Fair Trading Commission

Consultation Paper

LONG RUN INCREMENTAL COST (LRIC)

GUIDELINES FOR CABLE & WIRELESS (BARBADOS) LIMITED

Document No. **FTC /CONS2011/01** **Date: 27 May 2011**

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SECTION 1 – INTRODUCTION

Purpose of Document

This consultation document is part of the proceedings of the Fair Trading Commission (the Commission) on the development of Long Run Incremental Cost (LRIC) as a basis for calculating interconnection rates for the telecommunications sector in Barbados. The prime objective is to outline the Commission's current thinking and provide stakeholders with the opportunity to contribute to the formulation of guidelines which will be used by Cable & Wireless (Barbados) Limited (C&W) to inform the cost modelling process. The guidelines will be developed with the assistance of the Commission's external consultants.

This consultation is part of the Commission's mandate to:

(a) bring to public attention important issues relating to utility regulation, in order to promote public understanding and debate;
(b) put forward options and/or proposals as to the approach to be adopted in dealing with these issues; and
(c) invite comments from interested parties, including C&W, consumers, other service providers, businesses, professionals and academics.

The views and analysis set out by the Commission in this consultation document are intended to invite comments which may cause the Commission to revise its position.

The Commission encourages the widest possible participation in this consultation process. This document is available at the Commission's offices at the Fair Trading Commission, Good Hope, Green Hill, St. Michael and on the website www.ftc.gov.bb

The Consultation period will begin on **May 27th, 2011** and end on **July 8th, 2011 at 4:00 p.m**.

Objectives

The Commission, in its decision on C&W's Consolidated Reference Interconnection Offer (RIO) dated February 22, 2010, determined that C&W should implement interconnection rates based on LRIC methodology. The Commission also indicated that it would design guidelines which C&W would be required to follow when developing the LRIC model.

The provision of interconnection facilities on fair and efficient terms is widely recognised as an essential requirement for the creation of a competitive telecommunications market. This is because operators in a competitive market need to terminate calls on other operators' networks and similarly to receive calls originated on other operators' networks.

Furthermore it makes sense economically, especially as competition develops, for competing operators to use each other's core networks for transit purposes and often this will be the only way that a new entrant can provide some services. Interconnection charges can account for a substantial portion of an operator's costs. It is therefore important that interconnection rates be derived from appropriate costs which provide proper economic signals to operators to guide their investment decisions.

Interconnection rates derived from LRIC require a study and modelling exercise that utilises cost and demand estimates of the Company's operation. The objective of the model is to provide an estimate of the cost that C&W incurs to provide interconnection in the competitive market. The modelling exercise involves:

- Estimating the direct costs of providing the interconnection service over the "long run"(this allows for averaging out of any capital investments which would not be incurred annually)
- Including a capital cost component that reimburses the operator for the network equipment associated with interconnection
- Taking into consideration a reasonable allocation of costs that are not directly caused by interconnection but are incurred by C&W in connection with its interconnection facilities and services, for example, salaries. These are referred to as joint and common costs.

There are various LRIC approaches and the Commission will be using the Total Service Long Run Incremental Cost (TSLRIC) approach which measures the difference in cost

between producing a service and not producing it where the relevant increment is the total volume of the service in question and the time perspective is the long run.

This approach will replace the Historical Cost Accounting (HCA) approach which has been in use throughout the liberalisation process and on which the interconnection rates are currently based. HCA reflects what the operator actually pays for the asset, its actual cost of operating and maintaining that asset and includes all costs necessary to get the asset in place and ready for use. Many regulators have moved or are moving away from this as the basis for establishing interconnection charges as it is considered inadequate for the following reasons:

(a) Joint and common costs are allocated to the various categories of service using formulae that do not necessarily reflect relative usage or other cost related factors.

(b) Operational and technical inefficiencies of an operator are passed on to the interconnecting operators through the interconnection charge and the impact of newly deployed technology is not taken into consideration.

Some of the benefits of having interconnection rates based on LRIC are:

(a) It encourages efficient competition in the wholesale market which leads to competition in the retail market,

(b) It sends economic signals that promote efficient forward-looking investment decisions,

(c) It facilitates effective means of interconnection and

(d) It is non-discriminatory and non-preferential.

SECTION 2 – OVERALL PROCESS

This LRIC exercise will be conducted assuming an efficient operator and costs are calculated using estimates of future forward looking demand. Other assumptions that are needed in the modelling process include consideration of the planning period used in the model, whether or not the network is designed using the actual C&W network, the market share of C&W fixed and mobile network and the type of technology to be used for the fixed and the mobile network. Costing issues such as the type of depreciation, the valuation of assets, estimation of operating costs and the sharing of costs between different networks also form part of this exercise and are discussed in this paper.

Implicit in the TSLRIC definition is that prices should reflect efficient forward looking costs, i.e. the costs of delivering services using the most efficient technology for meeting current and future demand. TSLRIC or similar approaches such as LRAIC[1] or LRIC+EPMU[2] have been widely adopted internationally by regulators for telecommunications service costing. Jurisdictions like Australia, the UK and the United States[3] adopt this approach as it provides a good balance in meeting the various regulatory objectives in terms of competition and consumer benefits.

The Commission will review the output of the cost models including the interconnection cost estimates. The Commission may issue new interconnection rates as warranted.

For the avoidance of doubt, C&W will be required to develop separate TSLRIC results for its fixed and mobile network businesses based on the guidelines. However, it is for C&W to decide whether it will present these calculations in a single model or in two separate models.

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1 Long run average incremental cost

2 Long run incremental cost plus an equi-proportionate mark up

3 In the United States the TSLRIC is referred to as Total Element LRIC (TELRIC)

To initiate the process of designing guidelines which C&W would be required to follow when developing the LRIC model, the Commission required C&W to provide a LRIC model framework which was submitted in August 2010. Based on this framework document, the Commission has drafted LRIC guidelines in the form of this consultation paper which is now being offered to stakeholders for comment.

The TSLRIC model implementation process will consist of three main phases:

1. **Publication of TSLRIC guidelines -** Following this consultation the Commission will publish the guidelines taking due regard of any comments received during the public consultation period.

