Accounting Methodology Document

Long Run Incremental Cost Model: Relationships & Parameters

31 July 2018

Contents

1 Introduction

1.1 Overview of LRIC

We are required to annually prepare statements of Long Run Incremental Costs (LRIC), which form a part of the Regulatory Financial Statements (RFS). The "LRIC Model: Relationships and Parameters" (R&P) document is part of BT's Accounting Methodology Documents (AMD), but is presented as a separate document.

The R&P contains the principles that are applied in the production of Long Run Incremental Cost (LRIC) Statements, and describes in detail how we have applied these principles to construct Cost Volume Relationships (CVRs) and to calculate LRIC.

This version of the R&P details the calculation, relationships and parameters employed to produce the LRIC information for the year ended 31 March 2018.

The LRIC model uses fully allocated costs (FAC) produced by the Accounting Separation (REFINE) system as inputs. The basis of preparation of the Current Cost Accounting (CCA) financial statements, the accounting policies followed, the methodologies, the processes and the system used in preparing these FACs are described in more detail in the Accounting Methodology Document (AMD) for 2017-18.

1.2 Summary

The R&P describes the key parts of the production of LRIC Statements in more detail.

Chapter 2 presents information on the various definitions of LRIC terms and the principles used in the LRIC calculation.

Chapter 3 describes the process and calculation types behind the LRIC values.

Chapter 4 provides more detail on how CVR information is obtained and used.

Chapter 5 provides detailed examples of LRIC calculations.

Chapter 6 explains the changes we have made to LRIC modelling / methodologies for 2017-18.

Chapter 7 contains a glossary of terms.

The annexes list the relationships and parameters used in the LRIC model. These include:

- a list of Cost Categories;
- a full set of CVRs used;
- all increment specific fixed costs;
- a mapping of F8 code to Cost Categories;
- a mapping of Cost Categories to F8 codes;
- dependency group definitions.

2 LRIC Principles

2.1 LRIC Definitions

LRIC is the cost avoided through no longer providing the output of the defined increment, given that costs can be varied and that some level of output is already produced.

An **increment** is the output over which the costs are being measured, and theoretically there is no restriction on what products, services or outputs could collectively or individually form an increment. In extremis, the cost of providing an extra unit of output of a service will equal the marginal cost, whilst the incremental cost of providing the entire output of BT will equal the total cost of BT. More commonly, increments are related to the output of a discrete element as being the whole of a component, service or element of the network.

Incremental costs are the costs incurred through the provision of a defined increment of output given that some level of output (which may be zero) is already being produced. Equivalently, incremental costs can be defined as those costs that are avoided (i.e. saved) by not providing the increment of output.

The impact on the costs of no longer providing the defined increment is measured by taking a **long run** view. This allows all costs that do vary (even if only in the very long term) to adjust to the changes in output.

The LRIC methodology is applied only to network component costs, and is reported only for the activities within wholesale markets. The activities falling outside of the LRIC model are referred to within the LRIC structure as Retail & Other (R&O).

2.2 Cost Convention

It is possible to carry out LRIC calculations on either a "bottom up" or a "top down" basis. A "bottom up" approach requires assumptions on how an efficient operator would be structured and what types of costs this would lead to. A "top down" basis takes actual costs and applies a LRIC methodology; this is the method we use.

2.3 Stand Alone Cost and Fixed Common Costs

Whereas LRIC calculates the additional cost of producing an increment, given that some level of output is produced, the **Stand Alone Cost** (SAC) captures all costs of producing an increment independently from any other increments.

The difference between the LRIC and SAC of an increment is the **fixed common costs** associated with the increment under consideration and one or more other increments. Fixed common costs are the fixed costs, which are common to two or more increments, which cannot be avoided except by the closure of all the activities to which they are common.

2.4 Cost Volume Relationships

In simple terms, a **cost volume relationship** is a curve which describes how costs change as the volume of the **cost driver** changes. The costs associated with an increment can, either:

- Variable with respect to an increment being measured or
- Fixed but increment specific.

The cost volume relationship can be mapped with cost driver volumes on the X-axis and the costs caused by the cost driver on the Y-axis.

An example of a CVR is shown below in the figure below:

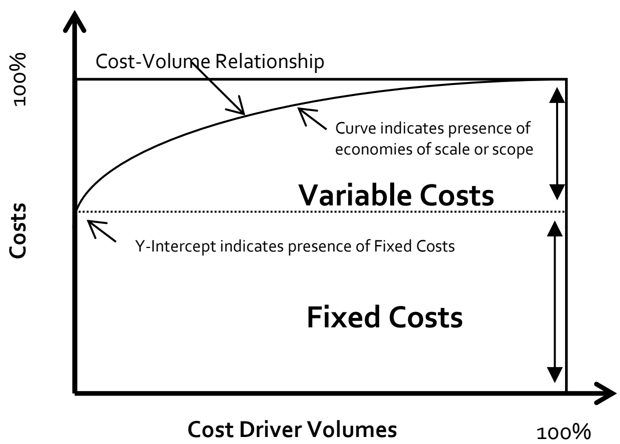


Figure 2.1 Diagram of a cost volume relationship (Example of one type)

LRIC Model: Relationships & Parameters

A number of different CVR shapes are possible depending on the relationship between costs and volumes for different cost types. Examples of the different CVR shapes used are provided in Annex 2.

A cost driver is the factor or event which causes a cost to be incurred. Cost driver volumes are the measure of the factors or events which cause a cost to be incurred. The cost driver for each **cost category** is identified and must be measurable, either directly or indirectly. For example the cost driver affecting the cost of motor vehicles could be the number of motor vehicles owned. A cost category is a grouping of costs into unique **cost labels** by identical cost driver.

The aim of building a cost volume relationship is to be able to demonstrate how costs change as the volume of the cost driver varies. This can be mapped in a two dimensional diagram (see Figure 2.1) with cost driver volume along the X-axis (e.g. the number of motor vehicles) and cost along the Y-axis (e.g. the cumulative spend for each number of vehicles), and a curve which maps the two axes together. The result of the construction of a cost volume relationship is a curve showing the behaviour of the variable cost, with the intercept on the Y-axis showing the level of fixed costs.

In the diagram shown in Figure 2.1, the intercept on the Y-axis represents the fixed costs, and the slope of the cost volume relationship indicates the extent to which **economies of scale or scope** are present. If the cost volume relationship is not linear, it indicates that these economies increase with volume.

In the absence of any fixed common costs, a fully allocated cost system adopting the same cost causality based apportionment would produce the same numbers as LRIC. This is because, in the absence of economies of scope or scale, FAC and LRIC will be the same.

However, when economies of scope or scale are present, FAC and LRIC are not equal. A cost volume relationship is then required to calculate the LRIC.

There are many cost drivers, each with their own cost volume relationship. CVRs are developed for every category of cost and these are discussed further in Chapter 4 CVRs.

3 LRIC Calculation

This chapter explains in detail the calculations within the LRIC model. It also describes the mechanics and processes by which the model inputs are used to calculate LRIC and Stand Alone Costs (SAC). The method for the calculation of LRIC is the same, irrespective of the increment being measured.

This chapter covers the following areas:

- Inputs to the LRIC model
- LRIC calculation process
- Cost Category dependencies (independent and cost-weighted dependent Cost Categories)
- Calculation of the SAC of increments

3.1 Inputs into the model

The LRIC Model requires six key inputs:

- the BT Group Current Cost Accounting (CCA) Fully Allocated Costs (FAC) analysed into Cost Categories;
- the CVRs;
- the cost driver volumes;
- the Cost Category to CVR dependency linkages;
- the increments to be measured
- any assumptions.

These are each described in detail below.

3.1.1 The BT Group CCA FAC analysed into Cost Categories

The LRIC model uses BT's Current Cost Accounting Fully Allocated Costs (CCA FACs) from our REFINE costing system. These costs are consolidated into groups ("Cost Categories") of similar cost type and identical cost drivers. The Cost Categories are listed in Annex 1 and the mappings of Cost Categories to summarised general ledger codes (called "F8 codes") are listed in Annex 5. Each cost category contains costs from one or more super components. More detailed information on BT's CCA FAC methodologies (including our CCA detailed valuation methodologies) is contained in BT's Accounting Methodologies Document (AMD).

In Annex 5 we explain that we map F8 codes to LRIC cost categories based on specific system markers (known as CID markers). However, in a small number of instances we make adjustments to these automatic pointings. Most of these adjustments relate to capitalisation adjustments. BT makes these adjustments to reflect that some pay and non-pay spend is related to capital projects, and therefore should be recorded as assets rather than being expensed in the year. The capitalisation adjustments may appear on different LRIC cost categories than the original pay and non-pay spend to which they relate. Where this is the case, we repoint the costs to ensure the costs and the capitalisation adjustment are matched, thereby ensuring consistent treatment in the LRIC model. We made a number of adjustments to these automatic pointings, which we describe in Chapter 6.

3.1.2 The CVRs

The CVRs used within the LRIC model are listed in Annex 2.

A CVR describes how costs change as the volume of its cost driver changes. The costs can be directly attributable to an increment being measured, a direct variable cost or direct fixed costs, or can span several increments such as those costs that include fixed common costs. The relationship can be mapped with cost driver volumes on the X-axis and costs on the Y-axis.

In the diagram below, the intercept on the Y-axis represents the fixed costs, and the slope of the CVR indicates the extent to which economies of scale or scope are present. If the CVR is not linear, it indicates that these economies are increasing with volume.

In the absence of any economies of scope (i.e. fixed common costs) or economies of scale (i.e. declining marginal costs) an accounting system based on the principle of cost causality could be relied upon to calculate LRIC. This is because, in the absence of economies of scope or scale, FAC and LRIC will be the same.

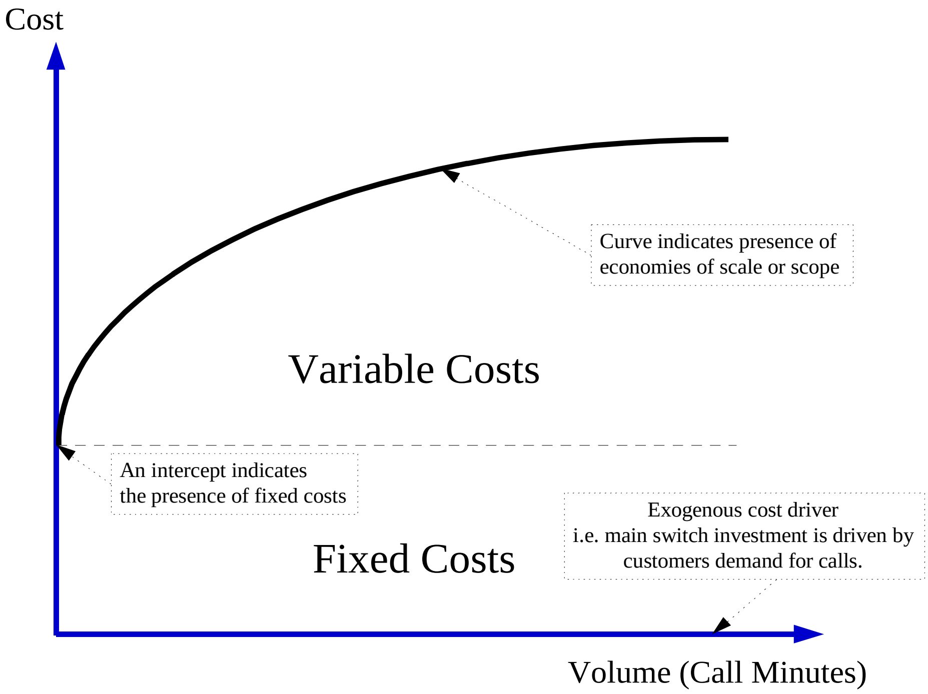


Figure 3.1 Diagram showing an independent Cost Category with its cost driver

An example of an independent CVR is Main Switch Investment. The investment in main switches is driven directly by customers' demand for calls, which is exogenous to the model.

The mapping of CVRs to Cost Categories can be one-to-one or one-to-many, as several Cost Categories may share an identical cost driver and an identical CVR. However, a CVR can only be shared by Cost Categories where the cost causality for each Cost Category is identical.

There are three elements to the cost volume data:

- The shape of the CVR describes how costs change with the level of the cost driver volume;
- The increment specific fixed costs are defined exceptionally where an element of fixed costs can be uniquely associated with an increment independent of other increments. The percentage of the cost that is increment specific is entered against the CVR and the increment to which it refers; and
- An explanation of how the CVR is derived.

3.1.3 The cost driver volumes

Each increment to be measured has an associated cost driver volume. The model determines by how much the cost driver volume falls if the increment is no longer provided. The model then uses the CVR to calculate how much cost is avoided if the increment is no longer provided. In practice the model uses cost outputs from REFINE as a proxy for the underlying cost driver volumes. This is because the REFINE system allocates costs to activities through the use of cost drivers so REFINE costs provide information as to the relative proportions of each cost driver volume associated with an increment.

3.1.4 The Cost Category to cost volume dependency linkages

3.1.4.1 Types of CVR dependency linkages

Cost volume dependency linkages show how cost drivers of some cost categories link to exogenous volumes and thereby use independent cost volume relationships. Other cost categories use cost driver volumes dependent on the cost output of one or more cost volume relationships and are thereby dependent. Worked examples of each of these dependency linkages are provided in Chapter 3.3.

Cost drivers can be categorised as:

- **Independent** These are cost drivers which are directly related to the external demand for an activity, i.e. they are not dependent on any other cost volume relationships. An example of an **independent cost category** linkage is fixed assets, network power.
- **Dependent** These **cost-weighted dependent** cost drivers are used when there is not a constant relationship between demand and the cost driver. A cost-weighted dependent cost driver uses the same cost volume relationship as the cost category, or cost categories on which it depends. Where it depends on more than one cost category, the cost-weighted dependency derives the average aggregate cost-volume relationship for those cost categories by weighting their incremental costs.

3.1.4.2 Ordering of cost category to cost volume linkages

The modelling process is sequential. For each cost category, incremental cost reductions are calculated by reference to the cost volume relationships and the analysis of cost driver volumes. The processing sequence is determined by the dependencies defined: independent cost categories are processed first; thereafter, the hierarchy of dependencies is followed. Figure 3.2 illustrates the sequence.

The model internalises inter-relationships so that incremental changes in one cost category are "rippled" through into others through defined linkages. The processing order is shown below. Detailed examples of the dependency linkages are described in the R&P.

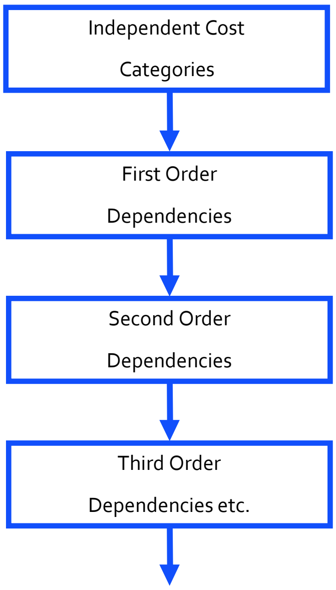


Figure 3.2 Processing Order through Model

The model avoids circular relationships by generating an order in which to process the cost categories so that any circular linkages are not fed back into the model. The number of potential circularities is minimised and those remaining after this process are removed by breaking the link. For more detail on the circular relationships refer to Chapter 3.3 below. The links between Cost Categories and their cost drivers, and the Cost Categories that make up each of the cost drivers are listed in Annex 1.

3.1.5 The increments to be measured

The diagram below shows the increments that are to be modelled. The boxes above the dotted line represent the main increments to be measured. The circles represent where those main increments are analysed further into smaller increments. The shaded boxes below the dotted line represent the areas where Fixed Common Costs exist across increments. The shaded boxes are shown spanning the increments to which they relate.

LRIC Model: Relationships & Parameters

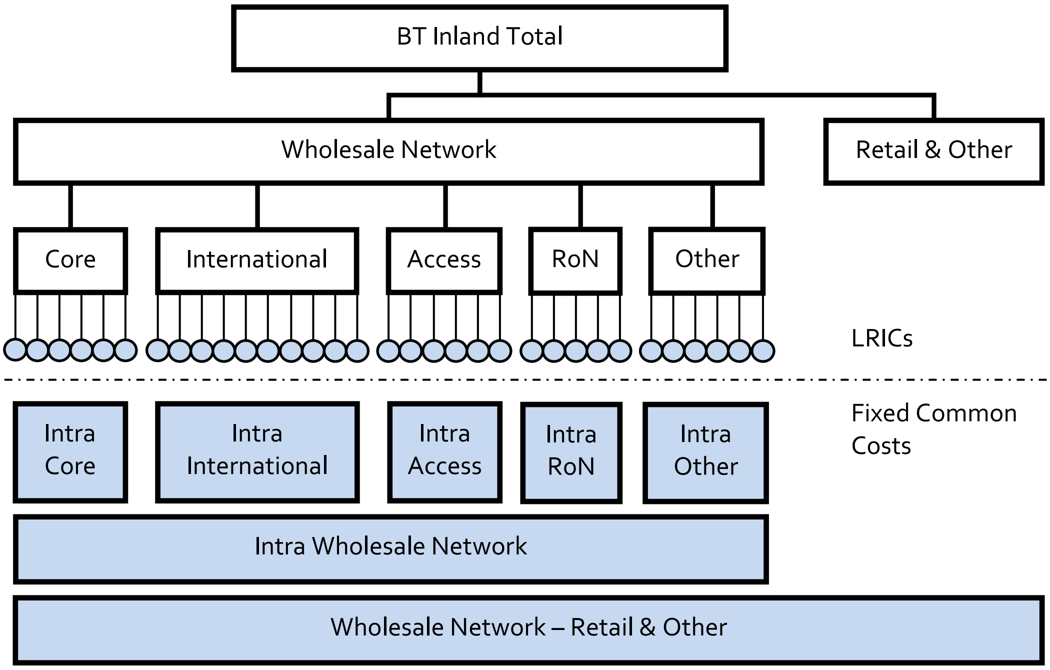


Figure 3.3 Increments to be modelled

Our approach to modelling LRIC is a top-down approach that takes as a starting point the incurred cost that arises out of our activities. This methodology applies to the modelling of the LRIC of our network activities within the Wholesale Network Business. A description of each of the increments is set out below.

Retail and Other (R&O)

The LRIC model focuses on the increments within Wholesale Network. In order to identify Fixed Common Costs between Wholesale Network and Retail and Other it is necessary to identify the latter as a separate increment.

Wholesale Network

The Wholesale Network increment comprises the Core, Access, International, Rest of Network and Other increments.

- **Core:** The Core increment comprises the network components required to provide: traditional leased lines (including the local ends); Ethernet leased lines (including the local ends but excluding 21st Century Network); and call conveyance (including interconnect circuits). For the purpose of calculating LRIC and Stand Alone Costs, Core is treated as a single increment within the model
- **Access:** The Access increment comprises principally the local loop network connecting customers to a local exchange using a copper line (except for private circuits). This includes any element of the local exchange that is provided for the connection of such customers. For the purpose of calculating LRIC and SACs, Access is treated as a single increment within the model.
- **Rest of Network:** This increment includes the network components for Operator Assistance, Payphones, Intelligent Network (IN), Carrier Price Select (CPS) and 21st Century Network and Broadband (except for copper access).
- **International:** This increment comprises the International Subsea Cables (ISC) to Frontier Links and International Private Leased Circuits.
- **Other:** This comprises a range of components including Service Centres, SG&A and Managed Services.

3.1.6 Assumptions

Certain assumptions are made which assist in the construction of the LRIC Model.

Scorched Node: BT maintains its existing geographical coverage in terms of customer access and connectivity between customers, and provides the infrastructure to do this from existing network nodes.

Thinning: It is assumed that existing transmission routes are required to provide connectivity between network nodes independent of the scale of activity. The amount and type of equipment housed in transmission routes will alter with the scale of activity.

Service: Existing levels of quality of service are maintained.

Constant mix assumption: The mix of demand characteristics, which impact on the volume axis of a cost function, is assumed to be constant with respect to scale. For example, the average call duration is assumed to be the same irrespective of the number of calls passing over the network.

Our network topology assumptions affect parts of our network differently. For example, where the number of customers in the local loop is reduced, it is assumed that there is no consequential impact on the volume of call minutes carried within Core. This is because our access customers are assumed to become the access customers of other communications providers who, for the purpose of the model, are assumed to route their calls over our network. Similarly, when looking at scenarios within Core, it is assumed that as the customer numbers fall, the calls routed over our network fall.

3.1.7 LRIC model input process

Of the six inputs into the model, two are combined, namely the BT costs analysed into Cost Categories and the associated cost driver volumes as they are entered into the model.

Where a cost has been apportioned across several increments by the CCA Accounting Separation (REFINE) system, it is possible to use the relative proportions of these costs to reflect the relative volumes of the underlying cost drivers associated with those activities. Taking the costs and cost driver volumes in this format simplifies the inputs into the model and guarantees consistency of costs and cost driver volumes between REFINE and the LRIC Model. The unshaded boxes as shown in *Figure 3.4* represent the inputs.

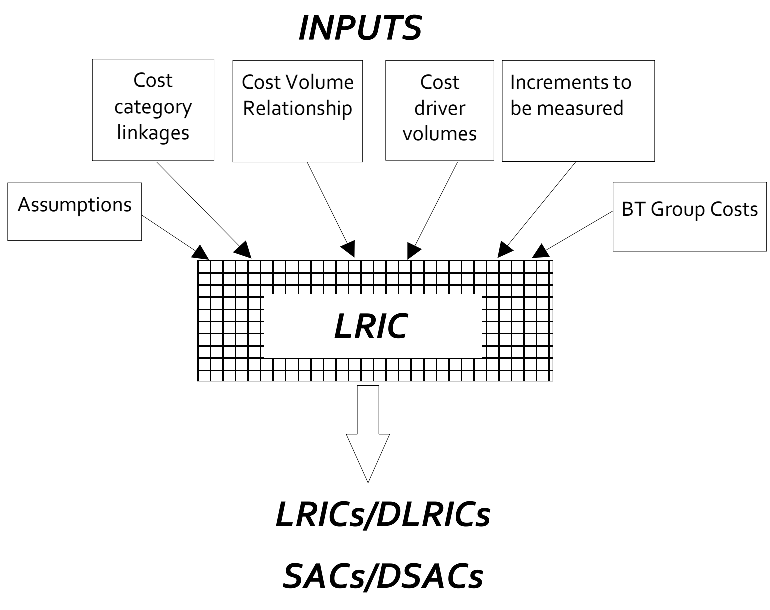


Figure 3.4 Inputs into BT's LRIC Model

3.1.8 LRIC model processing

The stages of processing are shown in the diagram in Figure 3.5 below and are repeated for each increment:

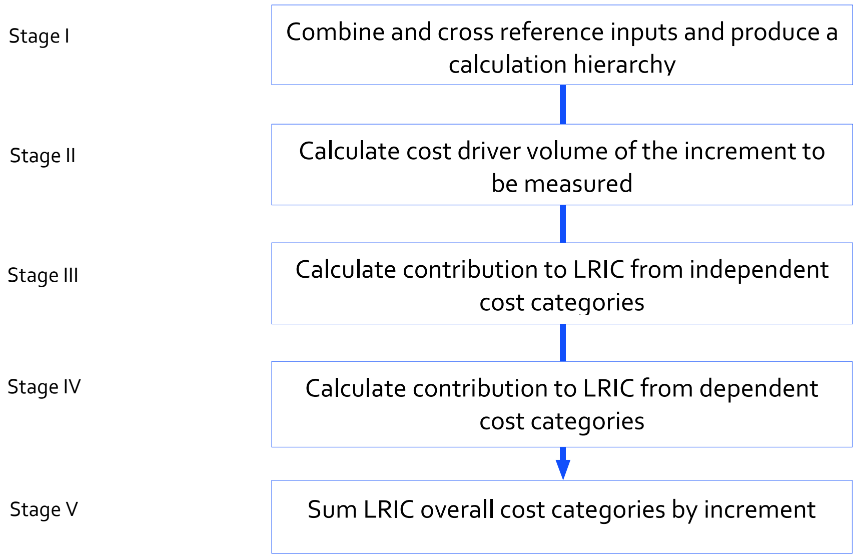


Figure 3.5 Flow diagram of inputs through the model to calculate LRIC

The data inputs are loaded and the model then generates an order in which to process the cost categories starting with **independent cost categories** and subsequently building the **dependent cost categories** on to these.

The LRIC of an increment is calculated by deducting the cost driver volume of the increment being measured from the cost driver volume of the whole of BT. By sliding down the cost volume relationship curve to this lower volume, the model calculates by how much costs would fall if this increment was no longer provided, which is the LRIC calculation.

Once all the cost categories have been processed, the LRIC is summed overall cost categories for an increment to produce the total LRIC of an increment.

3.2 Processing of costs

Having loaded the inputs into the model, the next step is to consider the processes that occur within the model. The processes within the model are described as stages i to v in the flow diagram *Figure 3.6*.

Stage iii addresses the detailed calculation of LRIC and is broken down further into detailed steps.

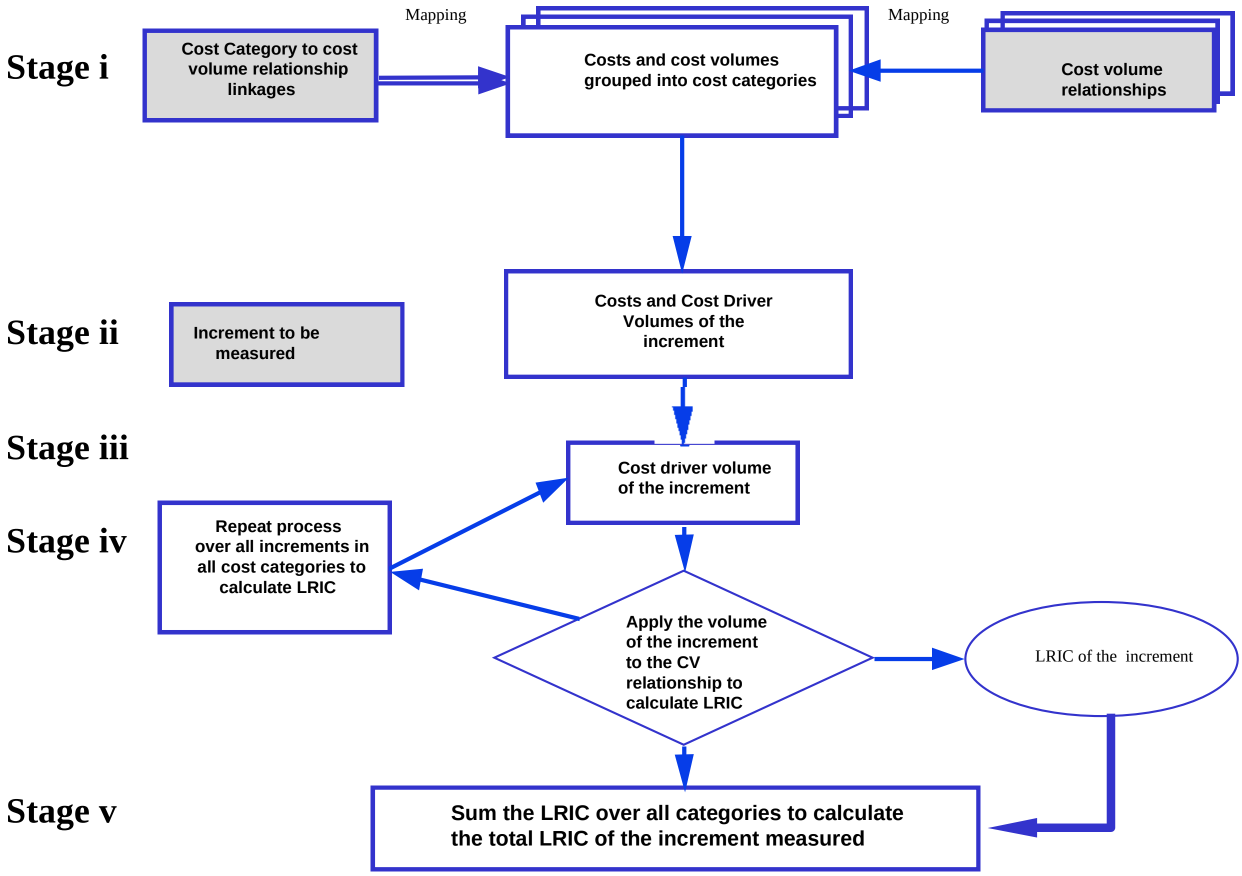


Figure 3.6 a flow diagram of inputs through the model to calculate LRIC

The calculation of LRIC itself can start from any reference point. This point is currently defined as the whole of BT (BT Total). The LRICs of increments within BT Total are calculated by deducting the cost driver volume of the increment being measured from the cost driver volume of BT Total. By sliding down the CVR curve to this lower volume, the model calculates by how much costs would fall if this increment was no longer provided, which is the definition of LRIC.

The logical steps in this process are:

Stage i

Mapping of Cost Categories to CVRs and to dependency linkages

The LRIC Model has the functionality to enable it to maintain full and accurate cross-referencing within the model as the data has been entered with a common unique identifier of the Cost Category label, the model references through to other inputs that are linked to this identifier.

Independent Cost Categories, which already contain cost driver volumes and total cost, each map to a CVR. When the model calculates the LRIC of the independent Cost Categories, it references the CVR that relates the cost driver volumes to the costs.

Dependent Cost Categories are calculated by the use of lower level (depended upon) cost categories. The model uses the hierarchy starting with the independent categories, then the first-order dependencies, then second-order dependencies and so on until all the Cost Categories are sequenced in an order which allows for complex indirect linkages.

However, the model does not allow for any circularity of dependencies. We believe this is not a serious defect given the hierarchical structure that is incorporated. For example, motor transport comes at the end of the dependency order and hence incorporates in its cost driver volume the changes in pay not only from independent relationships (e.g. local exchange pay), but also the previous hierarchy of dependent relationships (e.g. computing pay). The impact of changes in motor transport pay is ignored when the LRIC of motor transport is calculated.

Stage ii

Calculation of the cost driver volumes of the increment

Having generated a calculation order, the model then calculates the LRIC for each increment within BT Total. The model can calculate the LRIC for any increment so long as the cost driver volume can be measured. The cost driver for each Cost Category is shown on the appropriate CVR in Annex 2.

Stage iii

Calculation of the contribution to LRIC for an independent Cost Category

The contribution to the LRIC of an increment within a Cost Category is calculated as the effect on the Cost Category of deducting the cost driver volume associated with the increment from the volume comprising BT Total. The model uses the CVR associated with the Cost Category to determine by how much the cost will fall if a given increment is removed.

The flow chart in *Figure 3.7* describes the steps to calculate LRIC for those Cost Categories where the cost driver is independent.

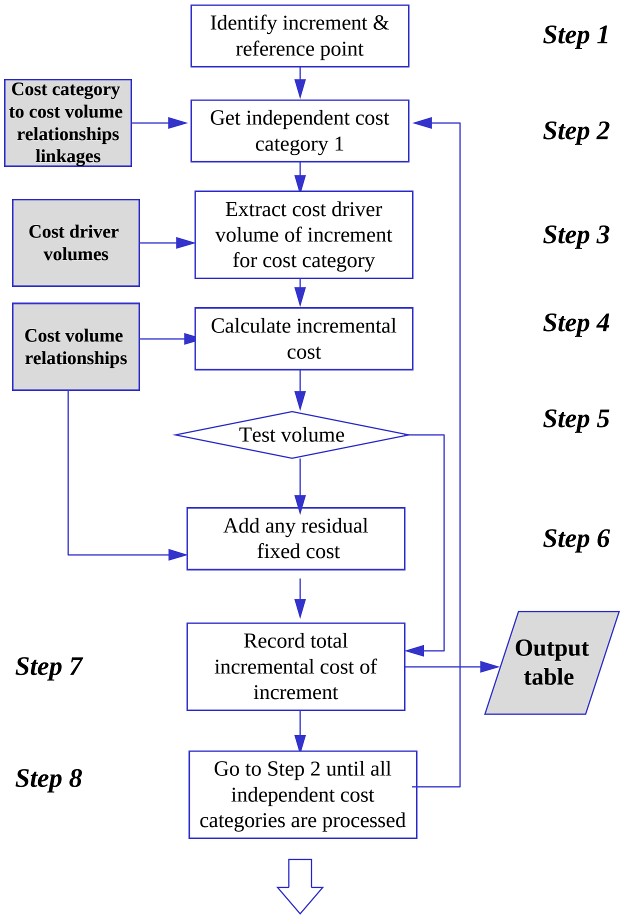


Figure 3.7 Calculation of the LRIC of an independent Cost Category

Steps 1 to 8 represent the process by which LRIC is calculated within Stage iii as follows:

Step 1

Identify the cost driver volumes associated with each increment for each Cost Category. The cost driver volume of BT Total is used as the reference point from which the LRIC of all other increments is measured.

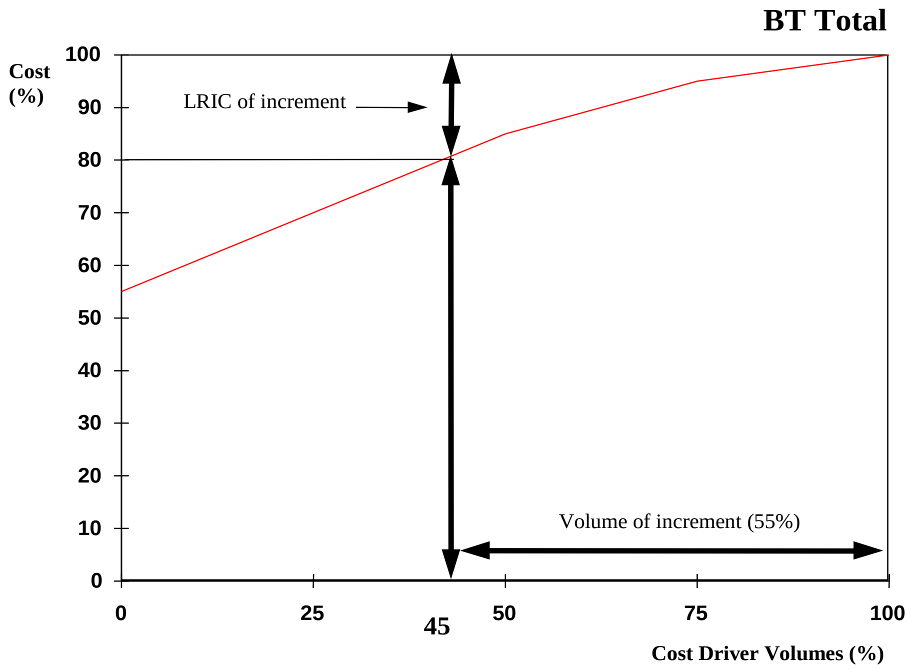
Step 2

Having defined the increment and reference point, the LRIC of each independent Cost Category is calculated. The processing sequence for independent Cost Categories is irrelevant, however these Cost Categories must be calculated before the dependent Cost Categories. At this stage a single Cost Category, defined and marked as independent, is selected.

Step 3

The cost driver volume associated with the Cost Category is extracted to identify the volume reduction associated with the defined increment. For example in *Figure 3.8*, we have assumed an increment that has 55% of the cost driver volume.

Figure 3.8 Example of CVR



Because the CVRs are expressed as curves constructed from a finite number of data points (x, y co-ordinates), there will usually be a need to interpolate between data points to calculate the appropriate LRIC.

Step 4

The calculation of LRIC of an increment.

The interpolation takes the x-axis value of the cost driver volume being measured and finds the two co-ordinates either side of that x-axis value. The decrease in cost from the higher data point is calculated by multiplying the gradient between the two data points by the difference between the cost driver volume being measured and the higher data point.

The calculations involved are illustrated in *Table 3.1* below with two detailed examples of how LRIC is calculated.

Cost Volume Relationship

Volume	0%	25%	50%	75%	100%
Cost	55%	70%	85%	95%	100%
Gradient	0.60	0.60	0.40	0.20	

	Vol (%)	Cost (%)	Cost (£)
Total cost		100%	£1,750
BT Total volume	100%		
Volume of increment	55%		
Volume of remainder	45%		
Calculation of cost of remainder		82%	
Incremental variable cost (Total - remainder)		18%	
Increment Specific Fixed Cost		0%	
Incremental cost		18%	**£315.00**

Table 3.1 Calculation of LRIC for The Rest and an increment

In this example, five data points define the cost volume relation at 25% intervals of the cost driver volume. The total cost of the Cost Category is £1,750, of which 55% is fixed.

The table shows how the LRIC of an increment is calculated and illustrates Step 4 of the calculation as described below.

LRIC for an increment of 55% is calculated by:

(i) Determining where on the curve the incremental cost driver volume lies.

This is defined as:

Volume of remainder = BT Total volume (100%) - Volume of increment

(ii) Interpolating between the two co-ordinates of the CVR which are either side of the volume of the remainder to find the cost of the remainder.

Remainder cost % = Cost at next highest point - (gradient x (volume change))

= 85% - (0.6 x (50-45))

= 82%

(iii) Subtracting the cost of the remainder from BT Total as:

Variable incremental cost = Cost of BT Total - Cost of remainder

= (100% - 82%)

= 18%

(iv) Checking for any Increment Specific Fixed Costs (ISFCs). If there are any ISFCs, these are added to the variable incremental cost to calculate LRIC in percentage.

(v) Multiplying LRIC by the total cost to get LRIC in pounds of the increment

£1,750 x 18% = £315

Step 5

The defined increment is tested to establish if the defined increment exhausts the total cost driver volume. If the defined increment exhausts the cost driver volume, then go to Step 6, otherwise go to Step 7.

It is possible that there are instances where there are two increments accounting for the total volume of a Cost Category, one using 99.9999% of the cost driver volume and the other 0.0001%. In such instances, the volume of the former cost driver will not exhaust the total cost driver usage, and therefore not take any of the fixed costs. This is clearly not a sensible outcome, and for pragmatic reasons, the cut-off point whether to include the fixed common cost within the LRIC of the larger increment is set at 99%.

Step 6

In many situations, the incremental volume of the cost driver will fully exhaust the total volume of the cost driver. In these cases, any fixed costs remaining (excluding the ISFC) of the Cost Category will be added in to the LRIC of the increment.

Step 7

The LRIC of the Cost Category and defined increment from either Step 5 or 6, as appropriate, is recorded in an output table.

Step 8

The whole process from Step 1 through to Step 8 is re-performed for all remaining independent Cost Categories.

