Office of Utilities Regulation

Principles of Long-run Incremental Cost Model for the Jamaican Telecommunications Market

Consultation

July 30, 2008

Abstract

This document has been prepared for the purpose of defining the requirements to be placed on Jamaican operators when they are required by the Office of Utilities Regulation (OUR) to determine the costs of providing interconnection services on the basis of the Long Run Incremental Cost (LRIC) as required by the Telecommunications Act (the "Act"). The Telecommunications Act requires that all dominant public voice carrier shall permit interconnection of its public voice network with the public voice network of another carrier for the purpose of voice services and that the prices at which it is to be provided shall be grounded by the principles set out in Section 33 of the Act. The Act also provides that the Office shall have regard to the principle of cost when making a determination of an operator's call termination charges. The Act stipulates that prices shall be established between the total longrun incremental cost ("LRIC") of providing the service and the stand alone cost (SAC) of providing the service.

Comments from Interested Parties

Persons who wish to express opinions on this Consultative Document on "The Principles for Long-run Incremental Cost Model for the Jamaican Telecommunications Market" are invited to submit their comments in writing to the OUR. Responses to this Consultative Document should be sent by post, fax or e-mail to:-

Carey Anderson
P.O Box 593
36 Trafalgar Road, Kingston
Fax: (876) 926-3635
Email: canderson@our.org.jm

Responses are requested by Thursday, October 9, 2007. Any confidential information should be submitted separately and clearly identified as such. In the interest of promoting transparent debate, respondents are requested to limit as far as possible the use of confidentiality markings. Respondents are encouraged to supply their responses in electronic form, so that these can be posted on the OUR's Website, http://www.our.org.jm, (or a link included where the respondent wishes to post its response on its own website).

Comments on responses

The Office's intention in issuing this Consultative Document is to obtain the views of stakeholders on the proposed principles of Longrun incremental cost (LRIC) for setting interconnection prices. The responses to this Consultative Document are a vital part of that public debate, and so as far as possible, should also be publicly available. The Office considers that respondents should have an opportunity both to have access to the evidence and opinions submitted in other responses, with which they may disagree, and to comment on them. The comments may take the form of either correcting a factual error or putting forward counterarguments.

Comments on responses are requested by Thursday, October 30, 2007

Arrangements for viewing responses

To allow responses to be publicly available, the Office will keep the responses that it receives on files, which can be viewed by and copied for visitors to the OUR's offices. Individuals who wish to view the responses should make an appointment with Gillian Henderson, at the OUR Information Centre, by one of the following means:-
Telephone: (876) 968-6053, email: ghenderson@our.org.jm
Fax: (876) 929-3635
The OUR's offices are at:
3rd Floor, PCJ Resource Centre, 36 Trafalgar Road, Kingston 10
The individual will be able to request photocopies of selected responses at a price, which just reflects the cost to the OUR.

Timetable

The timetable for the public consultation including an indicative date for the publication of the Determination Notice is set out in the Table below:-.

Event	Proposed Date
Publication of Consultation	Thursday, July 30, 2008
Responses to Consultation	Thursday, October 9, 2008
Comment on Responses	Thursday, October 30, 2008
Publication of Determination Notice	

This Consultative Document is not a legally binding document and does not constitute legal, commercial or technical advice of the Office of Utilities Regulation. This consultation is engaged without prejudice to the legal position of the Office and its duties under applicable legislation. Additionally, the views and opinions expressed reflect the Office's thinking at this point in time and as such should not be construed as a definitive position of the Office.

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Chapter 1: Legal Framework

1.0 The Legal framework surrounding all aspects of interconnection is set out in the Act at Sections 27-37 inclusive. Section 28 dictates;

> *"…the Office shall determine which public voice carriers are to be classified as dominant public voice carriers for the purpose of this Act".*

1.1 The Office carried out consultations titled "Dominant Public Voice Carriers Consultation Document" dated March 2000 followed by two further consultations with similar titles classified N. 2 and No. 3 respectively and dated November 2001 and April 2003 respectively as part of the process of arriving at a decision.

