

Report for Ofcom

Review of BT's 2011/12 cost allocation for fixed access markets

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Annex A Glossary

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1 Introduction

To inform Ofcom's proposals to set any future Local Loop Unbundling (LLU) and Wholesale Line Rental (WLR) charge controls, Analysys Mason is conducting a review of the allocation of costs to BT's copper access services (the cost allocation review).

The aim of the cost allocation review is to assess:

- whether the attribution of costs to the services covered by the LLU and WLR charge controls (as opposed to other services) is reasonable
- whether the attribution of costs between services covered by the LLU and WLR charge controls is reasonable.

Specifically each of these cost allocations has been examined to ascertain the following:

- Does it reflect cost causation?
- Is it objective?
- Is the treatment consistent between products?
- If based on statistical evidence, is that evidence sound?

A reasonable allocation is one which meets these criteria.

The cost allocation review has been carried out using a combination of:

- publicly available material such as BT's 2011/12 Regulatory Accounting Principles,¹ which provides an appropriate framework for the cost allocation review, and the 2011/12 Detailed Attribution Method (DAM)²
- confidential material held by Ofcom, including that obtained by means of statutory s.135 requests
- access to the relevant personnel in BT's Regulatory Finance team, to obtain detailed explanations and justifications of the allocation methodologies that BT uses, and
- Analysys Mason's knowledge of the costs involved in LLU and WLR products.

This report makes recommendations for adjustments to be considered by Ofcom, including adjustments to the allocation of costs to cost components and products.

This document is structured as follows:

¹ See http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2012/PADS_2012.pdf

² See http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2012/DAM_2012.pdf

- Section 2 covers BT's regulatory accounting principles that are most relevant to this review
- Section 3 outlines Analysys Mason's approach to the assessment
- Section 4 provides an assessment of the allocation of costs to services covered in the WLR and LLU charge controls and to other services
- Section 5 provides an assessment of the allocation of costs within the services covered by the WLR and LLU charge controls
- Section 6 provides Analysys Mason's recommendations to Ofcom based on this review.

2 BT regulatory accounting principles

BT defines a set of regulatory accounting principles³, of which the most relevant to this cost allocation review are:

- **Principle 3 – Cost causality.** “costs (including appropriate transfer charges) [...] shall be attributed to network components, wholesale services and retail products in accordance with the activities which cause the revenues to be earned or costs to be incurred or the assets to be acquired or liabilities to be incurred. Where it is not possible to attribute revenues, costs, assets and liabilities in accordance with the preceding paragraph, the attribution shall be such as to present fairly the revenues, costs, assets and liabilities accounted for in the Regulatory Financial Statement (RFS) for each Significant Market Power (SMP) market or Technical Area (as applicable), as disaggregated, where BT has a regulatory financial reporting obligation and to present fairly a comparison between the markets or Technical Areas (as applicable) as disaggregated.”
- **Principle 4 – Objectivity.** “The attribution shall be objective and not intended to benefit either BT or any other Operator, or any product, service or network component.”
- **Principle 7 – Transparency.** The level of transparency is designed such that “a suitably informed reader can easily:
 - Gain a clear understanding of the overall structure of BT’s financial and information systems from which regulatory accounting data is derived and in particular the sequence of the processing and ‘cascade’ effect of the intermediate cost centres.
 - Gain a detailed understanding of all the material, methodologies and drivers (e.g. systems, processes and procedures) applied in the preparation of regulatory accounting data.
 - Make their own judgement as to the reasonableness of these methodologies and driver data and any changes to them.”

This transparency is enabled by the publication of the DAM.

- **Principle 8 – Sampling.** “Where sampling is used to derive the attribution of costs, revenue etc. it shall be based either on generally accepted statistical techniques or other methods which should result in the accurate attribution of revenue (including transfer charges), costs (including transfer charges), assets and liabilities.”

Analysys Mason believes that these principles provide an appropriate framework for assessing reasonableness and we have therefore used it as part of this cost allocation review. For example, cost causation is a desirable principle because it means that the costs shown in the regulatory accounts for each component or service will reflect the cost of the resources used to provide that

³ The other principles are: 1 – Priority, 2 – Definitions, 5 – Consistency of Treatment and 6 – Compliance with applicable law and IAS. For further details, see http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2012/PADS_2012.pdf

component or service, and will therefore be useful to inform price setting and regulation. We believe these principles are reasonable, but not definitive, as they may not always lead to a unique cost allocation (such as where common costs are allocated to a group of services).

3 Approach to assessment

The approach taken by Analysys Mason in this review was to:

- *Identify whether the attribution of costs to the services covered by the LLU and WLR charge controls is reasonable.* For the cost components that constitute the majority of cost for these services, we have considered how costs are attributed between the products in question (i.e. WLR and LLU), and products in covered in other charge controls (e.g. ISDN2, partial private circuits (PPCs)). This is covered in Section 4.
- *Identify whether the attribution of costs between services covered by the LLU and WLR charge controls is reasonable.* For the products that constitute the majority of the cost, this report assesses the appropriateness of the attribution of components to WLR and LLU. We have also considered the majority of the differences in cost between MPF and WLR plus SMPF. Both are covered in Section 5.

The products covered by this cost allocation review are included in Figure 1. The products included here are those used by Analysys Mason in the cost model⁴. Note that, as the products which are described as ‘Internal’⁵ or ‘External’⁶ in the list below are sold on an equivalence of inputs basis⁷, they have been treated together in this cost allocation review.

Data assessed in this cost allocation review is BT data taken from the RFS and provided following Ofcom’s s.135 requests. It does not include the regulatory asset value (RAV) adjustment or other adjustments made by Ofcom to the cost model.

⁴ See Annex 12 of the consultation, <http://stakeholders.ofcom.org.uk/consultations/llu-wlr-cc-13/>

⁵ That is, products sold to other BT divisions.

⁶ That is, products sold to other CPs.

⁷ Openreach supplies products and services to all communications providers on an equivalent basis. Equivalence of Inputs means that products and services are provided to all customers at the same prices, using the same processes and according to the same timescales. For further information, see <http://www.openreach.co.uk/org/home/aboutus/equivalence/equivalence.do>

Figure 1: Products included in the cost allocation review [Source: Analysys Mason, 2013]

Products	
WLR Basic Rentals Internal	MPF Bulk Migrations
WLR Basic Rentals External	MPF Ceases
WLR Premium Rentals Internal	MPF Rentals
WLR Premium Rentals External	MPF Room build
WLR Basic Connections Internal	MPF Hostel rentals
WLR Premium Connections Internal	MPF Tie cables
WLR Premium and Basic Connections External	Shared Metallic Path Facility (SMPF) New Provides
WLR Premium and Basic Transfers Internal	SMPF Single Migrations
WLR Premium and Basic Transfers External	SMPF Bulk Migrations
Metallic Path Facility (MPF) New Provides	SMPF Ceases
MPF Single Migrations	SMPF Rentals

The products in this cost allocation review have hundreds of cost elements, which BT allocates to 30 components. A list of the components included in this review is provided in Figure 2.

