

INTERCONNECT COMMUNICATIONS



Report for Ofcom on the Analysis of Mobile Service Provider Costs arising from potential Systems Development / MNP Process Changes

**Final Report
10th May 2017**

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INTERCONNECT COMMUNICATIONS
Consulting in Communications Regulation and Strategy

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1. Executive Summary

Ofcom published proposals in March 2016¹ and July 2016² aimed at improving the switching process for consumers wishing to move from one mobile provider to another. Ofcom proposed two core proposals to reduce the hassle involved and the time spent talking to losing providers to progress the switch: Auto-PAC and GPL.

In addition, Ofcom also proposed removing notice period charges beyond the date on which a customer switches and/or ports their mobile number to another provider; and ‘End to end management’ of the switch in order to address loss of service that can occur during a switch. Ofcom published two supporting workbooks which set out a series of likely costs that could be expected as a result of the process and system developments required to implement these proposed options.

Ofcom has consulted on its proposals and received feedback from mobile providers with whom it has continued to interact on the issue and whose input has allowed a number of refinements to the cost assumptions in the two workbooks.

In January 2017, Ofcom published a further update³ to the proposals (*Consumer switching: Proposals to reform switching of mobile communications services: Revised cost estimates*) and associated cost models⁴. In parallel, however, it also wished to receive external validation of the approaches it had taken in estimating the typical costs likely to arise if either of the proposed options were implemented.

To that end, Ofcom contracted an independent consulting company (InterConnect Communications) to review, test and challenge the estimates of costs and implementation timescales it had identified as likely to arise from changes proposed in relation to the mobile switching process in the UK.

The scope of the review commissioned included the overall assumptions that Ofcom had made in its proposals and more fundamentally a validation of the cost models that had been developed and refined over the previous nine months. The principal aim of this testing was to ensure that Ofcom’s estimates were robust and proportionate.

The review was undertaken in February 2017 and was based on the January 2017 report (“the Proposals”) and supporting workbooks. The analysis focused around three key areas:

- The high-level approach and assumptions Ofcom had taken for the options proposed
- The structural and functional integrity of the two workbooks containing the estimated costs of each option

¹ *Consumer Switching: Proposals to reform switching of mobile communications services:*
<https://www.ofcom.org.uk/consultations-and-statements/category-1/consumer-switching-mobile>

² *Consumer Switching: Further proposals to reform switching of mobile services*
https://www.ofcom.org.uk/_data/assets/pdf_file/0023/83453/Consumer-Switching-Further-proposals-to-reform-switching-of-mobile-services-July-2016.pdf

³ *Consumer switching: Proposals to reform switching of mobile communications services: Revised cost estimates*
https://www.ofcom.org.uk/_data/assets/pdf_file/0033/97179/Consumer-switching-Proposals-to-reform-switching-of-mobile-communications-services-Revised-cost-estimates.pdf

⁴ *Workbook: Supporting calculations: Costs to Mobile Providers:*
<http://www.ofcom.org.uk/static/consultations/7781-making-switching-easier/costs-to-mobile-providers.xlsm> and
Workbook: Supporting calculations: CPS Costs <http://www.ofcom.org.uk/static/consultations/7781-making-switching-easier/CPS-costs.xlsx>

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- A line by line analysis of the contents of the two workbooks to assess the reasonableness of the costs identified and the extent to which there might be any omissions on the costs anticipated. For clarity, the service provider spreadsheet does not model costs for existing operator networks but rather the costs of a typical operator, based on size (small, medium or large) and whether an MNO or MVNO.

This report is the output of that external review and sections 3, 4 and 5 respectively contain the analysis and findings to each of the key areas above.

In terms of the structure of the workbook models, no errors were found with the design or functions of the workbooks reviewed, so findings in this sense were limited to affirming that the models perform correctly and produce output information that supplies Ofcom's analysis and conclusions.

At the detailed content level, the overall conclusion is that Ofcom's costings are basically sound and that the worksheets provide a reasonable forecast of the various costs and resource timescales that could be expected were the reforms to be implemented. Observations have been made; in some cases, activities may have been overestimated while in others the opposite was the case. In overall terms, however, it was not felt that the scale of variance arising would significantly distort the costings and the net effect would probably be neutral.