1.2 The Act at Section 29 (1) states;

> *'Each carrier shall, upon request in accordance with this Part, permit interconnection of its public voice network with the public voice network of any other carrier for the provision of services".*

1.3 Section 29 (4) states state as well;

> *"The Office may, either on its own initiative in assessing an interconnection agreement, or in resolving a dispute between operators, make a determination of the terms and conditions of call termination,* ***including charges****"*

1.4 The Act goes on to state the basis of charges, in sub-section 5 of Section 29;

> *"When making a determination of an operator's call termination charges, the Office shall have regard to the principle of cost orientation…"*

1.5 At Section 30, the Act imposed the duty on a dominant public voice carrier to provide interconnection in relation to a public voice network in accordance with the following principles – *"…charges shall be cost orientated and guided by the principles specified in Section 33".*

1.6 These principles of cost orientation stated at Section 33;

> *"where the Office is required to determine the prices at which interconnection is to be provided by a dominant carrier, it shall, in making that determination, be guided by the following principles-*
>
> *…..*
>
> *(e) prices for interconnection shall be established between the* ***total long run incremental cost of providing the service and the stand alone cost*** *of providing the service, so, however, that the prices shall be calculated as to avoid placing a disproportionate burden of recovery of common cost on interconnection services;*
>
> ***…"***

Chapter 2: Introduction

2.0 The standard of Long-Run Incremental Cost (LRIC) is increasingly applied by regulatory authorities for purposes of setting cost-based prices. The reason is that costs on the basis of LRIC correspond to those that a firm must meet in a vigorously competitive market. So if a telecommunications operator has significant market power or is dominant in a market, the application of this standard gives the regulatory authority assurance that prices are set in conformity with competitive market conditions. The concept of the LRIC costing model is reflected in the principles to guide the OUR in the determination of costs and to guide the industry in making submissions to the Office regarding cost based rates as depicted in the legal framework above.

2.1 The implications and requirements of the LRIC standard will be discussed in section 3. Here it is already noted that there are two methods for its implementation. One method, referred to as bottom-up cost modelling, starts from market demand, translates this demand via an engineering planning process into a model of the network, determines all the network elements necessary to bring services to the market and then determines this model's network costs using current input prices and knowledge of an operator's cost structure for maintenance and operations. It allows the determination of the cost of a fully efficient operator using the latest technology and is therefore often considered as the cost floor. Knowing a service's LRIC determined bottom-up has the advantage of providing the regulatory authority with information about the discrepancy between the cost that may be claimed by an operator and the one that a truly efficient operator would have to incur.

2.2 The other method, referred to as top-down approach, starts with information from the operator's cost accounting records. This information is to establish direct relationships between the operator's actual costs and the services that the operator brings to market. It has the advantage of being based on costs that the operator has actually incurred and may therefore command greater credence in certain circumstances.

2.3 In general, it can be said that regulatory authorities tend to rely on bottom-up cost modelling when they themselves engage in the exercise of a cost determination. Using this route puts them in the position of confronting the regulated operator with its own determination of costs and then requiring the operator to show where the costs so determined may not be accurate. When for reasons of resource and time constraints the regulatory authority does not go this route, it will typically request the operator to submit a cost estimate based on the LRIC standard using a top-down approach. It will then have to check this estimate as to the correct application of the LRIC standard, in particular as to whether it does not reflect inefficiencies that may be inherent in the operator's actual network and operations.

2.4 The top-down approach is less resource and time consuming which is the main reason that regulatory authorities may prefer it initially to bottom-up modelling. Further, requiring operators to develop their own bottom-up models would likely lead to severe complaints on their part of being subjected to an unjustified regulatory burden, including the issues of resourcing costs and capacity. The Office is of the opinion that it should require regulated operators to submit cost estimates that are derived according to the top-down approach. This document will describe the requirements for a LRIC cost determination that need to be fulfilled when this approach is being used.

2.5 A document that lists the requirements that a LRIC approach should fulfil is "Principles of implementation and best practice regarding FL-LRIC cost modelling" of 24 November 2000 by the Independent Regulators Group[1]. It has been widely cited and can be regarded as authoritative on the subject matter. The document covers both, the bottom-up and top-down, approaches and describes the choices that in respect of certain aspects are available and of which either is considered as acceptable for fulfilling the various requirements. In following the IRG document, the requirements developed below focus on those required for the top-down approach. The purpose is to clarify these requirements for the application of the LRIC standard to telecommunications operators in Jamaica but it is not designed to provide a description of the LRIC standard in all its details. Operators are assumed to have the required knowledge on their own. However, specifc reference documents have been included under References, that can be consulted to obtain the relevant information.

