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1. INTRODUCTION AND SUMMARY

1.1 On 10 July 2003, Cable & Wireless (Cayman Islands) Limited (C&W), the Governor in Cabinet of the Cayman Islands, and the Information and Communications Technology Authority (ICTA) entered into an agreement to liberalize the telecommunications sector for the Cayman Islands (the Agreement). Part 4 of Schedule 4 to the Agreement requires the creation of a new costing model to be used for the Cayman Islands that is to be a forward-looking long-run incremental cost (FLLRIC) model. Section 50 of Schedule 4 of the Agreement lays out the process to create the model, including an estimated 10 month proceeding to be conducted by ICTA (the Proceeding) to be commenced by the filing by C&W of a proposal on FLLRIC principles and parameters. In addition, C&W is to provide in that submission an estimate of the length of time and estimated costs to implement the proposed FLRRIC methodology. C&W submitted an initial LRIC proposal (Initial Proposal) that met these requirements on 10 September 2003.

1.2 Today C&W submits an elaboration on that proposal. This document is structured in much the same way as the Initial Proposal. Indeed, this document repeats all the substance of that Initial Proposal but provides more background to the policy issues, more fully justifies the positions taken and provides a detailed overview of our proposed methodology. We believe that this document shows more clearly that C&W's proposal is consistent with best practice requirements adopted in other regulatory jurisdictions, such as Canada, the USA, UK, EU and Australia. The document also spells out the terms of reference given to the consultants, and provides more detail with respect to the responses received.

1.3 As specified in Schedule 4 of the Agreement, the FLLRIC model will be used for determining:

- The rates for Interconnection[1] services – as such, the cost modelling should therefore be structured in such a way that the cost of a sufficient set of network elements can be estimated.

- Imputation tests – the cost modelling needs to cater for an appropriate number of retail service costs such that imputation tests required for retail services can be accurately carried out.

- Quantification of the "access deficit". As set out in the Schedule 1 of the agreement, access services include line rental, installation, reconnection and

[1] "Interconnection" includes mandated or prescribed infrastructure sharing under section 48 of the Information and Communications Technology Authority Law.

local call services. Thus, the modelling must be capable of estimating the costs of access network, network elements used in local calling and retail costs of providing these access services.

1.4 C&W envisages that the list of anticipated interconnection and retail services to be costed will be included in the issues that need to be fleshed out during the consultative period. In our methodological overview we present what we believe will be the initial set of services to be costed. However, to a great extent, the list is likely to remain open-ended in the sense that no-one can know what services may be the subject of regulatory scrutiny. Moreover, the FLLRIC model might be used for other purposes than those specified above in the future. One attribute of the chosen approach to costing, then, should sufficient flexibility to accommodate diverse applications.

1.5 We do not believe that the requirements for all three service sets will be satisfied by a single integrated model, but rather that a single FLLRIC approach will form the basis for each requirement with appropriate customization in each case. As will be detailed in subsequent sections of this document, C&W proposes a total service incremental costing methodology with a bottom-up approach to interconnection service costing and a top-down approach to retail services for imputation costs. We propose a provision for an equi-proportionate mark-up to LRIC to cover shared fixed and common costs where appropriate.

1.6 Our proposed hybrid approach offers several attractions:

- it is consistent with the principles and parameters of best international FLLRIC modeling;
- it maximizes the relative merits of bottom-up and top-down approaches to modeling; and
- it balances the dual objectives of a) employing the expertise of external, internationally-recognized costing consultants and b) keeping expenditure on the effort reasonable and domesticating LRIC modeling capability to Cayman.

1.7 There is much detail that we choose not to take a position on at this time. For example, we do not address the appropriate level of disaggregation—geographic or by customer segment—of costs, nor do we discuss our preferred approach to depreciation, etc. The reasons we choose not to take up a particular issue at this time may be either that without fuller input from ICTA and other parties, it would be premature to speculate on what ought to be required in a particular instance, or that we are open to a variety of options to dealing with an issue. In addition, we note that it is expected that certain areas of detail may be subject to change as ICTA conducts a public consultation during the several

months. Therefore C&W reserves the right to alter its position and proposals throughout the Proceeding.

1.8 With respect to the expected length of time and cost of the FLLRIC modeling, we base our estimate on the responses received from four consulting companies with extensive and recognized experience in such work. The consultants were asked to present 1) how they would design and implement a LRIC model to enable C&W Cayman islands to provide the information required to set interconnection rates, meet imputation tests and estimate the access deficit; 2) describe their proposed methodology and deliverables; 3) comment on what input/resources would be necessary from the Cayman business unit; 4) outline their fees and required timeframes; 5) describe which staff would undertake the project and their credentials; and 6) describe their firm's relevant experience.

1.9 The time requirements outlined in the consultant's proposals are consistent with the 12-month period envisaged in the Agreement (see section 50(d) of Schedule 4). The estimated costs of the project will vary as to the level of resource available within C&W Cayman and other factors, but can be expected to be around US$550,000. We emphasize that all the consultants assumed that costing the approach is agreed in advance and is carried out without revision over the course of the modeling. Thus, ambiguities within a mandated methodology that persisted after the conclusion of the proceeding could result in higher cost and delay.

1.10 The balance of this document is organized along the following lines. In Section 2, we discuss the principles that we believe should underlie any FLLRIC cost modeling exercise. In Section 3, we examine key parameters or attributes of our proposed FLLRIC approach. In Section 4, we detail our proposed bottom-up approach for FLLRIC modeling of interconnection services. In Section 5, we detail our proposal for a top-down approach for retail service costing in imputation tests. In Section 6, we present a summary of our expectations of cost and time requirements for implementing the FLLRIC exercise. Section 7 concludes.

2. PRINCIPLES

2.1 In developing a LRIC cost model, C&W proposes that the following underlying principles apply[2]:

a) **Competitive market standard** – the costing methodology should capture those costs for network elements or services that would lead to prices found in an efficient competitive market for provision of such elements or services. Efficient market prices are those that

- ensure the service provider has the opportunity to recover the costs of prudent investment;
- encourage the service provider to operate in a cost effective manner; and
- provide the right incentives for efficient competitive facilities-based investment, entry and exit.

b) **Cost causality** - costs are attributed to a service on the basis of underlying cost drivers. This principle has implications for cost allocation: only costs associated with the relevant increment of service provided are included in costing. It also has implications for the structure of cost-based pricing, e.g., distance dependence and separation of per-call and per-minute charges will follow from the underlying cost structures.

c) **Complete accounting** –the costs associated with provision of a service should reflect all relevant directly and indirectly attributable operational expenditure and capital-related costs. Where costing is made with a view towards determining price ceilings, provision should be made for the recovery of fixed and common costs.

d) **Transparency** - Transparency implies that the processes for generating cost information are clear and understandable, and that the numbers are objective[3] and based on verifiable[4] data. Transparency enhances the

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[2] These principles are consistent with the costing principles in most of the advanced regulatory jurisdictions that we are familiar with , including the United States, the Europe Union, Australia and New Zealand. See, for example: Section 7 of the First Report and Order in the Matter of the Local Competition Provisions in the Telecommunications Act of 1996 (hereafter "The Competition Order"), FCC; Directive 97/33/EC of the European Parliament and of the Council on Interconnection in Telecommunications with Regard to Ensuring Universal Service and Interoperability through Application of the Principles of Open Network Provision (ONP), Commission Recommendation of 8 January 1998 on interconnection in a liberalised telecommunications market (Part 1 – Interconnection pricing); "Access Pricing Principles – Telecommunications: a guide", July 1997; and "Application of a TSLRIC Pricing Methodology-Discussion Paper, New Zealand Commerce Commission, 2 July 2002.