Figure 2: Components included in the cost allocation review [Source: Analysys Mason, 2013]

Components	
Wholesale Access specific	Dropwire capital & PSTN NTE
Routeing & records	Residential PSTN drop maintenance
MDF Hardware jumpering	PSTN line cards
Software jumpering	Pair gain
Service Centre - Provision WLR PSTN/ISDN2	Service Centre - Assurance WLR PSTN/ISDN2
Service Centre - Provision LLU	Service Centre - Assurance LLU
Sales product management	Combi Card Voice
Directories	Local Loop Unbundling systems development
E side copper capital	Broadband Line Testing Systems
E side copper current	Local Loop Unbundling room build
D side copper capital	Local Loop Unbundling hostel rentals
D side copper current	Local Loop Unbundling hostel rentals power & vent
Local exchanges general frames capital	Local Loop Unbundling tie cables
Local exchanges general frames current	ADSL Connections
PSTN line test equipment	DSLAM capital / maintenance

4 Assessment of attribution of costs to LLU and WLR products

4.1 Approach

In this phase of investigation, the focus was to review costs (e.g. duct) which are split between LLU and WLR related products and products covered in other charge controls.

We have not included a separate assessment of the allocation of general overheads to the products in this review, as the cost model⁸ was based on products and components⁹.

The first stage of analysis was to identify the components that constitute the largest elements of cost.

Based on our analysis of BT data in the RFS, we identified 12 of the 33 components which between them constitute over 90% of total cost attributed to WLR/LLU. No other single component generates more than 1% of total cost. The amount of cost attributed to the components list can be seen below in Figure 3 and is illustrated in the chart in Figure 4.

Component	Percentage of total cost
D side copper capital	43.1%
Dropwire capital & PSTN NTE	15.2%
E side copper capital	6.8%
D side copper current	6.0%
PSTN line cards	5.4%
MDF Hardware jumpering	4.5%
Residential PSTN drop maintenance	3.7%
E side copper current	1.9%
Local exchanges general frames capital	1.9%
Local Loop Unbundling hostel rentals power & vent	1.9%
Broadband Line Testing Systems	1.8%
Local exchanges general frames current	1.3%
Other ¹⁰	6.5%

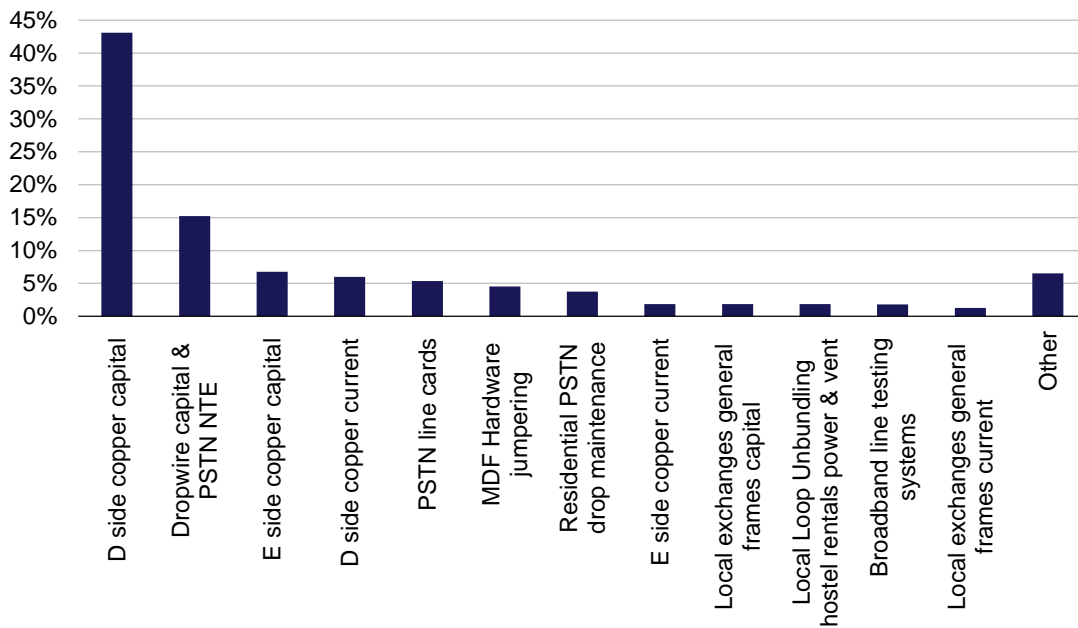
Figure 3: Key components as a % of total cost [Source: BT RFS, Analysys Mason, 2013]

⁸ See Annex 12 of the consultation, <http://stakeholders.ofcom.org.uk/consultations/llu-wlr-cc-13/>

⁹ The 2008 KPMG study into BT's cost allocation methodologies assessed the allocation of general overheads to Openreach and found it to be reasonable, subject to a number of considerations which KPMG believed were not material. The recommended changes were incorporated into BT's subsequent RFSs. In addition, the RFSs are audited every year, and material changes to allocations are identified. The 2008 KPMG report can be found at <http://stakeholders.ofcom.org.uk/binaries/consultations/openreachframework/annexes/allocations.pdf>

¹⁰ Components with greater than 0.1% and less than or equal to 1.0% of cost included in the 'Other' category are: Service Centre - Provision, LLU hostel rentals, Service Centre – Assurance, Directories, LLU room build, Routing and records, LLU tie cables, Sales product management, Combi Card Voice, PSTN line test equipment and DSLAM capital/maintenance.

Figure 4: Key components as a % of total cost [Source: BT RFS, Analysys Mason, 2013]



4.2 Review of each of the material components

In assessing the allocation of these components between other services and LLU and WLR, we excluded components that are only used by products included in the cost model. Of the list of components in Figure 3, the following components have all their costs attributed to WLR and LLU products, and have therefore been excluded from the analysis in this section:

- PSTN line cards
- Residential PSTN drop maintenance
- Local Loop Unbundling hostel rentals power & vent.