The considered finding of this report is that the approach taken by Ofcom in defining cost assumptions based on a perception of an average service provider within certain defined size categories was a reasonable approach and that the costings produced are representative. In so doing, Ofcom has communicated anticipated costs to industry resulting from new regulatory requirements, without necessitating intimate network and systems knowledge of each individual service provider.

2. Background and Scope of Work

In March 2016, Ofcom published proposals aimed at improving the switching process for consumers wishing to move from one mobile provider to another. Based on an earlier consultation on Mobile Switching in 2015 and information gathered subsequently, Ofcom was of the view that consumers experienced a number of issues when considering switching providers and, in the March 2016, consultation document set out their proposals to address the issues.

Fundamental to this was the switching process between the consumer, the losing provider and the gaining provider. Ofcom's reforms proposed changes to the process, with two options proposed:

- Automated PAC (Auto-PAC) - allowing consumers to request a PAC by text or online
- Gaining Provider Led (GPL) - enabling the new provider to co-ordinate the switch on behalf of the consumer.

Ofcom was conscious that there would be a cost impact to providers in these proposed changes and had undertaken internal analysis of the likely costs involved. These costs were published in an accompanying workbook to the main proposal document for industry review.

Following feedback to the March 2016 consultation, Ofcom continued to engage with mobile providers on the reforms and cost assumptions and has continued to refine the cost models.

In January 2017, Ofcom published an update to the proposals and associated cost models. In parallel, however, it also wished to receive external validation of the approaches it had taken in estimating the typical costs likely to arise if either of the proposed options were implemented.

To that end, Ofcom contracted an independent consulting company (InterConnect Communications) to review, test and challenge the estimates of costs and implementation timescales it had identified as likely to arise from changes proposed in relation to the mobile switching process in the UK.

The scope of the review included the overall assumptions that Ofcom had made in its proposals and more fundamentally a validation of the cost models that had been developed and refined over the previous nine months. The principal aim of this testing was to ensure that Ofcom's estimates were robust and proportionate.

It should be noted that the scope of work focused exclusively on an analysis of the data in two workbooks published in the context of the Proposals. The scope did not extend to any rework of the costing exercise nor did it include any verification of source material (vendor quotations, for example) that had been used to determine the costs in the workbooks, but rather whether the costs identified as a result of that initial research appeared reasonable based on the team's experience of other system upgrade work.

The analysis focused around three key areas:

- The high-level approach and assumptions Ofcom had taken with regard to the costing of the options proposed
- The structural and functional integrity of the two workbooks containing the estimated costs of each option
- A line by line analysis of the contents of the two workbooks to assess the reasonableness of the costs identified and the extent to which there might be any omissions on the costs

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anticipated. For clarity, the service provider spreadsheet does not model costs for existing operator networks but rather the costs of a typical operator, based on size (small, medium or large) and whether an MNO or MVNO.

The review was undertaken in February and March 2017, included review of further feedback received by Ofcom in response to the January publication, and reported to Ofcom in March.

3. High-Level Approach and Assumptions

3.1 Aims

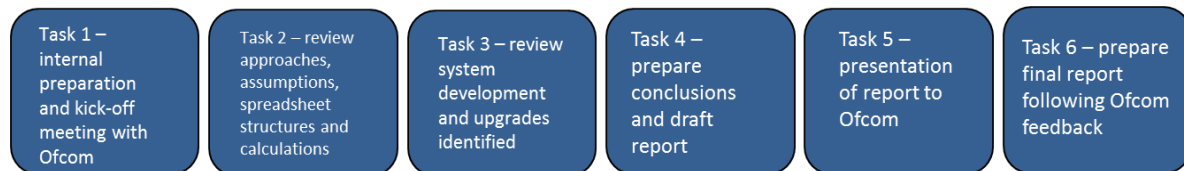
The focus of the review narrows down to two key workbooks; these are supported by and described in the *Proposals* document (*Consumer-switching-Proposals-to-reform-switching-of-mobile-communications-services-Revised-cost-estimates*). The workbooks contain the estimated costs relating to 1) the service providers and 2) the CPS⁵. Ofcom said that these workbooks reflected stakeholder feedback received to the March 2016 consultation, as well as discussions with the mobile industry over the autumn of 2016, which had given Ofcom an opportunity to adjust cost calculations and to refine their proposed new processes for Auto-PAC and GPL.