[3] Objectivity implies that that the information is based on facts rather than subjective judgement. Where the information is objective, two reasonable people would produce the same results from the same data. For example, an allocation based on trouble reports is objective – it is based on facts and any

credibility of the costing information, and therefore its value. Where the processes for producing the costing information are clear and understandable, and the cost information is objective and verifiable, there is a higher level of confidence that the information is free of manipulation.

e) **Proportionality and Reasonable Administrative costs** – The effort and resource required to produce the required information should be reasonable. In determining the type of information to be produced, the detail to be provided and the support required for the information, the value of any incremental improvements in the value of the information must be weighed against the associated incremental administrative costs.

2.2 We do not believe these principles are controversial per se. It is true, however, that in practice there are tensions created when regulators attempt to pursue all of these principles. Different jurisdictions therefore may tend to place more emphasis on one set of principles over another. Indeed different principles may be stressed in different contexts within the same jurisdictions.

2.3. In particular, proportionality may conflict with other principles. For example, the regulatory costing methods applied in both the United States and Canada have evolved over the past 20-30 years and have attributes that are extremely complex. In both the United States and Canada, small carriers are often exempted from having to undertake a LRIC study, because of the relatively high costs and little commercial benefit accruing to the regulated firm. In these cases proxy costs and prices might be used. Proxy values are neither causal nor necessarily efficient. We believe that our proposed approach focuses on methods which are tried and tested, but which could also be implemented at a reasonable cost in Cayman, which is a relatively small telecommunications market without a lengthy history of regulatory cost accounting.

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two individuals using the same trouble reports would produce the same allocation. A cost allocation based on a management estimate of time is relatively subjective and different individuals may produce different estimates.

[4] Verifiable means that the information can be checked against credible evidence. For example, historical costs can usually be checked back to invoices or other purchase documents. In contrast, an estimate of current cost that is based on a verbal quote from a supplier is inherently less reliable.

3. KEY PARAMETERS AND ATTRIBUTES

3.1 Consistent with the principles above, our proposed approach incorporates the following attributes.

- a forward-looking view of costs;
- the size of the increment is defined as the total service, and TSLRIC the appropriate cost standard;
- shared fixed and common costs are recovered through equi-proportionate mark-ups where appropriate;
- bottom-up approach to modelling network cost for interconnection services;
- top-down approach to modelling costs associated with retail services for the purposes of imputation tests
- operating costs associated with interconnection and retail service provision, will be derived from current costs allocated from an activity based costing system in which cost-volume relationships are accurately captured; and
- the company should be allowed to earn a reasonable return on its investment, equivalent to a current weighted average cost of capital (WACC).

This section deals with each of these attributes or parameters and associated issues.

Definition of forward-looking

3.2. Consistent with the competitive market standard, we recognize that under competitive conditions of service provision, the incumbent would have to set his prices, not on the basis of historic costs, but on the basis of current or forward looking costs. Thus, if the LRIC approach is to provide efficient price signals to the market then it must reflect the current or forward-looking cost of building and operating a modern telecommunications network. Forward-looking costs differ from historic costs in a number of ways. Forward looking costs may differ from historic costs as a result of technological change, price inflation (general and specific), network design considerations and, more generally, the fact that historic costs were incurred to meet past objectives and might now diverge from what is currently required in light of current needs.

3.3 There are a variety of ways that forward-looking costs can be captured. Costing experts often divide these into "top-down" and "bottom-up" approaches. In a "top-down" LRIC approach, existing costs of the regulated firm are taken as a starting point.[5] Current cost accounting techniques are used to "bring forward" historic costs. The first step in a top-down approach is recategorizing accounting information so that are in line with the activities that must be costed. For example, standard accounts of vertically integrated telcos do not generally distinguish in detail costs of the core and access network services that underlie retail services. Nor does traditional accounting group costs in relation to their underlying cost drivers. This recategorization must take place in order to model cost causality.

3.4 The second step is revaluing historic values. For example, with respect to capital, assets can be revalued at their replacement cost using methods such as indexation and absolute valuation based on modern equivalent assets (MEA). Current depreciation charges may be calculated on the basis of one of a number different of methods, including economic depreciation, but due to the revaluation of the assets, additional adjustments, which need not be detailed here, are required.[6] In top-down approaches, certain network-related current operational expenditure may have to be revalued or adjusted as well. This is a key step in understanding forward-looking costs as a current cost valuation is typically accepted as the best proxy for a forward view of costs and values.

3.5 The third step, which can represent the most time-consuming aspect of top-down modelling, is the construction of cost-volume relationships, or CVRs. CVRs depict how individual costs vary with underlying cost drivers and identify all variable, joint and common costs. To establish these CVRs rigorously engineering or statistical studies must be undertaken, particularly for costs associated with the network. Costs associated with retail services are often more straightforward.

3.6 In a "bottom-up" approach forward-looking costs are derived from an engineering model of a new network. This approach with respect to interconnection services involves the following steps:

- specifying the components necessary to provide the volume increment,
- estimating the volume increment and required capacity of each of these components,
- dimensioning the components to serve the estimated increment at on an efficient, forward looking basis,

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[5] For an example of top-down methodologies, see BT Long Run Incremental Cost Model—Relationships and Parameters, 13 November 1998

[6] See discussion of Operating Capital Maintenance and Financial Capital Maintenance, for example, in "Cost Oriented Access and Interconnection in Sweden", pg. 52-56 and Annex 2.

- determining the cost of different components,
- estimating the opex associated with the different components,
- quantifying the unit costs of the volume of traffic passed over each component, and
- aggregating the component unit costs by the use made of them by different services (using routing factors).

3.7 Operating costs make up a significant share of total annual costs in a network. Estimating them satisfactorily in a bottom-up model may be difficult. Most preferable would be to develop explicit models of operating costs that involve CVR analysis as mentioned above, but creating CVRs for opex of a hypothetical network is an uncertain undertaking. Therefore, most bottom-up models simply use a mark-up on or percentage of network capital expenditure to get an estimate of operating costs.[7]

3.8 It should be noted that the difference in results produced by top-down and bottom-up approaches should not be great if assumptions with respect to network design and technology, depreciation and efficiency in operational expenditures are consistent. In most countries where bottom-up models are implemented for interconnection services, top-down analysis is carried out in tandem or parallel for reconciliation purposes. Such reconciliation will reveal whether the modelling exercise might have neglected essential cost components.

3.9 The fundamental difference between the top-down and the bottom-up approach means that they carry differing advantages and disadvantages for the cost-modelling process. The advantages and disadvantages associated with the top-down approach are

Advantages

- Captures the total cost of the operator
- Can be reconciled to existing accounts
- Articulated
- Reflects real complexity and uncertainty in the business

Disadvantages

- Usually requires a degree of confidentiality at the expense of transparency
- Cost of implementation may be higher due to intensive work required to disaggregate accounting costs and investigate explicit relationship between cost and volume
- May include inefficiencies

[7] See for example, Oftel, Long-Run Incremental Cost: the Bottom-up Model, Version 2.2, March 1997. HAI Consulting, HAI Consulting Inc., HAI Model Release 5.0a Model Description, 16 February 1998; Estimating the Long-Run Incremental Cost of PSTN Access, January 1999, NERA.

3.10 The advantages and disadvantages associated with the bottom-up modelling approach are:

Advantages	*Disadvantages*
• Explicit, mapped relationship between cost and demand • Efficient costs are captured • Transparent and no real concern for confidentiality • Less costly to implement	• Rough modelling of operating costs • Ignores "organic" nature of network growth • Tends to underestimate or omit costs

3.11 The significance of any of these relative characteristics of bottom-up and top-down depends to some degree on what services are being costed. For example, the bulk of the incremental costs associated with interconnection services are network capital costs. We believe these costs are relatively more effectively modelled through a bottom-up approach. The bulk of incremental costs of retail services, on the other hand, are non-network opex for which recategorization from existing accounts and identification of cost drivers and cost-volume relationships do not pose as many challenges. Thus, for retail costing, we believe a top-down approach is relatively more advantageous.

