



A Consultative Document

Proposed Costing Methodology for the Telecommunications Sector

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1 Introduction

1.1 Requirement for a Cost Methodology

The Telecommunications Authority of Trinidad and Tobago ("the Authority") is in the process of introducing competition in the telecommunications sector on a gradual basis. Competition in the telecommunications market is being introduced through the licensing of competitors to the incumbent service provider, Telecommunications Services of Trinidad and Tobago (TSTT) in various parts of the market. For example, two new mobile concessions and the associated licences were awarded at the end of 2005.

In liberalising the various telecommunications markets, the Authority must ensure that competition is not impeded or adversely affected by anti-competitive behaviour. The benefits of competition must be allowed to reach all users and should include the delivery of new and highly efficient telecommunications services with lower prices, higher telecommunications sector employment and increased investment. The Authority must therefore create an environment which makes it feasible for both new and existing service providers to effectively compete with one another.

1.1.1 Legislative and Regulatory Requirements

An important component of a regulatory framework that promotes competition is a Cost Methodology which should be used, where necessary, as the basis for pricing wholesale and retail services in the market place. The Telecommunications Act ("the Act") reinforces and implies the need for a Cost Methodology to enable the Authority to deal with a myriad of issues. The following sections of the Act refer:

Section 25: Interconnection

Section 25(2):

*"In respect of a concessionaire's obligations pursuant to subsection (1), the Authority shall require a concessionaire to-
... (b) provide, upon request, points of interconnection in addition to those offered generally to other concessionaires, subject to rates that reflect the concessionaire's **total economic cost** of constructing additional facilities necessary to satisfy such request;*

... (l) permit other concessionaires of public telecommunications networks and public telecommunications services to have equal access to telephone numbers, operator services, directory assistance and directory listing **at a cost efficient rate** without unreasonable delay, in accordance with requirements prescribed by the Authority; and

(m) disaggregate the network and **on a cost basis**, in such a manner as the Authority may prescribe, establish prices for its individual elements and offer the elements at the established prices to other concessionaires of public telecommunications networks and public telecommunications services.”

Section 26: Access to Facilities

Section 26(4):

“The Authority may regulate the rates, terms and conditions for access to any facility, such rates, terms and conditions to be just and reasonable and it may adopt procedures necessary and appropriate to facilitate, by such means as the Authority deems appropriate, the determination of complaints concerning such rates, terms and conditions.”

Section 29: Prices

Section 29(2):

“The Authority may establish price regulation regimes, which may include setting, reviewing and approving prices, in any case where –

... (b) a concessionaire operating a public telecommunications network or providing a public telecommunications service cross-subsidises another telecommunications service provided by such concessionaire; or

(c) the Authority detects anti-competitive pricing or acts of unfair competition.”

Section 29(5):

“In respect of any telecommunications services provided on an exclusive basis by a concessionaire, the Authority shall establish the maximum rate of return that the concessionaire may receive on its investment, or shall prescribe the use of any other measures for determining the concessionaires profitability, as it deems appropriate.”

Section 29(6):

“For any public telecommunications service provided on a non-exclusive basis, the Authority may introduce a method for regulating the prices of a dominant provider of such telecommunications service by establishing caps and floors on such prices, or by such other method as it may deem appropriate”

The requirement for cost-based pricing is clear in the Act in respect of interconnection services. Further, the need to adopt a single cost methodology for the telecommunications sector became even clearer to the Authority during the first interconnection dispute between TSTT and Digicel on interconnection rates. The Arbitration Panel which deliberated and ruled on that dispute, in its decision, recommended that:

“the Authority consider developing a sector specific cost model for the purposes of considering whether proposed charges comply with the regulatory framework, or for setting charges if so required”.

Although the requirement for a cost methodology is not as explicit in Sections 26 and 29, the Act does give the Authority the power to make appropriate determinations as it sees fit. In the case of ‘Access to Facilities’, Clause 18(1) of the Telecommunications (Access to Facilities) Regulations further specifies that:

“A concessionaire shall set access rates based on its costs determined in accordance with such costing methodologies, models or formulae as the Authority may, from time to time, establish.

Similarly, the Authority may require the application of a cost methodology in order to:

- Detect cross-subsidies among telecommunications services;
- Detect anti-competitive pricing or acts of unfair competition such as price gauging or price squeezing;
- Establish a maximum rate of return or determine an appropriate profitability margin for exclusive providers; or
- Establish price caps or price floors for dominant providers.

In this regard, the Authority has also published a consultative document entitled, *Proposed Price Regulation Framework Policy for the Telecommunications Sector of Trinidad and Tobago*, that specifies where, when and how the Authority would intervene to regulate prices in the telecommunications market. The Proposed Price Regulation Framework is based on the principle of proportionality: the minimum possible interference to correct for any failures that may exist in the competitive market.

1.1.2 Maximizing economic welfare

Economic welfare will be at its greatest where charges for essential facilities and services (e.g. interconnection, unbundled local loop) are set to reflect the costs of provision. This will:

- Encourage new operators to use existing facilities where it is economically desirable (i.e. facilities which are not appropriate for entrants to duplicate)
- Encourage investment in new facilities where it is economically justified. These facilities may either be a modernisation of existing infrastructure (e.g. to embrace new technology) or the deployment of new infrastructure in greenfield sites. The investment may either be by the incumbent or an entrant.

When charges for essential facilities and services are based on cost they do not distort the build/buy decision of new entrants – they will be encouraged to use existing facilities if and only if it is economically desirable to do so. Just as important, setting these charges in this way also means retaining investment incentives for the incumbent to upgrade or extend its existing facilities when new technology becomes available.

In a fully competitive market charges for wholesale and retail services will tend to reflect costs as a matter of course. If one operator fails to offer cost-based charges another will exploit the opportunity to offer lower charges whilst retaining profit. Similarly, if an operator fails to make the most efficient investment decision, it will soon find itself out of business. It is the task of the regulator to mirror these conditions in the less than fully competitive telecommunications market so that economic benefits are passed on to consumers.

1.1.3 Attracting Investments

There now exists a near-global market in investment capital for telecommunications. This has two major ramifications for charges for essential facilities and services set by the Authority:

- The Republic of Trinidad and Tobago is competing for a limited (although large) pool of investment capital. This means it is not sufficient simply to open the national market to competition and expect that investment in telecommunications networks will follow. A stable and rational competitive framework, for which essential facilities and services are a major part, should be established in order to create the regulatory certainty necessary to attract investment. This framework should also ensure that the prospective returns on

investment are at least as good as are available in the many other liberalising national markets.

- The focus of investment capital will be on the most lucrative parts of the market. In contrast, one of the principal objectives of the Government of the Republic of Trinidad and Tobago is to allow the vast majority of the population to have access to services at affordable rates. The framework for telecommunications competition must therefore be established so as to enable and encourage this to happen. This means that the approach to determining costs must ensure that adequate returns on investment can be made not just in the main urban areas but throughout the country.

In other words, the pricing framework and costing methodology to be adopted by the Authority should balance the requirement to make telecommunications investment attractive, with the need to avoid cream-skimming of the most lucrative parts of the market. Setting cost-based prices for essential facilities and services is an important means of achieving this balance.

1.1.4 Purpose and Applicability of the Proposed Costing Methodology

This draft document presents proposals on a costing methodology and the appropriate costing principles to be adopted by the Authority for the purposes of regulating rates in the telecommunications sector in Trinidad & Tobago where it becomes necessary. Giving consideration to the legislative requirements outlined in the previous sub-section, the proposed costing methodology if adopted, will inform:

- the determination of interconnection rates for all concessionaires when required;
- the determination of rates for accessing the facilities (e.g. unbundled local loops) of any concessionaire when required;
- the determination of rates, where necessary, for any telecommunications service in which there is a monopoly or exclusive provider (un-contested market);
- the determination of rates, where necessary, for any public telecommunications service provided by a dominant provider in a contested market ; or
- any exercise by the Authority to detect unfair cross subsidies or any acts of anti-competitive pricing.

In this document the Authority seeks to identify and comment on internationally recognized costing principles and standards, and addresses the advantages and disadvantages of each of them (and of all relevant combinations), and makes proposals based on:

- Relevant telecommunications laws
- Data availability
- The estimated cost of implementation
- The goals of the Authority in relation to the development of the sector
- The required timetable for implementation.

After adoption of the costing principles and guidelines prescribed by the Cost Methodology, the Authority shall develop an appropriate cost model, in a subsequent consultation, that shall be used for the purposes of determining cost-based rates in the telecommunications sector. It is expected that the development of this model in consultation with stakeholders should take approximately 18 months.

1.2 Review Cycle

As the telecommunications sector grows and develops into more efficient and competitive markets and as the science of costing telecommunications network and services grows, the need will arise to revise and update the type of costing methodology that is employed by the Authority. As such, this document will be modified in consultation with concessionaires, stakeholders, interested parties and the public, as the Authority deems appropriate. The maintenance history will be modified accordingly.