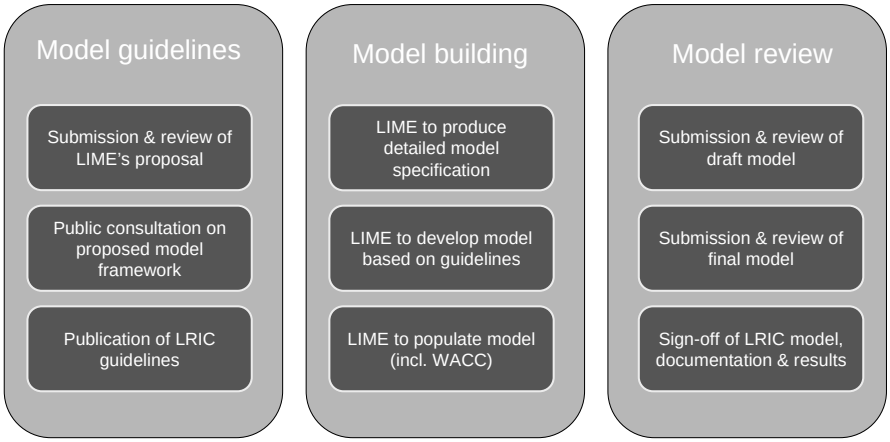
2. **Model building -** Following the publication of the guidelines, C&W will be required to specify the TSLRIC model for FTC review and build it consistent with the guidelines. The specifications will include the methodology to be implemented in the model, the model structure and proposed format of outputs.

3. **Review of C&W's TSLRIC model -** Upon C&W's submission of the draft TSLRIC model, the Commission will review the model to ensure that the modelling approach is consistent with the guidelines. The Commission will seek to ensure that the model is accurate and free from errors and bias. The burden of proof will be on C&W to satisfy the Commission that the model and its inputs are accurate and consistent with the guidelines. Where the Commission is not satisfied that the model is fit for purpose, C&W will be directed to produce evidence to justify assumptions and/or make modifications to the model calculations and input assumptions in order to resolve any issues identified. The review process will finish when the Commission is satisfied that the model is fit for purpose.

The resulting TSLRIC estimates generated by the final model will be used to determine interconnection rates for the services contained in C&W's RIO.

The model development process is summarised at Figure 1.

Figure 1. TSLRIC model development process stages



SECTION 3 – ISSUES IN NETWORK MODELLING

The "*IC*" in TSLRIC refers to "incremental cost" which can be defined as the change in overall cost for the company as a whole if it were not to deliver a service or group of services (the "increment"), where a company produces a large number of different services. Incremental cost approaches are based on the theory that efficient prices for services in perfectly competitive markets should reflect the cost of delivering these services.

The "*LR*" means that the incremental costs are measured over the long run including both costs that may vary in the short run, such as operating expenditure, and also costs which vary in the long run such as the cost of fixed assets. The long run view takes into account the need for operators to recover the costs of assets in order to ensure continued investment in the network.

The "*TS*" refers to a "total service" approach, where the increment is defined as all relevant services provided by a network with the costs of delivering individual services, for example interconnection services, estimated by distributing the cost of each element of the network over the services that use that element. A total service approach takes account of the large fixed and common costs within telecommunications networks which are not causally related to any single service, but which are required to deliver the totality of services. Under a total service approach, all services make a proportionate contribution to the recovery of these fixed and common costs.

"Total Service" Increment

For the purpose of calculating TSLRIC estimates, one must define the services to be included in the "increment" which will be used to determine costs. The increments defined must include the defined interconnection services for which costs are to be determined but will also include other services which make use of shared network components. This will ensure that interconnection services recover a proportion of any network fixed and common costs.

The Commission proposes to define two increments for which TSLRIC estimates will be calculated:

- A 'fixed core network' increment consisting of those elements of the fixed network that are sensitive to the level of traffic; and
- A 'mobile network' increment, consisting of the total mobile network.

Within its fixed network related TSLRIC model, C&W should further define a "fixed access network" consisting of those elements of the network which are sensitive to the number of subscribers, for the purpose of excluding the costs of these elements from the calculation of interconnection costs.

These increments are detailed in Table 1 below.

Table 1. Proposed increment definitions

Increment	Services
Fixed core network	**Voice calling services** (domestic on-net, domestic off-net, domestic directory enquiry, emergency services, internet dial-up, voicemail, domestic payphone, domestic operator assistance, outgoing international & incoming international)
	Interconnection service (fixed termination, directory enquiry, emergency services, international fixed termination, national transit, international incoming transit & international outgoing transit)
	Other – transmission capacity based – services (IP direct connect, domestic leased lines transmission, international leased lines, other data)
Mobile network	**Voice calling services** (domestic on-net, domestic off-net, voicemail, outgoing international & incoming international)
	Interconnection service (domestic voice termination, international voice termination, SMS termination & inbound roaming)
	Subscriber services (the provision of a mobile subscription – to be excluded from interconnection services)
Fixed access network	**Access lines** (PSTN, ADSL, ISDN & leased lines local connections)

The "fixed traffic" increment would therefore be defined as the entire group of services using the fixed core network, which is in line with definitions adopted internationally. The cost of providing this wider group of services would then be divided by the total volume of

demand in the core network increment to produce the average incremental cost per unit of traffic.

Q1. Do you agree with the proposed definition of 'total service' increments for the TSLRIC model?

Bottom-up versus top-down TSLRIC models

TSLRIC models can be developed on a "top-down" or a "bottom-up" basis. A top-down model is based on (and reconciles to) the operator's reported costs of the business from the financial statements. In contrast, a bottom-up model estimates the costs that a hypothetical network operator would face in order to meet a given level of demand based on a series of engineering rules and input cost data. A third option is to combine a bottom-up cost model with top-down cost information from the operator. This third approach is commonly referred to as a "hybrid" model.

There has been an extensive debate over the relative merits of each type of model, and particularly how these models should then be used to set interconnection prices.