3.12 On the basis of these considerations, we believe that a hybrid of that approach will best meet our requirements. The hybrid approach would use:

- a bottom-up approach to network capital costs for costing interconnection services, with a reconciliation with current asset values of existing plant,
- a top-down approach to network operating costs with forward-looking efficiency adjustments for costing interconnection costs; and
- a top-down approach for incremental costs of retail services for use in imputation tests, but bottom-up costing for input (interconnection) services.

The hybrid approach is discussed fully in Sections 4 and 5.

Size of the increment and cost standard

3.13 Incremental cost is a generic cost concept, defined as the increase in a firm's total costs as a result of an increase in output, or the costs avoided if output falls. A fundamental consideration in any LRIC based approach is therefore identifying the relevant increment.

3.14 In the case of interconnection, the size of the increment can be defined as the incremental cost associated with the increment of additional volume demanded, e.g., the volume of competitor interconnection traffic for an incumbent conveyance service. In this case, the incumbent has a pre-existing set of services (e.g. on-net long-distance calls) running over the same network elements as interconnection traffic. None of the fixed costs that are associated with this set of services are counted towards its LRIC costs because they do not increase with the advent of the interconnection services. We will refer to this definition of increment as the "Growth " increment approach.

3.15 In our view, the TSLRIC[8] approach should be adopted for the purpose of regulating interconnection charges in Cayman, for the following reasons:

a) Defining the size of the increment as additional or new volume (as is done in the Growth increment approach) could result in the incumbent operator unfairly bearing many of the fixed costs associated that volume. The fixed costs specific to the total volume of related service--captured in a total service approach, but excluded in a growth approach--are likely to be significant. In the case of traffic termination, for example, the fixed costs associated with the local exchange itself and most duct costs on routes used by the transmission network. Thus, using interconnection traffic as the size of the increment could lead to substantial under-recovery of the incumbent's costs.

b) This under-recovery of fixed costs may be exaggerated by specific market circumstances. For example, if a competitors mobile traffic substitutes for the incumbent's fixed network traffic using the same facilities, the net incremental traffic may be low (or even negative) under the growth increment approach, but the incumbent has less retail revenue to recover its substantially invariant costs.

[8] In this paper we do not distinguish between TSLRIC and TELRIC, in terms of the issue of which increment. We believe they reduce to essentially the same thing. For a distinction see Section 7 of First Order. However, the similarity between the two concepts is undeniable and is illustrated by the definition used by a lead consultant to the European Commission on costing in the 1990s, WiK:

> Element-oriented costs and charges mean on the one hand…that the costs of conveyance services are derived from the costs of the network elements actually used to provide the connections. But the concept also implies that each network element is dimensioned to handle all the services requiring it (the TELRIC approach). Calculated, then, are the incremental costs incurred for the provision of a given network element, compared with a situation in which the element (that is to say its functionality) is not offered. The relevant incremental costs is therefore the total amount of network element provided, expressed in the relevant unit of output. Hence we must identify total demand for each element from all the relevant services. The total incremental costs of the element are distributed in turn among all the services using the element. ["Analytical Cost Model for the National Core Network" Wik, 14 April 1999]

c) The Total Service increment approach does not require a sequencing of volume types based on which operator or customer originates the volume. The importance of this consideration is clearest in cases in which services are provided over new facilities or when new services substitute for existing services. If the incumbent establishes new facilities used both by itself and third parties, it is unclear which demand should be treated as incremental.

d) A related deficiency is an inconsistency in the treatment of fixed costs dependent upon the context in which the costing occurs. For example, imputation tests are used to assess whether the retail prices of the vertically integrated incumbent are greater than the price of the relevant network inputs faced by its competitors plus the costs of transforming those inputs into the retail service. Under a "growth" approach to incremental costing, service specific fixed costs might be excluded for calculating the price of the network input. But, since the entire retail service volume is the relevant increment for retail, these fixed costs may be included in the retail service costing. Similarly, wholesale rates of the incumbent are regulated on a retail-minus-avoidable-cost basis in Cayman. The avoidable cost refers to that associated with entire retail service of the incumbent, not just that associated with the difference in volumes that the incumbent would have been providing with and without the wholesale purchasing.

e) Under a Growth increment approach, the competitor potentially benefits from all the scale and scope economies associated with the required inputs in the provision of a given service. These are benefits that should be shared among all carriers.

f) The Total Service increment concept, we believe, is more consistent with a forward-looking approach. Under a forward-looking approach it is assumed that the network is dimensioned to accommodate forward-looking market traffic irrespective of where the traffic originates or in which order.

3.16. Most of the telecommunications regulators in the European Union[9], the regulator in Australia[10], and the state and federal regulators in the United States[11] have, therefore, used the total service as the increment in defining LRIC. As it is widely adopted best international practice, C&W also proposes to adopt Total Service Long Run Incremental Cost (TSLRIC) as the relevant cost standard.

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[9] See 8th EC Implementation report, Annex 2, Table 2. See also Commission opinion in its Communication on Interconnection Pricing (OJ No L73, 12.3, 1998, p. 42) as cited in the "Study on the Preparation of An Adaptable Bottom-up Costing Model for Interconnection and Access Pricing in European Union Countries", Europe Economics, April 2000.

[10] See for example, ACCC, Access Pricing Principles-Telecommunications, 1997.

[11] See, for example, Section 7 of the Local Competition Order.

3.17. We note that there are some instances in which total service and growth increments reduce to the same thing. As the FCC writes "the term 'total service', in the context of TSLRIC, indicates that the relevant increment is the entire quantity of the service that a firm produces, rather than just a marginal increment over and above a given level of production. Depending on what services are the subject of a study, TSLRIC may be for a single service or a class of similar services." Thus, we believe that the total service and growth approaches are arguably the same when considering new services provided by the incumbent.

Treatment of shared fixed and common costs

3.18. There are two types of fixed cost that are not attributable to specific services and therefore require special consideration in a LRIC modelling exercise. These costs are referred to as "shared fixed[12]" and "common" costs, respectively.

- **Shared fixed costs** – fixed costs associated with the supply of a group of services comprising more than one, but less than all, of a firm's services. Examples include trenches that are shared between the access network and the core network, and transmission link costs in the core network that are shared between leased line and PSTN services.

- **Common costs** – fixed costs associated with the supply of all services produced by a firm. Common costs typically include, for example, the general manager's remuneration.

3.19. A strict approach to either GLRIC or a TSLRIC would not include shared fixed costs and common costs. However, the incumbent must have an opportunity to recover these costs. If not, the regulated firm will face a shortfall between revenues and costs. It is therefore important that where LRIC is used as the basis for setting prices, a mark-up should be allowed for the provision for the recovery of (an efficient level of) fixed shared and common costs. Regulators around the world have recognized this and included a mark-up on interconnection charges to recover a proportion of such costs.[13]

3.20. The question is how to implement a set of mark-ups on services over incremental costs such that they sum to just cover the total shared fixed and common costs of an efficient firm. Of course, if no mark-up is included for interconnection services, the incumbent operator would have to recover all these shared and common costs from its own customers. On the other hand, if all such

[12] "Joint" costs may refer to either shared variable or fixed costs. In both the GLRIC and TSLRIC a portion of shared variable costs are included in the incremental cost.

[13] See, for example, Section 7 of the Local Competition Order, para. 643-646; "The Devleopment of Long Run Incremental Costing for Interconnection", ODTR, pages 22-23; ACCC (1997) pg, 39-41.

costs are recovered through interconnection charges, they may over-recover costs in total (depending on how other services are priced).