The costs were to be reviewed on the basis of sensibility because each and every service provider's network and systems could reasonably be expected to be unique. What was essential was a review of the reasonableness of the tasks listed, the resource required in terms of time, cost and skill-levels and flags for any omissions or gaps.

3.2 Approach Overview

InterConnect took the January 2017 *Proposals* and supporting workbooks as the basis of the review task. The *Proposals* document also contains the process flows for Auto-PAC and GPL.

The approach taken focused on six tasks, as illustrated below, starting with an inception meeting with Ofcom to confirm scope and reporting expectations and concluding with final report write-up.



Task 2 reviewed the overarching framework of the proposals in question and structures under which the resultant costings were determined and quantified. This included reviewing the assumptions made, the structure of the workbooks used and a line by line check on the formulae / calculations in each.

Task 3 was a validation of the content of the workbooks. In other words, a line by line analysis of all the system updates and costs identified that might be required in service provider systems in order to implement the MNP process changes under consultation.

Task 4 included the application of a sensitivity analysis to ensure that the final outputs from the models seemed logical and reasonable.

⁵ Central Porting System

4. Review of Workbook Model Structure and Integrity

4.1 Aims

The aim of this task was to assess the two workbook files published by Ofcom that quantify the work required to be done by the CPS and operators to implement various reforms.

This exercise did not question the design of potential reforms, tasks involved and assumptions on resource and development costs. It reviewed the workbook models in detail to ensure that the models presented work correctly in terms of structure and function, thereby supporting the analysis of options and development changes within other tasks.

The overriding aim of this task was to interrogate and test the workbook models so that a positive sign off could be achieved, whereby an independent review gives assurance that the models work properly.

4.2 Approach Overview

The exercise benefited from the manageable size and specification of the models and the fact that they have been developed and used by Ofcom, following discussion with industry, over time. The first phase of the task was to check the input sheets in each file, covering salary assumptions by resource type, working days per year, the uplift for people costs to cover benefits and overheads, and the uplift to be applied to development resource requiring ongoing operational expenditure. In addition, the CPS costs file contains assumptions on hardware and software licence costs.

The structure and function of the 'Development days' sheet in the mobile providers file was checked to ensure that resource choices by activity were logical and the days required calculated correctly.

The second phase of the task was to assess the outputs sheets in the files to ensure that formulae to enter resource types, unit costs and total costs by activity work correctly. This involved iterative testing to trace calculations to input sources on other sheets, including the scenario choice (in the provider file) for which type of provider the calculation is performed for.

The third phase of the task was to assess the provider cost summary for reform scenarios and the cost summary for CPS costs, checking links to output sheets and analysis relevant to business/residential only scenarios. Lastly, the function of the 'Industry cost summary' sheet was checked, including the choice of business/residential scenario, importing of numbers from the CPS file to the provider file and overall cost calculations.

4.3 Findings

No errors were found with the design or functions of the worksheets reviewed, so findings in this sense were limited to affirming that the models perform correctly and produce output information that supplies Ofcom's analysis and conclusions. Findings related to the assumptions, inputs and technical judgements included in the models are covered by the subsequent section below. The models were not explicitly reviewed with the intention of making any assessments on potential redesign or improvement. The focus of this task was to ensure that the models work correctly and do not contain any errors that could undermine Ofcom's reliance on them.

4.3.1 Costs to Mobile Providers Workbook

4.3.1.1 Inputs and assumptions

The salary and staff rates sheet contains input data that is used by the model to create quantified outputs. Data includes staff salary rates, contractor day rates, staff numbers, working days and hours, the mark up to be applied to salary costs to cover benefits and overheads, and the uplift required to calculate ongoing costs relating to system setup and operator numbers.

Data is held in a logical way and referred to by other sheets.

4.3.1.2 Development days

The 'development days' sheet holds data on every reform scenario and related activities, containing assumptions on the type and quantity of human resource required to complete tasks, the amount of training and development days required and whether or not ongoing cost is expected in relation to what has been set up. Data is held for each separate size category of operator and referred to by other sheets in the model accordingly.

Data is held in a logical way and formulae and references work in the way they are designed to.

4.3.1.3 Outputs

Five output sheets represent the five proposed reform scenarios covered by the model. Each one contains detail on activities and sub-activities required to be performed to achieve the desired outcome.