A top-down approach, based on the actual network structure of the operator may best capture the full complexity of the relationship between demand and network dimensioning and hence network cost. In each country, this relationship is the result of years of "on the ground" engineering decisions at both a macro level (strategic network planning), and a micro level (local capacity and traffic management) and as such, a top-down model will take account of these decisions; ensuring the operator's actually incurred costs are captured within the model.

In comparison, a bottom-up approach, based on an engineering model of the network, should exclude any inefficiency in capital investment and operating costs that may have developed over the years. Bottom-up models, being based on a hypothetical operator, also provide more flexibility to model various scenarios, such as the termination rate for an operator with a certain level of market share, or to investigate the impact of the frequency band available to operators on cost.

C&W's framework document proposed developing a TSLRIC model using a bottom-up approach to derive network capital cost estimates and a top-down approach for operating and common costs data. This approach would appear to strike an appropriate balance between accuracy and reflecting efficient forward looking costs. In particular the fixed network is in a period of transition from legacy Time Division Multiplex (TDM) technology or an IP based next generation network. As a result it is likely that a top-down approach would result in service costs that did not reflect true forward looking costs.

The Commission proposes use of the hybrid approach in the TSLRIC guidelines with a provision that any cost data drawn from C&W's financial accounts must be adjusted where appropriate to reflect the efficient operation of the modelled hypothetical network operator.

Q2. Do you agree with the proposed approach of using a bottom-up approach to derive network cost estimates and a top-down approach for operating and common costs?

Timescale of model

Regulated prices should be set on a forward looking basis, to reflect the costs of delivering the services in the future rather than the costs of delivering those services in the past. It is also helpful when setting prices to understand how costs may evolve in the medium term. In addition networks are designed to efficiently meet foreseeable demand over the medium term rather than to minimise costs and thus some forecast of future demand is necessary. A period of four years into the future would seem reasonable as forecasts over any longer period would be subject to a high degree of uncertainty.

In order to be able to calibrate the model against C&W's actual reported cost data and network structure, it will be necessary to include cost estimates for the latest available year for which C&W has actual data.

The Commission proposes to require the model to be populated to produce outputs for each year from the latest year for which financial data is available to four years from the date of finalisation.

Q3. Do you agree with the proposed four-year modelling period of the TSLRIC model with outputs produced for each of the four years?

Market share assumptions

In a multi-operator market, such as the mobile market, it may not be appropriate to set prices based on the costs of any given operator but instead to establish a hypothetical, "efficient" operator. Typically when there are "n" players in the mobile marker regulators have assumed that such an operator has a share of the market. The model should also be able to produce cost data based on C&W's actual market share in order to compare the model results with C&W's actual performance. In the case of the fixed market, it may be appropriate to set prices based on actual market share.

The Commission proposes to require C&W to construct the model such that it can produce results based on C&W's actual and forecasted demand of its fixed network operations and for a hypothetical mobile operator with a 50% share of the market.

Q4. What are your views on the proposed approach to setting the market assumptions within the model?

Technology Assumptions

Two key decisions to make when developing TSLRIC models are: (i) the technology that should be included in the model and (ii) the network architecture that should be modelled. The main fixed and mobile technology assumptions are set out below, followed by a discussion on the network design assumption in the subsequent section.

Fixed network

In the framework document C&W proposed to model its fixed network services using IP-based Next Generation Network (NGN) technology. In C&W's views this approach is in line with global trends towards NGN technology and is also in line with C&W's own transition from a PSTN to an NGN architecture which commenced in 2006.

The Commission considers this approach to be consistent with the TSLRIC methodology as it reflects the technology that would be used by a new operator entering the market today and it appears to be in line with the network evolution in Barbados.

Mobile network

C&W proposed to model 2.5G technology using 1900 MHz spectrum in the mobile network as it is currently deployed by both mobile operators in Barbados.[4] In its view an approach based on 2.5G technology will involve less uncertainty (relative to an approach based on 3G technology) as this approach will be in line with its modelling experience elsewhere in the region.

The Commission considers this C&W proposed approach reasonable notwithstanding their recently announced plans for deploying 4G technology in the future.

Q5. What are your views on the technology assumptions proposed for the hypothetical fixed and mobile network operators?

Network Design Assumptions

A key element of any TSLRIC model specification is the network design assumptions. The proposed assumption for the key network design parameters are set out below.

Scorched-node approach

Bottom-up TSLRIC models can involve varying degrees of optimisation in terms of how closely the modelled network matches the actual network deployed by the regulated operator. The degree of optimisation relates to both the choice of "nodes" to be modelled and to the choice of technologies.

[4] The Commission recognises that Digicel currently has been assigned spectrum in the 1800MHZ frequency band. However, it does not consider that this would result in sizeable cost difference relative to the 1900 MHz frequency band assumption proposed by LIME.

Models can be developed either under the "scorched node" or "scorched earth" basis. A "scorched earth" approach means the model is independent of the existing network locations while a "scorched node" approach builds the model on the basis of the existing network locations, with varying levels of optimisation. A "scorched node" approach is generally used in LRIC models. C&W's framework document proposed adopting such an approach in the TSLRIC model.

The Commission agrees with C&W's proposal to adopt a "scorched node" approach as this approach attempts to balance the need to model an efficient network with the constraint of the existing network topology in Barbados, with the nodes defined as existing network buildings[5].

Q6. Do you agree that the TSLRIC model should be based on a "scorched node" approach?

Quality of service levels

The network dimensioning rules will also need to take account of service quality. C&W needs to demonstrate that the modelled network would provide services at a level of quality and functionality, which as or at a minimum meet the level that C&W offers today to interconnecting operators based on the existing technology[6].

Demand Assumptions

Due to the forward-looking nature of the LRIC modelling exercise, the LRIC model needs to reflect the cost of networks which are able to efficiently meet the expected demand in the foreseeable future[7].

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5 Masts used for siting base stations would not be considered as nodes for the purpose of the 'scorched node' approach.

6 Quality of service can mean, among other things: Grade of service or blocking margin, resilience, speech quality, transmission delay and jitter.

7 In case of services where demand is falling (such as fixed voice services), peak demand may be for the earlier period in the forecast while for services with increasing volumes (such as broadband services) peak demand may occur at the end of period.