2.6 The literature contrasts the LRIC standard with that of Stand Alone Cost (SAC). This is the cost of the increment considered (a service, a bundle of services) if it were produced by itself and not together with other services. Stand-alone production thus would forgo economies of scale and scope that are possible by joint production with other services and products. The standard has relevance when prices are tested in respect of their cost orientation where prices may be considered cost-oriented if they are above LRIC but below the SAC. The difference between the LRIC and SAC norms plays no role in this document. In the case of a mobile network, the increment is essentially the total output of the relevant network so that the difference vanishes. In the case of a fixed network the increments in terms of services are at such a high level of aggregation that the difference becomes of relatively small significance. Ultimately, the objective of this document is the formulation of requirements when the LRIC standard is used to objectively calculate the costs of services, not to test whether existing prices are cost oriented.

Question 1: Do you agree with the use of the LRIC standard in determining the cost of telecommunications operators' regulated services and that for its implementation the top-down approach be used? If you do not agree please explain in detail.

[1] The IRG is an informal association of European telecommunications regulatory authorities. It has 31 members, i.e. all the EU member states plus the EEA countries plus Switzerland. It was founded in 1997.

Chapter 3: Requirements for LRIC costing based on the top-down approach

3.0 The IRG document lists seven requirements to be fulfilled by a LRIC approach. They are shown below identified by the aspects to which they apply:

1. Long-run and forward looking costs
2. Network topology
3. Relevant increment
4. Asset valuation
5. Depreciation
6. Common costs
7. Reasonable rate of return

3.1 These are the requirements that must be fulfilled by opereators when they are to report LRIC-based costs to the OUR. Each of the topics are addressed below, however, 'Asset valuation' and 'Depreciation' are treated together as the issues arising from them are closely related.

Long-run and forward-looking costs

4.0 As stated, LRIC is the cost standard that prevails in a competitive environment. The competitive environment implies that at any time now or in the future a new operator may enter the market and by building a network with the newest technology and at then prevailing prices, forces current operators to keep costs at the same level as that of such a potential competitor. The 'long run' in LRIC is thus the very long time period over which the operator can vary all capacities and inputs, which also means that all costs are to be considered as variable.[2]

4.1 The use of LRIC requires that costs are not to be based on historic prices of assets. This implies current cost accounting (CCA) for each of the current and future periods of the planning horizon. LRIC further implies that, at least conceptually, the principle of economic depreciation should be applied instead of a simple rule such as straight line depreciation. The concept of economic depreciation takes into account the development both of future prices as well as demand and therefore varying degrees of capacity utilization of network elements. What this and CCA imply in respect of requirements in

[2] In respect of another requirement, i.e. the allocation of common cost, it is often stated that such common cost is to be regarded as 'fixed' and thus cannot be allocated to particular services according to service specific cost drivers which means that another mechanism must be used. This sentence appears to imply an inconsistency as it is usually also stated that the LRIC methodology requires all costs to be considered as variable. This inconsistency is eliminated when it is recognized that describing costs as 'fixed' actually means that they are 'non-cost-driver-sensitive', or do not vary over a certain range with variations in the volume of any service specific cost driver. Note the restriction 'over a certain range' which implies that the non-cost-driver-sensitivity holds only piece-wise, i.e. for certain ranges of volumes of services, and that portions of non-cost-driver-sensitive costs may have to be incurred again, or disappear, when variations in volumes are sufficiently large. There are a very few costs that are truly fixed and need not be incurred again irrespective of the growth of demand and the network; one of them would be a one-off license fee required for entering the market at all which will never have to be paid again.

the context of the top-down approach will be discussed below in the section "Asset valuation and depreciation".

Requirements:

(I) For the purpose of cost determination on the basis of the LRIC standard, the 'long run' is to be defined as the time horizon over which all costs are variable.

(II) 'Forward looking' means that anticipated development of input prices and of future demand are to be taken into account when carrying out the cost calculations.

Question 2: Do you agree with the meaning given to the terms 'long run' and 'forward looking' in the prededing discussion? If you do not agree, please explain in detail.

Network topology

5.0 The major objective of using the LRIC standard is to determine costs that correspond to efficient service provision. Efficiency implies a network that is optimized, in particular in respect of network topology. Meeting the requirement of an optimal topology to the fullest extent means that a 'scorched earth' approach is taken according to which the geographical locations of all nodes of the network can freely be selected. Less demanding is the so-called 'scorched node' approach which starts from the node locations of the existing network but calls for the optimization of the structure of the network given these locations. When scorched node modelling is used, this may mean that that the locations of higher order equipment, such as main switches, can be freely selected among the given node locations, but it may also mean that the locations of all facilities higher up in the hierarchy, including remote control units, are those in the existing network.