1.3 Consultation Process

The Authority sought the views and opinions of the general public and other stakeholders on the first draft of this document during the period December 1, 2006 to January 29, 2007. Comments and recommendations were received from stakeholders regarding the proposals made in that first consultation round and a Decisions on Recommendations (DOR) matrix was developed and is included at Annex I. The DOR summarizes the Authority's response to all of the comments and recommendations received in the first round of consultation.

Proposed Costing Methodology for the Telecommunications Sector

This revised draft addresses all of the concerns raised by stakeholders and will be published for a second round of consultation in accordance with the Authority's *Procedure for Consultation in the Telecommunications Sector of Trinidad and Tobago*.

2 Considerations in Developing a Costing Methodology

2.1 Choosing an Appropriate Cost Standard

In this section we consider how costs may be interpreted in practice. There are five main choices to be made when establishing a cost-based pricing standard. These are:

- Historic costs or current costs?
- Fully allocated costs or long run incremental costs?
- Actual or theoretical efficiency?
- Choice of mark-ups on cost
- Choice of rate of return on capital employed.

Invariably the best answers to these questions are those which are most consistent with encouraging efficient investment in telecommunications.

2.1.1 Historic costs or current costs?

Historic cost accounting (HCA) means that the costing methodology works with the costs which the operators have actually incurred in developing their networks. These costs are recorded in the operator's accounts. The alternative approach, current cost accounting (CCA), sometimes referred to as forward-looking costs, takes account of technology and price changes which have occurred since an asset was purchased in order to derive a modern equivalent asset (MEA) value. Within the CCA approach all assets are revalued annually to derive their MEA values, and it is these values rather than the purchase prices which are then used within the cost model. Under CCA the depreciation lifetime of an asset may also differ from that recorded in a concessionaire's accounts since the depreciation is calculated on the basis of economic lifetime. Figure 1 provides a comparison of the two approaches.

Figure 1: Historic versus current cost accounting

	Historic cost accounting	Current cost accounting
Strengths	<p>Strong audit trail to existing audited accounts</p> <p>Ensures operators recover their actually incurred costs</p>	<p>Provides economically efficient pricing signals for investment decisions</p>
Weaknesses	<p>Historic costs are inefficient because they have no relevance to investment decisions today</p>	<p>Requires time and investment to complete a full revaluation of assets</p>

The Authority considers it important that the concessionaires set prices on a current cost basis, so as to ensure economically efficient investment decisions by potential market entrants. If interconnection or access prices are set below current costs then inefficient entry will be encouraged and/or there will be insufficient investment in alternative infrastructure. If access services are priced above current costs then there will be insufficient entry and/or over-investment in alternative infrastructure will be encouraged.

In general, current costs will be lower than historic costs owing to technology improvements. However, in the access network current costs may be higher than historic costs because the key cost components (labor and wayleaves) are subject to wage inflation.

2.1.2 Fully allocated or long run incremental costs?

Fully allocated costing (FAC) involves the allocation of all of an operator's costs either directly to services or indirectly to network elements and then to services, on the basis of identifiable cost drivers. This is a relatively simple and transparent process, and has been used in the early stages of market liberalization in many countries. The main alternative approach, known as long run incremental costing (LRIC)¹, requires an assessment of how the costs of individual components vary with volume.

¹ **Short-run** incremental costs (or **marginal** costs) are not considered appropriate for setting interconnection prices since planning and investment horizons in telecommunications are always long-term. This means that it is not possible to adjust supply to meet short-term fluctuations in demand; rather it is the long-term fluctuations in demand that drive supply.

Long run incremental costs give the most accurate price signals to the entrant when deciding whether to build its own facilities or buy the incumbent’s facilities through interconnection. In the long-run it is possible to avoid the volatility associated with spare capacity (low short-run costs) or capacity constraints (high short-run costs), and establish a true measure of the profitability of entry. Using LRIC means that prices are based on the costs avoided if an increment of output is no longer required – e.g. if an operator were no longer to provide a service. The avoided costs would be those which are directly attributable to the call service, and would exclude all common costs. Figure 2 provides a comparison of the two approaches.

Figure 2: FAC versus LRIC

	Fully allocated costs	Long run incremental costs
Strengths	<ul style="list-style-type: none"> Can be used with either historic or current cost accounting Based on reconcilable and readily available information Ensures recovery of all costs 	<ul style="list-style-type: none"> Provides economically efficient pricing signals for investment decisions
Weaknesses	<ul style="list-style-type: none"> No accounting for potential efficiency gains Does not reflect the economic cost of providing the service 	<ul style="list-style-type: none"> Requires current cost accounting Requires assessment of cost volume relationships which can be complex

If LRIC is adopted, the next question that arises is the size of the increment over which variable costs are to be calculated. The approach that regulators have most commonly adopted is known as Long Run Average Incremental Cost (LRAIC) or, synonymously, Total Service Long Run Incremental Cost (TSLRIC). The LRAIC standard assesses costs over an increment represented by the entire output of a service. If incremental cost varies with output (possibly due to economies of scale), LRAIC will be higher than the marginal cost measured at the current level of output. Furthermore, LRAIC includes service-specific fixed costs, (i.e. costs that do not vary with the level of output but would be saved if the firm discontinued production of the service). LRAIC is attractive to regulators both because it accounts for all the costs associated with an entire service, and because it allows costs to be determined without building complex cost-volume relationships for individual network assets. See Section 4.5 for details.

2.1.3 Actual or theoretical efficiency?

The efficiency of an operator should be measured based on its actual network topology (which is a legacy it cannot reasonably alter within the short-to-medium term) but using best-practice operational efficiency for operators of roughly its size and operating in similar markets (for this is an improvement it could commercially justify and practically achieve). By this means the incumbent is not penalized for having optimized its network for historical technologies, nor for obligations imposed on it as a publicly owned employer – legacies which no entrant has to bear. Nonetheless, the incumbent is given incentives to modernize its asset base and to eradicate operational inefficiencies.

In practical terms this means that any cost model should be built on what is known as the "scorched node" approach. Under scorched node assumptions, the core network nodes (e.g. switch and concentrator sites, or base stations in a mobile network) are taken as fixed, and the network construction is optimized given this constraint. This means using the latest available, efficient technology at modern equivalent asset prices.

2.1.4 Choice of mark-ups on cost

The mark-ups on LRAIC should, over the long term, enable the operator to recover its joint and common costs. If no mark-ups were included then the interconnect price would not allow the operator to recover its full cost base. If the operator priced in this way and only offered interconnect services, it would go out of business. Mark-ups are therefore required in the long term, and they should be spread across all of the incumbent's network services including interconnection.

2.1.5 Choice of rate of return using the Current Cost Approach

The allowable rate of return should be equivalent to that which would be expected by the financial markets when investing in a telecommunications company in the Republic of Trinidad & Tobago. This rate of return will be based on the typical rate in global telecommunications markets, adjusted to reflect the degree of political, economic, exchange rate and commercial risk involved in Trinidad and Tobago. The cost of capital is usually calculated as a weighted average of the cost of debt and the cost of equity finance.

2.2 Measuring against the Price Standard

There are basically three methods of deriving price controls which meet the standard of long run incremental costs. These are:

- Adapting the operator's accounts. This is a **top-down approach** which starts with the reality of the incumbent's actual costs and seeks to modify the basis of calculation to meet the pricing standard. For example: assets, valued in the accounts on the basis of historic costs, may need to be replaced by modern equivalent assets and revalued at replacement cost; joint and common costs may need to be removed from the cost allocation system in order to estimate LRIC.
- Developing cost models. This is a **bottom-up approach** which starts from a network engineering model and assesses the optimal network design to meet a given subscriber and traffic profile. A major challenge with the cost modelling approach is the incorporation of operational expenses. Typically this is achieved by identifying best practice ratios of capital to operating expense.
- Compiling **benchmarks**. Benchmarks involve reading across from the prices of other operators, often in other jurisdictions, in order to obtain a proxy for a concessionaire's costs. However, benchmarks may take various forms, e.g. a comparison between prices for equivalent services at the retail and wholesale level; a comparison of price relativities for incumbent and entrant operators; benchmarks of input assumptions for cost models. The challenge in the benchmarking approach is to determine which rates in which jurisdictions are both comparable with those of the operator under scrutiny and with the desired pricing standard itself.

None of these approaches is perfect. Each has its strengths and weaknesses. As a result the best approach varies according to circumstances, with different approaches being favored in different countries at different times. For example:

- The US almost exclusively uses the bottom-up approach, and this approach has been used also in much of the EU (e.g. Sweden, France), Asia (e.g. Korea, Singapore, Hong Kong) and Australia.