The sheets contain formulae that refer to scenario choice (size of operator) and resource types from other sheets, then look up the relevant salary and cost data to populate a cell with day rate information to be multiplied by development days required (from the appropriate input sheet) and derive setup cost. Any requirement for related ongoing costs is derived from the relevant input sheets.

The activities are organised in a logical and clear way. Formulae, references and lookups perform as required to provide correct output data.

4.3.1.4 Summaries

The service provider cost summary sheet shows the setup and ongoing costs for each reform, calculating the latter for a period of ten years. The sheet collects data from the relevant outputs sheets. The sheet also contains input data relevant to choices on the industry cost summary sheet regarding residential only and residential plus business scenarios. The sheet contains a drop-down box to choose service provider scenario (size of provider) referred to above.

The industry cost summary sheet contains a drop-down box to choose between residential only and residential plus business scenarios (see above). The sheet collects data from the service provider cost summary sheet and the CPS file (see below) to present total cost projections for each reform scenario, analysed by setup and ongoing costs. The sheet contains input data on reform variants connected to provider size and residential/residential plus business choices.

The summaries are organised in a logical and clear way. Formulae, references and lookups perform as required to provide correct output data.

4.3.2 Costs to CPS Workbook

4.3.2.1 Inputs and assumptions

The inputs sheet contains input data that is used by the model to create quantified outputs. Data includes staff salary rates, contractor day rates, hardware/software licence costs, working days and hours, the mark up to be applied to salary costs to cover benefits and overheads and the uplift required to calculate ongoing costs relating to system setup.

Data is held in a logical way and referred to by other sheets.

4.3.2.2 Outputs

Four output sheets represent the four proposed reform scenarios covered by the CPS model. Each one contains detail on activities and sub-activities required to be performed to achieve the desired outcome.

The sheets contain entered data for resource types and development days required, then look up the relevant salary and cost data to populate a cell with day rate information to be multiplied by development days required and derive capital expenditure cost. Where the activity requires licence purchase, the relevant data is looked up from the input sheet. Any requirement for related ongoing operational expenditure is indicated on the sheet and calculated with reference to the input sheet.

The activities are organised in a logical and clear way. Formulae, references and lookups perform as required to provide correct output data.

4.3.2.3 Summaries

The cost summary sheet shows the setup and ongoing costs for each reform, calculating the latter for a period of ten years. The sheet collects data from the relevant outputs sheets.

The cost summary sheet provides an input to the industry cost summary sheet in the service provider file (see above).

The summaries are organised in a logical and clear way. Formulae, references and lookups perform as required to provide correct output data.

5. Review of System Costs Arising from Proposed MNP Development

5.1 Aims

Having confirmed the effectiveness of the workbooks at a structural level, the reasonableness of the various costs and resource timescales as presented in the workbooks was then analysed. It was also necessary to establish that these costs and timescales were sufficient for and appropriate to, the required output i.e. upgrade to Auto-PAC and GPL.

5.2 Approach Overview

In order to confirm that the costs and timescales presented were sufficient for the required output, it was necessary firstly to review the process flows themselves because these reflect the end products. The next focus was on the output sheets for the various reforms as these represent the work breakdown structures which individually build up to said products i.e. the reforms in question.

The next level down was a study of each individual line of the output sheets to ensure that they contained the correct and necessary tasks and sub-tasks for the particular reform along with an appropriate resource allocation. Finally, the input sheets that fed into the output sheets were examined for the reasonableness of their contents. Amongst other things, this meant the salary levels, employee numbers and the development days forecast.

As has already been stated in this report, it was not possible to assess these costs in a way that might be done for a business case. Instead, reviewers utilised their combined experience of systems and infrastructure programmes to determine the reasonableness of each stated activity and its cost. This is because the workbooks do not model costs for existing operator networks but rather the costs of a typical operator. Following discussion, the queries were either resolved by the reviewers or observations raised in the appropriate section of this report.

5.3 Findings

Initially, the reasonableness of the stated tasks was verified and that they represented a realistic work package for the intended output i.e. the reforms (Removing notice period charges, Auto-PAC CPS, Auto-PAC LP, GPL and End to End Management). On the 'costs to mobile providers' work sheet, there are the above noted five reforms which must be multiplied by the five service provider types to give a total of twenty-five sheets. To this was added the 'costs to CPS' workbook with its own four sheets, making a total of twenty-nine sheets which were then reviewed line by line.