Stage iv

Repeat LRIC Calculation for each increment within the dependent Cost Categories

In Stage i, the model identified a calculation order for the dependencies.

Once the LRIC for the independent Cost Categories has been calculated in Stage iii, the model can process the LRIC of first-order dependencies, i.e. those Cost Categories whose cost driver is the LRIC output of one or more independent Cost Categories. This is repeated until the LRIC for all the first-order dependencies have been calculated.

Similarly, after all the first-order dependencies have been calculated, the model calculates the LRIC of second-order dependencies. All the LRIC calculations are repeated until the LRIC for all the second-order dependencies have been calculated. The model then turns to the third-order dependencies and this process continues until all the dependencies have been calculated.

Stage v

Sum the LRIC over all categories to calculate the LRIC per increment

Once the contribution to LRIC from all of the Cost Categories has been calculated, these can be summed to give total LRIC for the increment being measured. This process is repeated for each increment.

Note: LRIC includes both the operating costs and the cost of capital which is calculated by multiplying the relevant mean capital employed by the relevant cost of capital.

3.3 Cost Category Dependencies

An illustration of the way in which the model processes dependent cost categories is shown in *Figure 3.9*.

The model structures the sequence of calculations by creating a dependency order. The dependency order lists the Cost Categories in the order in which they need to be calculated. Taking *Figure 3.9*, the model would calculate the LRIC of A and B in the first pass through the model, then C in the second pass and then D in the third and final pass to enable the cost drivers to 'ripple' down through the model.

The model calculates the dependency ordering based on the dependency linkages, before LRIC is calculated.

A strength of the rule ordering function of the model is its capacity to avoid circular references. It is possible that in specifying the links between Cost Categories that a circular reference could have been introduced. Taking *Figure 3.10*, for activities E to G, there is a circular reference as E depends on external drivers and G, and G depends on F which depends on E. The rule order generated is fixed for all increments in the model, for one specific run.

The only way to remove circular references is to reduce the linkages between the Cost Categories. The model avoids circular references by rejecting the Cost Categories which cause the circular references in order of cost size, thereby keeping as much of the richness of the cost volume data as possible. In *Figure 3.10*, the model would remove the smallest link that is causing the circularity, say the link between E and G.

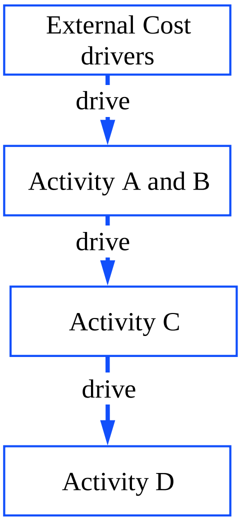


Figure 3.9 Hierarchy with no circularities

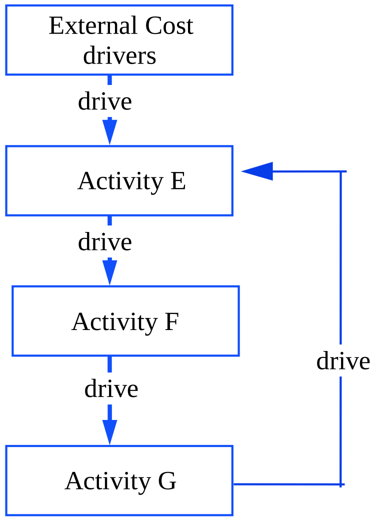


Figure 3.10 Hierarchy with circularities

The independent Cost Categories are driven by the external cost drivers. First-order dependencies are those dependent Cost Categories whose cost driver is the output from one or more independent Cost Categories. Accordingly, once the independents cost categories have been calculated, the model can then calculate the first-order dependencies.

After the first-order dependencies there are second-order dependencies, whose cost driver is the output from one or more first-order dependencies, which can then be calculated. This process continues until the entire cost driver volumes have been "rippled" through the hierarchy of dependencies.

3.3.1 Dependent Cost Categories - first-order dependencies

The processing sequence for first-order dependencies of the cost-weighted dependent cost categories use the LRICs and FACs of the cost categories on which the dependent cost categories depends. As for independent Cost Categories, the process continues until all first-order dependent Cost Categories have been processed. The calculations of first-order dependent Cost Categories are appended to the output table.

3.3.2 Dependent Cost Categories - second-order dependencies

Once the calculation of LRIC for first-order dependencies is completed the whole process begins again, this time processing second-order dependencies. Second-order-dependencies are those Cost Categories that depend on the calculations of independent and/or first-order dependencies.

The calculation of LRIC will be appended to the output table. The same process is then re-performed until the hierarchy of dependencies is exhausted.

3.3.3 Cost-weighted dependency

Cost-weighted dependent Cost Categories use CVRs derived from the weighted incremental costs of their cost drivers.

Cost-weighted dependent Cost Categories use implied CVRs derived from the weighted incremental costs of the cost categories on which they depend. They exist because there are cases where the costs being incurred are driven by multiple factors. For example total Maintenance Pay (a single cost category) depends on the maintenance costs associated with a range of products and services. The cost-weighted dependency uses a CVR identical to that of the Cost Category, or Cost Categories, on which it depends. Where a cost-weighted dependent Cost Category depends on many Cost Categories, the cost-weighted dependency derives the average aggregate CVR over the many Cost Categories. The use of the same CVR ensures that a cost-weighted dependent Cost Category's costs are allocated in the same proportion as the category or categories on which it depends.

The derivation of the CVR is explained in more detail in *Figure 3.11*. The top chart contains a CVR for an independent Cost Category where the LRIC is A and the fully allocated cost is B for increment i. By applying the ratio of A to B to the cost-weighted dependent for the same increment, it is possible to calculate the contribution to LRIC and the implicit CVR of the cost-weighted dependent. The CVR for the cost-weighted dependent is represented as the dashed line in the bottom chart.

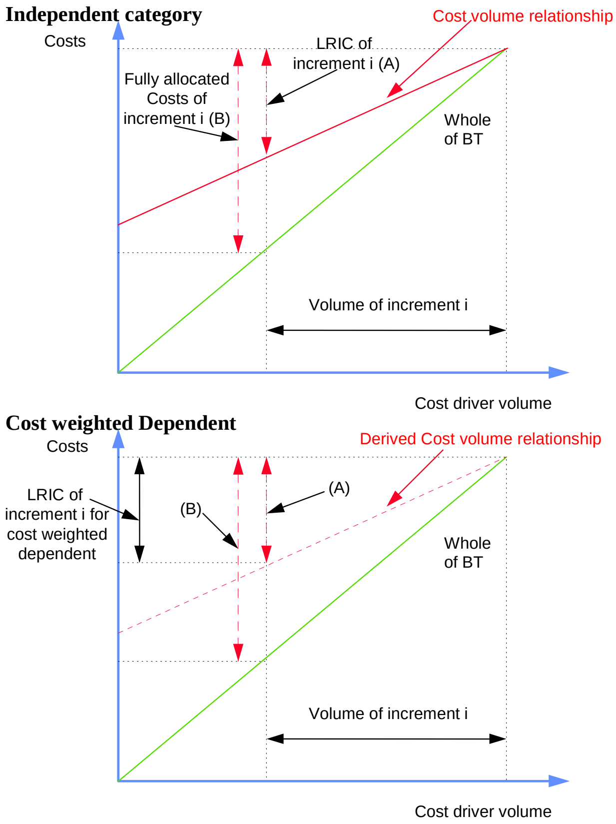


Figure 3.11 Diagram detailing the derivation of the CV for a cost-weighted dependency

An example of a cost weighted dependency calculation is given in Chapter 5.3.

3.4 Stand Alone Cost (SAC), Distributed LRIC (DLRIC) and Distributed Stand Alone Cost (DSAC)

The SAC of an activity or subset of activities is the cost incurred in providing that activity or activities of services by itself. The SAC will include all variable and fixed costs of that activity or subset of activities along with the associated fixed common costs associated with that activity or subset of activities.

Following this through the calculation stages above, each stage would be identical until Stage ii, where the cost driver volume being measured is the volume of the increment being measured but from the origin, and not from BT Total.

Stage iii would be unchanged except for the measurement point.

LRIC Model: Relationships & Parameters

An illustrative example of the calculation of LRIC and Stand Alone Costs (SACs) is set out below. Consider three products A, B and C with the fixed common costs spanning the products as shown in Figure 3.12 below.

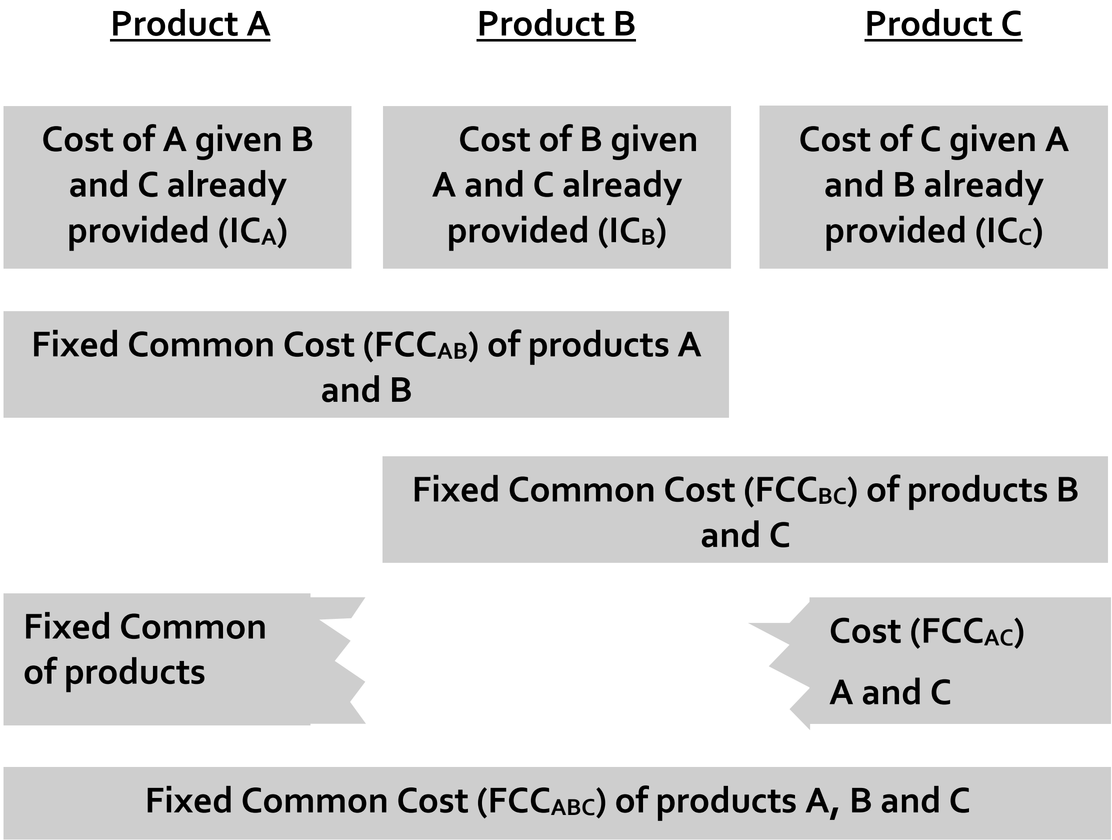


Figure 3.12 Example of Fixed Common Costs

The additional costs incurred in providing the products A, B or C is the cost of providing one of the products, given that the other two are already produced, represented by IC_A, IC_B and IC_C respectively. FCC_{AB} is the fixed common costs spanning products A and B, FCC_{BC} is the fixed common costs spanning products B and C, FCC_{AC} is the fixed common costs spanning products A and C and FCC_{ABC} is the fixed common costs spanning all three products.

The LRIC of product A is the cost of producing A given that products B and C are already provided, which is the cost represented by IC_A.

The SAC of a product is the total cost of production given that no other product is provided. The SAC of product A is therefore the cost of producing A alone. It is necessary to incur the fixed common costs between A and the other products, as without these inputs A would not be provided. Thus the SAC of product A is given by the sum of IC_A, FCC_{AB}, FCC_{AC} and FCC_{ABC}.

3.4.1 The calculation of SAC of an increment

We now consider the calculation of SAC for an increment of 55% as shown in the diagram below:

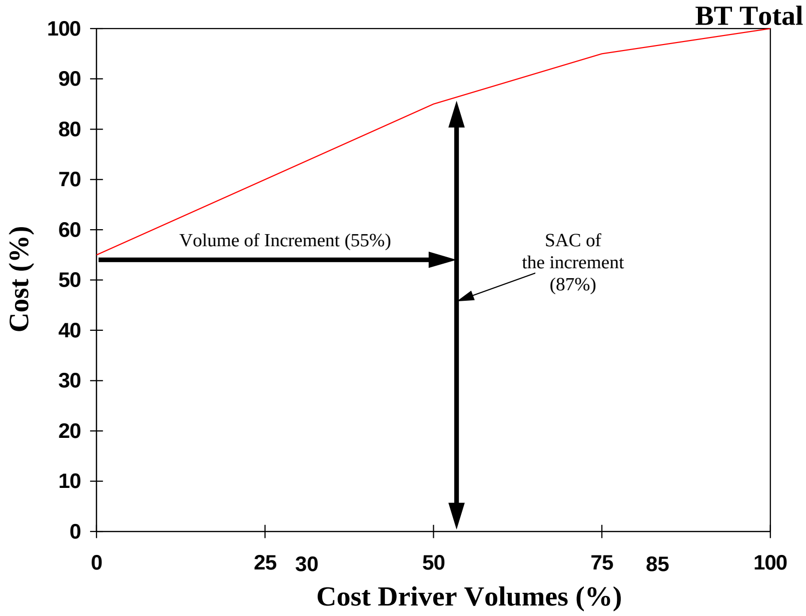


Figure 3.13 Illustration of worked example's calculation of SAC for an increment of 55%

The measurement in *Figure 3.13* differs from *Figure 3.8* in that the volume of the cost driver is measured from the left, with a start point of zero. Similarly the change in cost is measured from the start point of zero and not from the BT Total.

Using the data provided in *Table 3.1*:

CVR

Volume	0%		25%		50%		75%		100%
Cost	55%		70%		85%		95%		100%
Gradient		0.60		0.60		0.40		0.20	

(i) Determining where on the curve the cost driver volume lies.

This is defined as Volume of SAC increment, which is the volume of the increment measured from the origin, which is 55%.

(ii) Interpolating between the two co-ordinates of the CVR which are either side of the volume of the SAC increment to find the SAC cost.

SAC % = Cost at next highest point - (gradient x volume change)

= 95% - (0.4 x (75-55)) = 87%

(iii) Checking for any increment specific fixed costs.

If there are any ISFCs that do not relate to the SAC increment, these are subtracted from the SAC percentage.

(iv) Multiplying SAC % by the total cost to get SAC in pounds of the increment.

£1,750 x 87% = £1,522.50

3.4.2 The calculation of DLRIC

The DLRIC is derived by calculating the LRIC of Core in aggregate (and thus incorporating the intra core Fixed Common Costs) and distributing this total amongst the underlying components.

The diagram below shows the key increments to be measured and illustrates how DLRIC will be identified. The rectangular boxes above the dotted line represent the main increments to be measured. The circles represent where those main increments are analysed further into smaller increments. The shaded boxes below the dotted line represent the areas where fixed common costs exist across increments. The shaded boxes are shown spanning the increments to which they relate.

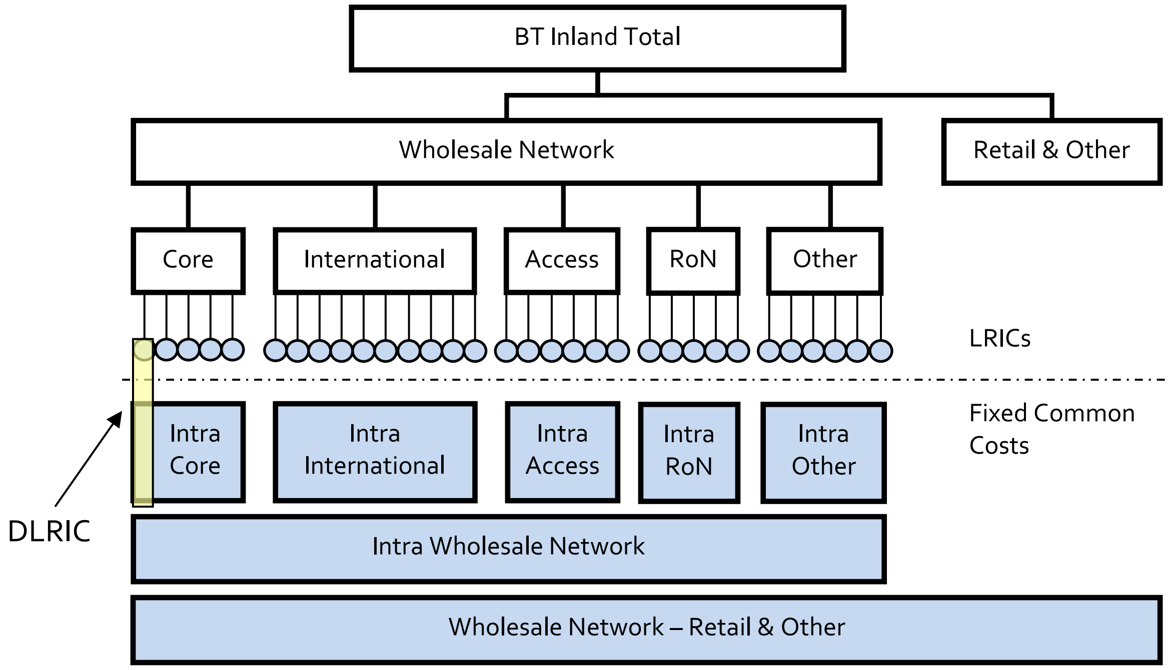


Figure 3.14 DLRIC Calculation

Figure 3.14 shows how the LRIC model calculates the DLRICs of the components within Core.

DLRIC calculations require a number of stages and these are as follows:

- First, the LRIC of Core is calculated by treating Core as a single increment.
- Then the LRICs of the network components comprising Core are calculated. The Intra-Core Fixed Common Costs are calculated as the difference between the LRIC of Core and the sum of the LRICs of the components within Core.
- The Intra-Core FCCs are then distributed to the components within Core on a Cost Category by Cost Category basis using an equal proportional mark-up. This method attributes the FCC to the relevant components in proportion to the amounts of the Cost Category included within the LRICs of each component.
- Finally the LRIC of each component is added to the distribution of the Intra Core FCC to give the resultant DLRICs.

3.4.3 The calculation of DSAC

A similar approach is taken with SACs in order to derive DSACs for individual components. The economic test for an unduly high price is that each service should be priced below its SAC. As with price floors this principle also applies to combinations of services. Complex combinatorial tests are avoided through the use of DSACs that reduce pricing freedom by lowering the maximum price that can be charged. This results in DSACs for individual components that are below their actual SACs.

SACs of two network elements are calculated; Core and Other Network components taken together. Where ceilings for individual components are needed, these SACs are "distributed" between the components comprising these increments.

3.4.3.1 Core

The SAC of the Core is calculated as a single figure and this control total is then apportioned to the underlying components. The SAC of Core will include not only elements of the Intra-Wholesale Network FCC but also those parts of the Wholesale Network-R&O FCC which straddle Core. This is shown in the diagram below.

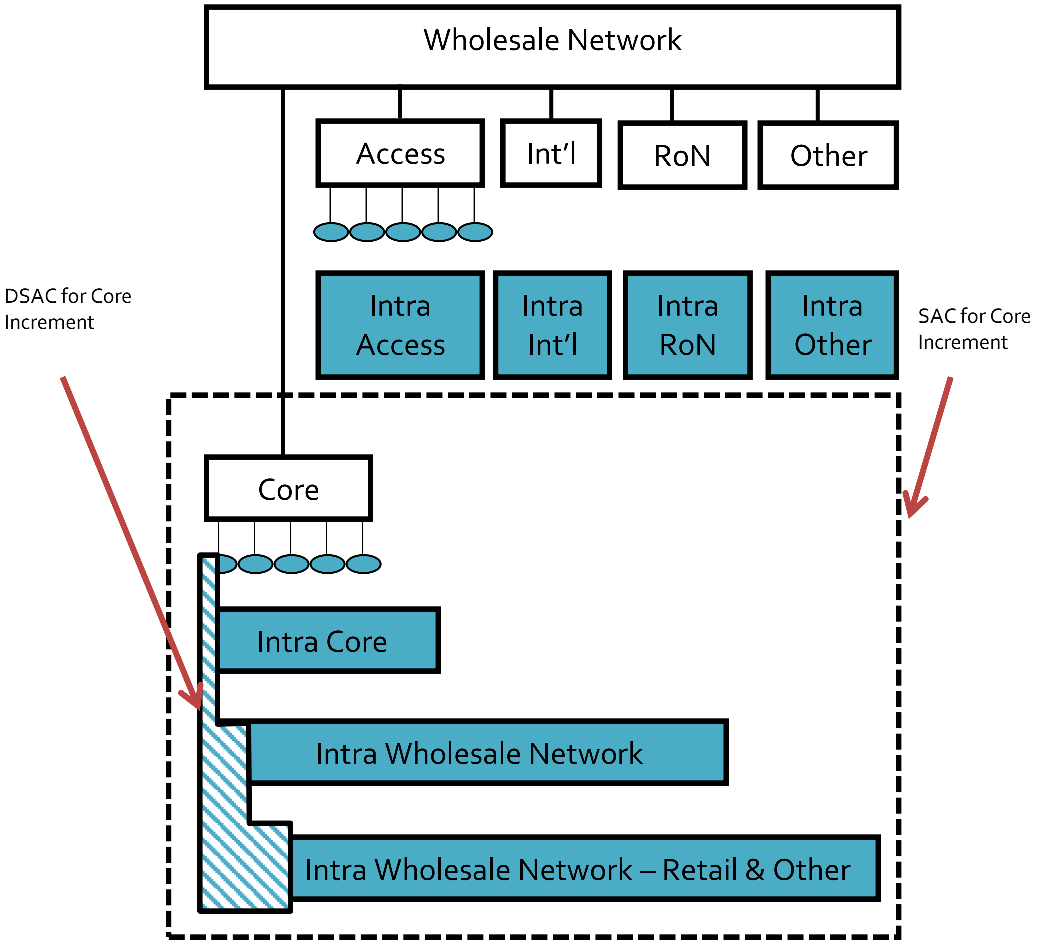


Figure 3.15 Distributed SAC of Core

The distribution of the Fixed Common Costs which are shared between Core and other increments are apportioned over the Core components using equal proportional mark-ups to derive DSACs. This method attributes the FCC to the components in proportion to the amounts of the Cost Category included within the LRIC of each component.

3.4.3.2 Access

The Stand Alone Cost of Access is calculated as a single figure and this control total is then apportioned to the underlying components. The SAC of Access will include not only elements of the Intra-Wholesale Network FCC but also those parts of Wholesale Network-R&O FCC which straddle Access. This is shown in the diagram below:

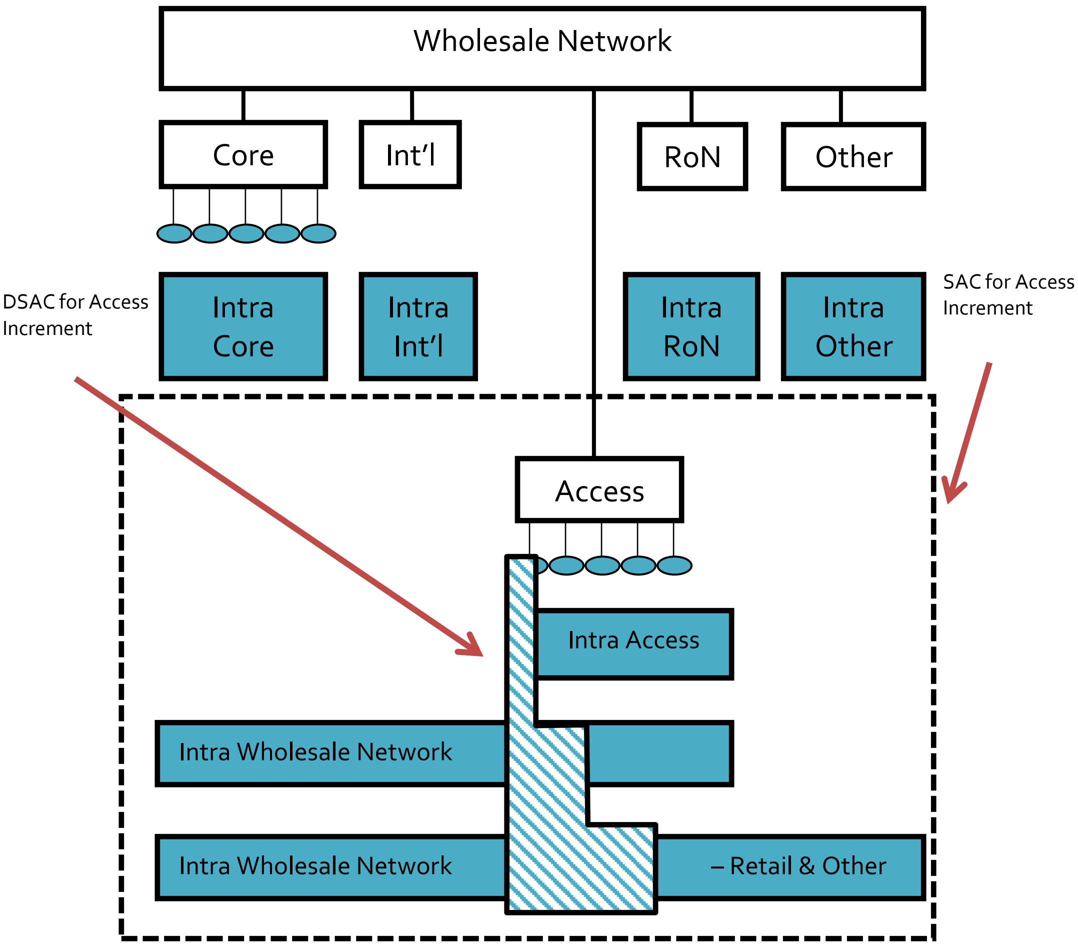


Figure 3.16 Distributed SAC of Access

3.4.3.3 Rest of Network Components

The SAC of Rest of Network Components will be calculated as a single figure. DSACs will be produced for the individual Rest of Network components, in the same way as DSACs are calculated for components within Core.

This is shown in the diagram below:

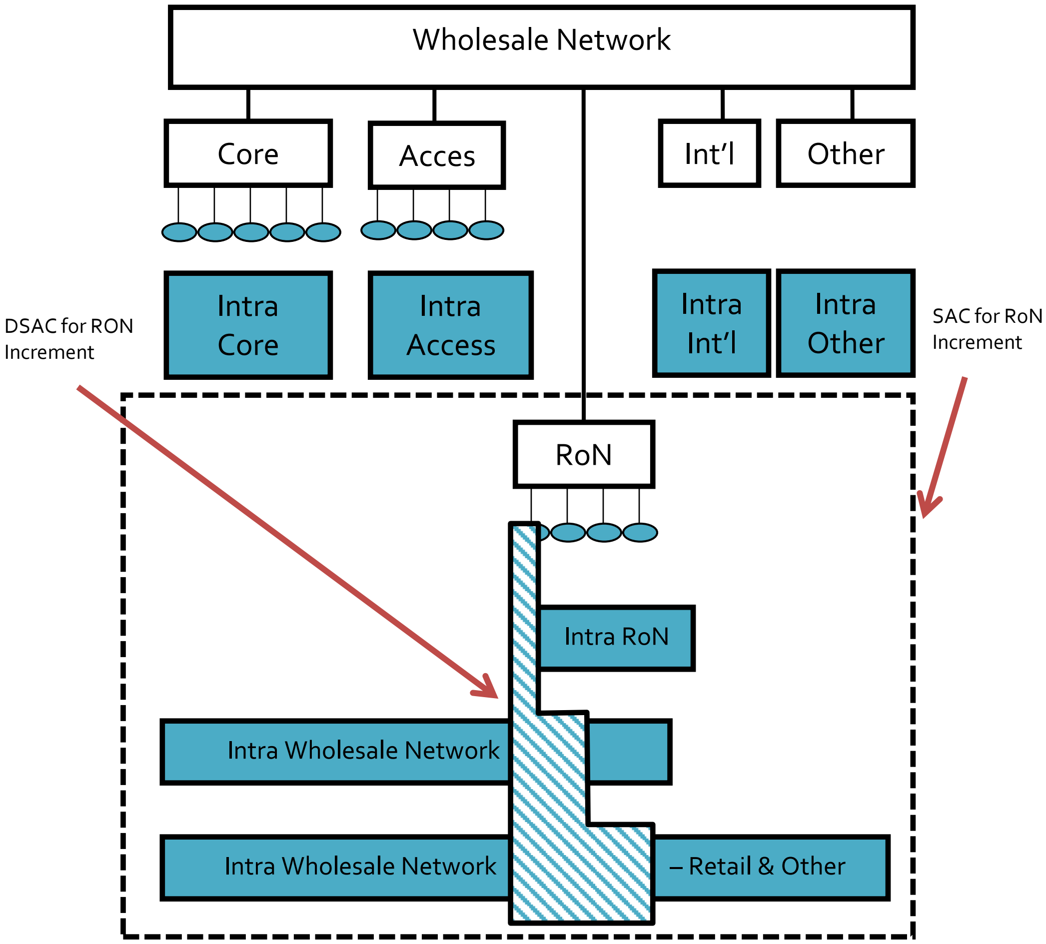


Figure 3.17 DSACs for Other Network Increment.

The distribution of the Fixed Common Costs which are shared between Access and other increments is apportioned over the Access components using equal proportional mark-ups to derive DSACs. This method attributes the FCC to the components in proportion to the amounts of the cost category included within the LRIC of each component.

The DSAC-based ceilings for services will be, in some cases, considerably below the SAC of the service.

4 CVRs

4.1 Descriptions of CVRs

CVRs are developed for every category of cost, asset and liability, and describe what level of cost, asset or liability is expected at each level of volume of the appropriate cost driver.

The shape of a CVR is controlled by two elements: whether it has a non-zero intercept or not and whether it is a straight line or is curved. The combination of these two factors results in four generic types of CVR:

1) straight line through the origin
2) straight line with an intercept
3) curved line through the origin
4) curved line with an intercept

4.2 Format of the CVRs

Each CVR used within the model is documented in a standard format. The sections are described below:

Section	Description
CV	Alphanumeric label which uniquely defines the CVR.
CV Name	Long name of CVR
ISFC	Alphanumeric Increment Specific Fixed Cost label where applicable
CV Description	Brief description of the CVR
CV Type	Description of the general form of the CVR
CV Derivation	Explanation of how the CVR is derived
Rationale and Assumptions	Explanation of the rationale and assumptions underpinning the CVR
References	Optional references to other sections of the documentation

4.3 Construction of CVRs

There are three main techniques that can be employed in constructing a CVR:

- Engineering simulation models

The BT network already incorporates the results of previous decision making which matches the investment and associated other costs to certain demand levels. Through the use of simulation models that draw on BT's experience of investment decisions and current best practice and on BT's knowledge of available technologies and asset prices, it is possible to consolidate this information to produce CVRs. A worked example is presented later to illustrate this approach for AXE10 local exchange investment costs.

- Statistical surveys

Where detailed cost and cost driver volume is available, it is possible to derive relationships between the cost and cost driver volume, to produce linear or curved relationships. The cost and cost driver volume data can be taken from a wide range of sources including organisational divisions.

- Interviews and field research

When no historic detailed cost information is available, it would still be possible to construct a detailed and accurate CVR via detailed interviews and field research.

By interviewing experts within each area which contributes towards the cost, it is possible to derive the fixed and variable cost and hence the shape of the CVR. This simple relationship is augmented by taking into account reasons why costs may change as volume alters, such as discounts and the impact of contracting out services. For example, by benchmarking bulk discounts with the discounts obtained by smaller organisations, it is possible to construct how variable costs would alter as the bulk order changed.

4.4 CVR and CVR to Cost Category mapping changes in 2017-18

The following changes to CVRs were made in 2017-18:

(i) CV800 - Accommodation (External Cost) has been reviewed, which has resulted in change in coordinates.
(ii) CV901 – Access Duct has been reviewed, which has resulted in change in coordinates
(iii) CV906 – 21CN - New CVR related to 21CN has been introduced
(iv) CV271 (METRO/CORE), CV272 (MSAN) and CV273 (WDM) have been removed, as these have now been combined into new CVR CV906 (21CN)

New cost categories created in 2017-18 are described in Chapter 6.

5 Examples

Chapter 2 contains the principles that must be followed in the preparation of LRIC Statements.

To aid the understanding of some of the principles, some of the concepts are explained further by the use of examples.

5.1 DLRICs and DSACs - an example

Consider a simplified example with incremental costs and common costs spanning the increments in *Figure 5.1*. Network is shown consisting of two components, Switching and Transmission, where costs are categorised as incremental or fixed common. Fixed common costs are shown spanning the increments to which they are common.

The LRIC of a network service comprising of two parts, Switching and Transmission components, will be the LRIC of both parts plus the fixed common costs which span both the activities. Here, if Access was already provided, the fixed common costs spanning Access and Transmission and those spanning Access and Switching together with those spanning all three activities will already have been incurred. This leaves the LRIC of the Switching and Transmission combined as the LRIC of the Switching and Transmission plus the fixed common costs spanning both activities. This is shown by the shaded areas in *Figure 5.1*. By implication, the mark-up on Switching and Transmission needs to be sufficient to recover the fixed common costs between Switching and Transmission otherwise the prices of Switching and Transmission taken together will fall below the LRIC of the two activities combined.

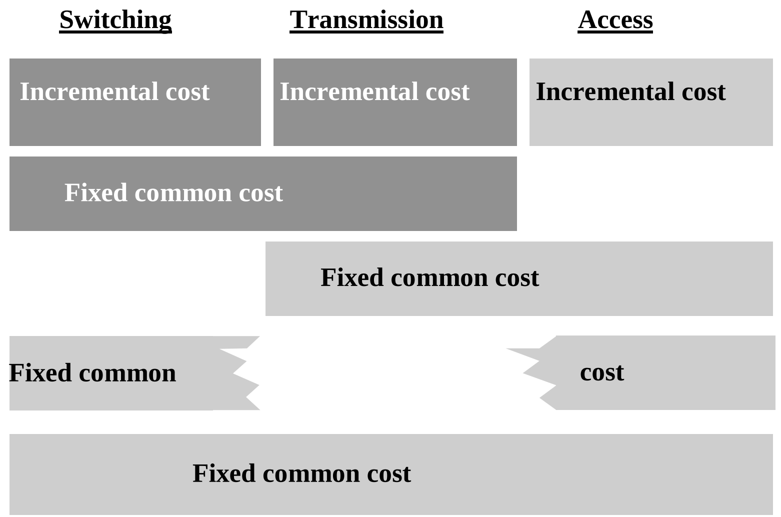


Figure 5.1 Example of DLRIC

The SAC can be derived in a similar way. For example, the SAC of a network service comprising Switching and Transmission but with no Access will be any costs incurred in providing these services. This is the same as the LRIC of the Switching and Transmission plus any fixed common costs which span either of the activities (and not just exclusively those activities) which is given by the shaded areas in *Figure 5.2*.

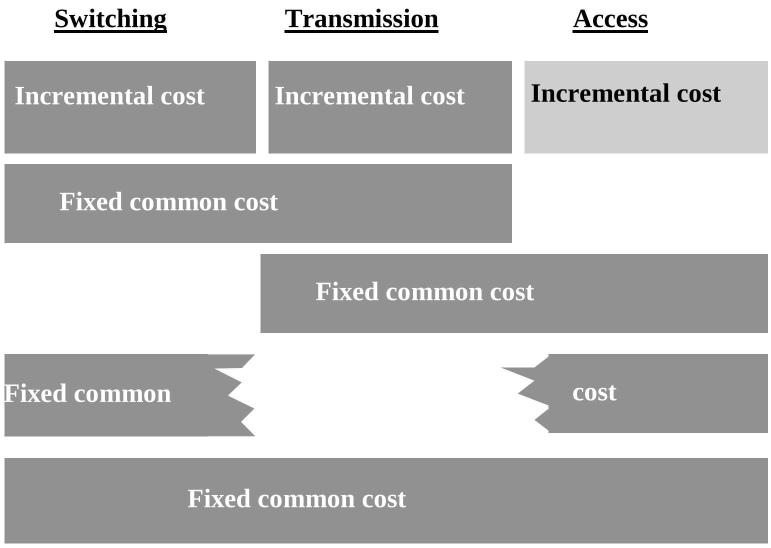


Figure 5.2 Examples of SAC

5.2 CVR

Consider a simple example of the construction of a CVR involving two increments, A and B, with costs split over the increments as below:

Cost type	A	B
Variable costs	Per unit variable cost of £10 up to 100 units and a per unit variable cost of £7.50 for units greater than 100 up to 200 units for ANY unit used by increment A and increment B	
Direct Fixed costs (known as increment specific fixed cost in model)	£750	£500
Fixed Common costs	£1,000 spanning both A and B	

In this example, the variable cost driver exhibits economies of 25% above 100 units, a source of economies of scale. This can be portrayed diagrammatically in *Figure 5.3*.

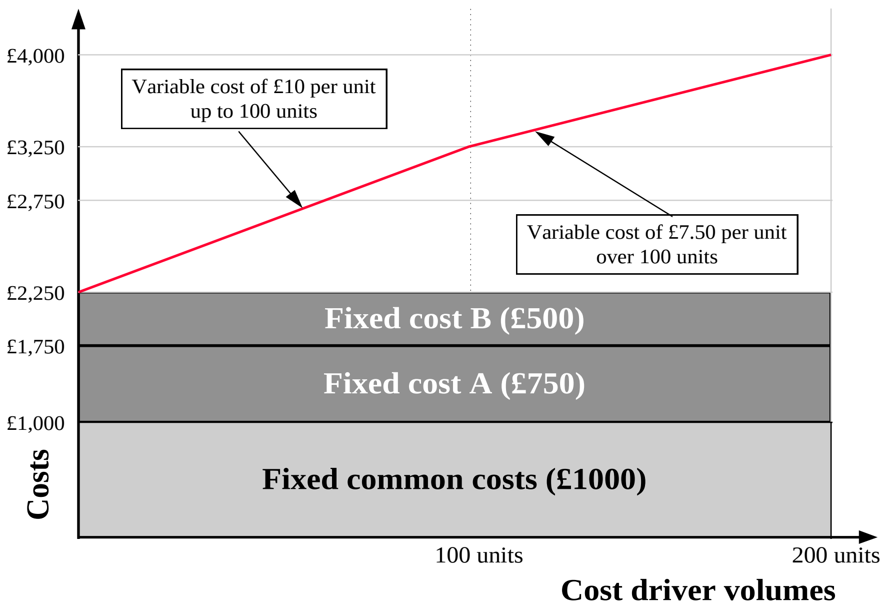


Figure 5.3 CVR with fixed costs

- **Increment Specific Fixed Costs**

  Increment Specific Fixed Costs within a Cost Category where the cost driver volume is contributed to by more than one increment are rare. The methodology, however, is able to cope with this existence, if necessary.

