£ m)	FAC (£ m)
Interconnect Outpayments Inland	PG599A	[£600 to £700]	[-£250 to -£200]	[£600 to £700]
Interconnect Outpayments International	PG561A	[£100 to £150]	£0	[£100 to £150]
OR Pay plus % FA driver	AG410	[£50 to £100]	[£50 to £100]	[£50 to £100]
Broadband Line Testing Equipment (Openreach)	PG151B	[£10 to £50]	[£150 to £200]	[£50 to £100]
Openreach Contribution to Light User Scheme	PGT11M	[£50 to £100]	£0	[£50 to £100]
Liquid Funds and Interest	AG113	[£10 to £50]	[£150 to £200]	[£10 to £50]
DSLAM - Equipment	PG153N	[£10 to £50]	[£10 to £50]	[£10 to £50]
Phonebooks	PG933A	[£10 to £50]	[-£10 to £0]	[£10 to £50]
Broadband Boost	PG580B	[£10 to £50]	[-£10 to £0]	[£10 to £50]
GEA Customer Site Installations	PG954C	[£10 to £50]	[£10 to £50]	[£10 to £50]
Routing and Records	PG140A	[£10 to £50]	[-£10 to £0]	[£10 to £50]
Private Circuits Megastream and IX Conns	PG413P	[£10 to £50]	[-£10 to £0]	[£10 to £50]
Operator Services Inland	PG911A	[£10 to £50]	[-£10 to £0]	[£10 to £50]
GEA FTTC Provision	PG958P	[£10 to £50]	[-£10 to £0]	[£10 to £50]
MSH STM64 Equipment	PG385T	[£0 to £10]	[£10 to £50]	[£10 to £50]
TISBO Excess Construction Adjustment Credit	PG002Y	[-£10 to £0]	[-£100 to -£50]	[-£10 to £0]
AISBO Excess Construction Adjustment Credit	PG003Y	[-£10 to £0]	[-£200 to -£150]	[-£50 to -£10]
Repayment Works	PG980R	[-£100 to -£50]	[-£50 to -£10]	[-£100 to -£50]
Openreach Other Activities	PG986R	[-£150 to -£100]	[-£10 to £0]	[-£150 to -£100]
Non-Core Suspense	AG114	[-£700 to -£600]	£0	[-£700 to -£600]
Others (x 4)	-	[£0 to £10]	[£0 to £10]	[£0 to £10]
Total		[£250 to £300]	[-£100 to -£50]	[£250 to £300]

Source: BT ASPIRE, Cartesian

Note: Cost attributions under £2m (FAC) have been excluded from the table. Plant groups excluded are SIP Servers (PG678A), PDH Traffic Grooming (PG399T), GEA FTTP Provision (PG957P) and Telephony over Passive Optical Network (PG119A)

5.10.16.2 *Interconnect Outpayments (PG599A and PG561A)*

This costs relate to interconnect payments made by BT to International Communications Providers (PG561A) and UK-based CPs (PG599A). Costs attributed to these plant groups from the GL are fully attributed to the Wholesale Residual Market.

5.10.16.3 *OR Pay plus % FA driver (AG410)*

This cost category collects non-specific software depreciation costs for Openreach and attributes these costs to other activity groups and plant groups on the basis of Pay and Return on Assets. This methodology is similar to the one described in Section 6 in detail, however in this case only Openreach assets are considered.

5.10.16.4 *Broadband Line Testing Equipment (Openreach) (PG151B)*

This PG contains the costs of Test Access Management Systems (TAMS) and Evolutionary TAMS (EvoTAMS). These systems are used by Openreach for remote testing purposes on various services such as MPF, SMPF, WLR, etc.

Attribution of this PG to Network Components for MPF line Testing (CF187) and EvoTAMS testing system (CF189) is based on an Asset Policy code attribution methodology. This methodology attributes costs on the basis of depreciation and is discussed in detail in Section 6 of this report.

5.10.16.5 *Openreach Contribution to Light User Scheme (PGT11M)*

This PG includes costs for the BT Basic service. BT Basic is a service offered by BT for customers on low incomes and the costs for providing this service is borne by Openreach and Retail. BT attributes these costs to PGT11M directly from the GL. Costs from this PG are allocated to the Wholesale Residual Market.

5.10.16.6 *Liquid Funds and Interest (AG113)*

AG113 holds all liquid funds (e.g. Cash, Short Term Investments, Net Interest Payable and Short Term Borrowing). Costs from the GL are attributed to AG113 (using NCOLF) base methodology. From the AG, costs are then attributed to other activity groups and plant groups based on the proportion of operational costs and capitalised costs within the AGs and PGs. This attribution methodology drives the highest cost apportionment to D-side Copper Cable (PG118C, ✂% of total FAC) and Analogue Line Final Drop (PG149A, ✂% of total FAC) within the regulated markets.

5.10.16.7 *DSLAM – Equipment (PG153N)*

This plant group covers DSLAM equipment costs. The costs are allocated directly to network component CR189, which then attributes costs to WBA Market.

5.10.16.8 *Phonebooks (PG933A)*

Costs within this plant group relate to costs for paper, printing, binding, delivery and freight of phonebooks. Costs for Phonebooks is directly allocated to network component CKT12, which allocates its costs to WLR.

5.10.16.9 Broadband Boost (PG580B)

This plant group is used the recover Openreach engineering costs relating to improving speed, quality and reliability of customers' broadband service. The costs in this plant group are directly allocated to CO580 (Broadband Boost) network components. These costs are then fully allocated to the Wholesale Residual Market.

5.10.16.10 GEA Customer Site Installations (PG954C)

Costs within this plant group relate to the provisioning, installation and recovery of customer equipment relating to NGA. Costs from this plant group are directly allocated to the GEA customer site installation Network Component (CL954) and then fully allocated to the Wholesale Residual Market.

5.10.16.11 Routing and Records (PG140A)

Costs attributed to this PG relate to routing and records for provisioning analogue/ISDN lines, LLU and Fibre based circuits. Attribution of costs related to Routing and Records uses a base methodology (PDTRAR) which has two elements:

- First, the time for engineering activities booked to Routing and Records CoW (RAR) is fully allocated to PG140A.
- Second, any time spent on Capital Planning (which includes non-field units and maintenance of records) is attributed to this plant group using the PDTDUCT base.

This base methodology is discussed in more detail in Section 6 of this report.

Costs from this plant group are directly allocation to the Routing and Records network component (CL160), which then attributes costs to various products and services.

5.10.16.12 Private Circuits Megastream and IX Conns (PG413P)

Costs within this plant group includes connection costs for providing two classes of MegaStream circuits at 2Mbps or higher bandwidth. The costs are attributed to network components using a price-weighted volume of circuits provided during the year.

Due to time constraints, Cartesian was unable to discuss this methodology with BT.

5.10.16.13 Operator Services Inland (PG911A)

This PG contains pay and non-pay costs of operators working on Inland Operator Assistance (OA) and Emergency Services. Costs are attributed to this plant group by calculating the total labour costs associated with BT Retail's Customer Contact Centres and apportioning those related to operator services to PG911A; the remainder are then apportioned to other Retail Products.

Attribution of this PG to Network Components is based on call volumes for different services types (which are mapped to individual components) and average operator handling time. Weights are then determined from the total Operator handling time across OA and Emergency Services.

5.10.16.14 GEA FTTC Provision (PG958P)

Costs in this plant group relate to NGA FTTC plant including: provisioning head-end electronics; DSLAM equipment; and customer NGA equipment. Costs from this plant group are directly allocated

to the GEA FTTC Provision network component (CL958), which is then fully allocated to Wholesale Residual market.

5.10.16.15 MSH STM64 Equipment (PG385T)

This plant group relates to depreciation, maintenance and other overhead costs for Marconi SDH bearers. Attribution of costs within this plant group is done within the CTCS model which attributes costs on the basis of number of circuit 'hits' and factored volumes of circuit segments. This attribution methodology is explained in detail in Section 6 of this report.

5.10.16.16 TISBO Excess Construction Adjustment Credit (PG002Y) and AISBO Excess Construction Adjustment Credit (PG003Y)

These plant groups relate to the credit adjustment required for Fibre and Duct investment where the infrastructure is not available. Since BT charges its customers upfront for deploying new Duct and Fibre infrastructure and also passes the costs for this investment to the regulated market, it applies an annual credit using these plant groups to avoid double-counting the costs.

This credit is applied to products based on product volumes as BT is not always able to specify which product the duct and Fibre investment relates to.

5.10.16.17 Repayment Works (PG980R)

This PG relates to the costs of maintaining physical integrity of BT's network, including protection of the network from damage as a result of third party works. Costs are attributed to this PG from the GL using a core and capital pay methodology (FTQ) which is explained in more detail in Section 6 of this report.

Costs from this plant group are fully allocated to the Openreach Repayment Work Network Component (CK980), which is then allocated to the Wholesale Residual Market.

5.10.16.18 Openreach Other Activities (PG986R)

This PG holds cost and income from miscellaneous activities conducted by Openreach, for example Openreach recovering and selling scrap copper from its network. Income attributed to this plant group is based on actual cable recovery data provided by Openreach.

Approximately ✂ [£100 to £150m] FAC (revenue) is attributed to this large income-based plant group. Of this income, ✂ [£10 to £50m] is the cost of the team recovering the copper from its network.

Income within this plant group is directly allocated from the PG to the Openreach Other Activities Network Component (CK986), which is then fully allocated to Wholesale Residual Market.

5.10.16.19 Non-Core Suspense (AG114)

Non-Core suspense is an activity group that holds all the transfer-out charges where a balancing transfer-in charge is not available. This situation arises when costs from core BT units are being transferred to non-core units. Costs from AG114 are all attributed to Retail Residual market.

5.11 Network Component to Market and Service Attribution

5.11.1 Introduction

The final stage of BT's cost attribution system is the apportionment of costs from the Network Component level to Services and Markets. Within the cost attribution system, network components are the building blocks of products and services.

Table 266 provides a list of the 40 network components discussed in this section of the report. These network components have been selected based on their contributions to the four Market Reviews (e.g. top 10 network components for BCMR, FAMR, NMR and WBA.).

The table also shows that D-side Copper Capital is the largest network component. This receives approximately 88% of its costs from the Copper and Duct cost groups. The table also shows that all the network components listed in the table receive cost from the General Overheads, Property and Other cost groups.

Table 266. ***Share of total Network Component costs by Cost Group[13]***

Network Component	BT Ref.	Compn. FAC (£ m)	Cost Groups							Total (%)
			21CN	Copper	Duct	Fibre	G.O.	Other	Prop.	
D side copper capital	**CL173**	£1,310	-	45%	43%	-	9%	3%	1%	100%
Dropwire capital & PSTN NTE	**CL178**	£452	-	82%	-	-	12%	5%	1%	100%
D side copper current	**CL174**	£249	-	74%	-	-	16%	7%	2%	100%
E side copper capital	**CL171**	£226	-	49%	21%	-	8%	3%	18%	100%
MDF Hardware jumpering	**CL161**	£175	-	-	-	-	17%	80%	3%	100%
Ethernet electronics	**CO485**	£160	-	-	-	-	12%	85%	3%	100%
PSTN line cards	**CL183**	£138	-	-	-	-	5%	51%	44%	100%
Ethernet Access Direct Fibre	**CW609**	£127	-	-	19%	53%	17%	7%	4%	100%
Combi card broadband access	**CN854**	£116	38%	-	-	-	7%	32%	23%	100%
DSLAM overheads	**CR188**	£112	-	-	-	-	6%	43%	51%	100%
Analogue line drop maintenance	**CL180**	£112	-	72%	-	-	18%	8%	3%	100%
Ethernet main links	**CO484**	£90	-	-	80%	4%	10%	3%	2%	100%

13 The total FAC shown in the table is the total network component costs (including a share of both regulated and unregulated markets). The table has not been divided by Market Review as there are common network components that attribute costs to multiple markets. Also, 'G.O.' in the table above represents General Overheads and 'Prop.' represents Property.

Network Component	BT Ref.	Compn. FAC (£ m)	Cost Groups							Total (%)
			21CN	Copper	Duct	Fibre	G.O.	Other	Prop.	
E side copper current	CL172	£80	-	73%	-	-	17%	8%	2%	100%
SG&A Broadband	CO609	£78	-	-	-	-	90%	6%	4%	100%
Wholesale & LAN extension services fibre etc.	CO450	£74	-	-	20%	52%	17%	7%	5%	100%
Broadband MSAN access	CN890	£74	50%	-	-	-	8%	27%	15%	100%
Local exchanges general frames equipment	CL175	£71	-	-	-	-	2%	17%	81%	100%
Core/Metro (broadband)	CN860	£70	75%	-	-	-	7%	14%	5%	100%
Ethernet Switch BB	CN891	£69	66%	-	-	-	9%	19%	5%	100%
OR PC rentals 2Mbit/s distribution	CF371	£67	-	-	35%	2%	9%	18%	35%	100%
Local exchange processor set-up	CO212	£65	-	-	-	-	6%	46%	48%	100%
Local exchange concentrator set-up	CO214	£60	-	-	-	-	5%	49%	46%	100%
OR systems & development - Ethernet	CO772	£57	-	-	-	-	8%	91%	1%	100%
PC rentals 2Mbit/s local end fibre	CO439	£54	-	-	15%	40%	20%	13%	12%	100%
ISDN30 access	CL189	£48	-	-	17%	32%	18%	14%	19%	100%
Broadband backhaul circuits	CO681	£47	-	-	37%	2%	9%	27%	24%	100%
Inter ATM transmissions	CO316	£42	-	-	42%	8%	7%	28%	15%	100%
OR Service Centre - Provision AISBO	CL573	£39	-	-	-	-	9%	90%	1%	100%
Ethernet Switches	CN901	£33	54%	-	-	-	13%	24%	9%	100%
DSLAM capital / maintenance	CR189	£31	-	-	-	-	2%	97%	0%	100%
Remote - local transmission link	CO325	£29	-	-	-	-	7%	18%	75%	100%

Network Component	BT Ref.	Compn. FAC (£ m)	Cost Groups							Total (%)
			21CN	Copper	Duct	Fibre	G.O.	Other	Prop.	
Local exchange concentrator duration	**CO215**	£26	-	-	-	-	6%	34%	60%	100%
Remote - local transmission length	**CO326**	£23	-	-	80%	4%	10%	3%	2%	100%
PC rentals 64kbit/s local end	**CO432**	£18	-	-	-	-	14%	41%	45%	100%
Local exchange processor duration	**CO210**	£18	-	-	-	-	6%	35%	59%	100%
iNode voice call set-up	**CN868**	£16	69%	-	-	-	8%	21%	2%	100%
Emergency OA (999) non chargeable	**CO942**	£14	-	-	-	-	12%	81%	7%	100%
OR Interconnect 2Mbit/s connection	**CF453**	£9	-	-	-	-	17%	80%	2%	100%
Product management policy & planning	**CO512**	£6	-	-	-	-	72%	13%	15%	100%
Total *(Percentages demonstrate a share of the total network component cost shown in this table)*		**£4,482**	**5%**	**31%**	**18%**	**3%**	**12%**	**20%**	**11%**	**100%**

Source: BT ASPIRE, Cartesian

The cost of each network component can either be directly allocated to an individual product/service or an attribution methodology can be used to apportion the cost to multiple products/services. These attribution methodologies are often directly linked to service volumes and hence drive the attribution of costs. For example, if Component A is used by two services, each with equal volume usage, then the attribution of costs of Component A to the two services will reflect an equal split.

A more complex scenario exists where BT needs to determine 'factored' volumes to be able to calculate the weights of cost attribution to different products and services. These factored volumes are calculated using Usage factors and Route factors.

5.11.2 Overview of Component to Service Cost Attribution Methodology

In cases where Components are used by multiple Services there is a need to factorise the component volume per Service to then determine the cost attribution. In this section, Cartesian describes the general methodology used by BT to attribute costs from Components to Services in this scenario.

Note: The BT definition of services is different from the way Cartesian has used the term within this report. Cartesian uses the term 'market service' to refer to a market such as AISBO or WLR. BT refers

to services as network services, i.e., a "Cartesian market service" is a set of "BT network services". The usage factors are defined on BT network services basis.

Usage Factor Calculation

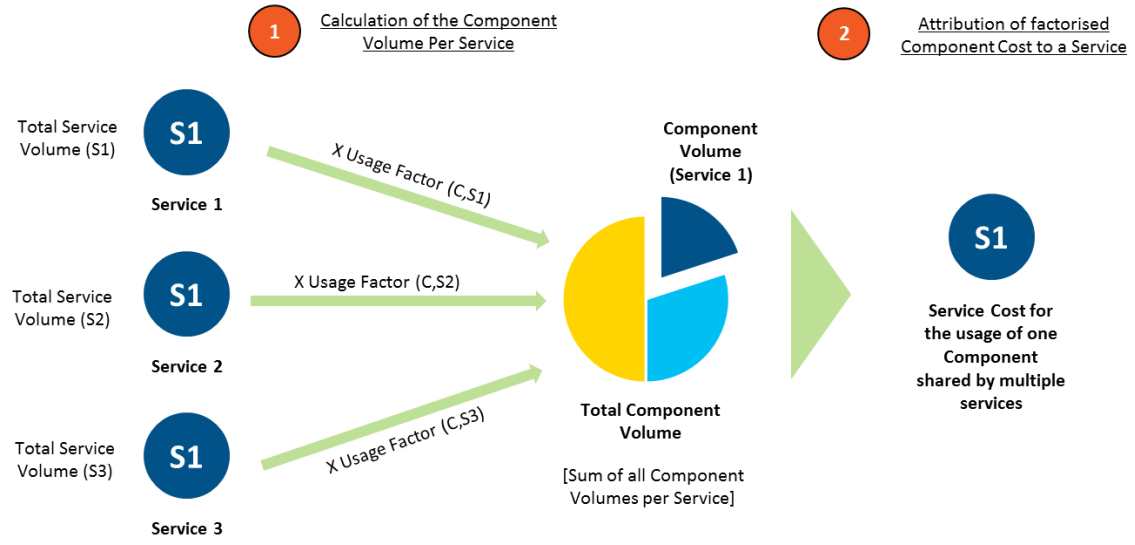
According to BT, the Component FAC is apportioned to Services in proportion to service volumes weighted by a Usage Factor (UF). The UF is determined by the aforementioned sharing of the component by multiple services. It reflects the usage of the component by a service compared to the other services, making it specific to each Component-Service combination. The methodologies used by BT to calculate the usage factors vary and are dependent on the type of service.

For instance, in the case of call related services (in Narrowband Market), BT uses a concept of call routes and routing sampling to determine the components' usage factors. In cases such as ISDN2 and ISDN30 (in Fixed Access Market), BT uses the number of channels. And for AISBO and TISBO (in Business Connectivity Market), BT applies the usage factors based on the WECLA and Non-WECLA split, among others. The exact methodologies are described in the sections for each regulated market.

Factorised Component Volumes and Component Unit Cost Calculation

The usage volume of a component by a service is determined by the usage factor which weights the measured service volumes to reflect the way it uses the component as shown in Figure 15.

Figure 15. ***Component Volumes per Service and Component Cost attribution to a Service***



Source: Cartesian

According to BT, service volumes are reported in the units that the services are sold, e.g., WLR rentals are reported as the number of copper lines, and 2 Mbit/s local ends are shown as the number of local ends (circuit ends).

The relationship between components and services can be expressed mathematically. The usage volume of a component "C" used by a service "S" is expressed as follows:

$$Component\ Volume\ (S) = Service\ Volume * Usage\ Factor(S, C)\ \forall\ Service(S)$$

The sum of the Component Volumes for all the Services using this component results in the total factored component volume:

$$Total\ Component\ Volume = \sum_{1}^{All\ Services} Service\ Volume * Usage\ Factor(S, C)$$

The factored Total Component Volume is used to determine the unit cost of the Component as reported in the RFS (Network Statement of Costs Section):

$$Component\ Unit\ Cost = \frac{Component\ FAC}{Total\ Component\ Volume}$$

The 'Component FAC' is the cost attributed to the component from the plant groups.

Attribution from Component to Wholesale Service

Each Wholesale Service uses a fixed, pre-determined set of network components. Therefore, the total FAC attributed to a Service is given by the sum of the factored costs of all the components used by such Service:

$$Service\ (S)\ FAC = \sum_{1}^{All\ Components} Component\ FAC\ (S)$$

Each factored Component FAC associated with a Service is given by weighting the Component FAC by the Component Volume for the Service over the Total Component Volume. Both variables are defined above. The component FAC is the cost attributed to the Component from the Plant Groups.

$$Component\ FAC\ (S) = \frac{Component\ Volume\ (S)}{Total\ Component\ Volume} * Component\ FAC$$

5.11.3 Business Connectivity Market

5.11.3.1 Overview

The Business Connectivity (BC) Market comprises of eight different market services which includes variants of TISBO and AISBO. These services use a total of 103 network components which total to approximately £952m FAC.

Table 267 shows the top 10 network components that attribute the largest costs (FAC) to the services in the Business Connectivity Market. The top four network components make up approximately half (47%, £444m FAC) of the total BC market costs. The table below also shows that five network components (CW609, CO439, CO450, CF371 and CO432), are exclusively used by the BC market.

Table 267. ***Costs apportioned to Business Connectivity Market from Network Components (Top 10)***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	% of the total comp value	Measurement Unit
Ethernet electronics	CO485	£134	£211	£156	16%	97%	Local Ends
Ethernet Access Direct Fibre	CW609	£76	£504	£126	13%	100%	Local Ends
Ethernet main links	CO484	£34	£548	£89	9%	99%	Fibre km
PC rentals 2Mbit/s local end fibre	CO439	£55	£188	£74	8%	100%	Local Ends
Wholesale & LAN extension services fibre etc	CO450	£43	£284	£71	7%	100%	Local Ends
OR PC rentals 2Mbit/s distribution	CF371	£47	£215	£69	7%	100%	km
OR systems & development - Ethernet	CO772	£37	£82	£46	5%	96%	Local Ends
Ethernet Switches	CN901	£34	£52	£40	4%	95%	Rentals
OR Service Centre - Provision AISBO	CL573	£30	-£4	£30	3%	96%	Miscellaneous
PC rentals 64kbit/s local end	CO432	£23	£30	£26	3%	100%	Local Ends
Others (x93)	-	£181	£457	£227	24%		
Total		**£695**	**£2,568**	**£952**	**100%**		

Source: BT ASPIRE, Cartesian

Network components within the BC market use four main types of measurement unit (Local Ends; Fibre km; km; and Rentals) plus a 'Miscellaneous' category.

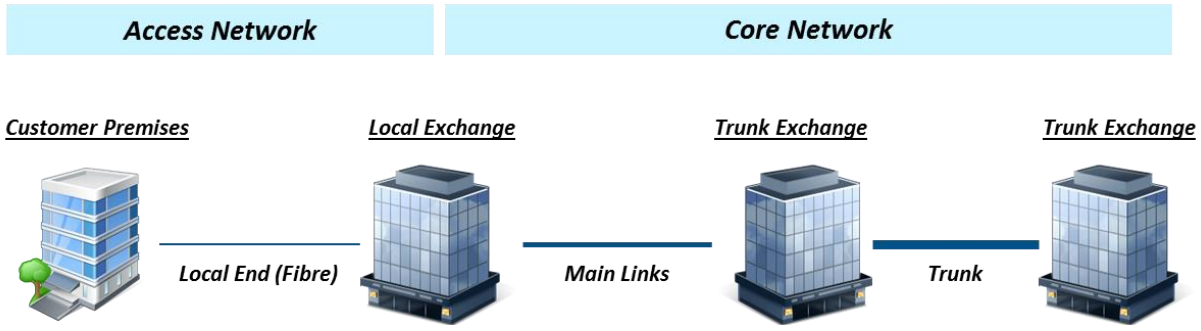
Usage factors for services in this market are geography-dependent. Following an explanation of the geographic usage factors used in the BC market, each of the top 10 components is analysed in more detail. The components are covered in alpha-numerical order (whereas in the table above they are ordered by FAC).

The analysis includes the description of each usage factor defined per Service-Component combination and the underlying calculation principles as per BT's explanation. For example, although Ethernet Electronics (CO485) is measured in terms of Local Ends, it uses 53 different usage factors for BCMR services alone.

5.11.3.2 *Explanation of Geographic Usage Factors*

Usage factors for services in this market depend on geography. AISBO and TISBO services are divided into WECLA (West, East and Central London Area) and non-WECLA variants. In ASPIRE BT has configured different components for WECLA/non-WECLA for the different segments in the network delivering AISBO and TISBO services. These segments include Local Ends, Main Links, Distribution and Trunks (Regional and National). The figure below shows an illustration of different network segments:

Figure 16. ***High Level Network Diagram***



Source: Cartesian

WECLA vs. Non-WECLA

WECLA is a sub-national geographic market defined by Ofcom in the BCMR. BT is subject to different regulation for business connectivity services in the WECLA region vs. the non-WECLA region. The costs of services in these two markets must therefore by calculated separately.

Identification of WECLA/non-WECLA split for the network segments is determined within BT's Core Transmission Circuit costing System (CTCS). CTCS is able to identify the geographical location of different network segments and hence is able to split plant groups and network components into WECLA and non-WECLA regions. Costs vary between the WECLA and non-WECLA regions for the following reasons:

- In the WECLA region there is a higher fibre coverage;
- In the WECLA region, BT is able to achieve economies of scale in the access network due to the density of population.

At a high level, the separation of WECLA/non-WECLA takes place in the Core Network for TISBO markets and within the Access Network for the AISBO market. Table 268 below summarises the factors considered when determining a WECLA/non-WECLA split for these two markets. These factors are then described in detail later in this section.

Table 268. ***BCMR Usage Factor Summary***

Markets	Local Ends	Main Links	EBD	Trunk *(does not split into WECLA / non-WECLA)*
AISBO	• Usage Factor for Fibre are based on data from INS • Usage factor for Duct is based on data from PIPER	• WECLA and non-WECLA usage factors are based on Fibre routes • The data is provided by BT's Chief Architect	• Costs are attributed only based on Fibre (electronics are not included)	• Not Applicable
TISBO *(uses CTCS)*	• There is no geographic split applied to services	• Different components are used for WECLA and non-WECLA markets • Costs are attributed from PGs based on actual route information from CTCS	• Same as Main Links	• Components are defined by regional/national TAMs • TAM adjacency is determined by CTCS using Ofcom data

Source: BT, Cartesian

AISBO Market

Since the WECLA/non-WECLA split of costs for AISBO and MISBO services is determined in the Access Network, this split is determined on the type of cost involved. Factors considered are different for different segments within the Access Network (i.e. Access Fibre and Duct, Backhaul and Ethernet Backhaul Direct).

In the Access network, spine and distribution fibre segments are combined into a single network component. BT separates the spine into WECLA and non-WECLA but does not separate the distribution segment. It is not entirely clear why there is a different treatment.

Access Fibre and Duct

When determining the WECLA and non-WECLA split for Access Fibre and Duct, BT considers factors including the higher number of fibre in the WECLA region, hence the cost to deliver services per fibre is low. Additionally, since there is high concentration of population, the length of cables used within the network are relatively short as compared to the non-WECLA region.

In the WECLA region, the ducts are larger and hence BT is able to install more cables per duct in this region when compared to the non-WECLA region. Consequently, the costs for duct are shared across more services and hence per unit cost is lower. In contrast, non-WECLA spine is longer and less utilised.

Backhaul

Backhaul includes both the fibre cable and the duct (i.e. there are no separate factors for fibre and duct). Cost efficiencies are derived in the backhaul due to high utilisation rates. Openreach conducted a survey to determine a fibre unit cost (per km) for backhaul in the WECLA and non-WECLA region. This study suggested that the average cost of fibre in the WECLA region is 37% of the average cost across the rest of UK.

Ethernet Backhaul Direct (EBD)

Since Ethernet Backhaul Direct includes both Backhaul (fibre and duct), as well as electronics, the factors of backhaul are combined with the factors for electronics to derive usage factors for WECLA/non-WECLA. BT uses a factor of 1 for both WECLA and non-WECLA region as the cost of electronics is the same (even though the usage may be different). Factors for EBD then use the depreciation and volume factors to determine the final usage factor at a network component level.

TISBO Market

TISBO separates the core network into WECLA and non-WECLA region using postcode information and data held in CTCS. By combining this information, BT determines the origination and end destinations of each circuit. If either end of the circuit has a non-WECLA postcode, BT considers that circuit to be in the non-WECLA region. BT then factorises the circuit based on the bandwidth these circuits are delivering.

Using information agreed with Ofcom as part of the BCMR published on 28 March 2013, BT divides the trunk market into regional and national trunks. Identification of a trunk as regional or national happens within CTCS. To determine whether or not a trunk is regional or national depends on the location of the Trunk Access Nodes. The principles used by BT to separate regional trunk to national trunk are as follows:

- If the start and end points of a circuit are in the same TAN then the trunk is considered regional
- If the start and end points of a circuits are in adjacent TANs then the trunk is considered regional
- If the start and end points of a circuit are in non-adjacent TANs, then the trunk is considered national

The following sections assess the usage factors relating to the top-10 components in the Business Connectivity market.

5.11.3.3 OR PC rentals 2Mbit/s distribution (CF371)

This network component receives costs from numerous plant groups, which attribute costs relating to backhaul fibre transmission equipment (e.g. PDH, SDH and MSH). Cartesian believes that that methodology to attribute costs for this network component follow the same principles as those used for CO450, below.

5.11.3.4 OR Service Centre - Provision AISBO (CL573)

This network component includes costs and balance sheet items for the provision of Wholesale Line Rental Ethernet. It receives all its costs from PG573B (Openreach Service Centre Provision Ethernet).

This component uses three main usage factors 0.17, 0.5 and 1. The EAD services (WECLA and non-WECLA) have a usage factor of 1. This usage factor is calculated on the basis of number of circuits ordered during the year.

Table 269. ***BCMR Usage Factor Summary***

Usage Factor	Description	Services
0.17	• This usage factor only accounts for the number of connections for the service • This service includes both volumes for rentals and connections	21C MSAN-BRAS Backhaul Broadband
0.5	• The usage factor of 0.5 is used as there are two local ends per circuit in the BES Service	BES Connections

Source: BT

Due to time limitation on the project and the response date of these usage factors, Cartesian was unable to discuss the methodology used to attribute these costs to services with BT.

5.11.3.5 Ethernet Switches (CN901)

The Ethernet Switches component receives its costs from PG901A (Ethernet Switches) and PG867A (Ethernet NTE) and attributes costs on the basis of number of customer lines in use for each service.

The data provided by BT shows 48 different variants of these usage factors, however rounding these to two decimal places reduces this number to 13 different usage factors.

Due to time limitation on the project, Cartesian was unable to discuss the methodology used to attribute these costs to services with BT.

5.11.3.6 PC rentals 64kbit/s local end (CO432)

This network components receives costs from numerous plant groups and includes cost of Local End Equipment, Access Radio Equipment and Signalling Equipment. The measurement basis of the usage factor for this component is local ends. This network component has two different usage factors 0.17 and 1. The usage factor of 0.17 for external 3rd party POH rental services, whereas a factor of 1 is used for PPC and RBS Rental.

In a response to Cartesian, BT explained that: "*The usage factor is used to transfer the costs associated with PoH, which is captured within the local end components, into third party PoH services. This usage factor was originally set at 0.23 when the new PoH services were created, which was calculated based on the local end adjustment factor (derived as 0.3 / 1.3 = 0.23). This factor was revised to 0.17 following Ofcom's review of PoH pricing in 2011.*"

The usage factor of '1' is used for the main local end services. This is because each service uses one component.

5.11.3.7 PC rentals 2Mbit/s local end fibre (CO439)

This network component receives its costs from numerous plant groups and has two different usage factors, 0.17 and 1. For more details see the previous network component, PC rentals 64kbit/s local end (CO432).

5.11.3.8 *Wholesale & LAN extension services fibre (CO450)*

This network component receives its costs from Access Fibre plant groups and has six different variants of usage factors. There are two elements to determining the usage factor of this component, for each service:

1. Relative costs to serve the end user in WECLA vs. NON-WECLA region, where usage factors are 0.46 vs. 1.00, respectively
2. Resilience offered by the service, where higher bandwidth services offer higher resilience (and require more fibres). In a response to a question, BT provided an example where it was explained that 1000Mbps non-WECLA has a usage factor of 1.03 compared to 10Mbps non-WECLA with a usage factor of 1.00.

5.11.3.9 *Ethernet Main Links (CO484)*

The usage factor of this component is the Main Links WECLA/non-WECLA costing factor, i.e. if service is in WECLA the usage factor is 0.37, and if service is non-WECLA the usage factor is 1.00. These costing factors were based on a study of fibre links between BT exchanges.

5.11.3.10 *Ethernet Electronics (CO485)*

Ethernet Electronics receives all its costs directly from PG447A (Ethernet Electronics). It includes costs the Short Haul Data Services (SHDS), which enables customers to extend their LAN to multiple sites. There are approximately 60 different values for the usage factors across all markets (including Wholesale Residual) for the services that use this component. Within the BC market, 53 different values are used (although some differences are small).

The usage factors are determined on the basis of the relative price of electronics that are used to deliver these individual services, rather than the actual usage of the electronics. For example, according to a response from BT, *the electronics used for an EAD 1000mbit/s circuit (usage factor 1.70) is approximately 12% more expensive than the electronics for an EAD 100 Mbit/s circuit (usage factor 1.52).*

Due to time constraints, Cartesian was unable to test the accuracy of how these electronics are mapped to each service and whether or not there are any mathematical errors when calculating the different usage factor variants.

5.11.3.11 *OR systems & development – Ethernet (CO772)*

This network component receives all its costs from PG772A (Openreach Systems and Development) and includes product specific R&D costs incurred by TSO for Openreach. The cost attribution from this component is based on the number of circuits ordered or rented during the year, which are represented by the service volumes.

For most services, BT uses a usage factor of 1. The exceptions to this rule are:

- WES and BES services. This is because the volumes are measured as local ends and hence a usage factor of 0.5 is used to convert the volume of local ends into circuits.
- Main Link services. This is because the volumes are measured in kilometres and hence the usage a factor is based on the average circuit length which is 7.1km. In this case the usage factor used is $\frac{1}{7.1}$ = 0.14.

5.11.3.12 Ethernet Direct Access Fibre (CW609)

This network component receives its costs from Access fibre plant groups and uses 29 different usage factors for the BCMR market. There is an outstanding question with BT to respond to Cartesian on what these usage factors represent.

5.11.4 Wholesale Broadband Access

Wholesale Broadband Access (WBA) comprises of two market services: WBA Market 1 and WBA Market 2. These services use a total of 19 network components which total to approximately £490m FAC.

Table 270 below shows the top 10 network components that attribute the largest costs (FAC) to the services in the WBA Market. The top five network components make up approximately half (48%, £237m FAC) of the total WBA costs. The table below also shows that most of the network components are shared with other markets (e.g. Combi-card broadband access component, CN845, only attributes 44% of its costs to the WBA markets).

Table 270. ***Costs apportioned to Wholesale Broadband Access Market from Network Components (Top 10)***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	% of the total comp value	Measurement Unit
DSLAM overheads	CR188	£73	£112	£84	17%	75%	Lines
Combi card broadband access	CN854	£43	£85	£51	10%	44%	Lines
Broadband backhaul circuits	CO681	£25	£133	£39	8%	80%	Circuits
SG&A Broadband	CO609	£30	£11	£31	6%	40%	Miscellaneous
Broadband MSAN access	CN890	£26	£53	£31	6%	44%	Rentals
DSLAM capital / maintenance	CR189	£24	£36	£28	6%	96%	Lines
Inter ATM transmissions	CO316	£14	£104	£25	5%	64%	Usage
Core/Metro (broadband)	CN860	£14	£17	£16	3%	20%	Circuits
Ethernet Switch BB	CN891	£11	£18	£13	3%	20%	Circuits
ATM network switching	CO314	£5	£5	£6	1%	56%	Usage
Others (x9) (including EOI & Revenue Debtors)	-	£165	£26	£166	35%		
Total		**£430**	**£600**	**£490**	**100%**		

Source: BT ASPIRE, Cartesian

Network components within the WBA use four main types of usage measurement (Lines, Circuits, Rentals and Usage) plus a 'Miscellaneous' category.

In the following text, each of the top 10 components is analysed in more detail. The components are covered in alpha-numerical order (whereas in the table above they are ordered by FAC).

The analysis includes the description of each usage factor defined per Service-Component combination and the underlying calculation principles as per BT's explanation.

Different usage factors may be applied to the same component because, as explained in Section 5.11.2 above, the usage factor is specific to a Service-Component combination. For example, although DSALM overheads (CR188) is measured in terms of Lines, it uses 12 different usage factors for WBA services alone.

5.11.4.1 *Combi-Card Broadband Access (CN854)*

The Combi-Card Broadband Access component receives 100% of the costs from PG857A (Copper MSAN Combi Cards Broadband element). This component includes costs for the broadband element of Combi-cards, housed within the MSANs.

Costs in this network component are apportioned based on end-user rental volumes within the 21C Wholesale Broadband Connect Service and the 20C IPStream and DataStream services.

5.11.4.2 *Core/Metro (broadband) (CN860)*

The Core/Metro (broadband) component receives costs from 21C-related plant groups. This component includes costs of equipment and maintenance for broadband products with the Metro Node (including a share of P-Routers).

The usage factor used by BT for this component is 1. The attribution of costs within this component is determined on the basis of volume of users on the 21C WBC service and the 20C IPStream and DataStream service. This user volume is factored by the bandwidth delivered by each of these services.

5.11.4.3 *Broadband MSAN Access (CN890)*

The Broadband MSAN Access component costs include the maintenance of the electronics in the backhaul transmission between the MSAN and the access port on the Ethernet Switch. Although this backhaul is shared, the separation of voice and data costs takes place at the plant group level. Consequently, the costs in this component are for the broadband element only.

The usage factor for this component is 1 and the costs are apportioned to the 21C WBC and 20C IPStream and DataStream based on end-user volumes.

5.11.4.4 *Ethernet Switch BB (CN891)*

The Ethernet Switch Broadband component includes the cost of maintenance of the electronics in the backhaul transmission. This is a shared element within the network. The attribution methodology used is bandwidth-factored end user volume for the 21C WBC services and the 20C IPStream and DataStream services. The usage factor for this component is 1.

When calculating factored volume of end users, BT takes into account the bandwidth of each service, e.g. The bandwidth of SM124 external IPStream Connect (0.8505Mbps) is multiplied by number of end users, for example 20,000 to calculate bandwidth factored volume of 17,010.

5.11.4.5 *ATM Network Switching (CO314)*

The ATM Network Switching component receives all its costs from the ATM Network Switching plant group and applies a usage factor of 1. It includes the costs of network switching ports deployed in the ATM network.

The methodology to calculate the apportionments is based on volume of 'Switched Bandwidth' required by the ATM network to support the services. Switched bandwidth is calculated for each product by first identifying all the relevant ports on the network and their type, e.g. E1 (2Mbps), E3 (34Mbps), Ethernet, etc. Using internal systems, BT is then able to determine the 'booked bandwidth' of each product by port type. This booked bandwidth of each product is then used to determine an apportionment of bandwidth for all the ports (used by that product).

This bandwidth (by product, by port), is then multiplied by actual port bandwidth to determine 'switched bandwidth' for each port. To account for two ends of the circuit, this bandwidth is then doubled. All the switched bandwidths for ports by product are then added to determine total switched bandwidth by product.

The 'switched bandwidth' at a product level is then used to determine apportionment weights. The apportionment weights for IPStream Mix is attributed over three markets in IPStream and Broadband test circuit attribution is shared across IPStream and DataStream.

Finally, using the end user volume, BT determines the split between internal and external services and attributes costs accordingly.

5.11.4.6 Inter ATM Transmissions (CO316)

This network component includes the costs of transmission between ATM nodes. The usage factor applied by BT is 1. BT apportions the costs to various services on the basis of (virtual) bandwidth required to support the services. To calculate this apportionment BT uses the link length data, cost per unit length and bandwidth used by the product.

In this methodology, BT first determines a proxy cost by using the Link information from the TISBO market (PPCs 140/155 Mbps FAC link cost) and the cost per unit length from Wholesale Trunk segments (PPC segment on a FAC-per-km basis). These data points are used in combination with the radial distance of each transmission circuit (between A-end and B-end) to derive a cost-per-unit-length of an STM1 circuit. This value is then multiplied by 4 and 16 to determine costs for STM4 and STM16 circuits respectively.

In the next step, BT determines the 'booked bandwidth' per product (using its internal systems) and calculates an apportionment basis for each product. These products include BTnet, CellStream, Enterprise Ethernet, IPClear, Megasteam, IPStream and DataStream products. This apportionment base is then multiplied by the proxy cost, determined in the previous step, to derive a cost by product. The total cost of all the products is then used to derive a new percentage apportionment for each product.

Finally, using the end-user data, BT splits the apportionment of IPStream and DataStream services into internal and external services. The external apportionments then attribute costs within Inter ATM Transmission component, CO316, to regulated markets and the internal apportionments are directed to the Wholesale Residual Market.

5.11.4.7 SG&A Broadband (CO609)

SG&A Broadband receives 100% of the attribution from PG609N (SG&A Broadband) and includes costs current and balance sheet costs for supporting the WBA market.

This component has 45 different usage factors ranging from 0 to 4,735,104. The usage factors are determined on the basis of the price of the service. To determine the apportionment BT uses the Network Charge Control (NCC) revenue for each WBA service. Each service is mapped backed to a SG&A component and the 'Price' factor is determined.

5.11.4.8 Broadband Backhaul Circuits (CO681)

This component includes depreciation and overhead costs (e.g. accommodation, maintenance and software) for broadband backhaul circuits which provide connectivity between DSLAMs and the ATM conveyance network.