C&W has proposed to assume fixed and mobile networks that are capable of meeting peak demand forecasts over a three-year planning period. We do believe that a four-year period might be more appropriate.

The Commission proposes that the overall structure of the network should reflect foreseeable demand, as it would not be efficient to change the structure of the network from year to year. However it may be reasonable to increase the capacity of certain network elements over time to reflect expected demand in the shorter term, for example increasing mobile base station capacity to reflect increases in demand in the next year. The Commission proposes that the network be designed to meet expected peak demand in the medium term (defined as four years from the date when the model is finalised) with capacity in each year of the model to meet the peak demand in the following year.

As part of the LRIC model exercise, C&W will therefore need to develop demand forecasts for each of the services contained in the models. The demand forecasting may be undertaken within the LRIC model or it can form an input to the model. However, C&W will have to provide its analysis and supporting evidence on its assumptions to the Commission to allow a full review of the demand forecasts underlying the LRIC models.

Additional information about the modelling approach is provided in Annex 2.

SECTION 4 –NETWORK COSTING

This section discusses the main methodological issues which arise in relation to the measurement of costs (i.e., operating costs, capital costs, and fixed and joint costs) in the bottom-up TSLRIC model.

Costing Assets

Capital costs required to compensate investors for the cost of purchasing fixed assets, such as network equipment, represent the bulk of a fixed or mobile operator's total cost base. As fixed assets by definition are used over a number of years, their costs should also be recovered over a number of years. There are a number of approaches to determining costs for fixed assets, including the following:

- **Straight line depreciation -** Straight line depreciation is widely used in financial reporting, and in regulatory accounting particularly in top-down approaches based on operators' financial reports. When implemented in a regulatory context, costs include both the depreciation charge itself and the opportunity cost of capital, estimated as the product of the weighted average cost of capital (WACC) and the net asset valuation. This results in the cost of a given asset declining over time, due to the declining value of the asset, effectively front-weighting the cost recovery of assets, which may not reflect usage of equipment. Implementing straight line depreciation in a bottom-up model of the type proposed would be difficult as the level of costs for an asset (i.e., the depreciation plus the opportunity cost of capital) is dependent on the acquisition date of the asset, which would not be defined.

- **Annuities -** An annuity is the constant annual payment which, when discounted at an appropriate cost of capital and summed over the asset's lifetime, gives the replacement cost for an asset. This approach implicitly includes both the depreciation and return on the asset. A constant recovery of costs is likely to be more appropriate than the front loading of recovery resulting from straight line

depreciation. The annuity approach is commonly implemented based on one of the following forms:

- a *standard* annuity calculates the charge that, after discounting, recovers the asset's purchase price and financing costs in equal annual sums (i.e., the annuity charge is constant in nominal terms); or
- a *tilted annuity* calculates an annuity charge that changes between years at the same rate as the price of the asset is expected to change (i.e., the charge is constant in real terms).

As an annuity charge is constant and does not depend on the age of the asset, the capital charges for a year can be calculated based on the assets in service in that year. For this reason annuity approaches are generally adopted for bottom-up models of the type proposed.

- **Economic depreciation** - In theory the recovery of asset costs in a competitive market may take into account factors such as changes in output profile or prices, overhead cost and the cost of capital over the lifetime of an asset.[8] Economic depreciation calculations add considerably to the complexity of the bottom-up model and result in a high degree of subjectivity in the resulting costs, as current prices become dependent on assumptions about the future.

In its framework document, C&W suggested the use of a "tilted annuity" depreciation method. This approach would be in line with the approach taken in several other jurisdictions.[9] A tilted annuity also has the advantage of setting prices that reflect the current acquisition cost of assets, rather than the cost at which assets were acquired in the past. Such current cost accounting (CCA) approaches are generally preferred by regulators when setting interconnection rates.

The Commission proposes that capital costs be estimated based on a tilted annuity approach.

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[8] While annuities and economic depreciation are described here as being separate approaches in some circumstances annuities provide a reasonable approximation of economic depreciation.

[9] For example, the TSLRIC models developed in Australia, Denmark and Sweden are also based on a tilted annuity approach.

Asset cost inputs

The standard tilted annuity depreciation formula that the Commission proposes to use is set out below:

$$\frac{(WACC - \Delta p)}{\left(\frac{(1 + \Delta p)}{(1 + WACC)}\right)^{\text{Asset life}}} \times \text{Asset value}$$

The inputs required are:

- WACC = the weighted average cost of capital;
- Δp = rate of price change ("tilt");
- The current replacement cost of the asset; and
- The determined useful asset life of the asset.

Q7. Do you agree with the proposed use of a tilted annuity to estimate capital costs?

Cost of capital

The annual capital cost estimates will need to include an appropriate allowance for a reasonable return on investment. The cost of capital is typically measured using the WACC. The WACC estimates for the fixed and mobile network assets will form an input to the TSLRIC model, based on a separate WACC study (studies) undertaken by C&W which will be reviewed by the Commission before being applied to the TSLRIC model.

C&W proposes to estimate separate WACC values for the fixed and mobile networks using the Capital Asset Pricing Model (CAPM) methodology. This approach will in its view be consistent with international best practice.

The Commission agrees in principle with the approach on WACC set out by C&W. The Commission will then review the analysis and resulting WACCs that C&W proposed to ensure the cost of capital reflects the best estimate of that of an efficient operator.

Asset costs and price changes

In its TSLRIC model framework document C&W proposes to source equipment unit cost information from vendor data from actual sales in Barbados or similar markets, where possible. However, this may not reflect the full set of cost information required for the fixed network TSLRIC model where, for example, the efficient network assumption results in different equipment requirements from those currently deployed in the network. For example, C&W may need to source prices for NGN equipment not yet deployed in its network from the relevant vendors. The underlying sources for all its unit costs input data need to be clearly explained in C&W's TSLRIC documentation – to be provided to the Commission as part of its TSLRIC model submission.

Generally, any equipment unit cost data needs to include the following three elements:

- Direct capital costs;
- A mark-up for capitalised installation and commissioning cost; and
- A mark-up for equipment spares which are required and justifiable from a network operations perspective.

Estimates of the rate at which prices are changing will need to be based on analyses of the trends to date.