Consider core transmission fibre and the Core and non-Core increments with the Network increment. The construction of the CVR for core transmission fibre assumes a minimum network capable of delivering calls and data between any two points within BT's network. At such a scale of operations, there are substantial fixed costs due to the presence of fibre to transmit the data. Fibre is needed in both the Core and non-Core increments. In deriving the theoretical minimum network under the scorched node assumption, there is a minimum level of fibre required that is not dependent on actual traffic. This represents the intercept on the CVR. This intercept is made up of three elements:

- The fixed cost specific to Core increment, being fibre used for example to support inland private circuits;
- The fixed costs of non-Core increments, being fibre used for example to support international services; and
- The fixed costs of jointly for provision of activities within the Core increment and other services within the Network increment.

5.3 Cost-weighted dependency calculation

In calculating the LRICs of dependent cost categories the model refers to the dependent cost category as the **parent** and the cost categories on which it is dependent as the **children**. Given that there may be more than one level of dependency it is possible that a particular cost category may be the child of a parent and also the parent of children. E.g. cost category A depends on B and C and cost category B depends on E, F and G. In this case, A is a parent while C, E, F and G are children and B is both a parent (of E, F and G) and a child (of A).

The LRIC of a dependent cost category (the parent) is the FAC of the parent multiplied by the sum of the LRICs of the children divided by the sum of the FACs of the children. Using the cost categories from the previous paragraph (A – G):

$$LRIC_A = \frac{(LRIC_B + LRIC_C)}{(FAC_B + FAC_C)} \times FAC_A$$

And

$$LRIC_B = \frac{(LRIC_E + LRIC_F + LRIC_G)}{(FAC_E + FAC_F + FAC_G)} \times FAC_B$$

5.4 Use of REFINE allocation of cost to derive volumes

BT uses the REFINE allocation of costs to increments to derive the percentage share of the cost driver volume for each increment.

Consider a simple example of an activity with a total cost of £300, and cost driver volumes expressed as percentages for Access, Switching and Transmission of 50%, 30% and 20% respectively. The CCA AS system would allocate costs in this proportion, i.e. £150, £90 and £60 to Access, Switching and Transmission. Where a cost has been apportioned across several activities by the CCA AS system, it is possible to use the relative proportions of these costs to reflect the relative volumes of the cost drivers associated with those activities.

This example can be shown diagrammatically in *Figure 5.4* where the AS system fully allocates costs in the proportion of the cost driver volumes A, B and C. These costs in the proportion A, B and C are used as the relative proportion of the underlying cost driver in the LRIC model. The diagram *Figure 5.4* shows how the calculation of LRIC for increment C is derived using the cost outputs from AS as a proxy for the underlying cost driver volumes.

The LRIC model uses the volume of network components as the cost driver for all Cost Categories, either directly where a Cost Category depends on the level of demand for network components or indirectly, where the cost of one Cost Category depends on the level of demand for other costs which themselves are driven by the level of demand for network components.

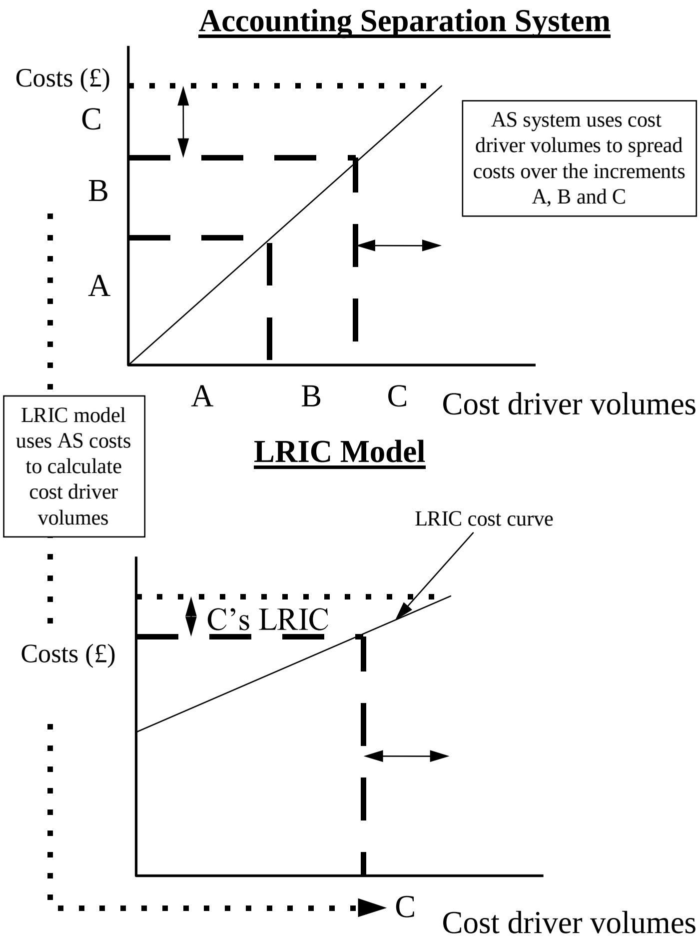


Figure 5.4 Calculation of LRIC using AS cost driver volumes

Taking the costs and cost driver volumes in this format simplifies the inputs into the model and guarantees consistency of costs and cost driver volumes between REFINE and the LRIC Model.

In this way, the feed from the REFINE system includes both the BT total cost and the cost driver volumes associated with the Cost Category. The totals of the Cost Categories are agreed back to REFINE and exported into the LRIC Model.

6 Changes to LRIC modelling and methodology in 2017-18

6.1 LRIC cost categories

2017-18 has resulted in some new independent cost categories being created. These have been mapped to CVRs or dependency groups as shown below:

Cost Category	Description	CVR
MMFXNPZZZZZDJZZZZ	Capex, Non pay, Network Enabling Computers	CV029
CECADRZZZZZG8ZZZZ	Current assets, Debtors, IFRS 15 Current Assets	CV210
CECLCRZZZZZHNZZZZ	Current liab & provisions, Creditiors, Notonal creditor	CV216

6.2 New cost dependencies

Please refer to Annex 4a - Mapping of Dependent Cost Categories (P147) for a complete list of the dependent cost category mappings (parent/child) used by BT.

7 Glossary of Terms

Access Network	Defined as the local loop network connecting customers to a local exchange, excluding any element of the local loop used for providing local ends of inland private circuits. The Access Network includes any element of the Concentrator that is provided for the connection of customers.
Accounting Methodology Document	The Accounting Methodology Document (AMD) is published with the Regulatory Financial Statements (RFS). The purposes of the AMD are to: • Describe the framework under which the accounting statements are to be prepared; • Describe the costing principles used by BT to prepare the RFS on a fully allocated cost basis; • Describe the methods used in the Accounting Separation process to attribute revenue, costs and capital employed to the Markets and Technical Areas in the RFS; and • Outline the systems and processes used by BT to support Accounting Separation.
Core	Defined as comprising the Inland Public Switched Telephone Network (PSTN), Inland Private Circuits (including local ends).
Cost Category	Grouping of costs into unique cost labels by identical cost driver for use in the LRIC model.
Cost driver	The factor or event which causes a cost to be incurred.
Cost label	Alphanumeric label which uniquely defines a Cost Category.
Cost volume relationship (CVR)	Expresses the relationship between cost on the one hand and volume of the relevant cost driver on the other. Cost-weighted dependent Cost Categories do not have a defined CVR.
Cost-weighted dependent Cost Categories	Cost-weighted dependent Cost Categories, however, use derived CVRs from the weighted incremental costs of their cost drivers, and have a different cost calculation.
Detailed Valuation Methodology	The Accounting Methodology Document (AMD) contains a section on BT's "Detailed Valuation Methodology" which describes the principles of valuation of fixed assets under CCA and includes the methods used for valuing each asset category.
Direct fixed costs	Those costs which do not vary with the volume of output of an activity and which can be directly attributable to one increment. These costs are associated with fixed factors of production and give rise to economies of scale. Direct fixed costs cannot be avoided unless all contributory output is ceased.
Direct variable costs	Costs that vary directly with the volume of output of an activity. Variable costs are associated with variable factors of production.
Distributed Long Run Incremental Cost (DLRIC)	This is calculated for super components within the Core Increment. It consists of the LRIC of the super component for that cost category plus a proportionate share of the intra-incremental common costs of the Core increment for that cost category.
Distributed Stand Alone Cost (DSAC)	This is calculated for all super components. It consists of the LRIC (or DLIRC if the super component is within the Core increment) of the super component for that cost category plus a proportionate share of the intra-incremental common costs for the Wholesale Network and Wholesale Network – Retail and Other increments.
Economies of scale	Economies of scale are said to exist if the average cost per unit declines with the volume of output. There are several sources of economies of scale. One example is the use of different or more efficient technologies at different scales of production. Another example is the ability to negotiate reductions in input prices for bulk purchases.
Economies of scope	Economies of scope occur due to the presence of fixed common costs. Economies of scope are said to exist when the cost of producing two outputs, A and B, together is less than the cost of producing them separately, i.e. less than the sum of their standalone costs.
F8 Codes	An accounting code which summarises general ledger codes at an organisational level, usually divisional level, for use in Accounting Separation system for cost allocation. For more information on F8 codes refer to the "Detailed Attribution Methodology."

LRIC Model: Relationships & Parameters

Fixed Common Costs	Fixed costs that are common to two or more activities. Fixed common costs cannot be avoided except by the closure of all the activities to which they are common. Fixed common costs give rise to economies of scope.
Increment	Defined as the output over which the costs are being measured. Increments are related to the output of a discrete element as being the whole of a component, service or element of the network.
Increment Specific Fixed Costs ("ISFC")	These occur where an element of fixed costs can be uniquely associated with an increment independent of other increments.
Independent Cost Categories	These are Cost Categories which have cost drivers which are directly related to the external demand for an activity.
Intra-core common costs	This cost represents the fixed common costs and economies of scale arising between the activities within the Core Network. To the extent that the fixed common costs and economies of scale are present, the sum of the LRIC of all the activities within the Core Network will be less than the LRIC of all the activities taken as a whole. The difference that represents the fixed common costs economies of scale is defined as the intra-core common costs.
Long run	Defined as a length of time in which all inputs are avoidable.
Long Run Incremental Costs (LRIC)	Defined as the cost caused by the provision of a defined increment of output given that costs can, if necessary, be varied and that some level of output is already produced.
Short run	Defined as a length of time in which at least one input into the production process is fixed. Thus, a characteristic of the short run is that capital investment decisions are predetermined and cannot change. For a given output of services, short run total costs can be no less than long run total costs.
Stand Alone Cost (SAC)	The stand alone cost of an activity or subset of activities is the cost incurred in providing that activity or activities of services by itself. Stand alone cost will include all direct variable, activity specific fixed costs and common fixed costs associated with the activity or subset of activities in question.

Annex 1 Cost Categories

For the purposes of the Long Run Incremental Cost model, BT's costs, as represented by the F8 account codes, are grouped into cost categories. The basis of the grouping is by similarity of cost type and associated cost driver. The aggregation of F8 codes into sensible groupings of like cost remains at a level of granularity sufficient to allow the association of the appropriate cost driver. Moreover, the cost categorisation also provides separate visibility of different cost types which share the same cost driver.

Annex 1 (see link below) lists the cost categories which are used in the model and whether the cost category is independent, dependent or cost-weighted dependent. These show how cost drivers of some cost categories link to exogenous volumes and thereby use independent cost volume relationships whilst other cost categories use cost driver volumes dependent on the cost output of one or more cost categories and are thereby "dependent".

Annex 1 shows all the cost categories used in the production of LRIC and their treatment, link is below.

https://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2018/index.htm

There are 352 cost categories and 19 dependency groups. The sections of the annex have the following meanings:

Section	Description
Cost Category	Alphabetic label which uniquely defines a category. The Prefix "CE" is capital employed, "MM" is memorandum and "PL" is profit and loss categories. "MMFX" refers to current year capital cost and "MMNC" refers to a notional cost, both of which are used only as cost drivers for other cost categories where applicable. The "MM" categories are not included in the LRIC unit costs.
Cost Category Description	Long name of the cost category.
CV Type	The CV Type indicates the source of the cost driver for the cost category: • Type 1 is independent i.e. the costs are driven by the volumes of external demand; and • Type 3 is cost-weighted dependent i.e. the costs are driven by a weighting of other cost categories within the model.
Dependency	The dependency group which drives the costs of the cost category. This is only relevant when the CV Type 3 indicating that the cost category is dependent. Please refer to Annex 4 for further information.
CV	Alpha Numeric label which uniquely defines the cost volume relationship. This is only relevant when the CV Type is Type 1 or Type 2 indicating that the cost category has an explicit cost volume relationship.
ISFC	Alpha Numeric label which uniquely defines the increment specific fixed cost relationship.
Matrix Key	A key which provides a mapping from cost category to the cost groupings used in the "Matrix of detailed LRIC by bands". Descriptions of the keys are at the end of the Annex.

Annex 2 Cost Volume Relationships (CVRs)

2.1 Description of Cost Volume Relationship

Cost volume relationships are developed for every category of cost, asset and liability which describe what level of cost, asset or liability is expected at each level of volume of the appropriate cost driver.

Cost volume relationships are used within the Long Run Incremental Cost model. For more information, refer to Chapter 2.4 and Chapter 4.

2.2 Format of the Cost Volume Relationships

There is an index at the front of the cost volume relationships. This is the same information as in Annex 1, but sorted by Cost Volume Relationship and omitting the Matrix Key. The index identifies which cost categories are driven by each cost volume relationship.

At the end of the index are those cost categories which are cost-weighted dependents which are sorted by their cost driver. Cost-weighted dependent cost categories derive their cost volume relationships from the weighted incremental costs of their cost drivers.

Each cost volume relationship used within the model is documented in a standard format. The sections are described below:

Section	Description
CV	Alpha Numeric label which uniquely defines the cost volume relationship.
CV Name	Long name of cost volume relationship.
ISFC	Alpha numeric increment specific fixed cost label where applicable.
CV Description	Brief description of the cost volume relationship.
CV Type	Description of the general form of the cost volume relationship.
CV Derivation	Explanation of how the cost volume relationship is derived.
Rationale and Assumptions	Explanation of the rationale and assumptions underpinning the cost volume relationship.

CV label	CV001
CV name	Access Fibre Cable

CoW relationship

LFSC – Construction, Local Line OF Spine Cable

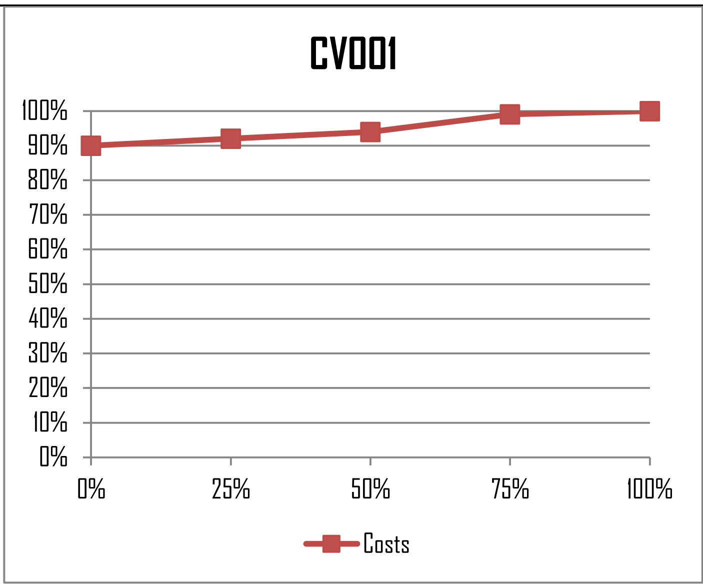
LFDC – Construction, Local Line OF Distribution Cable

CV description - Variation in fibre cable size in response to growth in network capacity based on customer connections.

CV type - Piecewise linear with fixed cost element.

CVR Co-ordinates

CV001	
Volumes	Costs
0%	90%
25%	92%
50%	94%
75%	99%
100%	100%



Definition of Costs & Volumes

In this CVR the costs are those which represent the whole of the Access Fibre Cable Network. This includes the spine, distribution and exchange only (EO) sections of the access fibre network.

The volume measure in this CVR is that of fibre cable size, with the minimum being 4 fibre and the maximum 240 fibre cable.

CV derivation

This Cost Volume Relationship (CVR) describes how the cost of access fibre cable changes as cable size changes. The approach taken in the production of the CVR is that based on cable and equipment costs from the Customer Services System (CSS) and fibre cable volumes from the Integrated Network Systems (INS).

<u>Data sources</u>

Access fibre length and cable size information is taken from Integrated Network Systems (INS). INS is a computer System for BT's Transmission Network, containing cable and equipment records. Interrogation of this system via a reporting tool called Network Decision Support (NDS) provides us with access fibre cable volumes.

For the costing of these volumes we interrogate the Customer Services System (CSS) for current cable and equipment costs.

<u>Process / CVR Construction methodology</u>

The cost volume relationship was constructed by deriving network valuations for access fibre cable kilometres at 25% increments from 0% (representing a minimum network) to 100% (representing BT's existing network) - and plotting a curve between them.

The existing network valuation (100% of access fibre network) uses the existing fibre cable size per route. The minimum network is defined as the least cost network capable of providing existing geographic coverage for extreme low density of customer demand for connections, while also maintaining the existing number of fibre route kilometres. It is valued using a network scenario of a minimum sized access fibre cable to any existing connection. To plot the cost volume relationship from the existing network to the minimum network we use the method of thinning (see full explanation below).

CVR Operation

Data is extracted from INS and downloaded into Fibot.xls spreadsheet, which provides an analysis of fibre cable data broken down into sheath km, fibre km and cost per fibre size.

The size of fibre cable required to carry volumes from 100% to 0% (minimum network) is then calculated in 25% increments. For example, at 100% of volume a 72 fibre cable may be required, at 50%, this would be 36 fibres and minimum would be a 4 fibre cable as this is the lowest available for purchase). The nearest cable size above and below this requirement is then costed and a mean cost calculated.

This is carried out for distribution, spine and exchange only access fibre prior to being totalled to give an overall cost volume relationship for access fibre cable.

Rationale and assumptions

There are four fundamental assumptions in this cost volume relationship:

Scorched Node Assumption: In this cost volume relationship BT maintains its existing geographical coverage of access fibre cable routes in terms of customer access and connectivity between customers, and provides the infrastructure to do this from existing network exchanges. This assumption means that the reach of BT access fibre cable kilometres is maintained nationally regardless of a change in the cable size.

Thinning Assumption: Thinning plays a large part of the production of the cost volume relationship as it impacts on the relationship between access fibre cable size and costs. The assumption maintains the reach of cable routes nationally but reduces (thins) the volumes to duct bores in increments until minimum network assumptions are reached.

Existing Network: The slope of the cost volume relationship represents by how much cost will fall moving from the existing access fibre network to the minimum local access network.

Minimum Network: The fixed cost indicated by the Y intercept on the graph includes the cost of a minimum fibre cable network.

CV label	CV002
CV name	Local Lines Copper Cable

CoW relationship - LDC – Construction, Local Distribution Cable. LMC – Construction, Local/Main Exchange Side Cable. LQD – Local Line Plant Improvement - Distribution Cable. LQM – Local Line Plant Improvement – Main-side Cable. LSB – Local Lines Asset Assurance. LWR – Low wires retention and replacement. FVRD – Joint Remakes – Metallic Distribution side cable network. FVRM – Joint Remakes – Metallic Main-side cable network.

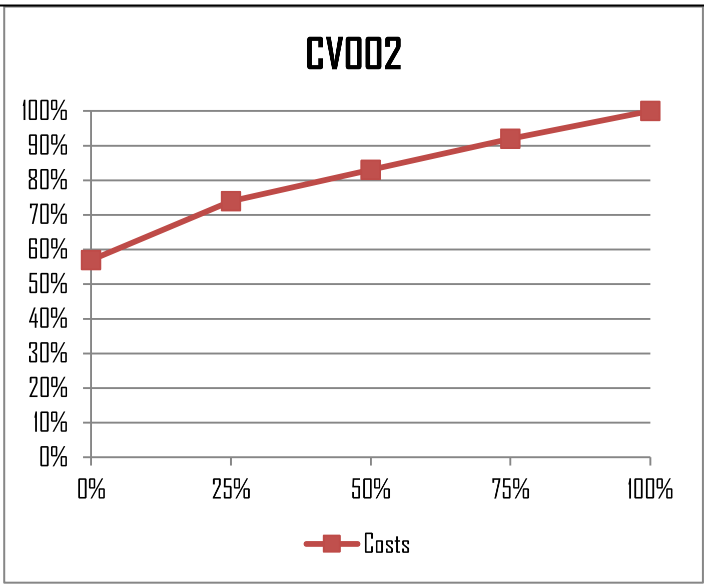
CV description - Variation in cable size in response to growth in network capacity based on customer connections.

CV type - Piecewise linear with fixed cost element.

CVR Co-ordinates

Piecewise linear with fixed cost element

CV002	
Volumes	Costs
0%	57%
25%	74%
50%	83%
75%	92%
100%	100%



Definition of Costs & Volumes

In this CVR the costs are those which represent the E-side and D-side of the access copper network.

The volume measure in this CVR is that of cable size. The minimum cable size available is 100 pair on E-side and 10 pair on D-side.

CV derivation

This Cost Volume Relationship (CVR) describes how the cost of local copper cable changes as cable size changes. The approach taken in the production of the CVR is that based on costs and volumes from the Local Line Costing Study (LLCS) and the Trunk & Junction Study.

Data sources

Local copper cable length and cable size information was taken from BT's Trunk and Junction Duct Study and Local Lines Costing Study (LLCS). LLCS is a database, which holds physical and financial data relating to the Access Network. The database has been constructed using local exchange records kept by Zonal Planning & Drawing Offices. Output from the LLCS is used for network planning and decision making purposes, apportioning access network costs and for producing CCA valuations for access copper and duct.

Process / CVR Construction methodology

The cost volume relationship was constructed by deriving network valuations for local copper cable kilometres at 5% increments from 0% (representing a minimum network) to 100% (representing BT's existing network) - and plotting a curve between them. These co-ordinates are summarised above at 25% increments.

The existing network valuation (100% of local copper cable network) uses the existing copper cable size per route. The minimum network is defined as the least cost network capable of providing existing geographic coverage for extreme low density of customer demand for connections, while also maintaining the existing number of route kilometres. It is valued using a network scenario of a minimum sized copper cable to any existing connection. To plot the cost volume relationship from the existing network to the minimum network we use the method of thinning (see full explanation below).

CVR Operation

Data is extracted from LLCS and downloaded into CABDAT.xls spreadsheet which provides an analysis of copper cable data showing total distance and cost per pair kilometre. This is then transferred into LL_MOD.xls spreadsheet that splits data between D-side and E-side.

The model then reduces each cable size in 5% increments. For each increment a mean is calculated using the cable sizes immediately above and below the cable size shown.

Regression calculations are then performed to obtain a line of best fit, illustrating the Cost/Volume Relationship.

Rationale and assumptions

There are three fundamental assumptions in this cost volume relationship:

Scorched Node Assumption: In this cost volume relationship BT maintains its existing geographical coverage of local copper cable routes in terms of customer access and connectivity between customers, and provides the infrastructure to do this from existing network exchanges. This assumption means that the reach of BT local copper cable kilometres is maintained nationally regardless of a change in the cable size.

Thinning Assumption: Thinning plays a large part of the production of the cost volume relationship as it impacts on the relationship between copper cable size and costs. The assumption maintains the reach of cable routes nationally but reduces (thins) the volumes to duct bores in increments until minimum network assumptions (100 pair cable on E-side and 10 pair on D-side) are reached.

Existing Network: The slope of the cost volume relationship represents by how much cost will fall moving from the existing local copper cable network to the minimum local access network.

Minimum Network: The fixed cost indicated by the y intercept on the graph includes the cost of a minimum copper cable network. The assumed minimum network is based on assumption of 100 pair cable on E-side and 10 pair on D-side.

CV label	CV019
CV name	Core Transmission Cable (Fibre)
ISFC relationship	SV019

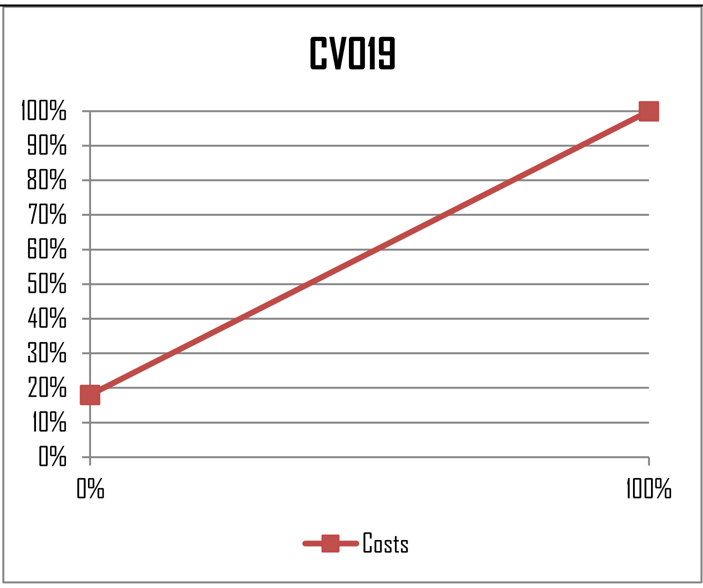
CoW relationship – MUC – Main Underground Cable including provision, replacement or recovery of Trunk Cables. BHQ – Submarine Cable Inland including provision and re-arrangement of submarine cables for the Trunk Network. CJF – Junction Cable - Optical Fibre including provision, replacement, renewal, re-arrangement or recovery of any optical fibre cable. CJC – Junction Metallic Pair Cable including provision, replacement and recovery of metallic pair Junction cables.

CV description - Variation in core transmission cable sheath length/size and hence cost in response to growth in network capacity.

CV type - Linear with fixed cost element.

CVR Co-ordinates

CV019	
Volumes	**Costs**
0%	18%
100%	100%



Definition of Costs & Volumes

In this CVR the costs are those which represent the whole of the cable network. This includes the costs of the MUC, BHQ, CJF and CJC Classes Of Work as noted above.

The volume measure in this CVR is that of a single fibre pair length.

CV derivation

This Cost Volume Relationship (CVR) describes how the costs of Core Transmission Fibre alter as the volume fibre pair's change. The approach taken in the production of the CVR is that based on length information provided by the Core Transmission Costing System (CTCS), assumptions regarding network configuration from EXPRES and unit costs provided by Procurement.

Data sources

Key data sources used to calculate the valuations include EXPRES, which is used to calculate the minimum number of nodes to which fibre must reach, CTCS which is used to provide details of total fibre length and Procurement who provide up to date unit costs.

Process / CVR Construction methodology

The minimum valuation is established via a series of steps:

1. The number of network nodes is established via a download from EXPRES which is broken down into the following categories:

DMSU – DMSU routes

DJSU – DJSU routes

Local – DMSU routes

Local – DJSU routes

Concentrator – Local routes

DISC – DMSU routes

DISC – DISC routes

2. An average route distance for each of the above is then calculated using output from CTCS.
3. CTCS is also then used in order to calculate the number of non-fibre line systems that also utilise these routes.
4. All of the above are then multiplied by a cable utilisation percentage which is calculated by running a query on NDS in order to produce a total sheath length.
5. The sheath length is then multiplied by the appropriate unit cost to give a capacity based minimum valuation.
6. A final minimum valuation is achieved by adding in non-capacity items and sub-sea cable which are sourced from the Wholesale LOP (Life Of Plant) list.

Rationale and assumptions

There are two fundamental assumptions in this cost volume relationship:

Scorched Node Assumption: In this cost volume relationship BT maintains its existing geographical coverage of fibre routes in terms of core length, and provides the infrastructure to do this from existing network exchanges.

Minimum Network: The minimum network is defined as being the least cost network required to provide existing connectivity but for extremely low levels of traffic. This is calculated using the PSTN routes from the equipment CVR and applying the average circuit lengths for each route type. These cable lengths have the PDH sharing and cable utilisation factors applied to give a total sheath length. The resulting sheath length is then valued using the current cost of the minimum commercially available cable size (12 fibres per sheath).

CV label	CV022
CV name	Core Transmission Equipment – PDH/SDH
ISFC relationship	SV022

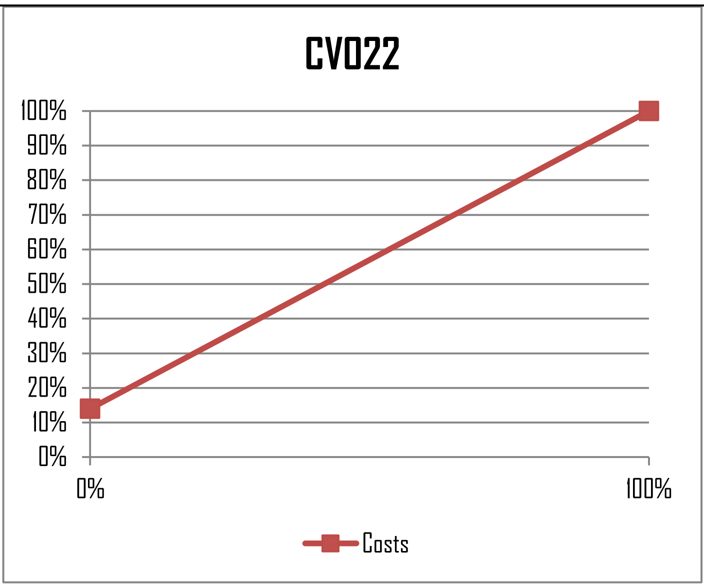
CoW relationship – CRD – Provision and re-arrangement of Junction Repeaters. (Non Optical Fibre). CRF – Provision and re-arrangement Junction Repeaters. (Optical Fibre). CRHQ – Provision of analogue, plesiochronous digital or optical repeater equipment in the Trunk Network. SDH – Provision, re-arrangement of synchronous transmission equipment in the Core Transmission network (Trunk and Junction) under the auspices of the SDH programme. TPWC – Provision, re-arrangement, renewal of Trunk and Junction Radio Systems.

CV description - Variation in core transmission electronics and hence cost in response to growth in network capacity.

CV type - Linear with fixed cost element.

CVR Co-ordinates

CV022	
Volumes	Costs
0%	14%
100%	100%



Definition of Costs & Volumes

In this CVR the costs are those which represent electronics within the network. This includes the costs of the CRD, CRF, CRHQ, SDH and TPWC Classes Of Work as noted above.

The volume measure in this CVR is that of number of circuits.

It should be noted that CRD, CRF and CRHQ classes of work are valued using SDH as a modern equivalent asset. This is due to the fact that PDH assets are no longer purchased by BT.

CV derivation

This Cost Volume Relationship (CVR) describes how the costs of Core Transmission equipment alter as the volume of circuits changes. The approach taken in the production of the CVR is that based on circuit information provided by the Core Transmission Costing System (CTCS) and unit costs provided originally by Procurement.

<u>Data sources</u>

Data sources for this CVR are the Core Transmission Costing System (CTCS), Procurement and CCA indexation values.

<u>Process / CVR Construction methodology</u>

Maximum position

To produce the maximum position (cost), the GRC values (excluding WIP) of the Classes of Work noted above are used.

The SDH maximum valuation is based on an indexed valuation. The indices are provided by Group Operations.

The PDH and Radio maximum valuations are absolute as described in the CCA Detailed Valuation Methodology.

Volume data is derived from CTCS as noted above.

Minimum position

The minimum position (cost) is derived by multiplying the number of Add Drop Multiplexors (ADMs), ASDH Consolidation units and Hub-MUXes, Cross Connects (SDXCs), line systems and Intermediate Station Equipment (ISEs) by their relevant unit cost. The cost of software, computing and test equipment is treated as fixed and is calculated by taking the GBV for each asset. This is because this ancillary equipment is not dependent on volumes of equipment, nor is it geography dependent.

For the purposes of the PDH MEA, traffic is assumed to use Access SDH technology. The minimum cost position is derived by multiplying the number of Hub MUXes and consolidation units by their relevant unit price. The minimum position for volume is derived as the minimum capacity at which PDH traffic can be transmitted – i.e. 2 Mbit/s.

In relation to radio assets, the minimum cost position is defined as the number of masts for retained routes, multiplied by their relevant unit price plus the number of radio systems multiplied by the average cost for a 34Mbit/s system. The minimum position for volume relates to all existing remote to local, local to tandem and tandem to tandem radio routes that cannot be replaced using cable due to geographical constraints.

Rationale and assumptions

Scorched Node Assumption: In this cost volume relationship BT maintains its existing geographical coverage of PDH/SDH/Radio nodes.

The scorched node concept for CVR022 is interpreted as:

Minimal Traffic:

SDH - A single 155 Mbit/s circuit throughout the network

PDH - A single 2 Mbit/s circuit

Equipment Levels

SDH - One ADM and/or Cross Connect per BT node.

PDH - One set of access equipment at each PDH node.

Radio - One mast in each present location which is not duplicated by a cable route.

2012/13: This CVR was reviewed and changed as follows:

- Equipment numbers were updated (where available). Network experts were consulted and noted the network had not changed significantly since the last refresh in 2004/5
- If equipment quantities were unavailable it was assumed that they remained constant from the 2004/05 version
- The equipment prices were updated using the SDH price index movement from March 2005 to March 2012

CV label	CV029
CV name	Computer Fixed Assets and Depreciation

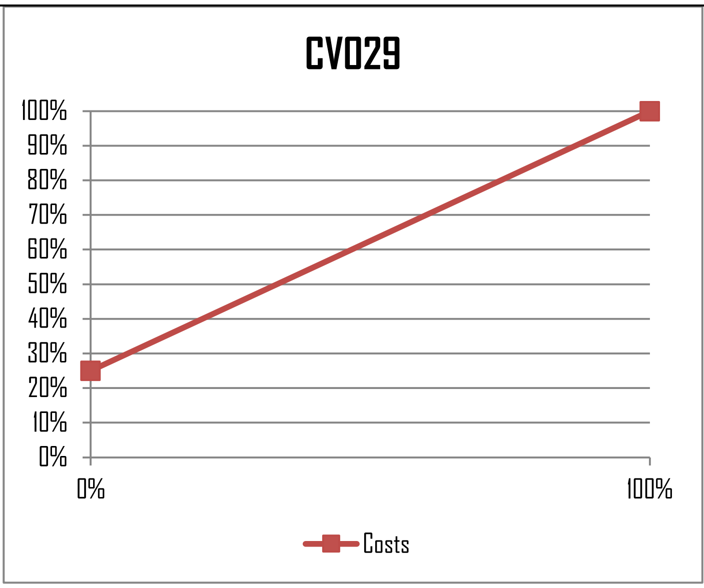
CoW relationship

CV description - Variation in computer Fixed Assets costs in response to changes in demand for computing services.

CV type - linear with fixed cost element

CVR Co-ordinates

CV029	
Volumes	**Costs**
0%	25%
100%	100%



Definition of Costs & Volumes

This CVR is used for the mean capital employed and depreciation costs for computing hardware items, including desktop, mid-range machines and mainframes. The volumes are those of the assets required.

CV derivation

Computer assets are used throughout BT: mid-range and mainframes host a variety of systems that operate the company´s key activities and processes; desktop computers are widely used by BT people either to operate / access these systems, or to undertake their day to day activities.

We calculated a "minimum network" intercept to be consistent with the "scorched node" and "thinning" principles. For computing assets, the minimum network must provide the capability to support key business processes and systems at scale deployment. In particular, the minimum network for computing assets needs to be consistent with the minimum network definition in other parts of the LRIC model – i.e. it supports:

- the minimum network infrastructure and platforms (i.e. both in core and access).
- the associated business process (network monitoring, repair, fault handling, order taking, work manager systems, etc.).

There is a close relationship between the computing hardware assets and the systems (software) that run on them. Computing assets are often shared across a range of software applications. However, it is the software / application that relates to the underlying network systems or business processes. Hence, the logic is that the network or business activity drives the requirement for software system, which in turn create the need for hardware assets.

We have recognised this in constructing the CVR for computing hardware, by using an analysis of internally and externally purchased software to calculate the minimum network intercept for the hardware assets. However, in doing this we have ignored any software costs that are "pass through" (i.e. simply reselling software as part of a solution) – this software would not use BT computing assets.

Our approach to constructing the minimum network intercept was as follows:

- We sub-analysed computing costs by Line of Business and by F8 code, based on information from the REFINE system.
- For any costs designated as "cost of sales", we assumed a zero intercept. These costs do not support a minimum network.

- For any costs incurred in BT retail and Global Services we assumed a zero intercept, since these costs do not support a minimum network;
- For costs in Openreach, BT Wholesale and BT Operate, we calculated an intercept based on an analysis of software spend by system / application provided by BT Operate. For each system / application, we established the platform, product or activity being supported, and determined the fixed cost proportion, based on existing assumptions within the LRIC model.
- The overall intercept was calculated as a cost-weighted average of the individual intercepts described above.

Changes

None in 2017-18.

Data sources

REFINE system: for sub-analysis of key cost be F8 code and Line of Business

BT Operate: for sub-analysis of software / computing spend by system / application.

Process / CVR Construction methodology

N/A.

CVR Operation

This is a two-point straight line CVR.

Other

N/A.

Rationale and assumptions

N/A.