Taking each of the remaining components in order of size:

- *D side copper capital*. D side copper capital, representing over 40% of total costs allocated to WLR and LLU, is by far the most important component. The costs driving D side copper capital are almost exclusively due to two assets, duct and cable. To give an example of the importance of duct and cable, in terms of the Gross Replacement Cost (GRC), duct accounts for over half, with cable accounting for over 40%. There are two issues associated with D side copper capital that Analysys Mason believed worthy of more detailed review:

- We believe that cable allocation is relatively straightforward in comparison to duct, as types of cable can be easily classified (for example, the distinction between fibre and copper cable is clear); however, duct costs are more complex, as costs are allocated in relation to duct capacity across the different products that use this space. Accordingly, one area we have investigated further is whether the allocation of duct cost to D side copper capital is reasonable. This is covered below in Section 4.3.

- The assessment of whether the allocation of D side copper capital between WLR/LLU and other products, such as ISDN, is reasonable is covered in Section 4.4.
- *Dropwire capital & PSTN NTE.* Total costs related to Dropwire capital and PSTN NTE are allocated on a volume basis to products in this review (e.g. WLR, MPF) and those outside this review (e.g. ISDN2). This is objective and reflects cost causation. We have not seen the data underlying the allocation (i.e. the details of the volume calculation) but we believe this to be a sound basis for allocation.
 - *E side copper capital.* As with D side copper capital, the capital costs for E side copper capital are largely due to the cable and duct assets. For example, cable accounts for over two thirds of the GRC for E side copper capital, and duct represents over a quarter. As with D side copper capital, while Analysys Mason is comfortable with the allocation of cable costs as being objective and based on cost causation, duct allocations merit further examination in principle. However, as E side copper capital is similar to D side copper capital in terms of the way it is used by the products and the fact that the allocation is made using a similar weighting, similar arguments apply to those in given in Section 4.4.
 - *D side copper current.* From the RFS there is insufficient detail on the allocation between WLR and LLU products and other products not covered by this review (such as ISDN2), which are also allocated D side copper current costs. Section 5.4 of this report discusses Analysys Mason's questions about how D side copper current costs are allocated between LLU and WLR products, and note that Ofcom is proposing alternative allocations for D side and E side copper current¹¹. As part of this assessment, Ofcom may also wish to consider how D side copper current costs are allocated to other products, such as ISDN2, ISDN30 and PPCs.
 - *MDF hardware jumpering.* Costs associated with this component are related to the product connection volumes. We note that the relative cost allocations between WLR and ISDN2 on a per-connection basis are similar (GBP21.34 for WLR compared to GBP21.74 for ISDN2), as would be expected. As such, we consider that these cost allocations are objective and based on cost causation.
 - *E side copper current.* As with D side copper current, there is a lack of clarity about how E side copper current costs are allocated between LLU and WLR (see Section 5.4). Ofcom may wish to consider how E side copper current costs are allocated to other products, such as ISDN2, ISDN30 and PPCs.
 - *Local exchanges general frames capital.* These costs are allocated to WLR/LLU and other products, such as ISDN. Based on the RFS, this allocation required further assessment. The assessment is provided in Section 4.5.

¹¹ See Table A13.7 in Annex 13 for details of these proposals.
<http://stakeholders.ofcom.org.uk/binaries/consultations/llu-wlr-cc-13/annexes/annexes.pdf>

- *Broadband Line Testing Systems.* In the source data, Broadband line testing systems are allocated to both WLR lines and to MPF (and SMPF) products. Ofcom has already examined this issue and consulted on a possible approach in section 6.151 of the 2013 charge control consultation document¹², spreading the cost of TAMS and evoTAMS across MPF and SMPF lines on the basis of volumes (i.e. a usage factor of 1 for SMPF, 1 for MPF, and 0 for WLR).
- *Local exchanges general frames current.* These costs are allocated to WLR/LLU and other products, such as ISDN. Based on the RFS, this allocation required further assessment. The assessment is provided in Section 4.5.

4.2.1 Summary

From our assessment of the 12 components that carry the most cost, 4 elements were considered worthy of further investigation, as described in the following subsections:

- the allocation of duct costs to products in and out of this review (Section 4.3)
- the general allocation of D side copper capital costs to products in and out of this review (Section 4.4), and
- the allocation of local exchanges general frames capital and local exchanges general frames current costs to products in and out of this review (Section 4.5).

4.3 Allocation of duct costs

The current allocation of duct costs used by BT is based on a sample of ducts that were surveyed by BT in 1996/7. The cost of replacing each duct was calculated by the 1996/7 study, and this cost allocated in proportion to the cross-sectional area of the cabling within the duct, based on the sample. For example, if copper cabling constituted 75% of the cross-sectional area of cabling in the duct, 75% of the replacement cost would be attributed to it. Changes in the allocation of cost by BT since this 1996/7 study have been based on the capital spend on duct, split by class of work (i.e. split by access copper duct, access fibre duct and core duct) and annual price movements.

The resulting allocation of duct cost between copper, fibre and core is shown below in Figure 5. The allocation in 1996/97 is taken from the survey, while the allocations for subsequent years are based on that data adjusted by spend on duct since the survey, using the methodology described above.

¹² See http://stakeholders.ofcom.org.uk/binaries/consultations/llu-wlr-cc-13/summary/LLU_WLR_CC_2014.pdf

Year	Copper	Fibre	Core
96/97	70%-80%	0%-10%	20%-30%
97/98	70%-80%	0%-10%	20%-30%
98/99	70%-80%	0%-10%	20%-30%
99/00	70%-80%	0%-10%	20%-30%
00/01	70%-80%	0%-10%	20%-30%
01/02	70%-80%	0%-10%	20%-30%
02/03	70%-80%	0%-10%	20%-30%
03/04	70%-80%	0%-10%	20%-30%
04/05	70%-80%	0%-10%	20%-30%
05/06	70%-80%	0%-10%	20%-30%
06/07	70%-80%	0%-10%	20%-30%
07/08	70%-80%	0%-10%	20%-30%
08/09	70%-80%	0%-10%	20%-30%
09/10	70%-80%	0%-10%	20%-30%
10/11	70%-80%	0%-10%	20%-30%
11/12	70%-80%	0%-10%	20%-30%

Figure 5: Duct allocation by cable type [Source: BT (confidential), 2013]

This method may introduce inconsistencies, as it combines two approaches – one based on cross-sectional area of cabling, the other on spend on duct.