The usage factor for this component is 1. The costs are attributed to the IPStream and DataStream Backhaul services. The attribution methodology used follows the principles defined below for DSLAM Overheads (CR188), whereby BT uses end user volumes to determine the attribution split. For this component BT equates one user to a single circuit.

5.11.4.9 DSLAM Overheads (CR188)

The DSLAM Overheads component includes costs for supporting the DSL product (e.g. equipment that supports DSL products, maintenance and overhead costs such as accommodation to house the equipment). This component does not however contain the cost of DSLAM equipment itself. It takes 100% of costs from PG152N (DSLAM Overheads).

Attribution of cost for this network component is done on the basis of 'No. of Customer Lines in use'. The methodology used to determine cost attribution can be broken down into six steps, as described below:

Step 1 – Prepare a list of all the DSLAMs

BT generates a list of all the DSLAMs which are individually identifiable and marks any DSLAMs that are not attributable to the regulated markets (e.g. those used for trials) as Market 0.

Step 2 – Divide costs into fixed and variable elements

All the overhead costs are then divided into fixed and variable costs baskets. These fixed costs are evenly distributed to each DSLAM and the variable cost is apportioned to each DSLAM based on the number of end users served by the DSLAM.

Step 3 – Attribute fixed costs to products

BT uses the network data to determine the number of users on each DSLAM and the product that they are consuming, e.g. of a DSLAM is supporting 90% users on IPStream and the remaining 10% on DataStream, then the 90/10 split is used to attributed the fixed costs to these products.

Step 4 – Determine split between end-user capacity vs. backhaul capacity

An analysis is conducted to determine how much capacity is being used for end-user vs. backhaul for each of the products supported by the DSLAM. For backhaul services, fixed costs are identified and attributed to bandwidth services within the relevant market.

The above four steps allow BT to come up with a cost distribution across different markets. This is illustrated in Table 271 below.

Table 271. ***Costs apportioned to Wholesale Broadband Access Market from Network Components (Top 10)***

Market	IPStream		DataStream		Total
	End User	Backhaul	End User	Backhaul	
Market 0	£ xx.xx	£ xx.xx	£ xx.xx	£ xx.xx	**£ xx.xx**
Market 1	£ xx.xx	£ xx.xx	£ xx.xx	£ xx.xx	**£ xx.xx**
Market 2	£ xx.xx	£ xx.xx	£ xx.xx	£ xx.xx	**£ xx.xx**
Market 3	£ xx.xx	£ xx.xx	£ xx.xx	£ xx.xx	**£ xx.xx**
Total	**£ xx.xx**	**£ xx.xx**	**£ xx.xx**	**£ xx.xx**	**£ xx.xx**

The cost breakdown in the table above allows BT to determine an attribution base by IPStream and DataStream products for each market. Apportionment for Market 0 is then attributed over the other markets.

Step 5 – Split costs between internal and external products

IPStream and DataStream apportionments calculated in Step 4 above are then split between internal and external variants of these products (by market) using the end-user volume data held by BT Wholesale.

5.11.4.10 DSLAM Capital / Maintenance (CR189)

The DSLAM Capital / Maintenance network component includes the capital and equipment costs of DSLAMs. Due to the way apportionment bases are set-up in ASPIRE, this network component also includes some capitalised pay.

This network component has 11 different usage factors and follows an attribution methodology which is identical to the once described earlier for DSLAM Overheads network component (CR188). Since most of the costs in this network component are asset related (i.e. depreciation), BT excludes any fully depreciated DLSAMS from the analysis at Step 1. The rest of the attribution process is the same.

5.11.5 Fixed Access Market

5.11.5.1 Overview

The Fixed Access Market comprises four different market services: WLR, LLU, ISDN30 and ISDN2. These services use a total of 40 network components (including Revenue debtors as component). A total of £3,231m FAC is attributed to these services.

Table 272 below shows the top 10 network components that attribute the largest costs (FAC) to these services in the Fixed Access market. The table shows how much cost is attributed from each network component and what share of the component's total value that sum represents. For example, 'D-side copper capital' component is used almost exclusively (c.99%) by these services, corresponding to c.40% of the market total cost.

Two components are used exclusively by the services in this market (PSTN line cards and ISDN30 access). The remaining components are shared with services in the other markets, such as Business Connectivity and Wholesale Residual.

Most of the service volumes are reported by number of lines, except those services using the 'ISDN30 Access' component which is reported by number of ISDN channels.

Table 272. ***Costs apportioned to Market from Network Components (Top 10)***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	% of the Total Comp Value	Service Volume Unit
D side copper capital	CL173	£683	£6,124	£1,295	40%	99%	Lines
Dropwire capital & PSTN NTE	CL178	£344	£1,032	£448	14%	99%	Lines
D side copper current	CL174	£228	-£12	£227	7%	91%	Lines
E side copper capital	CL171	£138	£847	£223	7%	99%	Lines
PSTN line cards	CL183	£120	£174	£138	4%	100%	Lines
MDF Hardware jumpering	CL161	£119	-£5	£119	4%	68%	Lines
Analogue line drop maintenance	CL180	£111	-£7	£111	3%	99%	Lines
E side copper current	CL172	£68	-£3	£68	2%	91%	Lines
ISDN30 access	CL189	£45	£150	£60	2%	100%	Channels
Local exchanges general frames equipment	CL175	£53	£22	£55	2%	82%	Lines
Others (30x)	-	£426	£622	£488	15%		Lines/ Channels
Total		**£2,336**	**£8,947**	**£3,231**	**100%**		

Source: BT ASPIRE, Cartesian

In the following text, each of the top 10 components is analysed in more detail. The analysis includes the description of each usage factor defined per Service-Component combination and the underlying calculation principles as per BT's explanation. The components are covered in alpha-numerical order (whereas in the table above they are ordered by FAC).

Different usage factors may be applied to the same component because, as explained above, the usage factor is specific to a Service-Component combination.

5.11.5.2 MDF Hardware Jumpering Component (CL161)

This component captures BT engineer's costs of jumpering activities on MDF equipment located at the exchanges. It is used by three services in Fixed Access market: WLR, LLU and ISDN2. This component is also used by services in Business Connectivity and Wholesale Residual markets.

The usage factors of this component is calculated based on a survey of the amount of time required to provide services for this activity relative to the time taken in the provision of WLR. For example, if a service takes 150% of time taken for WLR, the usage factor is 1.5.

BT defines seven different usage factors for this component as shown in Table 273.

Table 273. ***Usage factors used in MDF Hardware Jumpering Component***

Services	Activities	Usage Factor
WLR	WLR	1.0
ISDN2	ISDN2	0.5
LLU Service	MPF new provides	1.43
	MPF single migrations	1.44
	MPF bulk migrations	0.93
	MPF ceases	1.0
	SMPF new provides	1.19
	SMPF single migrations	1.42
	SMPF bulk migrations	0.93
	SMPF ceases	1.0

Source: BT

5.11.5.3 E side Copper Capital Component (CL171)

This component captures costs related to copper cables deployed in E-side access network and is used by all the services in this market. Some services in Business Connectivity market and Wholesale Residual also use this component, however less than 1% of its FAC is attributed to them.

The usage factors defined for this component are based on the number of copper lines (i.e. copper pairs) that are used by each service. BT defines three different usage factors for this component:

- 1.0 for WLR and LLU (MPF rentals) since each service provided uses 100% of one copper line
- 0.5 for ISDN2 services to take into account the fact that in ISDN2 access there are two data channels per physical line. Thus, the usage factor is calculated as 1/2 = 0.5
- 0.06 for ISDN30 because this service has an average of 17 data channels per physical line (out of a maximum of 30 channels). Thus the usage factor is calculated as 1/17 = 0.06

The same usage factors are also used for D-side copper capital (CL173).

5.11.5.4 E side Copper Current Component (CL172)

This component captures cost of maintenance of E-side copper lines and is used by all the services in this market. It is also used by Business Connectivity market and Wholesale Residual with c.8% FAC attributed between them.

BT defines six different usage factors for this component:

- 1.66 for LLU (MPF rentals)
- 1.2 for WLR premium
- 1.0 for WLR
- 0.85 for ISDN2
- 0.35 for LLU (SMPF rentals)
- 0.02 for ISDN30

BT calculates these usage factors as the product of three variables:

- Number of channels per line (e.g. ISDN2 has 2 channels per line);
- Care (service) level (e.g. BT estimates Care Level 2 for WLR premium services is 20% greater than Care Level 1 for basic WLR services); and
- Relative fault rate (e.g. LLU MPF has higher fault rates than SMPF).

The same usage factors are also used for D-side copper current costs (CL174).

5.11.5.5 D-side Copper Capital Component (CL173)

This component captures costs related to copper cables deployed in D-side access network and is used by all the services in this market. Some services in Business Connectivity market and Wholesale Residual also use this component, however less than 1% of its FAC is attributed to them.

This component is the largest contributor to the Fixed Access Market by FAC. The usage factors are the same as those for E-side copper capital (CL171), above.

5.11.5.6 D-side Copper Current Component (CL174)

This component captures cost of maintenance of D-side copper lines and is used by all the services in this market. It is also used by Business Connectivity market and Wholesale Residual with c.8% FAC attributed between them.

The usage factors are the same as those for E-side copper current costs (CL172), above.

5.11.5.7 Local Exchanges General Frames Equipment Component (CL175)

This component captures costs related to general frames equipment located at the local exchanges and is used by all the services in this market. It is also used by services in Business Connectivity market and Wholesale Residual, although less than 8% FAC attributed to those services.

According to BT, the usage factors of this component represent the number of jumpers per copper line. BT defines four different usage factors for this component:

- 1.0 for WLR and LLU (SMPF rental) since only one jumper per copper line is required

- 0.5 for ISDN2. Only one jumper per copper line is required but since there are two data channels in the line the factor is divided by the 2 channels (1/2)
- 0.06 for ISDN30 Only one jumper per copper line is required but since there are 17 data channels on average in the line the factor is divided by those 17 channels (1/17)
- 2.0 for LLU MPF rentals since two jumpers per copper line are required

5.11.5.8 Dropwire Capital & PSTN NTE Component (CL178)

This component captures costs related to the dropwires deployed in the access network between the distribution points (DPs) and the customer premises. It is used by three services in Fixed Access market: WLR, LLU and ISDN2. This component is also used by TISBO service in Business Connectivity market and Wholesale Residual.

BT defines two different usage factors for this component:

- 1.0 for WLR and LLU since each service provided uses 100% of one copper line
- 0.5 for ISDN2 services to take into account the fact that in ISDN2 access there are two data channels per physical line. Thus, the usage factor is calculated as 1/2 = 0.5

5.11.5.9 Analogue Line Drop Maintenance Component (CL180)

This component captures costs related to the maintenance of dropwires (also called analogue line drop). Cartesian has requested more information to BT on the calculation of the usage factors for this component. At the time of writing BT had not yet responded.

5.11.5.10 PSTN Line Cards Components (CL183)

This component captures costs related to the line cards installed at the local exchanges for the PSTN service and is used exclusively by a single service in the Fixed Access market: WLR. No other service in other markets use this component. The usage factor is 1.0 as there is no sharing.

5.11.5.11 ISDN30 Access Component (CL189)

This component is used exclusively by a single service, the Wholesale ISDN30 service. The usage factor is 1.0 since there is no sharing.

5.11.6 Narrowband Market

5.11.6.1 Overview

Narrowband Market comprises three different market services: Call Origination, Call Termination and Interconnect Circuits. These services use a total of 20 network components (including Revenue debtors as component). A total of £273m FAC is attributed to these services.

Table 274 below shows the top 10 network components that attribute the largest costs (FAC) to these services in the Narrowband market. The top two components are Local exchange processor and concentrator set-up, each attributing c.20% of the total market cost.

Note that the majority of the components are used exclusively by these services, with only four being shared by other services in Wholesale Residual.

Table 274. ***Costs apportioned to Market from Network Components (Top 10)***

Cost Category	BT Ref.	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	% of the Total Comp Value	Service Volume Unit
Local exchange processor set-up	CO212	£49	£71	£56	21%	98%	mm
Local exchange concentrator set-up	CO214	£45	£82	£54	20%	100%	mm
Remote - local transmission link	CO325	£29	£42	£33	12%	100%	mm
Local exchange concentrator duration	CO215	£20	£32	£23	8%	100%	mm
Remote - local transmission length	CO326	£7	£108	£18	6%	100%	mm
Local exchange processor duration	CO210	£15	£21	£17	6%	98%	mm
Product management policy & planning	CO512	£15	£1	£15	5%	94%	mm
iNode voice call set-up	CN868	£8	£34	£12	4%	84%	mm
Emergency OA (999) non chargeable	CO942	£9	-£2	£9	3%	100%	mm
OR Interconnect 2Mbit/s connection	CF453	£6	-£0	£6	2%	100%	circuits
Others (19x)	-	£26	£50	£31	11%	-	
Total		**£229**	**£439**	**£273**	**100%**		

Source: BT ASPIRE, Cartesian Note: mm = millions of minutes

The methodology used to calculate the usage factors has a slight variation from the description in Section 5.11.2. For call-related services a route factor is introduced in the usage factor calculation.

Following an explanation of route factors, each of the top 10 components is analysed in more detail. The components are covered in alpha-numerical order (whereas in the table above they are ordered by FAC).

The analysis includes the description of each usage factor defined per Service-Component combination and the underlying calculation principles as per BT's explanation.

5.11.6.2 Explanation of Route Factor

The calculation of the usage factor for the components used by the services related to calls is dependent on the route taken by the different type of call. This leads to the introduction of a new factor: the Route factor.

By way of illustration, let us assume that there are two services, A and B, where:

- Service A generates 600 minutes of use
- Service B generates 200 minutes of use
- The total volume of minutes is therefore (600 + 200) = 800

Now, let us assume that there is a network component, NC1, is that is used by the two services. Furthermore, that NC1 is used only once for each minute of use of Service A, but that it is used twice for each minute of Service B. Then the 'factored' volume of NC1 is calculated as follows:

- Service A volume of minutes: 600
- Service B factored volume of minutes: 2 x 200 = 400
- Total factored volume for NC1: 600 + (2 x 200) = 1,000 minutes

Usage factors are therefore based on the number of times a component is used for a single minute of call. To know this "number of times", BT samples a statistically significant volume of minutes for each of the possible routes a call can take. There are four different route types which were agreed upfront between BT and Ofcom. Using this data BT determines the usage factor of each component by service:

$$Usage\ Factor = \frac{\left[\sum^{Routes} Comp\ Usage\right]}{Service\ Call\ Volume\ (sampled)}$$

In this case, the service call volume is referring to the sampled volume. For each sampled call, the call routing is determined by looking at the switch record. Among other data, it captures the call routing details and indicates the number of times the call passes through any given component (such as a local exchange). Each sampled call fits in one of the route types defined.

From here, the process is similar to what is described in Section 5.11.2, i.e., the usage factor is multiplied by the total service volume as reported to determine the factored volume of the component for the service.

For example, let's assume that Service X and Y use three other Network Components NC2, NC3 and NC4. BT measure calls of these services and using the details provided by the switch records for each call in the extracted sample, these are mapped to one of the four network route types as illustrated in the tables below.

Table 275. ***Illustrative Volumes for Service X***

Route	Total Minutes (sampled data)	NC2 Utilisation	NC3 Utilisation	NC4 Utilisation
1	**200**	200	200	0
2	**100**	100	200	0
3	**80**	80	200	0
4	**20**	20	0	0
Total	**400**	**400**	**600**	**0**

Route	Total Minutes (sampled data)	NC2 Utilisation	NC3 Utilisation	NC4 Utilisation
Usage Factor		1	1.5	0

Table 276. ***Illustrative Volumes for Service Y***

Route	Total Minutes (sampled data)	NC2 Utilisation	NC3 Utilisation	NC4 Utilisation
1	**200**	200	0	100
2	**100**	100	0	50
3	**0**	0	0	0
4	**0**	0	0	0
Total	**300**	**300**	**0**	**150**
Usage Factor		**1**	**0**	**0.5**

The total 'factored' volume of each component is the sum of component utilisation for Service X and Y, i.e.:

- NC2: (400 + 300) = 700 minutes
- NC3: (600 + 0) = 600 minutes
- NC4: (0 + 150) = 150 minutes

BT divides the total cost of the component by factored volume of each Network Component to determine the unit costs of each Network Component as published in the RFS.

5.11.6.3 OR Interconnect 2Mbit/s Connection Component (CF453)

This component captures costs associated to the Openreach 2Mbps interconnect connections which are used by a single service in Narrowband market: Interconnect circuits.

BT defines three different usage factors for three different network services within the market service:

- 0.28 for Interconnect 2Mbit connection - rearrangements
- 0.61 for CSI circuit 2Mbit connection (OCP use)
- 0.10 for IEC circuit 2Mbps connection

Due to time constraints, Cartesian was unable to discuss the methodology used to attribute these costs to services with BT.

5.11.6.4 iNode Voice Call Set-up Component (CN868)

This component captures capital costs related to the voice call set-up functionality contained within iNode. It is attributed to Call Origination and Call Termination services within the Narrowband market. The component is also used by some services in Wholesale Residual.

BT defines seven different usage factors. Cartesian asked BT for further detail regarding the factors. However at the time of writing, BT has not yet responded.

5.11.6.5 Local Exchange Processor Duration Component (CO210)

Cartesian asked BT for further detail regarding the factors. However at the time of writing, BT has not yet responded.

5.11.6.6 Local Exchange Processor Set-up Component (CO212)

This component captures costs related to call set-up local exchange switches. Almost all of the cost (98% FAC) is attributed to Call Origination and Call Termination services. The remainder of cost from this component is attributed to Wholesale Residual.

BT defines five different usages factors. Cartesian asked BT for further detail regarding the factors. However at the time of writing, BT has not yet responded.

5.11.6.7 Local Exchange Concentrator Set-up Component (CO214)

Cartesian asked BT for further detail regarding the factors. However at the time of writing, BT has not yet responded.

5.11.6.8 Local Exchange Concentrator Duration Component (CO215)

Cartesian asked BT for further detail regarding the factors. However at the time of writing, BT has not yet responded.

5.11.6.9 Remote - Local Transmission link (CO325)

Cartesian asked BT for further detail regarding the factors. However at the time of writing, BT has not yet responded.

5.11.6.10 Remote - Local Transmission Length Component (CO326)

Cartesian asked BT for further detail regarding the factors. However at the time of writing, BT has not yet responded.

5.11.6.11 Product Management Policy & Planning Component (CO512)

This component captures costs incurred by BT in servicing and supporting the interconnect market and is used by Call Origination and Call Termination services within the Narrowband market.

Cartesian asked BT for further detail regarding the factors. However at the time of writing, BT has not yet responded.

5.11.6.12 Emergency OA (999) Non Chargeable Component (CO942)

This component captures pay and non-pay costs related to inland and international operator assistance calls as well as depreciation costs of the switching equipment used to support those calls. It is used exclusively by Call Origination service.

BT defines three usage factors. Due to time limitation on the project, Cartesian was unable to discuss the methodology used to attribute these costs to services with BT.

6 Assessment against Regulatory Accounting Principles

6.1 Introduction

6.1.1 Overall Findings

In this section of the report, the attribution methodologies used by BT are examined in detail and evaluated against the Regulatory Accounting Principles (RAP). For each method, we highlight any areas of concern with respect to compliance with each of the principles. In addition, we have considered whether there are reasonable alternatives to the methodologies that BT has chosen to use. Where alternatives are identified, we have assessed the relative pros and cons of these versus the existing method.

Our overall findings from the evaluation of the attribution methodologies are as follows:

- Many of the methodologies do not fully comply with the RAP
- Cartesian has concerns regarding compliance of some methodologies against the principles of accuracy, objectivity, consistency and/or causality
- The majority of the concerns we have identified do not have a material impact on attributed costs; however, the study identified a handful of errors which cause either cost to be incorrectly attributed to regulated markets, or incorrectly apportioned between regulated markets
- We do not believe that the system is inherently biased in favour of BT
- We do, however, believe that BT could improve the overall quality of cost attribution in the RFS

Compliance against the Regulatory Accounting Principles (RAP) varies for different attribution methodologies and attribution levels for the cost categories assessed. Throughout, there is a general lack of transparency across most of the methodologies as documented in the DAM. This may be a result of BT attempting to summarise the description of methodologies in the interests of brevity. Having said that, there are some methodologies which are not covered in the DAM at all.

In reviewing Cartesian's assessment of BT's cost attribution system, it is important to note that Cartesian has not performed the audit of BT's accounting data at a General Ledger level. Cartesian has primarily relied on the auditor's report published in the 2014 Current Cost Financial Statements as a basis of the accounts being free from errors.[14] In section 6.2.20 we have specifically highlighted the opinion of the auditor on the accuracy 21CN cost attribution.

[14] http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2014/index.htm

6.1.2 Summary by Regulatory Accounting Principle

6.1.2.1 Completeness

Cartesian is satisfied that BT complies with the Completeness principle as defined in the published RAP statement (included in Appendix B).

This judgement is based on BT's submitted Probity reports which show ASPIRE processing all the financial records.[15]

6.1.2.2 Accuracy

Cartesian is not satisfied that BT fully complies with the Accuracy principle as defined in the published RAP statement (included in Appendix B).

During the course of this project Cartesian identified numerous mathematical errors within the models provided by BT, as well as errors in the application of methodologies and configuration of systems with the correct usage factors (as identified by BT itself). These are summarised in Table 278 and Table 279 below.

Specific examples include:

- Some usage factor calculations were found to contain mathematical errors. The errors that were identified do not have a material impact, however other errors may exist in other usage factor calculations that Cartesian was unable to cover due to time constraints on the project.
- The Access Rentals model contains a number of input errors in the parameters for bearer capacities by circuit type. The errors that were identified do not have a material impact, however other errors may exist elsewhere in the model.

In addition, Cartesian identified a potential issue regarding certain Transfer Charges. Based on the data provided it appears that £300m of transfer-in charges enter the cost exhaustion system which are not fully offset by a balancing transfer-out. This appears to lead to an additional ✂ [£150m to £200m] (FAC) being attributed to the regulated markets as costs. However, due to balancing figures in the non-core units it is possible that the actual net-transfer charge being attributed to the regulated market is less than this.

6.1.2.3 Objectivity

Cartesian is not satisfied that BT fully complies with the 'Objectivity' principle as defined in the published RAP statement (included in Appendix B). This is because of the following two reasons:

- Cartesian has identified methodologies where the method does not appear to be objective. Specific examples include: duct costs not being attributed to 21CN Fibre; and, apportioning Openreach electricity costs using the same methodology that attributes Openreach Operational building space.
- Cartesian has wider concerns on the transparency of several methodologies. Overlooking the fact that the DAM does not clearly (or fully) explain most of the methodologies that Cartesian

15 Probity reports are generated by ASPIRE that show the completeness of processing of records at each level of the cost exhaustion process

analysed, there are some methodologies that remained partial "black boxes" at the end of the study, even after further explanation from BT. A specific example is the analysis that BT Wholesale undertakes to separate managed services contract values between the regulated and the unregulated markets.

6.1.2.4 Consistency with regulatory decisions

Cartesian is cautiously satisfied that BT complies with the 'Consistency with Regulatory Decisions' principle as defined in the published RAP statement (included in Appendix B).

Although Cartesian has not identified any major non-compliance with regards to consistency with regulatory decisions, Cartesian has identified that approximately ✂ [£10m to £50m] (FAC) costs of phonebooks was attributed to regulated markets in FY 2013/14. This issue was addressed in Ofcom's Fixed Access Market Review, Charge Control consultation published on 11 July 2013.[16] As of FY 2014/15 BT is no longer allowed to attribute BT Phonebook costs to the regulated markets.

6.1.2.5 Causality

Cartesian is not satisfied that BT fully complies with the 'Causality' principle as defined in the published RAP statement (included in Appendix B). This is because of the following reason:

- Cartesian believes that the rationale provided by BT for using certain methodologies is weak. One example relates to Pay and Return on Asset where Cartesian believes that using only Pay to attribute costs would represent a better cost driver.
- The approach to attribution of vacant space within General Purpose buildings may not be causal. The methodology penalises divisions which are housed in office space that is too large for their needs and office accommodation decisions may not be under the control of divisional management.
- The attribution methodology used to apportion costs for Openreach Electricity consumption does not appear causal as property allocation is not a good reflection of electricity consumption.

6.1.2.6 Compliance with the statutory accounting standards

Cartesian is "cautiously" satisfied that BT complies with the 'Compliance with the statutory accounting standards' principle as defined in the published RAP statement (included in Appendix B). Cartesian is cautious because of the following two reasons:

- Since Cartesian did not endeavour to conduct a full audit of BT's accounts, Cartesian is unable to comment on BT's compliance with all the statutory accounting standards.
- Given the mathematical errors found in BT's models and the complexity of some of the models, Cartesian is not confident that all the cost treatments have been correctly applied. In addition, the complexity of some of these models made it difficult for Cartesian to verify their accuracy.

16 http://stakeholders.ofcom.org.uk/binaries/consultations/llu-wlr-cc-13/summary/LLU_WLR_CC_2014.pdf

6.1.2.7 *Consistency of the Regulatory Financial Statements as a whole and from one period to another*

Cartesian is not satisfied that BT fully complies with the 'Consistency of the Regulatory Financial Statements as a whole and from one period to another' principle as defined in the published RAP statement (included in Appendix B). This is because of the following reasons:

- Cartesian has identified instances where BT was inconsistent in the treatment of the same types of cost within one period. For example, to split Fibre Access Duct cost between the Spine Fibre segment and distribution fibre segment, BT uses fibre depreciation; whereas, GRC is used to split Access Fibre costs between NGA and non-NGA. Cartesian is unable to comment the appropriateness of one method over the other, however the point to note is the consistent use of a methodology within the RFS.
- Cartesian identified instances where calculation methodology appears to have changed between periods. For example, in the TSO Power and Electricity Model BT has changed from using 'actual' power consumption data to 'maximum' power consumption specifications. We are unable to quantify the impact of this change.

6.1.3 RAP Compliance Summary of Methodologies

The following table summarises the Cartesian's assessment of the RAP compliance of those cost attribution methodologies within the scope of the project. The methodologies in the table are used to attribute costs from the General Ledger, and from Activity and Plant Groups within BT's cost attribution system.

Table 277. ***Impact Analysis of Issues confirmed with BT***

Methodology	RAP Compliance Concerns		Section Ref
Duct Valuation	**Accuracy**	• In the Duct model provided by BT, CCA indexing is not applied to the 1996/97 GRC or to Capex spent since the time of the study	6.2.2.4
	Causality	• D-side Duct costs should be allocated to AG135 instead of being apportioned using PDTDUCT	
	Consistency of RFS	• Duct costs are apportioned between core and backhaul based on the number of live circuits as opposed to fibre length	
Profit Weighted Net Replacement Cost (PWNRC)	**Objectivity**	• The approach used to identify NGA assets is not transparent	6.2.3.4
	Causality	• Cumulo rebate are attributed to non-core assets • This is not causal with the rationale used by BT to attribute rebates: distribution fibre is not a core asset	
	Consistency of RFS	• The methodology is not consistent with the approach taken for attributing Cumulo rates to non-NGA assets	
NGA Duct Depreciation	**Accuracy**	• There are concerns regarding accuracy, as the methodology relies on manual categorisation. This manual inspection and decision process may introduce human error	6.2.4.4
	Objectivity	• Costs are attributed to unrelated cost categories	

Methodology	RAP Compliance Concerns		Section Ref
	Causality	• Costs for E-Side duct are attributed using two different methodologies; Cable depreciation for NGA and Duct valuations for non-NGA	
E-Side Copper Cable Depreciation	**Accuracy**	• The accuracy of this method may be exposed to the risk of human error	6.2.5.4
	Objectivity	• The methodology is not transparent as the calculation of depreciation for FTTC Tie cables (PG192A) is not described in the DAM nor in the excel models	
Special Fault Investigation (SFI) and Openreach Time Related Charges (TRC) equivalent cost	**No Concerns**	• No Concerns	6.2.6.4
Fibre Length	**Objectivity**	• The methodologies apportion cost of the construction of optical/metallic junction cables. However, they are actually referring to backhaul and core network fibre cables. Junction is an old term used within BT but which now refers to backhaul and core network fibre	6.2.7.4
	Consistency of RFS	• The methodology is not consistent with the approach for apportioning duct costs	
Fibre Gross Replacement Cost (GRC)	**Accuracy**	• In the fibre GRC model, there is a large (unexplained) reduction in the NGA spine volumes between 2012/13 and 2013/14 leading to accuracy concerns	6.2.8.4
	Causality	• The costs are apportioned on the basis of GRC. This does appear to be a causal approach	
	Consistency of RFS	• BT uses a variety of approaches: GRC is used to access fibre costs between non-NGA and NGA; Fibre Length is used to backhaul and core fibre in 20C and 21C networks; and current year fibre depreciation is used to attribute associated duct costs between NGA and non-NGA fibre	
Access Fibre CCA adjustments based on Fibre GRC	**No Concerns**	• No Concerns	6.2.9.4
Openreach Common Costs (COMCOS)	**Objectivity**	• The methodology is not objective as it uses an arbitrary weighting factor. A WACC of 10.8% is used to effectively weight the importance of pay and asset values in the apportionment	6.2.10.4
	Causality	• Attributing a broad pool of common costs on the basis of Pay and RoA does not appear causal. The time and effort required to manage assets may not correlate with the value of the assets	
Data Centre Budgeted Data	**Objectivity**	• The methodology is not fully transparent as it is based on management negotiations and internal business unit models	6.2.11.4

Methodology	RAP Compliance Concerns		Section Ref
TSO Billing System	**Accuracy**	• The accuracy of the methodology is reliant on manual attributions. As the EXCEPT base methodologies are manually configured within ASPIRE (annually) to determine the destination cost categories, there is a risk of human error that may result in incorrect attribution and destinations being defined	6.2.12.4
	Causality	• There are concerns over this methodology fully satisfying the Causality principle. This is because particular EXCEPT base methodology uses more than one attribution approaches	
	Consistency of RFS	• BT uses two methods for direct cost allocation, raising concerns over consistency. It is not clear why BT attributes some costs directly to activity groups using an EXCEPT base methodology as opposed to directly allocating costs from F8/OUC to Level 1	
Floor Space Utilisation	**Accuracy**	• Attribution methodology of vacant space costs in Openreach Operational buildings may not be attributing costs to the right categories	6.2.13.4
	Causality	• Attributing all of vacant Operational building space to Openreach may not be causal	
Power Consumption for TSO	**Accuracy**	• BT TSO Electricity model appears to contain mathematical errors in the calculation of total power consumption of CWSS and DWSS	6.2.14.4
	Objectivity	• In 2013/14 BT excluded certain programmes from the cost analysis e.g. TV. Retrospectively BT has recognised that this was not the right decision	
Power Consumption for Openreach	**Objectivity**	• BT does not appear to use energy consumption data for different equipment within the Openreach estate to determine a fair attribution weight between different elements of Openreach's network	6.2.15.4
	Causality	• Using cost attribution of 'Property' to reflect electricity consumption does not appear to be a causal methodology	
	Consistency of RFS	• The methodology (and approach) used by BT to attribute electricity charges for TSO and Openreach is not consistent	
Managed Services Contract Value	**Objectivity**	• The DAM fails to properly explain BT's methodology to determine the split of contract costs between regulated and un-regulated markets	6.2.16.4
Previously Attributed Cost (including Pan-Division)	**No Concerns**	• No concerns	6.2.17.4
Vendor Contract Value	**Causality**	• Since the cost of contracts relate to 'support' activities, only the CoW relating to support activities should be used to attribute costs as opposed to using all CoWs	6.2.18.4
Asset Policy	**Consistency of RFS**	• This methodology risks attribution of similar types of costs in an inconsistent manner	6.2.19.4

Methodology	RAP Compliance Concerns		Section Ref
Depreciation for 21CN	**Accuracy**	• The complicated and organic nature of the 21CN Excel Model raises concerns around the likelihood of errors and difficulty BT would have in discovering errors through model audit • During Cartesian's review of the model we uncovered at least one apparent coding error	6.2.20.4
	Objectivity	• Apportionment of costs in next-generation networks (NGNs) presents challenges regarding objectivity, transparency and causality. This is due to one of the major technical advantages inherent NGNs	
	Compliance with Regulatory Decisions	• BT has identified eight components in the 21CN network that attribute costs to regulated services on the basis of 'future benefits'	
Software Depreciation	**Objectivity**	• The approach taken by BT to determine attribution weights involves combining the depreciation amounts of software assets before splitting them out again, as opposed to direct allocations	6.2.21.4
	Consistency of RFS	• The SOFTDEP model attributes costs for all of BT's main divisions except TSO. From a consistency perspective it will be good to have TSO software costs also attributed using the SOFTDEP base	
Activity Group and Plant Group Attributions			
Duct Valuation and Cable Depreciation	**Accuracy**	• The duct valuation model used to determine the split between copper duct and fibre duct doesn't appear to take into account the addition or removal of cables in the duct	6.3.2.4
	Objectivity	• The methodology described in the DAM isn't entirely accurate, hence transparency concerns	
	Causality	• A small proportion of access duct cost is apportioned to Intra-Exchange Tie Cables (PG130A). The reason for this is unclear and it may be an error	
	Consistency of RFS	• Apportionment of access duct cost uses cable depreciation (of copper and fibre) as an input. In contrast, apportionment of access fibre costs is based on fibre GRC (see Section 6.2.8)	
Number of Fibres Used	**Accuracy**	• The Access Rentals model contains a number of input errors in the parameters for bearer capacities by circuit type	6.3.3.4
	Objectivity	• The CTCS model calculations are not transparent. The calculations involve a relatively high number of steps with variables coming from several different sources which makes it difficult to follow	
	Causality	• There may be a causality issue in the treatment of unused fibre. The cost of unused fibre in the network is attributed equi-proportionally to services based on current fibre usage. However the unused fibre will be of greater benefit to growth services rather than legacy services that may be in decline	
Fibre Bandwidth and Length	**Accuracy**	• The methodology is not accurate as there is an error in one the formulae in the model. BT agree that the formula is incorrect	6.3.4.4

Methodology	RAP Compliance Concerns		Section Ref
	Objectivity	• The transparency of the network model could be improved. The model includes several redundant steps and could be simplified to mitigate potential human errors	
	Causality	• The cost of unused fibre in the network is attributed equi-proportionally to services based on current fibre usage. However the unused fibre will be of greater benefit to growth services rather than legacy services that may be in decline	
Factorised Pay and Return on Assets	**Objectivity**	• As the methodology uses factorised pay, the weights of attribution are skewed heavily towards the business unit that has more employees	6.3.5.4
	Causality	• Attributing a broad pool of common costs on the basis of Pay and RoA does not appear causal as the time and effort required to manage assets may not correlate with the value of the assets. We note, for example, that although BT's duct network has a high asset value (c.30% of total MCE) it is unlikely to demand 30% of head-office attention	
Pay and Return on Assets	**Objectivity**	• The methodology is not objective as it uses an arbitrary weighting factor. A WACC of 10.8% is used to effectively weight the importance of pay and asset values in the apportionment	6.3.6.4
	Causality	• Attributing a broad pool of common costs on the basis of Pay and RoA does not appear causal as the time and effort required to manage assets may not correlate with the value of the assets	
Property Cost Apportionment	**Accuracy**	• The treatment of costs related to early termination of leases on office buildings appears inaccurate. According to detailed data provide by BT, these costs are apportioned from AG414 based on transfer charges from BT Property related to both leased and BT retained office buildings	6.3.7.4
	Objectivity	• The unbalanced Transfer charges being attributed to AG106 raise transparency concerns as it is unclear whether this is in error or from a non-core unit	
	Consistency of RFS	• The treatment of income from sale of property and provisions from early termination of lease of office space is inconsistent	
Network Component Attributions			
Fixed Access Market	**Objectivity**	• Some usage factors are the product of more than one input, and there is little information on the source of the data	6.4.1.1

ISDN Services Usage Factor	**Accuracy**	• Error in calculation of CL160 usage factor	6.4.5.1
	Accuracy	• Error in calculation of CL177 usage factor	6.4.5.2
Miscellaneous Concerns			
Miscellaneous	**Accuracy**	• There are concerns around the accuracy of identifying Operator Services Costs at BT • In the cost attribution model there appears to be attribution of BT Retail Consumer costs to 21CN • Cartesian has identified that some Transfer Charges in BT's accounts do not balance. Cartesian understands that the unbalanced transfer charges relate to BT's non-core units, however Cartesian has concerns that as per the treatment of costs during BT's cost exhaustion process, leaving (positive) 'Transfer Charge In' and excluding an offsetting (negative) 'Transfer Charge-Out' from a cost category will means that these transfer charges are turned into costs, leading to double counting	6.5
	Compliance with Regulatory Decisions	• Cost of phonebooks are attributed to regulatory markets	6.5
	Consistency of RFS	• Costs in AG102 and AG103 are attributed in different ways • Some assets are attributed using GRC while others use NBV	6.5
	Concerns Outside RAP	• Revenue from sale of copper not offset against copper depreciation • Service Level Guarantee (SLG) penalties are attributed to regulated markets • Light user scheme costs attributed to wholesale residual	6.5

Source: BT ASPIRE, Cartesian

6.1.4 Estimated Impact of Issues and Concerns with Attribution Methodologies

Cartesian's assessment of BT's cost attribution methodologies against the RAP identified a large number of concerns. There are documented in full, by methodology, later in this section.

The majority of these potential issues do not have a material impact on cost attribution. In this section we highlight those issues which are material or otherwise interesting to note.

Table 278 and Table 279 below attempt to quantify (where possible) the impact of errors/methodology issues identified during the course of this project.

Table 278. ***Impact Analysis of Issues confirmed with BT***

Method	Concern	Description	Estimated Impact	Section Ref
Direct Allocation (AG148 and AG149)	Causality issue	• Backhaul and core duct costs are attributed to 20C-network-related fibre but not to 21C-network-related fibre PGs. • This results in ✂ [£10m to £50m] being incorrectly attributed to the regulated markets.	✂[£10m to £50m]	5.4.4 5.4.5
Miscellaneous	Phonebook cost attribution	• In FY 2013/14, BT attributed approximately ✂ [£10m to £50m] FAC to regulated markets for costs relating to Phonebooks • Based on the more recent Ofcom statement, BT is required to exclude these costs from the regulated markets	✂ [£10m to £50m]	6.5
Number of Fibres Used	Several errors in the excel model	• Correction of the number of bearers in the access segments has a significant impact. For the majority of cases, the average number of fibres per bearer increased changing the apportionment % per circuit type	✂ [£10m to £50m]	6.3.3
TSO Electricity Attribution	Electricity Model Errors	• Currently due to an incorrect selection of products, BT is attributing approximately ✂ [£0 to £5m] in excess to AISBO markets	✂ [£0 to £5m]	6.2.14
Duct Valuation	CCA indexation is missing	• In calculating the present value of duct, BT does not index the costs of the 1996/97 duct GRC and capex spent since then.	Non-material	6.2.2

Usage Factors	Configuration Errors	• During this project BT identified mathematical errors in the configuration of ASPIRE for Network Component CL160
		• Fixing the error results in cost redistribution within the markets:
		  ◦ Wholesale ISDN2 receives additional £172k
		  ◦ LLU costs are reduced by £107k
			Non-Material	6.4.5

Usage Factors	Configuration Errors	• During this project BT identified mathematical errors in the configuration of ASPIRE for Network Component CL177
		• Fixing the error results in cost redistribution within the markets:
		  ◦ WLR receives additional £36k
		  ◦ Wholesale ISDN2 costs are reduced by £49k
			Non-Material	6.4.5

Source: BT ASPIRE, Cartesian

Table 279. ***Impact Analysis of Potential Issues not confirmed with BT***

Method	Concern	Description	Estimated Impact	Section Ref
Pay and RoA	Causality & Objectivity of methodology	• Currently BT attributes general management and overhead costs using Pay and RoA methodology • Attributing these costs on the basis of Pay only reduces cost attribution of £299m to regulated markets	£299m	6.3.6.4
Copper Attribution	Copper Sale	• Copper revenue is not used to offset copper depreciation costs • Cartesian understands that this copper is from the Core Network	✂ [£100m to £150m]	6.5
Transfer Charges	Transfer charges are not balanced	• Transfer charges do not balance out in the BT account data provided to Cartesian • The discrepancy is ✂ [£150m to £200m], but the cost impact on regulated markets may be less than this	Up to ✂ [£10m to £200m]	6.5
Property Cost Apportionment	Treatment of costs	• The treatment of costs related to early termination of leases on office buildings appears inaccurate.	✂ [£10m to £50m]	6.3.7
Fibre Bandwidth and Length	Error in one of the formulae in the excel model	• The correction of the formula error results in a maximum variation of +6% of backhaul fibre costs (PG170B) to components, which represents ✂ [£5m to £10m] FAC • Regarding the core fibre (PG350N), the maximum variation is of ✂ [£0 to £5m] (1.44%). All the other variations are smaller than +/-1% but in a total of +/-2.07%	✂ [£5m to £10m]	6.3.4
Duct Valuation	Accuracy of the Access:Backhaul duct ratio	• The method used to determine relative duct value may be inaccurate. A variation of 1% in the Access:Backhaul duct ratio results in approximately ✂ [£0 to £5m] of costs redistributed within the regulated markets • A small amount also moves from regulated to unregulated markets	Likely to be ✂ [£0 to £15m], but depends upon the size of the error.	6.2.2
NGA Duct Depreciation	Accuracy of FTTC tie cable depreciation calculation	• Currently 11% of access duct costs are attributed to FTTC tie cables • Applying a variation of +1% on the ratio results in an additional ✂ [£0 to £5m] being attributed to Wholesale Residual and not to the regulated markets • A small amount also moves from regulated to unregulated markets	Likely to be ✂ [£0 to £5m], but depends upon the size of the error.	6.2.4
Copper Cable Depreciation	Accuracy of the FTTC tie cable depreciation calculation	• Currently 9.3% of copper cable costs are attributed to FTTC tie cables (PG192A) based on cable depreciation • A variation of 1% corresponds to an additional ✂ [£0 to £5m] copper FAC attribution to Wholesale Residual • A small amount also moves from regulated to unregulated markets	Likely to be ✂ [£0 to £5m], but depends upon the size of the error.	6.2.4

Method	Concern	Description	Estimated Impact	Section Ref
Fibre GRC	Accuracy of the NGA/Non-NGA fibre ratio	• The Fibre GRC valuation model determined an 87:13 non-NGA/NGA ratio. A variation of +/-1% of such ratio has the following impact at market level: • +1% applied to NGA ratio (i.e. 14%) results in -1.2% of fibre FAC attributed to regulated markets • NGA costs are 100% allocated to unregulated market) which represents ✂ [£0 to £5m] • A small amount also moves from regulated to unregulated markets	Likely to be ✂ [£0 to £5m], but depends upon the size of the error.	6.2.8
Duct Valuation and Cable Depreciation	Concerns around the ADS study	• A variation of 1% in the *Copper:Fibre* Access Duct ratio (RFS 13/14 is 91:8) results in ✂ [£5 to £10m] of duct costs attributed to fibre rather than copper services (+1% applied to Fibre ratio (i.e. 9% ratio). • A small amount also moves from regulated to unregulated markets	Likely to be ✂ [£0 to £15m], but depends upon the size of the error.	6.2.2
	Potential attribution error	• A small proportion of access duct cost is apportioned to Intra-Exchange Tie Cables (PG130A)	✂ [£0 to £5m]	6.2.2
Number of Fibres Used	Accuracy of the apportionment ratios used	• Using the average of the apportionment ratios between spine and distribution segments (which are different because the number of fibres used is different) results in a redistribution of ✂ [£0 to £5m] FAC.	✂ [£0 to £5m]	6.3.3
21CN	BT Retail Consumer Costs	• As shown by section 5.8.7, BT attributes BT Retail Consumer costs to 21CN. This appears to be an error	✂ [£0 to £5m]	5.8.7
Power Consumption for TSO	Mathematical Errors in the Model	• There are errors in TSO Electricity Model for the calculation of CWSS & DWSS Power and Accommodation • The error results in 3% to 5% change to the result of the calculation. The overall impact to cost attribution is most likely immaterial	Non-Material	6.2.14
	Change of Methodology	• In FY13/14, BT used total fitted capacity to determine the total power consumption, over actual working capacity (i.e. how many channels were active) for System X and AXE10. This resulted in higher power consumption in FY12/13 (variance over 50%)	Unknown	6.2.14.5

6.2 Base Attribution Methodology Assessment

In this section we review each of the material base methodologies against the regulatory accounting principles.