CV label	CV030
CV Name	Power Plant

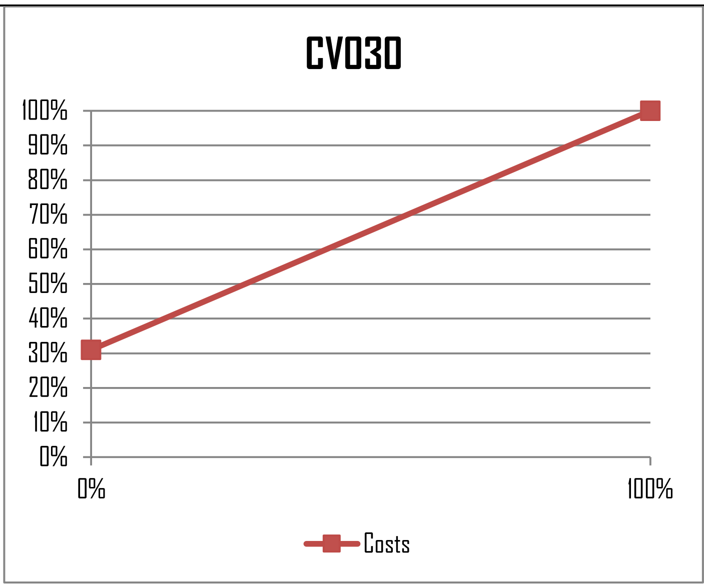
CoW relationship- TPC – Construction telecom power plant.

CV description - Variation in power equipment investment costs in response to changes in installed equipment.

CV type – Piecewise linear with intercept.

CVR Co-ordinates

CV030	
Volumes	**Costs**
0%	31%
100%	100%



Definition of Costs & Volumes

Network Power provides the infrastructure to distribute electricity from the supplier through to all of the network operational buildings such as telephone, radio stations and repeater stations. The power platform is responsible for providing the power requirements to all network platforms.

Power equipment is broadly split into:

i) stand-by power generators which are used to provide back-up power for all switching and transmission equipment contained within the network.

ii) the infrastructure within the building to distribute power.

iii) specific power rack equipment (i.e. AC/DC conversion etc.) used to power equipment.

The main functions of the power platform are:

- To provide a switchboard interface between the 'Utilities' power supply and the network building's power system.
- To provide a stand-by power system for each network building supported by diesel generators.
- To provide 50V DC power (requiring rectification) with a battery back-up to network platforms.

In this CVR the costs are those of the power equipment. The volumes are the volumes of the power equipment.

CV derivation

Power plant is required at each operational building housing access, transmission, data or switch electrical equipment. The total power consumption of a building determines the number and size of the power assets required for that building.

A minimum level of power equipment is required in each node to provide minimum power. The cost of this minimum power equipment is obtained from CCA cost data multiplied by the number of buildings to calculate the overall minimum value. This represents the fixed cost of power equipment. At the 100% point the power cost is the existing CCA total value.

This CVR describes how the costs of TPC class of work change with the number and size of the power assets. The total power consumption is used in the GRC to derive the costs of the power assets. The LRIC model calculates the fixed and the variable elements of power required.

Prerequisites

GRC analysis of TPC class of work to determine the maximum and minimum points.

Changes

None.

Data Sources

Power consumption is calculated using network equipment volumes obtained from the network cost analysts and operational managers. The make-up of the power assets and costs are obtained from operational managers.

Process / CVR Construction methodology

This model is based on the TPC CCA model. It calculates the cost of the power apparatus that is required to support the physical equipment that exists within each exchange building. For each network component, attributed power equipment is assumed to vary with the quantity of network plant supported. The cost curve is constructed by calculating the value of equipment required to meet different power consumption values between the current level and the minimum level.

CVR Operation

The following steps describe how the CVR operates. The CVR derives a fixed and variable element of the power required. The variable element can be adjusted to the required percentage from the 100% which represents the existing current network to the minimum.

The power assets are treated as follows:

- Standby Generators: The cost is flexed by changing the total power consumption for the whole building.
- Low Voltage Switchboards: Follows the same principle as Standby Generators.
- Mobile Generators: The minimum cost of mobiles is taken as fixed cost. The remainder, (variable) is divided by the number of kilowatts to produce a cost per kilowatt.
- Power Equipment Racks (PERs): This cost is flexed by changing the total transmission power.
- Distribution: All costs are assumed to be fixed.
- Alarms: Are fixed in line with BT engineering policy
- Uninterrupted Power Supply (UPS): In line with BT engineering policy UPS are installed wherever a generator is installed. Size of UPS is variable with demand.
- Miscellaneous and low value items: All costs are assumed to be variable.
- The rest of the power equipment consists of small value items that vary directly with equipment quantities.

Rationale and assumptions

The CVR uses a scorched node assumption. This requires power plant at each of the operational buildings that house access, transmission & data / switch electrical equipment in the current network. In order to produce the minimum and maximum points, the costs are separated into fixed and variable costs.

The assumptions are:

Standby Generators & Low Voltage Switchboard (LVS): The fixed element assumes every exchange/transmission site contains the minimum sized Standby & LVS. The variable element varies with the kilowatts of power.

Mobile Generators: The fixed element is assumed to be the smallest sized mobile generator multiplied by the number of mobile generators.

Distribution: All costs are fixed. Each separate area within a telephone exchange/transmission site requires a distribution unit. The cost of this distribution does not change due to a change in power consumption.

PERs: The fixed element is based on a minimum of one PER in every transmission site. The variable element varies with the number of kilowatts of power.

Alarms are fixed in line with BT engineering policy

UPS are installed wherever a generator is installed. The size of UPS is variable with demand.

Miscellaneous and low value items are all assumed to be variable.

Indirects: The fixed element follows the total fixed element of the CVR. If a small job is planned there is still a minimum amount of planning required. The Indirects have been included to keep the CVR consistent year on year, Indirects have no effect on the intercept point or any of the percentages throughout the range.

CV label	CV104
CV name	Payphones

CoW relationship - MPH - Installation of Managed Payphone Housings, MPM - Installation of Managed Payphone Mechanisms, PCOH - Installation of Street Payphone Housings, PCOP - Installation of Street Payphone Mechanisms, PPST - Installation of Multimedia Payphones

CV description - Variation in payphone equipment costs in response to the demand to make calls from public payphones.

CV type - Straight line through origin.

Definition of Costs & Volumes

This CVR includes the costs of the specific payphone equipment (mechanisms) and related street furniture (housings). It does not include the costs of the access network that provides service to this equipment.

Costs are driven by the demand to make calls from public payphones.

CV derivation

This Cost Volume Relationship (CVR) describes how the costs of payphone equipment and related street furniture change as the volume of calls made from payphones varies.

Process / CVR Construction methodology

The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs. As this is a straight line through the origin, no data sources have been used in computing the minimum and maximum co-ordinates.

Rationale and assumptions

Payphones are not a network in their own right and so in the absence of any demand for such calls, BT would not incur public payphone costs.

The makeup of the demand (between traditional voice only payphones and e-mail / broadband enabled payphones) is assumed to be independent of call volumes.

Volume reduction takes place in a manner such that the number of payphones can be reduced linearly.

CV label	CV129
CV name	Kilostream Switches

CoW relationship - DTTK – Kilostream core network equipment for Kilostream Private Circuits.

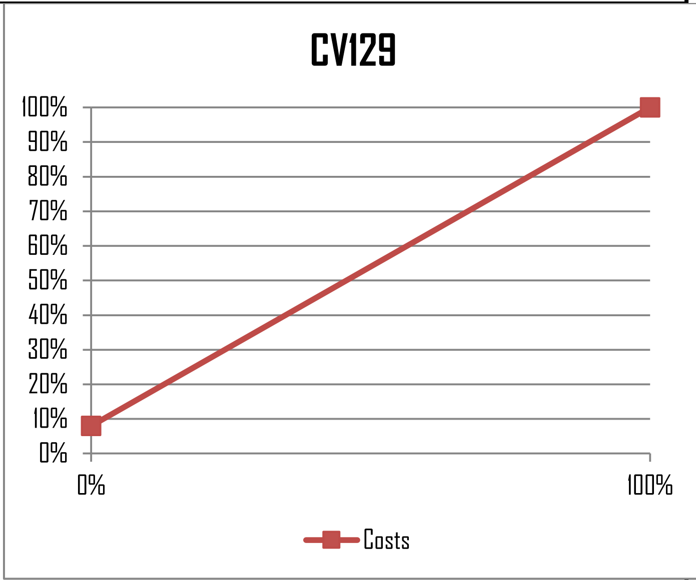
CV description - Variation in the cost of Kilostream Switches in response to the volume of 64kbits via the Digital Private Circuits Network (DPCN).

CV type - Piecewise linear with fixed cost element.

CVR Co-ordinates

Straight line linear relationship with a fixed cost element

CV129	
Volumes	Costs
0%	8%
100%	100%



Definition of Costs & Volumes

In this CVR the costs are those, which represents the whole of the Kilostream Network. This includes costs of contract, stores and labour for the construction, installation, commissioning replacement, rearrangement of Kilostream core network equipment for Kilostream Private Circuits e.g. MD202's (these now replace Automatic Cross Connect Equipment – ACE for all new purchases), Multiplexing Site Units (MSU) and Equipment Network Access (ENA). Also included within this cost is supply and installation of all customer end related equipment used for Kilostream Private Circuits (e.g. Line cards, Modern Units, and Network Terminating Units).

The volume measure in this CVR is that of 64kbit/s private circuits via the Digital Private Circuits Network (DPCN).

CV derivation

This Cost Volume Relationship (CVR) describes how the costs of the Kilostream network changes as the volume of 64kbits private circuits change. The approach taken in the production of the CVR is based on a straight-line linear relationship with a fixed cost element. So the CVR has only two co-ordinates. Minimum and Maximum points.

Data sources

The DPCN Capacity Management team has supplied the costs and volumes for this CVR. The data required from this team is No. of ACE & ENA (MD202) Sites as well as the minimum equipment required each site and that cost. Also required for the CVR are indirect & overhead costs specific to the kilostream network. This is provided the life of plant list (Loplist). Costs for the Customer NTE's are taken from eASC (Stores Database).

Process / CVR Construction methodology

The cost volume relationship was constructed by deriving the minimum and maximum network valuations for the Kilostream Network. This CVR is has straight line linear relationship with a fixed cost element, which means there are only two co-ordinates (0% & 100%).

The existing network valuation (100% of Kilostream network) uses the current cost accounting (CCA) valuation for CoW DTTK. The minimum network is calculated offline and is defined as the least cost network capable of providing existing geographic coverage for extreme low density of customer demand for Kilostream services.

CVR Operation

The following steps describe how the CVR operates:

As described earlier this CVR has two co-ordinates. Minimum network & maximum network co-ordinates. The maximum network co-ordinate (100%) is taken as the value of the CCA valuation. The Minimum network co-ordinate is calculated using a model. This model takes into account four categories of assets that require volumes and/or costs. These are:

- Equipment Network Access (ENA).
- MD202 (Digital Cross Connect).
- Customer Network Terminating Units (NTE).
- Indirect & Overhead equipment specific to Kilostream Network.

The model works by calculating the minimum amount of equipment required at each of the current ENA & ACE/MD202 sites. The DPCN Capacity Management team determines the minimum amount of equipment. Also for each ENA site there must be at least one customer NTE connection. This assumption is based on the least cost network capable of providing existing service.

There are a number of overheads and indirect costs specific to the kilostream network which are also calculated in the model. These are derived from the Life of Plant list. The sum of all four asset types (listed above) provides the minimum network costs for the kilostream network.

Rationale and assumptions

There are two fundamental assumptions in this cost volume relationship:

Scorched Node Assumption: In this cost volume relationship BT maintains its existing geographical coverage of the kilostream network in terms of infrastructure to sites. This assumption means that the reach of BT's kilostream network is maintained nationally regardless of a change in the number of kilostream connections in the network.

Minimum Network: The fixed cost indicated by the y intercept on the graph shows the cost of the least amount of equipment required at all the existing ENA & ACE/MD202 sites. Also for every ENA sites there is a minimum of one customer connection. This is to simulate the minimum-working network required. For every one ENA site there must be at least one Customer NTE working This means that the fixed of this CVR has in place approximately 4800 NTE's before a 64kbit private is provided.

CV label	CV130
CV name	Private Circuits 2Mbit/s (Megastream Equipment)

CoW relationship - DTTM – Customer Wideband Services Private Circuits 2Mbit (Megastream Equipment)

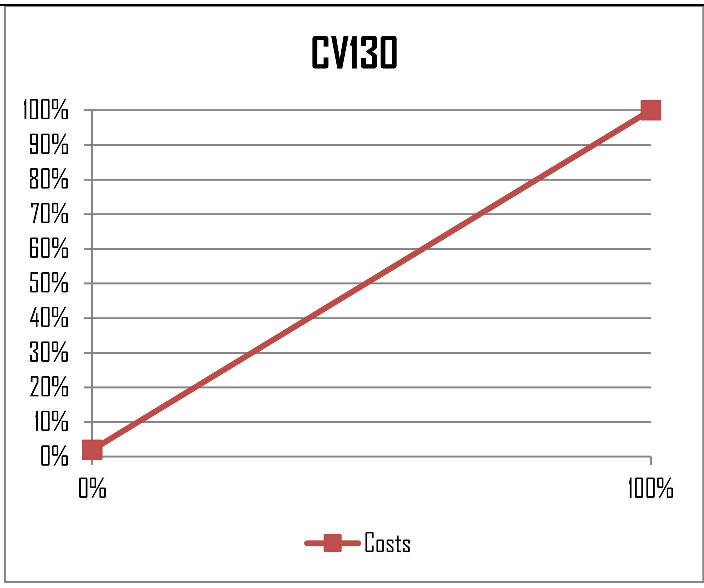
CV description- Variation in Access Wideband Electronics, in response to growth in customer demand for Wideband services.

CV type - Piecewise linear with fixed cost element.

CVR Co-ordinates

Straight line linear relationship with a fixed cost element

CV130	
Volumes	Costs
0%	2%
100%	100%



Definition of Costs & Volumes

In this CVR the costs are those, which represents all Megastream equipment in BTs private circuit network. This includes costs of contract, stores and labour for the construction, installation, commissioning, replacement, re-arrangement of equipment at local exchanges and customers' premises to carry Wideband services to customers.

The volume measure in this CVR is that of 2Mbit/s private circuit volumes over the access network.

CV derivation

This Cost Volume Relationship (CVR) describes how the costs of Megastream equipment in BT's private circuit network changes as the volume of 2mbit privates circuits change. The approach taken in the production of the CVR is based on a straight-line linear relationship with a fixed cost element. So the CVR has only two co-ordinates. Minimum and Maximum points.

Data sources

The costs of equipment for this CVR have been supplied from Customer Services System (CSS) database. The volumes measure for this CVR (No. of exchanges) has been supplied by the Access Management information System (AMIS).

Process / CVR Construction methodology

The cost volume relationship was constructed by deriving the minimum and maximum network valuations for the Megastream equipment in the BT's private circuit network. This CVR is has straight line linear relationship with a fixed cost element, which means there are only two co-ordinates (0% & 100%).

The existing network valuation (100% of Megastream equipment) uses the current cost accounting (CCA) valuation for CoW DTTM. The minimum network is calculated offline and is defined as the least cost network capable of providing existing geographic coverage for extreme low density of customer demand for Megastream services.

CVR Operation

The following steps describe how the CVR operates:

As described earlier this CVR has two co-ordinates. Minimum network & maximum network co-ordinates. The maximum network co-ordinate (100%) is taken as the value of the CCA valuation. The Minimum network co-ordinate is calculated using a model. This model takes into account two categories of assets that require volumes and/or costs. These are:

- Exchange Equipment (Racks, Shelves & Line Terminating Equipment (LTE))
- Customer Network Terminating Units (NTE).

The model works by calculating the minimum amount of equipment required at each existing Megastream serving site. The minimum amount of equipment required for each existing site is one rack, one shelf & one LTE. The minimum amount NTE's require at customer end premises is one, but two customer connections are assumed at each existing sites. This is because to customers connections make up an end to end private circuit. This assumption is based on the least cost network capable of providing existing service.

The sum of both asset types (listed above) provides the minimum network costs for the Megastream equipment in BT's private circuit network.

Rationale and assumptions

There are two fundamental assumptions in this cost volume relationship:

Scorched Node Assumption: In this cost volume relationship, BT maintains its existing geographical coverage of the Megastream equipment in terms of infrastructure to sites. This assumption means that the reach of Megastream service is maintained nationally regardless of a change in the number of 2Mbit private circuit connections in the network.

Minimum Network: The fixed cost indicated by the y intercept on the graph shows the cost of the least amount of Megastream equipment required at all the existing sites. Also for every existing sites there is a minimum of two customer connections. This is to simulate the minimum-working network required.

CV label	CV133
CV name	Apparatus
CoW relationship -	
CV description - Variation in apparatus costs in response to changes in apparatus volumes provided.	
CV type - Straight line through the origin.	
Definition of Costs & Volumes These assets are a heterogeneous mix of different types of Customer Premises Equipment (CPE). The volume measure in this CVR is the number of items of CPE demanded.	
CV derivation	
This Cost Volume Relationship (CVR) describes how the cost of items of CPE change as the demand for such equipment varies. <u>Process / CVR Construction methodology</u> The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs. <u>Rationale and assumptions</u> Apparatus costs are a direct function of the quantity of apparatus supplied. Apparatus costs are considered to be fully variable, dependent on the demand. The mix of apparatus products is independent of the level of provision.	

CV label	CV144
CV name	Other Private Circuits

CoW relationship - FBS - Flexible Bandwidth Services, RATE - Remote Access Test Equipment, CASCP - Provision/Installation of Cascade Equipment, LFS - Construction, Local OF Service Access Switches, CAMS - Computer Assisted Maintenance Support System

CV description - Variation in private circuit equipment costs, excluding Kilostream, Megastream and SMDS (Switched Multi-Megabit Data Service), in response to customer demand.

CV type - Straight line through origin.

Definition of Costs & Volumes

The costs relevant to this CVR are those for the contract, stores and labour for the construction, installation, commissioning, re-arrangement and recovery of equipment at exchanges and customer premises for Flexible Bandwidth Services, Remote Access Test Equipment, Cascade Equipment, Local OF Service Access Switches, Computer Assisted Maintenance Support System.

CV derivation

This Cost Volume Relationship (CVR) describes how the costs of Private Circuit equipment (excluding Kilostream, Megastream and SMDS) change as the volume of circuits varies.

Process / CVR Construction methodology

The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs.

Rationale and assumptions

As there is only one cost driver, a fully variable cost volume relationship is assumed. Purchasing economies of scale are assumed to be immaterial.

CV label	CV145
CV name	SMDS Switching

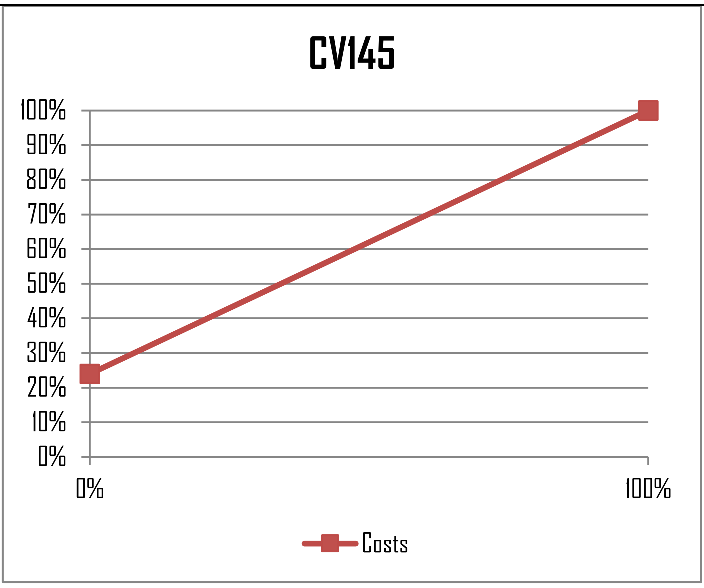
CoW relationship - SMDS - Switched Multimegabit Data Service

CV description - Variation in SMDS switch costs in response to growth in network capacity based on traffic volume.

CV type - Straight-line relationship with a fixed cost element.

CVR Co-ordinates

CV145	
Volumes	Costs
0%	24%
100%	100%



Definition of Costs & Volumes

The volumes are the total numbers of components required to put the network in operating order. These volumes are then multiplied by the unit price to come up with the total operating cost of the network.

CV derivation

The cost volume relationship for the SMDS network is derived from a two-point model, using the current CCA indexed historic valuation for the maximum network cost and a calculated valuation for the theoretical minimum network point.

Data sources

- Unit costs are obtained from supplier contracts whilst network volumes come from the database held by the capacity managers.
- The maximum network represents the Gross Replacement Cost (GRC) calculated at 03-04 year end. The bases of valuation is indexed historic.
- Minimum point on the curve – derived from current costs of equipment multiplied by the minimum numbers of those items of equipment. The theoretical minimum network configuration has been derived through discussions with the SMDS Implementation manager.
- Current SMDS contract prices for the individual items are provided by Alcatel.

Process CVR / Construction methodology

The minimum network point is calculated using a bottom up method, i.e. current contract costs are collated for individual items of equipment and then multiplied by the volumes of equipment required to maintain a minimum network, whilst adhering to the scorched node principle.

Non-capacity spend (e.g. Network Management) is a fixed cost, and as the number of nodes is constant, it does not vary between minimum and maximum network.

In applying the scorched node principle there are currently 17 Marconi nodes and 26 Alcatel nodes in the SMDS network. To provide a minimum network capable of delivering each type of data service that is currently supported, each node requires one customer facing E1 channelised card, one E1 unchannelised card, one HSSI card and one E3 card, plus one HSSI network card. Also included is the minimum network infrastructure to support these cards (racking, shelf, processors, etc.). Each node will consist of a STDX switch that is interconnected to two super nodes. These provide access to other SMDS nodes and the MSP. The latter provides access to SMDS customers outside the immediate area of the STDX9000 or super node.

Each super node consists of a C500 switch, which is connected to the MSP via STM-1 cards and the STDX9000s via HSSI cards.

Rationale and assumptions

The ATM nodes are all considered to be scorched nodes and remain constant. Minimum number of nodes is 43, plus 10 additional super nodes.

The valuation of the minimum network is based on the Alcatel current contract prices and configuration for two main reasons:

The quantities of obsolescent Marconi equipment in the network cannot be accurately determined, there are also variations in the typical equipment provided, so an accurate bottom up method cannot be easily applied to these assets.

- The Marconi network is being progressively replaced by the Alcatel network and therefore the Alcatel prices more accurately reflect costs in the long term.

There is a direct relationship between the number of ports and number of cards, hence it is reasonable that the relationship is linear.

The SMDS network consists of equipment from two suppliers, one of which is obsolete. The valuation from the minimum SMDS network is based on current prices for the newer equipment. These prices have been applied to the minimum network volumes required at all locations as if they were newly equipped.

CV label	CV149
CV name	Repayment Works

CoW relationship - HL - Repayment Work - Damage Repair, HK - Repayment Work – Alterations, HM - Repayment Work – Alterations, HO - Repayment Work - Alterations for Railway or ESI Authorities, HDU - Repayment Work – Damager, HUR - Repayment Work - Uneconomic Recovery, HN - Repayment Work - Non-BT, HNE - Repayment Work - Chargeable planning in advance of order, HSW - Repayment Work - Alterations (Major Works)

CV description - Variation in repayment works costs with the incidence of third party damage to BT's network.

CV type - Straight line through the origin.

Definition of Costs & Volumes

In this CVR the costs are those, which represents the costs incurred when a third party is responsible for damaging BT plant. This includes costs of repair or replacement of damaged BT apparatus anywhere within the external network including within the curtilage of a customer's premises. The volume measure in this CVR is that of the amount of damaged incurred.

CV derivation

This CVR describes how the costs of repayment works changes as the volume of damage incurred changes.

<u>Process / CVR Construction methodology</u>

Repayment work, the costs incurred when a third party is responsible for damaging BT plant, is probabilistic in nature. It is therefore appropriate that we plot a straight line through the origin given that zero damage incurs zero cost.

<u>Rationale and assumptions</u>

Damage caused to BT plant is unpredictable & variable by nature & it is therefore assumed that the associated costs will follow the same variable profile.

CV label	CV150
CV name	Storm Costs

CoW relationship - S - Repayment Work - Adverse Weather

CV description - Variation in costs of weather related damage.

CV type - Straight line through the origin.

Definition of Costs & Volumes

In this CVR the costs are those, which represents the costs incurred due to adverse weather conditions are responsible for damaging BT plant. This includes costs of repair or replacement of BT apparatus or property damaged as a result of severe adverse weather conditions.

The volume measure in this CVR is that of the amount of damaged incurred.

CV derivation

This Cost Volume Relationship (CVR) describes how the costs of repayment works changes as the volume of damage incurred changes.

Process / CVR Construction methodology

Repayment work, when adverse weather conditions are responsible for damaging BT plant, is probabilistic in nature. It is therefore appropriate that we plot a straight line through the origin given that zero damage incurs zero cost.

Rationale and assumptions

There is no empirical method for estimating the incidence of these storm-related activities.

CV label	CV155
CV name	Topographic Charges

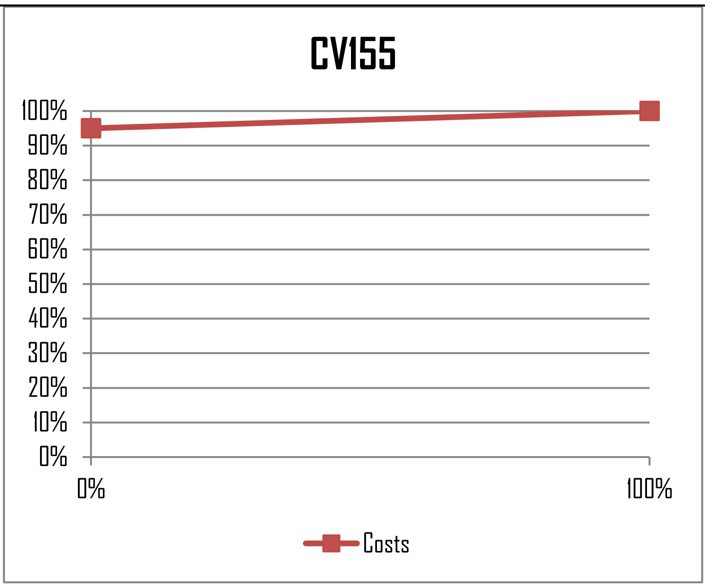
CoW relationship

CV description - Variation in the cost of topographic charges such as Wayleaves and Ordinance Survey maps in response to building and maintaining BT's network.

CV type - Straight line with intercept.

CVR Co-ordinates

CV155	
Volumes	Costs
0%	95%
100%	100%



Definition of Costs & Volumes

Topographic charges include the costs of Wayleaves and Ordinance Survey maps, which we incur to deploy and maintain our national network.

The volume measure in this CVR is the amount of Wayleaves and OS maps purchased to build and maintain BT's network.

CV derivation

This Cost Volume Relationship (CVR) describes how the costs of Wayleaves and Ordinance survey maps changes as the demand for these changes.

Process / CVR Construction methodology

We derived the intercept to be consistent with BT's minimum network. Under scorched node principle this cost is almost entirety fixed since it will be closely related to BT's duct network reach. We have therefore used the duct intercept of 95.2%. There are no purchasing economies and therefore we have used a straight line.

CVR Operation

N/A.

Rationale and assumptions

N/A.

CV label	CV156
CV name	POLOs and POAs

CoW relationship - N/A.

CV description - Variation in payments to UK operators (POLOs) and overseas operators (POAs) for the delivery of calls over their networks.

CV type - Straight line through origin.

Definition of Costs & Volumes

The 'costs' involved are those of the actual payments made from BT to other domestic or international organisations. The volume is the demand for interconnect and international services.

CV derivation

Payments to other operators, in the UK and overseas, is a direct function of prices and the volume of interconnect and international calls respectively. No purchasing or other economies of scale or scope are available and thus a straight line through the origin results. This means that Payments to Other Licensed Operators (POLOs) and Payments to Overseas Administrations (POAs) are fully variable, increasing proportionately as the levels of calls increases.

Process / CVR Construction methodology

The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs.

Rationale and assumptions

The mix of interconnect and international traffic and its geographic distribution is assumed to be insensitive to changes in volume.

CV label	CV158
CV name	Retail and Other
CoW relationship - N/A.	
CV description - Variation in Retail and Other costs in response to Retail and Other activities.	
CV type - Straight line through origin.	
Definition of Costs & Volumes A fully variable relationship is applied to ensure that Retail and Other costs are excluded from Combined Access and Network.	
CV derivation	
This Cost Volume Relationship (CVR) describes how a mixture of retail and other costs varies with volume. Process / CVR Construction methodology The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs Rationale and assumptions The use of a fully variable cost volume relationship for costs which are not associated with Combined Access and Network is a simplification (with no impact for Inland PSTN and private circuits) and does not imply that BT believes this relationship holds in reality.	

CV label	CV159
CV name	Customer works
CoW relationship- CWC –Customer Works Group Co-ordination, CWP - Customer Work Group -Planning	
CV description - Variation in the cost of the customer facing general maintenance works in response to changes in the volume of apparatus and line faults.	
CV type - Straight line through the origin.	
Definition of Costs & Volumes In this CVR the costs are those which represent the costs of the customer facing general maintenance works. The majority of the cost of customer works is engineering pay which will vary proportionately with the volume of faults reported. The volume measure in this CVR is that of the volume of line faults.	
CV derivation	
This Cost Volume Relationship (CVR) describes how the cost of customer works changes as the volume of lines faults changes. Process / CVR Construction methodology Customer works, mostly engineering pay will vary proportionately with the volume of faults reported. It is therefore appropriate that we plot a straight line through the origin given that zero line faults incur zero cost. CVR Operation Straight line through the origin. Rationale and assumptions Mix and average repair times are assumed to be independent of scale.	

CV label	CV160
CV name	Field Support Operations
CoW relationship - FSO – Field Support Office	
CV description - Variation in the cost of the field support operations in response to changes in the volume of engineering staff external activities.	
CV type - Straight line through the origin.	
Definition of Costs & Volumes	
In this CVR the costs are those, which represent the costs of engineering time in dedicated Field Support Offices for Field Operations only. This includes costs of allocation of work to the field, ordering stores for the field, and all field support office administration work. The volume measure in this CVR is that of the amount of engineering staff external activities.	
CV derivation	
This Cost Volume Relationship (CVR) describes how the costs of field support operations change in response to changes in the volume of engineering staff external activities. <u>Process / CVR Construction methodology</u> Field support operations are assumed to increase linearly as the level of field activity increases. It is therefore appropriate that we plot a straight line through the origin given that zero damage incurs zero cost. <u>CVR Operation</u> Straight line through the origin. <u>Rationale and assumptions</u> N/A – straight line through origin.	

CV label	CV161
CV name	Installation Control
CoW relationship - ICO - Provision & Installation (Installation Control Office) distribution	
CV description - Variation in the cost of the Installation control operations in response to changes in the volume of provision and installation activities.	
CV type - Straight line through the origin.	
Definition of Costs & Volumes In this CVR the costs are those, which represent the costs of engineering time in dedicated Installation Control Offices for P&I Operations only. The volume measure in this CVR is that of volume of provision and installation activities.	
CV derivation	
Installation control support costs are driven by a variety of activities which are not separately recorded but which include activities such as the co-ordination of the flow of work to BT's engineering field force. This Cost Volume Relationship (CVR) describes how the costs of these installations control support costs change in response to changes in the volume of provision and installation activities. Process / CVR Construction methodology Installations are assumed to increase linearly as the level of provision and installation activities increases. It is therefore appropriate that we plot a straight line through the origin given that zero damage incurs zero cost. Rationale and assumptions N/A – straight line through origin.	

CV label	CV162
CV name	Other Support Activities

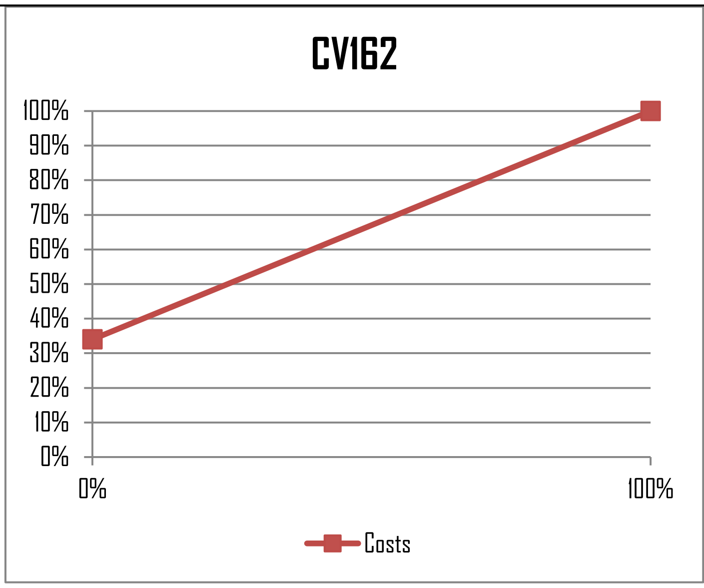
CoW relationship - DTO - Diagnostic Testing Officers, WMC - Work Manager Control - PC Staff Only, SPI - Other Support Activities

CV description - Variation in the cost of the other support activities in response to changes in the volume of demand for management support.

CV type - Straight line with intercept.

CVR Co-ordinates

CV162	
Volumes	Costs
0%	34%
100%	100%



Definition of Costs & Volumes

In this CVR the costs are for support activities undertaken by engineers within the work manager centres (managing and operating the work manager system), time spent on diagnostic testing duties, and support activities for provision and installation work. The volume measure in this CVR is that of volume of demand for such support activities.

CV derivation

Other support costs within the work management centres are driven by a variety of activities. This Cost Volume Relationship (CVR) describes how these other support costs change in response to changes in the volume of demand for these activities.

We calculated the intercept to be consistent with a minimum network as follows:

- We took information on the allocation of costs by component from the REFINE allocation system;
- For each component, we identified a minimum network intercept, based on assumptions used within the LRIC model
- We calculated a cost-weighted average of component intercepts.

Dependencies
CV901 (Duct).

Changes

None in 2017-18.

Process / CVR Construction methodology

Individual cost lines and F8 codes have been analysed to ascertain the level of common costs in line with the scorched node and minimum network assumptions. Given the general nature of this expenditure, the costs are assumed to vary proportionately with the level of demand for management support.

Rationale and assumptions

N/A.

CV label	CV168
CV name	General Management & Other

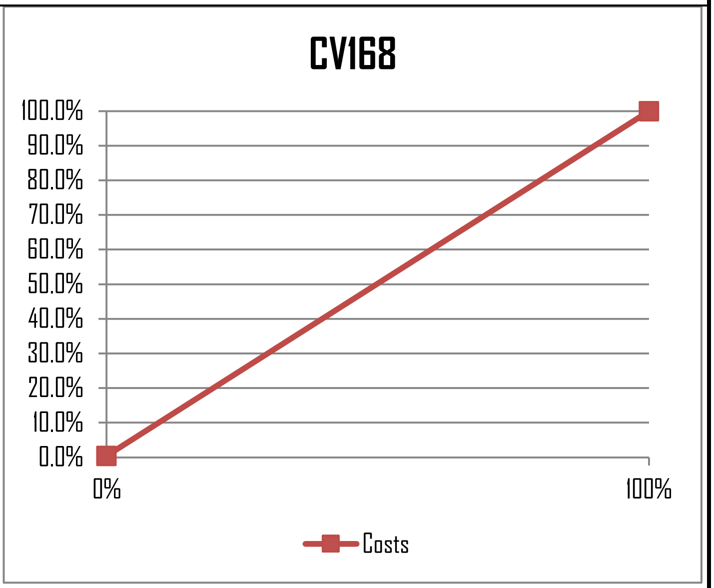
CoW relationship - N/A.

CV description - Variation in general management costs in response to changes in headcount (proxied by pay).

CV type - linear with y-axis intercept.

CVR Co-ordinates

CV168	
Volumes	**Costs**
0%	0.4%
100%	100.0%



Definition of Costs & Volumes

The costs included are a heterogeneous mixture. They include: management consultancy, AGM costs, Crown Estates legal fees, Employee shareholding, audit fees (including statutory accounts), royalties, production and filing of Securities reports, shareholders registration. The volume driver is pay.

CV derivation

General Management 'Other' is a heterogeneous cost category incorporating all general management costs excluding legal fees, insurance and certain provisions. As the majority of 'Other' general management costs are employee related the overall driver is proxied by pay.

Certain elements of these heterogeneous costs are unrelated to headcount and therefore a proportion of these costs is assumed to be fixed giving rise to a (small) y-axis intercept at zero volume.

Data sources

The data for this CVR is taken from the REFINE model.

Process / CVR Construction methodology

All Retail F8/OUC combinations for the General Management & Other sector (BF) are extracted from REFINE. Combinations without a CVR take the default CVR of LRIC = FAC (viz. a straight line). The data is weighted together to obtain the curve co-ordinates for the sector average curve.

CVR Operation	Other
N/A	N/A

Rationale and assumptions

The profile of the employee population is assumed to be constant over the full volume range.

CV label	CV169
CV name	General Management & Other, legal charges & other fees

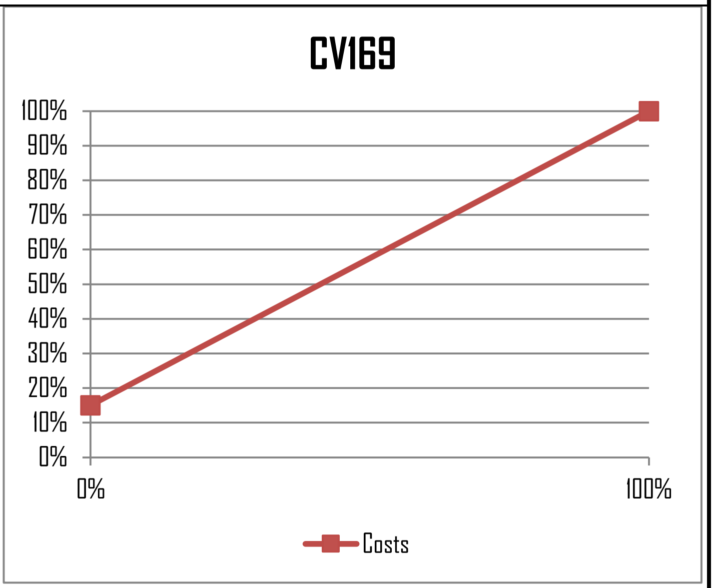
CoW relationship- None.

CV description - Variation in legal charges and other fees in response to changes in headcount (proxied by pay).