5.1 With bottom-up modelling the scorched earth approach is relatively easy to implement while with top-down approach compliance with this requirement may involve substantial adjustments if the topology of the given network deviates largely from that of an efficient one. The IRG document "considers it appropriate and reasonable to adhere to a bounded rationality approach, and thus to take the existing network topology as the starting point for the cost allocation process". Given that the OUR is proposing that operators use the top-down approach, the scorched node approach is also here taken as the most appropriate one. It should nevertheless be understood that the OUR may see the need to demand adjustments to the topology (expressed in number of nodes, switches, lengths of transmission links, etc.) underlying the cost calculations if that structure obviously differs substantially from a reasonably efficient one.

Requirements:

(I) A scorched node approach may be used for the network topology underlying LRIC costing.

(II) Application of the approach must be open to modification if it proves that the topology is obviously inefficient.

Question 3: Do you agree with the application of the scorched node approach as descirbed above? If you do not agree, please explain in detail.

Relevant increment

6.0 The LRIC costing approach derives its flexibility in part from the fact that the increment for which costs are to be determined can be freely selected. The increment may be only a particular wholesale service or it may be a bundle of services that all depend on the same kind of cost driver. The IRG document in fact states that "(i)n principle, there are an infinite number of different sized increments that could be measured, which can be grouped into an individual or collection of products, services, components or elements". The increment can also be defined as the whole set of services offered by the operator.[3]

6.1 In a fixed network, services are usually separated into 'access' to the network and 'conveyance', where the first refers to the service enabling users to receive calls from and place calls on switched networks, and the second covers the transport and switching of calls. The IRG document therefore lists 'conveyance' and 'access' as examples of how the increments of a fixed network may be defined. In the case of a mobile network there is usually no separate service of access to the network so there would correspondingly be only one increment, i.e. 'conveyance'.[4] The IRG document, however, also warns that having only a very few increments "could result in a high aggregation level of cost data that may not provide the information necessary to demonstrate cost orientation. Therefore it may be necessary to derive subsets of the main increments to enable LRIC data to be calculated at a lower level (such as the core components of the network)". One convenient way that fulfills this criterion is to define increments in terms of network elements.

6.2 Increments consist then of the outputs of well-defined network elements (local switches, transmission links, base stations, local loops) for which the cost drivers are also well-defined (switched minutes, minutes conveyed over links or base stations, number of subscribers) so that so-called cost-volume relationships (CVRs), expressing the cost of network element's output per unit of the cost driver, can readily be determined. The cost of a service, e.g. terminating a call on a network or providing a subscriber line, is then the sum of the costs of the network elements used to produce the service. This

[3] In this case there would be no difference between the LRIC and SAC since when the operator's total set of services is the increment, there is no further room for economies scale and scope (except when resources are shared with other operators).

[4] It is occasionally argued that, at this level of aggregation, the output of a mobile network should be divided into two increments, conveyance and coverage. This is not a useful distinction since different from a fixed network where access can be defined as a different service, in particular when it is provided as an unbundled local loop, coverage by a mobile network is not offered as a service by itself but only serves to make traffic on the network possible. This means that what is called the cost of coverage is effectively the cost of providing minutes of calling.

approach is known as the 'Total Element' version of LRIC, or TELRIC, and is the one that is implemented in almost all LRIC cost models.[5]

Requirements:

(I) Increments are to be defined as follows:
- for the fixed network: 'access' and 'conveyance',
- for the mobile network: 'conveyance' (which is actually its total output as 'access' is not a separate service in mobile networks).

(II) As subcategories for the purpose of calculating the relevant LRICs, each of the network elements used to produce the services are considered as increments which gives rise to the TELRIC approach

Question 4: Do you agree with the definitions of the increments for the fixed and the mobile networks as presented above? If you do not agree, please explain in detail.

Asset valuation and depreciation

7.0 As stated in the IRG document, an operator should be able to recover costs sufficient for maintaining future asset values in a competitive market. This implies that assets should be valued at replacement costs as is done in current cost accounting (CCA). The IRG points out that this in practice means that assets are valued using the cost of replacement with the modern equivalent asset (MEA) which means an asset which serves the same function but incorporates the latest available best practice technology and which a new entrant might be expected to employ.

7.1 As stated earlier, LRIC implies CCA and ideally requires that depreciation be according to the principle of economic depreciation, or at least uses a surrogate approach that attempts to approximate it. In this context, asset valuation and depreciation are closely related.