The reviewers were comfortable with the blended rates stated for employees (internal rates) and contractors (external rates). These aligned with experience from both recruiting and employment in the IT and Telecoms sector over recent years. A 15% ongoing set up ratio has been applied throughout as an opex cost. The reviewers considered that where specific new hardware was being deployed then a figure of 20% might be closer to the mark. However, where existing systems are being reconfigured, as is the case here, then 15% might be considered reasonable or possibly slightly generous.

Overall, the work sheets provide a reasonable forecast of the various costs and resource timescales that could be expected in pursuit of implementing the reforms. Observations have been made; in some cases, activities may have been overestimated while in others the opposite was the case. In some cases, differences have been noted between ratios of work effort on the various reforms (e.g.

Impact Assessment versus Development) for which the rationale has not been fully articulated. In general terms, however, it was not felt that the scale of variance arising would significantly distort the costings and the net effect would probably be neutral. The observations follow below.

5.4 Observations

5.4.1 Query on Figure A2: Auto-PAC Process

This query was presented to Ofcom during the review process. The query concerned a process descriptor in Figure A2 Auto-PAC Process (*Common process for all CPS and LP variants, i.e. after consumer has received a PAC and ETC*) on page 15 of the *Proposals* document.

The query was why the block operator (BO) should send the routing updated message to CPS only under what had been labelled 'CPS variant 1' of Auto-PAC?

Ofcom agreed that the block operator would need to send routing update messages to the CPS under both CPS variants i.e. regardless of whether the PAC was requested by text or phone/online, because in this scenario the CPS needs an accurate ported number database. Ofcom agreed that Figure A2 should be amended to suggest something to the effect of "under Auto-PAC CPS (sub-variants 1 and 2), BO sends routing update message to CPS".

5.4.2 Estimate of Effort

Assertion: Estimates / Costs could be understated

The primary metric from which the costs are derived is the development effort in days for a work item. When multiplied by the cost of the associated resource(s) and the number of organisations implementing the work item, the overall contribution towards the total costs is substantial.

From experience, depending on the stage of the lifecycle at which the estimates are obtained, there are a number of factors which can limit the accuracy of the estimates including:

- The stage of the project lifecycle (development lifecycle)
- Initial top-level estimates -/+ 40%
- High-level Outline plans -/+ 20%
- Detailed plans -/+ 10%
- Skills of the resources carrying out the work
- Maturity of the organisational project delivery processes
- Integration / cohesiveness of the enterprise systems architecture
- Extent of other systems change underway at the organisation

Assumptions

A number of assumptions were made during this analysis:

'CRM' (in the case of CRM System and CRM Vendor as used in the workbooks) is a generic term used for OSS or possibly OSS and BSS considered together as systems impacted by the MNP uplift and requiring modification.

Some examples of other systems follow:

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- Sales Tool
- Fault Ticketing System
- Reporting Tools (Financial etc.)
- Network Monitoring
- Provisioning System

It was assumed that reference to CRM extended to include at least some of the above referenced systems in addition to the core CRM.

‘Impact Assessment’ constitutes activities which will lead to a specification of the resulting business process, technological and system change and ensuing organisational change.

It is assumed the estimates in the worksheets are not based on thorough impact assessments (these are yet to be carried out) or actual metrics from implementing these changes in representative organisations, but are ‘initial top-level estimates’ based on industry knowledge and expertise of BSS at representative organisations. These ‘initial top-level estimates’ have been refined and revised as a result of discussions between Ofcom and mobile providers during Autumn 2016 which has led to increased estimate accuracy equivalent to the ‘high-level outline plans’ stage. If this assumption is valid, the accuracy of the estimates provided is likely to be of a similar level to the estimate accuracy at the ‘High-level Outline Plans’ stage stated above (i.e. +/-20%) and at best at the ‘Detailed plans’ stage of a project (i.e. +/-10%). This should not be interpreted as being 10% or 20% ‘out’ but rather should be seen as tolerance applied to the confidence of the estimate.

It is assumed that an Impact Assessment would lead to a description of the resulting business process, technological and system change, all ensuing organisational change and work to embed the new capability fully into the new organisation until fully effective/performant. A specification of the work that is required to make and use the product effectively in the implementing organisation would be an output of the Impact Assessment activity.

A robust Impact Assessment (provided sufficient time is allowed and the subject matter experts are available to contribute) can lead to a plan that could deliver with a +/-10% accuracy. Typically, following an Impact Assessment, initial outline plan effort estimates tend to increase.