- The UK considered bottom-up models but, failing to reconcile them with operator accounts, preferred the top-down approach as the principal source of data. Austria is another country that uses top-down models, and throughout the EU incumbent operators are required to produce separated accounts as a means of assessing costs on a top-down basis
- In many countries interconnect benchmarks have been used either as an interim solution while cost models are developed (e.g. Denmark) or as a longer term solution especially for mobile termination rates (e.g. Germany). Benchmarks are usually set against prices (preferably cost-based prices) for comparable services in other countries, but they can also be set against the prices for equivalent retail services with a discount reflecting the cost-savings available in the supply of the wholesale service.

2.2.1 Strengths and weaknesses

Figure 3 illustrates the main strengths and weaknesses of the three approaches. These are described in more detail below.

Figure 3: Comparing the three approaches to estimating cost

Approach	Strengths	Weaknesses
The top-down approach	<ul style="list-style-type: none"> Based on actual costs Accounts for cost minutiae Strong audit trail 	<ul style="list-style-type: none"> Accounting for potential efficiency gains Requires substantial up-front investment Data sources and data confidentiality
The bottom-up approach	<ul style="list-style-type: none"> Minimal co-operation needed from incumbent Accounts for theoretical operational efficiency Avoids data confidentiality problems 	<ul style="list-style-type: none"> Little resemblance to actual costs Poor transparency; hard to authenticate Can't deal with operational costs Substantial investment required
The read-across approach	<ul style="list-style-type: none"> Based on costs of real-world operations Realistic interpretation of efficiency Minimal investment Avoids data confidentiality problems 	<ul style="list-style-type: none"> Cannot reflect an operator's actual costs Limited by effectiveness of regulatory regimes in other countries Limited transparency Cannot easily account for differences in national operating conditions.

2.3 The Top-down Approach

2.3.1 Strengths

The main strengths of adapting the operator's accounts to match the pricing standard are that it:

- Is the only approach which is totally based on the actual costs of operating in the national market situation. Each of the other approaches requires simulation of national operating conditions.
- Has the ability to take account of the minutiae of real costs. No matter how good the assumptions used in other approaches they cannot match the detail obtained from the original accounts.
- Provides a strong audit trail. Top-down approaches can always be traced back to the audited accounts of the operator and can, if necessary, themselves be audited as a fair and true reflection of the price standard.

2.3.2 Weaknesses

The main weaknesses of the top-down approach are that it:

- Cannot take full account of potential efficiency improvements. The top-down approach is to some extent constrained by the historic network design and operating practices of the operator.
- Requires substantial up-front investment to establish the necessary cost accounting systems and to perform accounting separation between an operator's wholesale and retail functions. Equally it may take 2-3 years to realise the fruits of this investment.
- Introduces problems of maintaining the confidentiality of an operator's cost data. If the top-down approach is to be transparent, then data must be made publicly available.

2.4 The Bottom-up Approach

2.4.1 Strengths

The main strengths of building an economic/engineering model of an efficient operator are that it:

- Can be achieved with minimal co-operation on the part of the operator whose costs are being measured. The bottom-up method can be managed without substantial data input from the operator. In particular it does not require detailed accounting information to be available.
- Takes full account of all theoretically available efficiencies, both technical and operational. The bottom-up model can adopt a scorched earth approach, which simulates the operator's entire network and facilities being rebuilt in the most efficient manner to support estimated demand for access lines and call traffic.
- Avoids any problems of confidentiality of data. As the model will not be based on the operator's actual network, the cost and volume inputs can be generically obtained.

2.4.2 Weaknesses

The main weaknesses of the bottom-up approach are that it:

- Bears little resemblance to the actual costs of the operator. For example, after two years of effort on bottom-up models in the UK, Oftel was forced to admit that they could not be reconciled with the top-down approach.
- Provides little transparency. The workings of the model cannot be easily understood except by those who built them.
- Is difficult to authenticate. Typically it is difficult to obtain agreement even on the inputs to the model, and it is especially hard to verify the output as there is no real operator against which to calibrate the model.
- Cannot deal with operational costs which comprise maybe 50% of the total network costs of a real-world operator. To address operating costs the bottom-up model has to rely on mark-ups and rules-of-thumb derived from best practice comparisons.
- Requires substantial investment with uncertain benefits. Although several off-the-shelf network cost models are now available, this is a task which needs a significant amount of customisation if the model is to derive credible results.

2.5 The Benchmarking Approach

2.5.1 Strengths

The main strengths of using international comparisons to measure an operator's charges against the pricing standard are that it:

- Reflects real-world operations, both in technical design of the network and in operating conditions.
- Is the only approach which offers a realistic interpretation of an efficient operator. By comparing rates of different operators in different countries, the read across method works on the basis of international best practice.
- Requires minimal investment. The cost involved in developing an international benchmark, even quite a sophisticated benchmark, are substantially lower than for either of the other approaches.
- Avoids problems with confidentiality of data. The benchmark can largely be based on publicly available data. Where confidential data is used, it can generally be presented unattributed as a generic assumption.

2.5.2 Weaknesses

The main weaknesses of the read-across approach are that it:

- Cannot reflect the actual costs of the operator. The best that an international comparison can do is to measure the costs of similar operators in similar situations.
- Is limited by the efficiency of operators and the effectiveness of regulatory controls on prices in other countries. The read-across method provides no empirical evidence of how well the group of operators in the benchmark is doing in meeting the pricing standard. In the worst case, if all countries simply employed a benchmark technique, there would be no dynamic for lowering charges.
- Offers limited transparency. Although a simple comparison of rates can easily be achieved, if due account is to be taken of the variations in operating conditions in different countries, the level of transparency is unlikely to be significantly better than with the bottom-up approach.
- Cannot easily take account of variations in the operating conditions faced by service providers in different countries. These differences concern matters such as wage rates, import taxes, urbanisation and the geographical terrain.

3 Proposed Approach for Trinidad & Tobago

The Authority believes that the appropriate costing methodology for the Republic of Trinidad and Tobago should be as follows:

- Current cost accounting (CCA) and long run average incremental cost (LRAIC) should be implemented by all concessionaires. The LRAIC standard² has been used effectively in other countries and is the form of LRIC that assesses costs over an increment represented by an entire service. This means that costs can be determined without building complex cost-volume relationships for individual network assets. See Section 4.5 for details.
- A top-down method should be preferred as it is the most suited method, given the state of the telecommunications sector that accurately reflects the costs of operating a network in Trinidad and Tobago. In order to achieve this all concessionaires need to commence work on redesigning their cost accounting systems to capture data in a suitable format for long run average incremental costing.
- The Authority proposes to develop a telecommunications sector top-down long run average incremental cost (LRAIC) model within 18 months of the adoption of this Methodology. The Authority shall require all concessionaires who provide telecommunications and broadcasting services over telecommunications networks to adopt the Authority's top down LRAIC model after it has been completed.
- Until such time as top-down models are available, the benchmarking approach should be favoured since it can be implemented quickly and effectively and provides a reasonable proxy for cost-based pricing. Benchmarking, either against retail prices and/or against wholesale charges in other countries, ensures that wholesale charges are low enough to be competitive but high enough to ensure that there are adequate incentives for network investment. Benchmarking can also provide a suitably proportionate longer term remedy for pricing services of non-dominant concessionaires.
- The bottom-up approach should not be given a high priority at this time. This is because it is liable to under-estimate the true costs of building and operating a network. A bottom-up approach is more appropriate for developed countries such as the US and Western Europe where networks are already fully built and teledensity approaches saturation levels. The Authority believes that such an approach would be inappropriate in Trinidad & Tobago at this

time. Prioritising the bottom-up approach would amount to a disincentive for network investment – investment which is fundamental to achieving the goals of increased teledensity, universal service and, ultimately, economic growth.

Statement on Costing Model:

The Authority proposes to develop a telecommunications sector top-down long run average incremental cost (LRAIC) model within 18 months of the adoption of this Methodology. In this model asset values will be based on current cost accounting, CCA. In the absence of such a model, a benchmarking approach shall be used in the interim period. The Authority shall require all concessionaires who provide telecommunications and broadcasting services over telecommunications networks to adopt the Authority's top down LRAIC model after it has been completed.

² This standard is alternatively known as Total Service LRIC, TS-LRIC.