CV type - Straight line with y-axis intercept.

CVR Co-ordinates

CV169	
Volumes	Costs
0%	15%
100%	100%



Definition of Costs & Volumes

The costs comprise: legal charges, overseas advisors and Patents & Agents fees.

CV derivation

The provision of legal services is due to ad hoc, statutory and discretionary requirements, and the activity is a heterogeneous mix. Given the composite nature of this cost category, including such costs as patents and agents fees, legal and overseas advisor costs, it is reasonable to assume that legal costs are broadly related to the scale of operations. Headcount, proxied by payroll, is assumed to be a reasonable driver.

The y-intercept is due to a proportion of the legal costs, principally those incurred in relation to patents and license fees, being unrelated to the level of operations i.e. at zero volume (zero headcount) certain legal costs, such as patents and license fees, will continue to be required.

<u>Data sources</u>

The data on which this CVR is based is extracted from BT's accounting separation systems, REFINE.

<u>Process / CVR Construction methodology</u>

The values of spend against each of the relevant F8 codes is summed to give the 100% figure. The minimum is calculated by identifying those F8 codes which will have spend against them.

<u>Rationale and assumptions</u>

Even at the minimum point annual payments must be made during the life of patent in order to maintain ownership of it.

CV label	CV170
CV name	Motor Transport, fixed assets and depreciation

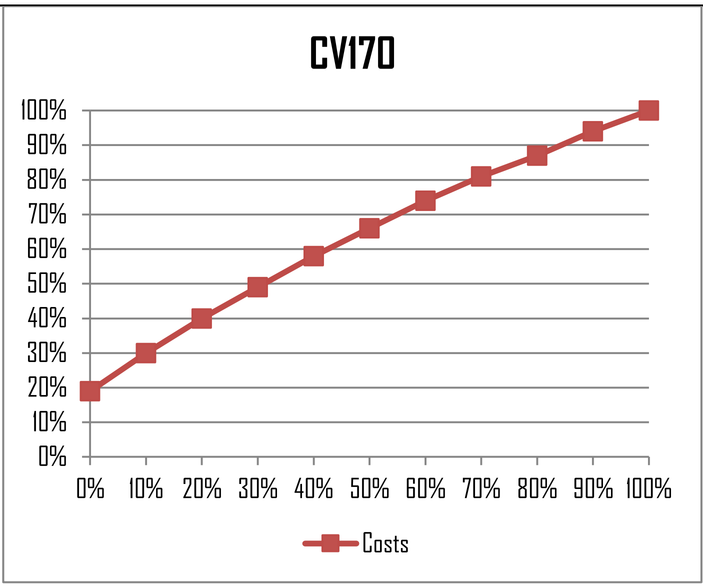
CoW relationship - LNV - New Vehicles – Leased, NVAC - New Vehicles & Accessories.

CV description - Variation in motor transport capital investment in response to changes in the cost weighted demand for motor vehicles.

CV type - Piecewise linear with intercept.

CVR Co-ordinates

CV170	
Volumes	Costs
0%	19%
10%	30%
20%	40%
30%	49%
40%	58%
50%	66%
60%	74%
70%	81%
80%	87%
90%	94%
100%	100%



Definition of Costs & Volumes

This category includes BT's fleet of vans and operational vehicles, and its fleet of company cars.

CV derivation

The key driver of capital investment in motor transport is the number of people who require motor vehicles, and the activities which they undertake.

We calculated a "minimum network" intercept in order to be consistent with the "scorched node" and "thinning" assumptions. To do this, we analysed how motor transport costs were allocated across the various network components and products within BT's REFINE system. For each component, we identified an intercept point that was consistent with a minimum network assumption, based on assumptions used within the LRIC model. For costs allocated directly to product, we used a minimum point of zero. We calculated the overall intercept as the cost-weighted average of the individual component and product intercepts.

The non-linear nature of the cost volume relationship is due to purchasing economies at higher volumes. At lower volumes the purchasing economy as a proportion of total investment cost falls. BT receives a volume discount which increases linearly with increasing numbers of vehicles to a maximum discount when the 80% volume is reached. Beyond this point the discount remains constant. Discounts are weighted into a single average discount rate that is flexed as volumes reduce, using a pro-rata approach: i.e. by applying the single average discount rate at 100% to each volume step down to zero volumes.

<u>Changes</u> None in 2017-18.

<u>Data sources</u>

The data comes from contract details and purchasing records, and from allocations within BT's REFINE system.

<u>Rationale and assumptions</u>

The mix and quality profile of the vehicle fleet is assumed to be independent of demand for motor vehicles.

CV label	CV171
CV name	Motor Transport, licences

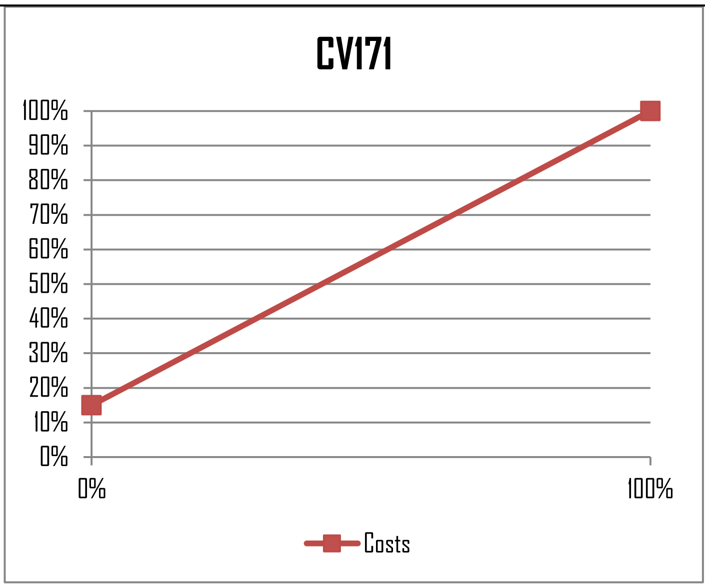
CoW relationship- N/A.

CV description - Variation in the cost of licensing BT's commercial vehicle fleet and personal cars in response to changes in the demand for motor vehicles.

CV type - Straight line with intercept.

CVR Co-ordinates

CV171	
Volumes	**Costs**
0%	15%
100%	100%



Definition of Costs & Volumes

The costs comprise the license with a pay-weighted volume driver.

CV derivation

Licence costs are fixed by vehicle type. As it is assumed that there is a constant mix of vehicle types throughout the cost volume range, and that total license costs will be fully flexible with the number of vehicles, the key driver of the number of vehicles is the number of people who require motor vehicles.

We calculated the intercept to be consistent with a minimum network as follows:

- We took information on the allocation of transport costs by component and product from the REFINE allocation system.
- For each component, we identified a minimum network intercept, based on the assumptions used within the LRIC model.
- For costs allocated to product, we assumed zero intercept.
- We calculated a cost-weighted average of component and product intercepts.

There are no purchasing economies, hence the CVR is a straight line between the minimum and maximum points.

<u>Rationale and assumptions</u>

It is assumed that the mix of vehicle types remains constant over cost-volume increments.

CV label	CV172
CV name	Motor Transport, fuel

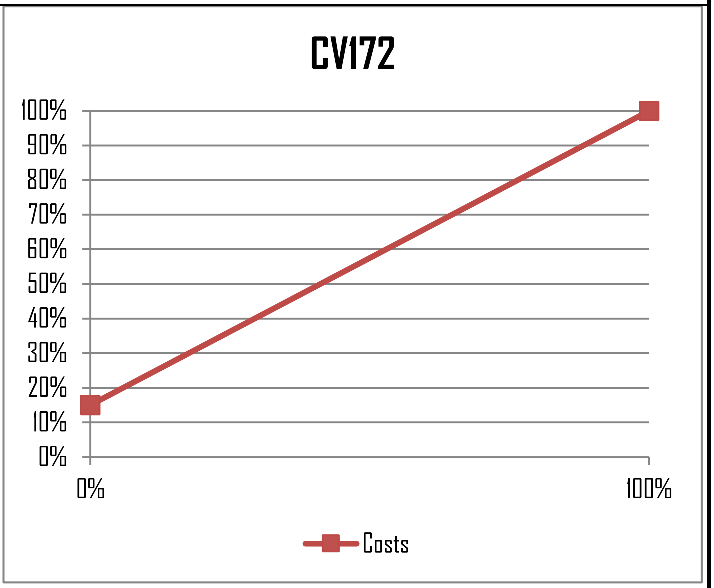
CoW relationship - N/A.

CV description- Variation in fuel costs in response to changes in the demand for motor vehicles.

CV type - Straight line with intercept.

CVR Co-ordinates

CV172	
Volumes	Costs
0%	15%
100%	100%



Definition of Costs & Volumes

The costs are those of the fuel consumed in response to the demand for fuel (volume).

CV derivation

The key determinants of fuel costs are the volume of fuel consumed and the price of fuel consumed.

Fuel is largely purchased individually by vehicle drivers, and although BT is a heavy consumer of fuel, this method of purchasing generates no purchasing economies. The main driver of fuel costs is therefore the number of vehicles which is in turn driven by the number of people. As it is assumed that there is a constant mix of vehicle types throughout the cost volume range, total fuel costs will be fully variable with the number of vehicles.

We calculated the intercept to be consistent with a minimum network as follows:

- We took information on the allocation of transport costs by component and product from the REFINE allocation system;
- For each component, we identified a minimum network intercept, based on the assumptions used within the LRIC model;
- For each product, we assumed zero intercept; and
- We calculated a cost-weighted average of the component and product intercepts.

<u>Rationale and assumptions</u>

It is assumed that the mix of vehicle types, fuel efficiency and average mileage per vehicle remains constant over cost-volume increments.

CV label	CV173
CV name	Motor Transport, Other

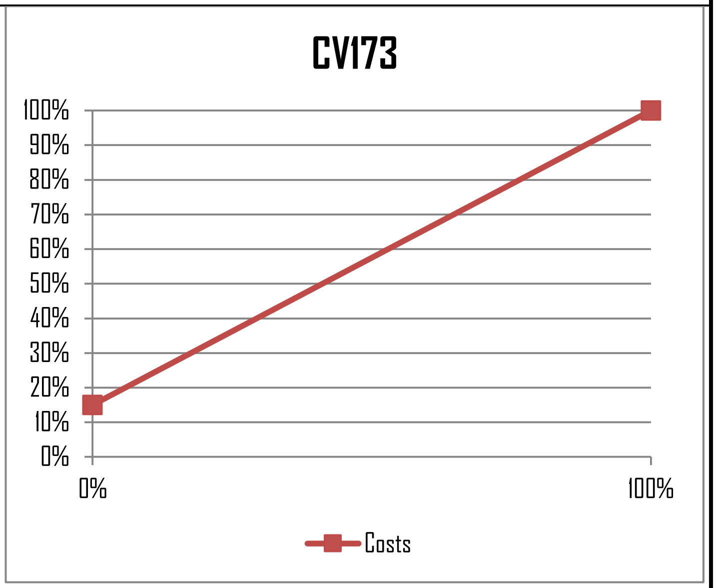
CoW relationship - N/A.

CV description - Variation in 'other' motor transport costs, such as fleet management, maintenance and spare parts, in response to changes in the cost weighted demand for motor vehicles.

CV type - Straight line with intercept.

CVR Co-ordinates

CV173	
Volumes	**Costs**
0%	15%
100%	100%



Definition of Costs & Volumes

The costs comprise those of acquiring, maintaining, managing and retiring BT's fleet of vans and company cars. This include the costs of spare parts and also of both BT and agency staff.

CV derivation

'Other' motor transport costs vary in direct proportion to the size of the vehicle fleet.

We calculated the intercept to be consistent with a minimum network as follows:

- We took information on the allocation of transport costs by component and product from the REFINE allocation system;
- For each component, we identified a minimum network intercept, based on the assumptions used within the LRIC model
- For each product, we assumed zero intercept
- We calculated a cost-weighted average of the component and product intercepts

Rationale and assumptions

It is assumed that the mix of vehicle types remains constant over cost-volume increments.

CV label	CV174
CV name	Personnel and administration

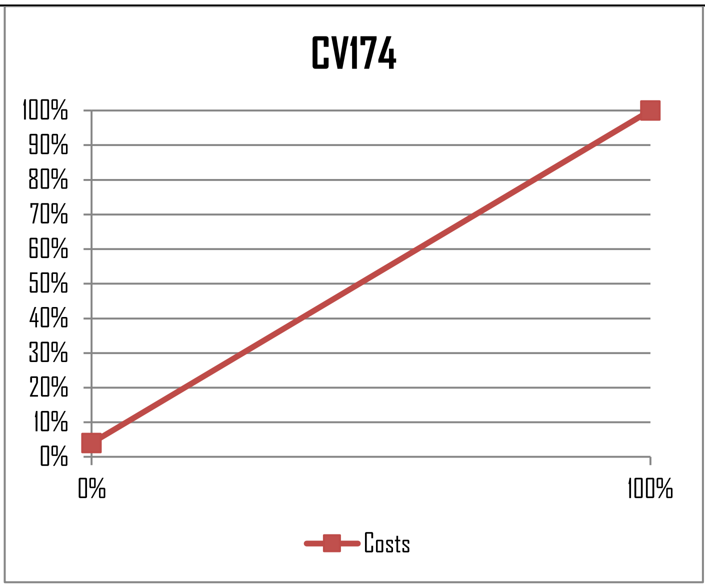
CoW relationship- N/A

CV description - Changes in pay and non-pay personnel and administration costs in response to changes in headcount (proxied by pay).

CV type - linear with intercept.

CVR Co-ordinates

CV174	
Volumes	**Costs**
0%	4%
100%	100%



Definition of Costs & Volumes

The costs comprise a heterogeneous mix of personnel and administrative pay and non-pay elements. These are driven by the volume of work, i.e. headcount proxied by pay.

CV derivation

Personnel department costs are driven by a combination of staff numbers, the complexity of personnel policies, the standard of service required from the personnel function by senior management, the technology used and the organisational structure. To some degree it is influenced by the extent to which personnel responsibilities are allocated to line managers rather than being undertaken by the personnel function. Most of the costs are driven by headcount, proxied by pay. Some costs, however, such as stationery have a small minimum stock requirement in order for the business to operate. Hence, this results in a small fixed cost.

Data sources

The data for this CVR is taken from the REFINE model.

Process / CVR Construction methodology

All Retail F8/OUC combinations for the Personnel & Administration sector (BE) are extracted from REFINE. Combinations without a CVR take the default CVR of LRIC = FAC (viz. a straight line). The data is weighted together to obtain the curve co-ordinates for the sector average curve.

Rationale and assumptions

Constant pay rate with volume.

The mix of complexity of work is constant with volume.

CV label	CV180
CV name	Trading stocks

CoW relationship - N/A.

CV description - Variation in the costs of trading stock held by BT.

CV type - Straight line through the origin.

Definition of Costs & Volumes

The costs represent those of the apparatuses supplied with a volume driver of the number of such items sold (proxied by ASB turnover).

CV derivation

The key driver of the cost of stocks is the level of stocks. As the majority of stocks are apparatus related the level of stocks would be driven by the size of the apparatus business, as proxied by ASB turnover. The level of stocks held is considered to increase proportionately as ASB turnover increases.

This curve is therefore assumed to be fully variable.

Process / CVR Construction methodology

The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs. As this is a straight line through the origin, no data sources have been used in computing the minimum and maximum co-ordinates.

Rationale and assumptions

N/A.

CV label	CV181
CV name	Provisions
CoW relationship- N/A.	
CV description - Variation in 'Other provision' costs in response to demand for provisions.	
CV type - Straight line through the origin.	
Definition of Costs & Volumes Costs include warranty, shop, and Head Office provisions.	
CV derivation	
Some of BT's largest provisions (e.g. Pension Provision) are treated individually in separate CVRs. This CVR encompasses numerous 'Other Provisions' such as warranty provisions, shop provisions and Head Office provisions. 'Other provisions' arise on a probabilistic basis. Accordingly, they are treated as fully variable with the factors and/or events that caused them to be incurred. <u>Process / CVR Construction methodology</u> The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs. As this is a straight line through the origin, no data sources have been used in computing the minimum and maximum co-ordinates. <u>Rationale and assumptions</u> The mix of the different types of provision remains constant with volume.	

CV label	CV182
CV name	Pension provisions
CoW relationship - N/A.	
CV description - Variation in pension provisions in response to changes in payroll.	
CV type - Straight line through the origin.	
Definition of Costs & Volumes The costs are the contributions made by BT to the pension schemes that it runs. The 'volume' is measured by the assemble level of pay.	
CV derivation	
BT runs both defined benefit (final salary) and money purchase (defined contribution) pension schemes. The driver for pension provisions is pay costs as BT's contribution to each scheme is a percentage of pay costs. This means that pension provisions takes, as its distribution of LRIC across increments, the exact same pattern as the LRIC observed within pay. This curve is therefore fully variable with relation to changes in pay costs. <u>Process / CVR Construction methodology</u> The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs. As this is a straight line through the origin, no data sources have been used in computing the minimum and maximum co-ordinates. <u>Rationale and assumptions</u> The mix of salaries and therefore pension contribution levels is assumed to vary uniformly throughout the CVR.	

CV label	CV185
CV name	Short term interest
***CoW relationship* - N/A.**	
***CV description* -** Variation in short terms interest payments in response to changes in net cash & short-term investments.	
***CV type* -** Straight line through the origin.	
Definition of Costs & Volumes The costs are the payments of interest made by BT.	
CV derivation	
Short-term interest is a direct proportion of the net level of investments, assuming a constant interest rate over the cost volume function. This means that the short-term interest takes, as its distribution of LRIC across increments, the exact same pattern as the LRIC observed within cash. This curve is therefore fully variable. Process / CVR Construction methodology The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs. As this is a straight line through the origin, no data sources have been used in computing the minimum and maximum co-ordinates. Rationale and assumptions The effective interest rate paid is constant across the volume of borrowings.	

CV label	CV189
CV name	Per Cent Club
CoW relationship- N/A.	
CV description - Variation in charitable donations in response to changes in the level of capital employed.	
CV type - Straight line through the origin.	
Definition of Costs & Volumes The costs are the payments made to the range of charities supported by BT.	
CV derivation	
This is the amount of money, decided by the BT Board each year, allocated for charitable donations. The key determinant of Per Cent Club costs is the level of pre-tax profits. In the long run, a constant 'normal' rate of return might be expected across the BT Group. Total capital employed can therefore be taken as the key driver of Per Cent Club costs. This curve is therefore fully variable. Process / CVR Construction methodology The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs. As this is a straight line through the origin, no data sources have been used in computing the minimum and maximum co-ordinates. Rationale and assumptions There is a linear relationship between Profits and Capital Employed because of BT's imposed, regulated ROCE regime.	

CV label	CV190
CV name	Own Use
CoW relationship - N/A.	
CV description - Variation in the cost of the use of BT's Network in response to changes in the volume of own use.	
CV type - Straight line through origin.	
Definition of Costs & Volumes The costs here are a mix of the range of service and products consumed by BT, with demand being the measure of volume.	
CV derivation	

In order to provide commercially available products and services, it is necessary that BT uses communications equipment and services itself. A company would not build its own network simply to process its own calls. The company would purchase telephony services on a per usage basis. Accordingly, the costs of own use are fully variable with the volume of BT's own use requirements and a fully variable curve is the result.

<u>Process / CVR Construction methodology</u>

The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs. As this is a straight line through the origin, no data sources have been used in computing the minimum and maximum co-ordinates.

<u>Rationale and assumptions</u>

The mix of the different types of products and services used is independent of volume.

CV label	CV191
CV name	Provision and Installation
CoW relationship – N/A.	
CV description - Variation in Provision and Installation costs in response to demand for the provision and installation of customer lines.	
CV type - Straight line through the origin.	
Definition of Costs & Volumes The costs are made up of a wide range of sources indicated by the range of CoWs shown at the end of this document.	
CV derivation	
Provision and Installation costs are dependent on the demand by customers for the provision and installation of customer lines. At zero volume of demand, there would be zero costs. It is also understood that any economies of scale are likely to be very small. This curve is therefore treated as fully variable. Process / CVR Construction methodology The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs. As this is a straight line through the origin, no data sources have been used in computing the minimum and maximum co-ordinates. Rationale and assumptions It is assumed that the scale effects of P&I costs are immaterial.	

CV label	CV193
CV name	Office Machines

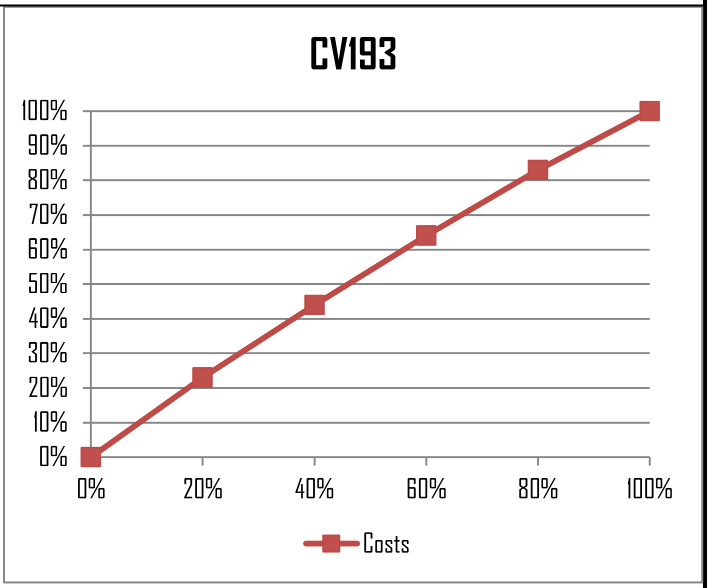
CoW relationship **-** IDX – Big and Large Switches for BT's own use, OM - Office Machines (BT own use).

CV description **-** Variation in Office Machine costs in response to headcount proxied by pay.

CV type **-** Piecewise linear through the origin.

CVR Co-ordinates

CV193	
Volumes	**Costs**
0%	0%
20%	23%
40%	44%
60%	64%
80%	83%
100%	100%



Definition of Costs & Volumes

Costs comprise those of office machines while the volume driver is represented as pay.

CV derivation

The demand for office machines, such as fax machines and photocopiers, is determined by headcount, which is proxied by pay.

Data sources

Used CV029 co-ordinates.

Process / CVR Construction methodology

N/A.

Rationale and assumptions

BT is able to obtain purchasing economies of scale due to volume discounts resulting in a curved CV relationship. These economies of scale are assumed to be equivalent to those for the computing assets cost volume relationship CV029.

References – See CV029

CV label	CV194
CV name	Operator Assistance - BT Pay

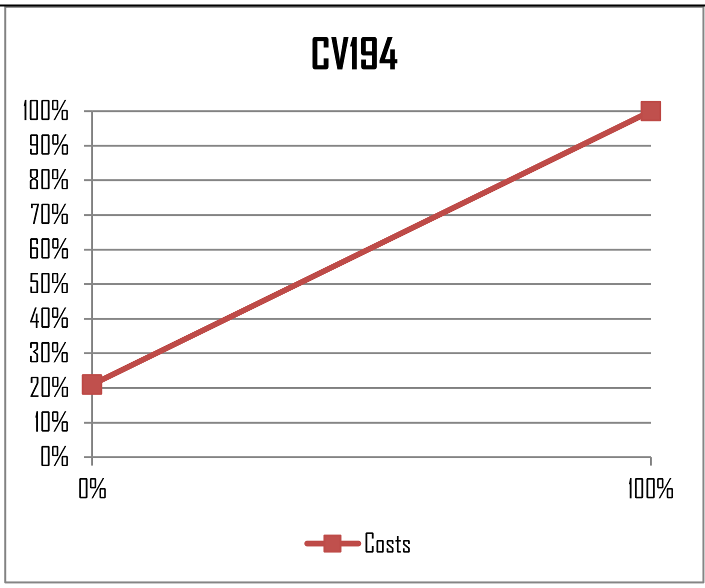
CoW relationship - N/A.

CV description- Variation in BT operator pay costs in response to demand for operator assistance activities.

CV type - Straight line with y-axis intercept.

CVR Co-ordinates

CV194	
Volumes	Costs
0%	21%
100%	100%



Definition of Costs & Volumes

The costs are the pay costs received by BT staff in providing operator assistance. The volume driver is the demand for operator assistance.

CV derivation

BT operator pay costs are driven by the demand for Operator Assistance services, such as Inland OA, International OA and Emergency 999.

An intercept is created by the (low) level of operations required to process a minimum level of operator assistance and to meet existing quality of service provision.

Data sources

The minimum point is modelled by assuming there to be two operator assistance centres. The number of staff (needed to provide 24 hour, year round service) and their respective grades and pay rates are then used to calculate the total pay costs at this minimum point.

Process / CVR Construction methodology

None.

Rationale and assumptions

Quality of service must be maintained.

Constant pay rate with volume.

Constant ratio of managers to operators for each shift is assumed for the minimum network.

CV label	CV198
CV name	Operator Services Agency Costs

CoW relationship - N/A.

CV description - Variation in Agency pay costs in response to demand for Operator Services activities.

CV type - Straight line through the origin.

Definition of Costs & Volumes

Agency pay costs are driven by the demand for Operator Services, such as Inland Operator Assistance (OA), International OA and Emergency (999), Inland Directory Enquiries (DQ) and International DQ.

CV derivation

Agency staff costs vary proportionately with the demand for agency staff. Agency staff are employed as and when required to supplement full-time employees.

This curve is therefore considered to be fully variable.

Process / CVR Construction methodology

The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs. As this is a straight line through the origin, no data sources have been used in computing the minimum and maximum co-ordinates.

Rationale and assumptions

A constant rate of agency pay is assumed.

At minimum operator service levels, all operators will be BT staff and therefore costs will be driven by CV194.

References – CV194

CV label	CV199
CV name	Insurance

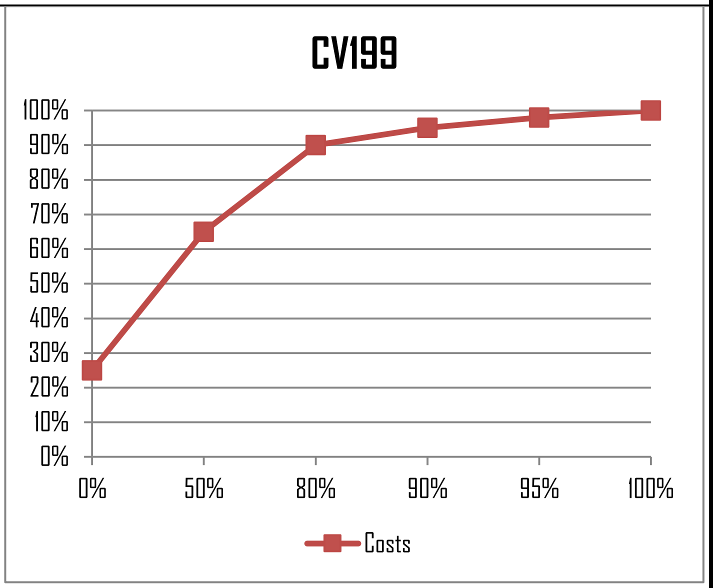
CoW relationship - N/A

CV description - Variation in insurance costs in response to changes in headcount (proxied by pay).

CV type - Straight line with y-axis intercept.

CVR Co-ordinates

CV199	
Volumes	Costs
0%	25%
50%	65%
80%	90%
90%	95%
95%	98%
100%	100%



Definition of Costs & Volumes

In this CVR the costs are those, which represent the costs of general insurance costs. The volume measure in this CVR is that of the level of headcount.

CV derivation

As the majority of insurance costs are employee related the overall driver is proxied by pay. Certain insurance costs, such as terrorism, property and storm cover, are unrelated to headcount. These costs are assumed to be fixed which gives a y-axis intercept at zero volume. Constant returns to scale thereafter have been assumed and the curve is therefore a straight line.

<u>Data sources</u>

The data is sourced from MICRA CVR 41, which models Insurance Cover expenditure for BT and its Subsidiary companies world-wide. This includes:

Property Loss or Damage / Business Interruption; Terrorism; Public / Product / Professional Liability; Building and Motor Vehicles.

<u>Process / CVR Construction methodology</u>

None.

<u>Rationale and assumptions</u>

The profile of the employee population is assumed to be constant over the full volume range.

CV label	CV200
CV name	Pay Accounting & Management Services Costs
CoW relationship - N/A.	
CV description - Variation in accounting and management services costs in response to demand for accounting and management services.	
CV type - Straight line through the origin.	
Definition of Costs & Volumes The costs include: exercising fraud and debt control, operating the billing, collection and procurement processes, providing commercial advice and support, and providing financial accounting, audit, treasury and payroll services.	
CV derivation	
Accounting and management functions are determined by factors such as complexity of operations, size of company, product range, and requirements from the accounting and management functions. It is assumed that accounting and management services pay have a 'straight line through origin' relationship to the demand for accounting and management services. This curve is therefore considered to be fully variable. Process / CVR Construction methodology The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs. Rationale and assumptions Assumed that the perfect long run planning situation holds such that BT will vary its total headcount to avoid under/overstaffing.	

CV label	CV202
CV name	Accrued Income
CoW relationship - N/A.	
CV description - Variation in accrued income in response to changes in income.	
CV type - Straight line through the origin.	
Definition of Costs & Volumes The ‘cost’ here is the accrued income, while the ‘volume’ is the level of income.	
CV derivation	
Accrued income is a function of company size and frequency of billing. Assuming that frequency of bills sent remains the same, as call minutes (for example) increase, the average number of unbilled minutes is expected to increase. As billing frequency increases, accruals are expected to decrease. If the billing period is independent of company size, accruals are a function of call minutes that are proxied by call income. This means that accrued income takes, as its distribution of LRIC across increments, the exact same pattern as the LRIC observed within call income. This curve is therefore fully variable. <u>Process / CVR Construction methodology</u> The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs. <u>Rationale and assumptions</u> This CV assumes that accrued income is sampled at the same point in time and bills are sent at the same frequency, irrespective of size of company.	

CV label	CV204
CV name	Other computing costs

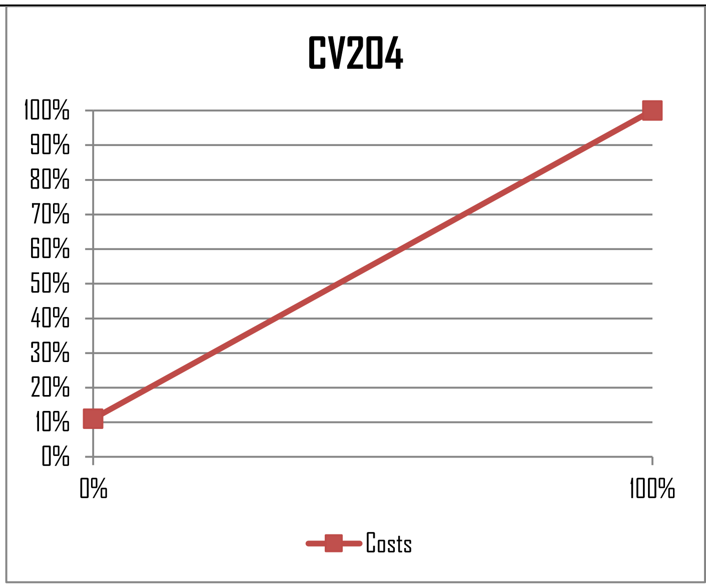
CoW relationship - N/A.

CV description - Variation in computer operational expenditure in response to changes in the demand for computing systems.

CV type – straight line with intercept.

CVR Co-ordinates

CV204	
Volumes	Costs
0%	11%
100%	100%



Definition of Costs & Volumes

The costs to which this CVR is applied comprise a range of software related costs (including both internally developed and externally purchased software), and other computing costs. It includes Mean Capital Employed and related depreciation (where software and development costs are capitalised), and also other expensed computing and development costs. The costs exclude computing hardware (see CV029).

The volumes are those of the software / computing systems and activities.

CV derivation

The costs that use this CVR include both software that is developed internally, and purchased from external suppliers. Internally developed software includes a variety of systems that BT uses to support its network operations, business processes, and development of key products. Externally purchased software also includes a variety of applications, including database software, desktop software, and generic off-the-shelf packages.

We calculated a "minimum network" intercept to be consistent with the "scorched node" and "thinning" principles. For computing assets, the minimum network is that which provides the capability to support key business processes and systems at scale deployment. In particular, this CVR needs to be consistent with the minimum network definition in other parts of the LRIC model. We assume that it supports the minimum network infrastructure and platforms (i.e. both in core and access), and associated business process (network monitoring, repair, fault handling, order taking, work manager systems, etc.).

Our approach to constructing the minimum network intercept was as follows:

- We sub-analysed software and other computing costs by Line of Business and by F8 code, based on information from the REFINE system.
- For any costs designated as "cost of sales", we assumed a zero intercept. These costs do not support a minimum network.
- For any costs incurred in BT retail and Global Services we assumed a zero intercept, since these costs do not support a minimum network;
- For costs in Openreach, BT Wholesale and BT Operate, we calculated an intercept based on an analysis of software spend by system / application provided by BT Operate. For each system / application, we established the platform, product or activity being supported, and determined the fixed cost proportion, based on existing assumptions within the LRIC model.

- The overall intercept was calculated as a cost-weighted average of the individual intercepts described above.

Data sources

REFINE system: for sub-analysis of key cost be F8 code and Line of Business

BT Operate: for sub-analysis of software / computing spend by system / application

Process / CVR Construction methodology

N/A.

Rationale and assumptions

N/A.

References

See CV029

CV label	CV207
CV name	Sales and Marketing costs

CoW relationship - N/A.

CV description - Variation in sales & marketing costs in response to demand for sales and marketing.

CV type - Straight line through the origin.

Definition of Costs & Volumes

The costs comprise a heterogeneous mixture of dealer commission and bonuses, marketing, market research, advertising, sponsorship and managing campaigns, publicity, brand development, monitoring and production of media, promotions.

CV derivation

An overall driver for marketing and sales is difficult to ascertain. It is assumed that sales and marketing costs are fully variable. Most of these costs relate to retail and activity and thus fall outside the model.

Process / CVR Construction methodology

The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs.

Rationale and assumptions

The relative proportion of each type of cost is constant across the range of volumes.

CV label	CV208
CV name	Other finance and billing costs

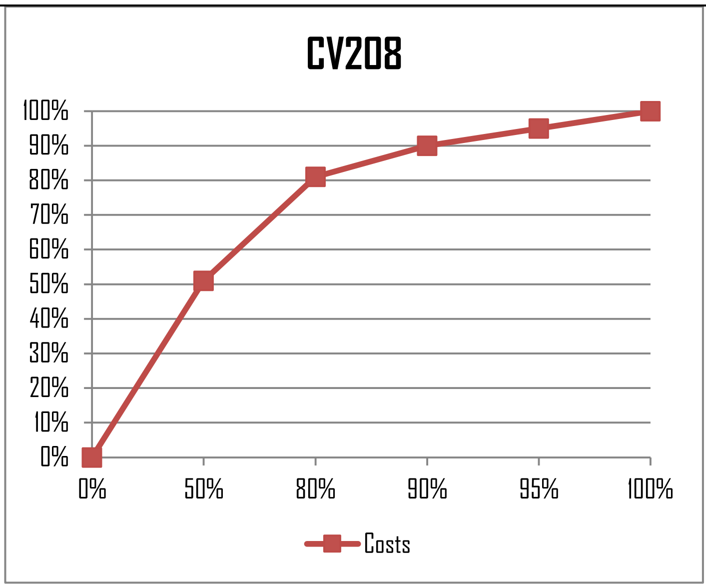
CoW relationship - N/A.

CV description - Variation in other finance and billing costs in response to changes in total billing activity.

CV type - Piecewise linear through the origin.

CVR Co-ordinates

CV208	
Volumes	Costs
0%	0%
50%	51%
80%	81%
90%	90%
95%	95%
100%	100%



Definition of Costs & Volumes

CV derivation

This cost category incorporates a variety of diverse finance-related costs that do not have their own specific CVR – some finance costs are modelled in separate, discrete CVRs. Most costs are assumed to be fully variable, with a small number considered to have an element of fixed cost. For example Billing Pay CVRs require a minimum team in order for the business to operate. This results in a straight line CVR with a y-intercept.

Data sources

The data for this CVR was taken from the Access database of the MICRA software tool (a BT Retail tool). The database itself is built with data from REFINE and the Product Profitability P&L Statements.

Process / CVR Construction methodology

All Retail F8/OUC combinations for the Finance & Billing sector (B9) were extracted from the MICRA database along with their CVR co-ordinates and their retail values. Combinations without a CVR take the default CVR of LRIC = FAC (viz. a straight line). The data is weighted together to obtain the curve co-ordinates for the sector average curve.

Rationale and assumptions

Costs are taken to be proportional to volumes.

A proportion of Post Office handling fees and billing costs make up the fixed costs element.

CV label	CV210
CV name	Other debtors
***CoW relationship* - N/A.**	
***CV description* -** Variation in other debtors' costs in response to level of other debtors.	
***CV type* -** Straight line through the origin.	
Definition of Costs & Volumes	
The costs include a range of cost types including season ticket loans, repayment works, travel & subsistence, accrued VAT relief on bad debt, loans to associates, dealers, and suppliers.	
CV derivation	
Given the heterogeneous nature of the 'Other debtors' category, it is assumed that other debtors cost vary proportionately with the level of other debtors activity, such as season ticket loans, loans to associates, dealers and suppliers. These costs are dependent on a number of factors such as the credit period allowed, credit control, size of company, and credit limit. This curve is therefore fully variable. <u>Process / CVR Construction methodology</u> The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs. <u>Rationale and assumptions</u> Credit policies are independent of company size.	

CV label	CV212
CV name	Non-Pay Accounting & Management Services Costs

***CoW relationship* -** N/A.

***CV description* -** Variation in accounting and management services (AMS) costs in response to changes in total payroll.

***CV type* -** Straight line through origin.

Definition of Costs & Volumes

The costs comprise payments for finance and management services consultants and finance related agency staff costs. The volume, here, is that of demand for these consultants and agency staff.

CV derivation

The derivation of the CV relationship was based on discussions with internal teams responsible for Finance & Billing to understand the nature of the costs. The cost volume relationship is based on qualitative analysis of these costs.

Daily workload is proportional to workload volume and so the demand for accounting and management consultants and agency staff increases with workload (straight line through the origin). Some fluctuations in workload ('noise') may result in small increases and decreases in the curve, but overall this will not be significant enough to change the fully variable relationship.