Example

From the SP Cost Summary in Mobile Operator Costs, the Auto-PAC CPS Variant for an MNO of £2,070K might have a worst-case estimate of £2,484K.

Conclusion

In conclusion, it could be suggested that the capex estimates in the work sheets might be understated by 10%-20%. Initially, that may well have been the case. Over against this however, InterConnect notes that Ofcom’s revisions following industry feedback have resulted in substantial uplifts since the original estimation exercise. It is assumed that these ‘Initial top-level estimates’ will have been refined following feedback as the overall industry cost of Auto- PAC increased by nearly half as much again whilst GPL costs increased by 70%.

5.4.3 Product Delivery Lifecycle Stages and Proportional Effort

Assertion: The ratio of costs for lifecycle stages are sometimes different

The delivery lifecycle in the worksheets has been mapped to a typical product development / software delivery lifecycle and, based on experience; a rule of thumb has been applied to the proportion of effort to each stage as follows:

Ofcom Stage	Typical Lifecycle Stage	% of Total Effort
Impact Assessment	Analysis/Specifications/High Level Design	15%
Development	Detailed Design/Development/Systems Testing	45%
Acceptance / Handover	UAT/Handover to Operations	20%
Project Management	Governance, Planning, Organisation, Control, Reporting	20%

A comparison has then been made between the proportion of effort for the stages in the work sheets and the typical rule of thumb proportions. There are a number of work items where the effort proportions do not correspond to this.

Example 1: Notice Period Reform in Mobile Operator Costs:

Ofcom Stage	A1.	A2.	A3.	Total	% of Total Effort	Typical %
Impact Assessment	2	2	8	12	12%	15%
Development	8	10	25	43	44%	45%
Acceptance / Handover	3	5	15	23	24%	20%
Project Management	3	4	12	19	20%	20%
Total Effort				97		

The division of effort in this example follows broadly typical proportions and InterConnect would expect to see similar proportions of effort in most work stages unless some specific explanation could be perceived or stated.

Example 2: Auto-PAC CPS Variant in CPS Costs

Activities 1.1 to 1.6 cover the development effort required for Activity 1: Provide additional central CPS functionality to support the centralised SMS PAC provision approach and interworking.

Ofcom Stage	Total Days	% of Total Effort	Typical %
Impact Assessment	20	2%	15%
Development	660	66%	45%
Acceptance / Handover	170	17%	20%
Project Management	145	15%	20%
Total Effort	995		

The division of effort for this work is different to the rule of thumb proportions. The comparison suggests that the Impact Assessment stage is considerably understated relative to the other lifecycle stages. Unless there is a particular explanation, InterConnect would recommend a rebalancing of forecast effort in these cases. However, the overall level of costs would not materially change.

Example 3: Auto-PAC CPS Variant in CPS Costs

Activities 3.1 to 3.6 cover the development effort required for Activity 3: Functionality to obtain switching information from LPs, and deliver with PAC to switchers.

Ofcom Stage	Total Days	% of Total Effort	Typical %
Impact Assessment	20	2%	15%
Development	660	56%	45%
Testing / Acceptance	170	31%	20%
Project Management	145	10%	20%
Total Effort	640		

The division of effort for this work is different to the rule of thumb proportions. The comparison suggests that the Impact Assessment and Project Management are understated relative to the other lifecycle stages. Unless there is a particular explanation, InterConnect would recommend a rebalancing of forecast effort in these cases. Again, the overall level of costs would not materially change.

Example 4: End-to-end Management in Mobile Operator Costs

Activities 1.1 to 1.12 cover the work and effort required for Activity 1: Update porting / CRM.

Ofcom Stage	Total Days	% of Total Effort	Typical %
Impact Assessment	10	2%	15%
Development	325	73%	45%
Testing / Acceptance	45	10%	20%
Project Management / Bus. Sup.	65	15%	20%
Total Effort	445		

This comparison suggests Impact Assessment stage and Testing/Acceptance are understated relative to Development.

Conclusion

The ratio of costs for lifecycle stages are different across different activities. Some other similar examples of different lifecycle cost ratios may be found in the CPS Costs and Mobile Operator Costs work sheets.

5.4.4 Training Delivery Estimates

Assertion: Training Delivery is sometimes either understated or overstated

The largest individual element contributing to the cost of change is the delivery of organisational training in the new business processes and system changes.