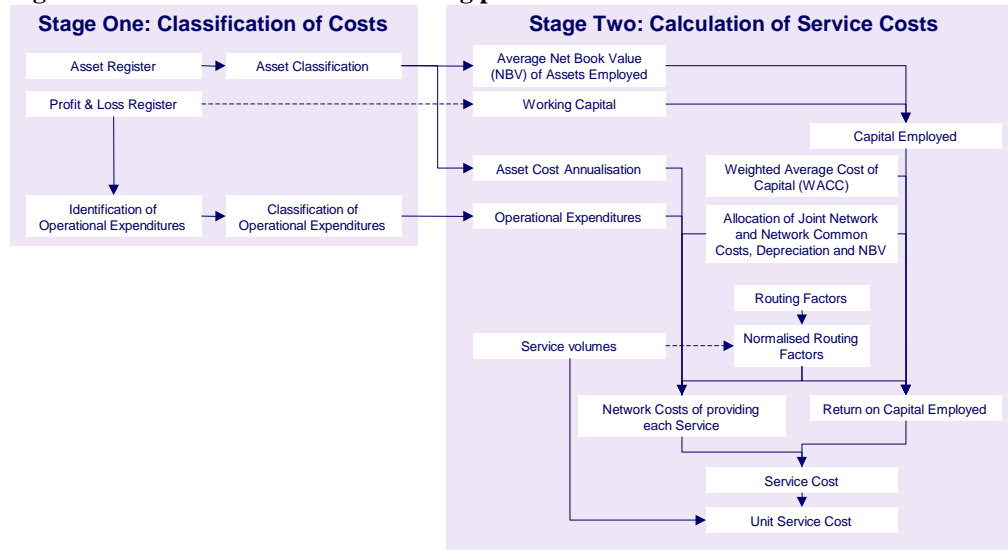
4 Building the Top-down Model

4.1 Overview of the Approach

An overview of the proposed costing methodology is illustrated in Figure 4.1. It consists of two stages:

- **Stage One: Classification of Costs.** This involves the identification and classification of annual costs from the concessionaire's accounting information. Costs are of two types: annual operational expenditure (opex) and capital expenditures (capex) which have to be annualised using some form of depreciation and cost of capital. A detailed classification of assets and opex into predefined categories is performed based on the cause of the cost items specified in the Asset Register and Profit & Loss Statement. The importance of this process is to isolate the "Network" costs from the "Retail" and "Common" costs. Network costs are then further allocated into the costs of individual network elements and "Network Common" costs.
- **Stage Two: Calculation of Service Costs.** This involves the aggregation of network element costs (along with their re-allocations of "Network common") into service costs through the use of routing factors (which measure the relative usage of network elements by different services). Three types of cost are included in this calculation: opex, annual depreciation and return on capital employed. Retail costs will be similarly allocated to services either directly (if the costs are caused by a particular service) or indirectly (if they are shared by multiple services). Finally the common costs of network and retail will be allocated across all the services, using equi-proportionate mark-ups.

Figure 4: Overview of the cost modelling process



The classification of costs will be based on the concessionaire's accounts, and where applicable any separated accounts that may be required in accordance with the *Proposed Pricing Regulation Framework for Telecommunications Services in Trinidad and Tobago* and the *Proposed Accounting Separation Guidelines for the Telecommunications Sector*, which will provide detailed charts of assets and operating expenditure using Historic Cost Accounting methods. The development of a top-down LRIC model requires the following additional steps:

- Revalue all of the assets using current cost accounting, i.e. to establish the modern equivalent assets to those already installed in the concessionaire's network, taking account of price changes and technology improvements.
- Compute annual depreciation
- Estimate and apply the cost of capital.
- Construct cost-volume relationships, to determine the incremental change in cost for each incremental change in service volumes.
- Determine service routing factors (i.e. the relative usage of network elements by different services).
- Determine mark-ups for common costs.

The Authority's proposals for addressing each of these issues are described in the sections that follow.

4.2 Asset Revaluation

There are three main methods for revaluing assets:

- Historic Cost,
- Indexation and
- Absolute or Full Asset Valuation.

The historic cost approach is used as a proxy for the current cost of an asset where there are no substantive changes to the value of the asset because of its low value, or the short life span of the asset or the period of usage of the asset (after being put in operation) is less than a year.

Indexation is the method by which assets are revalued by applying specific indices. This approach is appropriate for assets where there have been technological changes, price changes and additional capital costs if the assets are to be replaced. For cases where asset specific indices are not available, then a broader asset category index may be used as an alternative.

Absolute or full asset valuation is used where there have been *significant* technological changes and price changes within the asset groups and a modern equivalent asset (MEA) approach is employed as the basis for the revaluation of the assets. The MEA approach requires the identification of price trends for all assets within a concessionaire's network over the period from asset purchase to the current day. This requires a full inventory of asset purchase dates and asset prices so that an accurate picture can be obtained regarding price trends and those parts of the asset base to which they apply. This is likely to be a major undertaking that will take several months, and even then it is probable that some of the necessary information to complete the evaluation will not be available, and will need to be estimated.

A further complication with full asset revaluation arises when modern equivalent assets do not match directly onto the concessionaire's actual asset base. This issue is, for example, becoming more prominent in the migration to so-called Next Generation Networks based on IP technology rather than traditional circuit-switching.

Indexation is an alternative and more practical approach to modern equivalent asset revaluation. Indexation requires that annual price changes are estimated for broad categories of assets, taking account of both price and technology changes. Indices can be created on the basis of a variety of

information sources, e.g. extrapolation from historic price data; vendor price lists, assumptions against cost models deployed in other countries. While less accurate for historic price changes, this approach copes more easily with technology changes, permits cost models to be forward looking and takes account of potential efficiency improvements.

In some instances, the operational life span of assets may differ from their book life span. That is, the assets are fully depreciated. For the indexation approach, such assets are deemed to have no value and hence no cost and will not be used in a top-down LRAIC model³.

This treatment of fully depreciated assets is necessary so as to prevent concessionaires from “double counting”. If fully depreciated assets were treated as new assets, as done in a bottom-up model, then concessionaires would be able to charge depreciation and capital cost on assets for which the cost was previously recovered.

Statement on Revaluation of Assets:

The Authority proposes the adoption of the indexation approach for revaluing the assets of concessionaires. Assets that are fully depreciated will not be used in the top-down LRAIC model

4.3 Depreciation

Depreciation is divided into two broad categories, economic and accounting. Economic depreciation is defined as the period by period change in the market value⁴ of an asset. On the other hand, accounting depreciation does not involve the market value of an asset but rather the allocation of the historical cost of an asset over the period in which services are received from the asset⁵. The basic difference between the two approaches is that economic depreciation involves a process of valuation that is forward looking, while accounting depreciation deals with the allocation of historical cost.

In historic cost accounting the standard approach is straight line depreciation, in which an asset is depreciated in equal annual amounts throughout its lifetime. In forward-looking cost models it is

³ This is the approach used in the UK

⁴ The market value of an asset is equal to the present value of the income that the asset is expected to generate over its remaining life span.

⁵ Colditz, Gibbins and Noller 1988

more common to use an approximation to economic depreciation - that is, the most efficient form of depreciation which would be used in the case of a perfectly competitive market. For example, in a market where asset prices are falling, it is economically rational to take a greater share of depreciation in the earlier years, since otherwise a competitor would be able to enter the market and benefit from lower asset prices through lower capital costs.

There are two main approximations to economic depreciation, the tilted straight line and the tilted annuity. Tilted straight line depreciation allows for the forward-loading of straight line depreciation to precisely the extent justified by the average annual decline in asset prices. Tilted annuity depreciation likewise tilts the basic annuity calculation (in which the total capital charge, equal to depreciation plus return on capital, is held constant throughout an asset's lifetime).

The tilted annuity approach is commonplace in bottom-up cost models. This is because bottom-up models tend to work on the assumption that the network is redesigned each year to be efficient for the subscriber and traffic requirements of that year. Such models work exclusively from first year capital charges. The annuity approach is therefore attractive, whereas the straight-line approach will tend to exaggerate costs as it assumes that capital charges decline over time.

In a top-down model there is no such reason to prefer the tilted annuity approach. An illustrative example for each of these forms of depreciation is given in Appendix A.

Statement on Depreciation:

The Authority proposes the adoption of the tilted-straight line depreciation method in calculating the annual depreciation of the assets of concessionaires.

4.4 Cost of Capital

The annual return on capital employed is calculated by multiplying the mean capital employed by the weighted average cost of capital (WACC).

The Mean Capital Employed is the sum of:

- Average Net Book Value of the Assets
- Working Capital.

Working capital is defined as the sum of short-term assets minus short-term liabilities. If data is not directly available from the concessionaire's profit and loss statement, as a general rule, working capital can be approximated as the equivalent of 40 days of opex.

The estimated WACC should be the pre-tax nominal Cost of Capital. Typically the Capital Asset Pricing Model CAPM would be used to derive an estimate for the weighted average cost of capital across each concessionaire's business using the formula:

$$WACC_{pre\ tax} = \left(r_{Debt\ post\ tax} \frac{D}{D + E} + r_{Equity\ post\ tax} \frac{E}{D + E} \right) / (1 - T_c)$$

Where:

$$r_{Debt\ post\ tax} = (\text{Risk free rate} + \text{debt risk premium}) * (1 - T_c)$$

$$r_{Equity\ post\ tax} = \text{Risk free rate} + \text{Beta} * \text{market risk premium}$$

$$T_c = \text{Marginal tax rate}$$

$$D = \text{Market value of debt}$$

$$E = \text{Market value of equity}$$

For the **risk free rate** it is normal practice to use the long-term government bond yield (typically 10 years) as the basis for the risk free rate. Clearly, this yield reflects an element of country risk associated with investments in the country in general, but this risk is equally relevant for providers of debt and equity to companies in Trinidad & Tobago.