3.21. There are two basic issues to be faced in calculating the value of the mark-up. First is to determine what are the total shared fixed costs and common costs to be recovered by means of the mark-up. Second is deciding what principle governs how the LRIC costs are marked-up.

3.22. In most top-down TSLRIC[14] studies enough information is generated on a broad range of services of the firm that the total amount of these fixed and common costs can be explicitly modeled. Bottom-up models can also be designed to specifically model fixed share and common costs. The FCC bottom-up Hybrid Cost Proxy Model is a good example of this.[15]

3.23. Regarding the second question of what principle to use to mark-up incremental cost, two main options are available:

- Inverse elasticity (Ramsey) rule, or
- Equal proportionate mark-up (EPMU)

3.24. From the standpoint of economic efficiency, the inverse elasticity rule is preferable, as it is designed to promote an efficient allocation of resources. This method has attracted a considerable amount recent interest in Europe, in the context of the regulation of mobile termination rates[16]. When combined with network externality effects, the Ramsey pricing rule can be used to justify the addition of a sizeable mark-up to cost-based call termination rates.

3.25. However, the main drawback of the Ramsey approach is that it is often difficult to obtain reliable estimates of the demand elasticities required for its implementation, which introduces a degree of subjectivity and uncertainty into the equation. For this reason, regulators have tended to prefer the simpler EPMU method. EPMU is used in Australia and the UK, as well as is the form of mark-up that has been recommended by the EU for its national regulators to implement. EPMU attributes common and shared fixed costs in relative proportion to the underlying LRIC values.

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[14] We note here that in principle mark-ups to cover fixed costs should be larger in the case of GLRIC than in the case of TSLRIC. As noted above GLRIC would not include as direct costs any costs associated with the switches, transport and fiber terminals that do not vary with particular service volumes. Instead, these would be considered shared costs that would need to be assigned among the different services. In general, this means that the markup on GLRIC approach would tend to be greater than the markup in a TSLRIC or TELRIC approach because there is more shared-fixed costs that need to be recovered in the pricing of services.

[15] *HCPM/HAI Synthesis Cost Proxy Model,* FCC, 2000.

[16] See, for example, Vodafone, Orange, and T-Mobile: *Reports on the charges for terminating calls from fixed to mobile networks*, UK Competition Commission, 2002.

3.26. As we will show in our detailed methodology, we believe our approach will generate enough comprehensive information to capture an accurate level of economically justified fixed shared and common costs. As a proportionate and economically based means of arriving at an appropriate mark-up, C&W proposes to adopt the EPMU approach, which is consistent with that used by regulators in the EU and Australia.

3.27. We note that of the applications for which the FLLRIC will be designed—cost-based interconnection services, imputation tests for retail services and measuring the access deficit--the case for a mark-up is clear in the first and third. In both cases, the issue is how much additional cost beyond the incremental the firm should be allowed to recognize for recovery through interconnection rates and retail access rates, respectively. For costing the incremental costs of the retail service for use in an imputation test, the case for a mark-up is less obvious. The point of the imputation test is to assess whether the retail price is adequate to cover the cost of the retail service provision over and above the imputed underlying input costs to justify allow the firm to profitably provide that service. If not, then the incumbent may be assumed to be pricing anti-competitively. As long as the vertically integrated incumbent can meet its shared and common costs on other services, there may be no reason to believe that a firm whose retail price cover incremental retail costs exclusive of mark-up is behaving anti-competitively.

Design Issues with the "bottom up"

3.28. As discussed above, we propose to adopt a bottom-up approach for modelling capital costs for interconnection services. We estimate the cost of re-building C&W's forward looking network(s) using modern equivalent assets, assuming the network must carry projected traffic levels of C&W's own traffic and interconnection traffic at the existing grade of service, and assuming that the network is operated efficiently.

3.29. Network topology deserves special attention in this context. Since forward-looking costs consider costs that the carrier would incur in the future, a question arises as to whether investment (costs) should be based on the least-cost, most efficient network configuration and technology currently available, or whether forward-looking costs should be computed based on incumbents' existing network infrastructures. In general, there are three choices to consider for the core network[17]:

- ✓ **Existing network design** – Based on existing network design and technology that are currently in operation taking into account changes in depreciation and inflation. This approach uses the types of equipment currently being installed, regardless of whether the technology is efficient or

[17] The assumptions for the access network will have analogous considerations. For example, assumptions will be have to be made with respect to customer locations and local loop technology.

may be obsolete. This approach most resembles an embedded cost methodology, is used in Phase II costing in Canada.

- ✓ **Scorched node** - Based on the most efficient technology deployed in the incumbents' current wire center locations (*i.e.*, central office). This approach maintains the switch nodes in their current place and uses efficient technology deployed in the current switch locations and between the current switch locations.
- ✓ **Scorched earth** - Based on the most efficient network architecture, sizing, technology and operating decision that are operationally feasible and currently available to the industry. For example, this permits the cost analyst to assume away most network constraints that the operator currently faces. Switch nodes can be relocated in order to build an optimal network and minimize the costs of switching and interoffice transport.

3.32. To use the existing structure of the network would violate the competitive market standard principle of the FLLRIC. Of the remaining two approaches, scorched node is preferable to scorched earth for a number of reasons:

- It corresponds to a more appropriate, real-world efficiency standard, rather than either the existing network design or the hypothetical, unachievable standard associated with scorched earth.
- Assuming a different network architecture under a scorched earth approach is extremely complex and introduces considerable arbitrariness.
- There are potential difficulties in estimating the correct level of indirect costs under the scorched earth assumption.

3.33. Most European regulators as well as those in Australia have adopted the scorched node assumption as the standard international practice.[18] Recent developments in the U.S. point to the fact that theoretical argument about network efficiencies can be reduced even if one assumes that the cost object requires a reconstructed network, as TELRIC does. In a recent Notice of Propose Rulemaking that is examining the TELRIC rules, the FCC seems to be leaning toward establishing rules that ensure that the reconstructed network more closely resembles real network as opposed to hypothetical super efficient ones.[19]

Dynamic or Static Bottom-up Modelling

3.34. Most bottom-up interconnection models assume a long run planning horizon and, in practice, this usually means constructing a network that will be able

[18] See, for example, *Principles of interconnection and best practice regarding the FL-LRIC cost modelling*, EU Independent Regulators Group, 24 November 2000; NERA (1999), pp.3-4.

[19] See Federal Communications Commission, *In the Matter of Review of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers*, WC Docket No. 03-173, released September 15, 2003.

to meet current demand and allow for whatever growth is expected to occur over the relevant planning horizon. If the network being modeled represents a mature network then current demand can be taken as an adequate forecast of future demand. For mature networks, investment sized to provide service for current demand—augmented by a reasonable utilization and resilience factor—usually provides a reasonable estimate for current demand and demand over the planning horizon.[20]

3.35. On the other hand, if the network being modeled reflects a rapidly-growing network—as may be the case with a wireless network—then some type of demand forecasting is necessary which then must be related to investment requirements. In fact, given the existence of significant levels of fixed costs in telecommunications network—implying that the per-unit costs decrease as output increases—the unit cost of rapidly growing networks is likely to be high initially. This is the case because the designed network will not benefit from significant economies of scale that are realized as output increases. As output increase, unit costs will decline because economies of scale are achieved.

3.36. Regarding the long run, economists seem to be in agreement that, in theory, the long run is the appropriate planning horizon to use for purposes of measuring forward-looking economic costs for pricing. In practice, however, there is wide disagreement about how to implement a long run assumption into the model.

3.37. Long run costs measure the costs an efficient carrier will incur over the relevant planning period. The planning period may differ depending on some theoretical and practical considerations such as:

- ✓ How rapidly is demand evolving?
- ✓ How rapidly is technology changing?
- ✓ How long will the tariff for the service in question remain in place?