In Analysys Mason's view, the method of calculating cost based on cross-sectional area is reasonable, but the evolution of this figure on the basis of spend may distort the values. For example, if a duct was initially built to carry copper cabling, the cost will be attributed to copper. If fibre is later introduced in the same duct with no additional spend on the duct (e.g. if there is sufficient spare space in the duct and no maintenance is required), no cost will be attributed to fibre. Given the changes in the network over the past 16 years, particularly with the roll-out of fibre to support VDSL¹³, but also due to the growth in fibre access connections, Analysys Mason believes that this methodology may not reflect current usage of the duct.

We recommend that Ofcom should consider whether an update to BT's original 1996/7 survey of duct usage is needed.

4.4 Allocation of D side copper capital costs between products

D side copper is used both by WLR and MPF, as well as by products that are not subject to the LLU and WLR charge controls (such as ISDN2, ISDN30 and low-speed partial private circuits (PPCs)).

¹³ BT had passed over 13 million homes with VDSL by the end of December 2012 (source: http://www.btplc.com/Sharesandperformance/Quarterlyresults/PDFdownloads/q413_slides_update_part2.pdf)

As noted above, D side copper capital was selected for review on the basis of its contribution to the overall cost (constituting 43.1% of all costs for components covered by the LLU and WLR charge controls). Similar allocation methods apply to both capital and current components and for the analogous E side copper components.

Costs for D side copper capital are assigned on the basis of the effective number of pairs (which BT calls ‘weighted volumes’).

The calculation of the effective number of pairs is:

$$\text{Effective number of pairs} = \text{Volumes} * \text{Line equivalence factor} * \text{pairs per connection}$$

Where:

- *Volumes* is the volume of channels
- *Line equivalence factor* captures that the number of channels varies per connection. The line equivalence factor is:
 - 100% for PSTN, as each copper pair carries one voice channel
 - 50% for ISDN2, as each copper pair carries two voice channels
 - [X]% for ISDN30. This factor reflects the average number of channels per ISDN30 connection as well as the percentage of ISDN30 connections that use copper rather than fibre. Although ISDN30 is capable of carrying 30 channels, the average ISDN30 connection carries [X] channels. ISDN30 can use either copper or fibre. Based on Openreach data, [X]% of ISDN30 connections are copper. The line equivalence factor for ISDN30 is calculated as:
 - *ISDN30 line equivalence factor* = [X]
- *Pairs per connection* is the average number of pairs per connection. For most services (WLR, MPF) this is 1. For certain PPCs and ISDN30 this is [X].

Total costs for D side copper capital are then apportioned by the weighted volume in this review. For example, if the total cost was GBP100 and the total effective number of pairs was 1000, of which ISDN30 represented 50 (or 5%), ISDN30 would be allocated GBP5.

This means that D side copper capital costs are ultimately driven by the number of copper pairs used for each service. Analysys Mason believes that, in principle, this is a reasonable method for apportioning costs (as it is objective and based on cost causation) and that the figures in the calculation are reasonable. The details behind the cost weighting are provided in Figure 6.

We understand that costs are apportioned for E side copper capital using a similar methodology, which we also consider to be reasonable as it is objective and based on cost causation.

Figure 6: Inputs for weighted volume calculation, by service [Source: BT (confidential), 2013]

Service name	Units	Volume	Line equivalence factor	Pairs per connection	Effective number of pairs
WLR Premium Rentals Internal	Lines	3,026,492	100%	1.00	3,026,492
WLR Basic Rentals Internal	Lines	11,418,728	100%	1.00	11,418,728
ISDN30 rentals internal	Channels	[X]	[X]%	[X]	[X]
MPF Rentals	Lines	[X]	[X]%	[X]	[X]
WLR Premium Rentals External	Lines	1,762,117	100%	1.00	1,762,117
WLR Basic Rentals External	Lines	3,191,445	100%	1.00	3,191,445
Wholesale ISDN2 rentals internal	Channels	616,257	50%	1.00	308,128
Wholesale ISDN2 rentals external	Channels	524,051	50%	1.00	262,026
Wholesale ISDN30 rentals external	Channels	[X]	[X]%	[X]	[X]
Openreach PPCs	Line equivalents	[X]	100%	1.00	[X]
Openreach PPCs	Line equivalents	[X]	100%	[X]	[X]
Total	Line equivalents	-	-	-	25,110,162

4.5 Allocation of local exchange general frames capital and current costs

Local exchange general frames capital

Analysys Mason believes that the allocation of Local exchange general frames capital between WLR and LLU products and other products requires additional investigation by Ofcom. As can be seen in Figure 7, on a per-line basis, WLR is allocated twice as much cost as ISDN2. We are not aware of reasons to support this allocation in the 2012 RFS. Based on our understanding, both WLR and ISDN2 make equal use of the frame. On a per-line basis, we would therefore expect similar costs to be allocated to WLR and ISDN2. Furthermore, we note that in the 2013 RFS, on a per-line basis, WLR and ISDN2 are allocated almost the same cost for local exchange general frames capital (GBP1.81 and GBP1.80 respectively)¹⁴. Relative use of the frame by MPF and WLR is discussed below in Section 5.4.

¹⁴ For the 2013 allocation of costs, see section 7.3.2 and section 7.4.2 of <http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2013/CurrentCostFinancialStatements2013.pdf>

Product	Unit	Cost (GBP)	Ratio (relative to WLR)
WLR Rental (Basic and Premium)	Cost per line	1.71	1
MPF Rental	Cost per line	3.41	2
ISDN2 Rental	Cost per channel	0.43	0.25
ISDN2 Rental	Cost per line	0.86	0.5

Figure 7: Allocation of local exchanges general frames capital by product
[Source: BT RFS, 2012]

Local exchange general frames current

As with the allocation of capital costs, Analysys Mason believes that the allocation of Local exchange general frames current between WLR and LLU products and other products requires additional investigation by Ofcom. As can be seen in Figure 8, WLR was allocated twice as much cost, on a per-copper pair basis, as ISDN2. We are not aware of evidence to support these allocations. As with Local exchange general frames capital, the ratio of WLR to ISDN2 current costs has changed in the 2013 RFS, and on a per-line basis the costs are almost identical in the 2013 RFS.

Product	Unit	Cost (GBP)	Ratio (relative to WLR)
WLR Rental (Basic and Premium)	Cost per line	1.17	1
MPF Rental	Cost per line	2.34	2
ISDN2 Rental	Cost per channel	0.29	0.25
ISDN2 Rental	Cost per line	0.58	0.5

Figure 8: Allocation of local exchanges general frames current by product
[Source: BT RFS, 2012]

We recommend that Ofcom investigate further the allocation of local exchanges general frames capital and local exchanges general frames current between WLR, MPF and ISDN2 products.

5 Attribution of costs between WLR and LLU

5.1 General

In this task Analysys Mason assessed whether the attribution of costs in 2011/12 *between* products in this review was reasonable.