The **debt risk premium** reflects the difference between the government bond yield and corporate bond yields of the same maturity. This premium is normally about 2.0%, which is an international benchmark for telecommunications companies in developing markets.

The **market risk premium** reflects the difference between the return on Trinidad & Tobago equity and the yield on government bond yields for the same period. This difference can be determined based on ex-post and ex-ante calculations based on analysis of the stock market, or based on international benchmarks.

The **Beta** of a company is a measure of non-diversifiable risk that indicates the volatility of the stock compared with the market average. A Beta of 1.0 suggests that a stock has the same risk

profile as the market average. In general for telecommunications companies and in particular for mobile operators, Beta values tend to be greater than 1.0 indicating that these investments are more risky than average. Betas are published for many telecommunications operators, for example by Bloomberg.

The **debt to capital ratio** part of the WACC calculation $D/(D+E)$ is company-specific. Each concessionaire should be able to supply its own information based on its latest financial statements. Where the concessionaire does not supply the information within a reasonable time period, the information may be determined with reference to benchmarks as determined by the Authority. However, it is important to note that the calculation of the WACC should be based on market values and not on book values.

The **tax rate** should be the marginal rate of corporate tax.

Statement on Cost of Capital:

The cost of capital is a key input to all cost models and in order to ensure a consistent and fair approach to its calculation, the Authority proposes to use Weighted Average Cost of Capital, WACC, to determine annually, the allowed cost of capital for an efficient telecommunications service provider, for the period January to December of each year.

4.5 Cost-volume Relationships

The Long Run Average Incremental Cost, (LRAIC) approach (also known as Total Service Long Run Incremental Costs, TSLRIC) has been used by most national regulatory authorities around the world. LRAIC is a specific form of LRIC with two specific characteristics:

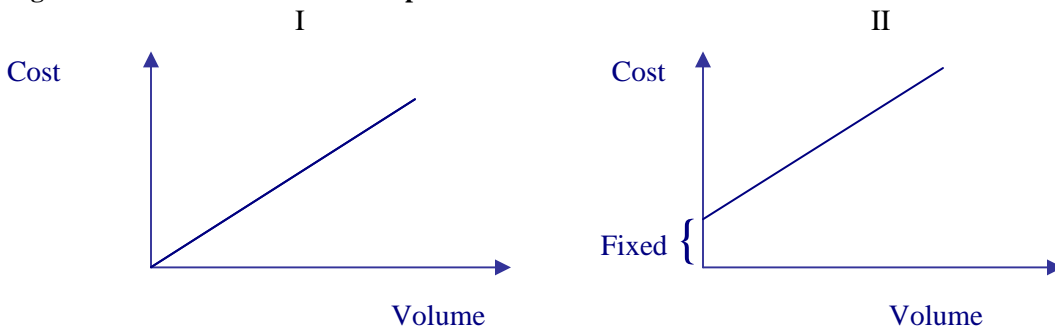
- LRAIC measures an average incremental cost over the entire range of output of the service. It takes no account of economies of scale, but averages costs across all service volume
- LRAIC includes service-specific fixed costs - costs that do not vary with the level of output, but would be saved if the firm discontinued production of the service.

In the LRAIC modelling approach, cost drivers can be used to identify cost volume relationships (CVRs). A cost driver is the factor or event that causes a cost to be incurred, while a CVR describes how costs change as the volume of the cost driver changes. Cost drivers can be either exogenous, such as traffic minutes, or number of lines, or endogenous, such as the net replacement cost of switches or total operating expenditure.

Two main characteristics of CVRs are the shape of the curve which depicts the relationship between variable costs and volumes and the extent of fixed common and joint costs exhibited in the relationship. CVRs are developed by using existing engineering models, consulting engineering experts, regression analysis and research of activity based costing processes. The method employed depends on the type of cost being analyzed.

Figure 5 below provides examples of CVR. Graph I depicts a straight-line through the origin which depicts a basic form of a CVR. This graph illustrates that there is linear relationship between the costs and volumes for the particular cost group being investigated. Graph II has a similar relationship but this time it has an associated fixed cost for the cost group examined.

Figure 5: Cost-Volume-Relationships



In practice, CVRs are more complicated than those presented above. The CVR for a typical LRAIC approach is depicted graphically in Figure 6 below.

Figure 6: Long Run Average Incremental Costs

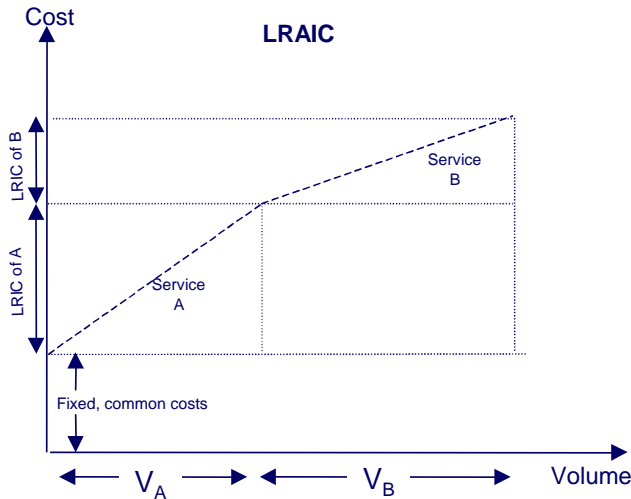


Figure 6 depicts the CVRs for an operator producing two services, where service A is the core service and service B is an additional service, with both services utilizing the same fixed costs. The CVR shows that the incremental cost of producing service B, LRIC of B, is lower than the incremental cost of service A, LRIC of A.

Statement on Cost-Volume Relationships::

The Authority proposes to use engineering models and activity based costing in the determination of CVRs.

4.6 Service Routing Factors

The aim of the cost model is to determine the unit costs of individual services. However the concessionaire’s accounts present costs in terms of network elements and multiple services make use of each network element. For example, in a Next Generation Network, the core IP-based network may be used by both fixed and mobile services; and a mobile switching center will be used by a variety of call services (e.g. on-net calls, fixed-mobile calls, mobile-to-mobile off-net calls).

In order to allocate the network costs of each network element to the various services that use it, it is necessary to know the extent to which each service uses each of the network elements. The input to the cost model should be a routing factor table of the form shown in Figure 7. This shows, for example, that, on average during the busy hour, one minute of traffic from service A passes over 1.2 units of NE2 and 0.9 units of NE3 but does not use NE1 or NE4.

Figure 7: Routing factor example

	<i>Network element 1</i>	<i>Network element 2</i>	<i>Network element 3</i>	<i>Network element 4</i>
Service A	0	1.2	0.9	0
Service B	1.5	0	0	0
Service C	0	1.2	0.9	1

The routing factors represent the usage that a unit of each service makes of each network element. These routing factors have to be weighted by the service volumes to calculate Weighted Routing Factors. The Weighted Routing Factors should then be normalized so that the usage of each Network Element adds to 100%.

Statement on Service Routing Factors:

Concessionaires shall be required to establish and justify routing factors for all network elements. The Authority may collect data on the routing profile for various networks and determine the most efficient routing factors for each type of network.

4.7 Common Cost Mark-up

The last step in the top-down cost model is to mark-up the unit service costs to include common costs. The Authority proposes that equi-proportionate mark-ups (EPMU) would be used: i.e. common costs are allocated in proportion to the LRAICs of the services that share these costs. EPMU is simple and effective, and is the standard treatment in most regulatory cost models around the world.

It could be argued that mark-ups should be set so as to recover common costs by setting higher prices for those services to which consumers are price insensitive, or less sensitive, balanced by lower prices for services where consumers are more price sensitive. This system of pricing is known as Ramsey pricing. The trouble with Ramsey pricing is that it requires data on the cross-elasticity of demand for the group of services over which a mark-up is being allocated. Such data is notoriously difficult to obtain, which makes the application of Ramsey pricing impractical, however theoretically attractive.

Statement on Common Cost Mark-up:

The Authority proposes to use equi-proportionate mark-ups (EPMU)

4.8 Externality Mark-up

The term "externality" refers to benefits (or costs) that are not taken into account by users when deciding whether to subscribe to, call or use a telecommunications service. The main externality is normally called a "network externality" or sometimes an "option externality". This refers to the benefits which existing subscribers gain when a new subscriber joins the network. Existing subscribers can then contact the new subscriber at times and in places where contact was previously impossible. This benefit is partly captured by the extra calls that are made as a result of subscription and partly through the (much more intangible) knowledge that it is possible to contact the new subscriber.