Base methodologies are used to attribute costs from the General Ledger (at level 0) to activity groups and plant groups (at level 1). This stage of the cost exhaustion process is represented by 'Stage 2' in Figure 3 of this report.

This section distils down all the key base methodologies discussed across multiple cost groups in the sections above. Within the cost attribution system, BT has used multiple names for similar attribution methodologies. In this section, Cartesian has grouped all similar base methodologies under a single methodology title, where appropriate.

Note: Only the cost categories within the scope of the study are shown in the tables in this section. Please see Section 3 for the selection methodology description.

6.2.1 Direct Allocation

Within the cost attribution system, some costs are allocated directly from the GL to activity groups and plant groups. These GL items are tagged with their destination cost categories and no apportionment methodology is required.

The data provided to Cartesian by BT also shows that in addition direct allocation based on 'tagging', BT also uses certain base methodologies to directly allocate costs from the GL to an activity group or a plant group. Where GL items are always attributed to particular activity groups or plant groups then using a base methodology appears unnecessary and the process could be simplified by directly allocating costs from the GL. The downside of following the direct approach is that it reduces 'visibility' of how certain costs are being treated. This is because, even though costs are being directly allocated, the base methodology provides information relating to the type of costs being allocated/attributed. Direct allocation, without a base does not provide this level of insight. Hence there are pros and cons of following each of the two approaches. Cartesian is inclined towards improving cost attribution visibility.

Cartesian estimates that BT attributes approximately £3.5bn (FAC) to activity groups and plant group at level 1 through direct allocation, using either a base methodology or direct tagging.

6.2.2 Duct Valuation

6.2.2.1 Overview

The duct valuation method is used to apportion duct costs between access and backhaul duct-related cost categories at Level 1. Duct costs are booked against the same class of work by the same units and therefore require an apportionment method. The duct valuation is used by a single base methodology, PDTDUCT.

6.2.2.2 Applicable Cost Categories

Table 280 below shows the two cost categories receiving duct costs using the PDTDUCT methodology.

Table 280. ***Cost Categories attributed with duct costs based on duct valuation driver***

Cost Category	BT Ref.	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
Duct used by Access Cables	**AG135**	Duct	83%	83%	83%	5.4.4
Duct used by Backhaul Cables	**AG148**	Duct	17%	17%	17%	5.4.5
Grand Total			**100%**	**100%**	**100%**	-

Source: BT ASPIRE, Cartesian

6.2.2.3 Detailed Methodology

Costs are apportioned in a two stage process. The costs are first apportioned between access and backhaul ducts based on the estimated value of the respective ducts using the Absolute Duct Survey (ADS) and capex spent. Note that the backhaul ratio is in fact derived from the core duct ratio determined in the ADS study. This is done based on circuit occupancy. The ratios used in the first stage are shown in the table below.

Table 281. ***BT's Duct Valuation and Ratio by Network Segment and Cable Type***

Duct Type	Cable Type in the Duct	ADS 96/97 Ratio (%)	96/97 Duct Valuation (£ m) (GRC)	Capex Spent Since 1997	13/14 Duct Valuation (£ m) (GRC 96/97 + Capex)	13/14 Ratio (%)
Access	Fibre	4.42%	✂	✂ [21.5%]	✂	7%
	Copper	71.15%	✂	✂ [74.0%]	✂	72%
Core	Fibre	24.43%	✂	✂ [4.5%]	✂	21%
Total		**100%**	✂	✂ [100%]	✂	**100%**

Source: BT ASPIRE, Cartesian

The value of the duct is calculated in two steps as follows.

First, the 1996/97 Gross Replacement Cost (GRC) of the duct, is apportioned based on a duct survey conducted in 1997 – the Absolute Duct Survey (ADS). This survey determined the split of the duct used in fibre access, copper access and (fibre) core as illustrated in the table above.

Second, to reflect the changes in the network, any capital expenditure on access and core duct since 1996/97 is added to the 1996/97 GRC. The capex data is sourced by Class of Work (CoW) records. According to the model description, both parameters must be CCA indexed but in practice they are not.

The following formula expresses the second step:

$$96/97\ GRC + \sum_{year=96/97}^{CY} \sum_{i=CoW\_i}^{CoW} Capex\ , \forall\ duct\ and\ cable\ types$$

A detailed analysis of BT's duct model which is used to calculate the apportionment percentages shows that c.79% of the costs are attributed to Access Duct (i.e. 72%+7% per table above).

The remaining 21% of duct value is attributed to duct in the core network. This amount must be further split between Inner Core (or, simply Core) and Backhaul Core (or simply Backhaul). BT determine the split using the number of live circuits in each duct type given by the CCTS system. This results in 5% and 16% shares of the total duct value for core and backhaul respectively. The methodology or calculation steps are not available.

The table below shows the duct ratio per duct type (transitioning from previous table above). The access (79%) and backhaul (16%) duct form 95% of the duct in BT's networks. The remaining 5% corresponds to Core duct.

Table 282 also shows the final attribution cost ratios per duct type and cost category. Openreach costs are apportioned in the ratio 79%:16% between access duct (AG135) and backhaul duct (AG148):

- 79% of the 95%, i.e., 83% to access duct (AG135)
- 16% of the 95%, i.e., 17% to backhaul duct (AG148)

In contrast, core duct costs are 100% allocated into AG149.

Table 282. ***Cost Attribution Ratio per Cost Category***

Division	Duct Type	BT Ref.	Duct Ratio (%)	Attribution Cost Ratio (%)
Openreach / BT Northern Ireland	Access	AG135	79%	83%
	Backhaul	AG148	16%	17%
TSO	Core	AG149	5%	100%
Total		-	**100%**	-

Source: BT ASPIRE, Cartesian

6.2.2.4 *RAP Assessment*

Concerns regarding **Accuracy**, **Consistency** and **Causality**

Accuracy

- The methodology does not accurately follow the documented approach. In the Duct model provided by BT, CCA indexing is not applied to the 1996/97 GRC or to Capex spent since then. This means the more recent costs have a larger weight than older ones in the apportionment ratio. BT has confirmed this is the case and will adjust the treatment for 2014/15.
- The apportionment may be inaccurate as the methodology relies on historic data. The apportionment method – using 1997 GRC plus capital spent since then – may not accurately reflect cost distribution in the network. BT has a GIS system (Network Engineering Journey, NEJ) which contains duct records. These GIS records are used in the WECLA/Non-WECLA split and may provide greater accuracy in this case also.
- Based on the FAC attributed and Cartesian's general understanding of the method, it is estimates that there will be approximately £6m of cost redistribution within the regulated markets by applying a 1% variation to the *Access:Backhaul* duct ratio.

Consistency

- The methodology is not consistent with the approach taken for apportioning fibre. Duct costs are apportioned between core and backhaul based on the number of live circuits. However for fibre, backhaul and core fibre costs in the GL are split between 20C and 21C networks based on fibre length.

Causality

- There appear to be issues regarding causality due to inclusion of unrelated costs. The PDTDUCT methodology also apportions costs booked against CoW "LDD (D-side)". However, D-side ducts (which includes duct for underground dropwires) are not related to backhaul. We believe these costs should be directly attributed to AG135 (Duct used by Access Cables).

6.2.2.5 *Potential Alternatives*

Alternative attribution methods are listed below.

1. Determine the core and backhaul ratio using the same apportionment mechanism as fibre (i.e. based on fibre quantity rather than circuit volumes).
2. Attribute costs booked against CoW "LDD (D-side)" directly to AG135 (Duct used by Access Cables).
3. Use a GIS system to determine the split of duct value with greater accuracy. BT has such a system called PIPER that records all the copper and fibre deployment with high levels of accuracy and coverage.

During the project we asked BT about the third option, using GIS records in place of the current method. BT's response is reproduced below:

> *"Consistency is a key criterion when we consider attribution methodologies. We have used the same methodology since the inception of regulation and therefore this*

treatment has the advantage of being consistent year on year. BT has not considered the use of a GIS system like PIPER to determine the duct splits. There are many factors that might inhibit the introduction of such a system including:"

- *What the problem statement is and what alternatives there might be (including the status quo),*
- *The extent to which a new system would produce consistent and superior attributions, Ensuring outputs are reliable and easy to maintain,*
- *How much it might cost to introduce and run for a new purpose; and*
- *What other initiatives / developments would be displaced, trades offs in terms of consistency etc. "*

We continue to believe that the use of a GIS system would produce a more accurate cost attribution. We therefore recommend that the cost and impact of such a change be properly assessed, rather than dismissed without evaluation.

6.2.3 Profit Weighted Network Replacement Cost (PWNRC)

6.2.3.1 Overview

The Profit Weighted Network Replacement Cost (PWNRC) method is used to apportion BT's cumulo rate costs. Cumulo rates are the non-domestic rates (property taxes) that BT pays on its rateable network assets in the UK. BT's rateable assets are defined by the Central Rating List Regulations based on inputs from Valuation Office Agency (VOA). The rateable assets within BT's Cumulo assessment include:

- Exchange buildings
- Telegraph poles
- Duct and manholes
- Cabinets
- Payphones
- Copper and fibre

Other property assets such as offices and workshops are assessed separately and are not part of BT's cumulo assessment. "Active" network equipment, such as routers and switches, are not rateable assets. All of BT's network rateable assets are assessed together and the single charge cannot be deconstructed by line of business, individual service or product. Hence, a methodology is required.

BT's Cumulo rate costs are calculated by applying a rate in the pound that applies to all rating assessments to the rateable value of BT's network assets. Rateable values are a measure of annual rental value under certain statutory conditions. The UK rating authorities assess the rateable value of BT's network assets under the receipts and expenditure method. This considers the net cash flows that can be generated by a hypothetical tenant who rents the rateable assets. In general rateable values are reassessed every five years.

6.2.3.2 Applicable Cost Categories

There are 86 cost categories which are attributed cumulo rate costs. Table 283 below shows those cost categories within the scope of the study and the respective amounts. The costs are apportioned using three different base methodologies: CUMNORM, CUMRBTE and ORCUMNOR.

- CUMNORM attributes the underlying Cumulo rate costs before any rebates.
- CUMRBTE apportions rebates that BT has received on its Cumulo rates due to increases in full unbundling volumes (i.e. Metallic Path Facility (MPF) LLU option). BT only apportions these rebates to rateable assets within BT's core network. These include some of the CoWs used in CUMNORM. BT's rationale is that the impact of increasing LLU is to reduce the traffic, both broadband and core, that is carried within its core network thus reducing the net cash flows that can be generated by these assets; the net cash flows generated by BT's assets in its access network are relatively unchanged.
- ORCUMNOR apportions transfer charges to Openreach to show accountability completeness between BT group and Openreach (regulatory obligation. However these charges balance off with transfer charges out from other BT Group divisions and therefore there is no cost impact.

The three base methodologies follow exactly the same methodology as described in the following section.

Table 283. ***Cost Categories attributed cost on the basis of PWNRC***

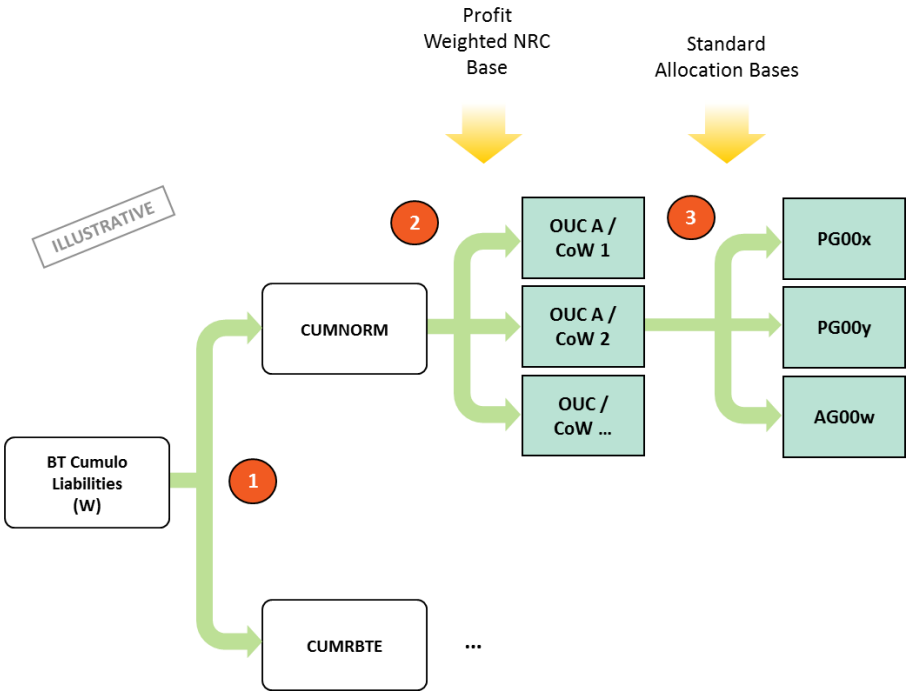
Cost Category	BT Ref.	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	FAC (%)	Section Ref.
Duct used by Access Cables	**AG135**	Duct	✂	✂	✂	61%	5.4.4
D-side Copper Cable	**PG118C**	Copper	✂	✂	✂	35%	5.7.10
GEA DSLAM & Cabinets	**PG953C**	NGA	✂	✂	✂	13%	5.9.4
Duct used by Backhaul Cables	**AG148**	Duct	✂	✂	✂	13%	5.4.5
Back-up Power Equipment - Non Maintenance	**AG164**	Other	✂	✂	✂	12%	5.10.9
GEA Access Fibre Spine	**PG950C**	Fibre	✂	✂	✂	9%	5.5.9
Analogue Line Final Drop	**PG149A**	Copper	✂	✂	✂	6%	5.7.13
Analogue Linecards	**PG127A**	Other	✂	✂	✂	4%	5.10.6
Access Fibre Spine	**PG111C**	Fibre	✂	✂	✂	4%	5.5.5
Main Distribution Frames Equipment	**PG217E**	Other	✂	✂	✂	1%	5.10.6
E-side Copper Cable	**PG117C**	Copper	✂	✂	✂	1%	5.7.5
LLU Co-mingling Recurring Costs (OR)	**PG132B**	Other	✂	✂	✂	1%	5.10.10
Corporate Costs	**AG112**	General Overheads	✂	✂	✂	1%	5.3.4
MSH STM64 Equipment	**PG385T**	Other	✂	✂	✂	-1%	5.10.16.15
Copper MSAN Control Transport	**PG860A**	21CN	✂	✂	✂	-1%	5.8.5
Ethernet Switches	**PG901A**	21CN	✂	✂	✂	-1%	5.8.7
WDM-Metro Link	**PG899A**	21CN	✂	✂	✂	-1%	5.8.6
Local Exchange Processor (AXE10) Equipment	**PG280C**	Other	✂	✂	✂	-1%	5.10.6
Local Exchange Processor (Sys X) Equipment	**PG285C**	Other	✂	✂	✂	-1%	5.10.6
Copper MSAN Combi Cards Broadband element	**PG857A**	21CN	✂	✂	✂	-1%	5.8.5
Local Exchange Concentrator (Sys X) Call	**PG288A**	Other	✂	✂	✂	-3%	5.10.6
WDM-Metro Length	**PG900A**	-	✂	✂	✂	-3%	-
Core Fibre	**PG350N**	Fibre	✂	✂	✂	-4%	5.5.11
PDH Traffic Grooming	**PG399T**	Other	✂	✂	✂	-4%	5.10.16
DSLAM - Overheads	**PG152N**	Other	✂	✂	✂	-5%	5.10.10
Access Distribution Fibre	**PG959C**	Fibre	✂	✂	✂	-5%	5.5.4
Backhaul Fibre	**PG170B**	Fibre	✂	✂	✂	-30%	0
Grand Total			✂	✂	✂	**100%**	-

Source: BT ASPIRE, Cartesian

6.2.3.3 *Detailed Methodology*

According to BT, the key attribution principle for cumulo rates is that it should reflect the use or occupation of its (rateable) assets. BT uses a combination of two attribution bases to this end as shown in the figure below (stage 2 and 3).

Figure 17. ***Cost Attribution based on PWNRC***



Source: BT ASPIRE, Cartesian

BT follows three key steps when applying the CUMNORM and CUMRBTE bases:

1- BT's Cumulo liabilities are divided into those to be attributed using CUMNORM and those using CUMRBTE. CUMRBTE is applied to reductions the rating authorities have made to BT's rateable value from the start of the latest (2010) rating list as a result of increased full unbundling volumes. CUMNORM applies to all other BT cumulo liabilities.

2- Cumulo costs are then apportioned across rateable CoWs on the basis of PWNRC. The first base uses PWNRCs. BT's Cumulo rateable value is assessed on the basis of forecast cash flows that could be generated by a hypothetical tenant renting the rateable assets. BT considers that the PWNRC of a particular class of work is a reasonable proxy for its relative net cash flow under the hypothetical rating tenancy.

   a. Rateable CoWs are those that include rateable assets. As mentioned before, these are defined by the Central List Regulations

   b. BT is regarded as the rateable occupier of its exchange buildings even though it no longer owns them. These buildings therefore form part of the rateable asset base. The NRCs of exchange buildings have been valued for the cumulo attribution by Telereal Trillium using the same principles that applied before the sale of BT buildings to Telereal Trillium in 2001.

c. The PWNRC is calculated by taking the NRC of each rateable CoW at the beginning of the rating period, 1/4/2010. The asset NRC is then multiplied by the return on capital employed (ROCE) of the broad service/markets in which the asset is utilised: Access markets, Other Wholesale markets and Network Residual. The ROCEs used in the calculation are the average of the ROCEs reported in the RFS across 2007/8 and 2008/9: this is a proxy for the returns at 1 April 2008, the Antecedent Valuation Date for the 2010 rating list.

3- The cumulo costs at each CoW are then further apportioned to AGs and PGs using previously used base methodologies.[17] BT believes the cost drivers of these methodologies provide a fair apportionment to the cumulo rate costs. For instance, if an OUC's base methodology cost driver is Pay (e.g. FTQ), then BT apportions cumulo liabilities in the same proportion of labour costs previously apportioned to a set of AGs and PGs as a reflection of those activities (AGs) and assets (PGs) importance. For access duct assets, BT uses PDTDUCT base methodology to apportion the cumulo rates in the same proportion to access and backhaul duct cost categories.

Note that NGA related cumulo rate costs are apportioned as part of the CUMNORM base but only across those assets/CoW used by NGA related services and only to specific NGA plant groups. Currently, an incremental fixed rateable value per connection is applied by UK authorities.

6.2.3.4 RAP Assessment

Concerns regarding **Causality, Objectivity** and **Consistency**

BT's attribution of Cumulo rate costs and Cumulo rebates of non-NGA assets is complex. Ofcom has recently addressed this in the Fixed Access Market (FAMR) charge control review where it proposes a variant of the PWNRC method which may be introduced with effect from 2014/15.[18] Ofcom noted that there were several issues with BT's current attribution: notably that Openreach's proportion of Cumulo costs increased over the length of the rating list and that there would be a discontinuity in the attribution proportions at the start of a new rating list. Ofcom's proposal aligns the attribution of Cumulo rebates with the Cumulo costs of those non-NGA assets and uses the relevant cost of capital for each market (WACC to be determined by Ofcom) as the "profit weights".

Cartesian also noticed some peculiar attributions of Cumulo rates at market level during the study that support Ofcom's decision to review this attribution method. These are the following:

- There are negative attributions of Cumulo rate costs for many but not all services at market level. For these services the attributed rebates under CUMRBTE more than offset the attribution under CUMNORM.
- The main exceptions are WLR and LLU rental services which receive a large attribution of Cumulo costs (via CUMNORM), but hardly any rebates (via CUMRBTE).

17 A similar mechanism is employed for AG106.
18 http://stakeholders.ofcom.org.uk/consultations/financial-reporting/

Causality

- There appear to be issues regarding causality due to the attribution of a material cumulo rebate to a non-core asset (Non-NGA distribution fibre (PG959C). This is not causal with the rationale used by BT to attribute rebates: distribution fibre is not a core asset
- A further apparent anomaly in the treatment of cumulo rates is the apportionment from ORCUMNOR to Core Fibre (PG350N) as this methodology relates to Openreach costs and Openreach does not have responsibility for the core network. The attribution, however, is very small and does not have a material impact on service costs. Although Cartesian agrees with BT responses that there is no net impact since these costs are transfer charges attribute to show accountability completeness, this response doesn't explain why these costs are attributed to PG350N and not for example to Core Duct (AG149). BT's response is reproduced below:

> *"The charges to Openreach for cumulo rates and the transfer charge out are allocated on the same basis, so there is no net impact. The relevant allocation is the CUMNORM base which allocates the underlying costs."*

Objectivity

- The approach used to identify NGA assets is not transparent. The methodology description can be further improved to expand the explanation on how BT identifies the NGA assets from the overall set

Consistency

- The methodology is not consistent with the approach taken for attributing Cumulo rates to non-NGA assets. Cumulo rates are 100% allocated to GEA Spine fibre (PG950C) which means GEA distribution fibre (PG951C) does not get apportioned any cumulo rates. Although Cartesian agrees with BT's explanation (below) that there is no impact since these costs are all attributed to the Wholesale Residual market, it raises consistency issues. Moreover, it may be an issue if NGA products are subject to charge control in the future. BT's response is reproduced below:

> *"The NGA rating value is calculated separately from the rest of the network so if cumulo rates were apportioned to FTTC tie cables the cost would be reallocated from PG953C (DSLAM and cabinets) and PG950C (GEA access fibre spine). All such costs lie within the residual market and therefore a reallocation would have no impact on the RFS or AFI as currently reported."*

6.2.3.5 Potential Alternatives

We note that an alternative to this method has been proposed by Ofcom in the recent Financial Reporting Consultation[19] and Ofcom will be taking a final decision on this in time for the 2014/15 RFS.

Ofcom's proposed method tackles the attribution issues identified above by Cartesian as part of the RAP assessment and appears to be a good alternative in the right direction.

[19] http://stakeholders.ofcom.org.uk/consultations/financial-reporting/

6.2.4 NGA Duct Depreciation

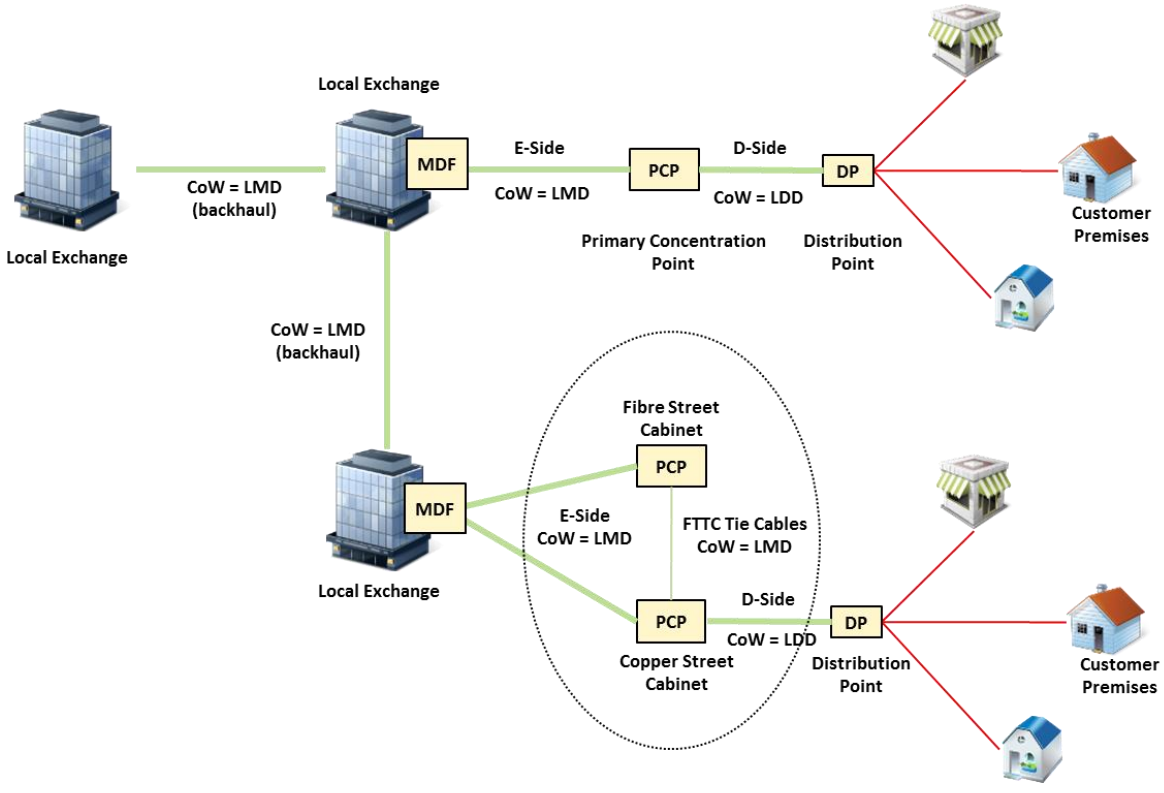
6.2.4.1 Overview

The NGA duct depreciation method is used to apportion duct costs related to duct built specifically to connect fibre street cabinets and copper street cabinets (i.e. for NGA FTTC deployments) from other duct built in other segments of the access network, as illustrated in the Figure below (bottom scenario).

The NGA duct costs are booked against the same E-side class of work (LMD – Local Exchange Side Duct) as non-NGA costs. The non-NGA duct costs are related to duct between local exchanges (backhaul segment) and between local exchange and Primary Point of Concentration (PCP) nodes (E-side access segment).

Note that BT hasn't created a specific CoW for NGA assets and activities costs. However, duct costs incurred due to NGA associated deployments must be split from other non-NGA E-side duct costs. The non-NGA duct costs are then split between access and backhaul as per Duct Valuation method.

Figure 18. ***BT's access network and CoW used by segment***



Source: Cartesian

6.2.4.2 Applicable Cost Categories

This methodology is used to apportion costs incurred by units within Openreach, BT Retail Northern Ireland Retail (MJ) and BT TSO divisions. Table 284 below shows those cost categories attributed with costs using the PDTLMD methodology and the respective attributed costs.

Table 284. ***Cost Categories attributed with cost by the NGA Duct methodology***

Cost Category	BT Ref.	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
Duct used by Access Cables	**AG135**	Duct	✂[£0 to £10]	✂[£200 to £250]	✂[£10 to £50]	5.4.4
Duct used by Backhaul Cables	**AG148**	Duct	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	5.4.5
FTTC Copper Tie Cables	**PG192A**	Copper	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	5.7.5
Grand Total			✂[£0 to £10]	✂[£300 to £350]	✂[£10 to £50]	-

Source: BT ASPIRE, Cartesian

6.2.4.3 *Detailed Methodology*

This method is used by the PDTLMD base methodology. The apportionment ratio for duct costs incurred due to the NGA FTTC product is calculated based on the depreciation of the copper tie cables used to connect the two street cabinets.

The apportionment uses the ratio of the depreciation of tie cables used for FTTC to the year-to-date (YTD) depreciation of E-side copper cable. A full-year period is considered (i.e. 12 months) for E-side copper, hence both are annual depreciation figures. LLU depreciation, which is part of LMD too, is removed.

The ratio is given by the following expression:

$$FTTC\ tie\ cables\ Ratio\ (\%) = \frac{FTTC\ Tie\ Cables\ Year\ Depn}{E-side\ Copper\ Cable\ YTD\ Depn}$$

The FTTC tie cables depreciation is estimated from the total capital expenditure (capex) on NGA projects, which is booked against LMD CoW. Total capex is then divided by the duct lifespan in E-side to determine the tie cables year depreciation. Duct lifespan is currently set to 40 years.

$$FTTC\ Tie\ Cables\ Year\ Depn = \frac{Total\ LMD\ NGA\ Capex}{Duct\ Lifespan}$$

The NGA share of costs is apportioned to PG192A. The remaining costs (non-NGA) are apportioned using the PDTDUCT methodology, meaning that 83% of these costs go to Access Duct (AG135) and 17% to Backhaul Duct (AG148).

6.2.4.4 *RAP Assessment*

Concerns regarding **Accuracy**, **Causality** and **Objectivity**

Accuracy

- There are concerns regarding accuracy, as the methodology relies on manual categorisation. The LMD/NGA capex mapping is done by inspecting the costs booked against LMD (provided by IPL extract from CID system) and then deciding which costs are related to NGA based on product knowledge. This manual inspection and decision process may introduce errors. Currently 11% of access duct costs are attributed to tie cables used to connect to two street cabinets (fibre and copper street cabinets) in FTTC deployment. Based on the FAC attributed and Cartesian's general understanding of the method, it is estimated that an additional ✂ [£0 to £5m] will be attributed to Wholesale Residual rather than to regulated markets if the ratio varies +1%.

Causality

- The FTTC tie cable depreciation calculation doesn't appear to be causal. Cartesian has some concerns about using cable depreciation to apportion duct costs when the rest of duct costs in the "LMD pool" are attributed based on duct valuation.

Objectivity

- There are concerns regarding objectivity due to attribution of costs to an apparently unrelated cost category. The PDTLMD base methodology allocates 100% of the costs (approximately ✂ [£0 to £5m] FAC) incurred by TSO to core duct (AG149). However the LMD CoW is used to book access (E-side) duct costs, and not core duct costs.

6.2.4.5 Potential Alternatives

Cartesian recommends the creation of a specific class of work for NGA related activities. This would allow a direct relationship to be established and avoid the need to apportion costs.

Further investigation is required by BT to confirm feasibility of the implementation of a new CoW in BT's systems.

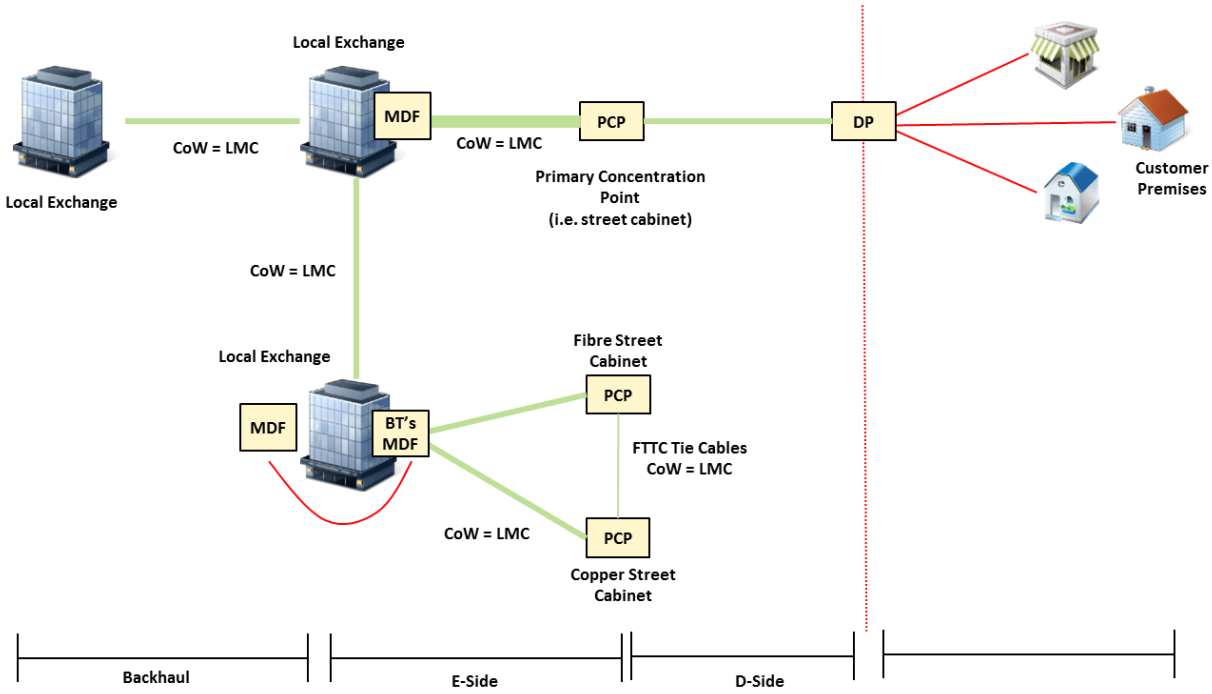
6.2.5 E-side Copper Cable Depreciation

6.2.5.1 Overview

E-side copper cable depreciation charges are used to apportion costs related to copper cables in the exchange side (E-side) which are booked against the LMC class of work (CoW).

The largest share of costs is apportioned to the copper cables deployed between exchanges and PCP nodes as they constitute the majority of copper cables in the E-side (PG117C). The remainder is attributed to tie cables within the exchanges (PG130A), tie cables that connect street cabinets in FTTC deployments (PG192A), and to testing equipment related to MPF services (PG151B).

Figure 19. ***BT's access network and CoW used by cable type***



Source: BT, Cartesian

6.2.5.2 Applicable Cost Categories

This methodology is used to apportion costs incurred by units within Openreach and BT Retail Northern Ireland Retail (MJ) divisions. Table 285 below shows those cost categories attributed with costs using the PDTLMC methodology and the respective CCA, MCE and FAC amounts.

Table 285. ***Cost Categories attributed with cost on the basis of E-Side copper depreciation***

Cost Category	BT Ref.	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
E-side Copper Cable	**PG117C**	Copper	✂[£10 to £50]	✂[£500 to £600]	✂[£100 to £150]	5.7.5
Intra-exchange Tie Cables	**PG130A**	Copper	✂[£10 to £50]	✂[£150 to £200]	✂[£10 to £50]	5.7.7
FTTC Copper Tie Cables	**PG192A**	Copper	✂[£0 to £10]	✂[£50 to £100]	✂[£10 to £50]	5.4.5
Broadband Line Testing Equipment (Openreach)	**PG151B**	Others	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	5.10.16.4
Grand Total			✂[£50 to £100]	✂[£800 to £900]	✂[£150 to £200]	-

Source: BT ASPIRE, Cartesian

6.2.5.3 *Detailed Methodology*

The apportionment is based on the relative sizes of the year to date (YTD) depreciation in the copper-cable plant groups at a period representative of the full year. These figures are taken from the Life of Plant (LoP).

The cost attribution method consists of two steps. First, the costs are apportioned among three sub-classes of work (called asset policies) representing the different copper cable types in the E-side segment: E-side copper cables, tie cables used within the exchanges to connect BT MDF to other providers' switching room in the exchange and tie cables used in FTTC deployments to connect two street cabinets.

The apportionment is done by weighting the year-to-date depreciation of the several cables for a full year period (12 months). These figures are taken from the Life of Plant (LoP).

Second, the corresponding costs attributed to tie cables (those used within the exchange) are further apportioned between Tie cables (PG130A) and TAMS equipment (PG151B). The reason is that Openreach's engineers record the time spent installing this equipment to the same asset policy within LMC CoW as that used for tie cables. The apportionment is done based on a survey of asset registrations.

6.2.5.4 *RAP Assessment*

Concerns regarding **Accuracy** and **Objectivity**

Accuracy

- The accuracy of this method may be exposed to the risk of human error. The derivation of FTTC tie cables depreciation is not explained but Cartesian believes it's done in the same way as described in PDTLMD methodology, i.e. using a manual process to identify capital expenditure on NGA projects.

- Copper cable costs are attributed to FTTC tie cables (PG192A) based on cable depreciation. The RFS 13/14 attributes 9.3% of costs booked against LMC CoW to PG192A. Based on the FAC attributed and Cartesian's general understanding of the method, it is estimated that an additional ✂ [£0 to £5m] copper FAC will be attributed to Wholesale Residual (via PG192A) if a variation of +1% is applied

Objectivity

- The methodology is not transparent as there is a step missing from the explanation. The calculation of depreciation for FTTC Tie cables (PG192A) is not described in the DAM nor in the excel models.
- The methodology is not transparent as it is unclear how BT makes use of some input data. A survey of asset registrations is used to apportion costs between TAMS equipment (PG151B) and Tie cables (PG130A) but BT does not explain how it uses it to determine the apportionment.

6.2.5.5 Potential Alternatives

No better alternatives identified.

6.2.6 SFI and TRC 'equivalent cost'

6.2.6.1 Overview

The cost attribution based on Special Fault Investigation (SFI) and Openreach Time Related Charges (TRC) 'equivalent cost' is shared by more than one methodology.

Table 286 below shows the base methodologies using this method. Each relates to a specific access segment.

Table 286. ***Base methodologies apportioning on the basis of SFI and TRC equivalent cost***

Base Methodology	Access Segment	Costs to Apportion
PDTORSFI	Dropwires	costs of repairing dropwires over-head cable
PDTURSFI	Dropwires	Costs of repairing dropwire underground cable
PDTCORES	Dropwires	costs of repairing residential dropwires
PDTUDL	D-Side Copper	costs of repairing D-side copper cables
PDTUEL	E-side copper	Costs of repairing E-side copper cables
PDTMTLUR	E-side copper	Costs of repairing copper cables associated with MDF
PDTMDF	MDF at exchange	Cost of repairing MDF at local exchange

Source: BT

In each network segment, cost of repair/maintenance activities are booked against the same CoW, i.e., D-side repairing costs to UDL, E-side repairing costs to UEL, etc. Those CoWs also include costs related to Special Fault Investigation (SFI) activities and Openreach Time Related Charges (TRC). However, these costs need to be split out in the RFS and treated separately. SFI and TRC costs are apportioned to specific Plant Groups and then 100% allocated to Wholesale Residual.

6.2.6.2 *Applicable Cost Categories*

Table 287 below shows the cost categories attributed with costs from base methodologies using SFI and TRC 'equivalent cost' as their apportionment method. Approximately ✂ [£200m to £250m] FAC is attributed by this method.

Table 287. ***Cost Categories attributed with fibre costs based on fibre length driver***

Cost Category	BT Ref.	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
D-side Copper Cable Maintenance	**PG118M**	Copper	✂[£100 to £150]	£0	✂[£100 to £150]	5.7.11
Dropwire Maintenance Residential	**PG122M**	Copper	✂[£50 to £100]	£0	✂[£50 to £100]	5.7.14
E-side Copper Cable Maintenance	**PG117M**	Copper	✂[£10 to £50]	£0	✂[£10 to £50]	5.7.6
Main Distribution Frames Maintenance	**PG217F**	Other	✂[£10 to £50]	£0	✂[£10 to £50]	5.10.10
Special Fault Investigation	**PG989A**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.14
Time Related Charges	**PG981R**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.14
Grand Total			✂[£200 to £250]	£0	✂[£200 to £250]	-

Source: BT ASPIRE, Cartesian

6.2.6.3 *Detailed Methodology*

For each CoW (e.g. dropwires, dropwires overhead cables, D-side copper cables, etc.), BT determines the 'equivalent cost' of the time spent on Openreach Time Related Charges (TRC) and Special Fault Investigation (SFI) activities on that part of the network. This is derived by multiplying a standard Openreach man-hour rate by kilo man-hours (kMH) spent on TRC and SFI. The kMH for each is given by Openreach Management accounts where BT is able to establish the total amount of engineers' hours booked to the Time Related Charges and SFI and also to which classes of work the hours have been booked.