Where training⁶ is only required for 0.125 days, if it is eLearning, then the number of delivery training days is overestimated in some instances. If classroom based training is anticipated for all (e.g. 10,400 CSAs for an MNO) the number of training delivery days are significantly understated.

Example 1: Notice Period Reform in Mobile Operator Costs for an MNO (Activity 4: Training)

Activity 4.1 Impact Assessment is expected to take 14 days but Activity 4.2 Develop Training Materials is expected to take just 2 days. In comparison, in Auto-PAC CPS Variant, Auto-PAC LP Variant and GPL, a 14 day Impact Assessment and a 64 day training materials development has been estimated. There would appear to be a large disparity between the time allocated to respective development of materials for the two options that warrants closer scrutiny.

Activity 4.3 Delivery Costs has allowed 90 days to train 60 IT Engineers for 1 day each and 10,400 CSAs for 0.125 days each. Assuming 6 IT Engineers per class for 1 day each, IT Engineer training

⁶ Classroom training is assumed to mean groups of employees in either interactive, tutor led training or computer based learning delivered in a classroom environment. eLearning is assumed to be employees completing a prepared eLearning module individually but at a time that is more convenient to them or the business.

would require 10 days of training delivery time leaving 80 days for training 10,400 CSAs. Classroom training for that number of CSAs is quite an undertaking and its practicality / feasibility is very dependent on preferred numbers per session. If conducted, it would require a trainee to trainer ratio of just over 16:1⁷. For classroom training, therefore, 90 days delivery of training time may be understated. If pure eLearning is intended for CSAs, then 90 days delivery of training time is overstated.

Example 2: Auto-PAC CPS Variant in Mobile Operator Costs for an MNO

Activity 6.3 Delivery Costs has allowed 240 days to train 60 IT Engineers for 0.5 day each and 10,400 CSAs for 0.25 days. Assuming 6 IT Engineers per class for 0.5 days each, IT Engineer training would require 5 days of training delivery time leaving 235 days for training 10,400 CSAs.

Classroom training for 10,400 CSA's is quite an undertaking and feasibility / practicality is very dependent on preferred numbers per session. If conducted, it would require a trainee to trainer ratio of just over 11:1⁸. This is more manageable than Example 1 above depending on any limitations on numbers per session. If pure eLearning is intended for the 10,400 CSAs then 240 days Delivery of Training is overstated.

Conclusion

Training delivery is sometimes either understated or overstated in the work sheets.

5.4.5 Relative Effort Costs for MNOs vs. Large MVNOs

Assertion: There is variation in the relative costs for these

The relative development effort for an activity depending on the size and operation of the organisation (e.g. MNO vs. Large MVNO) varies across different activities. Ofcom's approach was focused around the level of technology and administrative support. A large MVNO would literally have everything except network; a medium MVNO would have more limited IT (billing / CRM platform etc.); and a small MVNO would literally be a sales operation and rely on the MVNE to provide all other operational functionality.

⁷ 10,400 CSAs, 80 days available, 130 CSAs per day. If training lasts 60 minutes (0.125 of an 8 hour day), the maximum turnaround would be 8 sessions of 16/17 CSAs per session. This does not allow for breaks or change-over between sessions. 6 sessions seems more realistic but either requires a higher CSA allocation per session (c. 22 which may not be feasible) or it will require more than the allocated 80 days.

⁸ 10,400 CSAs, 235 days available, 45 CSAs per day. If training lasts 2 hours (0.25 of an 8 hour day), the maximum turnaround would be 4 sessions with c.11/12 CSAs per session. This does not allow for breaks or change-over between sessions. 3 sessions seems more realistic and would entail 15 CSAs per session which is more feasible. Ultimately, the complexity of the material and optimum class size will be the determining factor for tutor-led sessions while number of terminals will limit class size for eLearning modules if delivered in the classroom environment.

Example: Auto-PAC, CPS variant

Activity / Task	Development days - MNO	Development days - large MVNO
1.1	8	5
1.2	25	15
1.3	1	1
1.4	35	20
1.5	15	10
2.1	15	15
2.2	35	25
2.3	60	40
2.4	20	10
2.5	20	10
2.6	60	40
2.7	40	20
2.8	40	20
2.9	65	15
3.1	12	10
3.2	35	30
3.4	35	30
3.5	30	20

Activities 1.5, 2.9 and 3.5 are all Project Management activities.