Workload is proxied by pay for modelling purposes. This means that the non-pay accounting and management services takes, as its distribution of LRIC across increments, the exact same pattern as the LRIC observed within pay. This curve is therefore considered to be fully variable.

Process / CVR Construction methodology

The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs.

Rationale and assumptions

It is assumed that the in the long run perfect planning situation holds such that BT will vary its total headcount to avoid under or overstaffing.

CV label	CV216
CV name	Transfer charges
CoW relationship - N/A.	
CV description - Variation in transfer charges in response to changes in respective drivers.	
CV type - Straight line through the origin.	
Definition of Costs & Volumes - N/A.	
CV derivation	

Transfer charging is a mechanism of internal cost recovery based on fully allocated costs. Each transfer charge has an associated cost driver that is used to allocate fixed and variable costs incurred by a cost centre to products and other cost centres. The allocation to products and cost centres is determined by the level of usage or derived benefit of the service causing the cost to be incurred.

By definition, fully allocated cost recovery holds a straight line through the origin relationship with the respective driver. Overall, BT's internal transfer charges IN net out with BT's internal transfer charges OUT.

This curve is therefore considered to be fully variable. This fully variable CV relationship eliminates the transfer charges IN and OUT.

Process / CVR Construction methodology

The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs.

Rationale and assumptions

Transfer charges are based on fully allocated costs. The mix of transfer charges is independent of volume.

CV label	CV219
CV name	Local Exchanges: Digital, AXE10 Processor

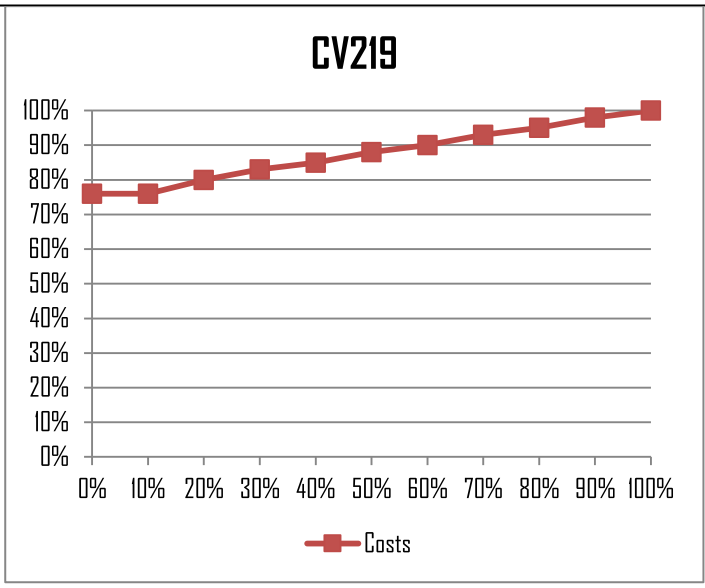
CoW relationship- LYX – Capital – AXE Local Exchange

CV description - Variation in Local Exchange AXE10 Processor investment costs in response to changes in traffic volume (based on Erlangs-per-Circuit).

CV type - Piecewise linear with fixed cost element.

CVR Co-ordinates

CV219	
Volumes	Costs
0%	76%
10%	76%
20%	80%
30%	83%
40%	85%
50%	88%
60%	90%
70%	93%
80%	95%
90%	98%
100%	100%



Definition of Costs & Volumes

There are two distinct assets within a local exchange, a local exchange processor (or host switch) and a number of concentrator units connected to this processor.

The number of items of equipment needed at processor level, and thereby the total cost incurred at processor level, depends on the expected volume of traffic to be processed. Therefore traffic volume is said to be the only cost driver for processor equipment. For example, it could be expected that an increase in the traffic volume would require an increase in the amount of equipment needed at processor level to handle the additional traffic volume, thereby leading to increased overall costs.

CV219 focuses on the link between processor costs and traffic volume for AXE10 local exchanges.

Costs in this CVR refer to the total costs associated with the number of processors needed to process a specified volume of traffic. It is the sum of the following costs:

- The purchase cost of processor equipment Local Exchange Modernisation Programme (LEMP2), a procurement contract between BT and Ericsson.
- The associated installation costs, which include the cost of setting-up individual customer connections (data build cost) and the contract supervision costs.
- The costs of maintaining a so-called 'mobile restoration fleet', which is used as back-up equipment.
- The purchase cost of software used in processor equipment (As a result of the scorched node assumption below, this is assumed to be purely a set-up, i.e. fixed cost as increases in the volume of calls does not incur additional software costs).

The volume measure in this CVR is traffic volume, measured in Erlangs-per-Circuit, a measure of telephone traffic capacity (1 Erlang = 1 circuit fully occupied for 1 hour).

CV derivation

This Cost Volume Relationship (CVR) describes how the total cost of AXE10 processor units changes as the volume of traffic changes.

Data sources

- Prices for given processor components (so-called price elements) are drawn from the pricing section of LEMP2.
- Information regarding cost drivers is obtained from detailed manufacturer information. For each price element scheduled item, Ericsson supplies further details on the cost driver allocation.
- Traffic rates for each local exchange was obtained from OTIS (Online Traffic Information System). OTIS is the major system supporting the network route capacity management function within BT.
- The number of exchanges, fitted signalling, 2Mb connections and the number of clusters are obtained from the NRS Database (Network Records System). This is a planning tool used by network planners within BT.
- The numbers for Multi-Party Conference Bridges are drawn from an in-house planning database called EXPRES (Exchange Planning & Review System). The database contains the names of every single local exchange in BT's network and lists detailed information relating to capacities of working lines, fitted lines, and other miscellaneous items such as the one above.
- Databuild cost and contract supervision cost are derived from man-hour rates as detailed in the Current Cost Accounting survey.

Process / CVR Construction methodology

The engineering model used to generate CV219 takes into account the actual number of AXE10 processors within BT's network. The maximum traffic volume considered in the model is equivalent to the actual traffic carrying capacity in BT's network.

As traffic volume is changed (the model uses the terminology 'flexed'), the processors are re-dimensioned using the provisioning rules specified in contract LEMP2. The aim is to determine the optimum number of AXE10 processor elements required for a specified volume of traffic at each site. The elements are then valued at current contract values. This is done for each AXE10 processor site in the network. Costs for a specified total traffic volume in the network are obtained by aggregating the costs incurred at each processor site.

The cost driver in this model is the volume of traffic. A cost driver is the factor that causes costs to be incurred. The model distinguishes between elements whose costs respond differently to changes in the cost driver. The types of costs incurred are fixed and variable:

- Fixed costs are costs that are incurred regardless of traffic volume. They relate to elements that form part of the minimum network. A minimum number of such elements is provided to ensure that a single phone call can be handled at any processor site.
- Variable costs are costs that vary with traffic volume. They relate to elements that must be added to the network as traffic volume increases.

The AXE10 concentrator price elements listed below are assumed constant regardless of traffic volume, i.e. they incur fixed costs. The classification is based on the cost driver information obtained from Ericsson. All other price elements are assumed to vary with traffic volume, thus incurring variable costs.

- Alarm Utility Subsystem: Provides Alarm Interfaces.
- Network Interface Subsystem (NIS): Provides network interface for the remote communication Facility.
- Tones and Recorded Announcements: This provides tones and recorded announcements.
- Test Network Subsystem (TNS): This element controls the accessing and testing of junctions.
- LE Site Package: Provides Miscellaneous exchange and peripheral equipment
- Digital TJR/TJRAE Equipment
- Power and Equipment Rack (PER)
- Suite Package
- Rack Equipment

- Integrated Service Platform (ISP)

CVR Operation

The model operates by scaling down (or flexing) the existing traffic volume across all of the network's processors from 100% to 0%. This is done in steps of 10% from 100% to 20% of existing traffic volume; the model then undertakes a step change from 20% to 1% and 1% to 0% (c.f. note below). As the volume of traffic is changed, the processors are re-dimensioned using the provisioning rules and then valued at LEMP2 contract values by price element whilst keeping the number of exchanges unchanged. The aim is to derive valuations for the total cost of processor units that are required for a specified volume of traffic. The model records the processor costs at each stage and then generates a summary table. The co-ordinates contained in this table are finally plotted on a two-dimensional graph to yield the underlying cost-volume relationship CV219.

Notes: There is a step change between 1% and 0% of traffic volume. This is because at 1% traffic volume, total cost includes the fixed costs of elements which are required to process a notional call. At the 0% level, there is no requirement for such price elements.

Rationale and assumptions

There are two fundamental assumptions in this cost volume relationship :

Scorched Node Assumption: It is assumed that the same number of processor nodes will be required to maintain national coverage under the minimum network. That is, when the volume of calls is reduced to a minimum (1% of the current network in this CVR), the same number of processor units is provided, but the capacity of each unit is reduced in proportion.

Constant mix: The ratio of peak call rate to average call rate is constant with changing demand that is the Erlang-per-circuit (EPC) measures are constant for all demand levels.

CV label	CV220
CV name	Local Exchanges: Digital, SYSTEM X Processor

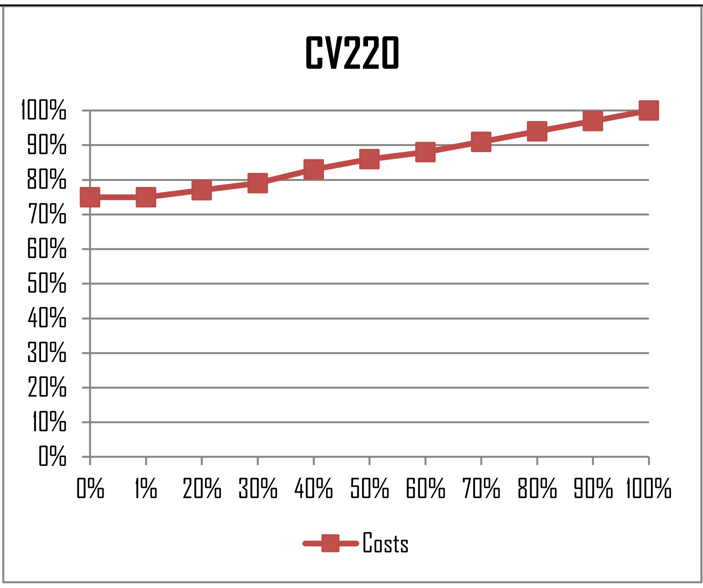
CoW relationship - LDX – Capital – AXE Local Exchange

CV description - Variation in Local Exchange SYSTEM X Processor investment costs in response to changes in traffic volume (based on Erlangs-per-Circuit).

CV type - Piecewise linear through origin.

CVR Co-ordinates

CV220	
Volumes	**Costs**
0%	75%
1%	75%
20%	77%
30%	79%
40%	83%
50%	86%
60%	88%
70%	91%
80%	94%
90%	97%
100%	100%



Definition of Costs & Volumes

There are two distinct assets within a local exchange, a local exchange processor (or host switch) and a number of concentrator units connected to this processor.

The number of items of equipment needed at processor level, and thereby the total cost incurred at processor level, depends on the expected volume of traffic to be processed. Therefore traffic volume is said to be the only cost driver for processor equipment. For example, it could be expected that an increase in the traffic volume would require an increase in the amount of equipment needed at processor level to handle the additional traffic volume, thereby leading to increased overall costs.

CV220 focuses on the link between processor costs and traffic volume for SYSTEM X local exchanges.

Costs in this CVR refer to the total costs associated with the number of processors needed to process a specified volume of traffic. It is the sum of the following costs:

- The purchase cost of processor equipment Local Exchange Modernisation Programme (LEMP2), a procurement contract between BT and Marconi.
- The associated installation costs, which include the cost of setting-up individual customer connections (data build cost) and the contract supervision costs.
- The costs of maintaining a so-called 'mobile restoration fleet', which is used as back-up equipment.
- The purchase cost of software used in processor equipment (As a result of the scorched node assumption below, this is assumed to be purely a set-up, i.e. fixed cost as increases in the volume of calls does not incur additional software costs).

The volume measure in this CVR is traffic volume, measured in Erlangs-per-Circuit, a measure of telephone traffic capacity (1 Erlang = 1 circuit fully occupied for 1 hour).

CV derivation

This Cost Volume Relationship (CVR) describes how the total cost of SYSTEM X processor units changes as the volume of traffic changes.

Data sources

- Prices for given processor components (so-called price elements) are drawn from the pricing section of LEMP2.
- Information regarding cost drivers is obtained from detailed manufacturer information. For each price element scheduled item, Marconi supplies further details on the cost driver allocation.
- Traffic rates for each local exchange was obtained from NEMOS_DR (Nemos Direct Reports). NEMOS_DR is the major system supporting the network route capacity management function within BT.
- The number of exchanges, fitted signalling, 2Mbit/s connections and the number of clusters are obtained from NRS (Network Recording System). This is a planning tool used by network planners within BT.
- The numbers for Multi-Party Conference Bridges are drawn from an in-house planning database called EXPRES (Exchange Planning & Review System). The database contains the names of every single local exchange in BT's network and lists detailed information relating to capacities of working lines, fitted lines, and other miscellaneous items such as the one above.
- Databuild cost and contract supervision cost are derived from man-hour rates as detailed in the Current Cost Accounting survey.

Process / CVR Construction methodology

The engineering model used to generate CV220 takes into account the actual number of SYSTEM X processors within BT's network. The maximum traffic volume considered in the model is equivalent to the actual traffic carrying capacity in BT's network.

As traffic volume is changed (the model uses the terminology 'flexed'), the processors are re-dimensioned using the provisioning rules specified in contract LEMP2. The aim is to determine the optimum number of SYSTEM X processor elements required for a specified volume of traffic at each site. The elements are then valued at current contract values. This is done for each SYSTEM X processor site in the network. Costs for a specified total traffic volume in the network is obtained by aggregating the costs incurred at each processor site.

The cost driver in this model is the volume of traffic. A cost driver is the factor that causes costs to be incurred. The model distinguishes between elements whose costs respond differently to changes in the cost driver. The types of costs incurred are fixed and variable:

- Fixed costs are costs that are incurred regardless of traffic volume. They relate to elements that form part of the minimum network. A minimum number of such elements is provided to ensure that a single phone call can be handled at any processor site.
- Variable costs are costs that vary with traffic volume. They relate to elements that must be added to the network as traffic volume increases.

The SYSTEM X concentrator price elements listed below are assumed constant regardless of traffic volume, i.e. they incur fixed costs. The classification is based on the cost driver information obtained from Marconi. All other price elements are assumed to vary with traffic volume, thus incurring variable costs.

- Alarm Utility Subsystem: Provides Alarm Interfaces.
- Network Interface Subsystem (NIS): Provides network interface for the remote communication Facility.
- Tones and Recorded Announcements: This provides tones and recorded announcements.
- Test Network Subsystem (TNS): This element controls the accessing and testing of junctions.
- LE Site Package: Provides Miscellaneous exchange and peripheral equipment
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- Suite Package
- Rack Equipment

- Integrated Service Platform (ISP)

CVR Operation

The model operates by scaling down (or flexing) the existing traffic volume across all of the network's processors from 100% to 0%. This is done in steps of 10% from 100% to 20% of existing traffic volume, the model then undertakes a step change from 20% to 1% and 1% to 0% (c.f. note below). As the volume of traffic is changed, the processors are re-dimensioned using the provisioning rules and then valued at LEMP2 contract values by price element whilst keeping the number of exchanges unchanged. The aim is to derive valuations for the total cost of processor units that are required for a specified volume of traffic. The model records the processor costs at each stage and then generates a summary table. The co-ordinates contained in this table are finally plotted on a two-dimensional graph to yield the underlying cost-volume relationship CV220.

Notes: There is a step change between 1% and 0% of traffic volume. This is because at 1% traffic volume, total cost includes the fixed costs of elements which are required to process a notional call. At the 0% level, there is no requirement for such price elements.

Rationale and assumptions

There are two fundamental assumptions in this cost volume relationship:

Scorched Node Assumption: It is assumed that the same number of processor nodes will be required to maintain national coverage under the minimum network. That is, when the volume of calls is reduced to a minimum (1% of the current network in this CVR), the same number of processor units is provided, but the capacity of each unit is reduced in proportion.

Constant mix: The ratio of peak call rate to average call rate is constant with changing demand that is the Erlang-per-circuit (EPC) measures are constant for all demand levels.

CV label	CV224
CV name	Advanced Switches

CoW relationship- ASU - Advanced Switching Unit

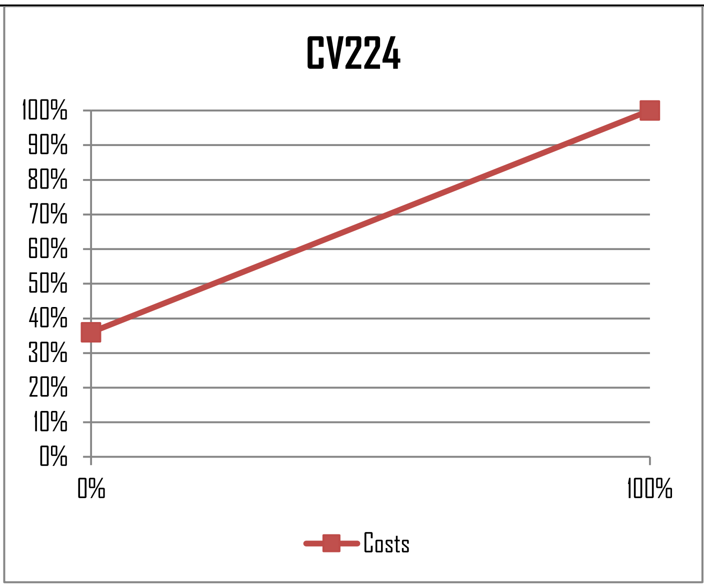
CV description - CV224 represents the relationship between costs and volumes for the Advanced Services Units (ASU). Which provide Featurenet products.

CV type - Linear with fixed cost element.

CVR Co-ordinates

Piecewise linear with fixed cost element

CV224	
Volumes	**Costs**
0%	36%
100%	100%



Definition of Costs & Volumes

ASU assets provide advanced PABX (Private Automatic Branch Exchange) facilities and connectivity in the form of VPNs (Virtual Private Networks) and access to/from the PSTN (Public Switched Telephony Network) for customers with or without their own PABXs. ASU assets support the Featurenet Products. There are four basic Featurenet products:

Featurenet 1000 is a managed virtual private network (VPN) service which closely mirrors the functionality of a private circuit network within a closed user group on the Featurenet network.

Featurenet 5000 is a digital networked centrex service which delivers most of the features associated with a PABX without the need for customers to invest in capital equipment.

Featurenet 5000 ACD provides advanced call queuing facilities for high volume inbound applications - call centres. A Management Information System (MIS) is available to optimize call and queue status information.

International Featurenet is the international VPN service available to Featurenet customers or for direct connection.

The ASU assets also provide interconnectivity with the PSTN (Public Switched Telephony Network) for traffic to and from PSTN customers (BT and OCPs [Other Communications Providers).

The following items are included in the Cost Stack:

- DMS100 Featurenet Switches including switch extensions to provide additional capacity
- SRUs (Small Remote Units) which interface customer sited equipment with ASU switches
- Ports used for connecting Analogue, Digital and Trunk connections to the ASU switches
- GPPs (Global Peripheral Platform) for FeatureNet Call Centre digital access
- Channel Groomers which allow better fill rates on directly connected Digital VPN customers by concentrating the 2Mb connections from customers' premises.
- Installation costs for all of the above.

The volume measure in this CVR relates to the number of Centrex, Digital and Analogue Lines and the customer and network facing ports on the ASU switches.

CV derivation

The cost volume relationship is worked out by determining the costs of the ASU platform for two volume points - the minimum and the maximum. The maximum volume point is the volume currently required on the ASU platform (the same as used for CCA valuation purposes) and the minimum volume point is one line of each type (Centrex, Analogue and Digital) and sufficient switch ports at each of the current nodes in the ASU network to allow connectivity for the minimal network.

Data sources

The physicals' volumes are provided by the Featurenet Capacity Management team. Equipment Unit costs are indexed forward using the ASU cost trend.

Rationale and assumptions

These assumptions are used in the derivation of the CVR:

Scorched Node Assumption: In this cost volume relationship BT maintains its existing geographical coverage of Advanced Switching Unit switches in terms of customer access and connectivity between customers, and provides the infrastructure to do this from existing switches. This assumption means that the reach of Advanced Switching Units is maintained nationally.

Average Traffic: The traffic generated by customers is assumed to have a linear relationship with the number of lines and hence the number of switch ports varies in proportion to the number of lines.

CV label	CV225
CV name	Universal Card Platform (formally known as Cashless platform)

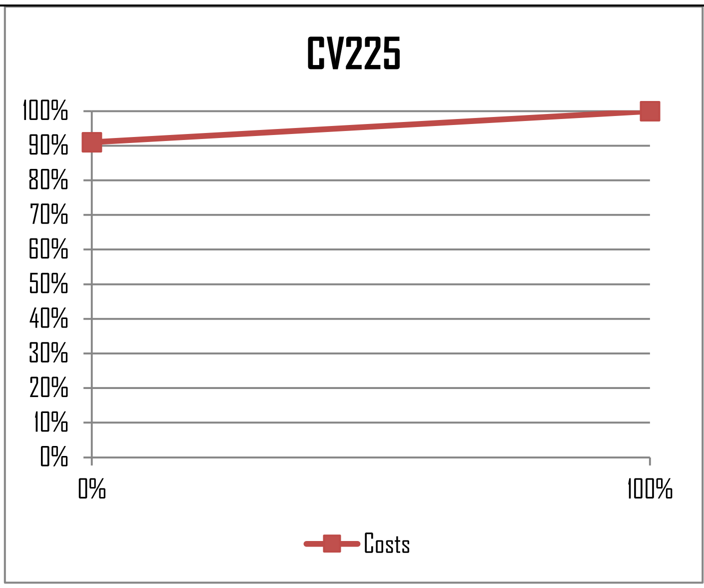
CoW relationship - CSNC – Universal Card Platform

CV description - Variation in Universal Card Platform costs in response variation in platform volumes (Chargecard etc calls).

CV type - Linear with fixed cost element.

CVR Co-ordinates

CV225	
Volumes	Costs
0%	91%
100%	100%



Definition of Costs & Volumes

In this CVR the costs are those, which represent all of the Universal Card Platform (UCP) and its associated costs. The platform is currently situated in three sites and they are fully 'meshed', therefore only two sites are required to obtain the minimum point - one is for operational purposes and the second is for resilience. One of these sites includes the test model.

The volume measure in this CVR relates to Call Minutes.

CV derivation

This CVR describes how the costs of the Universal Card Platform change as the volume of Call Minutes changes. The 100% volume GRC is the value of the present network which consists of three sites Cambridge, Leeds and Croydon. The minimum network represents the capacity required to provide minimal service. Software costs (including licences) are part of the minimum as they represent a fixed cost independent of call volumes.

<u>Data sources</u>

Data sources include the CCA GRC Valuation and minimum platform requirements from the platform commercial manager.

<u>Construction methodology</u>

The cost volume relationship was constructed by deriving the valuation of the three platforms.

The existing valuation (100% of UCPs) uses the existing maximum number (three) platforms. The minimum requirement is defined as the least cost set-up capable of providing existing geographical and functional coverage so it's able to handle the first call.

<u>CVR Operation</u>

The following steps describe how the CVR operates:

Both costs and volumes for these switches are obtained from the Platform Manager who uses indexed values based on the original GRC valuations for costs and billing systems for the call volume information.

Starting with the existing network (100% of network), the total CCA GRC represents the existing Costs.

The next stage is to identify the minimum requirements - to determine this we need to gain data for two out of the three sites (the first is used for operational purposes and the second site is required for resilience).To gather the data required, consultations take place with the platform manager to produce a comprehensive list of physical equipment that would be required to maintain minimum usage of the platform.

Rationale and assumptions

There are three fundamental assumptions in this cost volume relationship:

Scorched Node Assumption: In this cost volume relationship BT maintains its existing geographical coverage of Universal Card platforms in terms of customer access and connectivity between customers, and provides the infrastructure to do this from one platform. This assumption means that the reach of Chargecard customers is maintained nationally regardless of a change in the number of fully functional platforms.

Existing Network: BT's existing UCP costs include the cost of all three platforms with its full geographical and functionality being at full capacity. Thereby, the slope of the cost volume relationship represents by how much cost will fall moving from the existing capacity to the minimum requirement. Since there are only two co-ordinates (at the 0% and 100% points) there are no intermediate data points and therefore such values are interpolated.

Minimum Network: The fixed cost indicated by the intercept on the graph includes the cost, which is specific to two platforms, but with the reduced processing capacity to provide a minimum service.

Mix is assumed to be independent of customer density.

CV label	CV226
CV name	Circuit Provision activity – PSTN Traffic

CoW relationship - CPAP - Circuit Provision, Non-digital Public Network, CPDH - Circuit Provision, Digital Higher Order Network

CV description - Variation in core transmission circuit provision activity (provision, cessation and re-arrangement) in response to PSTN traffic.

CV type - Straight line through origin.

Definition of Costs & Volumes

The costs in this CVR are those for the provision, rearrangement or cessation of all digital higher order above 2 Mbit/s for the routing of PSTN, value add and private services, Analogue (A-A), FDM and Interworking (A-D) network.

The volume measure in this CVR is that of PSTN traffic.

CV derivation

This CVR describes how the costs of core transmission circuit provision activity change as the volume of PSTN traffic varies.

Process / CVR Construction methodology

The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs. As this is a straight line through the origin, no data sources have been used in computing the minimum and maximum co-ordinates.

Rationale and assumptions

As there is only one cost driver, a fully variable cost volume relationship is assumed.

Purchasing economies of scale are assumed to be immaterial.

CV label	CV227
CV name	Intelligent Network and Callminder

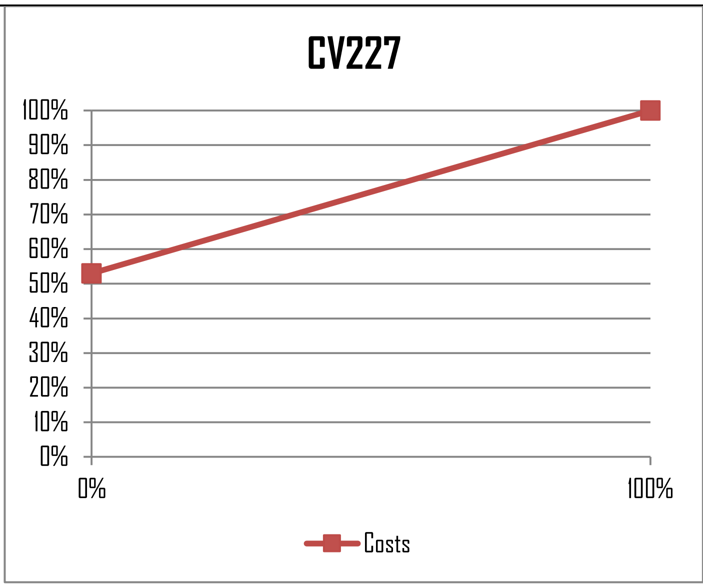
CoW relationship **–** INC CoW

CV description - Variation in costs of Intelligent Network (IN) and Messaging Services Platforms in response to growth in network capacity based on call volumes.

CV type - Linear with fixed cost element.

CVR Co-ordinates

CV227	
Volumes	**Costs**
0%	53%
100%	100%



Definition of Costs & Volumes

In this CVR the costs relate to the Intelligent Network Platform.

This consists of the following sub platforms:

Core IN, ICM (Intelligent Contact Manager), NIP (Network Intelligent Platform), Callminder, Montrose, Alfredo and FL-SMS (Fixed Line Short Messaging Service).

Core IN consists of Service Control Point (SCPs) hardware and associated software and supports Advanced Telephony Solutions and provides number translation for Dial IP type calls. The volume measure is the number of calls.

ICM supports Advanced Inbound products and call routing functions (rules based routing: time of day, day of week etc). The volume measure is the number of calls.

NIP consists of three nodes and supports Basic and Advanced Inbound Services and Internet type call number translation. NIP provides services not supported by ICM. The volume measure is the number of calls.

Callminder is made up of 12 operational Unisys nodes and two test nodes. This platform provides network based messaging services to customers. The volume measure for Callminder is the number of mailboxes.

Montrose Provides prepaid PSTN calling facilities for customers on credit management.

Alfredo delivers a call management system for large customers with multi sited call centres.

FL-SMS delivers the ability to send and receive short text messages on Fixed PSTN Lines. The volume measure is the number of FL-SMS users.

CV derivation

This Cost Volume Relationship (CVR) describes how the costs of INC CoW change as the volume of calls and the number of mailboxes change. The approach taken in the production of the CVR is that based on the number of nodes and amount of equipment required for the minimum level of service i.e. a single call / mailbox / FL-SMs user without compromising quality of service to customers. The minimum and maximum volume costs for each of the sub platforms are combined to obtain the overall minimum and maximum GRC points for the whole Class of Work (CoW).

Prerequisites

Minimum and maximum volume cost analysis of all sub platforms.

Data sources

Sub-platform Managers provide cost and volume information for each of the sub-platforms.

CVR Construction methodology

Core IN - for the minimum level of service three SCPs (Service Control Points) and a test model are required to which software and service support system costs are added.

ICM – Both nodes are required for minimum service but at a reduced size.

NIP - two out of three nodes are required for a minimum level of service.

Callminder - the minimum network requires four Unisys nodes and two test models to ensure presence at the four key geographic areas (Brighton, London, Leicester, and Falkirk). The maximum volume cost includes 14 Unisys units, several in each of the four locations. The maximum costs are dependent of the current number of mailboxes in service.

Montrose The variable costs of this platform are the licensing costs which vary according to throughput and processing requirements.

Alfredo The minimum platform consists of the same assets as the maximum for this small platform.

The sum of the minimum volume costs for all sub platforms determines the minimum volume cost for the whole INC CoW. The sum of the maximum volume costs for all sub platforms determines the maximum volume cost for the whole INC CoW.

CV label	CV228
CV name	Non Voice

CoW relationship - CCTV - Closed Circuit TV Plant, DISH - TVRO Equipment, GMMC – Support & maintenance of Genie Multimedia Capital, ICPCO – International PC's & Peripheral Equipment, IDCMP – BT Global Services, IMNV – Operation & Maintenance, International Non-Voice Network Equipment, INCAC – INCA Project Fixed Assets, IPSE – Installation, Packet Switch Exchanges, IPST – Installation, Packet Switch Transmission Equipment, MMC – Multimedia Capital, REDC – Construction, Bureau Services, RPS – Construction, Cellular Radio Systems, SIGHT – Broadcast Vision Services Plant, SOUND – Construction, Sound services equipment, SYNCA – Assets for Syncordia Services Contracts

CV description - Variation in Non-Voice investment in response to demand for non-voice services.

CV type - Straight line through origin.

Definition of Costs & Volumes

The non-voice heading consists of a heterogeneous range of specific equipment required to meet demand for a variety of non-voice products - with zero demand no non-voice equipment would be provided and therefore the costs incurred would be nil.

CV derivation

Process / CVR Construction methodology

The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs.

Rationale and assumptions

CCA valuations are assumed to represent costs at current levels of demand – the shape of the cost volume relationship between the origin and current values is assumed to be linear given the varied nature of both equipment types and costs.

CV label	CV230
CV name	Telex Exchanges and Transmission

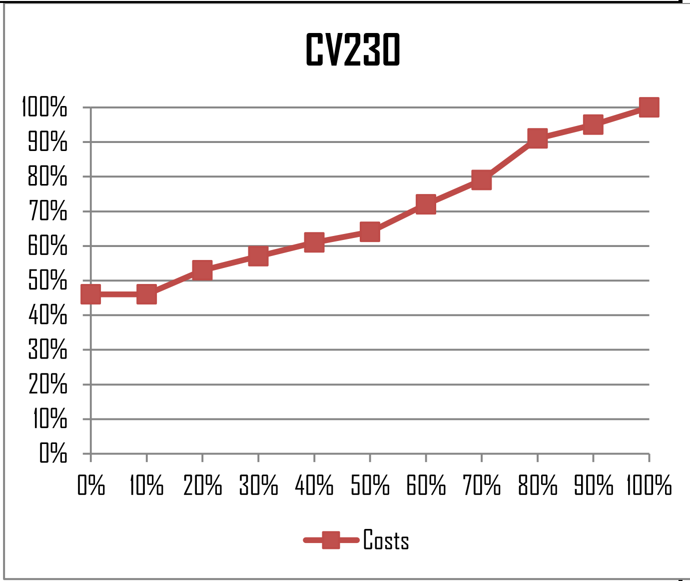
CoW relationship - DTN - Provision, TGXN - Mtce: Customers Telex Network Wiring, TLT – Construction, Transmission Equipment, TLXD - Construction, Telex Exchange Digital, TXMR - Telex Repair Service Testing, Records & Control

CV description - Variation in Telex investments costs in response to changes in telex 24 hour call minutes.

CV type - Piecewise linear with fixed cost element.

CVR Co-ordinates

CV230	
Volumes	Costs
0%	46%
10%	46%
20%	53%
30%	57%
40%	61%
50%	64%
60%	72%
70%	79%
80%	91%
90%	95%
100%	100%



Definition of Costs & Volumes

The costs comprise Telex Lines, Depreciation, Telex Repair Control, WIP, and relevant stores.

CV derivation

Telex is a residual service with low value investments close to life expiry. Given the materiality of these costs, the cost volume relationship has been approximated with the cost volume relationship shape for Main Switches.

Data sources

Used CV262 co-ordinates.

Process / CVR Construction methodology

N/A.

Rationale and assumptions

It is appropriate to approximate the Telex cost volume relationship with the relationship of main switches.

References

See CV262.

CV label	CV232
CV name	Maintenance of local lines overhead plant

CoW relationship - ON - Reactive Repair Local Line Overhead Network Plant, PT - Routine Testing of Poles and Wire & Cable Clearance

CV description - Variation in the operating cost of maintenance of local lines overhead plant in response to the volume of the overhead plant used in the network.

CV type - Straight line through origin.

Definition of Costs & Volumes

The costs in this CVR are those which are for all specialised test and inspection activities carried out on external plant where replacement or repair is covered by the Asset Assurance programme. Also maintenance of all external overhead plant, except wiring/cable at or beyond the distribution point.

The volume measure in this CVR is that of the overhead plant used in the network.

CV derivation

This Cost Volume Relationship (CVR) describes how the cost of maintenance of local lines changes as the volume of overhead plant used in the network varies.

Process / CVR Construction methodology

The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs.

Rationale and assumptions

Scorched Node Assumption - In this cost volume relationship BT maintains its existing geographical coverage of local lines overhead plant.

CV label	CV233
CV name	Maintenance of electronic equipment associated with local lines metallic cable

CoW relationship - LEM – Maintenance of Local Electronics for Copper Cables, MARS – Maintenance of Access Radio Systems

CV description - Variation in the operating cost of maintenance of electronic equipment associated with local lines metallic cable in response to the volume of the equipment used in the network.

CV type - Straight line through origin.

Definition of Costs & Volumes

The costs in this CVR are those for testing and maintenance of network radio systems in the access network and maintenance of electronic equipment associated with metallic cables in the local network.

The volumes measure in this CVR is that of the electronic equipment associated with local lines metallic cable used in the network.

CV derivation

This Cost Volume Relationship (CVR) describes how the cost of maintenance of electronic equipment changes as the volume of equipment used in the network varies.

<u>Process / CVR Construction methodology</u>

The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs.

<u>Rationale and assumptions</u>

Assumes that the geographic and topological mix of the access network remains unchanged in response to changes in total volume. Purchasing economies of scale are assumed to be immaterial.

CV label	CV237
CV name	Earth Stations Broadcast

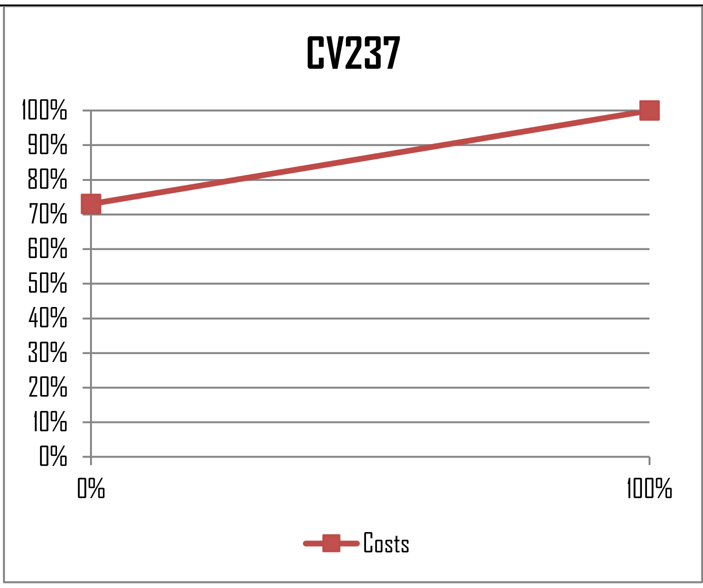
***CoW relationship* -** NCRR - International Radio and Repeaters (FAR)

***CV description* -** Variation in International Transmission (Earth Station) investment in response to demand for Broadcast Services.

***OPooooJIUKKCV type* -** Straight line with intercept.

CVR Co-ordinates

CV237	
Volumes	Costs
0%	73%
100%	100%



Definition of Costs & Volumes

The costs include those of: Antennas, Data Modems, Video compression systems, TV Infrastructure, Site Power Generation and Capitalised Pay.

The volume measure for this CVR is that of the level of provisioning activity for the deployment of broadcast service products.

CV derivation

This Cost Volume Relationship (CVR) describes how the costs of International Transmission (Earth Station) equipment varies in response to demand for Broadcast Services.

Data sources

Information for this return is sourced from the Quarterly Antenna Deployment Plan. The plan lists Broadcast Services operational antennas at Goonhilly, Madley, London Teleport, Martlesham Heath, and Maidstone Earth stations. The plan also shows the number of uplink chains on each antenna. Information on the type of HPA used is provided by the project manager responsible for coordinating the return. A standard amount is included for project management cost per antenna.

Process / CVR Construction methodology

CCA values are derived by multiplying the number of chains on each antenna by the type of High Power Amplifier (HPA) used to power the chains. Also included are the costs of: antennas, data modems, video compression systems, TV infrastructure and site power generation.

CVR Operation

The Modern Equivalent Asset CCA valuation of these antennae (and the number of associated uplinks) is used as the maximum point of this CVR. The minimum point is established by thinning down the system to antenna (one per satellite path), and uplinks (one per antenna).