The SFI and TRC 'equivalent cost' is the cost driver determining the apportionment of the actual costs to the TRC (PG981R) and SFI (PG989A) Plant Groups. The formula for the SFI ratio is shown below (TRC is identical):

$$SFI\ Ratio\ (\%) = \frac{SFI\ equivalent\ cost}{total\ (actual)\ CoW\ cost}$$

The remaining costs are attributed to either PG122M in case of dropwires maintenance (PDTORSFI and PDTCORES) or PG118M in case of D-side copper cable maintenance (PDTUDL).

The total (actual) costs for each CoW are extracted from the CID system at BT.

6.2.6.4 *RAP Assessment*

No concerns

We believe that this methodology aligns with Ofcom's regulatory accounting principles. Our assessment was conducted within the time constraints of the project and is based on information received from BT.

Note: The PDTMTLUR description in the DAM is incorrect. MTLUR is a CoW related to Maintenance of end-user customer's internal wiring and network termination equipment (NTE) and not MDF as indicated in the DAM. Despite this documentation error, the apportionment itself is correct according to further information received from BT.

6.2.6.5 *Potential Alternatives*

No better alternatives identified.

6.2.7 Fibre Length

6.2.7.1 Overview

BT uses the fibre length (km) to apportion backhaul and core fibre related costs between 20C and 21C networks and then uses the respective units and bearer types to apportion to the appropriated cost categories (at PG level).

The apportionment is required because fibre costs incurred on 20C and 21C backhaul and core networks are booked against the same CoWs (e.g. CJF, MUC or CJC) by the units working on them (from Openreach, BT TSO or BT Retail Northern Ireland divisions). These costs are mainly related to asset values and depreciation charges associated with the optical fibre in these networks.

This method is used by three different base methodologies. All three apportion fibre related costs into fibre related PGs. Table 288 below shows those base methodologies.

Note: Junction cables is an alternative term for backhaul and core fibre in BT. BT said CJF is the main CoW now used for all core and backhaul fibre and MUC and CJC CoW will be deprecated.

Table 288. ***Base Methodologies using the Fibre Length driver***

Base Methodology	Name
PDTCJF	construction of optical junction cable
PDTMUC	construction of metallic junction cable
PDTCJC	construction of main underground cable

Source: BT, Cartesian

6.2.7.2 Applicable Cost Categories

The PDTCJF methodology apportions the largest proportion of costs related to backhaul fibre between 20C and 21C networks. Note that units within BT TSO division do not attribute costs to backhaul fibre (PG170B), which is under Openreach remit. In contrast, units within Openreach division do not attribute costs to Core Fibre (PG350N), which is under BT TSO remit. The BT Retail Northern Ireland (Openreach equivalent in Northern Ireland) attributes costs to all the cost categories except for PG350N.

Cartesian noted however that BT Retail (M) attributes some MCE to PG350N using PDTCJF methodology, albeit very small amount (c. £10k).

Table 289 below shows the cost categories receiving costs from the three base methodologies using fibre length as the apportionment method. PG170B and PG350N represent fibre deployed in 20C backhaul and core fibre networks respectively. The remaining four PGs represent fibre deployed in 21C backhaul and core fibre networks. These four PGs are outside the scope of this study. Please refer to Section 3 for further explanation. Approximately £52m FAC is attributed by this method.

Table 289. ***Cost Categories attributed with backhaul and core fibre costs based on fibre length driver***

Cost Category	BT Ref.	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
Backhaul Fibre	PG170B	Fibre	✂[£0 to £10]	✂[£200 to £250]	✂[£10 to £50]	0
Core Fibre	PG350N	Fibre	✂[£0 to £10]	✂[£50 to £100]	✂[£10 to £50]	5.5.11
WDM-Metro Length	PG900A	Out of Scope	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	-
Core-Core Length	PG865A	Out of Scope	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	-
Metro-Core Length	PG885A	Out of Scope	£0	✂[£10 to £50]	✂[£0 to £10]	-
Fibre MSAN-WDM Length	PG873A	Out of Scope	£0	✂[£0 to £10]	£0	-
Copper-Fibre MSAN Length	PG863A	Out of Scope	£0	✂[£0 to £10]	£0	-
Grand Total			✂[£10 to £50]	✂[£350 to £400]	✂[£50 to £100]	-

Source: BT, Cartesian

6.2.7.3 *Detailed Methodology*

The first step in the process is to apportion fibre costs between 20C and 21C networks. This is done based on the length of the fibre attributable to 20C and 21C networks. The fibre data is extracted from CTCS system for 20C network and PACS system for 21C network. This is given by the following expressions:

(a) $20C\ Fibre\ ratio\ (\%) = \frac{\text{“20C fibre km”}}{\text{”fibre km total”}}$

(b) $21C\ Fibre\ ratio\ (\%) = \frac{\text{“21C fibre km”}}{\text{”fibre km total”}}$ = 1- ‘20C Fibre Ratio’

The fibre costs attributed to the 20C network (using (a)) are then attributed to Backhaul Fibre (PG170B) if incurred by a unit within Openreach (B) or BT Retail Northern Ireland (MJ), or to Core Fibre (PG350N) if incurred by a unit within BT TSO.

The fibre costs attributed to 21C network (using (b)) must be further apportioned by bearer tier represented by five different 21C-Network-related PGs in the same basis. The length of 21C fibre per bearer tier is extracted from the inventory system (PACS), and it is used to derive the apportionment to each one of the 21C-Network-related PGs.

6.2.7.4 *RAP Assessment*

Concerns regarding **Objectivity** and **Consistency**

Objectivity

- The methodology is not transparent. The DAM document says the methodologies apportion cost of the construction of optical/metallic junction cables. However, they are actually referring to backhaul and core network fibre cables. Junction is an old term used within BT but which now refers to backhaul and core network fibre.

Consistency

- The methodology is not consistent with the approach for apportioning duct costs. At the ledger level, backhaul and core fibre costs are split between 20C and 21C networks based on the fibre length. This contrasts with backhaul and core duct costs which are apportioned based on the number of live circuits (see Duct Valuation method). Cartesian believes that BT should align these two methodologies and use a consistent approach.

6.2.7.5 *Potential Alternatives*

No better alternatives identified.

6.2.8 Fibre Gross Replacement Cost (GRC)

6.2.8.1 Overview

The fibre GRC method is used to apportion NGA and non-NGA access fibre costs to the relevant cost categories. Note that NGA fibre is deployed for Generic Ethernet Access (GEA).

There is no specific CoW for NGA related assets and activities and therefore NGA and non-NGA fibre costs are booked against the same CoW – LFSC for fibre in the spine and LFSC for fibre in the distribution segment. This also applies to the maintenance costs of these assets.

BT defines three base methodologies using this method as shown in Table 290 below.

Table 290. ***Base Methodologies using the Fibre GRC driver***

Base Methodology	Description
PDTLFDC	Methodology used to apportion distribution fibre costs
PDTLFSC	Methodology used to apportion spine fibre costs
PDTLFCM	Methodology used to apportion all maintenance costs over all fibres (non-NGA and NGA)

Source: BT, Cartesian

6.2.8.2 Applicable Cost Categories

Table 291 below shows the cost categories receiving costs from the three base methodologies using fibre GRC as the apportionment method. Approximately £235m FAC is attributed by this method. Note that maintenance costs are exclusively apportioned by the PDTLFCM methodology to bottom three cost categories.

Table 291. ***Cost Categories attributed with fibre related costs based on fibre GRC driver***

Cost Category	BT Ref.	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
Access Distribution Fibre	**PG959C**	Fibre	✂[£50 to £100]	✂[£700 to £800]	✂[£150 to £200]	5.5.4
Access Fibre Spine	**PG111C**	Fibre	✂[£10 to £50]	✂[£250 to £300]	✂[£10 to £50]	5.5.5
GEA Distribution Fibre	**PG951C**	Fibre	✂[£10 to £50]	✂[£100 to £150]	✂[£10 to £50]	5.5.8
GEA Access Fibre Spine	**PG950C**	Fibre	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	5.5.9
Access Fibre Maintenance	**PG111M**	Fibre	✂[£0 to £10]	£0	✂[£0 to £10]	5.5.6
GEA Distribution Fibre Maintenance	**PG951M**	Fibre	£0	£0	£0	5.5.7

Cost Category	BT Ref.	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
GEA Access Fibre Spine Maintenance	**PG950M**	Fibre	£0	£0	£0	5.5.7
		Grand Total	✂[£100 to £150]	✂[£1000 to £1200]	✂[£200 to £250]	-

Source: BT ASPIRE, Cartesian

6.2.8.3 *Detailed Methodology*

The apportionment of fibre costs between NGA and non-NGA plant groups is based on the fibres' relative GRC. NGA does not have its own CoW but according to BT, NGA costs can be identified in the CCA fibre model.

BT's INS system provides the required data volumes for the GRC calculation. The following data is provided per access segment (i.e., non-NGA spine and distribution, and NGA spine and distribution):

- Number of fibre cables
- Total length per each fibre cable size (fibre sheath km)

There are nine different cable sizes in distribution and spine network segments (from 4 to 276 fibres). The Exchange Only (EO) line costs are taken into account in Spine PG.

A calculation is made for each fibre segment, i.e., non-NGA spine, non-NGA distribution, NGA spine and NGA distribution. The GRC consists of a combination of fibre materials (from BT stores e.g. replacement optical fibre cable, splicing box, chamber joint, etc.) and labour costs in deploying the fibres. These are calculated separately in an excel model ("232 CCA Fibre_13_14_p12_PART_E_Ofcom") based on a set of assumptions on stock needs and labour cost per fibre kit/activities (respectively) and cable type. These costs are composed of variable and fixed costs.

Storage (i.e. stores) costs

The stores variable costs are cost items shared by all fibre segments and thus costs are the same for all segments. In contrast, the fixed costs are specific to each fibre segment. A different mix of stores (e.g. chamber joint or optical terminations) and optical fibre cables is calculated for each cable size showing all the different combinations needed. This calculations takes into account stores and cable current prices.

Labour costs

The total labour costs (variable and fixed) are calculated per cable size: the variable and fixed hours per activity type and per cable size are first calculated based on the labour assumptions and then multiplied by the overall labour hour rate.

GRC Calculation

The calculation is performed for each fibre segment and is given by the sum of the total variable and fixed costs of all fibre cable sizes in such network segment.

$$Fibre\ GRC\ (£) = \sum_{Cable\ Size}^{9} [Total\ Variable\ Costs + Total\ Fixed\ Costs]\ \forall\ cable\ size$$

The variable costs are incurred on a fibre-length basis and hence are the labour and store variable costs are multiplied by the total fibre length of each cable size:

$$Total\ Variable\ Costs = Labour\&Stores\ \text{Variable Costs (per km) x Total Sheath Fibre(km)}\ \forall\ \text{cable\_size}$$

In turn, the fixed costs are incurred on a per-cable basis and hence labour and stores fixed costs are multiplied by the total number of cables per cable size:

$$Total\ Fixed\ Costs = Labour\&Stores\ Fixed\ Costs\ (per\ cable)\ x\ Total\ Number\ Cables\ \forall\ cable\_size$$

The weighting of the fibre valuation (i.e. GRC) over the total valuation for all the fibre segments (fixed and variable) defines the apportionment ratios:

$$Ratio(\%) = \frac{Fibre\ GRC}{Total\ Fibre\ GRC}\ \forall\ fibre\ segment$$

6.2.8.4 *RAP Assessment*

Concerns regarding **Consistency**, **Accuracy** and **Causality**

Consistency

- The methodology is not consistent with other approaches used by BT to apportion fibre-related costs. BT uses a variety of approaches: GRC is used to access fibre costs between non-NGA and NGA; Fibre Length is used to backhaul and core fibre in 20C and 21C networks; and current year fibre depreciation is used to attribute associated duct costs between NGA and non-NGA fibre. It is unclear why different approaches are used in each case.
- The Access fibre maintenance costs are captured in a single cost category while in similar cases BT decided to break the costs by segment (e.g. copper maintenance is segmented between D-side and E-side cable; and NGA access fibre maintenance is segmented by spine and distribution fibre)
- In the excel model, NGA fibre labour and stores costs are assumed to be the same both for spine and distribution segments which is not the approach for non-NGA fibre costs.

Accuracy

- There are concerns regarding accuracy due to large, unexplained changes in input parameters. In the fibre GRC model, there is a large reduction in the NGA spine volumes between 2012/13 and 2013/14. The number of cables falls from c. 48,000 to 2,500. There were no explanatory notes for this in the model provided to Cartesian. BT needs to provide further explanation.
- There are concerns regarding the accuracy of the model logic. The costs calculated for Exchange Only (EO) lines (as mentioned above these costs are taken into account in the Spine PG) are used for NGA labour costs (fixed and variable). It is not obvious why this is

done, but there are no separate calculations for NGA labour costs. A similar issues exists for NGA stores costs which take the output of the calculation of EO fixed costs.

- The Fibre GRC valuation model determined an 87%-13% non-NGA/NGA ratio. Based on the FAC attributed and Cartesian's general understanding of the method, it is estimate that -1.2% of fibre FAC will be attributed to regulated markets, (note that NGA costs are 100% attributed to unregulated market) which represents ✂ [£0 to £5m] if +1% is applied to NGA ratio (i.e. 14%).

- There are accuracy concerns regarding the broad use of a specific apportionment ratio. BT does not calculate a specific apportionment base for NGA spine fibre. For this segment, BT apportions costs using the ratios which are calculated for NGA distribution fibre. According to BT, although they have some data regarding spine segment (as shown in the excel model), it is difficult to distinguish NGA fibre in spine segment as similar fibres travel in the same cable. Since BT has more accurate data of the fibre split in the distribution segment, it has taken the simplifying approach that the ratio in the spine segment matches that of the distribution segment. BT's response is reproduced below:

    - BT response: *"GRC is a good basis to apportion our fibre asset since it allows us to compare the value of our fibre cables provided for NGA with the value of our other fibre cables at today's prices. The distribution fibre cables provided for NGA are readily recognisable in our source INS data but this is not the case for spine fibre cables. As distribution cables are connected to the spine cables, we consider it reasonable to use the GRC split of distribution fibre to apportion both spine and distribution cables"*

Causality

- The base for apportioning operational costs does not appear causal. The costs are apportioned on the basis of GRC implies that costs in the current year follow the value of assets. For maintenance costs, this may hold true (assuming that the likelihood of repair and the cost of maintenance does not vary between type of assets, only on value). However for construction of new fibre plant, this would require investment by network segment to be in proportion to the GRC of existing assets which does not appear reasonable.

6.2.8.5 Potential Alternatives

Cartesian recommends the creation of a new CoW for NGA related fibre activities and assets in the access network. This would allow a direct relationship to be established and avoid the need to apportion costs based on Fibre GRC.

6.2.9 Access fibre CCA adjustment based on Fibre GRC

6.2.9.1 Overview

CCA adjustment costs related to access fibre need to be apportioned over the access fibre cost categories. These are apportioned to plant groups by the CCAFIB base methodology.

6.2.9.2 Applicable Cost Categories

CCA adjustment costs for access fibre are apportioned between the distribution and spine fibre cost categories (see Table 292).

Table 292. ***Cost Categories attributed with access fibre CCA adjustment based on existing cost bases***

Cost Category	BT Ref.	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
GEA Access Fibre Spine	**PG950C**	Fibre	[-£10 to £0]	[-£50 to -£10]	[-£10 to £0]	5.5.9
GEA Distribution Fibre	**PG951C**	Fibre	[-£10 to £0]	[-£50 to -£10]	[-£10 to £0]	5.5.8
Access Fibre Spine	**PG111C**	Fibre	[-£50 to -£10]	[-£100 to -£50]	[-£50 to -£10]	5.5.5
Access Distribution Fibre	**PG959C**	Fibre	[-£50 to -£10]	[-£150 to -£100]	[-£50 to -£10]	5.5.4
		Grand Total	[-£100 to -£50]	[-£250 to -£200]	[-£100 to -£50]	-

Source: BT ASPIRE, Cartesian

6.2.9.3 Detailed Methodology

The method used to attribute CCA adjustments to the different access fibre related cost categories is equal to the fibre GRC method described above. BT uses the fibre CCA valuation (which is based on the fibre GRC) to determine the apportionment ratios.

The CCA adjustments are attributed to the different access fibre related cost categories in the same proportion to the fibre costs. BT uses the same method as defined for Fibre GRC. This is done to take into account the share of total access fibre CCA valuation for the year. The calculation of these ratios are done in the NGA model provided by BT.

Cartesian has assessed the two methods separately since they handle two different cost types.

6.2.9.4 RAP Assessment

No concerns

We believe that this methodology aligns with Ofcom's regulatory accounting principles. Our assessment was conducted within the time constraints of the project and is based on information received from BT.

It seems reasonable to Cartesian the usage of the same apportionment method to attribute both the CCA fibre costs and the corresponding CCA fibre adjustments for the year.

Note however, that the quality of this attribution will depend upon the Fibre GRC method being correct.

6.2.9.5 Potential Alternatives

No better alternatives were identified. However, see recommendations made for the Fibre GRC method in Section 6.2.8.

6.2.10 Openreach Common Costs (COMCOS)

6.2.10.1 Overview

In the DAM, BT describes the COMCOS base methodology to attribute 'common' Openreach costs on the basis of Current Pay and Return on Assets. Openreach Common costs include training, internal hospitality, H&S services, stores issues, fleet ICU rental charges and stationary among others. Costs are apportioned based on average pay and return on assets (ROA) within Openreach. This is similar to other attribution methodologies used by BT, e.g. AG103 attribution.

6.2.10.2 Applicable Cost Categories

Table 293 below shows that the majority of the costs are attributed to duct and copper cost categories by COMCOS.

Table 293. ***Cost Categories receiving attributions by COMCOS***

Cost Category	BT Ref.	Cost Group	CCA £m	MCE £m	FAC £m	Section Ref.
Duct used by Access Cables	**AG135**	Duct	[£10 to £50]	[£0 to £10]	[£10 to £50]	5.4.4
D-side Copper Cable	**PG118C**	Copper	[£10 to £50]	[£0 to £10]	[£10 to £50]	5.7.10
Analogue Line Final Drop	**PG149A**	Copper	[£0 to £10]	£0	[£0 to £10]	5.7.13
FTTC Service Delivery & Development	**PG197A**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.15
Access Distribution Fibre	**PG959C**	Fibre	[£0 to £10]	£0	[£0 to £10]	5.5.4
D-side Copper Cable Maintenance	**PG118M**	Copper	[£0 to £10]	£0	[£0 to £10]	5.7.11
Duct used by Backhaul Cables	**AG148**	Duct	[£0 to £10]	£0	[£0 to £10]	5.4.5
E-side Copper Cable	**PG117C**	Copper	[£0 to £10]	£0	[£0 to £10]	5.7.5
MDF Hardware Jumpering	**PG142A**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.12
GEA DSLAM & Cabinets	**PG953C**	NGA	[£0 to £10]	£0	[£0 to £10]	5.9.4
Ethernet Access Equipment	**PG447A**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.8
OR Pay driver	**AG401**	General Overheads	[£0 to £10]	£0	[£0 to £10]	5.3.6

GEA Customer Site Installations	**PG954C**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.16.10
Access Fibre Spine	**PG111C**	Fibre	[£0 to £10]	£0	[£0 to £10]	5.5.5
Time Related Charges	**PG981R**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.14
Dropwire Maintenance Residential	**PG122M**	Copper	[£0 to £10]	£0	[£0 to £10]	5.7.14
Broadband Line Testing Equipment (Openreach	**PG151B**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.16.4
E-side Copper Cable Maintenance	**PG117M**	Copper	[£0 to £10]	£0	[£0 to £10]	5.7.6
Backhaul Fibre	**PG170B**	Fibre	[£0 to £10]	£0	[£0 to £10]	0
Openreach Systems & Development (Product	**PG772A**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.15
Intra-exchange Tie Cables	**PG130A**	Copper	[£0 to £10]	£0	[£0 to £10]	5.7.7
OR Pay plus % FA driver	**AG410**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.16.3
LLU Co-mingling Recurring Costs (OR)	**PG132B**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.10
GEA Distribution Fibre	**PG951C**	Fibre	[£0 to £10]	£0	[£0 to £10]	5.5.8
Openreach Other Activities	**PG986R**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.16.18
FTTC Copper Tie Cables	**PG192A**	Copper	[£0 to £10]	£0	[£0 to £10]	5.4.5
Special Fault Investigation	**PG989A**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.14
Other (x21)			[£10 to £50]	[£0 to £10]	[£10 to £50]	-
Grand Total			[£0 to £10]	£0	[£0 to £10]	-

Source: BT ASPIRE, Cartesian

6.2.10.3 Detailed Methodology

To avoid duplication, a detailed description of how COMCOS base methodology attributes cost to activity groups and plant groups is discussed in the 'Pay and Return on Assets" assessment, in section 6.3.6.

6.2.10.4 RAP Assessment

Concerns regarding **Objectivity** and **Causality**

Objectivity

- The methodology is not objective as it uses an arbitrary weighting factor. A WACC of 10.8% is used to effectively weight the importance of pay and asset values in the apportionment. Whilst this value may be reasonable, we understand that it is not directly driven by BT's actual WACC.

Causality

- Attributing a broad pool of common costs on the basis of Pay and RoA does not appear causal. BT justifies the use of this apportionment methodology in the DAM on the basis that the driver reflects the corporate activities of "*managing the assets of the company to create a return"*. We have two concerns regarding the causality of this approach:
    1. The time and effort required to manage assets may not correlate with the value of the assets.
    2. Openreach employees (including the management) are working to achieve a return on the assets. Combining Pay and ROA may therefore lead to an aspect of double-counting.

6.2.10.5 Potential Alternatives

An alternative method would be to apportion costs on pay alone. Advantages of using pay as the cost driver include greater transparency and objectivity. In terms of causality, this overcomes the issue regarding large asset bases that do not require much management attention. Furthermore, as outlined above, a pay driver would correlate with employees who are themselves managing the company's assets.

In addition to the above, if BT believes that certain costs in the General Ledger have a particularly strong relationship to company's core assets and should not be attributed based on pay, then the attribution of those costs should be done separately (outside COMCOS) using a consistent and causal, asset attribution approach (e.g. depreciation or NBV).

6.2.11 Data Centre Budgeted Data

6.2.11.1 Overview

The Data Centre (DC) budgeted data method is used to apportion transfer charges associated with BT retained offices and facilities management costs to AGs and PGs at Level 1. This used by the OPGENACC base methodology.

BT TSO is responsible for BT's data centres which are billed by Group Property for the floor space they use. Consequently BT TSO bill the different LoBs for their usage of the data centres.

It appears these data centres are installed in BT's retained office buildings rather than in operational buildings. According to BT, the BT TSO accommodation space is made up of 33% of office space and 66% is occupied by computer servers.

These transfer charges are passed by BT Property to BT TSO units (TS and TX).

6.2.11.2 Applicable Cost categories

Table 294 below shows the cost categories receiving the transfer charges from the OPGENACC base methodologies using DC budgets as the apportionment method. Approximately ✂ [£10 to £50m] FAC is attributed by this method.

Table 294. ***Cost Categories receiving attributions from OPGENACC***

Cost Category	BT Ref.	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
TSO Operational Costs	**AG102**	Other	✂[£10 to £50]	£0	✂[£10 to £50]	5.10.11
WS Pay driver	**AG406**	General Overheads	✂[£0 to £10]	£0	✂[£0 to £10]	5.3.6
SG&A Broadband	**PG609N**	General Overheads	✂[£0 to £10]	£0	✂[£0 to £10]	5.3.7
Corporate Costs	**AG112**	General Overheads	✂[£0 to £10]	£0	✂[£0 to £10]	5.3.4
Others (26x)	-	-	✂[£0 to £10]	£0	✂[£0 to £10]	-
		Grand Total	✂[£10 to £50]	£0	✂[£10 to £50]	-

Source: BT ASPIRE, Cartesian

6.2.11.3 Detailed Methodology

The cost attribution method consists of two steps.

First the system attributes the charges by operational unit. This is done by weighting the budgets of each LoBs, estimating how much of the data centres capability each business unit intends to use. An apportionment weight by business unit is determined out of the total costs incurred by BT TSO to run those data centres on behalf of the LoBs.

Then, BT attributes the transfer charges to the relevant AGs and PGs. Transfer charges for Global Services and Retail are allocated directly to Retail Products. For other LoBs, BT uses Pay to determine the attribution weights. This is to reflect the use of the servers by the people.

For example, amongst other systems hosted in the data centres on behalf of Openreach by BT TSO, the Network Engineering Journey (NEJ) system in one of them which is used to record Openreach's duct geographical information and plan maintenance activities. To determine cost attribution, TSO attributes costs to Openreach for hosting NEJ. This is considered during the budgeting exercise mentioned earlier. Once the Openreach space costs are determined, BT the attributes costs of this Openreach system to duct AGs using the apportionment weights defined by the PDTDUCT base methodology.

6.2.11.4 RAP Assessment

Concerns regarding **Objectivity**

Cartesian has concerns over the Objectivity (transparency). This concerns is discussed below.

Objectivity

- The methodology is not transparent due to insufficient detail in the documentation. As BT explains the methodology, it appears that the business units go through a budgeting and negotiation exercise to determine how much of TSO data centre budget should be attributed to each division. The calculation models used and the assumptions made to determine the division level attributions were not available to Cartesian for review and are not discussed in sufficient detail in the DAM. We understand that once BT has identified the apportionment of cost at a division level, in some cases, further apportionment is made on the basis of pay, however the basis of attribution for each division may be different and are not specified by BT. Due to time limitations on the project, Cartesian was unable to discuss this methodology at length with BT.

6.2.11.5 Potential Alternatives

No better alternatives identified.

6.2.12 TSO Billing System

6.2.12.1 Overview

The TSO billing system is used to apportion costs that TSO incurs in supporting other BT units. It uses project codes, cost categories and OUCs to determine the weights and destination of cost attribution. The TSO Billing System is only used to attribute costs from F8/OUC (Level 0) to activity groups and plant groups. These base methodologies are TSO EXCEPT base methodologies.

6.2.12.2 Applicable Cost Categories

The TSO billing system is used to attribute approximately ✂ [£800 to £900m] FAC as shown in Table 295 below. All of these costs are operational costs. The majority of the costs are attributed to TSO Operational Costs (AG102) using this methodology, closely followed by Corporate Costs (AG112).

Table 295. ***Cost Categories Receiving costs using TSO Billing Methodology***

Cost Category	BT Ref.	Cost Group	CCA (£m)	MCE (£m)	FAC (£m)	Section Ref
TSO Operational Costs	**AG102**	Other	✂[£150 to £200]	£0	✂[£150 to £200]	5.10.11
Corporate Costs	**AG112**	General Overheads	✂[£100 to £150]	£0	✂[£100 to £150]	5.6.5
Openreach Systems & Development (Product	**PG772A**	Other	✂[£100 to £150]	£0	✂[£100 to £150]	5.10.15
FTTC Service Delivery & Development	**PG197A**	Other	✂[£100 to £150]	£0	✂[£100 to £150]	5.10.15
OR Pay driver	**AG401**	General Overheads	✂[£50 to £100]	£0	✂[£50 to £100]	5.3.6
WS Pay driver	**AG406**	General Overheads	✂[£10 to £50]	£0	✂[£10 to £50]	5.3.6
SG&A Broadband	**PG609N**	General Overheads	✂[£10 to £50]	£0	✂[£10 to £50]	5.3.7
TSO Support Functions	**AG103**	General Overheads	✂[£10 to £50]	£0	✂[£10 to £50]	5.3.5
OR Service Centre Provision Analogue/ISD	**PG570B**	Other	✂[£10 to £50]	£0	✂[£10 to £50]	5.10.13
OR Service Centre Provision LLU	**PG572B**	Other	✂[£10 to £50]	£0	✂[£10 to £50]	5.10.13
OR Service Centre Provision NGA	**PG574B**	Other	✂[£10 to £50]	£0	✂[£10 to £50]	5.10.13
SG&A Wholesale Residual	**PG583N**	General Overheads	✂[£0 to £10]	£0	✂[£0 to £10]	5.3.7
Routing and Records	**PG140A**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.16.11
OR Service Centre Provision Ethernet	**PG573B**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.13
Ethernet Access Equipment	**PG447A**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.8
SG&A downstream Residual	**PG585A**	General Overheads	✂[£0 to £10]	£0	✂[£0 to £10]	5.3.7
SG&A PPC (Wholesale)	**PG506N**	General Overheads	✂[£0 to £10]	£0	✂[£0 to £10]	5.3.7
Analogue Linecards	**PG127A**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.6

Other (x70)		-	[£10 to £50]	£0	[£10 to £50]	-
Grand Total			[£800 to £900]	£0	[£800 to £900]	-

Source: BT ASPIRE, Cartesian

6.2.12.3 *Detailed Methodology*

The majority of the TSO EXCEPT bases use the TSO billing system to determine the attribution weight of TSO costs. BT TSO is able to extract, from its internal trades billing system, a report with project codes, activity type (e.g. development, support, maintenance, etc.) and OUCs. When determining the attribution base, BT uses the two digit OUC information along with project type information to determine the attribution for the specific cost.

EXCEPT bases (short for exception) are manually configured attribution bases in ASPIRE. These are configured by BT annually. BT is able to point these bases to attribute costs to specific destinations.

The EXCEPT bases are applied based on two-digit OUCs. For example, the EXCEPT (TA) base will attribute all the costs relating to OUC TA, depending on the project type and the line of business receiving that project. This attribution base methodology can be broken down into three main steps as described below.

Step 1 – Download TSO Billing System Report

First, BT downloads a report from the TSO Billing System to determine all the projects delivered during the year to lines of businesses within BT. A simplified, illustrative output of the TSO billing system is shown in Table 296 below.

Table 296. ***TSO Billing System Output Illustration (Cartesian's understanding – not verified with BT)***

Project Code	Project (income) Type	TSO Unit Conducting Project	OUC Receiving Project	Division (LoB)	Cost of Project (£m)
Project 1	Development	TA	BA	Openreach	£ 1,000
Project 2	IT Support	TN	BA	Openreach	£ 2,000
Project 3	Network Design	TN	BE	Openreach	£ 500
Project 4	Development	TA	JA	BT Global Services	£ 500
…	…	…	…	…	…

Step 2 – Configure ASPIRE with EXCEPT base

Using the data from the TSO Billing System, BT manually creates mapping of specific EXCEPT bases to cost categories in ASPIRE. An illustration of this mapping in ASPIRE is shown in Table 297 below.

Table 297. ***EXCEPT base configuration in ASPIRE (Illustrative)***

Base Methodology	OUC Receiving Project	Destination Cost Categories configured in ASPIRE	Percentage Attribution
EXCEPT (TA)	BA	PG001	75%
EXCEPT (TA)	BA	PG002	25%
EXCEPT (TN)	BE	PG001	100%
…	…	…	…

These EXCEPT bases follow a set of rules to attribute costs to the destination cost categories. These rules depend on a combination of project type and the division for which that project was done. Table 298 below shows a sample set of these configuration rules.

Table 298. ***Configuration of EXCEPT Attribution Methodologies in ASPIRE (illustrative sample)***

Project Type	Division	Attribution Principle
Development / Non-Volume Development	Openreach (B)	Step A – For Openreach specific developments, attribute costs to specific Openreach related destinations (cost categories) as configured in ASPIRE Step B – If non-specific developments are found then attribute costs using **Openreach Fixed Asset base**
	BT Wholesale (K)	Step A – For BT Wholesale specific developments, attribute costs to configured destinations within ASPIRE based on the financial value of the projects Step B – If non-specific developments are found then attribute costs based on **Current Pay**
	BT Group (C)	Allocate 100% of costs to AG112
	BT Global Services (J)	Allocate 100% costs to Retail Products
	BT Retail (M)	Step A – If BT Retail OUC is 'MJ' (BT Northern Ireland), then treat costs following Openreach attribution principles Step B – For any other BT Retail costs, allocate 100% of costs to Retail Products

IT Support	All Divisions	Step A – Look up BT TSO internal billing system to determine IT Support costs for each division Step B – Attribute division specific costs to configured destinations based on **Pay**
Customer Services Network Operations (CSNO)	All Divisions	Step A – Look up BT TSO internal billing system to determine CSNO costs for each division Step B – Attribute division specific costs to configured destinations based on **Pay**
Contract & In-Life Product Support	All Divisions	Step A – Look up BT TSO internal billing system to determine Contract & In-Life Product Support costs for each division Step B – Attribute division specific costs to configured destinations based on **TSO Resourcing Planning data**
…	…	…

Source: BT ASPIRE, Cartesian

In discussions, BT confirmed that all the platform support costs (of TSO) can be mapped to the business units that own the platform. For example, if BT TSO provides 2nd and 3rd line support for a shared billing platform developed for BT Retail and BT Wholesale, then the support costs for that platform will be shared between the two divisions based on the share of development costs for the two divisions. BT also confirmed that there is typically more demand for platform support than the supply, hence there is typically no excess support costs that need to be shared by business divisions.

Step 3 – Enter TSO Billing Data in ASPIRE

Once TSO Billing System data is input into ASPIRE it attributes costs based on configured policies. For example, when cost for Project 1 (in Table 296) is being attributed, ASPIRE will check for the TSO unit delivering the project to identify which EXCEPT base to apply. Then, using the 'Project Type', 'OUC receiving the project' and 'configured destination' information for that EXCEPT base (within ASPIRE), ASPIRE will attribute cost (see Table 298 above for attribution policies).

Table 299. ***ASPIRE Attribution to Configured Destinations (Illustrative)***

Cost Category	Related OUC for Cost Category	Project Type	Project Code	TSO Unit Conducting Project	Base Applied	Cost Attributed
PG001	BA	Development	Project 1	TA	EXCEPT (TA)	£750
PG002	BA	Development	Project 1	TA	EXCEPT (TA)	£250
PG001	BE	Network Design	Project 3	TN	EXCEPT (TN)	£500
…	…	…	…	…	…	…

6.2.12.4 *RAP Assessment*

Concerns regarding **Accuracy, Causality** and **Consistency**

Accuracy

- The accuracy of the methodology is reliant on manual attributions. As the EXCEPT base methodologies are manually configured within ASPIRE (annually) to determine the destination cost categories, there is a risk of human error that may result in incorrect attribution and destinations being defined. As with addressing any other risk of human error, Cartesian recommends that BT applies due-diligence and extra checks to reduce the probability of this risk.

Causality

- There are concerns over this methodology fully satisfying the Causality principle. This is because the same EXCEPT base methodology uses different attribution methodologies. For example, EXCEPT (TA) attributes non-specific development costs for Openreach on the basis of Fixed Assets whereas the non-specific development costs for Wholesale are attributed on the basis of current pay. Cartesian's recommendation to address this concern is discusses in the Potential Alternative section below.

Consistency

- BT uses two methods for direct cost allocation, raising concerns over consistency. It is not clear why BT attributes some costs directly to activity groups using an EXCEPT base methodology as opposed to directly allocating costs from F8/OUC to Level 1. Some of the costs that use an EXCEPT base but are directly allocated are shown in Table 300 below.

Table 300. ***Direct Allocations configured in ASPIRE using an EXCEPT base***

Cost Type	Allocation Principle
General TSO Network Maintenance costs	Allocate 100% costs to AG102
General TSO Management Costs (e.g. Project Management, TSO Strategy, TSO HR, TSO Finance etc.)	Allocate 100% costs to AG103
Oracle License cost	Allocate 100% costs to AG112

Source: BT, Cartesian

6.2.12.5 Potential Alternatives

As shown in the configuration of EXCEPT methodologies table above (Table 298), in case of non-specific development, Cartesian believes that rather than using Pay (to attribute BT Wholesale non-specific development) and fixed asset base (to attribute Openreach non-specific development), a better alternative may be to attribute the costs based on the type of non-specific development. For example, HR related non-specific development to be attributed based on pay and platform-support-related non-specific development to be attributed based on asset base being supported.

6.2.13 Floor Space Utilisation

6.2.13.1 Overview

Attribution of property costs are made to BT divisions based on occupied floor space. Base methodologies which use this underlying method of space utilisation include DTNASBT and DTNASTR. The methodology applies to both property owned by BT and the costs of leasing the property from Telereal Trillium.

6.2.13.2 Applicable Cost Categories

Property costs are attributed to 46 plant groups on the basis of occupied floor space. Those that are within the scope of this study are detailed in Table 301 below.

Table 301. ***Cost Categories Receiving costs using Floor Space Utilisation Methodology***

Cost Category	BT Ref.	Cost Group	CCA £m	MCE £m	FAC £m	Section Ref
Back-up Power Equipment - Non Maint	**AG164**	Other	✂[£10 to £50]	£0	✂[£10 to £50]	5.10.9
Main Distribution Frames Equipment	**PG217E**	Other	✂[£10 to £50]	£0	✂[£10 to £50]	5.10.6
Analogue Linecards	**PG127A**	Other	✂[£10 to £50]	£0	✂[£10 to £50]	5.10.6
E-side Copper Cable	**PG117C**	Copper	✂[£10 to £50]	£0	✂[£10 to £50]	5.7.5
PDH Traffic Grooming	**PG399T**	Other	✂[£10 to £50]	£0	✂[£10 to £50]	5.10.16
DSLAM – Overheads	**PG152N**	Other	✂[£10 to £50]	£0	✂[£10 to £50]	5.10.10
LLU Co-mingling Recurring Costs (OR)	**PG132B**	Other	✂[£10 to £50]	£0	✂[£10 to £50]	5.10.10
Local Exchange Concentrator (Sys X) Call	**PG288A**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.6
Local Exchange Processor (AXE10) Equipment	**PG280C**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.6
Local Exchange Processor (Sys X) Equipment	**PG285C**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.6
Access Fibre Spine	**PG111C**	Fibre	✂[£0 to £10]	£0	✂[£0 to £10]	5.5.5
Copper MSAN Combi Cards Broadband element	**PG857A**	21CN	✂[£0 to £10]	£0	✂[£0 to £10]	5.8.5
MSH STM64 Equipment	**PG385T**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.16.15
WDM-Metro Link	**PG899A**	21CN	✂[£0 to £10]	£0	✂[£0 to £10]	5.8.6
Backhaul Fibre	**PG170B**	Fibre	✂[£0 to £10]	£0	✂[£0 to £10]	0
Copper MSAN Control Transport	**PG860A**	21CN	✂[£0 to £10]	£0	✂[£0 to £10]	5.8.5
IP Network Broadband	**PG672A**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.7
GEA Access Fibre Spine	**PG950C**	Fibre	✂[£0 to £10]	£0	✂[£0 to £10]	5.5.9
Copper MSAN Control Access	**PG859A**	21CN	✂[£0 to £10]	£0	✂[£0 to £10]	5.8.5

IP Network Management	**PG668A**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.5
IP VOIP Infrastructure	**PG675A**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.7
Ethernet Switches	**PG901A**	21CN	[£0 to £10]	£0	[£0 to £10]	5.8.7
Core Fibre	**PG350N**	Fibre	[£0 to £10]	£0	[£0 to £10]	5.5.11
Core-Core Link	**PG866A**	21CN	£0	£0	£0	5.8.6
Others (x22)	**Other**	-	[£0 to £10]	£0	[£0 to £10]	-
Grand Total			[£200 to £250]	£0	[£200 to £250]	-

Source: BT ASPIRE, Cartesian

6.2.13.3 Detailed Methodology

Property charges are incurred by BT Group Property and attributed to the divisions which use the property. BT Property's remit is to manage BT's estate including payments to Telereal, paying business rates (Cumulo rates), etc. Property owned by BT can be broadly split into two categories:

- Operational Buildings
- General Purpose Buildings

BT uses an internal system call Horizon to record space utilisation by each of the business divisions for the above two categories. This system is used by BT when attributing costs to different activity groups and plant groups. The attribution methodology behind floor space utilisation is discussed below.

First, BT downloads a report from Horizon to determine how much space is being utilised by **Operational Buildings**. This information can then be split down into two main types of utilisation:

- TSO Network Equipment
- Openreach Equipment

TSO Network Equipment

Using the equipment dimensions recorded in the equipment specification documents, BT is able to determine how much space is being utilised by TSO's network equipment. A heat dissipation factor is also applied to the physical dimensions to account for the required cooling and walking space between the equipment. Using the factored dimensions, BT is able to determine the total space occupied by each element of TSO's Network. The network elements are mapped to individual plant groups, which receive a share of the total BT TSO Operational Building space based on the factored dimensions.

Openreach Equipment

For Openreach, BT uses a system called Horizon (owned by Group Property Finance) to determine the space utilised by Openreach. The charges are divided over four different categories within Openreach:

- MDF
- Cable Chambers
- LLU hostels
- Other (which includes Service Centres)

The attribution for Openreach takes place in two stages:

First, using the internal database, Group Property Finance determines the space occupied by Openreach for MDF, Cable Chambers and LLU hostels.

Second, the remainder of used Operational building space is attributed to the 'Other' category. If any space within Horizon for Openreach Operational Buildings is marked as 'vacant', then this vacant space is attributed to the plant groups receiving costs from MDF, Cable Chambers and LLU hostels on an equi-proportional basis. The "Other" category does not receive an allocation of vacant space costs.

Space costs within the 'Other' category is allocated to AG407, which is subsequently attributed to plant groups based on engineers' pay.

General purpose buildings relate to office space costs. Using internal systems, such as Horizon, BT is able to determine how much office space is used by different divisions in the business. BT uses this division-level information to determine the attribution of general building space costs to each division. This is illustrated in the example below.