Our approach was to:

- identify the key products
- identify the main components of the key products, and
- establish whether the attribution of main component costs to key products was reasonable.

As a separate step we also compared the cost stack of MPF to the combination of WLR and SMPF, to see if the differences were reasonable (see Section 5.5).

Each of these steps and the results are described in more detail below.

5.2 Identification of key products

The initial stage of this analysis was to identify which products were allocated the majority of total cost. We describe these as the key products. For this analysis, as the internal and external products are sold on an equivalence of inputs basis, they were treated together (e.g. the cost stack for WLR Basic Rental internal is treated the same way as the cost stack for WLR Basic Rental external).

The three named products shown in Figure 9 and Figure 10 were selected for further examination, as they comprised 89% of the total cost¹⁵ in 2011/12. The remaining products included in this review (categorised as ‘Other’ in Figure 9 and Figure 10) amounted to 11% of the total costs, and no single product in this category amounted to more than 3.0%. It should be noted that while SMPF rentals are not included in our list of key products (as they constitute less than 1%¹⁶ of total cost), SMPF rentals are assessed in Section 5.5 below.

Product	% of total cost
WLR Basic Rentals	52.8%
MPF Rentals	18.6%
WLR Premium Rentals	17.6%
Other ¹⁷	11.0%

Figure 9: Products by % of total cost, 2011/2012
[Source: BT RFS, 2012]

¹⁵ Figures for total costs exclude values for WLR transfers though these do not have a material impact on results

¹⁶ This figure of less than 1% is for external SMPF only. If internal SMPF were also included the figure would be higher, though still less than 3% of total cost.

¹⁷ Products with greater than 0.1% of total costs were (in order of total cost): MPF Hostel rentals, MPF New Provides, MPF Tie cables, MPF Ceases, Wholesale Premium Connections Internal, MPF Bulk Migrations, SMPF Single Migrations and SMPF Ceases.

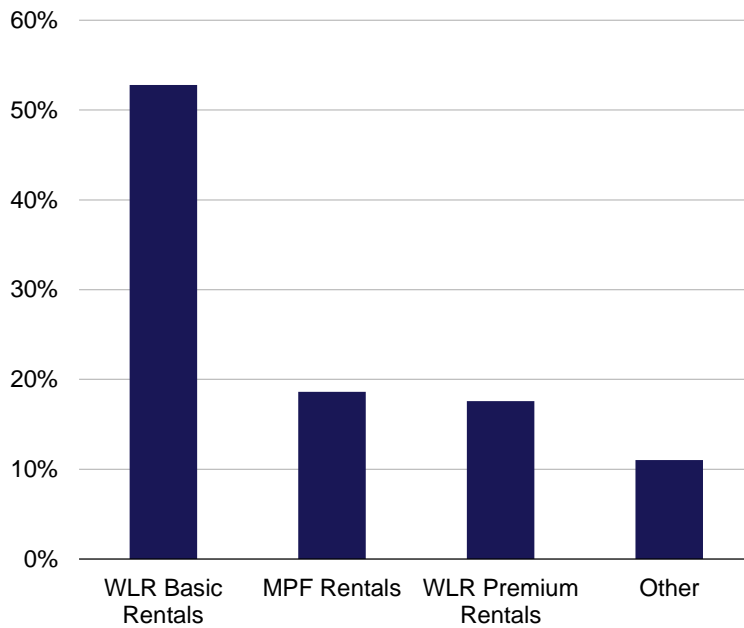


Figure 10: Products by % of total cost, 2011/2012 [Source: BT RFS, 2012]

Having identified the key products, the next step was to examine the unit component cost stacks of these products in order to determine the components that bear the highest cost. We describe these as the main components.

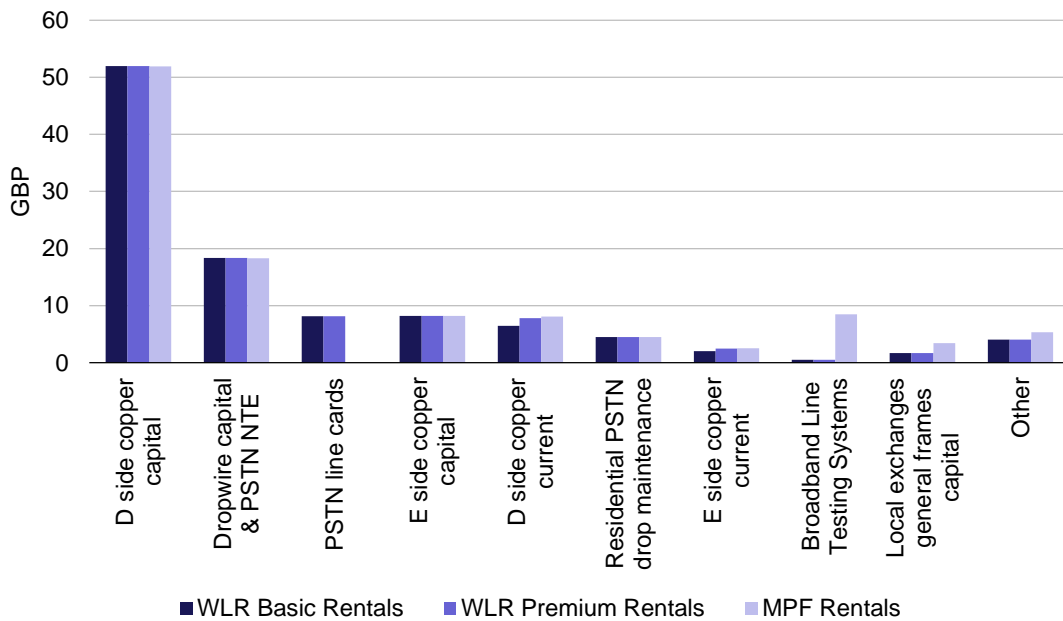
5.3 Identification of main components of the key products

The cost elements of the three key products are shown in Figure 11 and Figure 12.