3.38. Once the relevant planning horizon is chosen, decisions then have to be made regarding how the network is assumed to be constructed or grown in order to meet the anticipated level of demand over the planning horizon.

3.39. For the purposes of costing fixed interconnection services and the access network, we believe that a static model can be used. This is because the fixed network is mature as total current demand provides a reasonable estimate for volume over the long-term. For new retail services costing and mobile network costing a dynamic approach may be necessary.

[20] Utilization factors represent how the assets of the firm are being utilized with respect to demand. Capacity in telecommunications firm is "lumpy" which means that there is usually a mismatch between capacity available and current demand. Utilization factors represent what percent of the capacity is being utilized at any given point and are usually less than 100% to permit for growth, fluctuations in volumes in different parts of the network (e.g., increases or decreases of calling volumes due to customer movements, or churn), repair and internal needs and recognize the fact that telecommunications firm cannot operate at full capacity.

Activity based approach for operating costs

3.40. As we alluded to earlier, as operating costs (exclusive of depreciation) in accounts are by definition current costs, it is often the case that existing company data is used in FLLRIC modelling. There are two major problems with operating data as it currently resides in the firm. Firstly, the existing accounting categorization may not be amenable to cost causality.

3.41 Activity-based costing (ABC) is widely accepted as the best way to assign costs to products and services and minimize the share of common and fixed costs. C&W uses an activity-based approach as part of its current Fully Allocated Cost (FAC) model. It proposes to use the same approach to serve as the basis for determining operating cost inputs into the LRIC model. There will undoubtedly be some requirement to refine C&W's current ABC system to address a wider range of services than is now the case and better track cost-volume relationships. We have taken this requirement into account in the estimation of the project timeline.

3.42. The other major problem with existing opex data is that it may include some embedded inefficiency that are not consistent with a forward-looking view of costing. As we will discuss, further in Sections 4 and 5, we propose to exclude demonstrable inefficiencies in the company's opex to ensure an appropriate measure of costs.

3.43. We note that the use of existing operational expenditure allocated through an ABC system as we propose here is consistent with the application of Phase II methodology in Canada.

Use of LRIC for Imputation Tests

3.44 Imputation tests are used to address questions of anti-competitive pricing a vertically-integrated firm that exercises market power over the provision of inputs to competing firms. In particular, imputation tests are designed to assess whether the price at which a vertically-integrated firm sells a retail (downstream) service is sufficiently high to cover the cost of the input and the incremental costs of providing the downstream service. The price at which the competitor purchases the input from the vertically-integrated firm is the imputed input cost for the imputation test.[21] If the retail prices are not sufficient to cover the imputed input price and the incremental retail service cost, the price may be considered anti-competitive.

[21] The test is often specified in terms of revenues rather than prices. For example, the imputation test in Canada currently requires the vertically-integrated incumbent telcos to demonstrate that the revenues from a retail service that uses essential inputs equal or exceed the sum of a) the tariffed rates for essential inputs and b) incremental costs of the other service components. See Telecom Public Notice, CRTC, 2003-8, 23 October 2003

3.45 There has been a considerable amount of debate over the appropriate cost standard to use for the purpose of imputation tests, much of it focusing on the relative merits of Average Variable Costs (AVC) and Average Total Costs (ATC). As stated in a recent NERA report for the Australian regulator:

> 'The Canadian Predatory Pricing Enforcement Guidelines[22] illustrate the debate between the use of average variable and average total costs. Under these guidelines, a price at or above average total cost is not regarded as unreasonably low. A price below average variable cost will generally be considered predatory, unless there is a clear justification (such as the need to sell perishable inventory). Prices in the *grey range* require consideration of other circumstances, such as evidence of intent. The European Court takes a similar approach[23] (In contrast, US courts have explicitly rejected the use of average total cost measures.)'[24]

3.46 There are also signs that LRIC is increasingly being seen by regulators as the appropriate standard to use, in preference to both AVC and ATC. For example, the EC Access Notice states that:

> 'a price which equates to the variable cost of a service may be substantially lower than the price the operator needs in order to cover the cost of providing the service…the costs considered should include the total costs which are incremental to the provision of the service…[Therefore,] the Commission will often need to consider the average incremental costs of providing a service, and may need to examine average incremental costs over a longer period than one year.'[25]

3.47 The UK telecommunications regulator, Oftel, has also given a very clear indication that the pricing behaviour of dominant operators is to be assessed against a LRIC standard:

> 'Under the Network Charge Control arrangements, BT's charges for interconnection services are derived from the LRIC of conveyance, with an appropriate mark up to cover common costs. In relation to retail services, BT has, in consultation with Oftel, recently developed a methodology to produce cost information based on LRIC. When dealing with cases concerning the supply of telecommunications services the Director General proposes to request that BT provides cost information produced in

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[22] Consumer and Corporate Affairs, 1992. The application of these guidelines in telecommunications can be found in Telecom Decision CRTC, 94-13, 13 July 1994.

[23] Niels and Ten-Kate, "Predatory pricing standards: is there a growing international consensus", Anti-trust Bulletin, Vol. 45, No. 3, 2000. page. 805.

[24] "Imputation Tests for Bundled Services: A Report for the ACCC, NERA, January, 2003.

[25] EC Notice on the application of the competition rules to access agreements in the telecommunications sector, OJ 98/C 265/02.

accordance with this methodology. The Director General will also ask other operators to provide cost information based on LRIC when dealing with cases that are concerned with the supply of telecommunications services."[26]

3.48 In our view, LRIC is the appropriate standard to apply in the context of Cayman, and our proposed approach to LRIC cost estimation supports this approach.

Cost of capital

3.49. The cost of capital of operators should reflect the opportunity cost of funds invested in network components and other related assets. It conventionally reflects the following[27]:

- The (weighted) average cost of debt for the different forms of debt held by each operator;
- The cost of equity as measured by the returns that shareholders require in order to invest in the network given the associated risks; and
- The values of debt and equity.

3.50. This information can then be used to determine the weighted average cost of capital (WACC) using the following formula:

$$WACC = r_e . E/(D+E) + r_d . D/(D+E)$$

where r_e is the cost of equity, r_d is the cost of debt, E is the total value of equity and D is the total value of interest-bearing debt.

3.51. This approach to the cost of capital can be interpreted as forward-looking as long as the inputs reflect the current or forward-looking values. For example, r_d should be the current cost of debt financing, and r_e should reflect the current and foreseeable rate of return required by equity holders on their investment. The relative structure of debt to equity may also to be analyzed to see if it is truly reflective of the expected structure going forward.

3.52. Cable and Wireless has recently gone through an exercise of calculating a sufficiently forward-looking WACC. The resulting WACC of 13.5% is that which was agreed in the section 53(f) of Schedule 4 of the Agreement. We are agreeable to using this number for the FLLRIC study, applying it to forward looking capital base, including working capital.

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[26] "The Application of the Competition Act in the Telecommunications Sector", Oftel, January 2000.

[27] See for example, Phase II Costing Manual, 31 May 2002, pp. 8-10.

Costing the Access Deficit

3.53 The calculation of any access deficit or cost of any universal service obligation will draw upon the outputs of the bottom-up costing model described above but would also, typically, require considerable further analysis. For example, Universal Service calculations typically require extensive geographic disaggregation of access costs (e.g. by remote line unit area). The precedent from various other countries is that a separate cost study or cost modelling exercise is typically required for the purposes of access deficit and USO calculations.

3.54 We believe that addressing the access deficit cost calculation in isolation from the USO cost would be inefficient and would, potentially, introduce unnecessary complexity into the immediate costing task. We assume that the priority is cost information to support imputation tests and interconnect prices. Any delay in calculating the Access Deficit can only delay the introduction of the associated surcharge (if any) which would be to C&W Caymans disadvantage. Notwithstanding this potential disadvantage, we propose that the access deficit costing requirement be set aside for the time being until it can be addressed in conjunction with universal service issues.