Example:

If the total building floor space is 10,000ft^2 and the building is occupied by BT Retail, BT Wholesale and BT TSO with the following dimensions:

- BT Retail office space: 4,000ft^2
- BT Wholesale office space: 2,000ft^2
- BT TSO office space: 3,000ft^2

Then the total occupied office space in that building is 9,000ft^2. This utilised space is then used as the denominator to attribute the total building space across the divisions occupying that building. This means that any vacant space in the building is then shared between the divisions on the basis of occupied space. This also means that if the building is occupied by a single division and the space utilisation is (for example) only 20%, then the entire cost of the building is attributed to the division occupying the building. Consequently, this methodology does not more-broadly attribute the costs associated with inefficient use of buildings.

The other factor to consider here is BT's increasing use of hot-desks. When office space is reserved for hot desks, the cost is apportioned to the divisions based on an internal hot-desk booking system (using employee OUC codes). This means that even if the hot desk facility is not fully utilised, the annual cost will be attributed to the division(s) that have made use of the hot-desks.

Once BT Property has determined the cost of office space utilisation by divisions, the cost per division is then further attributed to OUCs within that division based on pay.

6.2.13.4 *RAP Assessment*

Concerns regarding **Accuracy** and **Causality**

Operational building space

Accuracy

- The methodology may not be accurate in its consideration of vacant space. Currently the vacant space in Openreach Operational buildings is only being attributed to MDF, Cable Chambers and LLU. Since some of this vacant space may be suitable for accommodating Openreach employees, it may be more accurate to attribute a portion to the 'other' category.

Causality

- Attributing all of vacant Operational building space to Openreach may not be causal. We understand that BT's justification for this is based on the complexity/cost of exiting a building that houses an MPF frame. However there may be some operational buildings in the core network which do not house MPF frames. If there are such buildings and TSO is a tenant, then it would be more equitable to apportion the shared costs of these buildings between Openreach and TSO.

General building space

Accuracy

- Attributing occupied space costs on the basis of Pay is unlikely to be accurate. Whilst we accept there is some relationship between office size and pay grade, this may be too simplistic. In the case of hot-desk occupancy there is no obvious relationship. Also some workers will have limited need of office accommodation, for example home workers and field technicians. A potential alternative is discussed in the section below.

Causality

- The attribution of vacant space may not be causal. Although the overall methodology used by BT to attribute occupied space appears causal, the approach to attribution of vacant space may not be. The methodology penalises divisions which are housed in office space that is too large for their needs, especially when office accommodation decisions may not be under the control of divisional management.

6.2.13.5 *Potential Alternatives*

Operational building space

To satisfy the Causality principle, Openreach should confirm that there are no operational buildings without MPF frames. If this is not the case, then an apportionment of shared costs (for vacant space)

to TSO may be warranted. The basis of the apportionment could be occupied floor space within those buildings.

Additionally to address the Accuracy principle, BT could attribute costs of vacant space to all categories within Openreach. This means that vacant space is not only attributed to MDF, Cable Chambers and LLU hostels but also to the 'Other' category. To improve accuracy further, Cartesian recommends that BT divides the 'Other' category further to identify where Openreach Operational building space can be used by Openreach employees and hence attribute a share of vacant space to these new sub-categories.

General building space

An alternative approach to deal with vacant office space in the attribution of costs to division is to attribute all vacant building cost to BT Group. The justification for this is that transformation exercises are led by BT Group's efficiency targets for each division. In addition, it is BT Group's responsibility to either return that office space to Telereal or to find new tenants to cover vacant space costs.

Within divisions, office space costs are apportioned based on pay. An alternative would be to attribute costs based on number of office-based FTE.

6.2.14 Power Consumption for TSO

6.2.14.1 Overview

Attribution of Electricity charge to TSO is done on the basis of power consumption of each network element. BT uses the network equipment spec to determine the power consumption of each network equipment. This attribution base is calculated using a TSO Electricity Model.

A separate method is used to attribute Electricity charges to Openreach which is discussed in section 6.2.15 below. The base methodology DTNELSP is used for both TSO and Openreach attribution.

6.2.14.2 Applicable Cost Categories

TSO Electricity costs are attributed to over 40 plant groups. Plant groups receiving costs using this methodology relate to NGA, System X, AXE10, 21CN and other network segments in TSO.

Table 302. ***Cost Categories Receiving costs using Power Consumption for TSO Methodology***

Cost Category	BT Ref.	Cost Group	CCA £m	MCE £m	FAC £m	Section Ref
DSLAM - Overheads	**PG152N**	Other	[£10 to £50]	£0	[£10 to £50]	5.10.10
Analogue Linecards	**PG127A**	Other	[£10 to £50]	£0	[£10 to £50]	5.10.6
LLU Co-mingling Recurring costs (TSO)	**PG132N**	Other	[£10 to £50]	£0	[£10 to £50]	5.10.10
Copper MSAN Combi Cards Broadband element	**PG857A**	21CN	[£10 to £50]	£0	[£10 to £50]	5.8.5
Local Exchange Concentrator (Sys X) Call	**PG288A**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.6
FTTC Copper Tie Cables	**PG192A**	Copper	[£0 to £10]	£0	[£0 to £10]	5.4.5
Local Exchange Processor (Sys X) Equipme	**PG285C**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.6
WDM-Metro Link	**PG899A**	21CN	[£0 to £10]	£0	[£0 to £10]	5.8.6
Local Exchange Processor (AXE10) Equipme	**PG280C**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.6
Copper MSAN Control Transport	**PG860A**	21CN	[£0 to £10]	£0	[£0 to £10]	5.8.5
MSH STM64 Equipment	**PG385T**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.16.15
PDH Traffic Grooming	**PG399T**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.16
Copper MSAN Control Access	**PG859A**	21CN	[£0 to £10]	£0	[£0 to £10]	5.8.5
Ethernet Switches	**PG901A**	21CN	[£0 to £10]	£0	[£0 to £10]	5.8.7
IP Network Broadband	**PG672A**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.7
Core-Core Link	**PG866A**	21CN	[£0 to £10]	£0	[£0 to £10]	5.8.6
IP Network Management	**PG668A**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.5
Metro-Core Link	**PG886A**	21CN	[£0 to £10]	£0	[£0 to £10]	5.8.6

Fibre MSAN Control Transport	**PG869A**	21CN	✂[£0 to £10]	£0	✂[£0 to £10]	5.8.5
IP VOIP Infrastructure	**PG675A**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.7
Copper-Fibre MSAN Link	**PG864A**	21CN	✂[£0 to £10]	£0	✂[£0 to £10]	5.8.55.8.6
Others (x20)	**Others**	-	✂[£0 to £10]	£0	✂[£0 to £10]	-
Grand Total			✂[£100 to £150]	£0	✂[£100 to £150]	-

Source: BT ASPIRE, Cartesian

6.2.14.3 Detailed Methodology

Electricity transfer charges for TSO are apportioned using network equipment data. The attribution weights are calculated using TSO Electricity Model which uses two key inputs:

- Power consumption of 'network segment'
- Hard-coded attribution weights for 'network element'

The terms 'Network Segment' and 'Network Element' are defined by Cartesian for this section only to simplify the understanding of the methodology that BT uses in the TSO Electricity model.

In the TSO Electricity model, BT has divided TSO into different 'Network Segments'. Network segments can be defined as either equipment related (e.g. AXE10, System X, 21CN), or service related (e.g. IP, LLU, NGA, DSL, and Satellite).

'Network Element' in this context can be defined as low level components of the network, e.g. line cards, local end equipment, Routers, Metro-Core links). Each of these network elements is mapped to a single plant group and has an attribution weight hard-coded within the TSO electricity model.

Methodology Calculation

The first step of the process is for BT to collect power consumption data for each of the defined network segments. This is done by speaking with operational managers within TSO. These operational managers are able to provide equipment specification data that helps BT determine how much power each network segment consumes. If actual (measured) power consumption data is available, then BT uses actual data over equipment specification data. This data gives BT per-unit power consumption for each network segment.

BT then uses volume information to determine total power consumption of each network segment (where appropriate).

The second step of the process is for BT to apportion the calculated total power consumption of each network segment to Network Elements (plant groups). This is done at a network element level. In the TSO electricity model provided by BT, the attribution weights are hard-coded. These hard coded inputs are copied and pasted from other data sources / models, which are referenced in the model. As the model did not contain the logic/methodology used to calculate these attribution weights and due to time limitations, Cartesian was unable to review the validity or accuracy of these attribution weights.

The third step of the process is to add power consumptions of all the plant groups and use this total value as a denominator to determine the final apportionment weights across all the plant groups.

In the final step, BT removes the NGA plant group (PG192A) attribution and then re-bases the apportionment weights over the remainder of the plant groups.

6.2.14.4 RAP Assessment

Concerns regarding **Accuracy** and **Objectivity**

Accuracy

- The electricity model shows that there is an 863% increase in power consumption data used for 21CN in FY 13/14(from FY 12/13) due to a change in data source. According to BT, the revised figures come from a more reliable source. Since there are no further details provided regarding the eight-fold increase in power consumption for 21CN, Cartesian is concerned about the reliability of this information and rationale for BT to determine a better power consumption measure for FY13/14. Due to limited time on the project, Cartesian was unable to seek a detailed response from BT on this variance.
- BT sometimes uses the power specifications of network equipment rather than measured values. There is likely to be some variance between the specification and the actual power consumption which may lead to accuracy issues, however on basis of effort and materiality we believe that this approach may be reasonable.
- BT also uses the maximum power consumptions values per equipment when it is using specification data and does not apply any efficiency factors. Since the equipment is not always being used at full capacity, this increases the risk that the data used does not accurately reflect reality.
- BT TSO Electricity model appears to contain mathematical errors in the calculation of total power consumption of CWSS and DWSS. Although the difference in results within the model is not material (between 3% - 5%), there is calculation errors nevertheless.

Objectivity

- The model uses hard coded inputs (percentages) as weights of attribution to plant groups in the model. Since there is no methodology in the model to calculate these attribution weights, it is hard for Cartesian to determine the objectivity, reasonableness and accuracy of these inputs.
- In 2013/14, BT excluded certain programmes from the cost analysis e.g. TV. This was done on the basis that the costs were not relevant to plant groups. However, BT now acknowledges that these programmes should have been taken account of in the calculation. This attribution base attributes costs to PG876A (Ethernet NTEs) which then attributes to the AISBO markets. BT believes that that excluding these programmes has had the effect of *over-allocating to AISBO markets by approx.* ✂ *[£0 to £5m].*

6.2.14.5 Potential Alternatives

This alternative methodology recommendation relates to costs being attributed on 'total' figures, as opposed to 'actual' energy consumption figures.

In FY13/14, BT used total fitted capacity to determine the total power consumption, over actual working capacity (i.e. how many channels were active) for System X and AXE10. This resulted in higher power consumption in FY12/13 (variance over 50%). Although this is consistent with other calculations used, e.g. where BT has used total number of racks (including un-used racks) for multiplexers for power consumption, Cartesian believes that due to the compounding effect, this may result in much larger total power consumption figure. As mentioned earlier, from an effort and materiality perspective it may be argued that this approach is reasonable, in which case Cartesian recommends applying efficiency factors to account for varying load / equipping levels of the equipment.

6.2.15 Power Consumption for Openreach

6.2.15.1 Overview

Power consumption of Openreach is attributed following identical methodology to how the Openreach cost of Operational buildings is attributed (as discussed earlier in section 6.2.13 of this report). In this methodology, Openreach Electricity transfer charges are attributed to the same four areas; MDF, Cable Chambers, LLU and Other.

6.2.15.2 Applicable Cost Categories

This attribution methodology attributes approximately ✂ [£10 to £50m] (FAC) to Openreach plant groups, with the largest cost attributions to MDF equipment (as shown in Table 303 below).

Table 303. ***Cost Categories Receiving costs using Power Consumption for Openreach Methodology***

Cost Category	BT Ref	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref
Main Distribution Frames Equipment	**PG217E**	Other	✂[£10 to £50]	£0	✂[£10 to £50]	5.10.6
E-side Copper Cable	**PG117C**	Copper	✂[£0 to £10]	£0	✂[£0 to £10]	5.7.5
LLU Co-mingling Recurring Costs (OR)	**PG132B**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.10
Access Fibre Spine	**PG111C**	Fibre	✂[£0 to £10]	£0	✂[£0 to £10]	5.5.5
Backhaul Fibre	**PG170B**	Fibre	£0	£0	£0	0
GEA Access Fibre Spine	**PG950C**	Fibre	£0	£0	£0	5.5.9
Core Fibre	**PG350N**	Fibre	£0	£0	£0	5.5.11
Grand Total			✂[£10 to £50]	£0	✂[£10 to £50]	-

Source: BT ASPIRE, Cartesian

6.2.15.3 Detailed Methodology

For Openreach, BT uses a database called CID (owned by Group Property Finance) to determine the space utilised by Openreach. The charges are divided over four different categories within Openreach: MDF, Cable Chambers, LLU hostels and Other (which includes Service Centres). BT then attributes Openreach Electricity costs to these four categories based using the attribution weights determined for property space allocation. This methodology is discussed in more detail within the Floor Space Utilisation section of this report.

6.2.15.4 RAP Assessment

Concerns regarding **Objectivity**, **Causality** and **Consistency**

Attributing Electricity costs on the basis of floor space utilisation (with factors attributing vacant space) appears to be neither causal nor objective. Cartesian's concerns on the compliance of these

principles are discussed below. Alternatives that can improve BT's compliance to RAP are discussed in the potential alternatives section below.

Objectivity

- BT does not appear to use energy consumption data for different equipment within the Openreach estate to determine a fair attribution weight between different elements of Openreach's network.
- During discussions with BT, it appears that for NGA, BT collects metered data, however from the description in DAM it does appear that this data is used.
- There are also transparency concerns as the DAM does not provide any details on which data points Group Property Finance use, and the methodology applied, to determine the attribution weights to the MDS, Cable Chambers, LLU Hostels and 'Other' categories.
- Furthermore, the method by which these categories attribute costs to spine, backhaul and core fibre is also unclear.

Causality

- The attribution methodology does not appear causal as the property allocation is not a good reflection of electricity consumption.
- Based on the description in the DAM, some of electricity costs (being attributed to 'Other') appear to being apportioned to plant groups based on Openreach engineering pay. This may not satisfy the Causality principle.

Consistency

- The methodology (and approach) used by BT to attribute electricity charges for TSO and Openreach is not consistent. See Power Consumption for TSO methodology discussed earlier in this report.

6.2.15.5 Potential Alternatives

A causal and more accurate methodology to attribute electricity costs for Openreach would be to use meter data for NGA equipment (e.g. street cabinets) and co-mingling activities, for clean attribution of costs to specific plant groups. For equipment that provides more general use, and for which metered data is not available, then the methodology for Openreach should be consistent with TSO (where BT uses equipment specification to determine an attribution weight).

6.2.16 Managed Services Contract Value

6.2.16.1 Overview

Cost of activities where BT provides managed services to other service providers (e.g. mobile backhaul services) use the relative share of contract value to determine the attribution base. This methodology typically applies to Wholesale, however there may be some TSO charges being attributed using this methodology (as described in the DAM). This underlying methodology is used for EXCEPT (KB) base methodology. According to the DAM, this attribution method is also applied using EXCEPT (KV) base methodology, which is for another OUC within BT Wholesale that provides managed services.

6.2.16.2 Applicable Cost Categories

The Managed Services contact value methodology attributes costs to SG&A cost categories. The total amount of costs attributed using these methodologies is approx. ✂ [£10 to £50m] FAC.

Table 304. ***Cost Categories Receiving costs using Managed Services Contract Value Methodology***

Cost category	BT Ref	Cost Group	CCA £m	MCE £m	FAC £m	Section Ref
SG&A Wholesale Residual	**PG583N**	General Overheads	✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]	5.3.7
SG&A Wholesale Other	**PG584N**	General Overheads	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	5.3.7
SG&A PPC (Wholesale)	**PG506N**	General Overheads	✂[£0 to £10]	✂[-£10 to £0]	✂[£0 to £10]	5.3.7
SG&A Broadband	**PG609N**	General Overheads	✂[£0 to £10]	£0	✂[£0 to £10]	5.3.7
Grand Total			✂[£10 to £50]	✂[-£10 to £0]	✂[£10 to £50]	-

Source: BT ASPIRE, Cartesian

6.2.16.3 Detailed Methodology

The DAM only goes as far to explain that the costs are attributed using one of two methodologies:

- A direct charge from TSO; or
- Value of Sale.

However, through discussions with BT, Cartesian understands that for managed services, BT Wholesale cost attribution follows the following process:

Step 1 – Collect costs within OUC KB and KV. These units provide managed services for both the regulated and unregulated markets

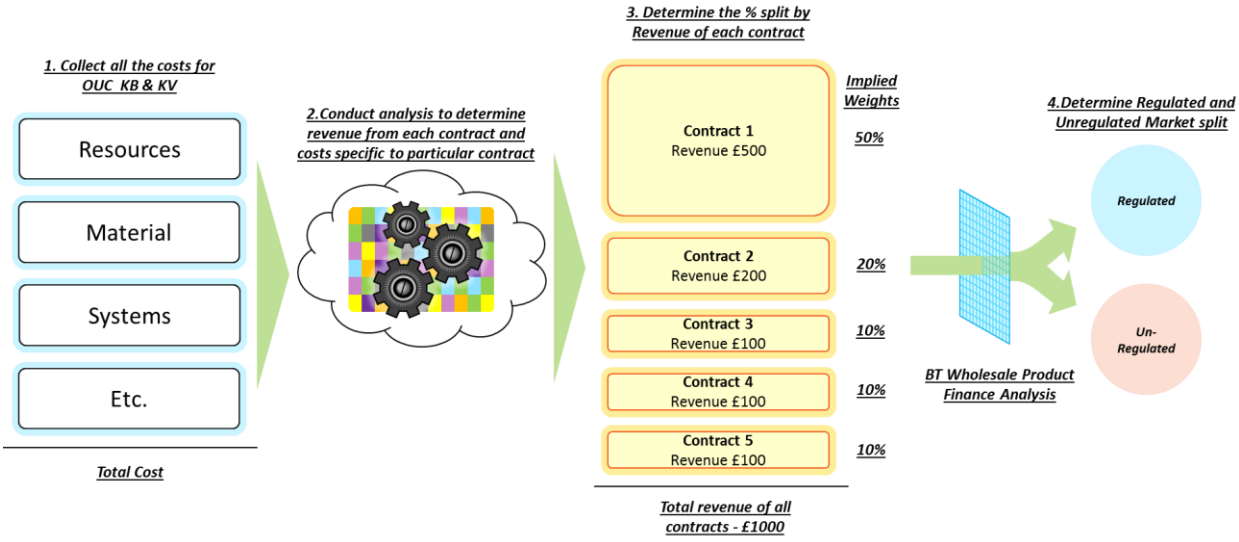
Step 2 – BT Wholesale conducts an analysis to determine the total revenue for each contract and costs that may be specific to a particular contract.

Step 3 – Revenue data from all the contracts is combined to determine an attribution weight of cost for each contract.

Step 4- BT Wholesale Product Finance team then conducts analysis to separate revenue share of each contract between regulated and unregulated markets.

These steps are illustrated in the figure below.

Figure 20. ***Managed Services Contract value divided into regulated and unregulated markets***



Source: Cartesian

Given the type of managed service activity that BT Wholesale provides, BT is able to associate these contracts to one of four categories; PPC, Broadband, Calls and Interconnect and Residual. Each of these categories have separate SG&A plant groups (as shown in the cost category table earlier).

Step 5 – The final steps is to then attribute costs to the plant groups, specific to each contract. In this step, any unregulated market contract attributions are attributed to PG583N (SG&A Wholesale Residual).

It is unclear how the BT Wholesale Product Finance team determine the share of regulated and unregulated markets. As a rough estimate BT indicated that the split may be 40% regulated and 60% unregulated.

6.2.16.4 RAP Assessment

Concerns regarding **Objectivity**

Cartesian has transparency concerns with this methodology. Since the methodology to determine an apportionment weight between regulated and unregulated markets is not transparent, it is not possible for Cartesian to comment on the accuracy of the methodology/analysis. The comments below relate to the transparency element within the objectivity principle of RAP.

Objectivity

- The DAM fails to properly explain what attribution methodology BT employs to determine the split of contract costs between regulated and un-regulated markets which results in the

methodology being used as non-transparent. Cartesian recommends that more information is provided by BT in the DAM to ensure that this methodology can be tested for Objectivity and other regulatory accounting principles.

6.2.16.5 Potential Alternatives

An alternative to attributing costs on revenue, would be to determine the apportionment of costs on the basis of total contract cost. This will allow for larger contracts (in terms of costs) to attribute more cost to their relevant plant groups.

6.2.17 Previously Attributed Cost (including Pan-Division)

6.2.17.1 Overview

The Previously Attributed Pan-Division base methodologies are system generated bases, which calculate apportionment weights based on how specific types of cost have been attributed previously. System generated base methodologies addressed in this report include CAPEXP, FTQ, OPEACN and OPEPST.

6.2.17.2 Applicable Cost Categories

Within the scope of this project, costs are attributed using this method from the General Ledger to 108 cost categories. Of these categories, D-Side Copper Cable Maintenance plant group (PG118M) receives the largest share of costs, as shown in Table 305 below.

Table 305. ***Cost Categories Receiving costs using Previously Attributed Pan-Division Methodology***

Cost Category	BT Ref.	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
D-side Copper Cable Maintenance	**PG118M**	Copper	[£50 to £100]	[-£50 to -£10]	[£50 to £100]	5.7.11
Analogue Line Final Drop	**PG149A**	Copper	[£50 to £100]	[-£50 to -£10]	[£50 to £100]	5.7.13
MDF Hardware Jumpering	**PG142A**	Other	[£50 to £100]	[-£50 to -£10]	[£50 to £100]	5.10.12
D-side Copper Cable	**PG118C**	Copper	[£10 to £50]	[-£50 to -£10]	[£10 to £50]	5.7.10
Access Distribution Fibre	**PG959C**	Fibre	[£10 to £50]	[-£50 to -£10]	[£10 to £50]	5.5.4
Dropwire Maintenance Residential	**PG122M**	Copper	[£10 to £50]	[-£10 to £0]	[£10 to £50]	5.7.14
Time Related Charges	**PG981R**	Other	[£10 to £50]	[-£10 to £0]	[£10 to £50]	5.10.14
E-side Copper Cable Maintenance	**PG117M**	Copper	[£10 to £50]	[-£10 to £0]	[£10 to £50]	5.7.6
GEA Customer Site Installations	**PG954C**	Other	[£10 to £50]	[-£10 to £0]	[£10 to £50]	5.10.16.10
Ethernet Access Equipment	**PG447A**	Other	[£10 to £50]	[-£10 to £0]	[£10 to £50]	5.10.8
OR Pay plus % FA driver	**AG410**	Other	[£10 to £50]	[-£10 to £0]	[£10 to £50]	5.10.16.3
Special Fault Investigation	**PG989A**	Other	[£10 to £50]	[-£10 to £0]	[£10 to £50]	5.10.14
Broadband Boost	**PG580B**	Other	[£10 to £50]	[-£10 to £0]	[£10 to £50]	5.10.16.9
E-side Copper Cable	**PG117C**	Copper	[£10 to £50]	[-£10 to £0]	[£10 to £50]	5.7.5
Main Distribution Frames Maintenance	**PG217F**	Other	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.10.10
Routing and Records	**PG140A**	Other	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.10.16.11
Repayment Works	**PG980R**	Other	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.10.16.17
SG&A Broadband	**PG609N**	General Overheads	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.3.7

Cost Category	BT Ref.	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
Access Fibre Spine	**PG111C**	Fibre	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.5.5
GEA FTTC Provision	**PG958P**	Other	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.10.16.14
SG&A Wholesale Residual	**PG583N**	General Overheads	[£0 to £10]	[-£50 to -£10]	[£0 to £10]	5.3.7
Private Circuits Megastream and IX Conns	**PG413P**	Other	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.10.16.12
GEA Distribution Fibre	**PG951C**	Fibre	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.5.8
Intra-exchange Tie Cables	**PG130A**	Copper	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.7.7
Backhaul Fibre	**PG170B**	Fibre	[£0 to £10]	[-£10 to £0]	[£0 to £10]	0
GEA FTTC Maintenance	**PG955M**	NGA	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.9.6
OR Service Centre Provision Ethernet	**PG573B**	Other	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.10.13
SG&A Wholesale Other	**PG584N**	General Overheads	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.3.7
Access Fibre Maintenance	**PG111M**	Fibre	[£0 to £10]	£0	[£0 to £10]	5.5.6
SG&A PPC (Wholesale)	**PG506N**	General Overheads	[£0 to £10]	[-£10 to £0]	[£0 to £10]	5.3.7
TSO Operational Costs	**AG102**	Other	£0	[-£50 to -£10]	[-£10 to £0]	5.10.11
Duct used by Access Cables	**AG135**	Duct	[£0 to £10]	[-£100 to -£50]	[-£10 to £0]	5.4.4
Corporate Costs	**AG112**	General Overheads	£0	[-£50 to -£10]	[-£10 to £0]	5.3.4
Group Property and Facilities Management	**AG106**	Property	£0	[-£150 to -£100]	[-£50 to -£10]	5.6.4
Others (x74)			[£10 to £50]	[-£200 to -£150]	[-£10 to £0]	-
Grand Total			[£500 to £600]	[-£700 to -£600]	[£400 to £450]	-

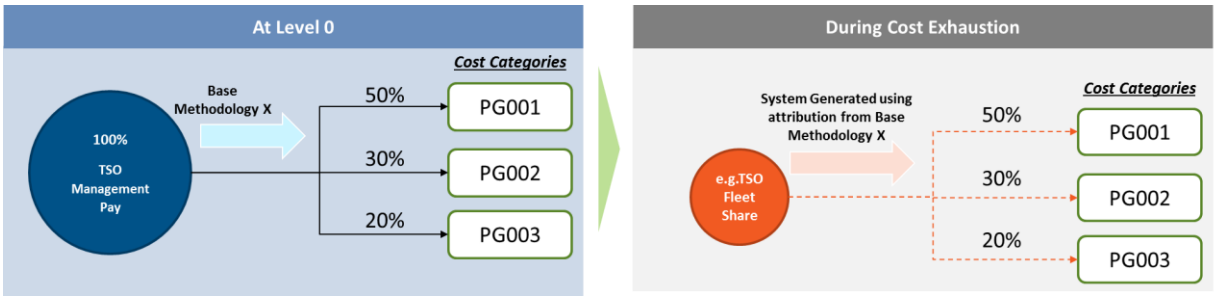
Source: BT ASPIRE, Cartesian

6.2.17.3 Detailed Methodology

The system generated base methodologies in this section are created by ASPIRE using records of cost attributions in previous layer(s) of the cost attribution model. This is explained in the example below.

If ASPIRE has used a base methodology to attribute management pay for BT TSO to PG001, PG002 and PG003 with the ratio of 50:30:20, then every time ASPIRE is required to use TSO management pay system generated base to attribute costs, it will use the 50:30:20 ratio to attribute costs to PG001, PG002 and PG003 respectively. This is illustrated in the figure below.

Figure 21. ***System Generated Methodology Principle***



Source: Cartesian

For example, for methodology OPEPST, which attributes costs of creditors, the system first selects all operating costs (excluding pay and depreciation) from the general ledger. It then divides the divisions into two groups:

- BT Group Cost Centres – Openreach, BT TSO, Global Services, BT Wholesale and BT Retail
- All other costs Centres – includes Corporate Headquarters, Corporate Adjustments, BT Property and Group Business Services

For each group the share of operating costs is calculated by line of business and the creditors charges are attributed using the attribution weights used for these groups previously during the exhaustion process.

Table 306 provides a sample list of methodology variants used to attribute costs covered in this report.

Table 306. ***Methodology variants***

Methodology Code	Costs Attributed	Previous Attributions Used
CAPEXP	Capital Expenditure Payables	This methodology determines the attribution weights by analysing all previous attribution of 'non-pay capital'
FTQ	Core Capital and Current Pay	This methodology determines the attribution weights by analysing all previous attribution of capital and current pay (excluding non-core pay and exceptional pay)
OPEACN	Receivables and Payables of Accommodation costs	This methodology determines the attribution weights by analysing all previous attribution of accommodation related charges
OPEPST	Miscellaneous Trades Payables	This methodology determines the attribution weights by analysing all previous attribution of external operating costs (excluding depreciation and pay)

Source: BT, Cartesian

When one of these base methodologies is considered 'Pan-Division' (as is the case with CAPEXP), ASPIRE does not limit the attributions to specific divisions. This means that the system generated

attribution weights are based on previously attributed (similar type) costs across all divisions configured in ASPIRE.

6.2.17.4 RAP Assessment

No concerns

Cartesian believes that this methodology aligns with Ofcom's regulatory accounting principles. Our assessment was conducted within the time constraints of the project and is based on information received from BT.

Note however, that the quality of this attribution method is reliant upon the previously-attributed costs being correct.

6.2.17.5 Potential Alternatives

No alternatives identified.

6.2.18 Vendor Contract Value

6.2.18.1 Overview

Vendors that provide network equipment to BT TSO also provide support for their equipment on a contract basis. Costs for vendor support, which is typically on a fixed term contract, are attributed using the contract values. PDTSCNM base uses this methodology to attribute the vendor support costs.

6.2.18.2 Applicable Cost Categories

Vendor supports costs are attributed to 24 plant groups. Those that are within the scope of this study mainly relate to 21CN and are detailed in Table 307 below.

Table 307. ***Cost Categories Receiving costs using Vendor Contract Value Methodology***

Cost category	BT Ref.	Cost Group	CCA £m	MCE £m	FAC £m	Section Ref.
Ethernet Switches	**PG901A**	21CN	✂[£10 to £50]	£0	✂[£10 to £50]	5.8.7
Analogue Linecards	**PG127A**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.6
DSLAM - Overheads	**PG152N**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.10
IP VOIP Infrastructure	**PG675A**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.7
IP Network Broadband	**PG672A**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.7
IP Network Management	**PG668A**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.5
Local Exchange Processor (AXE10) Equipme	**PG280C**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.6
MSH STM64 Equipment	**PG385T**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.16.15
Ethernet Access Equipment	**PG447A**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.8

Copper MSAN Combi Cards Broadband element	**PG857A**	21CN	[£0 to £10]	£0	[£0 to £10]	5.8.5
Local Exchange Concentrator (Sys X) Call	**PG288A**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.6
Ethernet Switch Access Cards	**PG902A**	21CN	[£0 to £10]	£0	[£0 to £10]	5.8.7
Local Exchange Processor (Sys X) Equipme	**PG285C**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.6
Copper MSAN Control Transport	**PG860A**	21CN	[£0 to £10]	£0	[£0 to £10]	5.8.5
Broadband Line Testing Equipment (Openre	**PG151B**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.16.4
Copper MSAN Control Access	**PG859A**	21CN	[£0 to £10]	£0	[£0 to £10]	5.8.5
Others (x8)	Others	-	[£0 to £10]	£0	[£0 to £10]	-
Grand Total			[£50 to £100]	£0	[£50 to £100]	-

Source: BT ASPIRE, Cartesian

6.2.18.3 Detailed Methodology

Costs for vendor support contracts are attributed using data held by the Vendor Management unit within BT TSO. The methodology can be broken down into two main steps:

Step 1 – Associate contracts to Network Platforms

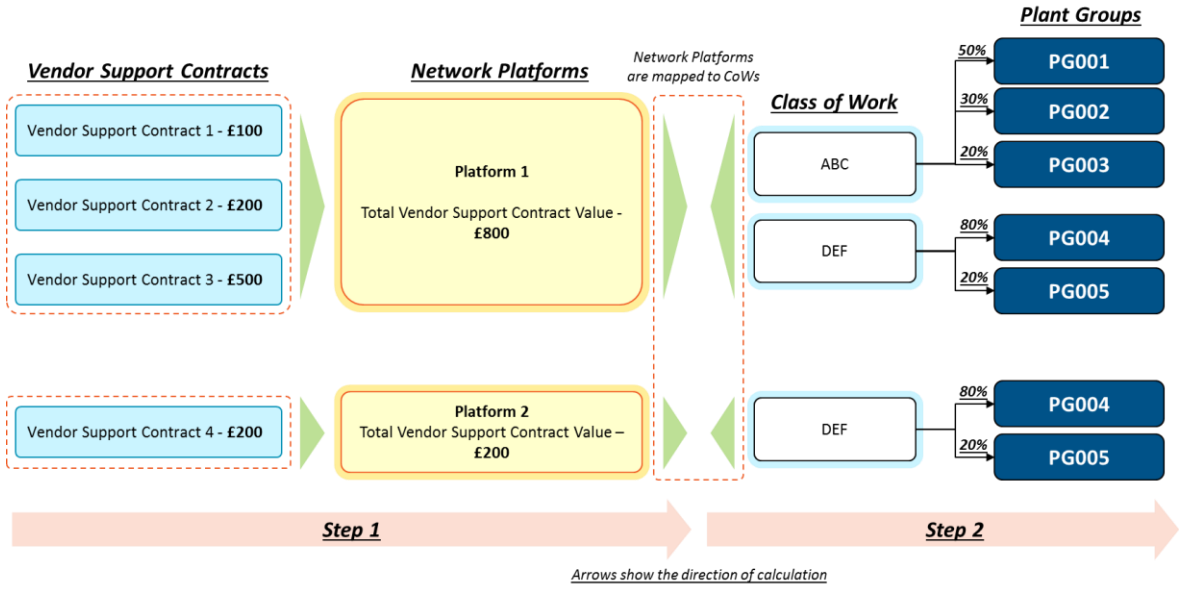
A report is extracted from BT TSO systems that provides a complete list of TSO platforms (e.g. Transmission, Switch, Broadband, Private Circuits and Intelligent Networks). TSO then maps the existing vendor support contracts to each of these platforms.

Step 2 – Determine attribution to Plant Groups

Attribution weights for each of the plant groups are then determined using the CoW associated with each platform. For example, relevant CoW for the Intelligent Network platform (IN) include ASN and INM, which both relate to maintenance of IN platform. The attribution bases relating to these CoW are then used to determine the attribution weights and destinations of the contract cost values.

The figure below illustrates Cartesian's understanding of how this attribution methodology works.

Figure 22. ***System Generated Methodology Principle***



Source: Cartesian

6.2.18.4 *RAP Assessment*

Concerns regarding **Causality**

Causality

- Cartesian has concerns that this methodology appears to apply all CoW driven methodologies related to a platform. Since the cost of contracts relate to 'support' activities, only the CoW relating to support activities should be used to attribute costs.

6.2.18.5 *Potential Alternatives*

An alternative method would be to separate CoW into different types (e.g. Capitalised Development, Maintenance, Support, etc.) and attribute costs using the base methodologies that relate to support activities only.

6.2.19 Asset Policy

6.2.19.1 *Overview*

BT attributes certain costs relating to capitalised engineering activities and network related assets (e.g. NGA DSLAM and Cabinets) using asset policies. These Asset policies provide an attribution methodology based on depreciation. Amongst numerous asset policies, the attribution bases covered in the key cost groups of this report include PDTACPA, PDTDTTW and DTNCAP2.

6.2.19.2 *Applicable Cost Categories*

On an absolute basis, these methodologies are used by BT to attribute approximately ✂ [£50 to £100m] FAC from the General Ledger. The largest attribution relates to LLU Co-mingling recurring costs (PG132B) which is approximately ✂ [£10 to £50m] (FAC). The negative attributions in the table below result from the use of DTNCAP2. This base methodology is used by BT to attribute Capitalised field provision costs.

Investigating these numbers at a General Ledger level show that these charges relate to 'Postal Services' that relate to Openreach division (Openreach Service Delivery and Openreach NGA engineers). It is not clear what negative postal charges are. Due to the time constraints on the project, Cartesian was unable to discuss these negative attributions with BT.

Table 308. ***Cost Categories Receiving costs using Asset Policy Methodology***

Cost Category	BT Ref.	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
LLU Co-mingling Recurring Costs (OR)	**PG132B**	Other	✂[£0 to £10]	✂[£50 to £100]	✂[£10 to £50]	5.10.10
GEA DSLAM & Cabinets	**PG953C**	NGA	✂[£0 to £10]	✂[£50 to £100]	✂[£10 to £50]	5.9.4
Ethernet Access Equipment	**PG447A**	Other	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	5.10.8
GEA Access Fibre Spine	**PG950C**	Fibre	£0	£0	£0	5.5.9
Backhaul Fibre	**PG170B**	Fibre	£0	£0	£0	0
Intra-exchange Tie Cables	**PG130A**	Copper	✂[-£10 to £0]	£0	✂[-£10 to £0]	5.7.7
Access Fibre Spine	**PG111C**	Fibre	✂[-£10 to £0]	£0	✂[-£10 to £0]	5.5.5
GEA Distribution Fibre	**PG951C**	Fibre	✂[-£10 to £0]	£0	✂[-£10 to £0]	5.5.8
E-side Copper Cable	**PG117C**	Copper	✂[-£10 to £0]	£0	✂[-£10 to £0]	5.7.5
D-side Copper Cable	**PG118C**	Copper	✂[-£10 to £0]	£0	✂[-£10 to £0]	5.7.10
Access Distribution Fibre	**PG959C**	Fibre	✂[-£10 to £0]	£0	✂[-£10 to £0]	5.5.4
Analogue Line Final Drop	**PG149A**	Copper	✂[-£50 to -£10]	£0	✂[-£50 to -£10]	5.7.13
Grand Total			✂[-£50 to -£10]	✂[£150 to £200]	✂[-£10 to £0]	-

Source: BT ASPIRE, Cartesian

6.2.19.3 *Detailed Methodology*

The asset-policy-based attribution methodologies are defined using information from the Fixed Asset Register (FAR). The FAR is used by BT to record all the projects that have been capitalised. Cartesian has attempted to get details on how policy codes are used to determine attribution base

as the description in DAM isn't very clear, however the information received from BT was still somewhat vague. Cartesian's understanding (with some assumptions) is described below.

The methodology to determine attribution weights can be broken down into the following two steps:

Step 1 – Extract LoP list from FAR

BT extracts a Life of Plant (LoP) report from the FAR. This is a management report that provides three key pieces of information; 1) asset value, 2) life of asset and 3) depreciation. This information is provided for each Class of Work (CoW) defined by BT.

CoW are essentially three or four digit codes that indicate the type of engineering work being conducted and the equipment the engineering tasks relate to. For example CoW 'ACPA', relates to Capital Work relating to racks, power and ventilation. When a CoW is being used for attribution of capitalised engineering costs, the finance teams use an engineering time booking system to determine the 'number of hours' spent on a CoW and apply a standard charge rate to determine the total cost of the activity. This cost then allows BT to determine an attribution base.

Step 2 – Determine the attribution weights

Within ASPIRE there is a mapping of CoW to one or more plant groups. The attribution of costs from CoW to plant group depends on the type of cost being attributed. For example, if the cost being attributed by a CoW is capitalised engineering pay, then the attribution weight is determined based on previously allocated pay to the receiving plant groups. If, however, the costs being attributed relate to assets, then the attribution weights are determined based on previously attributed asset costs within the plant groups.

6.2.19.4 RAP Assessment

Concerns regarding **Consistency**

Consistency

- This cost attribution method attributes different types of capitalised costs (e.g. engineering activities and assets) based on CoW data. For example, depending on how asset costs have been previously attributed by a CoW (i.e. NBV, GRC, etc.), this methodology will use attribution percentages from previously used methodologies for those specific capitalised costs. We are concerned that this may lead to inconsistent treatment of similar type of capitalised cost attribution when using Asset Policy methodology.

6.2.19.5 Potential Alternatives

A potential alternative will be for BT to add another layer of logic to determine the type of capitalised/asset costs being attributed when using this method. The purpose of this additional layer of logic would be to bring consistency in the attribution of capitalised costs when using this method.

6.2.20 Depreciation for 21CN

6.2.20.1 Overview

21CN costs are attributed to regulated and unregulated markets using an Excel model (the "21CN model"). This model attributes 21CN capital expenditure to plant groups and network components on the basis of annual depreciation.

The model applies the same logic to attribute all 21CN costs, although different base methodology names are used for different elements of the 21CN. These base methodologies are PDTMETAL, PDTMETCI, PDTCORLU, PDTMETSI, PDTMSANF, DPTMSANH, PDTWDM21, PDTETHER and PDTINODE.

6.2.20.2 Applicable Cost Categories

The 21CN model attributes approximately ✂ [£250 to £300m] fully allocated costs to the following plant groups as shown in Table 309 below.