Expected Asset Lives

In addition to the network design assumptions above, C&W will also need to define, as part of the network design and costing exercise, the average expected lifetime of each asset. The asset lives shown in C&W's statutory accounts provide a good starting point for this. However, there may be reasons for amending these asset lifetimes for the TSLRIC modelling exercise to take account of current engineering and economic realities. There is further a wide range of publicly available information on asset life assumptions applied in TSLRIC models elsewhere.

The Commission will, as part of its general review of C&W's draft LRIC models, also assess C&W's asset lives assumptions to ensure that these are reasonable and in line with international practice.

Operating costs

In addition to the costs of purchasing network equipment, the model should include the operational expenditure directly or indirectly resulting from operating and maintaining the network. Indirect costs will include a range of common corporate support activities.

Many bottom-up models estimate operating costs on the basis of operating cost to replacement cost mark-ups (or "expense factors"). These expense factors are then applied to the network capital costs (i.e. the gross replacement cost) estimated in the bottom-up LRIC model. A similar approach can also be applied to common costs, for which separate expense factors would need to be derived. There are two common approaches to estimating expense factors:

- **Top-down data -** Expense factors are often based on top-down cost information contained in alternative cost models or costing systems available for the operator. In order to make the expense factors applicable to the hypothetical operator assumed in the (forward-looking) bottom-up model, further adjustments for inflation, expected efficiency gains, and the impact of different technologies will be required.

- **Benchmarking -** An alternative approach is to derive expense factors based on benchmarking data from operators in other jurisdictions. This approach requires adjusting the available benchmarks to ensure that they reflect local prices, particularly for non-traded services such as labour costs or rental costs. It may also require making further adjustments to reflect any differences in technology used (i.e. Time Division Multiple (TDM) vs. Next Generation Network (NGN) technology).

In its framework document C&W proposed to base the operating costs within the model on estimates drawn from its Enhanced Allocation Model (EAM). While the Commission believes that C&W's reported costs are likely to reflect the costs of operating in the Barbados

environment, it believes the costs must be adjusted to take account of the network as modelled, compared to C&W's current network. Such adjustment should take account of a range of factors including:

- Differences in the dimension of the network, reflecting different levels of demand;
- Changes in unit costs over the period of the model; and
- Increased efficiency resulting from the use of more modern technology and productivity increases over time.

The Commission proposes to require C&W to base estimates of operating costs on its reported costs, adjusted to take account of the factors that would lead to the costs of the modelled efficient operator to differ from the level of costs reported.

Q8. Do you agree with the proposed approach to operating costs?

Other Costing Issues

Working Capital

Working capital is required because companies typically face a delay between paying out cash for inputs and receiving cash for outputs (i.e., a financing cost to its net current assets). To control for this, TSLRIC models may contain an allowance for working capital. As part of its modelling submission, C&W must provide evidence in support of the working capital included (if any) in its TSLRIC models.

Shared cost between different networks

The TSLRIC model should take account of the sharing of certain assets by reducing the costs recognised by an individual operator. Shared costs could include:

- Cross-border assets (i.e., network assets and operations shared with operations in other jurisdictions);
- Assets shared between fixed and mobile networks; and
- Assets shared between mobile networks within Barbados (i.e. such as masts shared between Digicel and C&W).

The Commission proposes that such costs should be reduced by applying a coefficient to the specific network costs that is subject to sharing.

Q9. What are your views on the proposed approach to shared costs between different networks?

SECTION 5 – REPORTING REQUIREMENTS

The Commission believes that C&W is best placed to estimate the efficient costs of delivering services in Barbados and it is thus appropriate for them to implement the cost model. However, the Commission's role as the regulator is to critically review the output of the models. In order to conduct the review, C&W must submit both the model itself and supporting documentation and evidence to the Commission. Below the Commission sets out the proposed reporting requirements for C&W.

General Model Requirements

LRIC models tend to be extensive and complex. When building a TSLRIC model, C&W should ensure that the model is logically structured and sufficiently detailed in order to allow the Commission to easily review the model. Unless standard-software such as MS Excel is used, the model should be provided along with the software that allows the Commission to verify and run the models.

Sensitivity Analysis

The TSLRIC model should be fully articulated and flexible allowing the Commission to examine the impact of changes, within a reasonable range in:

- Demand forecasts;
- Market share assumption of the hypothetical operator;
- Equipment prices;
- Network Quality of Service (or proxies such as utilisation levels);
- The WACC values;
- The adjustments applied to operational expenditure;
- The applied annualisation methodologies; and
- Asset lives.

Required Documentation

To ensure that C&W has developed the TSLRIC models in line with its guidelines, the Commission will review the models upon completion. To facilitate this review process, C&W will have to prepare and provide to the Commission, as part of its TSLRIC model submission, detailed documentation of its modelling approach and modelling tool.

As part of its TSLRIC submission C&W should at a minimum, provide the following documentation:

- A TSLRIC *model documentation* document which should contain, at a minimum:
  - The specifications used when developing the model setting out an overview of the modelling approach taken (including a compliance table for all requirements set out in the upcoming TSLRIC guidelines);
  - A description of and source for each input data used within the models;
  - A detailed explanation on each modelling assumption applied;
  - A comprehensive description of the network dimension analysis and subsequent network costing (including, key design parameters, assumed network algorithms and an explanation of the main equipment types);
  - A detailed description of the approach applied to derive the operational cost estimates (including, for example, an overview of the source data, assumptions applied and a list of the resulting adjustments); and
  - The route factor matrix applied in each model as well as a detailed explanation of how these route factors were derived.
- A *user guide* to the TSLRIC model files developed, setting out a step-by-step guide to these files (including, for example, an overview of the main model flows, where to locate any input data and modelling results, and how to undertake the sensitivity analyses).

Q10. What are your views on the general reporting requirement for the TSLRIC model?

SECTION 6 – CONSULTATION PROCESS

Legislative Framework

The Commission is a statutory body established by the Fair Trading Commission Act CAP. 326B of the Laws of Barbados. The Commission is responsible for, *inter alia*, regulating utility services, safeguarding the interests of consumers, and promoting and maintaining effective competition in the Barbados economy. The Commission currently regulates the domestic and international telecommunications services of C&W and the Barbados Light & Power Company Limited, the country's sole provider of electricity.