In Activity 1.5, the PM effort drops from 15 days to 10 days from MNO to Large MVNO. The drop in Activity 3.5 is similar, about 33%.

In Activity 2.9, however, the PM effort drops from 65 days (for managing 290 days of activity) to 15 days (for managing 180 days of activity) from MNO to Large MVNO.

Conclusion

The relative effort costs for MNOs vs. Large MVNOs vary across activities in the worksheets.

5.4.6 Industry Standard CRM and other BSS systems

Assertion: Large organisations may have CRM from the same vendors and so would not need to carry out bespoke development and as a result, would incur less cost

Assumptions

The worksheets assume system development costs are borne by each of the larger organisations.

In the new regulatory regime, service providers would need to update their CRM. Their business cases would be designated as 'regulatory' rather than e.g. ROI or new branding (intangible). In other words, it is work that must be carried out. Where common vendors pertain, due to common systems acquired, it is likely that the vendors would create a version for their CRM corresponding to the required functionality for the new regulatory requirements.

Conclusion

Service providers (MNOs, Large MVNOs, Medium MVNOs) using the systems would incur the cost for an upgrade and not bespoke development of the systems as costed in the work sheets.

5.4.7 Other minor observations for consideration from Mobile Operator Costs

- a) In Notice Period Reform: Activity 3. 'Calculate final bill'. The reviewers assumed that an existing rule for determining the final date would be changing but it could be expected that the functionality to calculate a final bill exists already. Ofcom explained that this activity is supposed to reflect the development needed to generate a final bill which calculates any unused portion of the monthly airtime charge, if this has been paid in advance, and credits this against final usage or roaming charges that have been incurred since the previous bill. Operators must also close down the collection arrangements with the customer once the final bill has been settled and collected.
- b) Mobile Operator Costs Acceptance Testing activities. It is assumed 'IT Engineer' is a generic resource as typically operational staff would normally be involved in testing and acceptance of a new function/capability on behalf of business operations. It is also assumed that 'Testing scenario/script preparation' is included in the testing and acceptance activities identified in the works sheets. If this is not the case, then this critical activity should be added and costed.

All Acceptance Testing type activities throughout the Mobile Operator Costs work sheets are carried out by an Employee of type IT Engineer at cost of £456/day. The only exception appears to be for 'Making CPS Aware of Repatriation' (activities 11, 12 and 13), Auto-PAC CPS Variant and Auto-PAC LP Variant, where the resource type is an employee of type Middle Manager at £526/day. Whilst the cost difference is not significant, there is no explanation for this nuance.

5.4.8 Programme Efficiency

Assertion: Programme Management can substantially reduce the costs

In MNOs, Large MVNOs and Medium MVNOs, the changes would be expected to be undertaken as a programme across the organisation.

Typically, a programme of works would be undertaken to effect the total change in the organisation. The Programme Management Office (PMO) would organise the work, manage the suppliers, manage quality of internal and external deliverables, ensure alignment of delivery schedules, manage dependencies and resources and coordinate acceptance testing and training across the organisation.

Whilst this would incur the additional resource for programme management, substantial reduction in project management estimates, internal technical resource estimates and external supplier estimates could be expected across the programme. Efficiency of delivery, acceptance testing and training, as well as holistic e2e business process and system change, acceptance testing and training would be made possible. External consultant costs (e.g. CRM Vendor costs) when negotiated as a whole are likely to reduce the large development effort estimates quoted in the work sheets. It is



difficult to put a figure on this but it is suggested that a 10% efficiency improvement could be gained from programme management after its own associated costs are taken into consideration.

Appendices

Appendix 1 – List of Acronyms

BO – Block Operator (the number range-holder operator)

BSS – Business Support System

CP – Communications Provider

CPS – Central Porting System

DO – Donor Operator

GPL – Gaining Provider Led

LP – Losing Provider

MNO – Mobile Network Operator

MVNE – Mobile Virtual Network Enabler

MVNO – Mobile Virtual Network Operator

Ofcom – Office of Communications (the government regulatory body for telecommunications)

OSS – Operational Support System

PAC – Porting Authorisation Code

PMO – Programme Management Office

RO – Recipient Operator

ROI – Return on Investment

SP – Service Provider (used interchangeably with 'operator')