Table 309. ***Cost Categories Receiving costs using Depreciation for 21CN Methodology***

Cost Categories	BT Ref	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Document Section Ref
Ethernet Switches	PG901A	21CN	✂[£10 to £50]	✂[£100 to £150]	✂[£10 to £50]	5.8.7
Core-Core Link	PG866A	21CN	✂[£10 to £50]	✂[£100 to £150]	✂[£10 to £50]	5.8.6
Copper MSAN Combi Cards Broadband element	PG857A	21CN	✂[£10 to £50]	✂[£50 to £100]	✂[£10 to £50]	5.8.5
Metro-Core Link	PG886A	21CN	✂[£10 to £50]	✂[£50 to £100]	✂[£10 to £50]	5.8.6
Copper MSAN Control Transport	PG860A	21CN	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]	5.8.5
Network Router Metro	PG896A	21CN	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]	5.8.4
Metro-Edge Ethernet Bandwidth	PG887A	21CN	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]	5.8.4
Network Router (large) Core	PG895A	21CN	✂[£10 to £50]	✂[£10 to £50]	✂[£10 to £50]	5.8.4
WDM-Metro Link	PG899A	21CN	✂[£10 to £50]	✂[£50 to £100]	✂[£10 to £50]	5.8.6
Copper MSAN Control Access	PG859A	21CN	✂[£0 to £10]	✂[£10 to £50]	✂[£10 to £50]	5.8.5
Metro-Edge Ethernet Port	PG888A	21CN	✂[£0 to £10]	✂[£10 to £50]	✂[£10 to £50]	5.8.4
Metro Broadband Edge Aggregator	PG880A	21CN	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	5.8.4
Ethernet Switch Access Cards	PG902A	21CN	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	5.8.7

Cost Categories	BT Ref	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Document Section Ref
Fibre MSAN Control Transport	PG869A	21CN	✂[£0 to £10]	✂[£10 to £50]	✂[£0 to £10]	5.8.5
Metro Broadband Remote Access Server	PG881A	21CN	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.8.4
Multi Service Provider Edge Routers	PG893A	21CN	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.8.4
Metro Broadband LNS	PG878A	21CN	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.8.4
Core Directors	PG898A	21CN	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.8.4
Copper-Fibre MSAN Link	PG864A	21CN	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.8.5
Metro Front End Router	PG882A	21CN	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.8.4
Metro-Media Gateway	PG890A	21CN	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.8.4
Copper MSAN Combi Cards Voice element	PG858A	21CN	✂[£0 to £10]	✂[£0 to £10]	✂[£0 to £10]	5.8.5
Metro-Sync Racks	PG892A	21CN	£0	£0	£0	5.8.4
Metro BBL3	PG879A	21CN	£0	£0	£0	5.8.4
Copper MSAN ISDN30 cards	PG861A	21CN	£0	✂[£0 to £10]	£0	5.8.5
Fibre MSAN TDM cards	PG872A	21CN	£0	£0	£0	5.8.5
Total			✂[£200 to £250]	✂[£600 to £700]	✂[£250 to £300]	-

Source: BT ASPIRE, Cartesian

6.2.20.3 Detailed Methodology

Using Capex forecasts (based on inputs provided by TSO experts), the model first determines the depreciation of each network element category by year. Then using a series of interconnected tables, the model maps element depreciation to PGs and Network Components based on service volumes, service bandwidth and usage factors. The model arrives at an annual depreciation value for each PG and Network Component. The PG depreciation values drive the attribution percentages below.

The base methodology uses two primary methods to attribute the costs and balance sheet of selected 21CN components to plant groups. Costs are attributed either:

- On the basis of hard-coded attribution percentages (e.g. MSAN-Copper: BB is attributed 50% to the CMSAN Control Access PG and 50% to the CMSAN-Control Transport PG); or,
- Using a formulaic approach which attributes costs to a manually selected group of relevant PGs in proportion to the previous year costs of those PGs (e.g. the cost of labour and site

preparation for the MSAN nodes is attributed to six PGs relating to MSANs). The previous year costs are taken from an ASPIRE report.

The method used depends upon the particular 21CN component. In either case, the attribution may result in a 100% cost allocation from a 21CN component to a single PG. In some cases a combination of methods (1) and (2) is used, with some PGs receiving a hard-coded attribution and others being driven by the formulaic approach. The choice of hard-coded cells varies depending on the component.

In a second step, the costs relating to combined voice and data plant groups are redistributed between the voice and broadband specific plant groups on the basis of the relative number of voice and broadband users.

6.2.20.4 RAP Assessment

Concerns regarding **Accuracy, Objectivity** and **Consistency with regulatory decisions**

Cartesian has conducted a high-level assessment and review of the 21CN Model. Through this review and Q&A sessions with BT, we have acquired a working understanding of the principles used to attribute costs within the model.

A full audit of the model was not feasible (nor was it in scope). An analysis of the model revealed that it contained over 3,100 unique formulae. The most complex of these formulae ran over several lines (beyond the limit of our analysis tool) and occurred 1,428 times in the model.

In the 2014 Current Cost Financial Statement, BT's auditors have noted that they are unable to comment on the accuracy of the method and the sources of data used to determine the 21CN cost attribution.[20] In the same report, BT's management confirmed that BT has used statistical analysis, at times working with a limited set of sampled data, to determine cost attribution of 21CN costs. During FY 2014/15 BT intends to conduct a more thorough forecasting exercise and improve sampled data for better cost attribution of 21CN costs. Additionally, BT has confirmed that until this exercise is completed, the uncertainly over the accuracy of data used as well as attribution of 21C costs will continue to exist.

Cartesian recognises that determining the attribution of NGN costs can be challenging. Issues regarding the development of an objective attribution methodology are discussed under 'Objectivity' below.

Accuracy

- The main issue with 21CN cost attribution is the scale, complexity and poor layout of the 21CN Model which prevents Cartesian from fully validating whether the model accurately follows the attribution principles. The current state of the model also raises concerns as to the likelihood of errors and the difficulty BT would have in discovering these through a model audit. In our review of the model we uncovered one apparent coding error. Whilst this did not have an impact on the model outputs, it reinforces our concerns on the likely accuracy of the model. BT acknowledged these concerns and indicated that it planned to improve the model to address these shortcomings.

[20] http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2014/index.htm

Objectivity

- There are many hard-coded inputs to the model which are provided by technical experts within BT. Due to the scope constraints of the project, Cartesian did not attempt to independently validate these inputs. However, having raised specific questions with BT, Cartesian understand that some inputs are being used in the model purely for historic reasons (i.e. in the absence of new information, BT has continued to use historic data points).
- More broadly, apportionment of costs in next-generation networks (NGNs) presents challenges regarding objectivity, transparency and causality. This is due to one of the major technical advantages inherent NGNs – the ability to dynamically attribute common network resources across multiple services. In the legacy circuit-switched world, resources are used fairly statically and can easily be measured using, for example a circuit inventory database. This approach is not possible in an NGN as resource allocation is continuously varying. The main issues this presents for cost attribution are: (i) ensuring that usage of resources by services is measured accurately and fairly; and, (ii) establishing an objective, causal basis for cost attribution. To the first point, a system which uses service-specific measurement techniques may result in unequitable apportionment. To the second, it can be difficult to determine the share of cost that is caused by a single service (or could be avoided were it not present), as individual services may have non-coincident busy hours.

Consistency with regulatory decisions

- Ofcom has determined that BT shall not attribute costs to the regulated markets on the basis of "future benefits", e.g. attributing network costs to services under the assumption that the services will use those network assets in the future (but not today). BT has identified eight components in the 21CN network that attribute costs to regulated services on the basis of future benefits. In the 2013/14 RFS, costs are attributed from these components to the AISBO markets with Business Connectivity and both of the WBA markets.
- The 21CN model directly allocates the costs of certain network elements to Pathfinder voice services (namely: Infrastructure Ethernet, Media Gateway and EEA Ports Voice). These costs are ultimately attributed to Narrowband Services. From the 21CN Model, the combined value of these assets appears large in relation to Pathfinder, hence we are concerned that these assets may be part of a larger (nationwide) infrastructure which was deployed before BT changed its 21CN strategy with respect to voice. As such, it may also represent a type of future benefit.

In conclusion, Cartesian has concerns regarding the 21CN Model for the reasons outlined above. We therefore recommend that BT invests in rebuilding the model to improve confidence in its inputs, methodology and outputs.

6.2.20.5 Potential Alternatives

Whilst no alternative methods have been identified, Cartesian recommends that BT invests in reviewing the model in depth and conducts an exercise to ensure that some of the historic inputs are still relevant (given that BT's strategy on 21C has changed significantly over the last decade).

6.2.21 Software Depreciation

6.2.21.1 Overview

The SOFTDEP base apportions software depreciation costs to PGs at Level 1 using methods that are specific to the BT division against which the costs are recorded in the General Ledger.

For Openreach, attribution of software depreciation charges is based on the output of an Excel model that distributes costs to a range of PGs. BT did not provide the BT Wholesale SOFTDEP attribution model to Cartesian, however based on the description within the DAM, it appears that the methodologies are identical.

6.2.21.2 Applicable Cost Categories

This base methodology attributes most of the costs to Openreach Systems and Development (PG772A). There are also some attributions to activities groups, for example AG410 and AG409, which demonstrates non-specific software costs being attributed using generic Pay and RoA drivers.

Table 310. ***Cost Categories Receiving costs using Software Depreciation Methodology***

Cost Category	BT Ref.	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref
Openreach Systems & Development (Product)	**PG772A**	Other	[£50 to £100]	[£150 to £200]	[£50 to £100]	5.10.15
OR Pay plus % FA driver	**AG410**	Other	[£10 to £50]	[£50 to £100]	[£10 to £50]	5.10.16.3
SG&A downstream Residual	**PG585A**	General Overheads	[£10 to £50]	[£50 to £100]	[£10 to £50]	5.3.7
WS Pay plus % FA driver	**AG409**	Out of Scope	[£10 to £50]	[£10 to £50]	[£10 to £50]	-
FTTC Service Delivery & Development	**PG197A**	Other	[£10 to £50]	[£10 to £50]	[£10 to £50]	5.10.15
Corporate Costs	**AG112**	General Overheads	[£10 to £50]	[£10 to £50]	[£10 to £50]	5.3.4
Duct used by Access Cables	**AG135**	Duct	[£0 to £10]	[£10 to £50]	[£0 to £10]	5.4.4
SG&A Broadband	**PG609N**	General Overheads	[£0 to £10]	[£10 to £50]	[£0 to £10]	5.3.7
Others (x 40)	-		[£10 to £50]	[£10 to £50]	[£10 to £50]	-
Grand Total			[£150 to £200]	[£400 to £450]	[£200 to £250]	-

Source: BT ASPIRE, Cartesian

6.2.21.3 Detailed Methodology

As highlighted above, the treatment of costs within the SOFTDEP base depends on the division that the software costs relate to. The division-based attribution methods are summarised in the table below.

Table 311. ***SOFTDEP attribution methods by division***

Division	Description	Attribution	CCA (£ m)	MCE (£ m)	FAC (£ m)
B	Openreach	Method described below	[£100 to £150]	[£250 to £300]	[£100 to £150]
K	BT Wholesale	Unknown, but believed to be similar to Openreach	[£50 to £100]	[£100 to £150]	[£50 to £100]
C	BT Group Headquarters	Direct to AG112	[£10 to £50]	[£10 to £50]	[£10 to £50]
J	BT Global Services	Direct to Retail Products	[£0 to £10]	[£0 to £10]	[£0 to £10]
V	Business Services	Direct to AG112	£0	£0	£0
Total			[£150 to £200]	[£400 to £450]	[£200 to £250]

Source: BT ASPIRE, Cartesian

Openreach related Attribution Methodology

The Openreach Excel model takes current year (CY) depreciation figures from the P12 Fixed Asset Register (FAR) as an input. The software items in the FAR are first classified into one of five categories: Duct, NGA, Product Specific, Service and Other Programmes. The model then apportions costs in each category using methods specific to that category:

- Duct category costs are apportioned between Access and Backhaul duct
- NGA category costs are apportioned between FTTC and FTTP
- Product Specific costs are directly allocated to products using further detail in the FAR. The product list comprises: Ethernet, ISDN2, LLU, MPF, Overhead, Products, TSR, WLR and WLR/LLU
- Service category costs are apportioned to Openreach Service Centres
- Other Programmes are allocated to Openreach Pay and Return on Assets Driver (AG410)

Each line in the FAR corresponds to a software item which can be mapped to a product range / specific treatment such as Duct or NGA. All items in the FAR are assigned to one of these categories.

Items in the FAR that cannot be attributed to a specific treatment/product are treated using Openreach Pay and Return on Assets Driver (AG410). Cartesian is unable to comment on what proportion of total costs are attributed using Openreach Pay and Return on Asset driver as the data received from BT does not include this information.

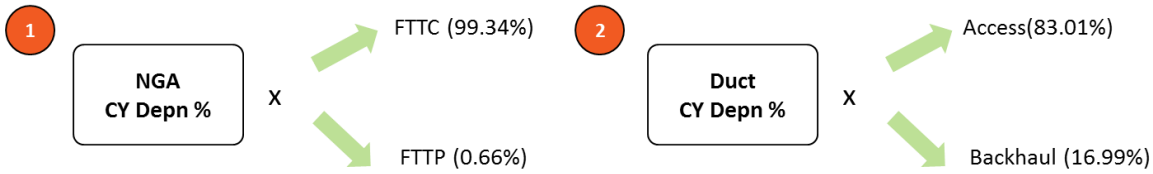
Note: Further details of methodology for BT Wholesale SOFTDEP are not explained in the DAM, however the following description for Openreach provides an indication of what other calculations are applied within the SOFTDEP model

Within the OR SOFTDEP model, there are cases where a second-order attribution is required. For these, the OUC is used to determine a further base. For instance, Openreach Duct (which is one of the products to receive software depreciation costs) needs to be split into Access and Backhaul duct; Service Management Centre (SMC) needs to be split into different variations of Openreach Service

Centres and NGA needs to be split into FTTP and FTTC development. This is illustrated in the example below:

- First, NGA-Software depreciation % is calculated for current year by dividing the NGA-Software CY depreciation over total Software CY depreciation costs
- Second, the NGA-Software CY depreciation % is apportioned between FTTC and FTTP based on the proportion of number of connections and lines for each type of access.

Figure 23. ***SOFTDEP NGA and FTTx Cost Attribution Methodology Illustration***



Source: BT, Cartesian

The resulting percentages are used to apportion the related software depreciation costs.

NOTE: It appears that total CURRENT YEAR depreciation are taken from P&L.

6.2.21.4 RAP Assessment

Concerns regarding **Objectivity** and **Consistency**

Objectivity

- The approach taken by BT to determine attribution weights involves combining the depreciation amounts of software assets before splitting them out again. A more objective approach would be to directly allocate those costs that have a 1:1 relationship with destination PGs.

Consistency

- Based on the information provided by BT, the SOFTDEP model attributes costs for all of BT's main divisions except TSO. From a consistency perspective it will be good to have TSO software costs also attributed using the SOFTDEP base.

6.2.21.5 Potential Alternatives

As mentioned above, a more objective alternative would be for BT to directly allocate those costs that have a 1:1 relationship with destination PGs.

6.3 Assessment of Activity and Plant Group Apportionment

In the cost exhaustion process, AGs and PGs are apportioned to other cost categories. Ultimately, the cost exhaust to PGs and from there to Network Components. In this section we review the apportionment methods against the regulatory accounting principles.

6.3.1 Direct Allocation

6.3.1.1 Overview

The costs from several plant groups are allocated directly to network components without using an apportionment methodology. This is true for the majority of copper related plant groups and the NGA access fibre plant groups This direct allocation appear non-controversial as BT is able to identify clear causal relationships between the origination and destination cost categories.

Having said that, it is important to note that, in principle there should not be direct allocations from activity groups to plant groups. This is because a direct allocation from an AG to PG would remove the justification of having an intermediate activity group that is not attributing costs to more than one destination. However, Cartesian identified two exceptions to this principle, AG148 and AG149 as discussed below.

These activity groups relate to duct costs (AG148 and AG149) which directly allocate costs to 20CN fibre plant groups. The RAP assessment for these cost categories is discussed below.

6.3.1.2 RAP Assessment (AG148 and AG149)

Concerns regarding **Causality**

This assessment refers solely to AG148 and AG149. These cost categories capture costs related to backhaul duct and core duct respectively.

Causality

- The backhaul and core duct cost categories (AG148 and AG149) directly allocate costs to 20CN fibre plant groups. However backhaul and core ducts are also used by 21CN fibre. These costs should therefore also be apportioned to 21CN fibre PGs (e.g. PG900A). BT confirmed this and are reviewing this treatment for 2014/15.

6.3.1.3 Potential Alternatives

An alternative method would be to use the ratio determined in the fibre length (PDTCJF) methodology. The impact of adopting this method is analysed in Section 7.2 of this report.

6.3.2 Duct Valuation and Cable Depreciation

6.3.2.1 Overview

A combination of duct valuation and cable depreciation is used by BT to apportion access duct costs from Access Duct (AG135) to the various PGs representing the different cable types in those ducts.

These costs are attributed to the PGs on a similar basis to the PDTDUCT base methodology which uses duct valuation to apportion duct-related costs at ledger level into AG135. However, in this case the first step of the apportionment is based on the Fibre:Copper access ratio rather than *Access:Core* ratio. In a second step, the respective fibre and copper costs are apportioned based on the relative depreciation of the different cables in access.

6.3.2.2 Applicable Cost Categories

This methodology is used to apportion costs from AG135 to access cable plant groups.

The access network is composed of fibre and copper cables deployed over two main network segments: E-side (from exchange point to PCP point) and D-side (from PCP point to Distribution point) in case of copper; or Spine and Distribution in case of fibre. Each combination of access segment and cable type has a unique PG.

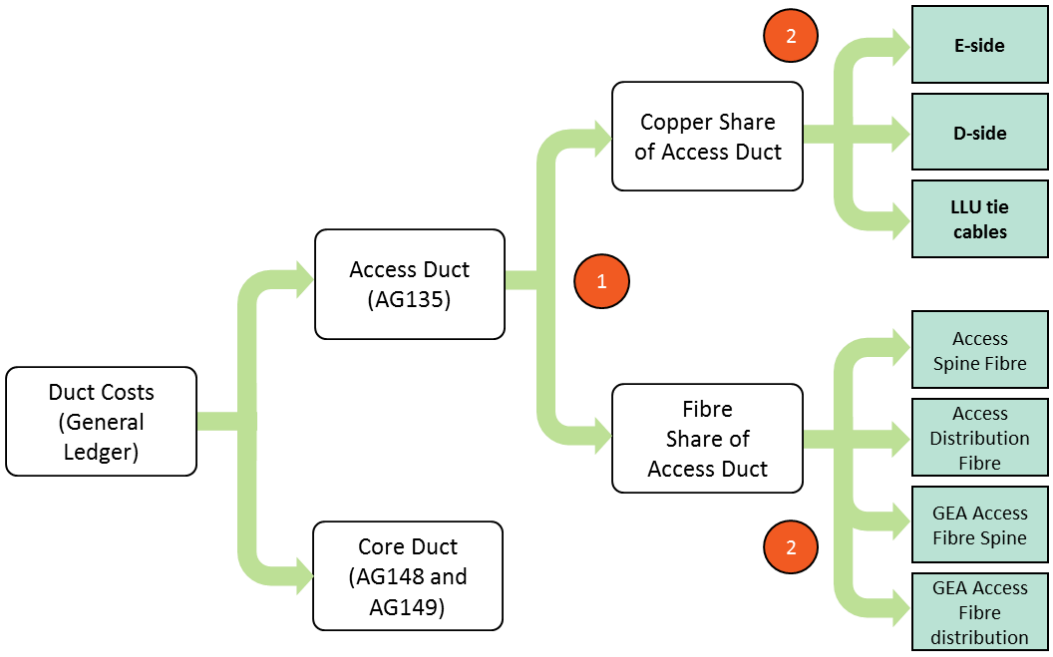
Please refer to Section 6 for further details.

6.3.2.3 Detailed Methodology

The cost attribution method consists of two steps as shown in the Figure below. These steps are explained in detail below. Although the explanation of the apportionment process is divided in steps, the actual attribution is run in a single step.

Note also that calculation of the apportionment percentages takes place outside of ASPIRE.

Figure 24. ***Apportionment of Duct Costs Between Copper and Fibre (1) and then between access segments per cable type (2)***



Source: Cartesian

Step 1 – Cost Split between Fibre and Copper Share of Access Duct

The first step apportions access duct costs between fibre and copper cables based on their share of the duct.

The apportionment is exactly as described for PDTDUCT methodology (see Section 5.4.4) but using the *Fibre : Copper Access* ratio rather than the *Access : Core* ratio. The Access Duct Survey (ADS) provides information for both. The 1997 share of access duct used by fibre and copper was determined based on the cross-sectional area of the cables. This provides the apportionment percentages for the first step in the process as illustrated in Table 312 below.

Table 312. ***2013/14 Access Duct Valuation and Corresponding Fibre : Copper Access Ratio***

Cable Type in Access Duct	13/14 Duct Valuation (£m) (GRC + Capex)	Access Ratio (%)
Copper	✂	91%
Fibre	✂	9%
Total	✂	**100%**

Source: BT ASPIRE, Cartesian

Step 2 – Cost Split between Access Segments for both Fibre and Copper

The second step apportions the costs attributed to each cable type by access segment. In other words, the *Fibre : Copper* Access ratio calculated in step 1 is apportioned between each access segment by type of cables, i.e., E-side / D-side for copper, and NGA / Non-NGA Spine and Distribution for fibre. The apportionment is based on the cables' relative depreciation charges.

2a. Copper Ratio Calculation

1- Copper cable is represented by three classes of work (CoWs): LMD for cable in E-side; LDD for cable in D-side; and DLLU for LLU tie-cables.

2- YTD depreciation of each cable type (CoW) is obtained from List of Plant (LoP).

The apportionment ratio of each copper cable type is calculated by dividing the YTD cable depreciation (item 2, above) by the sum of YTD depreciation of all copper cable types. This is given by the following expression:

$$Copper\ Ratio\ (\%) = \frac{YTD\ Depn}{Total\ Copper\ Depn}\ ,\forall\ Cable\ Type \qquad (1)$$

2b. Fibre Ratio Calculation

1- Fibre cable is represented by two classes of work (CoWs): LFDC for Distribution fibre; and LFSC for Spine fibre.

2- YTD depreciation of each fibre (per CoW) is obtained from List of Plant (LoP).

3- However, the values for the two CoWs need to be apportioned between NGA and Non-NGA fibre types as NGA does not have a unique CoW. This is achieved using a calculated NGA % ratio (see the GRC model).

4- This results in four fibre types: (non-NGA) Spine and Distribution fibres; and (NGA) GEA Spine and GEA Distribution fibres.

The expression for the fibre apportionment ratio is similar to that of copper but with the addition of the NGA/Non-NGA ratio parameter:

$$Fibre\ Ratio\ (\%) = \frac{YTD\ Depn * (NGA/Non{-}NGA\ Ratio)}{Total\ Fibre\ Depn}\ ,\forall\ Fibre\ type \qquad (2)$$

The LoP is sourced from BT's Fixed Asset Register (FAR). Note that fibre lifespan differs for fibre deployed in the spine (20 years) and distribution segments (15 years). The difference is associated with the higher commercial risk of deploying fibre in the last segment (towards customer premises). For copper, E-side and D-side cables have the same asset lifespan (40 years). Copper dropwires follow the same rationale as distribution fibre and thus have a lower lifespan.

Step 3 – Final calculation

The final apportionment percentages for AG135 are calculated by multiplying the apportionment ratios for *Fibre : Copper* by the corresponding ratios for cable type. The formula for cost apportionment to the copper cable PGs can be expressed as follows:

$$Apportionment\ to\ Copper\ PGs = \ Copper\ Ratio\ (\%) * Copper\ Access\ Duct\ Ratio, \forall\ Copper\ Cable\ Type$$

The formula for fibre follows an identical form.

Example for copper cable in D-side access segment

D-side copper cable costs are captured in PG118C cost category. The share of access duct costs are apportioned to PG118C as follows:

- Copper Access Duct Ratio (%) = 91%
- Copper Ratio (%) for D-side cable = 92%

D-side copper cable is attributed with 92% of the 91% of costs apportioned to copper access duct, i.e., the PG118C is attributed 84% (92% x 91%) of the total access duct costs.

6.3.2.4 RAP Assessment

Concerns regarding **Accuracy, Objectivity**, **Consistency** and **Causality**

Accuracy

- The duct valuation model used to determine the split between copper duct and fibre duct doesn't appear to take into account the addition or removal of cables in the duct
- The methodology does not account for unoccupied duct space and the most likely future use of this

Consistency

- Apportionment of access duct cost uses cable depreciation (of copper and fibre) as an input (see step 2, above). In contrast, apportionment of access fibre costs is based on fibre GRC (see Section 6.2.8). Although the apportionments are not interrelated, it is not obvious why two different valuation metrics have been chosen.

Objectivity

- The depreciation charges used to attribute costs between GEA and non-GEA fibre are both retrieved from the LoP according to the Duct model provided by BT. The depreciation is not recorded separately but rather split based on the NGA percentage (input from another model). This is different from what described in the DAM.

Causality

- A small proportion of access duct cost is apportioned to Intra-Exchange Tie Cables (PG130A). The reason for this is unclear and it may be an error. It does not have a material bearing on the overall cost attribution.

6.3.2.5 Potential Alternatives

A potential refinement to the existing attribution methods would be to use a GIS system to determine the split of duct value with greater accuracy. BT has such a system called PIPER that records all the copper and fibre deployment with high levels of accuracy and coverage.

During the project we asked BT about this option. BT's response is reproduced below:

> *"Consistency is a key criterion when we consider attribution methodologies. We have used the same methodology since the inception of regulation and therefore this treatment has the advantage of being consistent year on year. BT has not considered the use of a GIS system like PIPER to determine the duct splits. There are many factors that might inhibit the introduction of such a system including:"*
>
> - *What the problem statement is and what alternatives there might be (including the status quo),*
> - *The extent to which a new system would produce consistent and superior attributions, Ensuring outputs are reliable and easy to maintain,*
> - *How much it might cost to introduce and run for a new purpose; and*
> - *What other initiatives / developments would be displaced, trades offs in terms of consistency etc."*

We continue to believe that the use of a GIS system would produce a more accurate cost attribution. We therefore recommend that the cost and impact of such a change be properly assessed, rather than dismissed without evaluation.

Another potential alternative would be to represent duct costs at Plant Group rather than at Activity Group level.

The duct-related cost categories are unusual activity groups, given that they contain a large MCE value (dominant over the operational costs). The large MCE value indicates the cost categories are more related to assets than activities. This makes them closer in nature to plant groups (e.g. Fibre), rather than to other AGs.

The reason for having duct costs in AGs is due to the cascade model of BT's attribution system, and the constraint that PGs cannot exhaust into other PGs (only AGs exhaust to PGs). In the duct case, costs are apportioned based on the physical use of the duct by the different cable types in it. These cables are represented at PG level, and hence the duct costs need to be held in an AG for this to work.

Attribution duct costs to cables on the basis of occupied space is rooted in the physical world and can be argued, on that basis, to be causal. However, if one considers that the cables are a means to an end (i.e. to carry circuits), and that BT has a choice in which cable types to deploy, then it could also be argued that duct costs should instead be apportioned directly to network components, e.g. on the basis of bandwidth. In this case, the duct cost categories could be PGs and these could be treated in a similar manner to the fibre PGs.

In terms of impact, copper cables occupy considerably more space in the duct than fibre cables which means copper related services receive a bigger portion of duct costs. From a cost recovery point of view (to the extent that cost attribution is used to set charge controls), this loads more costs onto copper-based access products.

Due to the complexity of modelling this scenario, it was not possible to determine the impact on costs within the timeframe of the project. However this may be worth subsequent investigation.

6.3.3 Number of Fibres Used

6.3.3.1 Overview

Access fibre costs are captured in PG111C for spine fibre, PG959C for distribution fibre and PG111M for access fibre maintenance costs. BT attributes these costs to network components (representing circuits) based on the number of fibres used by each circuit type in the access network.

6.3.3.2 Applicable Cost Categories

Please see the descriptions of PG111C, PG959C and PG111M for more details in these cost categories and the corresponding network components.

6.3.3.3 Detailed Methodology

An external Excel model ('Access Rentals') is used to calculate the proportion of total fibre used by each circuit type based on circuit and fibre volume data extracted from BT systems. The apportionment percentages are loaded as inputs into ASPIRE.

Data for the calculation is extracted from BT's Core Transmission Costing System (CTCS). CTCS is BT's network inventory system which keeps records of all the circuits, cables and equipment deployed in the network. CTCS provides a mapping of the network and indicates how many circuits of each type are running over the bearers and fibres in the network. Other data sources (e.g. the network decision support tool, "NDS") provide additional network related information. For example, the number of single fibres and fibre pairs used by the access bearers is given by NDS since this level of detailed is not modelled in CTCS.

There are nine bearer types in BT's access (local end) network as shown Table 313. A bearer is defined as a combination of a fibre and terminating network transmission equipment at each end. The majority of bearer types use fibre pairs. CTCS accounts for those cases where single fibres are used.

Table 313. ***Bearer Types in BT's Access (Local-End) Network***

Bearer Type	Bandwidth (Mbps)	Mux Technology
2 Mbps	2	PDH
34 Mbps	34	PDH
140 Mbps	140	PDH
565 Mbps	565	PDH
STM-1 16xDS2 (ASDH)	155	SDH
STM-1 4xDS2 (ASDH)	155	SDH
STM-1	155	SDH
STM-4	622	SDH
STM-16	2488	SDH

Source: BT

Circuits are carried on the bearers. There are 93 network circuit types. These are mapped to Network Components resulting in nine different types for TDM circuits (including protected circuits).

Table 314. ***Circuit Types in BT's Access (Local-End) Network***

Circuit Category	Circuit Type	Comp Code
TDM (9)	140Mbit	CO436
	140Mbit Protected	CP436
	2Mbit	CO439
	2Mbit Protected	CP439
	34Mbit	CO434
	34Mbit Protected	CP434
	INTERCONNECT	CO452
	ISDN30	CL189
	SMDS	CF781
Ethernet (5)	WES & LES (Ethernet)	CO450
	BES (Ethernet)	CO447
	BNS (Ethernet)	CT454
	EAD (Ethernet)	CW609
	Redcare (Ethernet)	CK985

Source: BT

Five additional Ethernet circuits are added, which increases the total number to 14 circuit types receiving non-NGA access fibre costs. Ethernet circuit volumes and fibre usage is not captured in CTCS; this data is provided separately by Openreach and included in the model. Note that Ethernet circuits have one circuit per fibre while TDM circuits can have multiple circuits per fibre

The main steps of the apportionment model are as follows:

1- Fibres used by each TDM bearer type is determined by the number of bearers (given by CTCS) x average number of fibres per bearer (given by NDS). In the distribution segment, the number of fibres per bearer is doubled.

2- Total number of fibres used by all circuits is given by the sum of the fibres for each TDM bearer type (Point 1) plus the fibres used by Ethernet service circuits.

3- Bearer Usage by circuit type is calculated:

   a. Volume of circuits (e.g. analogue circuit, Partial private circuit (PPC) 34Mbps) and bearer type (e.g. 34Mbps local end (LE)) are taken from CTCS.

   b. Number of 'bearer equivalents' for each circuit type is calculated by dividing the number of circuits by the capacity of each bearer. This gives the total number of bearers of a certain bandwidth type that would be needed to transport all the circuits of this type. The bearer capacities are defined in a table which maps bearer and circuit multiplexing relationships.

   c. The ratio between 'bearer equivalents' and 'number of bearers taken from CTCS' (Step 1) is referred to as the *spare capacity factor*. A factor greater than 1 indicates a number of spare bearers and less than 1, an overloaded bearer. This allows BT to distribute underutilised capacity on each bearer type to the circuits that are able to use it.

d. In order to take the underutilised capacity into account, bearer equivalent circuit volumes are multiplied by their respective spare capacity factor. This results in factored bearer equivalent volumes by circuit type.

4- Multiplying the *number of fibres per bearer type* (Step 1) and the *factored bearer equivalent volumes by circuit type* (Step 3d) gives the volume of fibres actually used by each circuit bandwidth type (e.g. the 2Mbps circuits in 34Mbps bearers use a total of 19,871 fibres). This is repeated for all bearer types and then summed to give the **total fibre usage per circuit type**.

5- The apportionment ratio per circuit type is calculated by dividing the *total fibre usage by circuit type* (step 4) by the *total number of fibres* (Step 2).

The above steps can be mathematically represented by the following expression:

$$Ratio\ (\%) = \frac{\sum^{all\ Bearers} Fibres\ in\ Bearer * Bearer\ Usage}{Total\ Fibres\ used\ by\ all\ circuits\ across\ all\ bearers}, \forall\ Circuit\ Type$$

6.3.3.4 *RAP Assessment*

Concerns regarding **Accuracy, Objectivity** and **Causality**

Accuracy

- The Access Rentals model contains a number of input errors in the parameters for bearer capacities by circuit type. It appears that some PDH factors have been used for SDH and vice versa. Correcting the errors results in a small redistribution of costs from 64kbps local ends (PG412) to 34Mbps local ends (PG444).
- Correcting the errors in the PDH and SDH bearer capacity conversions/mapping do not change the number of fibres used and thus the error is not material (changes in order of 0.1%).

  However the correction of the number of bearers in the access segments has a significant impact. For the majority of cases, the average number of fibres per bearer increased which in turn increased the total number of fibres used (113k), changing the apportionment % per circuit type. The estimated redistribution is approx. 7% for both spine and distribution segments. The most affected components are PC rental 2 Mbps local end fibre (CO439) and ISDN30 (CL189) circuits, which costs are attributed mostly to EAD (CW609) and Wholesale & LAN extension (CO450) components. In FAC terms, this represents a redistribution of c.£18m based on the non-NGA access fibre PGs FAC.

- The Access Rentals model uses incorrect data for the number of bearers. BT has shared revised input data with Cartesian which shows a significant variation in the number of bearers. This has a material impact on the average number of fibres per bearer and thus in the apportionment percentages. A first simulation shows a redistribution of non-NGA access fibre costs of ✂ [£10 to £50m] of the ✂ [£250m to £300m] FAC of the related access fibre PGs at the exhaustion level (level 7). As a result of this error in the FY 2013/14 RFS, the EAD (CW609) and WES & LES (CO450) components (both mainly used in the business connectivity market) were attributed less costs than they should have been. The majority of these costs were incorrectly attributed to the 2

Mbps (CO439) and ISDN30 (CL189) components (both mainly used by services in the Fixed Access market).

- The methodology does not properly account for maintenance costs in the distribution segment. The apportionment of Non-NGA Fibre Maintenance (PG111M) to components uses the same weights as the spine segment. However, this PG relates to maintenance across both spine and distribution segments, hence a weighted average would be more accurate. Correcting this error leads to a redistribution of costs between components. The figures are significant in terms of the overall maintenance value, however at a service level it is not material.

Objectivity

- The CTCS model calculations are not transparent. The calculations involve a relatively high number of steps with variables coming from several different sources which makes it difficult to follow.
- The network model is also not transparent as it contains several intermediate steps which are not explained. This make it very hard to follow.

Causality

- There may be a causality issue in the treatment of unused fibre. The cost of unused fibre in the network is attributed equi-proportionally to services based on current fibre usage. However the unused fibre will be of greater benefit to growth services rather than legacy services that may be in decline.

6.3.3.5 Potential Alternatives

In theory it may be possible to account for the long term expected benefit of fibre to services based on forecasted sales volumes. In practice this is likely to be difficult to achieve on an objective basis

6.3.4 Fibre Bandwidth and Length

6.3.4.1 Overview

BT uses a combination of bandwidth and fibre length to apportion core and backhaul fibre costs (PG350N and PG170B) to network components. A detailed Excel model is used to determine how circuits (components) use the network (in terms of bandwidth consumed on the fibre network).

The length of the fibres in backhaul and core networks must be taken into account because circuits take different routes. Therefore, the apportionment base is determined not only by the share of fibre bandwidth used (as per access fibre attribution) but also by the fibre length of each circuit.

BT defines a combined fibre length x bandwidth factor and uses it to calculate the apportionment percentages. 'Fibre km' (summed length of individual fibres) is used as the fibre length in the calculation rather than 'Sheath km' (length of fibre cables) as the quantity of fibres in fibre cables varies in the network.

6.3.4.2 Applicable Cost Categories

Please see PG170B (Backhaul Fibre) and PG350N (Core Fibre) for more details on these cost categories and the corresponding network components.

6.3.4.3 Detailed Methodology

An Excel model ("051_BTW_PG_to_Comp (New CTCS)") is used to determine the apportionment percentages from data extracted from CTCS. The percentages are then loaded into ASPIRE.

The volume of circuits, bearers and fibres is extracted from the Core Transmission Costing System (CTCS). CTCS is BT's network inventory system which keeps records of all the circuits, cables and equipment deployed in the network. CTCS provides a mapping of the network and indicates how many circuits of each type are running over the fibres. In contrast, Fibre lengths for Ethernet main links (in backhaul) are not captured in CTCS: their volumes are provided by Openreach volumes and included in the model. Ethernet circuits have one circuit per fibre therefore allowing the fibre km to be used as the bearer length.

The apportionment percentages are calculated for each circuit type present in the backhaul and core networks. There are more than 40 different circuit bandwidth types. Note that Ethernet related circuits are be taken into account.

The main steps of the model are as follows:

1- Volume of circuits and fibre length per bearer are extracted from CTCS

2- Total fibre length (km) in all bearer types is calculated. The data is provided by Openreach (for Ethernet main links) and CTCS system (for other transmission links)

3- "Fibre equivalent km" represents the amount of fibre (in km) used by a circuit across all bearers in the network. This is given by the percentage of bearer used by the circuit multiplied by the total fibre km in the bearer. This is justified by the need to weight the usage of fibre in the bearer by all the circuits of same type (i.e. bandwidth)

4- The percentage of bearer used by a circuit is defined by the combined fibre bandwidth x length factor. The STM-1 payload is used as the reference to normalise the fibre capacity used by the circuit (i.e. bandwidth)

Finally, the apportionment percentage for a circuit type is given by dividing the sum of 'Fibre Equivalent' for all the bearer types crossed by the circuit and the total fibre length in the network as follows:

$$Ratio\ (\%) = \frac{\sum^{bearers\ '} Fibre\ equivalent\ km}{Total\ Fibre\ Length\ in\ the\ Network}\ \forall\ circuit\ , \forall\ Division\ (B, W)$$

6.3.4.4 *RAP Assessment*

Concerns regarding **Accuracy, Objectivity** and **Causality**

Accuracy

- The methodology is not accurate as there is an error in one the formulae in the model. (The formulae was not covering all of the cells in a range.) BT agree that the formula was incorrect. Cartesian has run the model with this change and a high level analysis shows a small impact (-2.5%) in the backhaul fibre attribution for one component. The impact is believed to be non-material at a market level.
- The correction of the formula error has the following impact: +6% to be attributed to CO484 (Ethernet Main Links) component which represents ✂ [£10m to £50m] FAC. Also, -2.72% to be attributed to CF371 (OR PC 2mbps distribution) component which represents ✂ [£0 to £5m] FAC. There are additional variations but are considered non-material (i.e. below 1%). Regarding the core fibre (PG350N), the maximum variation is at CO316 with an increase of ✂ [£0 to £5m] (1.44%). All the other variations are smaller than +/-1% but in a total of +/- 2.07%.

Objectivity

- The transparency of the network model could be improved. The model includes several redundant steps and could be simplified to mitigate potential human errors. The model also contains several deprecated calculations which may confuse the reader.

Causality

- There may be a causality issue in the treatment of unused fibre. The cost of unused fibre in the network is attributed equi-proportionally to services based on current fibre usage. However the unused fibre will be of greater benefit to growth services rather than legacy services that may be in decline.

6.3.4.5 *Potential Alternatives*

In theory it may be possible to account for the long term expected benefit of fibre to services based on forecasted sales volumes. In practice this is likely to be difficult to achieve on an objective basis.

6.3.5 Factorised Pay and Return on Assets

6.3.5.1 Overview

Apportionment of General Overheads (AG112) to other activity groups and plant groups is based on a weighting that combines factorised pay costs and return on assets. This attribution base has two components:

- Factorised Current and Capitalised Pay
  - Salary is factorised using average salary in a division (business unit) and the number of staff (FTE) in that division
  - Salaries are factorised to reflect the number of employees (FTE) by Business Unit as BT believes that attribution based on number of employees is the right way to attribute these costs
- Return on Assets (ROA)
  - Net Book Value of Assets is used to calculate RoA using a BT WACC of 10.8%

The results of factorised pay and ROA are then combined to determine the attribution weightings.

6.3.5.2 Applicable Cost Categories

Factorised Pay and Return on Asset is only used to attribute Corporate Costs (AG112) as shown in Table 315.

Table 315. ***Cost Categories Attributing costs using Factorised Pay and Return on Assets Methodology***

Cost Categories	BT Ref	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Document Section Ref
Corporate Costs	AG112	General Overheads	✂[£600 to £700]	✂[£250 to £300]	✂[£600 to £700]	5.3.4

Source: BT ASPIRE, Cartesian

6.3.5.3 Detailed Methodology

Factorised Pay and Return on Asset methodology uses a two stage process to determine the attribution base.

The first stage is to calculate factorised pay, which is calculated using the following formula:

$$Factorised\ pay\ for\ business\ unit = Total\ Pay\ for\ business\ unit \times Pay\ Factor\ for\ business\ unit$$

Where,

$$Total\ Pay\ for\ Business\ Unit = Current\ Pay + Capitalised\ Pay$$

And,

$$Average\ Pay\ for\ Business\ Unit = \frac{Total\ Pay\ in\ Business\ Unit}{Number\ of\ FTE\ in\ Business\ Unit}$$

$$Pay\ Factor\ for\ Business\ Unit = \frac{Average\ Pay\ across\ BT}{Average\ Pay\ for\ Business\ Unit}$$

This pay factor allows BT to rebalance the pay weights and adjust pay for each business unit based on average pay of employees at BT.

Factorised pay reflects what a business unit's pay costs would be if their staff all received the average pay across BT.

The result of using factored pay rather than actual pay is that BT essentially reflects the number of employees (FTE) in a business unit. BT believes that attributing BT Group costs based on number of employees in different business units is the most appropriate measure of attribution. The reason for using factorised pay rather than number of employees, is to produce a financial value which can be combined with the Return on Assets factor. In addition, according to BT ASPIRE can only accept financial data and cannot accept FTE numbers as an input.

The table below illustrates how BT calculates factorised pay. See formulas mentioned above which are used in the tables below.