Rationale and assumptions

Modems, TV infrastructure and site power are adjusted proportionally to the change in uplink numbers.

Only major antennae are valued in this exercise, Small Television Received only antennae are excluded as they do not have uplink chains and have low values.

CV label	CV241
CV name	Income
***CoW relationship* - N/A.**	
***CV description* -** Variation in income in response to changes in volumes of goods and services provided.	
***CV type* -** Straight line through the origin.	
Definition of Costs & Volumes 'Costs' are the income received, depending on the 'volume' of goods and services sold.	
CV derivation	
Income is a simple function of tariff and sales volume for any given service or good sold. This curve is therefore considered to be fully variable. Process / CVR Construction methodology The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs. Rationale and assumptions The retail tariffs and the mix of goods and services provided are independent of the level of provision. No income is associated with Combined Access and Network.	

CV label	CV252
CV name	IP (Internet Protocol)

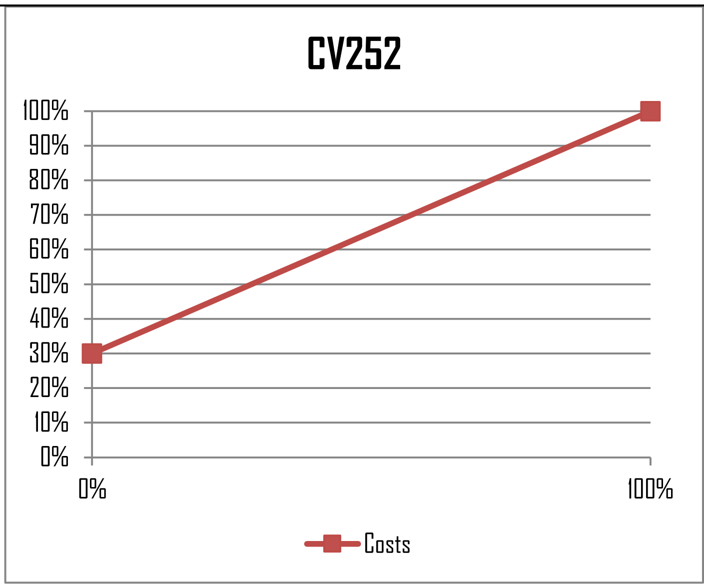
CoW relationship - IPNC - IP Network Capital, MMC - Multimedia Capital

CV description - Variation in IP costs to growth in network capacity based on port demand.

CV type - Linear with fixed cost element.

CVR Co-ordinates

CV252	
Volumes	Costs
0%	30%
100%	100%



Definition of Costs & Volumes

The minimum fixed cost point is calculated using a bottom up method. Cost are collated for individual items of equipment and then multiplied by the volumes required to maintain the minimum network, whilst adhering to the scorched node principal

CV derivation

The cost volume relationship for IP network is derived from a two point model, the current (100%) network cost and the theoretical minimum (0%) network point – using linear interpolation.

Data sources

The information was gathered from the Colossus, MSIP network costs models and Broadband subset models. This information shows the minimum network required adhering to the scorched node principle.

The data from the cost models is built after input from the platform team.

Process CVR / Construction methodology

Pricing and network configuration information is calculated using a bottom up method, i.e. unit costs are collated for individual items of equipment and then multiplied by the volumes of equipment required to maintain a minimum network, whilst still adhering to the scorched node principle. A bottom up build approach is used where all the core equipment and network cost are implemented first. The Point of Presence (POP) rollout is the same for minimum and maximum network, the only difference being more kit is required on the basis of increased volumes for customers for the maximum network. The minimum cost is built on the basis that the network is operational running with 1 customer on the network. The maximum network is built on the basis of the volume of customers at the end of 2004/05 on the network using the Gross Replacement Cost.

Rationale and assumptions

Minimum Network: Includes all core node equipment and POPs required for the network to be up and running without any customers on the network.

Maximum Network: In addition to the equipment used in minimum network it requires more kit on the basis of volume turnover of customers. However equipment can often only be bought in large quantities at times. E.g. One POP consists of 720 ports. Even if you may have just one customer requiring a single port, the minimum you must purchase is 720 ports.

CV label	CV253
CV name	ATM Switching

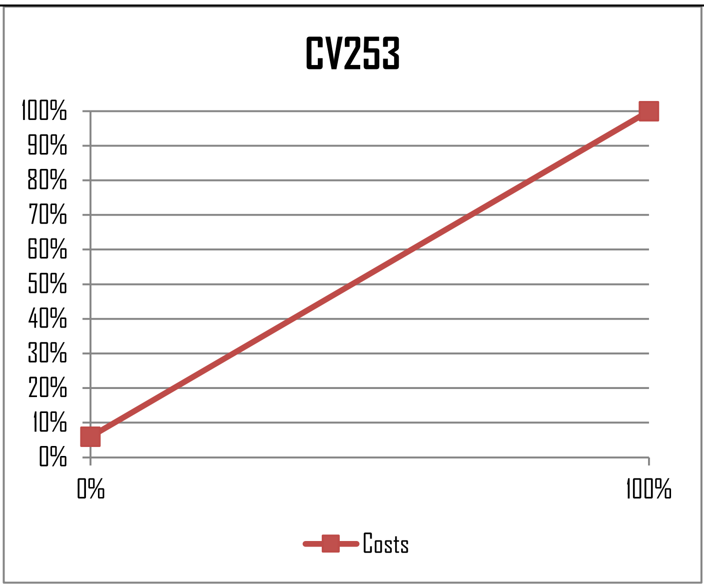
CoW relationship - ATM - Asynchronous Transfer Mode

CV description - Variation in ATM switch costs in response to growth in network capacity based on traffic volume.

CV type - Straight line with a fixed cost element.

CVR Co-ordinates

CV253	
Volumes	Costs
0%	6%
100%	100%



Definition of Costs & Volumes

The minimum/fixed costs consists of the minimal volumes of racking required to accommodate the minimal shelving containing the equipment to run the theoretical minimum network, these equipment volumes are then multiplied by the latest prices from the suppliers which then get factored up by planning and installation costs.

CV derivation

The cost volume relationship for the ATM network is derived from a two point model, the current (100%) network cost and the theoretical minimum (0%) network point – using linear interpolation.

Methodology
Information from the AIM & NEI reports comes with cards installed, switch type and location by 1141 code. With this level of detail it has been possible to calculate the number of POP's and switch type present in the network.

The latest cost of shelves and Racking are uplifted to take into account installation, planning and clerk of works using a percentage factor.

Assuming the Scorched Node principle, the calculation to provide the minimum network consists of taking the location by switch type and applying the appropriate equipped shelf price and the racking required to support the shelf. This is then uplifted by installation costs, exchange infrastructure costs etc. The total cost for all of the POP's is then summed up to provide the minimum network. This is then taken as a percentage over the indexed Gross Replacement Cost (GRC). The minimum cost is then extrapolated up to the GRC in increments of 10%.

Data sources

A complete inventory of cards has been obtained from the AIM (Analysis and Inventory Module) and NEI (Network Equipment Inventory) reports provided by Peter Pickett - Network Planning & Design Manager.

The latest cost of shelves and Racking required by each POP has been provided by Mark Butler - Commercial Engineering & Cost Analysis Manager.

Planning and clerk of works factor supplied by Mark Austin - Product Cost Analyst and Mark Butler.

Process CVR / Construction methodology

Refer to new methodology above.

Rationale and assumptions

Minimum Network: The minimum network is built on the scenario assuming one customer per product.

Maximum Network: The maximum equipment includes all existing customers as of 2005/06. To accommodate these customers in addition to additional core equipment required to meet demand, a higher proportion of interface cards are required as well.

CV label	CV254
CV name	Access Radio

CoW relationship - TPWA - Construction, Access Radio Systems

CV description - Variation in Access Radio costs in response to demand for radio systems.

CV type - Straight line through the origin.

Definition of Costs & Volumes

In this CVR the costs are those which represents the cost of provision, re-arrangement or renewal of Access Network radio systems. These costs include Hand held mobile systems, Testing equipment, line-of-sight surveying equipment, masts, aerials, transceivers and ancillary indoor and outdoor equipment for point-to-point and point to multi-point radio systems.

The volume measure in this CVR is radio systems.

CV derivation

This Cost Volume Relationship (CVR) describes how the costs of access radio systems change as the demand for radio systems changes.

<u>Process / CVR Construction methodology</u>

BT's access radio costs are driven by the demand for access radio systems. In the absence of any demand for such systems, BT would not incur any access radio costs.

Radio systems are not configured as a network in their own right, but are used as an element within the access network. A radio system comprises a matching pair of radio antenna equipment, one at each end of the link.

<u>CVR Operation</u>

Straight line through the origin.

<u>Rationale and assumptions</u>

As the demand for the radio systems reduces, the number of antenna pairs required, and therefore their cost, would reduce. A fully variable cost volume relationship is therefore assumed.

CV label	CV256
CV name	ADSL

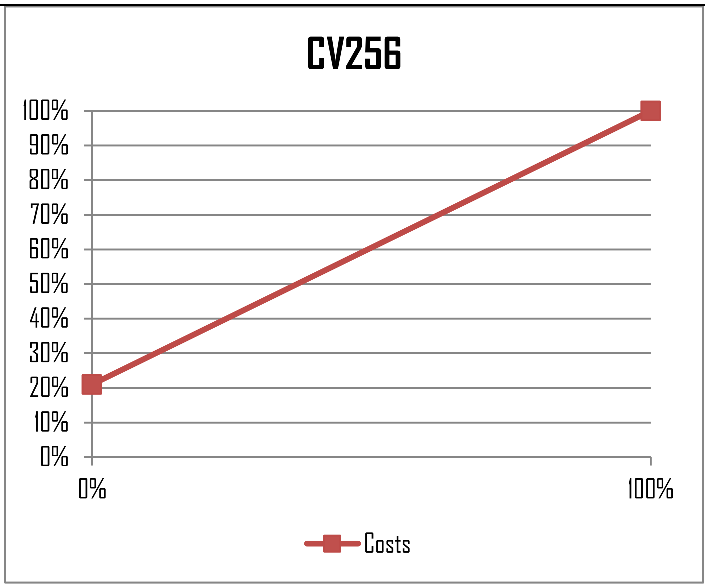
CoW relationship - ADSA - Exchange & Customer end ADSL equipment, ANTE - ADSL Residential NTE, AOSS - Broadband OSS/Software, BNTE - ADSL Business NTE, SDSL – Symmetric services equipment (in trial)

CV description - Variation in Asynchronous Digital Subscriber Line (ADSL) equipment costs, including both Exchange and Customer premises sited equipment, in response to growth in network capacity based on customer connections.

CV type - Straight line graph with y-axis intercept

CVR Co-ordinates

CV256	
Volumes	Costs
0%	21%
100%	100%



Definition of Costs & Volumes

The costs associated with this curve mainly relate to DSLAM (Digital Subscriber Line Access Multiplexer) exchange end equipment. In addition there are costs included for the NTE (network terminating equipment located in the end users' premises).

The volume measure is that of end users (customers).

CV derivation

This Cost Volume Relationship (CVR) describes how the costs of providing ADSL access changes as the volume of customers change. The approach taken in the production of the CVR is that based on costs (from supplier contracts) and volumes provided by the Platform Commercial Manager for DSLAMs and Procurement and Supply chain for customer NTE.

The information on DSLAM volumes is derived from a weekly dump from NISM and FastCAP. The DSLAM price information comes from a saleable entity list provided by the supplier and authorised by procurement.

CPE volumes and prices were obtained from the ASC (automated supply chain) system.

<u>Changes</u>

Minimum network has been re-assessed at 1 DSLAM per enabled exchange. Not all NTE's are capitalised, only those installed by an engineer. It is assumed that the minimum network of 1 customer per D-Slam, will have the same proportion of engineer installed NTE's as in the full valuation.

The least cost from the three main suppliers (Marconi, Fujitsu and Alcatel) was used in the 04-05 CVR, this has remained unchanged for 05-06 as there has been no change in unit prices.

<u>Data sources</u>

The volumes and prices of DSLAMs, and the associated extension racks and line cards are derived from NISM and processed by Broadband Platform Commercial Management.

The volumes and prices for customer NTE was supplied by BT Procurement and Supply Chain. A review of the unit prices was carried out for the CCA valuation which showed minimal movement and therefore the unit prices have remained unchanged from 04-05.

Process / CVR Construction methodology

The cost volume relationship has been constructed by taking the unit cost for each component and the minimum volume requirement for each Broadband enabled exchange and multiplying by the number of enabled exchanges as of 31st March 2009. This will derive the minimum network assuming the scorched node principle. The maximum network has been derived by taking the closing GRC from the Asset Movement Statement less Work In Progress.

The minimum network represents the fixed cost of the minimum network required for one connection, at each D-Slam.

CVR Operation

A model is used to calculate the minimum amount of equipment required to enable each of BT's current DSLAM points of presence (POPs) to deliver one ADSL line.

The assumed minimum equipment required for each exchange consists of:

- One rack apparatus
- One Line Card
- One customer NTE
- Other DSLAM related costs from suppliers (spares and development)

Once costed, this minimum cost can then be compared to the current total cost of the access broadband electronics and the intercept point can be calculated in percentage terms.

Rationale and assumptions

The following fundamental assumptions underlie this cost volume relationship:

The unit prices for the minimum network have been derived from the 05-06 prices and indexed to 08-09 using the national statistic inflation rates.

Scorched Node Assumption: In this cost volume relationship BT maintains its existing geographical coverage enabled exchanges in terms of customer access and connectivity between customers.

Minimum Network:

a) Treatment of NTE

The minimum network requires one customer NTE (modem/router) for each DSLAM, in order to enable one customer to receive ADSL services at each of the enabled exchanges.

b) Treatment of D-Slams

The minimum network includes 1 DSLAM per enabled exchange, no additional racks are included.

c) Development costs and small value items are included in the minimum network.

d) WIP is excluded from minimum and maximum network.

CV label	CV261
CV name	Customer lead-ins and Network terminating Equipment

CoW relationship - HHB - Business Highway Provision, HHR - Residential Highway Provision, NTIS - Network terminating Equipment – Integrated Digital Access (IDA), NWR – Provision & Installation Exchange lines (Residential), NWB – Provision & Installation Exchange lines (Business)

CV description - Variation in provision and installation costs for customer lead-ins and network terminating equipment in response to growth in network capacity based on customer connections.

CV type - Straight line through the origin.

Definition of Costs & Volumes

Costs for customer lead-ins and Network Terminating Equipment (NTE) are those associated with the provision and installation of overhead and underground plant (including duct and internal wiring) from the Distribution Point (DP) to the customer. These costs also include the Network test/termination point.

The volume measure in this CVR is customer connections.

CV derivation

This CVR describes how the costs of customer lead-ins and Network Terminating Equipment (NTE) change as the amount of customer connections change.

Process / CVR Construction methodology

The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs.

Rationale and assumptions

As the demand for customer connections reduces, the number of lead-ins and NTE's required reduce, and therefore cost would reduce. A fully variable cost volume relationship is therefore assumed.

This means that customer lead-in and NTE cost is fully incremental. In other words, the contribution to each increment's LRIC equals the costs allocated to that increment by the AS system. The geographic and topological mix of the access network is assumed to remain unchanged in response to changes in local loop connections.

CV label	CV262
CV name	Main/Trunk Exchanges using NGS (Next Generation Switches)

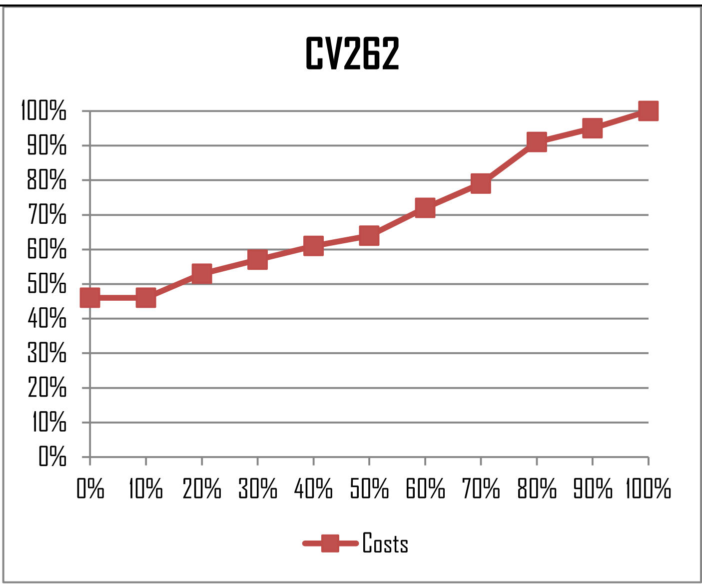
CoW relationship - NGSC – All existing NGS switches in the network. MDX - Additional capacity required on the NGS switch to accommodate the working connexions on the remaining System X switches.

CV description - Variation in Main/Trunk Exchange NGS investment costs in response to changes in the volume of calls (based on Erlangs-per-Circuit).

CV type - Piecewise linear with fixed cost element.

CVR Co-ordinates

CV262	
Volumes	Costs
0%	46%
10%	46%
20%	53%
30%	57%
40%	61%
50%	64%
60%	72%
70%	79%
80%	91%
90%	95%
100%	100%



Definition of Costs & Volumes

Costs in this CVR refer to the following:

- The purchase cost of main exchange switching equipment that is required to switch a specified traffic volume. It includes the purchase cost of Next Generation Switches as specified in the NGS procurement contract between BT and manufacturer Ericsson.
- The associated installation costs, which include the set-up costs (so-called data build cost), the purchase cost of spare components held for maintenance purposes and the contract supervision costs (as specified in the respective contracts above).
- The costs of maintaining a so-called 'mobile restoration fleet', i.e. switching equipment held for back-up purposes.

The volume measure in this CVR is the volume of traffic. It is expressed in Erlangs-per-Circuit, a measure of telephony traffic capacity (1 Erlang = 1 circuit fully occupied for 1 hour).

CV derivation

This Cost Volume Relationship (CVR) describes how the Main/Trunk Exchange and NGS investment costs change in response to changes in the volume of calls (based on Erlangs-per-Circuit). The investment costs also include the additional NGS costs required for the consolidation of the remaining System X switches and therefore represent a Modern Equivalent Asset for these assets as well as the NGS switches in the network. This falls into line with the CCA methodology.

Data sources

The analysis covers all main exchange nodes using a field survey of System X Main exchanges and data from BT's NRS and NGS information databases.

Process / CVR Construction methodology

An engineering model, which analyses the NGS into its constituent elements, is used. The model uses provisioning rules in line with those specified in the NGS contract 658109 to determine the optimum number and mix of elements for given traffic volumes.

As traffic volumes are changed, the exchanges are re-dimensioned using the provisioning rules and then valued at current contract values by element.

The elements used in the models may be analysed into fixed and variable cost. The sub-systems listed below form the fixed cost. All other systems are variable with traffic.

Additional capacity has been added to selected switches in order that there is enough resource to accommodate the remaining System X switches. In some cases this has involved additional switches being required in order to ensure the scorched node methodology remains true.

Calls related fixed cost

NGS

- Switch Core
- Signalling Links
- For a Hybrid NGS, the AXD (ATM) Core and ATM Tunnelling Ports
- Installation

Calls related fixed and variable cost

NGS

- STM1 Connections. These provide transmission line terminations.

The value identified with each element is derived by reference to an analysis of the cost of exchanges given by suppliers.

CVR Operation

To produce the cost volume curve, traffic volumes are flexed through the model, which, in line with the scorched node principle, retains at least one main switch at each site while reducing each switch's call carrying capacity. This is done for 10% increments between 0% and 100% volumes.

The y-axis intercept, which represents the minimum network, includes the costs for all those elements which are required to deliver a notional call, including all of the calls related fixed cost elements.

Rationale and assumptions

Scorched Node Assumption:

All NGS nodes are retained at the minimum point.

CV label	CV263
CV name	Signalling Network Interconnect

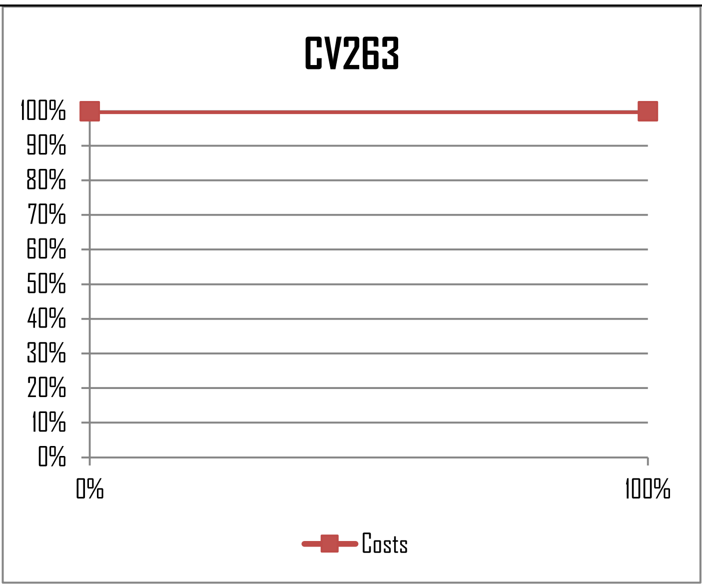
CoW relationship - SIGNI (Signalling)

CV description- Variation in costs of signalling equipment in response to growth in network demand based on call volumes.

CV type - Linear with fixed cost element

CVR Co-ordinates

CV263	
Volumes	**Costs**
0%	100%
100%	100%



Definition of Costs & Volumes

In this CVR the costs are those, which represent signalling network assets which consist of SPR (Signalling Point Relay), STP (Signalling Transfer Point) switches and Signalling Assurance equipment.

The SPR and STP switches relay and switch respectively signalling messages between BT's Intelligent Network and the PSTN (Public Switch Telephony Network) which also includes links to and from OLOs (Other Licensed Operators). The Signalling Assurance equipment monitors these signalling messages to maintain resilience and the integrity of the Signalling network.

The maximum volume point in the CVR represents all of the signalling equipment described above as currently in use in the network as valued for CCA purposes.

The minimum volume point in the CVR represents the SPR, STP and Signalling Assurance equipment required to provide the minimal network which provides the same functionality but for the minimum volume.

CV derivation

Data sources

The amount of equipment required and its price for the maximum and minimum volume points is provided by the Signalling Policy and Design Manager for the STPs and SPRs and the Signalling Assurance Team Manager for the Signalling Assurance equipment.

CVR Operation

The above information is used to determine the maximum and minimum cost values for the maximum and minimum volume points.

Rationale

Scorched Node: Scorched Node assumes PSTN switching presence at all of the existing network nodes in the minimal network.

For SPRs and STPs, the same number of switches exist at the minimum network to maintain geographic reach and connectivity to each PSTN switch and Intelligent Network platform as at the maximum point.

For Signalling Assurance equipment, this means that the same amount of Signalling Assurance equipment is required for the minimal volume as for the maximum volume.

This is because Signalling Assurance equipment consists of E1 (2Mb) connections from the link monitors to each Network route being monitored. Hence as the number of PSTN switching nodes is the same in the minimal network then it follows that the same number of routes need to be monitored. And as the number of E1s to each Link Monitor does not vary then the size of each Link Monitor does not vary.

Support and management systems are present at the minimum volume point to allow the network to be configured and managed.

CV label	CV270
CV name	Co-Operative Intelligence Layer

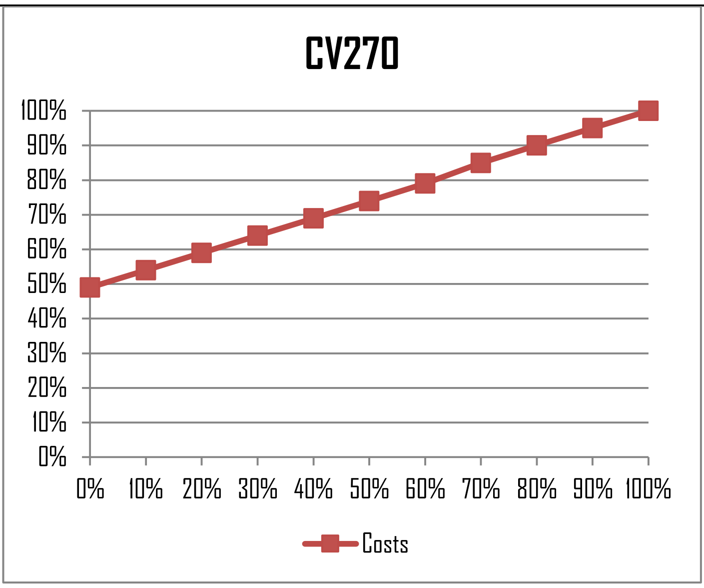
CoW relationship – SIL

CV description - Variation in CISL costs in response to growth in network capacity based on equipment volume.

CV type - Straight Line with a fixed cost element for the intercept.

CVR Co-ordinates

CV270	
Volumes	Costs
0%	49%
10%	54%
20%	59%
30%	64%
40%	69%
50%	74%
60%	79%
70%	85%
80%	90%
90%	95%
100%	100%



Definition of Costs & Volumes

The minimum/fixed costs consists of the minimal volumes of component required to run the theoretical minimum network, these equipment volumes are then multiplied by the latest prices from the suppliers.

CV derivation

The cost volume relationship for the CISL network is derived from a two point model, the current (100%) network cost and the theoretical minimum (0%) network point – using linear interpolation.

Changes

This is a newly introduced platform having gone live this year thus this being the first methodology with no frame of reference to compare to.

Data sources

A complete schedule of current prices from the suppliers has been obtained from the original contracts showing each component split into items between CISL and Alfredo as provided by Hamilton Wilson – The Functional owner of the platform.

Process / CVR Construction methodology

Assuming the Scorched Node principle, the calculation to provide the minimum network consists of taking the fixed costs added to the minimum quantity of software, capitalised test development and Central Processing Units required to provide a service for one unit of volume with the same level of quality of service, resilience and geographic reach as if it were a fully implemented system. The total cost is then summed to derive the minimum network. This minimum cost is then extrapolated up to the maximum, full network cost in increments of 10%.

Rationale and assumptions

Minimum Network: The minimum network is built on the scenario assuming one customer per product.

Maximum Network: The maximum equipment includes all equipment needed as of 2005/06 to accommodate the current level of customers.

CV label	CV500
CV name	Misc
CoW relationship - N/A	
CV description - This CVR has been set up to for the Negative DSAC Correction	
CV type - Straight Line through the Origin.	
Definition of Costs & Volumes N/A.	
CV derivation	
The LRIC calculation is based on the Fully Allocated Costs (FAC) sourced from REFINE. In recent years, some of these costs have had negative values for various components. Unfortunately, in some instances, this has led to the effect of artificially lowering the calculated DSAC in the LRIC model. To combat this problem, adjustments to the negative F8 codes in the LRIC model have been necessary, which is predominantly a manual process, and has historically required a considerable commitment of time by both the BT LRIC and the PwC audit team. To help with this problem, some cost categories have been changed to fully variable. Hence the need for this CVR. Process / CVR Construction methodology The cost volume relationship was constructed by drawing a straight line between the 100% volume with 100% of the cost and the 0% volume with zero costs Rationale and assumptions N/A.	

CV Label	CV800
CV Name	Accommodation External Costs

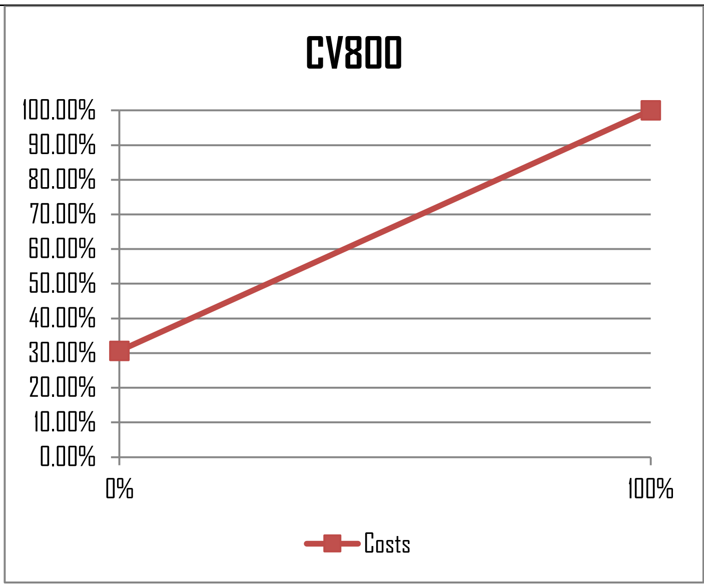
***CoW relationship* –** None.

***CV description* -** Variation in the cost of accommodation in response to changes in demand for accommodation.

***CV type* –** Linear with y-axis intercept.

CVR Co-ordinates

CV800	
Volumes	**Costs**
0%	30.6%
100%	100%



Definition of Costs & Volumes

The costs related to this CVR include a variety of accommodation-related costs, including the costs of Building Rent, Facilities Management charges, Electricity charges and other externally-incurred costs. The volume measure in this CVR is that of volume of demand for the specific activities.

CV derivation

We analysed the cost by F8 code and, for each F8 code, we assessed the proportion of costs (i.e. intercepts) consistent with the minimum network (by applying the scorched node and thinning principles).

Changes

There was no change to the underlying methodology or data source, however the CVR's Specialised and Non-Specialised buildings assumptions were aligned to REFINE's cost allocation Activity Groups. Updated input data was used from VOA (Valuation Office Agency) and DCLG (Department for Communities and Local Government – now known as the Ministry for Housing, Communities and Local Government (MHCLG)).

Process / CVR Construction methodologyThe key items analysed include:

1. Telereal and other building rental costs: the minimum network point was calculated on the basis that operational buildings must be retained to comply with the scorched node assumption. We used the accommodation base (ACCOMBS) in REFINE to ascertain the split between operations and non-operations buildings. Data from public sources was used in order to estimate the split of property: The VOA Property Market Report was used for the average industrial rateable values as well as the prescribed decapitalisation rate; and DCLG was used for the estimate of average industrial land values for appraisals. The cost of land was kept fixed, in line with the scorched node assumption. The buildings cost was reduced ("thinned" to reflect lower space requirements in line with the reduced demand for exchange equipment at nodes (i.e. reflecting the thinning assumption for the exchange equipment);
2. Facilities management external costs: an intercept was calculated to be consistent with the Telereal costs (above);

3. Electricity costs: the analysis of the costs by platform / component was obtained from the REFINE system. The intercept points for these components (using information within the LRIC model) was used to calculate a weighted average intercept for Electricity. This is consistent with the scorched node and thinning assumptions.

The overall accommodation intercept is a cost-weighted average of the individual cost elements.

Rationale and assumptions

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CV Label	CV801
CV Name	Accommodation BT Property Pay

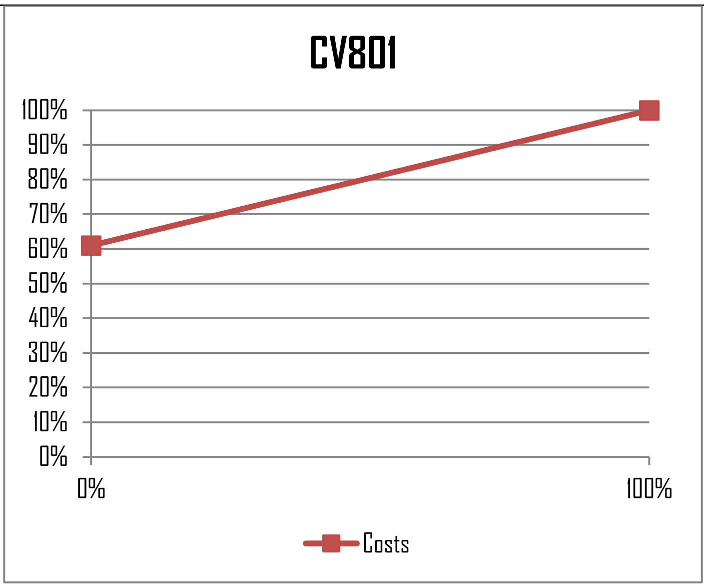
CoW relationship **–** None.

CV description **-** variation in the pay costs of BT Group Property in response to changes in demand for accommodation.

CV type **–** Straight Line with intercept.

CVR Co-ordinates

CV801	
Volumes	**Costs**
0%	61%
100%	100%



Definition of Costs & Volumes

The costs are those of the BT Group Property unit which is responsible for managing all aspects of the BT property estate. This includes setting BT's property strategy, and also managing external suppliers such as Telereal (for outsourced buildings) and Monterey (for Facilities Management).

CV derivation

Group Property costs are related to the size of the property estate and the ancillary activities being managed. We calculated the intercept as follows:

- We used information from the Telereal contract to calculate the split of costs between operational buildings (e.g. exchange nodes) and general purpose (i.e. office) buildings
- We assumed that the contract management costs for operational buildings were fixed, to align with the scorched node principle.
- We assumed the contract management costs for general purpose buildings were variable

- We calculated the intercept based on the cost-weighted average of operational and general purpose costs.

Changes

None in 2017-18.

CV Label	CV802
CV Name	Accommodation BT Owned Depreciation

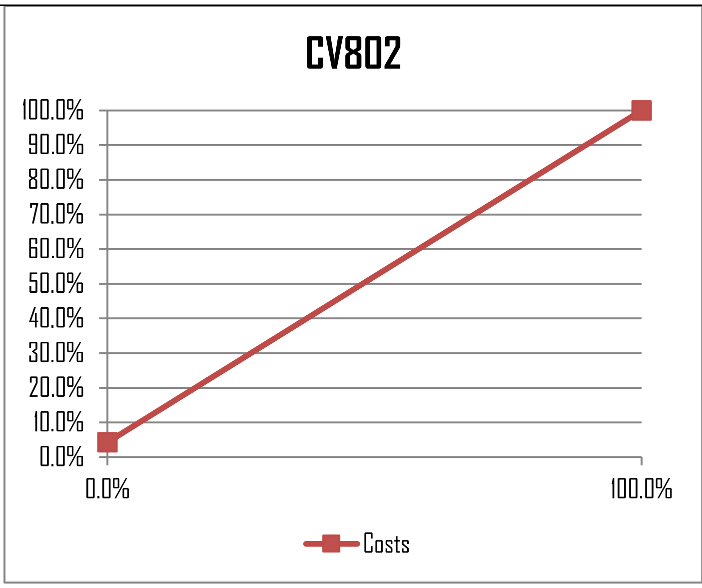
CoW relationship - BFH, BSL, AFH, ALL

CV description - variation in the depreciation costs cost of BT owned buildings in response to changes in demand for accommodation.

CV type – straight line with intercept.

CVR Co-ordinates

CV802	
Volumes	**Costs**
0.0%	4.3%
100.0%	100.0%



Definition of Costs & Volumes

The costs are depreciation on the BT-owned buildings, plus leasehold costs.

CV derivation

We obtained information on the split of costs between freehold depreciation, short leaseholds and long leaseholds. We calculated an intercept that reflects the scorched node assumption for the costs of operational buildings, based on a cost-weighted approach.

<u>Changes</u>

None in 2017-18.

CV Label	CV803
CV Name	Accommodation (BT Owned) – Mean Capital Employed

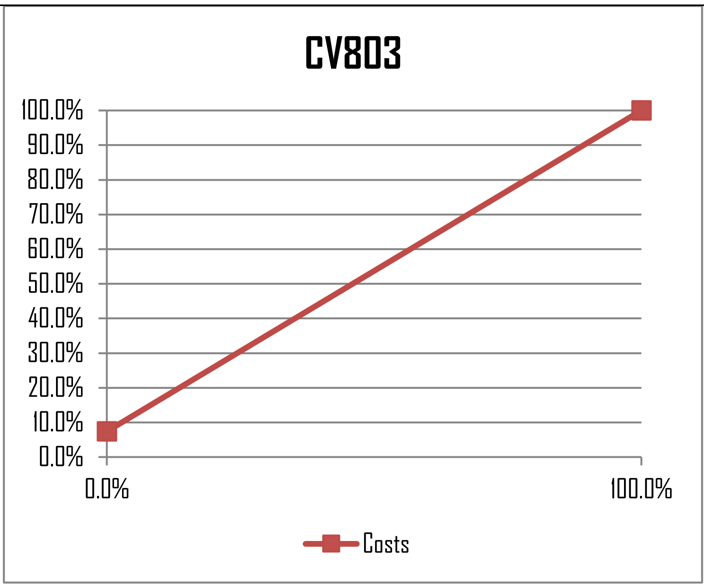
CoW relationship **-** BFH, BSL, AFH, ALL

CV description - variation in the Mean Capital Employed of BT owned buildings in response to changes in demand for accommodation.

CV type – straight line, with intercept.

CVR Co-ordinates

CV803	
Volumes	**Costs**
0.0%	7.4%
100.0%	100.0%



Definition of Costs & Volumes

The costs are Mean Capital Employed of BT-owned buildings.

CV derivation

We obtained information on the split of costs between freehold depreciation, short leaseholds and long leaseholds. We calculated an intercept that reflects the scorched node assumption for the costs of operational buildings, based on a cost-weighted approach.

Changes

None in 2017-18.

CV Label	CV804
CV Name	Accommodation Plant Network - Depreciation

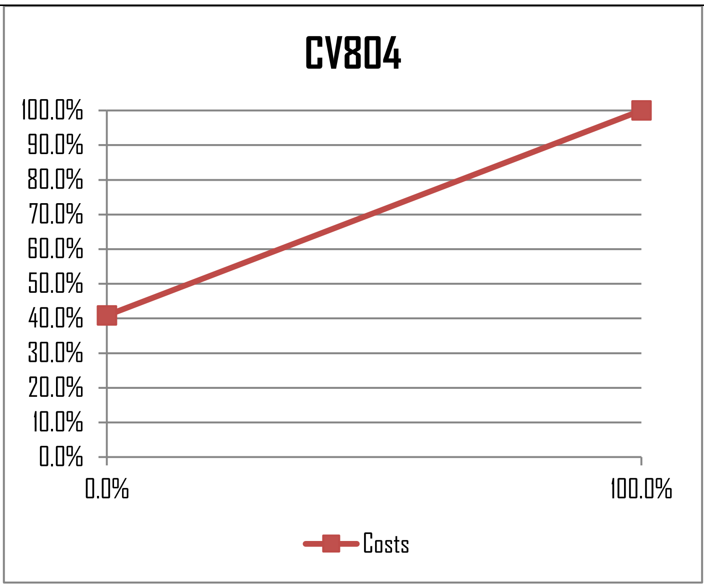
CoW relationship **-** ACPN, ACPA, ACPS, ACPM, ACPC, ACPR, ACPG

CV description **-** variation in the depreciation of accommodation plant costs in response to changes in demand for accommodation.