Section 4 (3) (a) of the Fair Trading Commission Act allows the Commission to:

> ***"Establish principles for arriving at the rates to be charged by service providers."***

A similar provision exists under Section 3 (1) (a) of the Utilities Regulation Act, CAP. 282 of the Laws of Barbados while Section 6 (1) (d) of the Telecommunications Act CAP. 282B of the Laws of Barbados states that the Commission shall:

> ***"Establish and administer mechanisms for the regulation of prices in accordance with this act, the Fair Trading Commission Act and the Utilities Regulation Act;"***

In carrying out its duties as a regulator, the Commission must operate in a transparent, accountable and non-discriminatory manner. Consultative documents and the public consultation process are the main ways in which the Commission discharges its responsibilities relating to transparency and accountability.

In addition, the Commission is specifically charged under the Fair Trading Commission Act CAP. 326B to consult with interested persons when it is discharging certain functions.

Section 4 (4) of the Fair Trading Commission Act, CAP. 326B states:

> *"The Commission shall, in performing its functions under subsection (3) (a), (b), (d) and (f), consult with the service providers, representatives of consumer interest groups and other parties that have an interest in the matter before it."*

Further, the provisions of the Telecommunications Act, CAP. 282B "TA" Section 27 (3) also state, inter alia, that the Commission shall:-

> *"(a) consult with the carrier providing the RIO and any other carriers likely to seek interconnection to that carrier's network."*

The Commission is of the view that this provision also supports the Commission's decision to consult on the development of the interconnection rates. Notwithstanding that the provision deals primarily with consulting on the RIO and that the Commission has already completed its consultation on the C&W consolidated RIO, the Commission is of the view that the interconnection rates form a critical part of the RIO and as such it is appropriate that there also be consultations on the Guidelines that will be used to develop interconnection rates**.**

Consultative Documents

In general, with consultation papers, the issues at hand will influence the nature of the document and its content. On some issues, the Commission may simply set out what it regards as the available options and, although there may be some analysis of the pros and cons of the options, it may be that no single option emerges as the favoured or proposed approach. In other consultation papers, the issues are such that the Commission may set out a clear preference for a particular approach and invite comments on this basis.

The consultative document generally includes a series of specific questions on which the Commission is particularly seeking comments. The comments may cause the Commission to revise or expand its views. To ease the task of analysing comments, respondents should reference the relevant question numbers in the document. If they consider it appropriate, respondents may wish to address other aspects of the document for which the Commission has not prepared specific questions. Failure to provide answers to all questions will in no

way reduce the consideration given to the entire response. Commercially sensitive material should be clearly marked as such and included in an annex to the response.

Responding to this Consultation Paper

The Commission invites and encourages written responses in the form of views or comments on the matters discussed in the Paper from all interested parties including other licensed operators, government ministries, non-governmental organisations (NGOs), consumer representatives, residential consumers, businesses and academics.

Consultation Timetable

The Consultation period will begin on **May 27th, 2011** and end on **July 8th, 2011 at 4:00 p.m**. All written responses should be submitted by this deadline. The Commission is under no obligation to consider comments received after 4:00 p.m. on July 8th, 2011.

Copies of this Consultation Paper can be collected between the hours of 9:00 a.m. to 4:00 p.m., Mondays to Fridays from the Commission's offices at the following address:

Fair Trading Commission
Good Hope
Green Hill
St. Michael
BB 12003BARBADOS

The Consultation Paper can also be downloaded from the Commission's website at http://www.ftc.gov.bb

Respondents to the Consultation may submit responses in electronic format. The Commission would prefer that emailed responses be prepared as Word or PDF documents, attached to an email cover letter and forwarded to**: info@ftc.gov.bb**

Responses can be faxed to the Commission using fax number (246) 424-0300. Mailed or hand- delivered responses should be addressed to the Chief Executive Officer at the above mailing address.

Confidentiality

The Commission expects to receive views from several stakeholders and believes that views and comments received should be shared as widely as possible with all respondents.

Respondents should therefore ensure that they indicate clearly to the Commission any response or part of a response that they consider confidential or proprietary information.

Analysis of Responses

The Commission expects, in most consultations, to receive a range of conflicting views. In such circumstances, it would be impossible for the Commission to agree with all respondents. Through its decision the Commission will seek to explain the basis for its judgments and where it deems appropriate give the reasons why it agrees with certain opinions and disagrees with others. Sometimes analysis of new evidence presented to the Commission may cause it to modify its view. In the interests of transparency and accountability, the reasons for such modifications will be set out and, where the Commission disagrees with major responses or points that were commonly made it will, in most circumstances, explain why.

Annex 1 - Glossary

Table 2. Glossary of terms and abbreviations

Term	Description
BHCA	Busy hour call attempts
BHE	Busy hour Erlang
CAPM	Capital asset pricing model
CCA	Current cost accounting
EAM	Enhanced allocation model
EBC	Element based costing
EPMU	Equal proportionate mark-ups
FAR	Fixed asset register
FCM	Financial capital maintenance
FDC	Fully distributed cost
FTC	Fair Trading Commission
GBV	Gross book value
GL	General ledger
GRC	Gross replacement cost
HCA	Historic cost accounting
LRIC	Long run incremental cost
NGN	Next generation networking
NPV	Net present value
PSTN	Public switched telephone network
RIO	Reference interconnection offer
TSLRIC	Total service long run incremental cost
WACC	Weighted average cost of capital

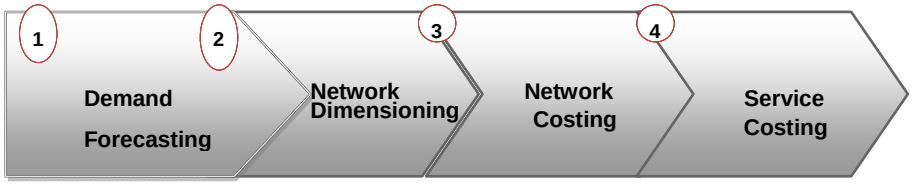
Annex 2 - Overview of modelling approach

This annex provides a high-level overview of the main steps within the bottom-up LRIC modelling approach in order to aid stakeholders' understanding.