4. BOTTOM-UP APPROACH TO INTERCONNECTION SERVICES

4.1 Part 4 of Schedule 4 of the Agreement, which discusses interconnection services, is not clear about what services would be required to be costed in the short-term. However, we would expect that any initial model or models should cost the following services:

- Fixed termination
- Transit
- Directory assistance
- 9-1-1 service
- Mobile termination

4.2 We believe that for these services two models will need to be developed: one for the interconnection services provided on the fixed network[28] and one on the mobile network. These models will naturally diverge in terms of technology and network structure. We would also expect that--as the fixed network is mature and stable, while the mobile network is still developing--the study periods are likely to diverge. The mobile is likely to be a dynamic, i.e., multi-year model; the fixed a static model.

4.3 However, the bottom-up approach would be consistent across the two network models. For simplicity in this section, which describes our proposed bottom-up methodology, as well as elsewhere in the document, the examples given for application to interconnection conveyance services refer to those provided on the fixed network.[29]

4.4 An additional caveat: as stated to Section 1 of this document we do not undertake to present every detail of our proposed methodology. We, of course, will be pleased to elaborate on the approach presented here as the proceeding continues. In addition, there are many publicly available works that present in more detail the application of the bottom-up approach in the context of interconnection service costing.[30]

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[28] Fixed termination and transit are standard outputs of interconnection models. Directory assistance and 9-1-1 services would required some additional analysis of call centres, database, and other related system specific costs.

[29] For a full discussion of the application of interconnection on mobile see for example "Mobile LRIC model specification: Final version for the industry working group", Post & Telestyrelesen, 12 June 2003.

[30] For example, "Estimating the Long Run Incremental Cost of PSTN Access: Final Report for ACCC", NERA, January 1999. "Study on the Preparation of an adaptable Bottom-up Costing Model for Interconnection and Access Pricing in European Union Countries" Europe Economics, April 2000, "An Analytical Cost Model for the National Core Network, Consultative Document", Wissenschaftliches Institut fur Kommunikationsdienste (Wik), 14 April 1999, "Application of a TSLRIC Pricing Methodology – Discussion Paper." New Zealand Commerce Commission, 2 July 2002.

4.5 As previously noted, having determined the services to be modelled and the network components necessary to provide these services, there are several steps in the bottom-up modelling of costs:

- estimating the volume increment and dimensioning the network components to serve the increment on an efficient, forward looking basis;
- determining the cost of different components;
- estimating the network opex and other related costs associated with the different components;
- quantifying the unit costs of the volume of traffic passed over each component; and
- aggregating the component unit costs by the use made of them by different services (using routing factors).

4.6 In addition to these steps, to derive a full costing for services it will be important to include:

- a mark-up for fixed and common costs; and
- a degree of reconciliation of costs between those generated by the bottom-up and those evaluated in a top-down process. We propose to limit the reconciliation to network asset values, which drive the bulk of the costs of the interconnection service.

Estimating the volume increment and dimensioning

4.6 The demand or volume of the relevant increment is typically multi-dimensional. For example, for the fixed interconnection conveyance service, the basic demand is represented by peak or busy hour billed minutes; successful and unsuccessful call attempts, call set-up time, anticipated growth and capacity. Thus, the modeling includes not only those aspects of volume which represent current demand on network resources, but also growth over the relevant planning horizon and an allowance for spare capacity. Such information should be available from network operations and network planning organizations within C&W Cayman Islands business unit.

4.7 A key input in the dimensioning and further costing of the network is network components usage (or routing) factors. Routing factors mark how various traffic types use the network components. In addition to providing the translation of service demand into network demand they also form part of the denominator in defining unit network element costs as well as the multiplier used to translate network element costs into interconnection and other service costs.

4.8 The volume increment and routing drives the dimensioning of the network components. For interconnection conveyance service, these components are the switching and transmission plant network and subcomponents,[31] essentially everything from the main distribution frame to the point of interconnection of other networks. The engineering rules that govern this dimensioning is fairly standard and will be built into the costing models. Here the assumptions regarding network design, i.e., scorched node (maintaining the existing location of remote and local switches) and technology, become key.

4.9 To be sure, certain network components, such as the underground transmission network, may be a function of other factors. For example, underground transmission infrastructure costs are a function of trench length, the number of bores it contains, the surface in which the trench is dug (e.g. pavement, verge, concrete). Cable costs are a function of length, cable size (number of fibres) and fibre quality. As a helpful generalization, however, we say the network capital costs are driven by demand volumes.

Determining the cost of different components

4.10 Having dimensioned the network to meeting the estimated demand volumes, the components of the network are costed. Unit investment cost of components including any relevant supervision costs and capitalized interest are multiplied by quantities from the dimensioning exercise to arrive at the gross incremental investment for each network element.

Estimating the network opex and other related costs

4.11 Beyond network capital costs, we must include network related opex (net of depreciation), non-network capital costs and opex. As noted in section 3, in bottom-up models these costs tend to be determined by ratios, e.g. network opex and non-network capital as a percentage of network asset values, and non-network opex as a percentage of non-network capital cost.

4.12 We propose a more sophisticated approach to opex and non-network costs. Because of the relatively small size of the Cayman business and presence of a pre-existing allocation tool, we propose to use, as a starting basis, existing company opex. We will refine the existing allocation tool by constructing cost volume relationships (see Section 5). These CVRs will separate fixed from

[31] An exchange concentrator, for example, has various sub-components such as Line Interface Cards, LIC Magazine, 2Mb switch processor facing ports, Port Magazine, Concentrator core & control and Racks. These have different functionality and therefore different functional relationships to demand.

variable costs. The variable costs will come into the incremental cost at this stage. The remaining fixed network opex and non-network costs would then be considered through the use of an equi-proportional mark-up.

4.13 We propose a similar refinement for non-network capital cost. We will use existing asset values as a starting point. We propose to generate a set of cost volume relationships for the major asset categories that will be applied to the corresponding CCA valuations. The CCA valuation is discussed below.

Quantifying the unit costs of the volume traffic and aggregating

4.14 The direct and indirect incremental costs are summed together for each network component to calculate the total incremental cost per network component. These costs are multiplied by a set of service routing factors to obtain the total incremental service cost for a particular service. This total incremental service cost is divided by the demand for the service to produce the incremental service cost per unit.

Inclusion of the mark-up

4.15 Our proposed approach identifies fixed and common costs on the basis of activity-based analysis of current opex and analysis of non-network capital costs from the C&W accounts and the application of cost-volume relationship. As discussed in section 3 we propose that these costs are used to mark-up the LRIC values on an equi-proportionate basis.

Reconciliation of Assets[32]

4.16 It is essential to undertake a current cost accounting (CCA) valuation in order that the LRIC model can be loaded with accurate asset costs reflecting C&W Cayman Islands current operating position. This is widely accepted as a reasonable first step in establishing forward-looking costs, whether taking a top-down or bottom up approach. The use of the output of the CCA ensures that the asset costs inputted into the bottom-up model reflect those that would actually be incurred by C&W Cayman Islands and capture the extent of economies of scope experienced by the operator. Additionally, it provides a full and detailed count of assets and allows for decisions regarding the type and manufacturer of assets to reflect those taken by C&W Cayman. By using CCA analysis as a base it can be ensured that the bottom-up LRIC model closely emulates the actual Cayman Islands network while maintaining the assumption of efficient network design

4.34 In CCA analysis the goal is to restate the value of assets to reflect their value to the business, which is usually equivalent to their net current

[32] This section draws directly on text from one of the consultants answering to our request for proposal (Section 6) as it was concisely composed and fit well with our proposal.

replacement cost ("NRC"). The NRC will be derived from the asset's gross replacement cost ("GRC"), which is the current purchase price of an identical new asset or the cost of a modern equivalent asset ("MEA") with the same service potential, adjusted to reflect its remaining life.