Table 316. ***Methodology to Calculate Pay Factor (Illustrative)***

Division	Current Pay (£m)	Capital Pay (£m)	Total Pay (£m)	FTE	Average Pay per Business Unit	Pay Factor	Factorised Pay (£m)
T	£1,000	£500	£1,500	30,000	£50,000	1.39	£2,079
J	£1,500	- £	£1,500	15,000	£100,000	0.69	£1,039
K	£100	£5	£105	1,500	£70,000	0.99	£104
M	£800	£10	£810	10,000	£81,000	0.86	£ 693
	£3,400	**£515**	**£3,915**	**56,500**	**£69,292**	**1.00**	**£3,915**

Methodology to calculate attribution weights using pay factors

Pay factors calculated in the table above (Table 316) are then used to re-base the total pay in each cost category (as shown in Table 317 below). It is then combined with cost of capital to determine a total cost base for each business unit. Here, BT uses Return on Assets is calculated using a WACC of 10.8%. This value is equal to the "rest of BT" WACC set by Ofcom in the June 2014 FAMR, however we understand that this is coincidental and that BT does not update the WACC value used in this methodology on an annual basis.

Table 317. ***Methodology to Calculate Total Cost Category Base (Illustrative)***

Division	Cost Categories	Total Pay in Cost Category (£m)	Pay Factor (by Business Unit)	Total MCE in each Cost Category (£m)	WACC	Factorised Pay + Cost of Capital (£m)
M	PG001	£10	0.86	£40	10.8%	£13
M	PG002	£400	0.86	£40	10.8%	£346
M	Retail Products	£400	0.86	£40	10.8%	£346
T	PG001	£500	1.39	£200	10.8%	£715
T	PG002	£500	1.39	£200	10.8%	£715
T	Retail Products	£500	1.39	£100	10.8%	£704
Other Divisions	Other Divisions	£1,605	0.71	£ -	10.8%	£1,143
	Total	**£3,915**		**£620**		**£3,982**

Total cost at a cost category level is calculated and is used to determine the attribution weight for each cost category. This is shown in Table 318 below.

Table 318. ***Attribution Base (Illustrative)***

Cost Category	Factorised Pay + Cost of Capital by Division (£m)			Total (£m)	Attribution weights
	M	T	Other Divisions		
PG001	£13	£715		£727	**18%**
PG002	£346	£715		£1,061	**27%**
Retail Products	£346	£704		£1,050	**26%**
Other Divisions			£1,143	£1,143	**29%**
				£3,982	**100%**

6.3.5.4 RAP Assessment

There are some concerns on **Objectivity** and **Causality**

Objectivity

- The methodology is not objective as it uses an arbitrary weighting factor. A WACC of 10.8% is used to effectively weight the importance of pay and asset values in the apportionment. Whilst this value may be reasonable, we understand that it is not directly driven by BT's actual WACC. This arbitrary factor therefore raises concerns regarding objectivity.
- The use of factorised pay may not be objective. As the methodology uses factorised pay, the weights of attribution are skewed heavily towards the business unit that has more employees. The difference in attribution by division is shown in the table below. Figure 25 demonstrates that Global Services receives 10% less pay costs than it would have, if the attribution was based on Pay rather than factorised pay.

Figure 25. ***Impact of Attribution based on Factorised Pay vs. Pay***

Division	Description	Attribution based on Pay	Attribution based on Factorised Pay (i.e. FTE)	Difference
B	**Openreach**	29%	36%	**7%**
J	**Global Services**	29%	19%	**-10%**
K	**BT Wholesale**	3%	2%	**0%**
M	**BT Retail**	16%	18%	**2%**
T	**BT TSO**	17%	16%	**-1%**
C	**BT Group**	6%	9%	**3%**

Source: BT, Cartesian

Causality

- Attributing a broad pool of common costs on the basis of Pay and RoA does not appear causal. BT justifies the use of this apportionment methodology in the DAM on the basis that head office activities encompass management of the company's employees and assets. We have two concerns regarding the causality of this approach:
  1. The time and effort required to manage assets may not correlate with the value of the assets. We note, for example, that although BT's duct network has a high asset value (c.30% of total MCE) it is unlikely to demand 30% of head-office attention.
  2. The employees under the management of head office are also working to achieve a return on the company's assets. Combining Pay and ROA may therefore lead to an aspect of double-counting.

6.3.5.5 Potential Alternatives

An alternative method would be to attribute general management costs such as Corporate Overheads on the basis of Pay only.

Cartesian recognises that some of the costs attributed to AG112 purely relates to assets and hence a better approach may be to take a more granular approach by further breaking down AG112 into an asset related cost category and a general management related cost category.

The objective of taking this granular approach is to identify costs that should be attributed based on RoA or NBV as opposed to 'Pay and RoA'. All other costs could be attributed based on Pay. This means that costs such as 'General Computers' should be attributed based on Pay (instead of RoA, which would be the case by following BT's currently defined Pay and RoA methodology).

Advantages of using pay as the cost driver include greater transparency and objectivity. In terms of causality, this overcomes the issue regarding large asset bases that do not require much head-office attention (such as duct). Furthermore, as outlined above, a pay-driver would correlate with employees who are themselves managing the company's assets. This final point is supported by the fact that generic costs that relate to Network Support activities, such as those in AG102 (TSO Operational Costs) are attributed based on Net Book Value of Assets under the management of BT TSO.

6.3.6 Pay and Return on Assets

6.3.6.1 Overview

This attribution method attributes costs on the basis of pay and return on assets. To calculate the Return on Asset BT uses the net book value of assets and a WACC of 10.8%. This method is used to attribute costs at two different stages of the cost exhaustion process; 1) as a base methodology (COMCOS) to attribute costs from the general ledger to activity/plant groups; and 2) from AG103 to plant groups.

BT believes that this methodology is appropriate when general management and support costs need to be attributed as these functions covers the management of both people and assets.

6.3.6.2 Applicable Cost Categories

This methodology is used to attribute costs at two different stages of the cost exhaustion process. First as base methodology (COMCOS, which is discussed earlier in this section) and then from TSO Support Functions (AG103) to other cost categories. Costs attributed at these two different levels are shown in the two tables below.

Table 319 below shows that Pay and Return on Asset methodology attributes ✂ [£100m to £150m] of TSO Support Function Costs.

Table 319. ***Cost Categories attributing costs using Pay and Return on Assets Methodology***

Cost Categories	BT Ref	Cost Group	CCA (£ m)	MCE (£ m)	FAC (£ m)	Section Ref.
TSO Support Functions	AG103	General Overheads	✂[£100 to £150]	✂[-£50 to -£10]	✂[£100 to £150]	5.3.5

Source: BT ASPIRE, Cartesian

Table 320 below shows all the cost attributed from the General Ledger to activity groups and plant group using the COMCOS methodology. Amongst these cost categories, AG135 receives the largest proportion of costs.

Table 320. ***Cost Categories receiving costs using the COMCOS base methodology***

Cost Category	BT Ref.	Cost Group	CCA £m	MCE £m	FAC £m	Section Ref.
Duct used by Access Cables	**AG135**	Duct	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]	5.4.4
D-side Copper Cable	**PG118C**	Copper	✂[£10 to £50]	✂[£0 to £10]	✂[£10 to £50]	5.7.10
Analogue Line Final Drop	**PG149A**	Copper	✂[£0 to £10]	£0	✂[£0 to £10]	5.7.13
FTTC Service Delivery & Development	**PG197A**	Other	✂[£0 to £10]	£0	✂[£0 to £10]	5.10.15
Access Distribution Fibre	**PG959C**	Fibre	✂[£0 to £10]	£0	✂[£0 to £10]	5.5.4

Cost Category	BT Ref.	Cost Group	CCA £m	MCE £m	FAC £m	Section Ref.
D-side Copper Cable Maintenance	**PG118M**	Copper	[£0 to £10]	£0	[£0 to £10]	5.7.11
Duct used by Backhaul Cables	**AG148**	Duct	[£0 to £10]	£0	[£0 to £10]	5.4.5
E-side Copper Cable	**PG117C**	Copper	[£0 to £10]	£0	[£0 to £10]	5.7.5
MDF Hardware Jumpering	**PG142A**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.12
GEA DSLAM & Cabinets	**PG953C**	NGA	[£0 to £10]	£0	[£0 to £10]	5.9.4
Ethernet Access Equipment	**PG447A**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.8
OR Pay driver	**AG401**	General Overheads	[£0 to £10]	£0	[£0 to £10]	5.3.6
GEA Customer Site Installations	**PG954C**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.16.10
Access Fibre Spine	**PG111C**	Fibre	[£0 to £10]	£0	[£0 to £10]	5.5.5
Time Related Charges	**PG981R**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.14
Dropwire Maintenance Residential	**PG122M**	Copper	[£0 to £10]	£0	[£0 to £10]	5.7.14
Broadband Line Testing Equipment (Openreach)	**PG151B**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.16.4
E-side Copper Cable Maintenance	**PG117M**	Copper	[£0 to £10]	£0	[£0 to £10]	5.7.6
Backhaul Fibre	**PG170B**	Fibre	[£0 to £10]	£0	[£0 to £10]	0
Openreach Systems & Development (Product	**PG772A**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.15
Intra-exchange Tie Cables	**PG130A**	Copper	[£0 to £10]	£0	[£0 to £10]	5.7.7
OR Pay plus % FA driver	**AG410**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.16.3
LLU Co-mingling Recurring Costs (OR)	**PG132B**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.10
GEA Distribution Fibre	**PG951C**	Fibre	[£0 to £10]	£0	[£0 to £10]	5.5.8
Openreach Other Activities	**PG986R**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.16.17
FTTC Copper Tie Cables	**PG192A**	Copper	[£0 to £10]	£0	[£0 to £10]	5.4.5
Special Fault Investigation	**PG989A**	Other	[£0 to £10]	£0	[£0 to £10]	5.10.14
Other (x21)			[£0 to £10]	£0	[£0 to £10]	-
Grand Total			[£50 to £100]	[£0 to £10]	[£50 to £100]	-

Source: BT ASPIRE, Cartesian

6.3.6.3 Detailed Methodology

In this methodology BT uses a combination of Pay and Return on Assets (ROA) applied to NBV of assets to determine the attribution weights of costs.

Certain cost categories exclude particular asset types (e.g. for AG103 the following asset types are excluded: Copper, Fibre, Land and Buildings, vehicles and materials awaiting installation). Excluding these assets ensures that BT is calculating the return on the assets that are relevant to the cost category (in the case of AG103, only TSO assets should be considered).

In this methodology ASPIRE looks for specific OUCs information to determine which PGs should receive cost attribution. For examples if costs are being attributed from a TSO only activity group such as AG103 (BT TSO Support Functions), ASPIRE will check for all activity groups and plant groups where there has already been some attribution of pay and will only apportion costs to those AGs and PGs.

The following illustration (Table 321) describes the two stages of the process.

Table 321. ***Attribution Methodology illustration for Pay and Return on Assets***

Cost Category	Stage 1		Stage 2		Total Cost	Final Weights
	Pay Costs	Implicit weights based on Pay only	Asset Value	ROA @ 10%		
PG001	£ 300m	30%	£ 8bn	£ 800m	£ 1,100m	**52.4%**
PG002	£ 100m	10%	£ 1bn	£ 100m	£ 300m	**14.3%**
PG003	£ 100m	10%	£ 0	£ 0	£ 100m	**4.8%**
Retail Products	£ 500m	50%	£ 1bn	£ 100m	£ 600m	**28.6%**
Total	**£ 1bn**	**100%**	**£ 10bn**	**£ 1bn**	**£ 2.1bn**	**100%**

In the above table, note that PG003 does not receive any attribution from assets whereas PG001, PG002 and Retail Products will receive costs related to both Pay and Assets. This is because in this illustration, the previous attribution to PG003 did not have had any asset attributed to it and hence no asset costs are attributed to it.

6.3.6.4 RAP Assessment

Based on the experience of the Cartesian project team, Pay and Return on Assets is an uncommon attribution method in regulatory cost accounting. It is more common for Network operators to attribute overheads using attribution bases such as:

- Pay (or FTEs);
- Opex; and,
- Opex plus annual Capex.

These common alternatives are simpler and more transparent than Pay and Return on Assets, however they are not necessarily superior in other regards.

Concerns regarding **Objectivity** and **Causality**

Objectivity

- The methodology is not objective as it uses an arbitrary weighting factor. A WACC of 10.8% is used to effectively weight the importance of pay and asset values in the apportionment. Whilst this value may be reasonable, we understand that it is not directly driven by BT's actual WACC. This arbitrary factor therefore raises concerns regarding objectivity.

Causality

- Attributing a broad pool of common costs on the basis of Pay and RoA does not appear causal. BT justifies the use of this apportionment methodology in the DAM on the basis that these TSO Support Function activities encompass management of the TSO employees and assets. We have two concerns regarding the causality of this approach:
    1. The time and effort required to manage assets may not correlate with the value of the assets.
    2. TSO employees under the management of the TSO Support Function are also working to achieve a return on the TSO assets. Combining Pay and ROA may therefore lead to an aspect of double-counting.

6.3.6.5 Potential Alternatives

An alternative method would be to apportion costs on Pay alone. Advantages of using pay as the cost driver includes greater transparency and objectivity as it removes the need to use an arbitrary RoA factor. In terms of causality, using only pay as a cost driver overcomes the issue regarding large asset bases that do not require much management attention.

Furthermore, as outlined above, a pay-driver would correlate with employees who are themselves managing the company's assets. This final point is supported by the fact that generic costs that relate to Network Support activities, such as those in AG102 (TSO Operational Costs) are attributed based on Net Book Value of Assets under the management of BT TSO.

Cartesian suggests that BT considers taking a more granular approach to defining generic costs categories such as AG103. In this approach BT could separate costs that have a causal relationship to BT's key assets and then use an appropriate attribution method to attribute costs over an asset related cost categories. Other generic costs should be attributed on the basis of Pay.

6.3.7 Property Cost Apportionment

6.3.7.1 Overview

This method is used to apportion property related costs at AG level to other AGs and PGs.

BT property assets are divided in two main property types: Operational (e.g. local exchange) and General Purpose (e.g. offices) buildings. The breakdown between operational and office space costs is inferred from the transfer chargers generated from BT Group Property division to recover the incurred costs from the BT operational units actually utilising these property assets.

These transfer charges relate to each one of the building types, either for accommodation (rent) or electricity costs. These charges determine the apportionment of property costs captured in three different costs categories among various AGs and PGs.

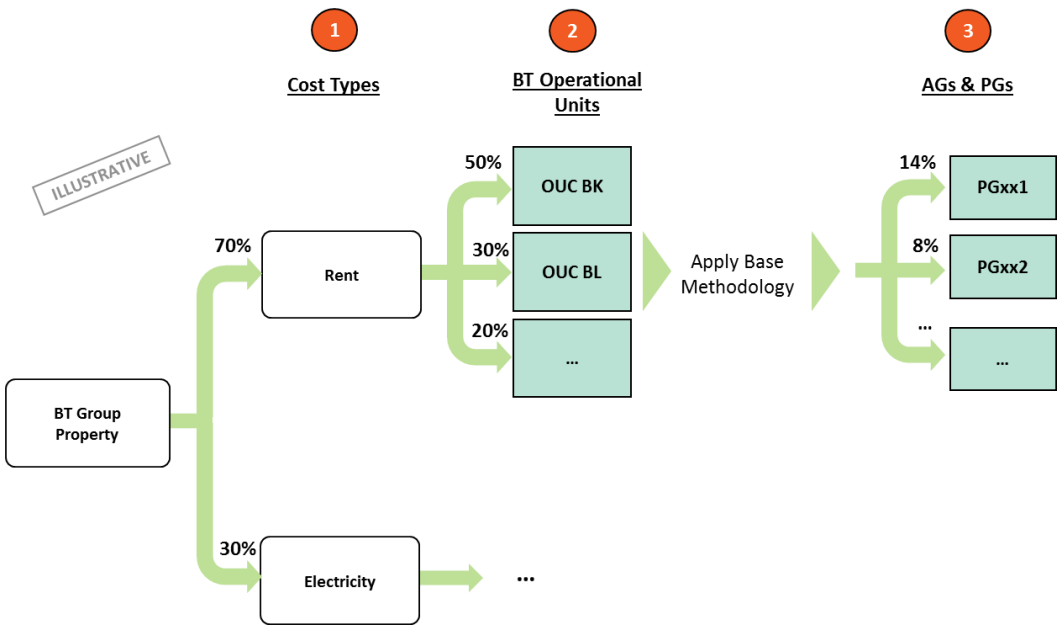
6.3.7.2 Applicable Cost Categories

This method applies at AG106, AG412 and AG414 cost categories.

6.3.7.3 Detailed Methodology

The apportionment is based on a three stage process as illustrate in the Figure below.

Figure 26. ***Attribution Methodology for Property costs in AG106***



Source: BT ASPIRE, Cartesian

Firstly, BT looks at the billed amounts (i.e., transfer charges) from Group Property to all the different BT operational units for rent of leased property (business rates, which includes facility management charges), depreciation of BT owned property, and electricity charges (i.e., the different cost type of each transfer charge) and works out the percentage of Group Property total charges for each cost type (1).

As an example, the top three cost types used in AG106 and approximate % of Group Property are shown in Table 322 below (directional %). Note that these cost types are different for AG106, AG412 and AG414 to reflect the nature of the costs captured in these cost categories:

- AG106 – Transfer charges relate to accommodation and electricity costs in both leased and BT retained office and operational buildings
- AG412 – Transfer charges relate to accommodation costs in BT retained buildings only
- AG414 – Transfer charges relate to accommodation costs in both leased and BT retained office building

Table 322. ***Illustrative Transfer Charges Cost Types used to apportion Property costs in AG106 (Step 1 in above figure)***

Cost Type	% of Group Property charge
Telereal leased exchange building rent	46%
BT retained exchange building costs	4%
BT Office costs	17%
BT retained office building costs	3%
Telereal leased exchange building electricity	29%
BT retained exchange building electricity	2%

Secondly, BT looks at how much of each cost type was charged to each operational business unit, e.g., how much rent was billed to Openreach or BT TSO. It then works out the percentage of the total cost type for each unit (2).

Before BT moves to the final step, it multiplies the combined percentages calculated in points 1 and 2 to the actual total costs from Group Property to get them attributed to each operational unit.

Finally, those costs sitting with each different cost type and OUC combination are further apportioned out to AGs and PGs based on a previously used base methodology either to attribute the transfer charges (majority of the cases) or to attribute ledger costs incurred from the usage of the property assets by the units e.g. use of pay of people occupying the office space to apportion office costs.

BT's rationale for using these methods is that the billed amounts for usage of space or electricity are representative of the actual costs incurred. BT uses various number of methodologies for this end and for the different cost categories comprised in the Property group.

Table 323 shows the methods which attribute the largest amounts of cost to AG106 as an example. These base methodologies provide the apportionment base and consequently the destination cost categories receiving the property costs. For example, the DTNELSP base methodology is used to attribute electricity costs in leased exchange buildings for BT TSO General Infrastructure Services team.

Table 323. ***Notable Methods for Cost Attribution from AG106 (Point 3)***

Cost Driver	Base Methodology	OUC	OUC Name	Cost Type	Section Ref.
Occupied space in telereal buildings	DTNASTR	TS	BT TSO General Infrastructure Services	Exchange building Rental costs	6.2.13
Electricity consumed in telereal buildings	DTNELSP	TS	BT TSO General Infrastructure Services	Electricity costs in leased exchanges	6.2.14
Occupied space in telereal buildings	DTNASTR	B	Openreach	Exchange building Rental costs	6.2.13
Occupied space in telereal buildings	DTNASTR	TX	BT TSO Centre	Exchange building Rental costs	6.2.13
Electricity consumed in telereal buildings	DTNELSP	TX	BT TSO Centre	Electricity costs in leased exchanges	6.2.14
Apportionment using the budgeted amounts	OPGENACC	TS	BT TSO General Infrastructure Services	BT Office costs	6.2.11

Source: BT ASPIRE, Cartesian

6.3.7.4 RAP Assessment

Concerns regarding **Completeness**, **Consistency, Accuracy** and **Objectivity**

Cartesian has some concerns mainly with the methodologies used to apportion costs from the three costs categories related to Property. BT uses transfer charges, which reflect the internal trades between the different units within BT Group, as a first step in the apportionment process for the three cost categories related to Property. Although it seems a good basis to associate the actual costs to the LoBs, in practice this results in a mixture of different types of costs during the apportionment process as a result of this approach (each of which may have its own more-specific apportionment method).

Completeness

- The costs attributed to AG106 appear incomplete. A ✂ [£10m to £50m] FAC transfer charge is attributed by BT Property into AG106. However, no transfer charge out can be identified to be attributed from the data provided by BT. By principle, transfer charges should balance per cost category. In case, there is an exception to this, it isn't mentioned (which makes it a transparency issue as well). This concern was shared with BT but no response had been received at the time of drafting this report.

Consistency

- The treatment of income from sale of property is inconsistent. This income is not attributed to regulated markets because BT does not consider such profits to be part of the normal cost of managing their estate and don't believe it is cost causal to attribute them to AG106. However, this is a different approach to the treatment of the provision from existing leased properties (AG414) due to early termination of lease of office space.

Accuracy

- The treatment of costs related to early termination of leases on office buildings appears inaccurate. According to detailed data provide by BT, these costs are apportioned from AG414 based on transfer charges from BT Property related to both leased and BT retained office buildings. Cartesian detects two accuracy issues with this approach:

  1) The transfer charge related to BT retained office buildings shouldn't be used to apportion provision amounts which relate exclusively to leased buildings

  2) The transfer charge related to leased office buildings allocates costs to Retail Residual. If this point and the former are correct then, the ✂ [-£50m to -£10m] FAC (provision) in AG414 will go 100% to Retail which means an approximately extra ✂ [£10 to £50m] FAC in the regulated markets. If point 1 is correct but point 2 is incorrect, then the ✂ [-£50 to -£10m] FAC are still within regulated markets but the distribution across services will vary. The former case appears to be correct.
- Some depreciation charges relating to BT retained buildings are still attributed to AG106 rather than in AG412
- Leased office building costs in AG106 are attributed to Retail Residual. However, as per issue identified in AG414 this is inconsistent with the treatment of BT retained office buildings

Objectivity

- Direct allocation is used to attribute ledger level costs to AG412 and AG414 and therefore a base methodology isn't required, contrary to what BT does.

6.3.7.5 Potential Alternatives

Cartesian recommends the following:

- BT retained office transfer charges (out) should not be used during AG414 exhaustion process. Thus, BT should only use the transfer charged related to the leased buildings to apportion costs in AG414. The units "selected" to be attributed with costs are defined by the transfer charges used. Thus, it should be those units incurring lease costs to receive the provision from AG414. Ultimately, services using components in leased buildings will get a reduction in their cost stack due to RoMCE
- The combination of the point above, together with the assumption that the attribution to Retail is not right (see Accuracy issues in the RAP Section), makes that provision previously going to Retail will now be attributed to regulated markets lowering their cost stack even though the variation on the attribution percentages is small
- If point 1 of potential alternatives is followed then AG412 becomes superfluous as the transfer charges and the base methodologies used in the apportionment of costs out of AG412 are exactly the same of those used in AG106. Hence, the costs in AG412 should be captured in AG106 and AG412 should be removed
- If Point 1 of potential alternatives is not followed then Cartesian recommends to attribute all fixed assets costs of BT retained buildings, e.g. depreciation and GBV, currently captured in AG106 to AG412

6.4 Assessment of Network Component Attributions

Network Components costs are attributed to services and markets using route and usage factors. In this section we review the attribution method against the regulatory accounting principles.

Based on the information provided to date by BT, some issues have been identified with the attributions from network components. As highlighted in Section 5.11, there are a number of questions that are still outstanding with BT.

6.4.1 Fixed Access Market

6.4.1.1 D-side Copper Current Component (CL174)

Concerns regarding **Objectivity**

Objectivity

- There are issues with transparency. Some usage factors are the product of more than one input, and there is little information on the source of the data.

6.4.1.2 Other Components

No concerns

We believe that the usage factors align with Ofcom's regulatory accounting principles. Our assessment was conducted within the time constraints of the project and is based on information received from BT.

The components for which we have no concerns are as follows:

- MDF Hardware Jumpering Component (CL161)
- E side Copper Capital Component (CL171)
- E side Copper Current Component (CL172)
- D-side Copper Capital Component (CL173)
- Local Exchanges General Frames Equipment Component (CL175)
- Dropwire Capital & PSTN NTE Component (CL178)
- Analogue Line Drop Maintenance Component (CL180)
- PSTN Line Cards Components (CL183)
- ISDN30 Access Component (CL189)

6.4.2 Narrowband Market

At the time of writing, BT has yet to respond to questions in this market. As such Cartesian is unable to make an assessment against the RAP.

The components in this market are as follows:

- OR Interconnect 2Mbit/s Connection Component (CF453)
- iNode Voice Call Set-up Component (CN868)
- Local Exchange Processor Duration Component (CO210)

- Local Exchange Processor Set-up Component (CO212)
- Local Exchange Concentrator Set-up Component (CO214)
- Local Exchange Concentrator Duration Component (CO215)
- Remote - Local Transmission link (CO325)
- Remote - Local Transmission Length Component (CO326)
- Product Management Policy & Planning Component (CO512)
- Emergency OA (999) Non Chargeable Component (CO942)

6.4.3 Business Connectivity Market

At the time of writing, BT has yet to respond to questions in this market. As such Cartesian is unable to make an assessment against the RAP.

The components in this market are as follows:

- OR PC rentals 2Mbit/s distribution (CF371)
- OR Service Centre - Provision AISBO (CL573)
- Ethernet Switches (CN901)
- PC rentals 64kbit/s local end (CO432)
- PC rentals 2Mbit/s local end fibre (CO439)
- Wholesale & LAN extension services fibre (CO450)
- Ethernet Main Links (CO484)
- Ethernet Electronics (CO485)
- OR systems & development – Ethernet (CO772)
- Ethernet Direct Access Fibre (CW609)

6.4.4 Wholesale Broadband Access

At the time of writing, BT has yet to respond to questions in this market. As such Cartesian is unable to make an assessment against the RAP.

The components in this market are as follows:

- Combi-Card Broadband Access (CN854)
- Core/Metro (broadband) (CN860)
- Broadband MSAN Access (CN890)
- Ethernet Switch BB (CN891)
- ATM Network Switching (CO314)
- Inter ATM Transmissions (CO316)
- SG&A Broadband (CO609)
- Broadband Backhaul Circuits (CO681)
- DSLAM Overheads (CR188)
- DSLAM Capital / Maintenance (CR189)

6.4.5 Mathematical Errors in Usage Factors

During the study, Cartesian requested BT to provide usage factor information for a selected set of network components. In the response provided, BT recognised mathematical errors for certain ISDN related network components. Cartesian has attempted to estimate the impact of these errors on the services which is described below. Due to time constraints, Cartesian was unable to audit all usage factor calculations. (There are hundreds.)

6.4.5.1 Routing and Records (CL160)

This network component includes the costs of routing and record activities. A calculation error in the formula for the usage of this component by ISDN services significantly understates the usage factors for those services. The usage factors used in the 2013/14 RFS are compared with the corrected values in the table below.

Table 324. ***Network Component Usage Factors***

Network Component	BT Ref.	Service	Usage Factor (13/14 RFS)	Usage Factor (Corrected)
Routing and Records	CL160	ISDN2	0.33	0.75
		ISDN30	0.0422	0.1139

Source: BT ASPIRE, Cartesian

The result of correcting this error is shown in the table below. An additional £172k of CCA cost is attributed to Wholesale ISDN2 Lines market and approximately £107k is removed from LLU markets. This component does not have any MCE costs.

Table 325. ***Impact of Correcting Usage Factor Error***

Market	Attribution Weight Delta	Cost Attributed by Component	CCA Impact (£ k)
AISBO Non-WECLA	-0.01%	CCA: £25.2m MCE: £0	-£2
AISBO WECLA	0.00%		-£0
Local Loop Unbundling	-0.42%		-£107
MISBO Non-WECLA	0.00%		-£0
TISBO (up to and including 8 Mbps)	0.00%		-£0
Wholesale ISDN2 Lines	0.68%		£172
Wholesale ISDN30 Lines	0.27%		£69
Wholesale Line Rentals	-0.22%		-£56
Wholesale Residual	-0.30%		-£76

Source: BT, Cartesian

6.4.5.2 PSTN Line Test Equipment (CL177)

This network component includes the costs of equipment that supports line testing on PSTN and ISDN circuits. A calculation error in the formula for the usage of this component by ISDN services overstates

the usage factors for those services. The usage factors used in the 2013/14 RFS are compared with the corrected values in Table 326 below.

Table 326. ***Network Component Usage Factors***

Network Component	BT Ref.	Service	Usage Factor (13/14 RFS)	Usage Factor (Corrected)
PSTN Line Test Equipment	CL177	ISDN2	0.07	0.06
		ISDN30	0.81	0.5

Source: BT

The result of correcting this error is shown in Table 327 below. An additional £36k (FAC) is attributed to WLR market and approximately £49k is removed from ISDN2 Lines.

Table 327. ***Impact of Correcting Usage Factor Error***

Market	Attribution Weight Delta	Cost Attributed by Component	CCA Impact (£ k)	MCE Impact (£ k)	FAC Impact (£ k)
Local Loop Unbundling	0%	CCA - £3.4m MCE - £5.8m	£13	£2	£15
TISBO (up to and including 8 Mbps)	0%		£0	£0	£0
Wholesale ISDN2 Lines	-1%		-£42	-£7	-£49
Wholesale ISDN30 Lines	0%		-£3	-£0	-£3
Wholesale Line Rentals	1%		£31	£5	£36
Wholesale Residual	0%		£0	£0	£0

Source: BT, Cartesian

6.5 Miscellaneous RAP Observations

This section of the report discuses general concerns identified during various discussion with BT in addition to some of the cost categories covered in the 'Other' cost group.

Accuracy

- Cartesian has concerns about BT accurately identifying the costs relating to Operator Services Inland. This is because there appears to be no OUC separation between teams supporting Retail products (e.g. customer care call centre) and those supporting Operator Services. Separating the business units will make attributions more transparent and may also improve accuracy. Cartesian raised this as a question with BT to which BT responded, "BT Retail set these functions up as shared resource centres combining emergency services, directory enquiries, operator services and text relay. The centres are organised by geographical location but not by call type, which is shared across the centres. The team, and therefore the OUC, structure thus does not correspond to the different functional areas that the agents deal with."
- Cartesian has identified that certain Transfer Charges in BT's accounts do not balance. From discussions with BT, Cartesian understands that the unbalanced transfer charges relate to BT's non-core units and that this treatment may be correct in specific cases where additional costs (from non-core units) need to be pushed into the cost exhaustion system. However, Cartesian has concerns that these unbalanced transfer charges may lead to double counting. Without visibility of which additional non-core unit costs are driving these Transfer-In charges (costs), Cartesian has concerns over the overall Accuracy (and Transparency) of this methodology.

Consistency with Regulatory Decision

- In FY 2013/14 costs for Phonebooks (✂ [£10m to £50m] FAC) were attributed to the WLR market using network component CKT12. Ofcom requires BT to exclude phonebooks from regulated markets from FY 2014/15 onwards.

Consistency of the RFS as a whole and from one period to another

- Costs in AG103 which relate to TSO Support functions (e.g. HR, Finance, and Strategy) is attributed based on Pay and RoA, whereas Network management costs in AG102 (i.e. non-LoB specific network costs) are attributed using NBV. Cartesian feels that this treatment is inconsistent because either AG103 should be based on Pay and AG102 on Assets due to the nature of costs within these cost categories or BT should have used Pay and RoA for both cost categories to be consistent.

Concerns outside RAP

- BT attributes Service Level Guarantee (SLGs) penalties for the provision and repair of Ethernet and WLR services to the regulated markets. These attributions (✂ [£10m to £50m] FAC) are made using the SLGETH and SLGWLR methodologies respectively. Attributing these costs to the regulated market is reasonable, however there may be an argument that BT should not be able to fully recover these costs from its customers in any future charge controls based on this cost data.
- BT attributes costs of Openreach Contribution to Light User Scheme to Wholesale Residual Market. Since Light User Scheme relates to a Retail product, Cartesian would have expected these costs to be attributed to Retail Residual market.

- In FY 2013/14 BT generated approximately ✂ [£100m to £150m] (FAC) in revenue from activities such as selling copper (see PG986R). Of this ✂ [£100m to £150m], approximately ✂ [£100m to £150m] FAC is fully attributed to Wholesale Residual Market. Since the cost of copper is a major contributor of costs within the regulated markets, it is unclear why none of this revenue is used to offset copper costs within the regulated markets.

7 Impact of Alternative Attribution Methods

7.1 Introduction

The analysis of BT's cost attribution methodologies (Section 5) and subsequent assessment of these against the RAP (Section 6) highlighted a number of areas of concern. These included identified attribution errors and potential issues of causality. In addition, through the analysis we identified alternative attribution methods which may improve BT's compliance to RAP.

This section assesses the impact of two of the alternative attribution methods identified. One of these corrects an error in the attribution of backhaul and core duct. The other concerns the use of Pay and Return on Assets as a basis for the apportionment of certain common costs.

In addition to the two alternative attribution methods, this section also analyses the sensitivity of the outputs to a duct valuation ratio used within the cost attribution system. This is tested as the method by which BT estimates the ratio – using a survey from 1997 – may not accurately represent the current ratio of ducts in the network.

The key findings within this section are:

- Correcting the error in the attribution of backhaul and core duct leads to an estimated £26m reduction in the costs of regulated markets. The majority of this reduction is to services within the Business Connectivity market.
- Apportioning specific common costs on the basis of Pay only, rather than the 'Pay and Return on Assets' driver, leads to a reduction in the costs of regulated markets of approximately £300m. The reduction of cost impacts many services across the regulated markets, with an average reduction of 6% per service; the greatest reduction (10%) occurs for AISBO non-WECLA.
- The cost attributed to regulated markets is sensitive to the choice of WACC in the 'Pay and Return on Assets' driver. For every 1% point reduction in WACC, the costs in the regulated markets would fall by an estimated 0.5%.
- The overall apportionment of costs to regulated markets is not sensitive to the duct valuation ratio. Hence, there is a low risk of over or under-attribution of costs to the regulated markets as a result of BT's use of inaccurate estimation method used to value duct.
- The distribution of costs to selected services within the regulated markets shows some sensitivity to the duct valuation ratio. Therefore, any error in the estimation of this ratio could bias costs to or from these services (most notably between Fixed Access services vs. Business Connectivity services).

7.2 Backhaul and Core Duct Attribution Alternative

7.2.1 Summary

In reviewing BT's cost attribution methodology, Cartesian identified an issue with the treatment of backhaul and duct costs. This scenario aims to assess the impact at service/market level if that error was corrected.

Within BT's cost attribution system, backhaul and core duct costs are directly allocated to plant groups associated with fibre deployed in the 20C backhaul and core networks. Currently, no backhaul and core duct costs are apportioned into 21C-related fibre PGs. This is incorrect as 21C fibre does use backhaul and core duct.

This scenario simulates an apportionment of backhaul and core duct costs into both 20C- and 21C-related fibre cost categories. The variation of the costs is calculated by comparison of the reference scenario built using 2013/14 RFS data.

The simulated scenario suggests that BT is excessively attributing approximately ✂ [£10 to £50m] costs to the regulated services as a result of the incorrect attribution of duct costs. Correcting the error may result in the reduction of costs of several services in the business connectivity market, although some may also rise slightly.

7.2.2 Methodology

To simulate the impact, Cartesian used an external model representing the ASPIRE cost attribution system. Within the model, we simulated the impact by apportioning duct costs from Backhaul (AG148) and Core (AG149) duct cost categories to five 21CN Fibre PGs, in addition to 20CN Backhaul (PG170B) and Core (PG350N). [21] The five 21CN fibre plant groups are:

- PG900A - WDM-Metro Length
- PG865A - Core-Core Length
- PG885A - Metro-Core Length
- PG873A - Fibre MSAN-WDM Length
- PG863A - Copper-Fibre MSAN Length

Apportionment of costs follows the Fibre Length method (see Section 6.2.7), which is used to attribute costs between 20C and 21C backhaul and core fibre. This ratio is also applied to the AG148 and AG149 cost categories.

Table 328 compares the apportionment ratios used in the reference scenario (the 2013/14 RFS) with the simulated apportionment ratios for the above cost categories. Note that the ratios are the same for backhaul and core: c.81% of costs are related to 20C network and c.19% are related to 21C network. The attribution among the 21C fibre related PGs also follows the same ratios defined by the Fibre Length method.

[21] Note that of the five PGs, only one (PG900A) appears in the Cartesian-selected list of material cost categories. The others are beyond the scope of the study (see Appendix B).

Table 328. ***Current and Simulated Duct Apportionment Ratios***

Scenarios		Reference Scenario (%)	Simulation Scenario (%)
Backhaul / Core Fibre	PG170B / PG350N	100%	81%
Copper-Fibre MSAN Length	PG863A	0%	0%
Core-Core Length	PG865A	0%	4%
Fibre MSAN-WDM Length	PG873A	0%	1%
Metro-Core Length	PG885A	0%	3%
WDM-Metro Length	PG900A	0%	11%
TOTAL		100%	100%

Source: BT ASPIRE, Cartesian

7.2.3 Results

The table below compares the outputs of the simulation scenario for apportionment of backhaul and core duct costs into 21CN fibre related PGs to the reference scenario based on the 2013/14 RFS. The results are shown by service in absolute cost and percentage change.

The simulated scenario affects all services with the exception of LLU and WLR, which relate only to the access network and hence aren't attributed backhaul and core duct costs. In general, the costs of regulated services fall as a result of the change. The maximum cost reduction at an individual service level of c.7% FAC (Wholesale Regional Trunk Segments). Note however that the AISBO WECLA service is attributed with an additional 0.5% FAC.

In the AISBO and MISBO market scenarios, backhaul fibre costs are apportioned to services via two component types: Ethernet Main Links (CO484) component, which uses 20C backhaul fibre, and Ethernet Backhaul Direct (EBD) component (in fact, three different components), which uses 21C backhaul fibre (WDM-Metro).

By correcting the duct attribution error, more backhaul duct costs are attributed to 21C backhaul fibre (PG900A) – and less to 20C backhaul fibre (PG170B) - which in turn attributes more costs to EBD components and less costs to Ethernet Main Links.

According to the data provided by BT, the usage factor of EBD component (0.86) is significantly higher than the usage factor of Ethernet Main Links component (0.37) in the WECLA region. Hence, AISBO services in the WECLA region are attributed with c.10% of EBD related fibre costs against only c.2% of Ethernet Main Links related fibre costs, which means that any variance in duct and fibre costs results in a bigger impact on the EBD component.

Hence, the resulting increase of EBD costs due to backhaul fibre costs is more significant than the cost decrease of Ethernet Main Links, making the overall costs attributed to AISBO WECLA higher than before.

For AISBO Non-WECLA and MISBO services, the reduction of 20C backhaul fibre costs has a bigger impact than the increase of 21C backhaul fibre costs. MISBO (non-WECLA) services are delivered in their majority over Ethernet Main Links compared to only 11 EBD circuits, making the overall costs attributed lower than before.

In absolute terms, the simulated scenario reduces the costs in regulated markets by £26m. This amount is reattributed to Wholesale Residual market as shown in Table 329.

Table 329. ***Results for apportioning backhaul and core duct costs to fibre in both 20C and 21C networks***

Market Review	Market Name	Service Code	Reference FAC (£ m)	Scenario 1 FAC (£ m)	Delta (£ m)	Delta (%)
Fixed Access Markets	Wholesale Line Rentals (WLR)	SW011	£1,919	£1,919	£0	0%
	Wholesale ISDN2 Lines	SW031	£77	£77	-£0	0%
	Wholesale ISDN30 Lines	SW270	£91	£91	-£0	0%
	Local Loop Unbundling (LLU)	SW290	£1,133	£1,133	£0	0%
Business Connectivity Markets	TISBO (up to and including 8 Mbps)	SW100	£286	£280	-£6	-2%
	TISBO (above 8 Mbps up to and including 45 Mbps)	SW111	£18	£17	-£1	-4%
	TISBO (above 45 Mbps up to and including 155 Mbps)	SW112	£20	£19	-£1	-5%
	Wholesale Regional Trunk Segments	SW151	£16	£15	-£1	-7%
	Point of Handover	SW140	£5	£5	-£0	0%
	AISBO Non-WECLA	SW311	£517	£507	-£10	-2%
	AISBO WECLA	SW312	£41	£41	£0	1%
	MISBO Non-WECLA	SW321	£46	£45	-£1	-1%
Narrowband Markets	Calls: Call Origination	SW040	£130	£129	-£2	-1%
	Calls: Call Termination	SW090	£113	£111	-£1	-1%
	Interconnect Circuits	SW080	£29	£28	-£0	-1%
Wholesale Broadband Access Markets	Wholesale Broadband Access - Market 1	SW181	£259	£256	-£3	-1%
	Wholesale Broadband Access - Market 2	SW182	£77	£77	-£0	0%
Total Regulated		-	**£4,776**	**£4,750**	-£26	-1%
Wholesale Residual		SW500P	£2,532	£2,558	£26	1%
Total Unregulated		-	**£2,532**	**£2,558**	**£26**	**1%**
Grand Total			**£7,308**	**£7,308**	**£0**	**0%**

Source: BT ASPIRE, Cartesian Note: Retail Residual is not shown as there are no duct costs attributed into it

Note that without access to ASPIRE, Cartesian was unable to validate that the modelled results accurately reflect the outputs of the system. The results of this analysis should therefore be interpreted as directional.