CV type **–** straight line with intercept.

CVR Co-ordinates

CV804	
Volumes	**Costs**
0.0%	40.9%
100.0%	100.0%



Definition of Costs & Volumes

The costs related to this CVR include the Depreciation of Network equipment-related plant, such as electric light and power conduits, fire protection, ventilation and cooling plant, equipment lifts / hoists, security equipment, motor transport workshop equipment, and equipment used in computer centres.

CV derivation

We obtained a download of the costs related to this CVR from BT's General Ledger. We used this to identify the specific class of work for accommodation plant equipment in BT's network operational buildings. We calculated the intercept for this cost based on scorched node principles (i.e. there is a need to retain all network nodes at their current locations, and hence a need to retain accommodation plant costs to support the network equipment at these nodes).

<u>Changes</u>

None in 2017-18.

CV Label	CV805
CV Name	Accommodation Plant Network – Mean Capital Employed

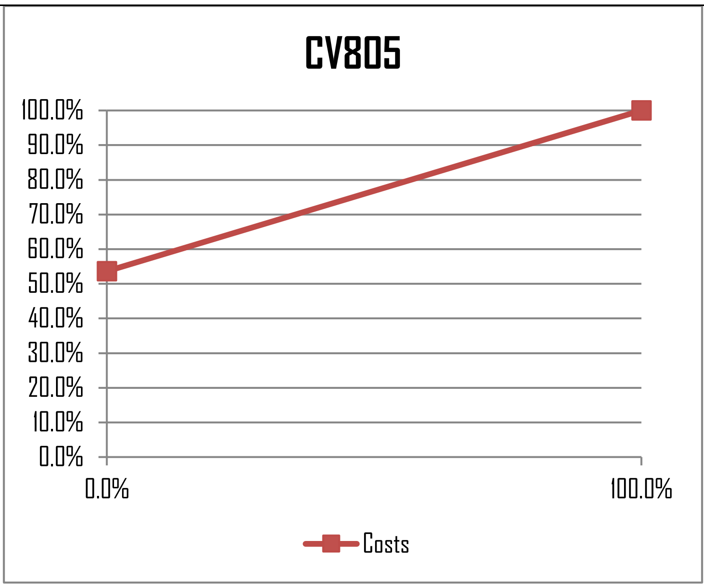
CoW relationship **-** ACPN, ACPA, ACPS, ACPM, ACPC, ACPR, ACPG

CV description **-** variation in the Accommodation Plant Mean Capital Employed in response to changes in demand for accommodation plant.

CV type **–** straight line with intercept.

CVR Co-ordinates

CV805	
Volumes	**Costs**
0.0%	53.6%
100.0%	100.0%



Definition of Costs & Volumes

The costs related to this CVR include the mean capital employed of equipment-related plant, such as electric light and power conduits, fire protection, ventilation and cooling plant, equipment lifts / hoists, security equipment, motor transport workshop equipment, and equipment used in computer centres.

CV derivation

We obtained a download of the mean capital employed related to this CVR, from BT's General Ledger. We used this to identify the specific class of work for accommodation plant equipment in BT's network operational buildings. We calculated the intercept for this cost, based on scorched node principles (i.e. there is a need to retain all network nodes at their current locations, and hence a need to retain accommodation plant costs to support the network equipment at these nodes).

<u>Changes</u>

None in 2017-18.

CV Label	CV901
Associated cost categories	CEFAZZZZYAD3ZZZZ (CEFAZZZZZZD3ZZZZ) PLOPNPDPYDD3ZZZZ (PLOPNPDPZZD3ZZZZ)
CV Name	Duct

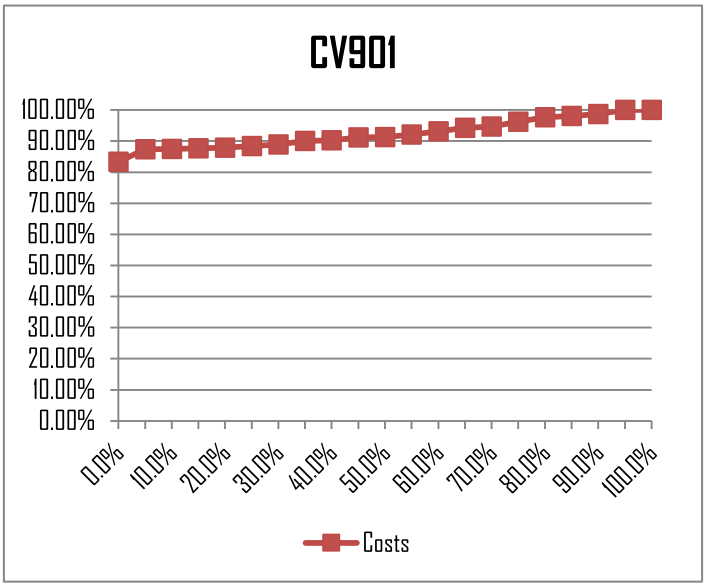
CoW relationship – LDD - Construction - Local Distribution Duct for Copper Cable; LMD - Construction, Local main (Exchange-side) Duct for Copper; LFD - Construction, Local Duct for Optical Fibre Cable; TVD - Cable TV: All ductwork; MUD - Construction, Core Network; CJD - Construction, Core Network.

CV description – Variation in duct costs in response to growth in core and access network capacity.

CV type – Piecewise relationship with a fixed cost element.

CVR Co-ordinates

CV901	
Volumes	**Costs**
0.0%	83.38%
5.0%	87.36%
10.0%	87.47%
15.0%	87.70%
20.0%	87.83%
25.0%	88.36%
30.0%	88.90%
35.0%	90.02%
40.0%	90.23%
45.0%	91.16%
50.0%	91.24%
55.0%	92.15%
60.0%	93.08%
65.0%	94.23%
70.0%	94.72%
75.0%	96.19%
80.0%	97.63%
85.0%	98.03%
90.0%	98.64%
95.0%	99.98%
100.0%	100.0%



Definition of Costs & Volumes

In this CVR the costs are those which represent the whole of the access and core duct network. This includes costs of main, distribution, branch and core duct, and associated jointing chambers and street furniture (manholes, footway boxes, carriageway boxes, etc.).

The volume measure in this CVR is that of the duct bore (single bore being the minimum possible to provide service).

CV derivation

This Cost Volume Relationship (CVR) describes how the cost of duct changes as the volume of duct bores changes.

Although the majority of local access duct is single bore, where many cables share the same duct for part of their routes, more than one bore will be required. The largest component of duct cost consists of the contract costs of excavation and fill of trenches that does not vary proportionally with the size of trench. Other costs are the cost of the duct itself, and the cost of any furniture (such as manholes). Variable costs consist of the cost of additional bores and the additional cost of digging wider trenches.

Changes

There was no change to the underlying methodology or data source, however the data source inputs were updated.

Data sources

The following data sources were used to produce this CVR:

1. information on duct length and number of bores from our PIPeR system.
2. financial information from Procurement (such as latest external contract prices for civil works) to give us the average per-km cost of duct by bore size, and for other costs such as manholes.
3. the correct synthetic codes associated with each activity and extracted from the Orbit system costs for jobs associated with these codes

PIPeR is a database which holds physical data on BT's access network, including electronic maps of duct and transmission routes, with associated physical measures. This data has been constructed using local exchange records from the Planning & Drawing Offices, and currently covers around 60% of BT's exchange areas. PIPeR is used by operational planners and engineers to plan and specify jobs within the access network. We also use PIPeR data in apportioning access network costs for REFINE purposes.

Process / CVR construction methodology

We have calculated 20 network valuations for duct routes: BT's existing network (100% on the volume axis); the minimum network (0%), and intermediate points at 5% intervals.

The existing network valuation (100% of duct network) uses the existing number of bores per route. The minimum network is defined as the least cost network capable of providing existing geographic coverage for a minimum requirement of Access and Core transmission cables. Hence, we adjust the number of bores, consistent with a minimum network configuration, but we keep the duct route distances constant.

The majority of Duct in today's network is single bore, and will therefore remain so in the minimum network. Where we have multi-bore Duct in today's network, we assume that the minimum network is 2 bore. We established that the minimum network requirements for transmission cables (i.e. Access Copper, Access Fibre and Core Fibre) could not be accommodated in single bore. Therefore, we defined the minimum Duct network to be sufficient to support the minimum requirements for cables using Duct.

To plot the cost volume relationship from the existing network to the minimum network we use the method of thinning. We start with the existing network (100%), and then thin the number of duct bores for each duct bore category.

Rationale and assumptions

There are three fundamental assumptions in this cost volume relationship:

Scorched Node Assumption: In this cost volume relationship BT maintains its existing geographical coverage of duct routes in terms of customer access and connectivity between customers, and provides the infrastructure to do this from existing network exchanges. This assumption means that the reach of BT duct kilometres is maintained nationally regardless of a change in the number of duct bores.

Thinning Assumption: Thinning plays a large part of the production of the cost volume relationship as it impacts on the relationship between the number of duct bores and costs. The assumption maintains the reach of duct routes nationally but reduces (thins) the volumes to duct bores in increments of 25% down to a minimum network configuration.

Existing Network: BT's existing network includes the cost of both the local access and core transmission networks. Thereby, the slope of the cost volume relationship represents by how much cost will fall moving from the existing network to the minimum transmission network.

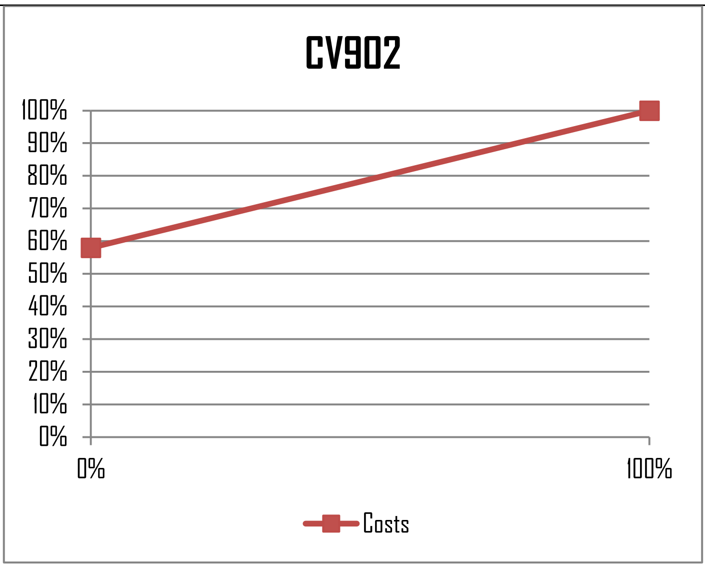
Mix is assumed to be independent of customer density.

CV Label	CV902
Associated cost categories	CEFAZZZZYBD4F3ZZ (CEFAZZZZZZD4F3ZZ) PLOPNPOTYGB2F1ZZ (PLOPNPOTZZB2F1ZZ) PLOPPYZZYKB2F1ZZ (PLOPPYZZZZB2F1ZZ) PLOPNPDPYED4F3ZZ (PLOPNPDPZZD4F3ZZ) PLOPNPOTYHB2F3ZZ (PLOPNPOTZZB2F3ZZ) PLOPPYZZYLB2F3ZZ (PLOPPYZZZZB2F3ZZ)

CV Name	Exchanges: Digital, AXE10 Concentrator
CoW relationship - LYX – Capital – AXE10 Local Exchange.	
CV description - Variation in Local Exchange AXE10 Concentrator investment costs.	
CV type – Straight line relationship with a fixed cost element.	

CVR Co-ordinates

CV902	
Volumes	**Costs**
0%	58%
100%	100%



Definition of Costs & Volumes

Costs in this CVR refer to the following:

- The purchase cost of AXE10 concentrator equipment, as specified in Local Exchange Modernisation Programme 2 (LEMP2), a procurement contract between BT and manufacturer Ericsson.
- The associated installation costs (as specified in contract LEMP2), which include the cost of setting up individual customer connections (data build cost) and the contract supervision costs.
- The costs of maintaining a so-called "mobile restoration fleet", i.e. mobile concentrator and processor equipment held for back-up purposes.

CV derivation

The AXE10 Concentrator CVR has been calculated and aligned to the minimum network and scorched node assumptions

Data has been extracted from BT operational systems to determine the locations on AXE10 Concentrators and these have been fixed using the scorched node assumption.

The size and makeup and therefore cost of the AXE10 concentrator has been calculated using BT engineering policy and the last available bulk purchase contract for AXE10 from Ericsson

BT Engineering policy is to supply an AXE10 concentrator that is able to satisfy potential demand at a site, under a minimum network assumption this is the number of E-side pairs entering into a concentrator site. A minimum number of line cards are also supplied per AXE10 magazine to allow the concentrator to operate but line cards required to supply potential demand are not.

Prices from the last available bulk purchase contract for AXE10 purchase are then used to calculate the cost of a scorched node minimum network and then compared to the recalculated actual infrastructure to calculate the y-axis cost intercept.

CV Label	CV903 (Replaced CV004 and CV005)
Associated cost categories	CEFAZZZZYCD4F4ZZ (CEFAZZZZZZD4F4ZZ) PLOPNPDPYFD4F4ZZ (PLOPNPDPZZD4F4ZZ) PLOPNPOTYIB2F4ZZ (PLOPNPOTZZB2F4ZZ) PLOPPYZZYMB2F4ZZ (PLOPPYZZZZB2F4ZZ)

CV Name	Local Exchanges: Digital, System X Concentrator

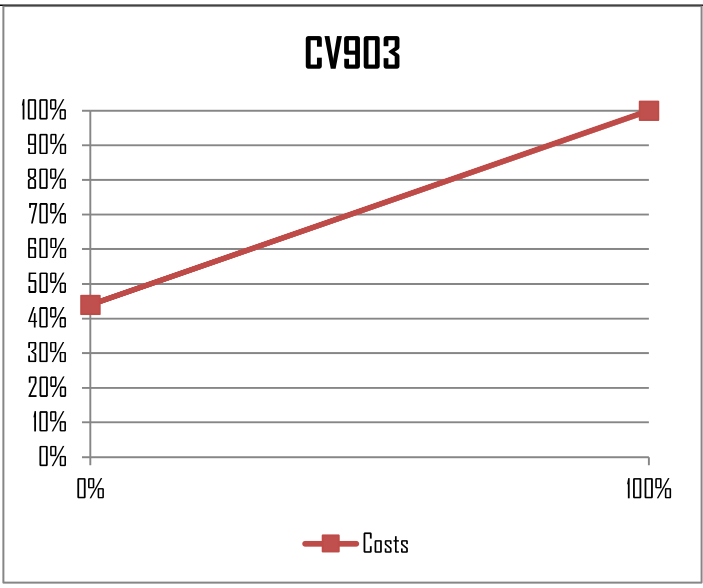
CoW relationship - LDX – Capital – System X Local Exchange

CV description - Variation in Local Exchange Concentrator investment costs.

CV type – Straight line relationship with a fixed cost element.

CVR Co-ordinates

CV903	
Volumes	Costs
0%	44%
100%	100%



Definition of Costs & Volumes

Costs in this CVR refer to the following:

- The purchase cost of System X concentrator equipment, as specified in Local Exchange Modernisation Programme 2 (LEMP2), a procurement contract between BT and manufacturer Marconi.
- The associated installation costs (as specified in contract LEMP2), which include the cost of setting up individual customer connections (data build cost) and the contract supervision costs.
- The costs of maintaining a so-called „mobile restoration fleet", i.e. mobile concentrator and processor equipment held for back-up purposes.

CV derivation

The CVR was estimated based on the existing CVRs for the categories .c and .l sub-categories (namely CV004 and CV005).

The CVR coordinates from Annex 2 of BT's "LRIC Model: Relationship and Parameters" Document for each of the .c and .l sub-categories were assessed on the basis of the proportion of costs that were fixed costs (i.e. percentage of costs that were incurred at zero volumes).

The CVR for the sub category which had the lowest proportion of fixed costs (in this case CV004) was adjusted to a CV type of "Straight line relationship with a fixed cost element" to apply for the combined category. This was done by assuming that there are no common costs and all kinks in the original curve were removed. This assumption was necessary to allow the LRIC results to be generated within the off-line calculation.

This CVR was used as a conservative estimate given that the DSAC levels would then be lower than for the sub-category with the higher proportion of fixed costs.

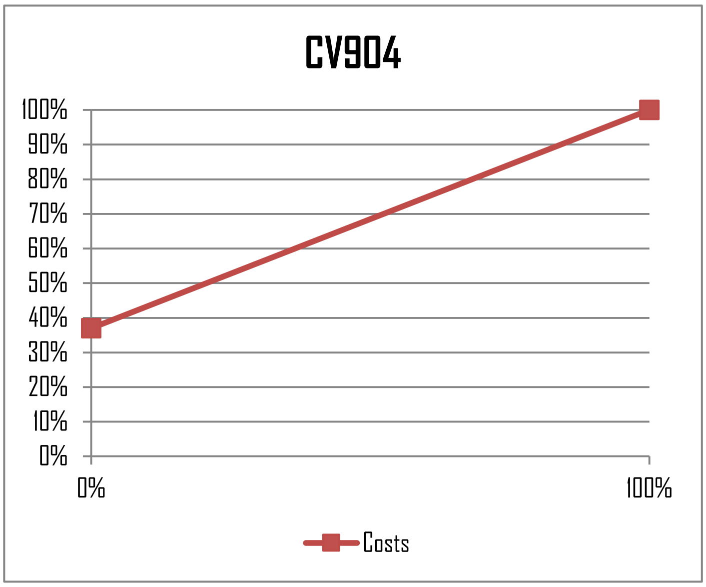
This CVR is a simplified estimate to provide indicative results, and in order to get accurate results, a new CVR will need to be derived using engineering derivations, and the LRIC model re-run accordingly.

CV Label	CV904 (Replaced CV010 and CV011)
Associated cost categories	PLOPNPOTYJB2F6ZZ (PLOPNPOTZZB2F6ZZ) PLOPPYZZYNB2F6ZZ (PLOPPYZZZZB2F6ZZ)

CV Name	Local Exchanges: Digital, UXD5
CoW relationship - LUX – Capital – UXD5 Local Exchange	
CV description - Variation in UXD5 Local Exchange Concentrator investment costs.	
CV type – Straight line relationship with a fixed cost element.	

CVR Co-ordinates

CV904	
Volumes	Costs
0%	37%
100%	100%



Definition of Costs & Volumes

There is only one distinct asset within a UXD5 local exchange. Unlike System X or AXE10 local exchanges, UXD5 local exchanges do not have a separate processing function. They are treated in the same fashion as concentrator units.

This combined CVR focuses on the concentrator costs for UXD5 local exchanges.

CV derivation

The CVR was estimated based on the existing CVRs for the categories .c and .l sub-categories (namely CV010 and CV011).

The CVR coordinates from Annex 2 of BT's "LRIC Model: Relationship and Parameters" Document for each of the .c and .l sub-categories were assessed on the basis of the proportion of costs that were fixed costs (i.e. percentage of costs that were incurred at zero volumes).

The CVR for the sub category which had the lowest proportion of fixed costs (in this case CV010) was adjusted to a CV type of "Straight line relationship with a fixed cost element" to apply for the combined category. This was done by assuming that there are no common costs and all kinks in the original curve were removed. This assumption was necessary to allow the LRIC results to be generated within the off-line calculation.

This CVR was used as a conservative estimate given that the DSAC levels would then be lower than for the sub-category with the higher proportion of fixed costs.

This CVR is a simplified estimate to provide indicative results, and in order to get accurate results, a new CVR will need to be derived using engineering derivations, and the LRIC model re-run accordingly.

CV Label	CV905 (Replaced for PLOPPYZZZZB2F1ZZ.C and PLOPPYZZZZB2F1ZZ.L)
Associated cost categories	PLOPPYZZYKB2F1ZZ (PLOPPYZZZZB2F1ZZ)
CV Name	Combined CVR for Opex, Pay, Maintenance, LE General cost category

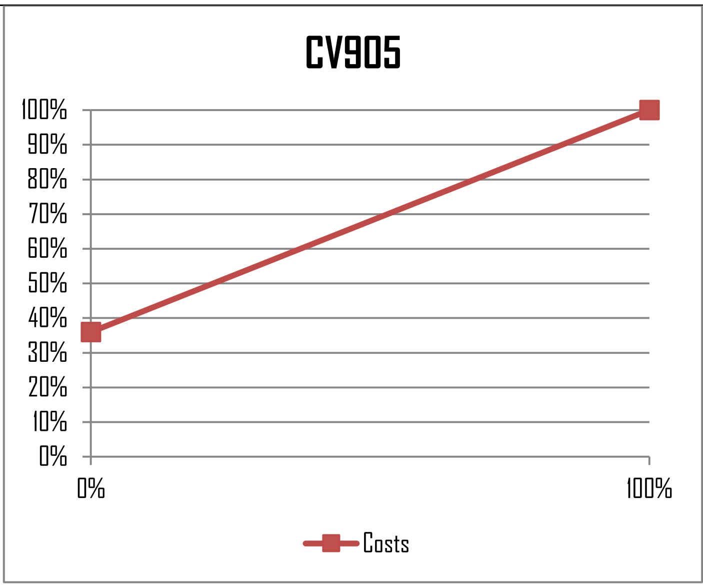
CoW relationship – N/A.

CV description – N/A.

CV type – Straight line relationship with a fixed cost element.

CVR Co-ordinates

CV905	
Volumes	Costs
0%	36%
100%	100%



Definition of Costs & Volumes

These are the costs related to Opex, Pay, Maintenance, LE General.

CV derivation

The original sub-categories did not have CVRs associated with them, as they were Type 3 CVR. The LRIC for each cost category was driven by a weighting of other cost categories within the model (See annex 1 of BT's "LRIC Model: Relationship and Parameters" Document for details).

The simplified CVR for this combined category was taken as a weighted average of the LRIC: FAC ratios for the dependent cost categories.

CV label	CV906
CV name	21CN

CoW relationship – All associated network equipment for MSAN nodes, Metro and CORE nodes and WDM backhaul/transmission nodes.

CoW's: MSAN, MSANF, MSANH – MSAN Costs and Equipment;

COR21, CORLU, METAL,METCI , METCN, METSI – Core and Metro node Costs and Equipment;

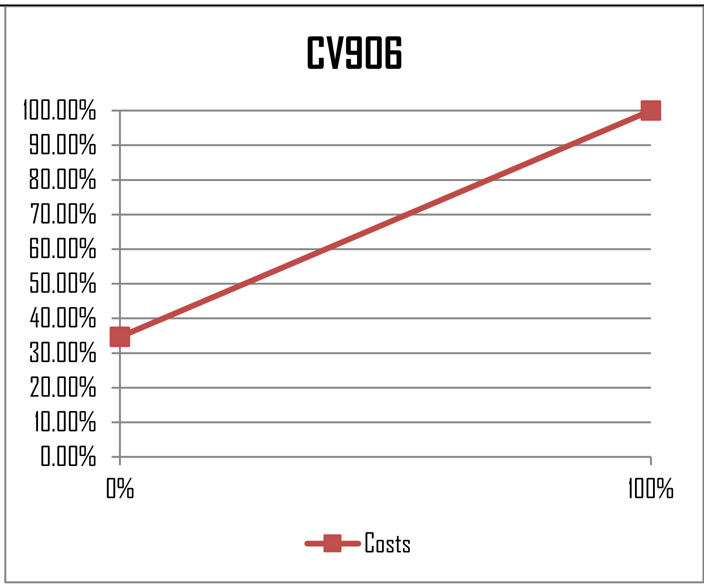
WDM21 and WDMH WDM Cost and Equipment;

CV description – Variation in 21CN equipment costs, includes the minimum build cost for the MSAN, Metro & Core and WDM nodes to the maximum build of the 21CN network.

CV type - Straight line relationship with a fixed cost element.

CVR Co-ordinates

CV906	
Volumes	**Costs**
0%	34.7%
100%	100%



Definition of Costs & Volumes

In this CVR the costs are all those associated with 21CN equipment. This includes all METRO/CORE node equipment, MSAN node equipment and WDM backhaul/transmission node equipment.

The volume measure in this CVR is that of the minimum build required for the equipment to be fully operational i.e. to be able to handle one single connection and carry the minimum bandwidth traffic.

CV derivation

This Cost Volume Relationship (CVR) describes how the costs of providing the minimum equipment associated with nodes change as the volume of traffic increases from the minimum to the maximum. The approach taken in the production of the CVR is that based on costs (from supplier contracts) and equipment volumes derived from BT Designs 21CN capital build models.

Changes

CV271 (METRO/CORE), CV272 (MSAN) and CV273 (WDM) has been removed, as these have now been consolidated into this new CVR CV906 (21CN). The individual results from each of the network elements were summed together to give an overall intercept.

Data sources

The volumes and prices of all associated equipment including racking and cabling is provided by BT/TSO – Network Solutions Cost Optimisation Team.

Process / CVR Construction methodology

The cost volume relationship has been constructed by taking the unit cost for each component and the minimum volume requirement for each node/route and multiplying by the number of deployed sites/routes requiring connectivity. This derived the minimum network assuming the scorched node principle.

The maximum network has been derived as the MEA valuation of the 21CN nodes and routes platform by taking the total capital as supplied by BT/TSO.

CVR Operation

To calculate the intercept a model is used to calculate the minimum amount of equipment required to enable each of BT's current deployed node points of presence (POPs) to transport the minimum bandwidth, provide access for one line at each site and enable connectivity to transport the minimum bandwidth.

Once costed, this minimum cost can then be compared to the MEA total cost of the nodes and the intercept point can be calculated in percentage terms.

Rationale and assumptions

Scorched Node Assumption: In this cost volume relationship BT maintains its existing geographical coverage enabled nodes in terms of network access and connectivity between nodes.

Minimum Network:

As detailed above

Annex 3 Increment Specific Fixed Costs

ISFC label	SV019
ISFC Name	Core transmission cable
CV Relationship	CV019
ISFC description	
The element of core transmission cable investment costs that would be saved by the non-provision of activities within the Core increment measured from a minimum network configuration.	
ISFC derivation	
The ISFC relationship was constructed by deriving the costs associated with a minimum network and calculating the costs associated with the Core increment only. The minimum network is defined as the least cost network capable of providing existing connectivity but for extremely low levels of traffic. It is valued using the current cost of the minimum commercially available cable size. Core transmission cable is categorised as: (a) Solely for the provision of activities within the Core increment (that is the 'Top 9' components, Inland private Circuits and Interconnect Connections and Rentals); (b) Solely for the provision of activities within the Network increment but not within the Core increment; and (c) Jointly for the provision of activities within the Core increment and other services within the Network increment. The increment specific fixed cost of core transmission cable investment costs that relate to the Core increment is calculated in two stages. First, the cost of the least cost network of cable in category (b) and (c) is identified. This is done by applying average circuit lengths per route type, PDH sharing factors and cable utilisation percentages to the non-Core route types. Second, this cost is deducted from the cost of the minimum network to derive the amount that is specific to Core. The non-international Subsea cable that is included in the minimum network is not included in the increment specific fixed cost.	
Rationale and assumptions	
Core transmission cable provided solely to carry traffic relating to activities within the Core increment would not be provided in the absence of those activities.	

ISFC label	SV022
ISFC Name	Core transmission equipment - SDH
CV Relationship	CV022

ISFC description

The element of core transmission equipment investment costs that would be saved by the non-provision of activities within the Core increment measured from a minimum network configuration.

ISFC derivation

The ISFC relationship was constructed by deriving the costs associated with a minimum network and calculating the costs associated with the Core increment only.
The minimum network is defined as the least cost network capable of providing existing connectivity but for extremely low levels of traffic. It is valued using the current cost of the relevant line equipment.
Core transmission equipment is categorised as:

(a) Solely for the provision of activities within the Core increment (that is the 'Top 9' components, Inland private Circuits and Interconnect Connections and Rentals);
(b) Solely for the provision of activities within the Network increment but not within the Core increment; and
(b) Jointly for the provision of activities within the Core increment and other services within the Network increment.

The increment specific fixed cost of core transmission equipment investment costs that relate to the Core increment is calculated in two stages. First, the cost of the least cost network of equipment in category (b) and (c) is identified. This is done by applying number of regenerations and PDH sharing factors to the non-Core route types. Second, this cost is deducted from the cost of the minimum network to derive the amount that is specific to Core.
The radio equipment that is included in the minimum network is also included in the increment specific fixed cost.

Rationale and assumptions

Core transmission equipment provided solely to carry traffic relating to activities within the Core increment would not be provided in the absence of those activities.

Annex 4 Dependency Group

This annex gives definitions for dependency groups, which drive dependent cost categories.

The annex starts with a glossary of all the dependency groups and the description of the dependency group. Then follow lists the cost categories which are members of each dependency group.

Glossary of Dependency Groups

Group Name	Group Description
APN_FA	1. Network fixed assets, which drive the accommodation plant network expenditure.
Comp_FA	2. Network fixed assets, which drive network computing expenditure.
CS	3. Operational customer support expenditure, which drives general customer support expenditure.
GP_Accom_TCI	4. General purpose accommodation transfer charge in, which drives general purpose accommodation expenditure.
GS	5. Operational general support expenditure, which drives other general support expenditure.
LEX_FA	6. Local exchange fixed assets, which drive general local exchange fixed asset expenditure.
Maint	7. Operating maintenance expenditure, which drives general maintenance expenditure.
NW_Capex_NP	8. Current year non pay network capital expenditure, which drives materials awaiting installation.
Nwk_FA	9. Network fixed assets, which drive the miscellaneous network capital expenditure.
Opex_Capex	10. Pay and non-pay expenditure for operating costs and for current year capitalised costs, which drive short term investments and accrued expenses.
Opex_Capex_NP	11. Non-pay operating costs and current year non-pay capital expenditure, which drive trade creditors and input VAT.
Opex_NP	12. Non pay operating costs, which drive prepayments and other creditors.
PI_Pay	13. Personnel & Admin pay and pay operating costs, which drive Personnel & Admin pay related categories.
Power_FA	14. Network fixed assets, which drive network power expenditure notional cost driver (Nwk_Pow_NCD).
PS	15. Operational plant support expenditure, which drives general plant support expenditure.
ROI_Cap	16. Network fixed assets, which drive Rates on Installation expenditure.
SE_TCI	17. Specialised electricity transfer charge in, which drives electricity costs.
SP_Accom_TCI	18. Specialised buildings accommodation transfer charge in, which drives specialised buildings cost.
SP_Buildings	19. Specialised buildings fixed assets, which drives plant protection expenditure.
Supplies	20. Operating costs, which drive supply expenditure.
Test_FA	21. Network fixed assets, which drive network testing expenditure.

LRIC Model: Relationships & Parameters

The table below shows the members of each dependency group

Dependency Group	Dependent cost categories
APN_FA	MMFXNPZZZZDEZZZZ
APN_FA	MMFXPYZZZZDEZZZZ
APN_FA	PLOPPYZZZZB2A4ZZ
Comp_FA	CEFAZZZZZZDIZZZZ
Comp_FA	PLOPNPDPZZDIZZZZ
Comp_FA	PLOPPYZZZZB2G8ZZ
CS	PLOPNPOTZZBVH7ZZ
CS	PLOPNPOTZZBVZZZZ
CS	PLOPNPOTZZBVH9ZZ
CS	PLOPPYZZZZBVH7ZZ
CS	PLOPPYZZZZBVZZZZ
GP_Accom_TCI	MMFXNPZZZZDPGPZZ
GP_Accom_TCI	MMFXPYZZZZDPGPZZ
GS	PLOPNPOTZZB0H7ZZ
GS	PLOPPYZZZZB0ZZZZ
LEX_FA	CEFAZZZZZZDGF5ZZ
LEX_FA	MMFXNPZZZZDGF5ZZ
LEX_FA	MMFXPYZZZZDGF5ZZ
LEX_FA	PLOPNPDPZZD4ZZZZ
LEX_FA	PLOPNPDPZZDGF5ZZ
LEX_FA	PLOPNPOTYGB2F1ZZ
LEX_FA	PLOPNPOTZZB2F1AZ
LEX_FA	PLOPPYZZYKB2F1ZZ
LEX_FA	PLOPPYZZZZB2F1AZ
Maint	PLOPNPOTZZB2B4ZZ
Maint	PLOPNPOTZZB2DXZZ
Maint	PLOPNPOTZZB2I6ZZ
Maint	PLOPNPOTZZB2L5ZZ
Maint	PLOPNPOTZZB2S8ZZ
Maint	PLOPNPOTZZB2ZZZZ
Maint	PLOPPYZZZZB2B4ZZ
Maint	PLOPPYZZZZB2DXZZ
Maint	PLOPPYZZZZB2G2ZZ
Maint	PLOPPYZZZZB2I6ZZ
Maint	PLOPPYZZZZB2S8ZZ
Maint	PLOPPYZZZZB2ZZZZ
Maint	PLOPPYZZZZB2J5ZZ
Nwk_FA	CEFAZZZZZZDGH7ZZ
Nwk_FA	CEFAZZZZZZDGZZZZ
Nwk_FA	MMFXNPZZZZDGZZZZ
Nwk_FA	PLOPNPDPZZDGZZZZ
Nwk_FA	PLOPNPDPZZDHQ2ZZ
Nwk_FA	PLOPNPOTZZB4ZZZZ
Nwk_FA	PLOPNPOTZZD3ZZZZ

LRIC Model: Relationships & Parameters

Dependency Group	Dependent cost categories
Opex_Capex	CECAINZZZZG4ZZZZ
Opex_Capex	CECAINZZZZG5ZZZZ
Opex_Capex	CECAINZZZZG6ZZZZ
Opex_Capex	CECLCRZZZZH1ZZZZ
Opex_Capex	CECLCRZZZZH9ZZZZ
Opex_Capex_NP	CECLCRZZZZH3ZZZZ
Opex_NP	CECADRZZZZGAZZZZ
PI_Pay	CECLCRZZZZH6ZZZZ
PI_Pay	PLOPPYZZZZBEZZZZ
PI_Pay	PLOPPYZZZZBFZZZZ
PI_Pay	PLOPPYZZZZBGZZZZ
Power_FA	MMNCNPTRTIDFZZZZ
Power_FA	PLOPNPTRTIBCSEZZ
Power_FA	PLOPNPTRTOBCSEZZ
PS	PLOPPYZZZZBKZZZZ
ROI_Cap	PLOPNPOTZZBKJ4ZZ
SP_Accom_TCI	MMFXNPZZZZDPSPZZ
SP_Accom_TCI	MMFXPYZZYTD4F4ZZ
SP_Accom_TCI	MMFXPYZZZZDPSPZZ
SP_Accom_TCI	PLOPNPOTZZBCSPZZ
SP_buildings	PLOPNPOTZZBKI3ZZ
SP_buildings	PLOPPYZZZZBKI3ZZ
Supplies	PLOPNPOTZZB6ZZZZ
Supplies	PLOPPYZZZZB6H7ZZ
Supplies	PLOPPYZZZZB6ZZZZ
Test_FA	PLOPNPOTZZB2L6ZZ
Test_FA	PLOPNPOTZZBKL4ZZ
Test_FA	PLOPNPOTZZBKL5ZZ
Test_FA	PLOPPYZZZZB2L6ZZ
Test_FA	PLOPPYZZZZBKL4ZZ
Test_FA	PLOPPYZZZZBKL5ZZ
Test_FA	PLOPPYZZZZBVL5ZZ

Annex 4a Mapping of Dependent Cost Categories

This annex shows the dependent cost category mappings (parent/child) used by BT, link is below.

https://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2018/index.htm

Section	Description
Parent	Parent Cost Category
Child	Child Cost Category (cost driver)
Concatenation	Parent/child

Please note: in previous years, Annex 4a showed F8 code to cost category mappings, this is now available in Annex 5

Annex 5 Mapping of F8 Codes to Cost Categories

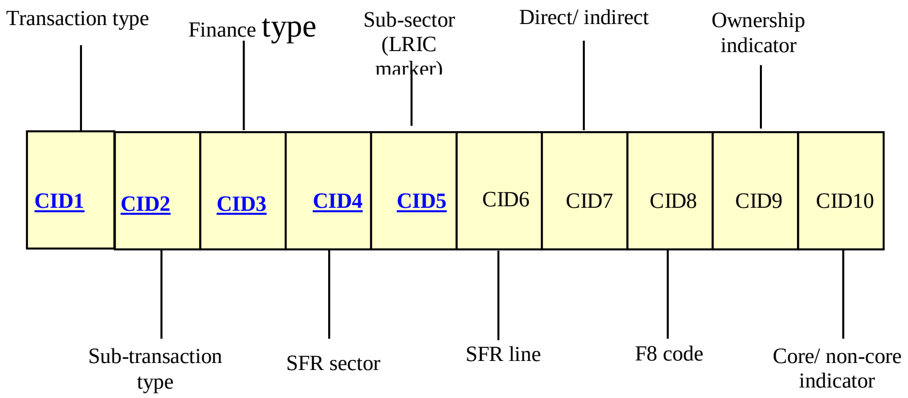
This annex maps the F8 codes to cost categories used by BT, link is below.

https://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2018/index.htm

Section	Description
F8 Code	Numeric label which uniquely defines a F8 code
F8 Code name	Long name of the F8 code
Cost Category Marker	Alphabetic label which uniquely defines a category.
Cost Category Description	Long name of the cost category

General ledger accounts are the lowest level at which financial information is brought into REFINE. A CHART file is fed into REFINE, which sets out a mapping of general ledger accounts to F8 codes, sectors, transaction types, etc. This is done through a series of markers, which enable the system to track and report results against a number of views:

The Cost Category Marker is made up of those CID Markers (underlined in bold) from the CHART file, which includes the F8 codes.



By integrating the CID markers and applying a set of rules, a 16 character cost category code is derived.

CID Markers from AS

CID00	CID01	CID02	CID03	CID04	CID05
FA	J	FA	P	DE	UU

CID Markers to Cost Category

KEY	ICKEY
FAJPDEUU	CEFAZZZZZZDDZZZZ

Please note: Annex 5 replaces Annex 4a and Annex 4b of previous years. Only one annex is now published as Annex 4a and Annex 4b essentially had the same F8 code data.