Bottom-up LRIC modelling commonly involves four main steps. These are set out in

Figure 2.

Figure 2. Key analysis steps in bottom-up LRIC models



As the first step, the expected volumes of each service within the total service increment provided by the hypothetical operator need to be forecasted over the entire modelling period. This will need to include both demands from end users and from other operators, including interconnection services.

As a second step, the efficient size of the hypothetical operator's network for each year needs to be estimated in order to deliver the volume of services forecasted under the previous analysis step.

Once the size of the efficient network required has been estimated, the total cost of the network can be determined.

As a final step, the total cost estimates for the entire network are allocated to each service based on an Element Based Costing approach, where the costs of each network element are allocated across services in proportion to the use made of the network element by each service. Dividing the total cost of a service by the volume of demand for that service then gives the unit cost.

Following is discussion of each analysis step in more detail.

Step 1: Demand forecasting

As an initial step, demand forecasts for each service provided by the hypothetical operator have to be produced for the entire modelling period.

The range of services to be forecasted will include services delivered to end users (i.e. retail access and call services) and services to other operators (such as interconnection and transit services). They also encompass both conveyance (i.e., calls, messages and data services) and connection services (i.e., fixed line or mobile access services). The required conveyance service volumes are typically measured in one of the following three units:

- Conversation minutes in the case of circuit switched services;
- Messages in case of SMS and MMS services; and
- Megabytes in the case of packet switched services.

There are a range of forecasting techniques available to determine demand forecasts for LRIC models. The most common approach is to extrapolate historic growth in the relevant service, taking into account expected changes in the socio-economic environment as well as, where relevant, potential saturation points (i.e. it is commonly assumed that take-up of telecommunication services follow a s-curve over time).

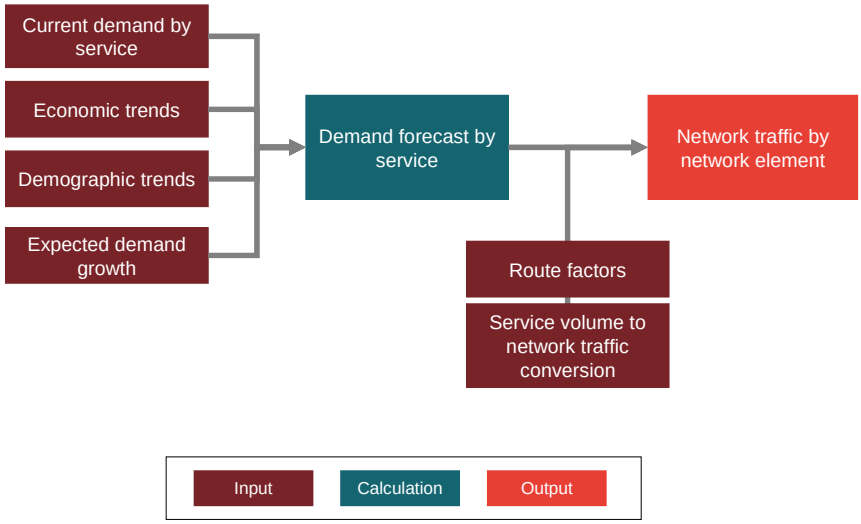
Although information on traffic is generally collected on an annual basis, telecommunication networks are commonly dimensioned to meet busy-hour traffic demand subject to required blocking margins (i.e. busy-hour traffic). It should be noted that busy-hour can vary in different parts of the network and for different services (for example, voice calls and broadband usage). For non-contended services, such as leased lines, the full capacity should be assumed to be used even though in practice the customer is unlikely to utilise that capacity on a continuous basis.

The resulting end user and wholesale traffic forecasts then need to be converted into busy-hour traffic estimates. The relevant unit will depend on the network element under consideration. For example, Time Division Multiple (TDM) equipment is dimensioned according to "busy-hour erlangs" (BHE) and "busy hour call attempts" (BHCA). For packet based networks, measures of bandwidth (e.g. Mbit/s) or the number of busy-hour packets (mpps) may be used. The conversion from end user traffic to network traffic will need to take into consideration concentration of traffic in busy-hour and issues such as contention

ratios. Once this is completed the busy-hour traffic estimates are converted into busy-hour traffic estimates for each network element, based on route factor information.

The key modelling flows within this analysis step are set out in the diagram below.

Figure 3. Main modelling flows – Demand forecasting



The demand forecasting can be undertaken within the LRIC model or as a separate analysis with the forecasts forming an input to the LRIC model.

Step 2: Network dimensioning

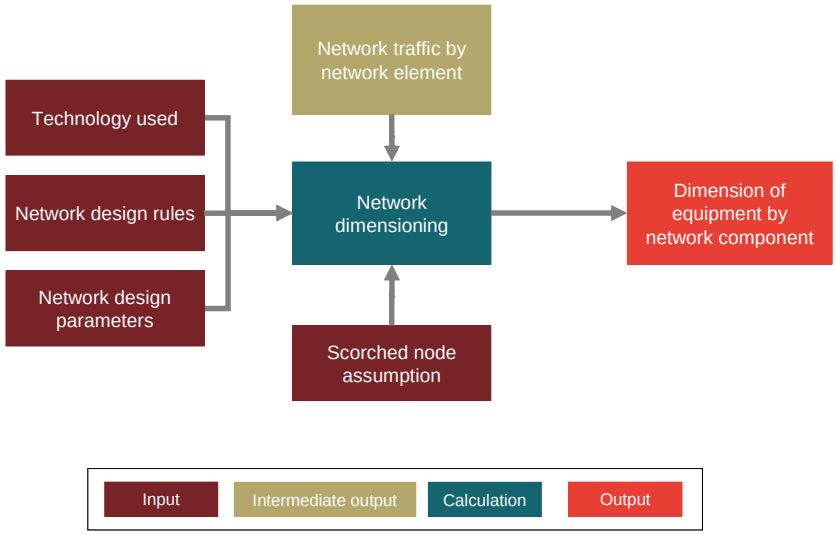
As a second step, the efficient size of the hypothetical operator's network for each year needs to be estimated in order to deliver the volume of services forecasted under the previous analysis step.