The Authority believes that there is a theoretical case for including a network externality in interconnection charges. However, there are two reasons why in practice very few regulators have adopted this approach:

- The externality is difficult to measure with any degree of confidence. In the UK Ofcom and the Competition Commission made strenuous efforts to assess the externality when determining mobile termination rates. Their analysis is extensive, but it is not exhaustive and there remain many grounds on which it can be criticised. The base research seems less than robust, relies on parameters⁶ which are unreliable and for which there is little empirical basis,

⁶ Such as the Rohlfs-Griffin factor, equal to the ratio of total benefits (private and public) to the private benefit created by a customer's decision to join a network

and there has been no attempt to consider how the externality may vary over time particularly as the mobile market reaches saturation and handset subsidies are reduced or removed.

- The scale of the externality. There is disagreement amongst economists and regulators as to whether the externality is of a significant scale. The UK Competition Commission estimated it as 0.45 pence per minute for mobile networks, but the Swedish regulator, PTS, concluded that the externality is so negligible that it may reasonably be ignored. It is clear that the scale of the externality reduces the nearer the mobile market is to saturation, but it is not clear at what point it becomes negligible.

Given that the externality is still being considered by the International Telecommunications Union ITU, the Authority considers that it would be premature to implement any externality mark-up at present.

Statement on Externality:

The Authority shall not include any externality markups when calculating the cost of access services at this time.

5 Defining an Appropriate Benchmark Methodology for Trinidad and Tobago

Benchmarks may serve as a proxy for cost-based prices, either as a short-term measure while a top-down cost model is being constructed or as a longer-term proportionate remedy where necessary. In either case the benchmark should be constructed in such a manner that it does provide a reasonable approximation of cost-based prices.

As indicated in Section 2.2, benchmarks can take a variety of forms, and the Authority may use different approaches as appropriate on a case by case basis. However, the principal form of benchmarking is a comparison of cost-based prices for the equivalent service in other countries.

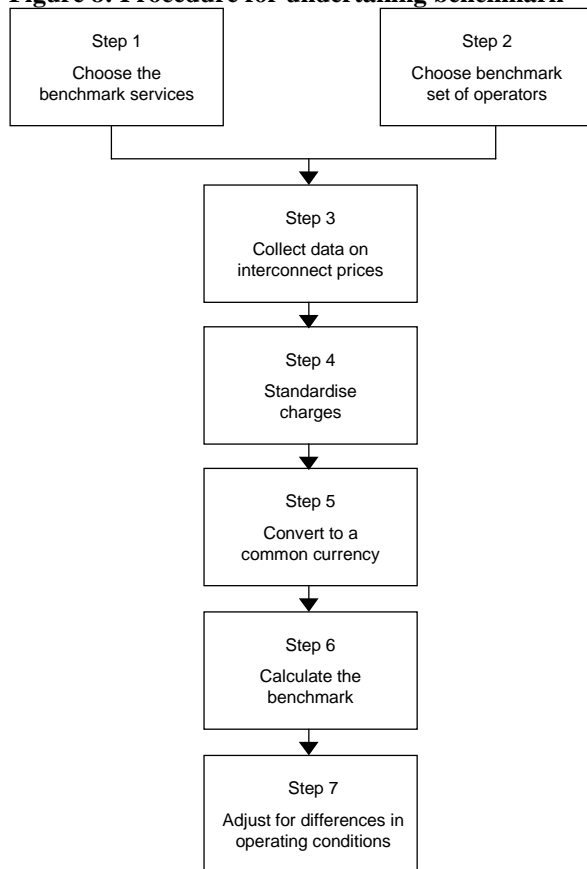
5.1 The Benchmark Process

Figure 8 below illustrates the stages involved in undertaking a benchmark for the purpose of approximating cost-base prices in Trinidad & Tobago.

There are seven steps in the process:

- Step 1: Choose the services for which a benchmark is required.
- Step 2: Choose the operators for the benchmark set against which prices are to be compared. The operators should be in markets that have embarked on liberalisation and have regulated rates, so that there can be some assurance that the benchmark rates are cost-based. Also the operating environments should be as similar as possible to Trinidad & Tobago in key economic and demographic indicators, such as GDP per capita, teledensity, population density and urbanisation, as these will be indicators of similar operational costs to those of a concessionaire in Trinidad & Tobago. To create a robust benchmark it is usually advisable to have at least 8 operators in the benchmark set. Refer to 5.2 below for more details.

Figure 8: Procedure for undertaking benchmark



- Step 3: Collect data on prices for each service and each operator.
- Step 4: Standardise the various charging formats of the operators. The benchmark operators are likely not only to have different price levels, but also different price structures. This means that prices have to be standardised to be presented in a common format. For example, standardisation must take account of call set-up charges, different billing increments, different distance bands and different peak and off-peak periods.
- Step 5: Convert all charges to a common currency. The Authority is of the view that, the United States dollar (US\$) should be the best choice of a common currency, and that conversion should be done on the basis of simple exchange rates. However, a case may be made for the use of Purchasing Power Parities (PPPs) to account for differences in the buying power of the US\$ in each of the benchmark countries. This could, for example, replace the adjustments for wage rate differences in Step 7.
- Step 6: Calculate the basic benchmark. Typically the benchmark will be set as the simple average of the rates from the benchmark operators, but other possibilities include the median

rate, or the average of a subset of the rates (e.g. excluding the highest and lowest rates, or the average of the lowest three rates). The choice of the benchmark will to some extent depend on the purpose for which the benchmark is being used, and should reflect the policy objectives relevant to that situation.

- Step 7: Enhance the benchmark to take account of differences in national operating conditions. This step may not be required if the operating environments of the benchmark operators in step 2 above are similar to the environment in Trinidad & Tobago. If there are significant differences, (e.g. in wage rates, teledensity, urbanisation or other parameters discussed in section 5.2) it may be appropriate to make adjustments to the benchmark outcomes on account of their being significant difference in efficient operational costs in the different environments.

5.2 Defining the Parameters for the Benchmark Sample

In developing an appropriate costing benchmark, the Authority proposes to utilize the following process to define the relevant set of parameters for identification of the countries to comprise the benchmark sample. Prior to outlining the preferred process for defining the relevant parameters for identification of the countries to comprise benchmark sample, the Authority recognizes the importance of understanding the economy of Trinidad and Tobago and the defining characteristics to be used which impact upon telecommunications services costs. This is extremely critical given that countries comprising the benchmark sample should have similar characteristics which should have a similar impact on telecommunications services costs.

5.2.1 Defining Characteristics of T&T⁷

Trinidad and Tobago is typically categorized as a Small Open Island economy (SOIE) which exhibits specific socio-economic characteristics inclusive of:

- a) Exogeneity of import and export prices;

⁷ This Section draws from the following documents: (1) Baksh, Sherman and Roland Craigwell. 1997. *The Monetary Transmission Mechanism in Small Open Economies: A Case Study of Barbados*. Savings and Development. 21(2): 179-192; Best, Lloyd and Sherman Baksh. 1999. *Salient Characteristics of the Trinidad and Tobago Macroeconomy*. Mimeo, unpublished; (3) Best, Lloyd, Michael Craigwell and Sherman Baksh. 1999. *The Operations of Pension Funds in Trinidad and Tobago*. Paper Presented at the Colonial Life Symposium on Social Security Reform: Mapping the Future.

- b) Price taker on the international markets (capital and staple);
- c) High import content in domestic absorption mix and strong bias in output mix;
- d) High export/Gross Domestic Product ratio (> 40%); and
- e) Heavy reliance on the production of a mono-staple⁸ that is subjected to the vicissitudes of international prices.

The reliance by Trinidad and Tobago on a mono-staple which constitutes the country's main export commodity and whose prices are exogenously determined on the international market and are therefore subjected to fluctuations, impact significantly upon the country's export earning and its Gross Domestic Product (GDP). Buoyancy in international commodity prices would therefore imply an increase in the mono-staple sector's contribution to GDP. The consequential increases in GDP and governmental revenue windfalls derived from buoyant mono-staple prices are manifested economy-wide in higher labour prices and commodity prices.

Higher labour and commodity prices have two effects simultaneously. Firstly, higher labour prices imply increased levels of effective demand by consumers for goods and services inclusive of telecommunications services. This increase in demand could inevitably engender higher retail prices for telecommunications services in a small open economy like Trinidad and Tobago. Alternatively, the higher retail rates may be a function of higher on-net costs arising from increases in the costs of provisioning services to meet increasing demand by end users. However, in a competitive environment, service providers may engage in a strategic game whereby they seek to minimize on-net charges to their own subscribers while negotiating higher termination rates onto their networks thus requiring subscribers of other service providers to pay higher off-net termination rates.

Secondly, higher commodity prices typically arise from the increase in import prices associated with a higher level of demand. This emanates from Trinidad and Tobago being a price taker on international markets and the exogeneity of import prices of which telecommunications investments in plant and equipment is a part thereof. However, where the country is a price taker

on the international capital market, the acquisition of capital goods and services for telecommunications networks build out, upgrade and maintenance are typically above international market prices (attributed to the absence of economies of scale in acquisitions). This implies the possibility of higher network costs inclusive of interconnection and access costs. The conditioning factors on network costs are the market size both in terms of telecommunications subscribership and population (the actual and potential market size respectively over which costs are to be recouped) and the dispersion of the population. These factors would determine the network design and topology.