7.2 Economic depreciation is the difference between the value of an asset at the end and the beginning of the relevant period. This difference corresponds to;

- the value of the output that (either due to use or obsolescence) the asset will not be able to produce any more in the future, where the capacity to produce this output (the depreciation due to use or obsolescence) should be valued at current MEA prices;

- plus the losses or minus the gains due to changes in the MEA's price applied to the remaining net book value of the asset.

[5] TELRIC can be contrasted with 'Total Service Long-Run Incremental Cost' or TSLRIC which is defined as the cost of producing a particular service (the increment) in addition to other services already provided by the network in question. If, however, the increments considered are like 'conveyance' or 'access', the examples given in the IRG document, and the use of subcategories is recommended to avoid too high a level of aggregation, the TELRIC version offers itself as an obvious choice.

7.3 Carrying out depreciation this way guarantees that the net book value of the operator's assets always corresponds to the assets' remaining capacity valued at current MEA prices. It also guarantees so called 'financial capital maintenance' (FCM) whereby it is assured that the value of the initial investment is maintained as the sum of the net book value and the present value of accumulated of depreciation. This is in contrast with the alternative of so-called 'operating capital maintenance' (OCM) for which the depreciation charge does not include the gains or losses due to the MEA's price changes. It should be noted that the EU recommends the use of FCM.

7.4 The objective with economic depreciation is to write down the value of an asset in agreement with its loss in productive capacity due to its use in the given period. It is often the case that the rate of capacity utilization of a telecommunications facility (a duct, a base station tower, a switch) varies substantially over time, with typically a low utilization rate at the beginning and a high utilization rate at the end which implies that also depreciation charges should be low at the beginning and high at the end. The practical difficulty of the approach lies in making this kind of assessment. The IRG document recommends that instead of full-blown economic depreciation surrogate approaches could be used where their acceptability should be judged on how close they come to the theoretically correct measure of depreciation. This is also the position of the OUR.

Requirements:

(I) Current cost accounting should be implemented by valuing an asset on the basis of a modern equivalent asset (MEA).

(II) Depreciation should be applied in a manner to closely approximate economic depreciation.

(II) Depreciation should be applied to assure financial capital maintenance (FCM).

Question 5: Do you agree with how current cost accounting and economic depreciation are to be implemented in the LRIC determination? If you do not agree, please explain in detail.

Common costs

8.0 Common costs are considered those that cannot be related directly to a particular service and therefore not to particular cost drivers so that their alloaction to the various services has to be done using some other mechanism. Before the discussion of the appropriate mechanism can be started, it must be noted that common cost arise at various levels of the production process, e.g. at the level of a bundle of services if these use facilities in common that give rise to a substantial portion of non-cost-driver-sensitive costs. In the TELRIC approach these types of common costs (also referred to as joint costs) are alloacted to the services by incorporating them into the cost-driver relationship as a separate amount that is considered fixed over a certain range of the services' volumes.

8.1 For common costs arising at the company level the IRG document notes that "depending on the approach used, LRIC cost modelling as such may not include common cost, nevertheless it is fairly standard practice to mark-up LRIC" by an appropriate amount. The document then goes on to discuss alternative mechanisms two of which are the ones most often being proposed, i.e. the Ramsey inverse elasiticity rule or the equal proportionate mark-up (EPMU) rule. Arguing that from an economic point of view the Ramsey rule is the more desirable one, the IRG document nevertheless also suggests that because of the lack of relevant information it would be too difficult to implement. Therefore the EPMU rule should be given preference.

8.2 The preference given to the EPMU rule is justified. It is to be preferred, however, because it is per se the correct approach and not because it is too difficult to implement the Ramsey rule. The Ramsey rule should be applied, if at all, only to costs arising from the use of a truly fixed resource of which at the level of a company there are very few. The resources used in the activities giving rise to a company's common costs do not belong to this category. Since common costs rise and fall with the volume of a company's total activities, i.e. they rise, although in an unspecifiable manner, with (the sum of) the volumes of the various products provided, the LRICs of each of these products should be marked up in an equal proportionate way.

Requirements:

(I) Common costs that arise at the level of the network are to be incorporated in the LRIC calculation.

(II) To cover common costs that arise at the level of the company a mark-up may be added to the LRIC using the EPMU rule.

Question 6: Do you agree with how common cost is to be accounted for as part of the LRIC determination? If you do not agree, please explain in detail.