Figure 11: Key component costs by product, 2011/12, in GBP [Source: BT RFS, 2012]

	D side copper capital	Dropwire capital & PSTN NTE	PSTN line cards	E side copper capital	D side copper current	Residential PSTN drop maintenance	E side copper current	Broadband Line Testing Systems	Local exchanges general frames capital	Other	Total
WLR Basic Rentals	51.94	18.33	8.13	8.18	6.48	4.51	2.04	0.49	1.71	4.06	105.87
WLR Premium Rentals	51.95	18.33	8.13	8.18	7.78	4.51	2.45	0.49	1.71	4.07	107.60
MPF Rentals	51.90	18.31	-	8.17	8.08	4.51	2.54	8.47	3.41	5.36	110.75

Figure 12: Key component costs by product, 2011/12 [Source: BT RFS, 2012]



As is to be expected, due to the fact that both WLR and MPF are based on copper pairs, most component costs were, although not identical, extremely close across the different products. For example, D side copper capital contributed GBP51.94 to WLR Basic, GBP51.95 to WLR Premium and GBP51.90 to MPF. Therefore, the key focus for Analysys Mason's review was not on where the costs were the *same* (or extremely similar) but rather where they were *different*, and to try to understand why these costs were different and whether this difference was reasonable. This analysis is presented in Section 5.4.

5.4 Attribution of main component costs to key products

In order to understand how product costs are constituted, we first needed to understand the relationship between products and their underlying components. The costs associated with each product depend on the usage factors of components. For example, as each WLR Basic Rental uses 1 unit of D side copper the usage factor is 1.

For the key products and their main components, the usage factors are displayed below in Figure 13.

Figure 13: Usage factors for 2011/12, by product [Source: BT RFS, 2012]

	D side copper capital	Dropwire capital & PSTN NTE	PSTN line cards	E side copper capital	D side copper current	Residential PSTN drop maintenance	E side copper current	Broadband Line Testing Systems	Local exchanges general frames capital
WLR Basic Rental	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.10	1.00
WLR Premium Rental	1.00	1.00	1.00	1.00	1.20	1.00	1.20	0.10	1.00
MPF Rental	1.00	1.00	-	1.00	1.25	1.00	1.25	1.79	2.00

In our assessment we then took each component in turn and compared the allocation as determined by the usage factor to see whether we believed this to be reasonable.

- *D side copper capital.* The usage factor for all key products is identical at 1.00. Analysys Mason believes this to be objective and based on cost causation and therefore reasonable.
- *Dropwire capital & PSTN NTE.* The usage factor for this component is also 1.00 across all products, which is objective and based on cost causation and therefore reasonable.
- *PSTN line cards.* The usage factor for this component is 1.00 for WLR rental products and 0 for MPF Rental products, which is reasonable (as only WLR products use PSTN line cards).
- *E side copper capital.* As with D side copper capital, the usage factor is 1.00 across the key products, which is reasonable.
- *D side copper current.* The usage factors used by BT for this component range from 1 to 1.25, depending on the product in question. According to BT, there are two reasons for this variance:

- *WLR Premium and MPF products are provided with a higher level of service level agreement (SLA) than WLR Basic products.* BT believes that this justifies the higher usage factor of 1.20 for D side copper current. While it is possible that the higher SLA (“care level”) does indeed lead to higher costs, Analysys Mason has not seen convincing evidence to support this usage factor – in other words the justification is not transparent¹⁸. Analysys Mason understands that Ofcom is planning to consult later in 2013 on the relationship between service quality and resource costs¹⁹.
- *MPF has a higher fault rate than WLR lines.* BT has argued that MPF lines suffer from a 4% higher rate of failure than WLR lines and therefore a higher proportion of D side copper current costs should be allocated to MPF lines.

As further evidence is needed to support higher fault rates for MPF lines we recommend that Ofcom explore this issue further, and understand that this is already underway²⁰. Ofcom’s proposed allocation for D side and E side copper current can be found in Table A13.7 in Annex 13 of the consultation document²¹.

- *Residential PSTN drop maintenance.* The allocation of drop maintenance costs is equal across all of the key products, with a usage factor of 1.00 for each. Analysys Mason believes this is objective and based on cost causation and therefore reasonable.
- *E side copper current.* As with D side copper current, usage factors for this component range from 1 to 1.25 depending on the product in question. The explanation from BT is that the usage factors are due to the same reasons as for D side copper current (i.e. high SLAs and a greater fault rate for MPF). While it is possible that the higher SLA (“care level”) does indeed lead to higher costs, Analysys Mason has not seen convincing evidence to support this usage factor – in other words the justification is not transparent. Analysys Mason understands that Ofcom is planning to consult later in 2013 on the relationship between service quality and resource costs. In its consultation, Ofcom has proposed alternative usage factors for E side and D side copper current²².

Analysys Mason recommends that Ofcom consider alternative usage factors for E side copper current, as it is doing for D side copper current.

¹⁸ See A13.136 in the annex of the consultation document for more detail on this point, <http://stakeholders.ofcom.org.uk/binaries/consultations/llu-wlr-cc-13/annexes/annexes.pdf>

¹⁹ See section 5 of the consultation document at http://stakeholders.ofcom.org.uk/binaries/consultations/llu-wlr-cc-13/summary/LLU_WLR_CC_2014.pdf. See also Annex 13 of the consultation document for further discussion and background on the service levels, including Ofcom’s proposed usage factor, at <http://stakeholders.ofcom.org.uk/binaries/consultations/llu-wlr-cc-13/annexes/annexes.pdf>

²⁰ See Section 5.23 on fault rates in the consultation document at http://stakeholders.ofcom.org.uk/binaries/consultations/llu-wlr-cc-13/summary/LLU_WLR_CC_2014.pdf

²¹ See <http://stakeholders.ofcom.org.uk/binaries/consultations/llu-wlr-cc-13/annexes/annexes.pdf>

²² See Table A13.7 for the proposed allocation for E-side and D-side copper current at <http://stakeholders.ofcom.org.uk/binaries/consultations/llu-wlr-cc-13/annexes/annexes.pdf>

- *Broadband Line Testing Systems.* In the source data, broadband line testing systems are allocated to both WLR lines and to MPF (and SMPF) products. Ofcom has already examined this issue and consulted on a possible approach in section 6.151 of the 2013 charge control consultation document, which would involve spreading the cost of TAMS and evoTAMS across MPF and SMPF lines on the basis of volumes (i.e. a usage factor of 1 for SMPF, 1 for MPF, and 0 for WLR).
- *Local exchanges general frames capital.* The usage factors for this component are 1 for WLR Rentals and 2 for MPF Rentals. The difference is due to the wiring arrangements of WLR and MPF. Further detail on this can be found in the annex to the consultation²³. Analysys Mason believes this to be objective and based on cost causation and therefore reasonable.

In the final section below, the above exercise is repeated but comparing the cost stack for MPF Rental with that of WLR Basic Rental plus SMPF Rental.

5.5 Comparison of attribution of main component costs between MPF and SMPF plus WLR

As with the assessment of the main components, in order to make a comparison between MPF Rental and WLR Basic Rental plus SMPF Rental we built the cost stack of both, as shown in Figure 14 and Figure 15.