4.36 Different valuation methods may be employed for different technology types, as described below.

4.37 *Existing Technology.* Where an asset is being revalued on a direct replacement basis its replacement cost is usually assessed either by indexation or by absolute valuation. Factors that would be considered in the choice of method include the following:

> **Indexation**: This is an appropriate method when there has been little technological change in the asset category and all the direct costs associated with bringing the asset into service would be incurred if it were to be replaced today. NRC is derived using indexation of the historical net book values. The index used should be an asset specific index. Where a specific index cannot be obtained, a more general index may be used as a proxy.
>
> **Absolute valuation**: In using the indexation method there may be difficulties in establishing appropriate indices and hence it may be more accurate and reliable to use physical volumes and unit prices to derive an absolute valuation. Absolute valuations decompose the aggregate asset values in volumes and unit prices. Unit prices should be based on supplier prices, adjusted for normal volume discounts where appropriate. Adjustments are required to include current labour and overhead costs associated with bringing the asset into service.

4.39 *Modern Equivalent Asset.* For asset categories where the underlying technologies have changed significantly, existing assets would not be replaced in an identical form. In such cases replacement cost should be based on the cost of an MEA, which is the cost of a modern asset with similar service potential.

4.40 In practice, the rate at which modern assets can be introduced is limited by practical constraints, such as manufacturing capacity and lead times. The technologies requiring the modern equivalent valuation approach will usually be derived from a forecast of installed technology to be in place within an Operators' planning timeframes.

4.41 Examples of where the MEA approach should be used are:

- analogue switches (versus digital);
- copper (versus fibre); and
- PDH technology (versus SDH).

4.42 In line with the scorched node assumption, this assumes no changes to existing network topography, but changes in technology at each network node or link

4.43 *Low Value/Short Life.* Where an asset has a relatively low value, it may be accounted for at its historical cost and is not revalued. Similarly where the life of an asset is relatively short, such that there is unlikely to be a significant difference between the cost of the asset at the date of acquisition and it's GRC, the asset need not be revalued.

5. TOP-DOWN APPROACH TO RETAIL COSTING

5.1 Part 3 of Schedule 4 of Part 5 of the Agreement anticipates a set of downstream services that might be considered for imputation tests in the foreseeable future. We note that, given the competitive environment currently taking shape in Cayman, the most likely of these services to be subject to such tests in practice in the near term are[33]:

- International direct dial
- Custom calling features
- Low speed fixed internet
- High speed fixed internet
- Mobile calling
- International leased lines
- Domestic leased lines

5.2 We propose to take a top-down incremental costing approach to retail costs for the purposes of imputation tests. The cost of the network services or components sourced from the bottom up model described in the previous section (or the price derived therewith) may serve as the relevant input price for test.[34]

5.3 We choose a top-down approach over a bottom-up approach for the following reason primarily. As discussed, the bottom up costing model is driven by a series of engineering and operational assumptions about factors such as network dimensioning, switching or remote line unit capacity, call rates and the incremental costs associated with specific volumes. Such assumptions can be clearly specified and debated and there is often some engineering consensus about the appropriate assumptions to use.

5.3 In contrast, as alluded to earlier, retail costs are much more difficult to derive from recognised dimensioning rules. In general, there is much less published discussion of the incremental costing of retail activities available to draw upon – for example, in British Telecom's Incremental Costing Relationships and Parameters, most sales and marketing costs are simply treated as directly proportional to service volumes and merit much less attention and analysis than network and operating costs.

5.4 Therefore, we propose that the incremental costing of retail activities should be based on the actual retail costs of C&W Cayman.[35] Clearly, costs with no causal relationship to the services under consideration would be excluded from any such

[33] Our listing of these services should not in anyway imply that we are agreeing to undergo imputation tests for these services. It is presented here without prejudice to a decision to dispute an unreasonable or unjustified call for application for such a test.

[34] In the case of a downstream service that uses inputs other than bottom-up costed network services, there would presumably be a wholesale price that would serve as the relevant price.

[35] We believe this is consistent with the approach used in Canada at the time of this writing.

analysis. The top down analysis would then focus on identifying, for each major cost category, the relationship between costs and volume and, in particular, identifying any fixed cost element. This would then support the inclusion of only the appropriate incremental element of actual costs in any imputation tests.

5.5 Compared to network costing (either top down or bottom up), this exercise should be relatively straightforward and therefore meets the Proportionality principle.

5.6 As we discussed in section 3, the three core steps in a top-down approach are 1) recategorizing accounting costs; 2) revaluing historic values and 3) constructing CVRs. In addition to these core steps, measures may be necessary to adjust for demonstrable inefficiency.

Categorisation of Costs, Assets and Liabilities

5.7 Costs, assets and liabilities (referred to generically as "costs" for the purposes of this section) have to be grouped in categories to enable data to be treated consistently, to represent more clearly over-aggregated information and to allow the identification and modelling of cost causality. The costs are grouped or split into categories the number and type of which are defined the following criteria. They should

- broadly reflect the different types of capital and operating expenditures actually incurred by the business or service line,
- should be homogeneous in the sense of having a common cost driver,[36]
- reflect the need for transparency and any reporting requirements, and
- support the generation of cost-volume relationships.

5.8 An additional key principle is that, at this stage, irrespective of how the costs are categories, in aggregate they must sum to the original accounting totals.

Efficiency Adjustments

5.9 We propose to consider an number of benchmark ratios (e.g. subscribers or lines to staff ratios, operating costs to subscribers or lines) to determine whether there is any cause to suspect inefficiencies within the Cayman business that would require some adjustment to the costs. Any consideration of

[36] Here "cost driver" refers to the measure of demand whose variation cause a variation in the cost incurred in the provision of the service. The cost driver must be quantifiable.

benchmarks would have to conducted very carefully to ensure that like-for-like is being compared.[37]

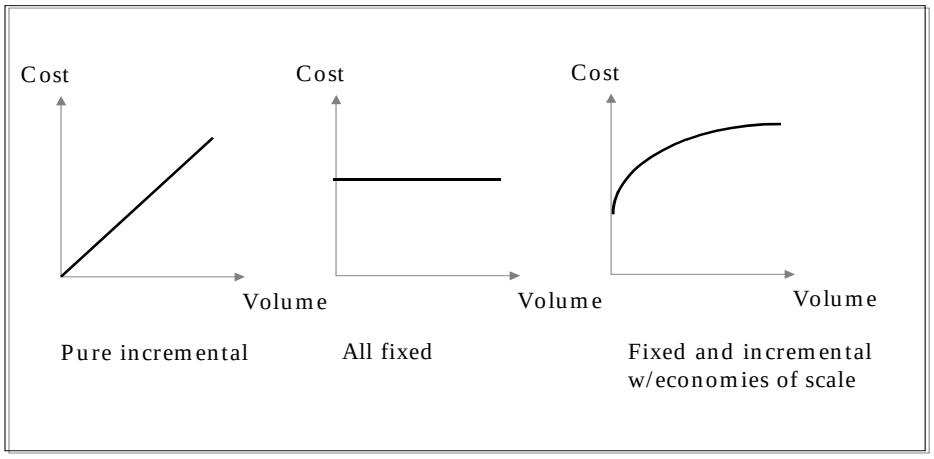
5.10 If any inefficiencies are identified in the opex or capital costs, the existing cost figures may be reduced by an appropriate percentage.

Revaluing Historic Asset Values

5.11. This step involves exactly the same activity as outlined in Section 4 with respect to CCA valuations for valuation purposes. The difference is that here we limit our analysis to assets specific to retail services.