Reasonable rate of return

9.0 The regulation of prices of operators that are dominant in a market (in EU parlance: have significant market power) has the objective of determining prices that are consistent with competitive market conditions. It therefore must allow the operators to earn a return on their invested capital that corresponds to what they would be able to earn in a truly competitive market. Such a return must reflect the risk in the given business field, here the telecommunications markets, as well as, where appropriate, the risk of doing business in a particular country.

9.1 In the LRIC approach, this allowable rate of return is determined on the basis of the so-called 'weighted average cost of capital' (WACC) for which the rate of return on equity capital and the interest paid on debt, each weighted with its share in total capital, are added up. The Office has adopted this approach for determining the appropriate return to be

allowed on invested capital. The Office will therefore take the same approach to calculating the WACC as is described in the same consultation document; ***Estimated Weighted Average Cost of Capital for Cable and Wireless***[6].

Requirements:

(I) For the determination of the return on invested capital, the WACC formula is to be used.

(II) For determining the return on equity capital, the CAPM is to be used; its parameter values are to be set accoring to the discussion in the text.

(III) For determining the interest rate on debt capital, the risk free interest rate plus a mark-up for risk is to used.

Question 7: Do you agree with the approach to determining a reasonable rate of return on invested capital? If you do not agree, please explain in detail.

The use of operators submitted interconnection prices

10.0 After each operator's interconnection cost is submitted to the Office, the Office will be in a position to determine which cost would be most efficient and/or which price could be the benchmark interconnection price. This efficient price should be technology neutral and neutral of the topology of the network. The question remains then, should the Office approve interconnection prices that are higher than this 'most efficient interconnection price', therefore approving imbedded inefficiencies in these interconnection prices. Would this be fair to consumers? Would this conform to dynamic economic efficiency and the entire concept of effective competition? The Office therefore seeks commentary on what should be the best approach. Should individual interconnection prices be accepted and used, or should the average industry interconnection price be used, or should the most economically efficient of the interconnection prices be used?

Question 8: What interconnection price should be accepted and used, should it be the industry average interconnection price, should it be individual interconnection prices ascertained, or should it the most economically efficient interconnection price? Please provide reasons for answer.

[6] This document was published on May 9, 2008, with document number TEL 2008/05: Con/01

Conclusions

This document provides a set of requirements that are proposed to be placed on telecommunications operators in Jamaica for reporting to the OUR the costs of services determined according to the LRIC standard using the top-down approach. It does not claim that it is providing a detailed account of how the LRIC cost exercise is to be carried out. Regulated operators in Jamaica are assumed to have the relevant knowledge available to them. If not there are European operators that have been regulated according to this standard for some time that provide on their websites detailed accounts of how they carry out LRIC costing using the top-down approach.

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Glossary

Access	In the cost modelling context: service enabling users to receive calls and/or data from and place calls on or send data over a switched network; also the service rendered to a network operator other than the owner of the access network so that users can avail themselves of the services of that operator's switched network
Bottom-up modelling	Cost modelling approach which starts from basic information about demand, technology, prices of inputs etc. and based on this information models the network and derives therefrom the costs of service
CCA	Current cost accounting; in this approach all assets are valued at the prices currently asked for them in their markets
Common cost	Cost incurred by an operator that cannot be traced to any particular service or bundle of services
Conveyance	In the cost modelling context: the transport and switching of calls and data in the switched network concerned; in a fixed network, from the MDF at which the calling party is connected, to the MDF at which the called party is connected; in a mobile network from the calling party's handset to the called party's handset.
EPMU	Equal proportionate Mark-up; a means of recovering fixed and common costs through the addition of a mark-up on top of incremental costs. The costs to be recovered are allocated across a range of services so that each service is allocated the same mark up as a percentage of its incremental cost.
FL	Forward looking; in conjunction with LRIC it means the cost that the operator must be able to achieve in the future to be able to meet future competition
LRIC	Long-run incremental cost; the cost incurred when producing a service or bundle of services (the increment) in addition to other services that are already being produced
Modern equivalent asset	Asset that serves the same function as an existing one but incorporates the latest available best practice technology
Scorched earth approach	Approach in modelling the cost of a telecommunications network in which the locations of all nodes of the network can be freely chosen
Scorched node approach	Approach in modelling the cost of a telecommunications network in which node locations of the existing network are accepted as given

CAPM	Capital asset pricing model; the standard methodology used in finance theory
Top-down approach	Cost modelling approach which starts from the information from the cost accounting records of the operator
WACC	Weighted average cost of capital, i.e the average of the rate of return on equity and the interest rate on debt