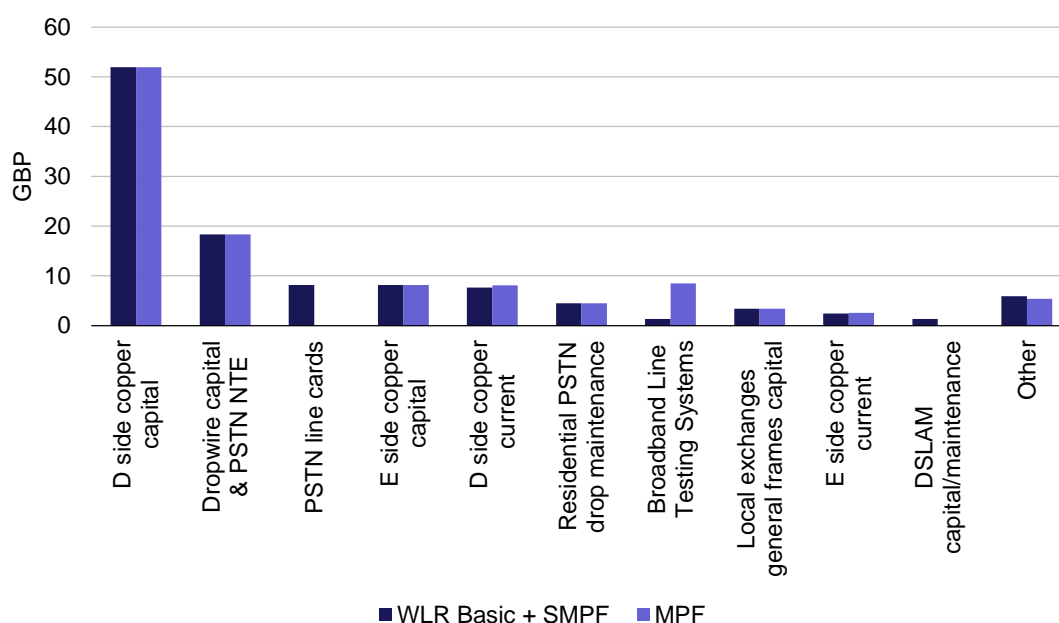
The main nine components have been selected. For both MPF Rental and WLR Basic Rental plus SMPF Rental these components represent over 90% of the total cost for each product.

²³ See figures A10.1-3 for an explanation of the different wiring configurations at <http://stakeholders.ofcom.org.uk/binaries/consultations/llu-wlr-cc-13/annexes/annexes.pdf>

Figure 14: Key component costs of WLR Basic Rental plus SMPF Rental vs. MPF Rental, 2011/12, in GBP
[Source: BT RFS, 2012]

	D side copper capital	Dropwire capital & PSTN NTE	PSTN line cards	E side copper capital	D side copper current	Residential PSTN drop maintenance	Broadband Line Testing Systems	Local exchanges general frames capital	E side copper current	DSLAM capital/maintenance	Other ²⁴	Total
WLR Basic Rental	51.94	18.33	8.13	8.18	6.48	4.51	0.49	1.71	2.04	-	4.06	105.87
SMPF Rental	-	-	-	-	1.17	-	0.86	1.71	0.37	1.31	1.83	7.25
WLR Basic Rental plus SMPF Rental	51.94	18.33	8.13	8.18	7.65	4.51	1.35	3.42	2.41	1.31	5.89	113.12
MPF Rental	51.90	18.31	-	8.17	8.08	4.51	8.47	3.41	2.54	-	5.36	110.75

Figure 15: Key component costs of WLR Basic Rental plus SMPF Rental vs. MPF Rental [Source: BT RFS, 2012]



²⁴

Other components representing at least GBP0.10 of cost for at least one product are: PSTN line test equipment, Pair gain, Combi card voice, Service Centre Assurance, Sales product management, Directories and LLU systems development. Details can be found in Appendix 1.2.1 of BT's 2012 RFS at http://www.btplc.com/Thegroup/RegulatoryandPublicAffairs/FinancialStatements/2012/RFS_2012.pdf

The differences seen above can be explained by examining the usage factors. Figure 16 provides a comparison of the usage factors for MPF Rental and WLR Basic Rental plus SMPF Rental for the key components.

Figure 16: Usage factors for 2011/12, by product [Source: BT RFS, 2012]

	D side copper capital	Dropwire capital & PSTN NTE	PSTN line cards	E side copper capital	D side copper current	PSTN drop maintenance	Broadband Line Testing Systems	Local exchanges general frames capital	E side copper current	DSLAM capital/maintenance
WLR Basic Rental	1.00	1.00	1.00	1.00	1.00	1.00	0.10	1.00	1.00	-
SMPF Rental	-	-	-	-	0.18	-	0.18	1.00	0.18	1.00
WLR Basic Rental plus SMPF Rental	1.00	1.00	1.00	1.00	1.18	1.00	0.28	2.00	1.18	1.00
MPF Rental	1.00	1.00	0	1.00	1.25	1.00	1.79	2.00	1.25	-

Each of the following components has an identical usage factor for both MPF Rental and for WLR Basic Rental combined with SMPF Rental, which Analysys Mason believes to be reasonable as it is objective and based on cost causation:

- D side copper capital
- Dropwire capital & PSTN NTE
- E side copper capital
- Residential PSTN drop maintenance
- Local exchanges general frames capital²⁵.

Looking at each of the remaining components in turn:

- *D side copper current*. As discussed in Section 5.4 earlier, the difference in usage factors between WLR and MPF is explained by BT as being due to the higher SLA levels and the higher fault rates of MPF lines. However, when SMPF lines are also combined with WLR, the difference is much lower (1.18 compared to 1.25). There is a lack of transparency in the justification of this difference, which we expect will be addressed in the work Ofcom is

²⁵ The usage factor for MPF and WLR plus SMPF is what we expected, given the usage of the frame by these products. Further discussion of this can be found in annex 10 of the consultation document at <http://stakeholders.ofcom.org.uk/binaries/consultations/llu-wlr-cc-13/annexes/annexes.pdf>

already undertaking in relation to fault rates and quality of service as well as to MPF lines as part of the rebalancing of costs.

- *Broadband Line Testing Systems.* Analysys Mason does not believe that BT's explanation for how costs have been shared across SMPF, WLR and MPF products is sufficiently robust to justify the wide difference in the usage factors. Ofcom is looking at this point as part of its consultation. Further discussion of this, and Ofcom's proposed alternative, can be found in the consultation documents²⁶.