7.2.4 Conclusions

The simulated scenario suggests that BT is over-attributing costs to the regulated services as a result of the incorrect attribution of duct costs. The exact figure can only be determined by BT using ASPIRE, however the analysis suggests the error is of the order of ✂ [£10 to £50m] FAC in 2013/14.

In addition to reducing the costs attributed to regulated markets, correcting the error would lead to some redistribution of cost between regulated services. This is likely to see the costs of several services in the business connectivity market reduce, although some may increase slightly.

7.3 Using Pay as an alternative to 'Pay and Return on Assets'

7.3.1 Summary

BT uses Pay and Return on Asset to attribute costs from the General Ledger to activity and plant groups, (using the COMCOS base methodology), and from AG112 and AG103 to plant groups during the cost exhaustion process.

In the assessment against the regulatory accounting principles, we identified potential issues in this approach with regard to causality, (Section 6.3.6). Specifically, that accounting for asset values may result in an attribution of management costs that does not align with management effort.

This scenario provides a view of cost attributions to markets using an alternative method based only on Pay, instead of Pay and RoA. The objective of modelling this scenario is to estimate the change in cost attribution to regulated markets.

The results show that using pay as the driver would reduce the costs in the regulated markets by c. £300m FAC (6%). The greatest reduction, of over 10% FAC, occurs for AISBO non-WECLA.

The analysis also provides an indication of the sensitivity of the attributions to value selected for WACC in the Pay and RoA formula. The results imply that for every 1% point reduction in WACC, the costs in the regulated markets would fall by approximately 0.5%.

7.3.2 Method

The attribution mechanism in ASPIRE is complex as there are many relationships to consider (including the order at which all the attribution methodologies are executed). Based on our understanding of the cost exhaustion process, we have simulated what we believe to be a reasonable approximation for BT's system as described below.

In order to simulate the scenario, Cartesian identified the proportion of pay within in the cost exhaustion at each level and then attributed costs by:

- First, attributing costs being attributed by COMCOS on the basis of pay weights determined at level 1
- Second, attributing costs from AG103 to destination AGs and PGs based on revised pay weights
- Third, attributing costs from AG112 to destination AGs and PGs based on revised pay weights

Without access to ASPIRE, Cartesian was unable to validate that the method fully reflects all cost attributions within the system. The results of this analysis should therefore be interpreted as directional.

7.3.3 Results

Based on the simulated cost attribution, the alternative methodology attributes a greater share of costs into the Retail Residual Market, leading to a reduction of £300m FAC (6%) within the regulated markets. The largest cost reduction is for the AISBO non-WECLA market which is reduced by 10%. Table 330 below illustrates the difference in costs.

Table 330. ***Results for using Pay driver instead of Pay and RoA***

Market Review	Market Name	Original Model FAC (£ m)	Scenario Model FAC (£ m)	Delta (£ m)	Delta (%)
Fixed Access Markets	Wholesale Line Rentals	£1,925	£1,801	-£124	-6%
	Wholesale ISDN2 Lines	£78	£73	-£4	-6%
	Wholesale ISDN30 Lines	£92	£87	-£6	-6%
	Local Loop Unbundling	£1,136	£1,076	-£60	-5%
Business Connectivity Markets	TISBO (up to and including 8 Mbps)	£287	£273	-£14	-5%
	TISBO (above 8 Mbps up to and including 45 Mbps)	£18	£17	-£1	-6%
	TISBO (above 45 Mbps up to and including 155 Mbps)	£20	£19	-£1	-6%
	Wholesale Regional Trunk Segments	£16	£15	-£1	-6%
	Point of Handover	£5	£5	-£0	-6%
	AISBO Non-WECLA	£519	£467	-£52	-10%
	AISBO WECLA	£41	£38	-£4	-9%
	MISBO Non-WECLA	£46	£42	-£4	-9%
Narrowband Markets	Calls: Call Origination	£131	£126	-£5	-4%
	Calls: Call Termination	£113	£108	-£5	-4%
	Interconnect Circuits	£29	£28	-£1	-2%
Wholesale Broadband Connect Market	Wholesale Broadband Access - Mkt 1	£359	£346	-£13	-4%
	Wholesale Broadband Access - Mkt 2	£131	£127	-£4	-3%
Total Regulated		**£4,946**	**£4,646**	**-£299**	**-6%**
Retail Products		£9,497	£9,880	£384	4%
Wholesale Residual		£2,389	£2,305	-£84	-4%
Total Unregulated		**£11,886**	**£12,185**	**£299**	**3%**
Grand Total		**£16,832**	**£16,832**	**£0**	**0%**

Source: BT ASPIRE, Cartesian

These results also provides an indication of the sensitivity of the attributions to value selected for WACC in the Pay and RoA formula. (As noted in section 6.3.5.4, although close to actual WACC the value chosen appears arbitrary.) The results imply that for every 1% point reduction in WACC, the costs in the regulated markets would fall by approximately 0.5%.

Note that without access to ASPIRE, Cartesian was unable to validate that the modelled results accurately reflect the outputs of the system. The results of this analysis should therefore be interpreted as directional.

7.3.4 Conclusions

Attributing common costs on the basis of Pay rather than Pay and RoA has a material impact on the share of costs attributed to the regulated markets. The current attribution methodology enables BT to attribute £300m FAC to the regulated markets that it would not if the alternative method was selected.

Cartesian also recommends that BT takes a granular approach to defining activity groups such as AG112. This granular approach will allow BT to use asset based attribution methodologies where appropriate and attribute all overhead/general management costs (capitalised or current) on the basis of pay.

7.4 Sensitivity of Outputs to the Duct Valuation Ratio

7.4.1 Summary

The duct valuation method is used to apportion duct costs between access and backhaul network. This method is defined in Section 6.2.2. This method is used by the PDTDUCT base methodology.

This scenario simulates alternative *access:backhaul* duct valuation ratios for the apportionment of duct costs incurred mainly by Openreach teams in the access and backhaul networks. The objective of the analysis is to observe the impact on the attributed FAC at Service/Market level of the variation of the apportionment of duct costs between access and backhaul cost categories (AG135 and AG148 respectively).

The results show that the duct valuation ratio has relatively little impact on the attribution of costs between regulated and unregulated markets. However, the ratio does have an impact on the distribution of costs within regulated markets.

7.4.2 Method

Varying the *access:backhaul* duct valuation ratio has an impact on the two cost categories:

- AG135 – Access Duct
- AG148 – Backhaul Duct

To simulate the impact, Cartesian used an external model representing the ASPIRE cost attribution system. Within the model, we varied the duct ratio within a 10% range [+5% and -5%]. The attribution process is linear and therefore Cartesian only evaluated the two edge cases to set the upper and lower bounds.

The current duct valuation ratio is defined as 83% to Access Duct and 17% to Backhaul Duct (given by 2013/14 duct valuation – see Section 6.2.2). The associated costs are apportioned by the PDTDUCT base methodology which is used by any Openreach unit.

Table 331 below shows the apportionment ratios used by the BT Reference scenario (i.e. using BT's data as published in the 2013/14 RFS) and those of the simulated scenarios.

Table 331. ***Current and Simulated Apportionment Ratios***

Scenarios		Access %	Backhaul %	Total
BT Reference	-	83%	17%	100%
Simulation	1	88%	12%	100%
	2	78%	22%	100%

Source: BT, Cartesian

7.4.3 Results and Analysis

Table 332 below shows the results for the two simulation scenarios. In Scenario 1, the access duct contribution is increased +5% compared to the reference model. In Scenario 2, the access duct contribution is reduced 5% compared to the reference model.

The delta (%) column, shows the range of cost variation at a service/market level and how costs move between the different markets. Because the cost attribution process is linear, the results of Scenario 2 are a mirror image of the results of Scenario 1.

In Scenario 1, a high access duct percentage increases the costs of services in the Fixed Access market (LLU and WLR), as these have a high access-duct-cost weighting. TISBO services in the Business Connectivity market reduce most. Note that TISBO (above 8Mbps and up to 45Mbps) shows the greatest variance, with an approximate range of 9% between Scenarios 1 and 2.

It is interesting to observe that there is relatively little difference in attribution of costs between regulated and unregulated markets in the two scenarios. A 5% point change in the duct valuation ratio results in a change of only £1m FAC.

Table 332. ***Results of using different Access:Backhaul duct ratios***

Market Review	Market	Service Code	Reference FAC (£ m)	Scenario 1 FAC (£ m)	Delta (£ m)	Delta (%)	Scenario 2 FAC (£ m)	Delta (£ m)	Delta (%)
FAMR	Wholesale Line Rentals (WLR)	SW011	£1,919	£1,940	£21	1%	£1,898	-£21	-1%
	Wholesale ISDN2 Lines	SW031	£77	£78	£1	1%	£77	-£1	-1%
	Wholesale ISDN30 Lines	SW270	£91	£91	-£0	0%	£92	£0	0%
	Local Loop Unbundling (LLU)	SW290	£1,133	£1,142	£9	1%	£1,124	-£9	-1%
BCMR	TISBO (up to and including 8 Mbps)	SW100	£286	£281	-£5	-2%	£291	£5	2%
	TISBO (above 8 Mbps up to and including 45 Mbps)	SW111	£18	£17	-£1	-4%	£19	£1	5%
	TISBO (above 45 Mbps up to and including 155 Mbps)	SW112	£20	£19	-£1	-4%	£21	£1	4%
	Wholesale Regional Trunk Segments	SW151	£16	£16	£0	0%	£16	£0	0%
	Point of Handover	SW140	£5	£5	£0	0%	£5	-£0	0%
	AISBO Non-WELCA	SW311	£517	£502	-£15	-3%	£531	£15	3%
	AISBO WECLA	SW312	£41	£41	-£0	-1%	£41	£0	1%
	MISBO Non-WECLA	SW321	£46	£45	-£1	-1%	£46	£1	1%
NB	Calls: Call Origination	SW040	£130	£128	-£2	-1%	£132	£2	1%
	Calls: Call Termination	SW090	£113	£111	-£2	-2%	£114	£2	2%
	Interconnect Circuits	SW080	£29	£28	-£0	-1%	£29	£0	1%
WBA	Wholesale Broadband Access - Market 1	SW181	£259	£256	-£3	-1%	£261	£3	1%
	Wholesale Broadband Access - Market 2	SW182	£77	£77	-£0	-1%	£78	£0	1%
Total Regulated		-	**£4,776**	**£4,777**	**£1**	**0%**	**4,775**	**-£1**	**0%**
Wholesale Residual		SW500P	£2,532	£2,531	-£1	0%	£2,533	£1	0%
Total Unregulated			**£2,532**	**£2,531**	-£1	0%	£2,533	£1	0%
Grand Total		-	**£7,308**	**£7,308**	**£0**	**0%**	**£7,308**	**£0**	**0%**

Source: BT ASPIRE, Cartesian Note: Retail Residual is not shown as there are no duct costs attributed to it

Note that without access to ASPIRE, Cartesian was unable to validate that the modelled results accurately reflect the outputs of the system. The results of this analysis should therefore be interpreted as directional.

7.4.4 Conclusions

The results show that the duct valuation ratio has relatively little impact on the attribution of costs between regulated and unregulated markets. This suggests that the risk of BT over- or under-attributing costs to regulated markets is low.

However, the ratio does have an impact on the distribution of costs within regulated markets. An error of a 5% points in BT's estimation of this ratio would lead to a deviation of a few percent in the costs attributed to Fixed Access services vs. Business Connectivity services.

This information will help inform any future assessment of whether BT should adopt an alternative methodology for determining the mix of ducts, e.g. using GIS records.

Appendix A – Cost Category and Cost Group Mapping Table

This appendix provides a complete list of Activity Groups (AG) and Plant Groups (PG) provided by BT in different data sources. This table provides a mapping of each AG and PG to a cost group and cost sub-group in this report. Any cost categories that were not within the scope of Cartesian's study (as agreed with Ofcom) are marked 'Out of Scope'. This list is provided in the alpha-numerical order of AG/PG reference.

Table 333. ***Activity Group and Plant Group mapping to Cost Group and Sub-Group***

BT Ref	Cost Category	Cost Group	Cost Sub-Group
AG101	Motor Transport	Other	Vehicles
AG102	TSO Operational Costs	Other	TSO Operational Costs
AG103	TSO Support Functions	General Overheads	TSO Support Functions
AG106	Group Property and Facilities Management	Property	Group Property and Facilities Management
AG112	Corporate Costs	General Overheads	Corporate Costs
AG113	Liquid Funds and Interest	Other	Miscellaneous
AG114	Non-Core Suspense	Other	Miscellaneous
AG135	Duct used by Access Cables	Duct	Access Duct
AG148	Duct used by Backhaul Cables	Duct	Backhaul Duct
AG149	Duct used by Core Cables	Duct	Core Duct
AG161	Specialised Accommodation Equipment - Maintenance	Out of Scope	-
AG162	Specialised Accommodation Equipment - Non Maint	Other	Exchange Overhead Equipment
AG163	Back-up Power Equipment - Maintenance	Out of Scope	-
AG164	Back-up Power Equipment - Non Maint	Other	Exchange Overhead Equipment
AG401	OR Pay driver	General Overheads	Pay Drivers
AG402	TSO Pay driver	Out of Scope	-
AG403	OR Stores driver	Out of Scope	-
AG404	TSO Stores driver	Out of Scope	-
AG405	Retail Stores driver	Out of Scope	-
AG406	WS Pay driver	General Overheads	Pay Drivers
AG407	OR Ops Pay driver	Out of Scope	-
AG408	OR Fixed Asset driver	Out of Scope	-
AG409	WS Pay plus % FA driver	Out of Scope	-
AG410	OR Pay plus % FA driver	Other	Miscellaneous
AG412	Property Asset Driver	Property	Property Asset Driver
AG414	Property Prov Driver	Property	Property Prov Driver
AG415	Fleet Fuel Driver	Out of Scope	-
PG001X	PoH Equipment Depreciation Adj Debit	Out of Scope	-
PG002X	TISBO Excess Construction Adjustment Debit	Out of Scope	-
PG002Y	TISBO Excess Construction Adjustment Credit	Other	Miscellaneous
PG003X	AISBO Excess Construction Adjustment Debit	Out of Scope	-
PG003Y	AISBO Excess Construction Adjustment Credit	Other	Miscellaneous

BT Ref	Cost Category	Cost Group	Cost Sub-Group
PG004X	POH Depreciation Local End Adjustment Debit	Out of Scope	-
PG004Y	POH Depreciation Local End Adjustment Credit	Out of Scope	-
PG111C	Access Fibre Spine	Fibre	Non-NGA Access Fibre
PG111M	Access Fibre Maintenance	Fibre	Non-NGA Access Fibre
PG114L	ISDN30 Connections	Out of Scope	-
PG114M	Local Lines Service Access Switches Cur	Out of Scope	-
PG115C	Access Radio Equipment	Out of Scope	-
PG115M	Access Radio Maintenance	Out of Scope	-
PG117C	E-side Copper Cable	Copper	E-Side
PG117M	E-side Copper Cable Maintenance	Copper	E-Side
PG118C	D-side Copper Cable	Copper	D-side
PG118M	D-side Copper Cable Maintenance	Copper	D-side
PG119A	Telephony Over Passive Optical Network	Other	Miscellaneous
PG121M	Dropwire Maintenance Business	Out of Scope	-
PG122M	Dropwire Maintenance Residential	Copper	Dropwire
PG123M	ISDN2 Maintenance	Out of Scope	-
PG124A	ISDN30 Equipment	Out of Scope	-
PG127A	Analogue Linecards	Other	20C Equipment
PG128A	ISDN2 Linecards	Out of Scope	-
PG129A	Pair Gain Systems	Out of Scope	-
PG130A	Intra-exchange Tie Cables	Copper	E-Side
PG132B	LLU Co-mingling Recurring Costs (OR)	Other	Co-Mingling, DSLAM Support & MDF
PG132N	LLU Co-mingling Recurring costs (TSO)	Other	Co-Mingling, DSLAM Support & MDF
PG136A	LLU C-mingling Surveys	Out of Scope	-
PG136N	LLU Co-mingling Provision	Out of Scope	-
PG140A	Routing and Records	Other	Miscellaneous
PG142A	MDF Hardware Jumpering	Other	MDF Hardware Jumpering
PG145N	WBA End User NTEs	Out of Scope	-
PG149A	Analogue Line Final Drop	Copper	Dropwire
PG150A	ISDN 2 Access Equipment	Out of Scope	-
PG151B	Broadband Line Testing Equipment (Openreach)	Other	Miscellaneous
PG151N	Broadband Line Testing Equipment (TSO)	Out of Scope	-
PG152B	Other Openreach Repairs	Out of Scope	-
PG152N	DSLAM - Overheads	Other	Co-Mingling, DSLAM Support & MDF
PG153N	DSLAM - Equipment	Other	Miscellaneous
PG170B	Backhaul Fibre	Fibre	Backhaul Fibre
PG192A	FTTC Copper Tie Cables	Copper	E-Side
PG197A	FTTC Service Delivery & Development	Other	Openreach Product Development
PG198A	FTTP Development	Other	Openreach Product Development
PG213C	Remote Concentrators - Equipment	Out of Scope	-
PG213M	Remote Concentrators - Maintenance	Out of Scope	-
PG216C	Operator Assistance Systems Equipment	Out of Scope	-

BT Ref	Cost Category	Cost Group	Cost Sub-Group
PG216M	Operator Assistance Systems Maintenance	Out of Scope	-
PG217E	Main Distribution Frames Equipment	Other	Co-Mingling, DSLAM Support & MDF
PG217F	Main Distribution Frames Maintenance	Other	Co-Mingling, DSLAM Support & MDF
PG217R	Main Distribution Frames Maintenance (TSO)	Out of Scope	-
PG224A	Universal Card Platform Equipment	Out of Scope	-
PG227A	Advanced Switching Units	Out of Scope	-
PG228A	Signalling Transfer Point and Edge Link Monitors	Out of Scope	-
PG229A	Signalling Point Relay and Core Link Monitors	Out of Scope	-
PG240A	Analogue Line Testing Equipment	Out of Scope	-
PG241A	Repair Handling Duty	Out of Scope	-
PG249C	Main Exchange Line Transmission Equipment	Out of Scope	-
PG249M	Main Exchange Line Transmission Repair	Out of Scope	-
PG252B	Openreach Residual Elimination	Out of Scope	-
PG252N	Network Residual Elimination	Out of Scope	-
PG254A	Main Exchange - Intelligent Access & Messaging	Out of Scope	-
PG255B	Main Exchange Switchblock	Out of Scope	-
PG257C	Main Exchange Processors Equipment	Out of Scope	-
PG257M	Main Exchange Processors Maintenance	Out of Scope	-
PG260A	Intelligent Network Platform	Out of Scope	-
PG276A	Common Capability - Intelligence Service Layer	Out of Scope	-
PG280C	Local Exchange Processor (AXE10) Equipment	Other	20C Equipment
PG280M	Local Exchange Processor (AXE10) Maintenance	Out of Scope	-
PG281C	Local Exchange Line Transmission (AXE10) Eqpt	Out of Scope	-
PG281M	Local Exchange Line Transmission (AXE10) Mtce	Out of Scope	-
PG282A	Local Exchange Switch Block (AXE10)	Out of Scope	-
PG283A	Local Exchange Conc (AXE10) Call set-up	Out of Scope	-
PG284A	Local Exchange Conc (AXE10) Call Duration	Out of Scope	-
PG285C	Local Exchange Processor (Sys X) Equipment	Other	20C Equipment
PG285M	Local Exchange Processor (Sys X) Maintenance	Out of Scope	-
PG286C	Local Exchange Line Transmission (Sys X) Eqpt	Out of Scope	-
PG286M	Local Exchange Line Transmission (Sys X) Mtce	Out of Scope	-
PG287A	Local Exchange Switch Block (AXE10)	Out of Scope	-
PG288A	Local Exchange Concentrator (Sys X) Call Set-up	Other	20C Equipment
PG289A	Local Exchange Concentrator (Sys X) Call Duration	Out of Scope	-
PG300T	PPC Point of Handover	Out of Scope	-
PG301T	SDH Tier 0 Equipment	Out of Scope	-
PG311T	SDH Tier 1 STM1 Equipment	Out of Scope	-
PG313T	SDH Tier 1 STM4 Equipment	Out of Scope	-
PG315T	SDH Tier 1 STM16 Equipment	Out of Scope	-
PG321T	SDH Tier 2 STM1 Equipment	Out of Scope	-
PG323T	SDH Tier 2 STM4 Equipment	Out of Scope	-
PG325T	SDH Tier 2 STM16 Equipment	Out of Scope	-
PG331T	SDH Tier 3 STM1 Equipment	Out of Scope	-
PG333T	SDH Tier 3 STM4 Equipment	Out of Scope	-
PG335T	SDH Tier 3 STM16 Equipment	Out of Scope	-

BT Ref	Cost Category	Cost Group	Cost Sub-Group
PG341T	SDH Tier 4 STM1 Equipment	Out of Scope	-
PG343T	SDH Tier 4 STM4 Equipment	Out of Scope	-
PG345T	SDH Tier 4 STM16 Equipment	Out of Scope	-
PG350N	Core Fibre	Fibre	Core Fibre
PG351T	SDH TierSC STM1 Equipment	Out of Scope	-
PG353T	SDH TierSC STM4 Equipment	Out of Scope	-
PG355T	SDH TierSC STM16 Equipment	Out of Scope	-
PG359T	SDH Traffic Grooming	Out of Scope	-
PG361T	PDH Metal 2Mbits/s Equipment	Out of Scope	-
PG365T	PDH Metal 34Mbits/s Equipment	Out of Scope	-
PG367T	PDH Metal 140Mbits/s Equipment	Out of Scope	-
PG371T	PDH Optical 2Mbits/s Equipment	Out of Scope	-
PG373T	PDH Optical 8Mbits/s Equipment	Out of Scope	-
PG375T	PDH Optical 34Mbits/s Equipment	Out of Scope	-
PG377T	PDH Optical 140Mbits/s Equipment	Out of Scope	-
PG379T	PDH Optical 565Mbits/s Equipment	Out of Scope	-
PG381T	MSH STM1 Equipment	Out of Scope	-
PG383T	MSH STM16 Equipment	Out of Scope	-
PG385T	MSH STM64 Equipment	Other	Miscellaneous
PG391T	PDH Radio 8Mbits/s Equipment	Out of Scope	-
PG393T	PDH Radio 34Mbits/s Equipment	Out of Scope	-
PG395T	PDH Radio 140Mbits/s Equipment	Out of Scope	-
PG399T	PDH Traffic Grooming	Other	Miscellaneous
PG400T	ACE/ENA Core Equipment	Out of Scope	-
PG401A	Netstream Equipment	Out of Scope	-
PG405A	DMS100 Call Centre Switches	Out of Scope	-
PG408A	Carrier Pre Selection Customer Set-Up	Out of Scope	-
PG411P	Analogue Private Circuit Connections	Out of Scope	-
PG412C	Local End Equipment 64kbit/s	Out of Scope	-
PG412M	Local End Equipment 64kit/s Repair	Out of Scope	-
PG412P	64kbit/s Private Circuit Connections	Out of Scope	-
PG413P	Private Circuits Megastream and IX Conns	Other	Miscellaneous
PG414M	Private Circuits Intntl Analogue IPLC Cur	Out of Scope	-
PG421S	Private Circuits Analogue Installation	Out of Scope	-
PG422S	Private Circuits Analogue Installation	Out of Scope	-
PG440C	Local End Equipment ASDH 4x2Mbit/s Equipment	Out of Scope	-
PG440M	Local End Equipment ASDH 4x2Mbit/s Maintenance	Out of Scope	-
PG441C	Local End Equipment ASDH 16x2Mbit/s Equipment	Out of Scope	-
PG441M	Local End Equipment ASDH 16x2Mbit/s Maintenance	Out of Scope	-
PG442C	Local End Equipment 2Mbit/s (Copper) Equipment	Out of Scope	-
PG442M	Local End Equipment 2Mbit/s (Copper) Maintenance	Out of Scope	-
PG443C	Local End Equipment 2Mbit/s (Fibre) Equipment	Out of Scope	-
PG443M	Local End Equipment 2Mbit/s (Fibre) Maintenance	Out of Scope	-
PG444C	Local End Equipment 34Mbit/s Equipment	Out of Scope	-
PG444M	Local End Equipment 34Mbit/s Maintenance	Out of Scope	-
PG445C	Local End Equipment 140Mbit/s Equipment	Out of Scope	-

BT Ref	Cost Category	Cost Group	Cost Sub-Group
PG445M	Local End Equipment 140Mbit/s Maintenance	Out of Scope	-
PG446C	Local End Equipment 622Mbit/s Equipment	Out of Scope	-
PG446M	Local End Equipment 622Mbit/s Maintenance	Out of Scope	-
PG447A	Ethernet Access Equipment	Other	Ethernet Access Equipment
PG448A	CCTV Rental	Out of Scope	-
PG448L	CCTV Connection	Out of Scope	-
PG461A	Private Circuits Test & Maintenance Systems	Out of Scope	-
PG462A	Private Circuits Customer Premises	Out of Scope	-
PG463A	Private Circuits Testing	Out of Scope	-
PG483A	#N/A	Out of Scope	-
PG502B	SG&A Openreach Sales Product Management	Out of Scope	-
PG504B	Number Portability Operational Management	Out of Scope	-
PG506N	SG&A PPC (Wholesale)	General Overheads	SG&A
PG511M	Interconnect OCP Maintenance	Out of Scope	-
PG511P	Interconnect OCP Provision	Out of Scope	-
PG512A	SG&A Calls	Out of Scope	-
PG561A	Interconnect Outpayments International	Other	Miscellaneous
PG570B	OR Service Centre Provision Analogue/ISDN2	Other	Openreach Provisioning Service Centre
PG571B	OR Service Centre Provision ISDN30	Other	Openreach Provisioning Service Centre
PG572B	OR Service Centre Provision LLU	Other	Openreach Provisioning Service Centre
PG573B	OR Service Centre Provision Ethernet	Other	Openreach Provisioning Service Centre
PG574B	OR Service Centre Provision NGA	Other	Openreach Provisioning Service Centre
PG575B	OR Service Centre Assurance WLR PSTN/ISDN2	Out of Scope	-
PG576B	OR Service Centre Assurance WLR ISDN30	Out of Scope	-
PG577B	OR Service Centre Assurance LLU	Out of Scope	-
PG578B	OR Service Centre Assurance Ethernet	Out of Scope	-
PG579B	OR Service Centre Assurance NGA	Out of Scope	-
PG580B	Broadband Boost	Other	Miscellaneous
PG583N	SG&A Wholesale Residual	General Overheads	SG&A
PG584N	SG&A Wholesale Other	General Overheads	SG&A
PG585A	SG&A downstream Residual	General Overheads	SG&A
PG586N	SG&A Interconnect	Out of Scope	-
PG590B	LLU Service Level Guarantees External	Out of Scope	-
PG591B	LLU Service Level Guarantees Internal	Out of Scope	-
PG599A	Interconnect Outpayments Inland	Other	Miscellaneous
PG609N	SG&A Broadband	General Overheads	SG&A
PG622A	Public Payphones Operations	Out of Scope	-
PG622B	Public Payphones Operations - OR	Out of Scope	-
PG653A	ATM Customer Interface 2Mbit/s Cards	Out of Scope	-

BT Ref	Cost Category	Cost Group	Cost Sub-Group
PG654A	ATM Customer Interface 34Mbit/s Cards	Out of Scope	-
PG656A	ATM Network Switching	Out of Scope	-
PG657A	Framestream Switch	Out of Scope	-
PG658A	ATM Customer Interface >155Mbit/s Cards	Out of Scope	-
PG659A	ATM Network Interface Cards	Out of Scope	-
PG668A	IP Network Management	Other	System
PG670A	IP Network Fixed Access	Out of Scope	-
PG671A	IP Network VPN	Out of Scope	-
PG672A	IP Network Broadband	Other	IP Network
PG673A	IP Network BT Intranet	Out of Scope	-
PG674A	IP Core/Colossus	Out of Scope	-
PG675A	IP VOIP Infrastructure	Other	IP Network
PG678A	SIP servers	Out of Scope	-
PG721A	Circuit Provision Digital Higher Order	Out of Scope	-
PG722A	Circuit Provision Digital Public Network	Out of Scope	-
PG723A	Circuit Provision Analogue Public Nwk	Out of Scope	-
PG732A	Generic Data Amendments Network Costs	Out of Scope	-
PG761A	Special Applications SMDS	Out of Scope	-
PG771A	Special Applications Other Development	Out of Scope	-
PG772A	Openreach Systems & Development (Product Specific)	Other	Openreach Product Development
PG823P	BT Own Use Private Circuits	Out of Scope	-
PG857A	Copper MSAN Combi Cards Broadband element	21CN	MSAN
PG858A	Copper MSAN Combi Cards Voice element	21CN	MSAN
PG859A	Copper MSAN Control Access	21CN	MSAN
PG860A	Copper MSAN Control Transport	21CN	MSAN
PG861A	Copper MSAN ISDN30 cards	21CN	MSAN
PG862A	Copper MSAN SDSL cards =<2Mbit/s	Out of Scope	-
PG863A	Copper-Fibre MSAN Length	Out of Scope	-
PG864A	Copper-Fibre MSAN Link	21CN	MSAN
PG865A	Core-Core Length	Out of Scope	-
PG866A	Core-Core Link	21CN	21CN Links
PG867A	Ethernet NTE	Out of Scope	-
PG869A	Fibre MSAN Control Transport	21CN	MSAN
PG872A	Fibre MSAN TDM cards	21CN	MSAN
PG873A	Fibre MSAN-WDM Length	Out of Scope	-
PG874A	Fibre MSAN-WDM Link	Out of Scope	-
PG875A	INODE Network Features	21CN	iNode
PG876A	INODE Voice Call Set-Up	21CN	iNode
PG878A	Metro Broadband LNS	21CN	MetroNodes
PG879A	Metro BBL3	21CN	MetroNodes
PG880A	Metro Broadband Edge Aggregator	21CN	MetroNodes
PG881A	Metro Broadband Remote Access Server	21CN	MetroNodes
PG882A	Metro Front End Router	21CN	MetroNodes
PG885A	Metro-Core Length	Out of Scope	-
PG886A	Metro-Core Link	21CN	21CN Links

BT Ref	Cost Category	Cost Group	Cost Sub-Group
PG887A	Metro-Edge Ethernet Bandwidth	21CN	MetroNodes
PG888A	Metro-Edge Ethernet Port	21CN	MetroNodes
PG889A	Metro-Infrastructure Ethernet	Out of Scope	-
PG890A	Metro-Media Gateway	21CN	MetroNodes
PG892A	Metro-Sync Racks	21CN	MetroNodes
PG893A	Multi Service Provider Edge Routers	21CN	MetroNodes
PG895A	Network Router (large) Core	21CN	MetroNodes
PG896A	Network Router Metro	21CN	MetroNodes
PG898A	Core Directors	21CN	MetroNodes
PG899A	WDM-Metro Link	21CN	21CN Links
PG900A	WDM-Metro Length	Out of Scope	-
PG901A	Ethernet Switches	21CN	Ethernet Switches
PG902A	Ethernet Switch Access Cards	21CN	Ethernet Switches
PG911A	Operator Services Inland	Other	Miscellaneous
PG912A	Operator Services International	Out of Scope	-
PG924A	Directory Enquiries Non Chargeable	Out of Scope	-
PG933A	Phonebooks	Other	Miscellaneous
PG950C	GEA Access Fibre Spine	Fibre	NGA Access Fibre
PG950M	GEA Access Fibre Spine Maintenance	Fibre	NGA Access Fibre
PG951C	GEA Distribution Fibre	Fibre	NGA Access Fibre
PG951M	GEA Distribution Fibre Maintenance	Fibre	NGA Access Fibre
PG952C	GEA Electronics	NGA	GEA Electronics
PG953C	GEA DSLAM & Cabinets	NGA	GEA DSLAM & Cabinets
PG954C	GEA Customer Site Installations	Other	Miscellaneous
PG955M	GEA FTTC Maintenance	NGA	NGA Maintenance
PG956M	GEA FTTP Maintenance	NGA	NGA Maintenance
PG957P	GEA FTTP Provision	Other	Miscellaneous
PG958P	GEA FTTC Provision	Other	Miscellaneous
PG959C	Access Distribution Fibre	Fibre	Non-NGA Access Fibre
PG980R	Repayment Works	Other	Miscellaneous
PG981R	Time Related Charges	Other	TRC and SFI
PG982R	Openreach Managed Services for Wholesale	Out of Scope	-
PG984R	Openreach Managed Services for Global Services	Out of Scope	-
PG985R	Openreach Managed Services for Retail	Out of Scope	-
PG986R	Openreach Other Activities	Other	Miscellaneous
PG989A	Special Fault Investigation	Other	TRC and SFI
PGT01N	Line Card Trade	Out of Scope	-
PGT02N	Backhaul Electronics Trade	Out of Scope	-
PGT03N	Access Electronics Trade	Out of Scope	-
PGT05N	Local Loop Unbundling (LLU) Power and ventilation trade	Out of Scope	-
PGT06N	Network Features trade	Out of Scope	-
PGT11M	Openreach Contribution to Light User Scheme	Other	Miscellaneous

Source: BT, Cartesian

Appendix B – Regulatory Accounting Principles

Appendix C – Glossary of Terms

Allocation	Allocation is a 100% direct attribution of costs to a single cost category
Access	Access refers to the network segment between a local exchange and the customer premises
Access Distribution	Fibre access network segment between an optical distribution node and the customer premises
Access Spine	Fibre access network segment between a local exchange and an optical distribution node
ADS	Access Duct Survey
AG	Activity Group. A Cost category that includes costs related to BT support functions (e.g. Duct, Motor Vehicles, Group Property and Facilities Management)
AISBO	Alternative Interface Symmetric Broadband Origination. Ofcom has defined the AISBO market to contain services with a bandwidth up to and including 1Gbps.
APC	Asset Policy Code. A further level of granularity to Class of Work (CoW)
Apportionment	Apportionment is used when costs need to be split among different cost categories based on a cost driver
AS	Accounting Separation
ASPIRE	ASPIRE is a regulatory reporting system used to perform the fully allocated cost attribution for Accounting Separation (AS).
Attribution	Attribution is act of associating costs, revenues, assets and liabilities from one cost category to another.
Backhaul	Backhaul refers to the network segment between the core and access networks
Base Methodology	A methodology used to apportion costs at ledger level into cost categories at Level 1. Most commonly used for costs that do not have a direct relationship with a single asset or activity.
BES	Backhaul Extension Services. A BT service.
BNS	Backhaul Network Services. A BT service.
BT	British Telecommunications plc
BT Retail Northern Ireland	BT Retail in Northern Ireland is responsible for Openreach-type activities in Northern Ireland.
CCA	Current Cost Accounting
CCA Price	Holding gain for increase in price of an asset
Cost Category	A grouping of similar costs into unique cost pool using an identical cost driver

Cost Driver	The factor or event which causes a cost to be incurred. BT also refers to it as 'Base'. It has the same meaning as Method or underlying method.
Cost Group	A Cartesian-defined term within the project to refer to a set of BT cost categories for similar types of costs e.g. duct, fibre or property
Cost of Capital	The opportunity cost associated with an asset investment. Cartesian has used a 10% WACC as a reference in the study to calculate the cost of capital based on the mean capital employed (MCE).
CoW	Class of Work are essentially three or four digit codes that indicate the type of engineering work being conducted and the equipment the engineering tasks relate to. For example CoW 'ACPA', relates to Capital Work relating to racks, power and ventilation. When a CoW is being used for attribution of capitalised engineering costs, the finance teams use an engineering time booking system to determine the 'number of hours' spent on a CoW and apply a standard charge rate to determine the total cost of the activity. This cost then allows BT to determine an attribution base.
CP	Communications Provider
CTCS	Core Transmission Circuit Costing System. A BT system for recording circuit information.
Cumulo Rates	A tax on commercial property. In BT's case these relate to taxes paid to local governments for BT's network assets in the UK.
CY	Current Year
DAM	Detailed Attribution Methodology
DP	Distribution point. The closest network flexibility point to the customer premises.
Dropwires	copper cables deployed in the final segment of the access network between the distribution point and the customer premises
D-side	A network segment in BT's copper network between a local exchange and a primary concentration point
E-side	A network segment in BT's copper network between a primary concentration point and a distribution point
Exhaustion	Exhaustion is the process of fully attributing costs from one cost category into other cost categories e.g. AG to PG, or PG to Components. Cost category does not receive any further costs once exhausted.
F8	F8 is a system code for group of similar cost items at the General Ledger. Normally, defined as a F8/OUC combination.
FAC	Fully Allocated Cost. Within the scope of the study, Cartesian uses a WACC of 10% to calculate FAC as the sum of capital and current account costs.
FAR	Fixed Asset Register is used to record details of all of BT's fixed assets

FTTC	Fibre to the Cabinet
FTTP	Fibre to the Premises
FTTx	A generic term for various access fibre delivery architectures such as FTTC and FTTP
GIS	Geographic Information System. A system for recording geographic information, for example of duct routes in the network.
GL	General Ledger is a key element of a company's financial records. It records details of every financial transaction.
GRC	Gross Replacement Cost
INS	Integrated network system. BT's major Operation Support Systems (OSS) holding network routing data
ISDN	Integrated Services Digital Network. There are two variants: ISDN2 with two data channels per physical line and ISDN30 with 30 data channels per physical line.
Layer	Layer refers to BT's hierarchical pyramid coding structure of its financial and reporting system. It supports the data capture and information summation at the Line of Business and activities level.
Level	Level refers to the different stages of the AS system processing where a particular cost category is exhausted/attributed to other cost category and receives no further costs itself.
LLU	Local Loop Unbundling is a regulatory remedy which enables CPs to access BT's copper lines
LoB	Line Of Business. Terminology used by BT to identify a business function within its organisation
LoP	List of Plant is a management report containing details of all the Capital Fixed Assets for BT TSO & Openreach on a monthly basis: 1) asset value 2) life of asset and 3) YTD depreciation. This information is provided for each class of work (CoW)
Market	Market is a collection of similar market services (by connectivity type), e.g. LLU and WLR are grouped in the Fixed Access market.
Market Service	A market service consists of a set of one or more network services.
MCE	Mean Capital Employed
Method	Method or underlying method is the same as cost driver: the factor or event which causes a cost to be incurred
MFU	Market Facing Unit. LoBs that directly interface with an external customer.
MISBO	Multiple Interface Symmetric Broadband Origination. A BT service offering connectivity at over 1 Gbps.

MSAN	Multi-Service Access Node. A network element used to terminate copper or fibre access cables in BT's local exchange buildings.
Network Component	Cost category capturing costs representing discrete parts of BT's Network (e.g. MDF Equipment, Access Fibre Spine and ISDN30 Connections). Groups of these components are attributed to Services that feed into Markets and Products
Network Service	A network service consists of a fixed set of one or more network components e.g. MPF Rental network service belonging to the LLU market service.
NGA	Next Generation Access. Typically associated with FTTX technologies.
Non-Pay	Non-Pay is a current cost type that excludes salaries, asset valuation and depreciation.
NRC	Network Replacement Cost
ONBS	Openreach Network Backhaul Services. A BT service/
OUC	Organisational Unit Code. A code that represents a unit within BT's organisation.
Pay	Pay cost is a cost type related to salaries and contracting fees of BT human resources due to business operations. This cost can be capitalised over a period, in particular for engineering associated pay cost
PDH	Plesiochronous Digital Hierarchy. A TDM-based transmission system.
PG	Plant Group. Cost category capturing costs related to activities, equipment and infrastructure for the purposes of running and selling network services (e.g. provision and maintenance activities, MSAN equipment, Copper and fibre cables, etc.)
Provision	A cost recorded for future use against a liability.
PWNRC	Profit Weighted Network Replacement Cost. An attribution method used by BT for apportioning cumulo rates.
RAP	Regulatory Accounting Principles
Retail Residual	An unregulated market capturing all the costs not related to the supply of Network Services within UK, as well as costs for services attributable to BT Retail (e.g. Bad debts, Derivatives Financial Instruments)
RFS	Regulatory Financial Statements
ROA	Return on Assets
SDH	Synchronous Digital Hierarchy. A TDM-based transmission system which superseded PDH.
SMP	Significant Market Power
TISBO	Traditional Interface Symmetric Broadband Origination. Ofcom has defined the following Wholesale markets in TISBO: Low Bandwidth (up to and including 8Mb/s); Medium Bandwidth

	(above 8Mbit/s up to and including 45Mbit/s); High Bandwidth (above 8Mbit/s up to and including 45Mbit/s); and Very High Bandwidth (above 155 Mbit/s).
Transfer charges	These are charges related to internal trades between BT units. A transfer out means the recovery of costs incurred but not due by a unit. Transfer in is the "bill" received by a unit who actually uses the asset and generates the cost
WACC	Weighted Average Cost of Capital
WECLA	West, East and Central London Area. A geographic region used by Ofcom in the definition of markets in the BCMR.
WES	Wholesale Extension Services. A BT service
Wholesale Residual	An unregulated market capturing all the costs incurred on assets and activities in BT's network due to BT's business operations
WLR	Wholesale Line Rental is a BT market service within the Fixed Access market
YTD	Year-to-Date (as in YTD depreciation)

Appendix D – Compilation of BT responses to questions on Cost Attribution

Cartesian™ is a specialist consulting firm of industry experts, focused exclusively on the global communications, technology and digital media industries. For over 20 years, we have advised clients worldwide in strategy development and assisted them in execution against their goals. Our unique portfolio of consulting services and managed solutions are tailored to the specific challenges faced by executives in these fast-moving industries. Combining strategic thinking, robust analytics, and practical experience, Cartesian delivers superior results.

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