Cost-volume relationships

5.12 The construction of cost volume relationships ("CVR") is key part of any top-down approach to the calculation of incremental costs. A CVR depicts how costs change as the volume of its cost driver changes. The costs associated with an increment can be of several types. An example of CVRs is shown in the diagram below.



5.13 The sample CVRs above illustrate how they may appear for three different cost categories. The intercept on the Y-axis represents the proportion of fixed costs associated with the cost category, and the slope of the CVR would

[37] Benchmark evidence can be confirmed through supporting tests, such as stochastic frontier analysis, if deemed necessary.

indicate the extent to which economies of scale or scope are present. CVRs are generated for each cost category through engineering analysis. We can also rely on experience in other jurisdictions to confirm these relationships.

5.14 As we have noted in Section 3, CVR construction process is arguably the most time-consuming aspect of the top-down approach. However, we are proposing to create them only for opex and non-network capital costs, for which they are much more straightforward than with network capital costs.

Approach to new retail services

5.15 The preceding discussion is based on the assumption that the retail services under consideration are existing services currently provided by C&W Cayman. The services that have been identified in the Agreement are, after all, existing services. When new services are considered, an analogous methodology based in engineering and business plans can be used. We note that in this context the GLRIC and TSLRIC concepts largely converge. Moreover, the relevance of top-down disappears in the sense that there is no historic incremental retail costs to be analysed. For new services, the approach closely approximating the Phase II cost methodology in Canada.

6. IMPLEMENTATION TIMEFRAMES AND COSTS

6.1 We welcome ICTA's considered approach to the time requirements for agreeing a methodology and generation of the FLLRIC model(s) to address interconnection, imputation test and access deficit requirements. C&W Cayman Islands is a small carrier and, as such, has not invested a great deal of its resources into costing systems used for non-business purposes. Regulators in the United States and Canada have generally treated smaller local exchange carriers (LECs) differently from larger ones, understanding there may be modelling requirements and resource constraints that differ from those at larger LECs. For example, although the LRIC methodology for local loops of larger LECs has been set in the United States and Canada, for some years, proceedings continue on the approach to smaller ones. We believe the 12 month timeframe for developing the required modelling is fair.

6.2 In order to achieve as complete an understanding of possible time requirements and costs involved in this project, C&W invited four well-recognized consultancies to prepare proposals for us. Two of these consultancies were based in North America, and two in Europe. Each of the North American consultancies had experience in costing to meet Canadian requirements. Each were provided a copy of Schedule 4 of the Agreement and some basic data to indicate the size and topology of the network C&W Cayman Islands. They also were given the following guidance with respect to terms of reference for the proposal:

- how would you design and implement a LRIC model to enable C&W Cayman islands to provide the information required to set interconnection rates, meet imputation tests and estimate the access deficit;
- describe your proposed methodology and deliverables;
- comment on what input/resources would be necessary from the Cayman business unit;
- outline your fees and required timeframes;
- describe which staff would undertake the project and their credentials; and
- describe your firm's relevant experience.

6.3 We note that at the time of requesting proposals we did not inform the consultants as to C&Ws preferred approach. Thus, the elements of methodologies proposed may or may not be wholly consistent with C&W's preferred approach. That said because C&W's approach is based on best international practice, the methodologies base much in common with approaches proposed by the consultants.

6.4 Below we summarize the time requirements and costs found in the proposals. C&W would be pleased to supply ICTA--on a confidential basis--the proposals themselves. C&W would request that the proposals be kept confidential as clearly it would cause it direct harm, and encourage collusion, if C&W was forced to put third party estimates on the public record. Nonetheless, in the interest of transparency with regard to C&W's cost estimate of building the model in the Annex, C&W has placed a summary of the key parameters of the proposals on the public record.

6.5 Although all of the consultancies have extensive experience with FLLRIC costing in telecommunications, the fact that the methodology had not been agreed posed a challenge for their responding. Furthermore, the number of services that will be initially required to be costed and the granularity of the costing will be greatly impact the overall costs of the exercise. Another consideration is how much internal resource from C&W Cayman can be contributed the project. Significant as well is will be the degree to which the methodology is "stable", i.e., without significant amendment, over the modelling period.

6.6 The proposals were quite consistent in terms of the costs of the basic modelling, in the US$300-$400k range (excluding travel and other related expenses). Given a stable set of requirements emerging from the consultation we estimate the cost modelling will be around US$550,000. This excludes the internal cost and manpower associated with the project.

6.7 C&W notes that under section 51 of Schedule 4 of the Agreement, C&W should be entitled to recover the cost reasonable incurred of building the model. As such, C&W is required to make a proposal as to the method and amount to recover these costs. C&W notes it is premature at this stage for such an application, but anticipates making that application at a later date.

6.8 In terms of time, the consultants' proposals are consistent with the 12 month timeframe set out in the Agreement. The base requirement for the initial model is between 5 and 10 months. However, this excludes time for gathering required inputs, testing the model for robustness and consistency of results, training internal staff and establishing procedures for regular updates. We therefore suggest that for planning purposes ICTA retain its 12 month time allowance for building the required models.

7. CONCLUSION

7.1. This document represents C&W's preferred approach for FLLRIC modeling to interconnection and retail services. It proposes a total service incremental costing methodology with a bottom-up approach to interconnection service costing and a top-down approach to retail services for use in imputation costs. Where appropriate we propose a provision for an equi-proportionate mark-up to LRIC to cover shared fixed and common costs.

7.2 Our proposed hybrid approach offers several attractions:

- it is consistent with the principles and parameters of best international FLLRIC modeling;
- it maximizes the relative merits of bottom-up and top-down approaches to modeling; and
- it balances the dual objectives of a) employing the expertise of external, internationally-recognized costing experts with b) keeping expenditure on the effort reasonable and domesticating LRIC modeling capability to Cayman.

7.3 We believe that addressing the access deficit cost calculation in isolation from the USO cost would be inefficient and would, potentially, introduce unnecessary complexity into the immediate costing task. We assume that the priority is cost information to support imputation tests and interconnect prices. Any delay in calculating the Access Deficit can only delay the introduction of the associated surcharge (if any) which would be to C&W Caymans disadvantage. Notwithstanding this potential disadvantage, we propose that the access deficit costing requirement be set aside for the time being until it can be addressed in conjunction with universal service issues.

7.4. There are additional issues related to costing and cost-based rates that Cable & Wireless would wish to explore in the coming weeks of this proceeding. Among these are is the concept of implementing a price-cap regime on interconnection services prices at a period of time after the implementation of the cost-based rates implicit in the costing discussion outlined in this paper. Such a regime would obviate the need to engage in costly costing exercises at regular intervals.

7.5 C&W trusts that this submission has been of assistance to ICTA, and looks forward to ICTA to instructions as to the subsequent steps in the Proceeding.

ANNEX: COMPARATIVE ESTIMATES ON COSTING CONSULTANCY WORK

Consultancy	Base modelling costs (US$)	Base time frame	Proposed deliverables	Per day cost of consultant (US)
1	$375k plus $30-60k per additional service	39 weeks plus 3-6 week per additional service	• Bottom-up models with top down reconciliation • Documentation, training and presentations	$1120-$3360 depending on experience level of consultant
2	$300k	23 weeks	• Wireline and wireless models Phase II basis	$2625 composite rate
3	$420k	20 weeks	• Top-down or reconciled Bottom-up or top-down (either GLRIC or TSLRIC basis) • CCA model • Manual, training and presentation	$1124-$3552 depending on experience level of consultant
4	$550k	40 weeks	• Phase II type costing manual • Network models for asset valuations • Opex assessments • Cash flow models	$825-$1200 depending on experience level of consultant

Note: these cost estimates exclude travel and travel related expenses