As discussed in Section 5.4, Analysys Mason suggests that Ofcom consider how these costs are allocated across products.

- *E side copper current.* As with D side copper current, the difference between the allocation of copper current costs between MPF Rental and WLR Basic Rental is reduced significantly when SMPF Rental is also included. However, there is a lack of transparency in the justification of the difference, which we expect will be addressed in the work Ofcom is already undertaking.

As discussed in Section 5.4, Analysys Mason recommends that Ofcom consider alternative allocation of current costs for D side and E side copper.

- *DSLAM capital maintenance.* According to the RFS, SMPF is allocated GBP1.31 of DSLAM capital/maintenance costs based on its usage factor of 1. This appears to be a misclassification, as SMPF should not be allocated costs related to the DSLAM.

Analysys Mason recommends that Ofcom seek clarification of the nature of DSLAM capital/maintenance with BT. It may be that the term DSLAM is miscategorised and these costs are related to SMPF, based on cost causation and are therefore reasonable. In this case, we recommend relabelling 'DSLAM capital/maintenance' more appropriately. Alternatively, if these costs are not related to SMPF, we recommend that Ofcom consider the reallocation of DSLAM capital/maintenance.

²⁶

See Section 6.137 of the main consultation document for discussion of the broadband line testing costs at http://stakeholders.ofcom.org.uk/binaries/consultations/llu-wlr-cc-13/summary/LLU_WLR_CC_2014.pdf and see Table A13.4 for Ofcom's proposed adjusted unit cost at <http://stakeholders.ofcom.org.uk/binaries/consultations/llu-wlr-cc-13/annexes/annexes.pdf>

6 Recommendations

Based on our review of BT's cost allocation, Analysys Mason considers that overall it is reasonable. Analysys Mason does have the following recommendations however, which are issues of transparency and sampling:

- We note that the method used to allocate duct costs between products within the review (WLR and LLU) and other products is potentially inaccurate, as it mixes a survey-based approach (measuring the cross-sectional area used) with one based on spend on duct construction since that date. Ofcom may wish to consider whether an update to BT's original 1996/7 survey of duct usage is needed.
- We recommend that Ofcom investigate further the allocation of local exchanges general frames capital and current between WLR, MPF and ISDN2 products. We are not aware of reasons to support the allocation in the 2012 RFS and note that the relative allocations are significantly different in the 2013 RFS.
- As further evidence is needed to support higher fault rates for MPF lines we recommend that Ofcom explore this issue further, and understand that this is already underway. Ofcom's proposed allocation for D side and E side copper current can be found in Table A13.7 in Annex 13 of the consultation document.
- We note that there is limited supporting evidence for the difference in BT's current usage factors for D side and E side copper current for WLR basic and WLR premium/MPF products. Analysys Mason recommends that Ofcom consider alternative usage factors for both E side copper current and D side copper current. We understand that Ofcom is planning to consult later in 2013 on the relationship between service quality and resource costs and is undertaking further analysis of fault rate data. As part of this assessment, Ofcom may also wish to consider how D side copper current costs are allocated to other products, such as ISDN2, ISDN30 and PPCs.
- In the source data, Broadband line testing systems are allocated to both WLR lines and to MPF (and SMPF) products. Ofcom should also investigate further the relative allocation of Broadband line testing costs between MPF and SMPF.²⁷
- Analysys Mason recommends that Ofcom seek clarification of the nature of DSLAM capital/maintenance with BT. It may be that the term (especially the reference to DSLAM) is inaccurate and these costs are related to SMPF and are based on cost causation and therefore reasonable. In this case, we recommend relabelling 'DSLAM capital/maintenance' more

²⁷ See Section 6.137 of the main consultation document for discussion of the broadband line testing costs, at http://stakeholders.ofcom.org.uk/binaries/consultations/llu-wlr-cc-13/summary/LLU_WLR_CC_2014.pdf and see Table A13.4 for Ofcom's proposed adjusted unit cost, at <http://stakeholders.ofcom.org.uk/binaries/consultations/llu-wlr-cc-13/annexes/annexes.pdf>

appropriately. Alternatively, if these costs are not related to SMPF, we recommend that Ofcom further consider the reallocation of DSLAM capital/maintenance.

Annex A Glossary

- **BT:** British Telecommunications plc.
- **Charge control:** A control which sets the maximum price that a communication provider can charge for a particular product or service. Most charge controls are imposed for a defined period.
- **Communications provider:** A person who provides an electronic communications network or provides an electronic communications service.
- **Dropwire:** The part of the network that uses a copper line from the distribution point to and including the PSTN network terminating equipment (NTE).
- **Gross replacement cost (GRC):** The cost of replacing an existing tangible fixed asset with an identical or substantially similar new asset having a similar production or service capacity.
- **ISDN2:** A type of digital telephone line service that supports telephony and switched data services. ISDN2 allows a business to handle two phone calls simultaneously. It is primarily used by smaller businesses.
- **ISDN30:** A type of digital telephone line service that provides up to 30 lines over a common digital bearer circuit. These lines provide digital voice telephony, data services and a wide range of ancillary services. It is primarily used by larger businesses.
- **Local loop unbundling (LLU):** A process by which a dominant provider's local loops are physically disconnected from its network and connected to competing provider's networks. This enables operators other than the incumbent to use the local loop to provide services directly to customers.
- **Main distribution frame (MDF)/unbundled local loop:** An internal wiring frame where copper access network cables are terminated and cross connected to exchange equipment by flexible wire jumpers.
- **Metallic path facilities (MPF):** The provision of access to the copper wires from the customer premises to a BT MDF that covers the full available frequency range, including both narrowband and broadband channels, allowing a competing provider to provide the customer with voice and/or data services over such copper wires.
- **Openreach:** The access division of BT established by Undertakings in 2005.
- **Regulatory financial statements (RFS):** The financial statements that BT is required to prepare and publish by Ofcom.
- **Shared metallic path facility (SMPF)/shared access:** The provision of access to the copper wires from the customer's premises to a BT MDF that allows a competing provider to provide the

customer with broadband services, while the dominant provider continues to provide the customer with conventional narrowband communications.

- **Significant market power (SMP):** The significant market power test is set out in European Directives. It is used by national regulatory authorities (NRAs), such as Ofcom, to identify those CPs which must meet additional obligations under the relevant Directives.
- **Wholesale line rental (WLR):** The service offered by BT to other UK CPs to enable them to offer retail line rental services in competition with BT's own retail services. Line rental is offered along with calls (and other service elements, such as broadband) to retail customers