This is undertaken based on the detailed network traffic forecasts, Quality of Service objectives, network coverage requirements, geographic traffic distribution and equipment modularities and other modelling assumptions, such as the "scorched node" assumption. Any network dimensioning needs to reflect the technology assumed for the hypothetical operator.

The network design rules will usually be simplifications of the detailed engineering rules used to plan networks since it is impractical and unnecessary to fully reproduce the complete network dimensioning rules in the context of a bottom-up LRIC model. A key output of this exercise is a detailed breakdown of the equipment required, within each part of the hypothetical operator's network in order to meet the expected demand.

The key modelling flows within the network dimensioning analysis step are set out in the diagram below.

Figure 4. Main modelling flows – Network dimensioning



Step 3: Determining the cost of the hypothetical network

Once the hypothetical network has been dimensioned, the total cost for each network element defined within the model needs to be derived. This commonly involves the following main analysis steps.

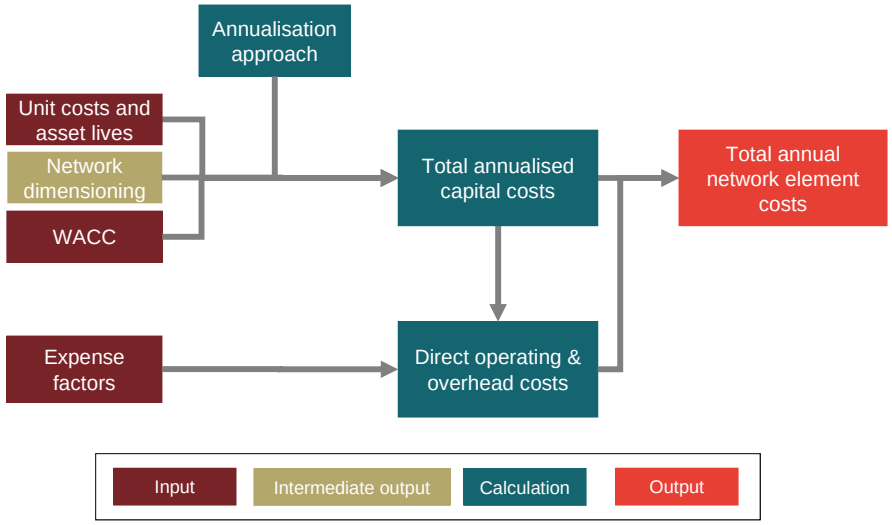
1. Determine the annual costs of the estimated network equipment required, based, for example, on a tilted annuity approach (taking into account the current cost of acquiring the equipment, the required cost of capital and assumed asset lives).
2. Derive the total network costs of each network element by adding on direct network-related operating costs and network-related overhead costs based on expense factors.

3. Determine the total cost of each network element by applying a mark-up for common costs.

The main outputs of this analysis stage are the total costs (including and excluding a common cost mark-up) for each network element defined within the LRIC model.

The key modelling flows within this analysis step are set out in the diagram below.

Figure 5. Main modelling flows – Network costing



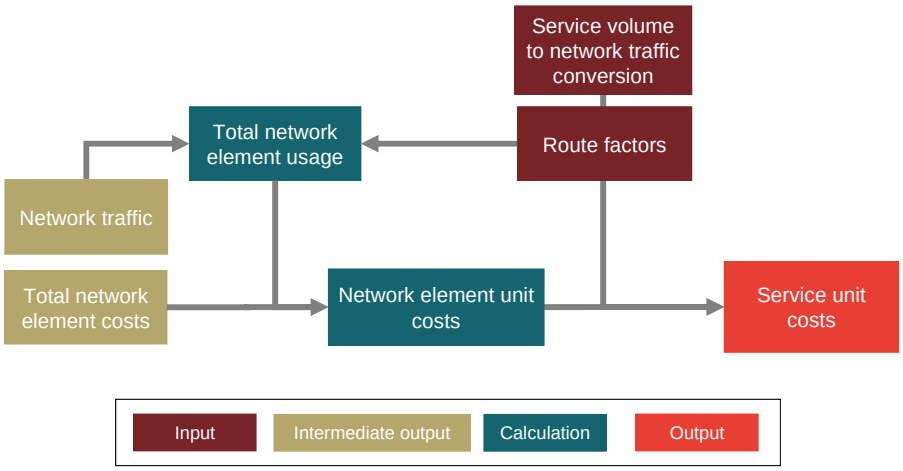
Step 4: Determining service costs

As a final step the total network element costs, derived above, are allocated across services based on an Element Based Costing approach. This commonly involves the following steps:

- The total usage by all services of each network element is calculated by combining network traffic with the relevant route factors.
- The total cost for each network element is divided by the total usage to get a unit cost for that network element.
- The unit cost for each service is calculated as the total of the unit cost for each network element multiplied by the average usage of the component (i.e. the route factors).

The key modelling flows within this final analysis step are set out in the diagram below.

Figure 6. Main modelling flows – Service costing



Annex 3 – Summary List of Consultation Questions

Within this consultation document, the Commission seeks comments from all interested parties on the following issues which are discussed in this document:

1. **Do you agree with the proposed definition of 'total service' increments for the TSLRIC model?**
2. **Do you agree with the proposed approach of using a bottom-up approach to derive network cost estimates and a top-down approach for operating and common costs?**
3. **Do you agree with the proposed four-year modelling period of the TSLRIC model with outputs produced for each of the four years?**
4. **What are your views on the proposed market share assumptions within the model?**
5. **What are your views on the technology assumptions proposed for the hypothetical fixed and mobile network operators?**
6. **Do you agree that the TSLRIC model should be based on a scorched-node approach?**
7. **Do you agree with the proposed use of a tilted annuity to estimate capital costs?**
8. **Do you agree with the proposed approach to operating costs?**
9. **What are your views on the proposed approach to shared costs between different networks?**
10. **What are your views on the general reporting requirement for the TSLRIC model?**

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