Network costs are however not only a function of input prices but also of the network topology which is directly influenced by the country's topography and population distribution. Both factors determine the quantum, quality and capacity of plant and equipment to be deployed in various geographic areas across the country. It can be assumed that where a mobile network is to be deployed and given the ease with which subscribers can traverse the islands (given its small size), the costs of network utilization are constant regardless of the geographic area. In such a situation, the population density of Trinidad and Tobago can be used as a proxy to ascertain network costs. The rationale for this is premised upon the country's landmass influencing the network size, and the population distribution influencing the costs of deploying and maintaining the requisite plant and equipment at various geographic areas. However, given the mobility of the subscriber it can be argued that the homogenous network costs mentioned *supra* can be reflected in the country's population density.

Pertaining to a fixed network, it is recognized that the costs of network deployment would be different between urban and rural areas and areas that are served and those that are underserved and/or un-served. However, this limitation may be overcome via the utilization of a geographically averaged rate structure that allows for cost recovery. While this approach assumes homogeneity of costs across the island and is not without its drawbacks, it nonetheless can be used for determining an appropriate proxy for costs as it can be argued that the de-averaged costs across the island maybe evened out by network design and topology. This assumed homogeneity of network costs can be reflected in the country's population density.

The use of the country's population in the population density variable is directly correlated to the limitation that it imposes on the telecommunications market size. Thus, actual market size should

⁸ A mono-staple could be broadly defined to include Oil, Gas, Sugar, Banana, Tourism etc.

not be greater than the actual population unless there are anomalies. Such anomalies may arise in the mobile market where there may exist a high and sustainable number of roamers in the country over a long-run horizon, and the existence of multiple mobile phone ownership whereby subscribers possess end user equipment from multiple service providers and/or different numbers for different services(voice or data). Multiple mobile phone ownership is more reflective of certain market failures namely –failure to negotiate interconnection rates or interconnection rates not being costs based thus making it more economical to acquire two mobile phones rather than make an off-net call.

Undeniably however, the actual market size would be reflective of the level of growth within the telecommunications market as a result of competition therein. In fact, the existence of competition should induce both technical and operational efficiency, and induce lower prices inclusive of interconnection and access charges and higher levels of quality of service. There is one caveat however: In Trinidad and Tobago, the large mobile subscriber base may not be reflective of competitive forces but rather more reflective of affordability resulting from higher levels of disposable income emanating from rising GDP, the presence of pre-paid service offering which empowers subscribers to control their expenditure patterns and the existence of Calling Party Pays (CPP) which places cost recovery on the party originating the call. CPP effectively transfers revenues between networks (fixed to mobile) and revenue support between subscriber type (from post-paid to pre-paid).

From the aforementioned discourse, there are a number of key parameters that can be distilled which would impact significantly upon rates:

- i. GDP per capita;
- ii. Population Density; and
- iii. Number of Subscribers.

Each of the identified variables can effectively serve as a proxy for a given relationship that impact upon network and service provisioning costs:

- i. GDP per Capita for socio-economic characteristics and effective demand;

- ii. Population Density for economies of scale, market demand, network size, network topology and network costs; and
- iii. Number of subscribers as a degree of competition and level of competitiveness.

5.2.2 Other Relevant Factors

There are a number of other relevant factors, specific to telecommunications that would influence the choice of parameters for defining the set of countries to constitute the sample size:

- a) Telecommunications networks are by nature highly capital-intensive, subjected to increasing economies of scale, have large sunk costs and exhibit tremendous economies of scale and scope. Thus:
 - i. Due to rapid technological changes, telecommunications networks typically have shorter depreciation life times; and
 - ii. A telecommunications network with larger traffic volume would exhibit lower unit costs;
- b) In many countries that may comprise the sample size for the benchmark, the rates may reflect the endogeneity of the countries' specific characteristics and may not be purely based on actual costs of service provision unless those countries have implemented an appropriate costing model;
- c) The vision of the Trinidad and Tobago Government is to attain developed country status by 2020. Consequently, the sample data set may include some jurisdictions that like Trinidad and Tobago, have implemented policies geared towards achieving a developed country status; and
- d) Pertaining specifically to interconnection:

- i The cost of call termination on any given telecommunications network should be the same regardless of originating network (i.e. whether that said call originated on a fixed or a mobile network);
- ii The identified jurisdiction to be included in the sample size should exclude those that utilize a Received Party Pays (RPP) regime given that CPP is the option of choice in Trinidad and Tobago.

From the preceding discourse on other relevant factors, the following key variables can be distilled which would impact significantly upon benchmarking telecommunications cost:

- i. The existence of a liberalize market and the date of liberalization thereof and the level of market development and competition therein as reflected by number of providers and subscribers and/or traffic volumes;
- ii. Efficiency of market entry by new entrants;
- iii. The type of technology utilized to provision service;
- iv. The need for an adjustment factor to compensate for the endogeneity of prices and costs that may render certain benchmarks rates not being based on costs;
- v. The presence of a legacy network with depreciated assets;
- vi. The country's desire to obtain developed status; and
- vii. The presence of CPP in the domestic telecommunications market;

5.2.3 Parameters for determining a Costing Benchmark

Ex post consideration of the discourse *supra*, the key parameters, *inter alia*, for determining a costing benchmark in Trinidad and Tobago are summarized in Figure 9 below:

Figure 9: Parameters for Costing Benchmark and Relevant Costs Drivers

COSTING BENCHMARK PARAMETERS	DESCRIPTION OF ASSOCIATED COSTS DRIVERS
Per Capital GDP	Socio-economic costs viz labour, security, affordability etc
Population Density	Population Size, Country's topography and Network topology
Network Topology	Network costs of service offerings
Type of Mobile Network Technology	Costs of acquisition and deploying relevant systems -GSM, CDMA, UMTS, EVDO
Number of Mobile Service Providers	Degree of Competitiveness as manifested in costs of marketing etc to gain market share
Number of Mobile Subscribers	Network costs per subscriber etc and costs of substitutability
Type of Economy	Costs of Network equipment, labour, maintenance and repairs, other office equipment, security and safety etc
Presence of CPP	Costs to end users
The <i>ex ante</i> competition introduction timeframe of mobile legacy networks	Depreciation costs
The <i>ex post</i> competition introduction timeframe of entrants' profitably	Costs recovery and long term profitability
Adjustment Factor for price/costs endogeneity	Efficiency costs and reflective of country's specific costs of production

Appendix A: Approximations to economic depreciation

Economic depreciation is the annual change in the value of an asset in a fully competitive market. The economic life of the asset is determined by the time at which the net cash flow becomes negative, while the value of the asset is determined from the net present value of future cash flows, based on changes in prices and operating costs. For illustration, consider an asset which has an investment cost of 100, whose purchase price is falling at 5% per annum, and for which operating expenditure is 15% of the investment cost. Figure A1 shows the depreciation schedule for such an asset, assuming an 18% weighted average cost of capital.

Figure A1: Profile of economic depreciation

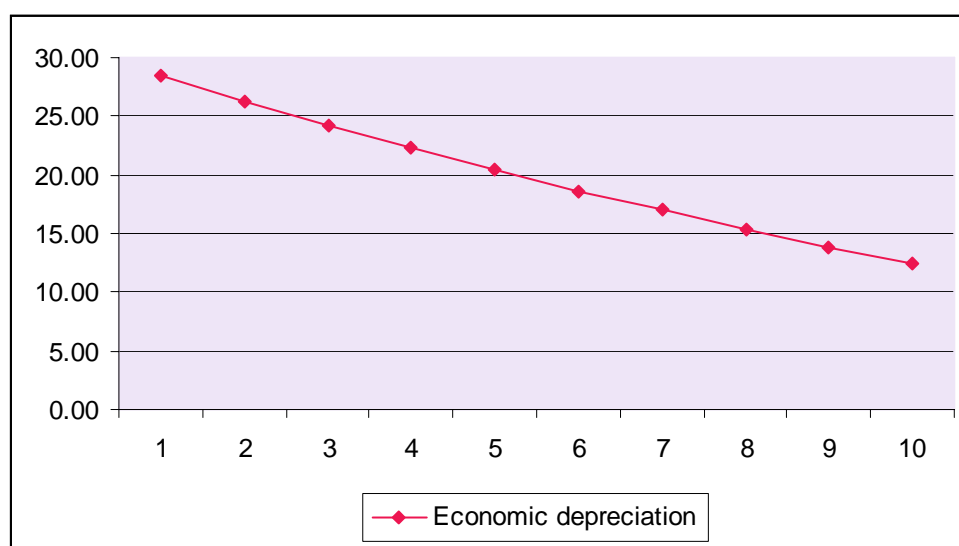


Figure A2 illustrates the annual capital charges using the various accounting depreciation methods that are commonly used to approximate to economic depreciation. These are:

- **Annuity** - in which the annual capital charge (i.e. depreciation plus cost of capital) remains constant throughout the asset lifetime
- **Tilted annuity** - in which the basic annuity is adjusted to take account of annual changes in asset values (and thus in the available revenues in a perfectly competitive market)

- **Straight line depreciation** - in which annual depreciation remains constant throughout the asset lifetime
- **Tilted straight line depreciation** - in which the basic annuity is adjusted to take account of annual changes in asset values (and thus in the available revenues in a perfectly competitive market)

Figure A2: Profile of different accounting depreciation methods

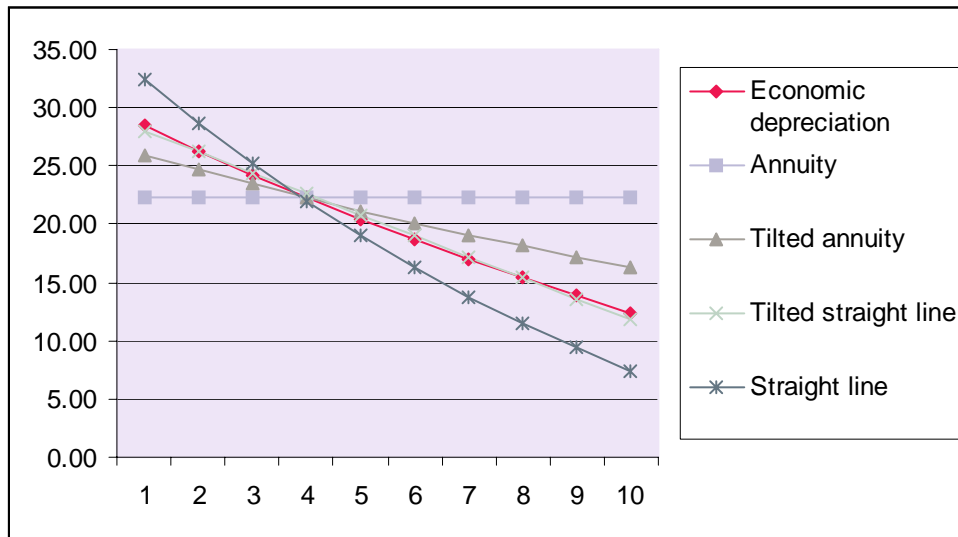


Figure A3 compares the annual capital charge using these various methods of accounting depreciation with the profile derived from economic depreciation.

Figure A3: Annual capital charge using depreciation methods

	Year									
	1	2	3	4	5	6	7	8	9	10
Economic depreciation	28.48	26.30	24.24	22.28	20.41	18.64	16.96	15.36	13.84	12.40
Annuity	22.25	22.25	22.25	22.25	22.25	22.25	22.25	22.25	22.25	22.25
Tilted annuity	25.97	24.67	23.44	22.27	21.15	20.10	19.09	18.14	17.23	16.37
Tilted straight line	28.00	26.20	24.40	22.60	20.80	19.00	17.20	15.40	13.60	11.80
Straight line	32.50	28.69	25.18	21.95	18.98	16.25	13.75	11.45	9.35	7.44

Assumptions:	
Investment	100
WACC	18%
MEA price trend	-5%
Asset life (years)	10
Opex as % of investment	15%
% annual change in opex	0%

Appendix B: Glossary of Terms

Current Cost Accounting (CCA): Financial accounts prepared on the basis of the current value of a company's asset.

Economies of scale: Economies of scale exists if the average cost per unit declines as volume of output increases.

Economies of scope: Economies of scope occurs due to the presence of common and shared fixed costs or of joint costs in producing different products or in providing a range of services.

Fully Allocated Costs: The costs that would arise for each service provided by an operator if an appropriate share of all of the operator's costs were allocated to each service.

Historic Cost Accounting (HCA): Financial accounts prepared on the basis of the cost of a company's assets when they were purchased, adjusted for depreciation.

Increment: The output over which costs are being measured.

Incremental costs: The additional costs that would result from a defined increment to demand.

Long Run: The period over which the factors of production, including capital, are variable.

Long Run Incremental Costs (LRIC): The incremental costs that would arise in the long run with a defined increment to demand.

Long Run Average Incremental Costs (LRAIC): The term used by the European Commission to describe LRIC with the increment defined as total service.

Modern Equivalent Asset (MEA) value: The cost of replacing existing assets with modern assets that would perform the same function.

Scorched earth assumption: A modeling assumption that optimally-sized switches are employed at locations optimal to the overall transmission design, as if the network was being optimally redesigned on a ‘greenfield’ site.

Scorched node assumption: A modeling assumption that adds up to date technologies are employed to perform existing functions at each existing node. So that, for instance, a small analogue switch would be replaced by a small digital switch and not by the remote concentrator which might, in due course and in practice, be its replacement. Optimal transmission technologies are used to connect up these models.

Stand Alone Cost: The cost incurred in providing a service in isolation.

Total Service Long Run Incremental Cost (TSLRIC): Synonymous with Long Run Average Incremental Cost.

ANNEX I: Decisions on Recommendations

The following summarizes the comments and recommendations received from stakeholders on the first draft of this document (dated December 6th 2006), and the decisions made by TATT as incorporated in this revised document (dated July 23rd 2007).

Sub-Section as Per First Draft of Document	Submission Made By: Stakeholder Category ⁹	Comments Received	Recommendations Made	TATT's Decisions
Section 1				
1. Introduction	Telecommunications Services of Trinidad and Tobago (TSTT)	<p>The Background section raises questions that the rest of document does not answer, in particular, about which operators and services the costing requirements discussed under this consultation are meant to apply to.</p> <p>First, we note that the second paragraph of Background section states that "...so long as there remains one dominant operator the Authority must ensure that competition is not impeded or adversely affected by anti-competitive behavior". Thus, the document begins with the invalid suggestion that the cost-based rates should be mandated for only one operator.</p> <p>Given the legislative framework within which concessions are granted, we assume therefore that all concession agreements highlight the requirement for cost-based rates to be applied to all concessionaires. Section 14 of the TSTT concession, for</p>	TSTT recommends that the background section be revised to state explicitly which service providers the costing methodology is applicable to.	The Authority agrees with TSTT's recommendation. Further clarification is provided in the revised document.

⁹ Regional regulatory or Governmental agencies, Existing service and/ or network provider and affiliates, Potential service and/ or network providers and affiliates, Service/ Network Provider Associations/ Clubs/ Groups, General Public

Sub-Section as Per First Draft of Document	Submission Made By: Stakeholder Category ⁹	Comments Received	Recommendations Made	TATT's Decisions
		<p>example, states that, "All interconnection charges shall be based on costs determined in accordance with such costing methodologies as the Authority shall from time to time specify, which may include termination rates or any other metric of cost agreed between concessionaires;"</p> <p>It is particularly surprising that the consultative document should start with this presumption given that the central problem of pricing access services in Trinidad to date has been the costing of mobile termination service, which is provided by each mobile operator. The arbitration panel established by TATT to adjudicate the first dispute between Digicel and TSTT explicitly tied the costing requirement to a market rather than one particular operator, on pages 21 to 22 of decision, Digicel vs. TSTT Arbitration Decision No. 2/2006, dated August 16, 2006,</p> <p>"Considering mobile termination is a monopoly market, the panel interprets the approach to cost based charging in The Act and Concessions as originating from the expectation that there is likely to be a lack of competitive effects on interconnection charges that it is necessary to mandate by law and regulation that they be cost based, set pursuant to methodologies prescribed by the regulator..."</p> <p>In virtually every jurisdiction where the calling party pays,</p>		<p>TSTT's comments are noted</p> <p>The Authority agrees with TSTT's comment.</p> <p>The Authority agrees with</p>

Sub-Section as Per First Draft of Document	Submission Made By: Stakeholder Category ⁹	Comments Received	Recommendations Made	TATT's Decisions
		<p>Regulators have ruled that each mobile operator is dominant as it relates to calls terminated on its network.</p> <p>To be sure, later in the document, we read that other concessionaires will be subject to costing requirements, but it is never stated which ones, nor the basis on which the application is determined. Instead, the consultative document is replete with explicit or implicit references to the “incumbent” as the relevant regulated entity.</p> <p>In a related point, we note the document’s “Background” section states that “the dominant service provider must be provided with the opportunity to compete without unnecessary rules and regulations”. The fact that the text of the consultative document so often uses the word incumbent rather than the dominant service provider emphasizes the need for a broader statement: The dominant service provider must be provided with a fair opportunity to compete without rules and regulations that are unnecessary or make it impossible to compete on a level playing field. In respect to the application of these costing rules, this means that the methodology chosen should not show preference to new entrants.</p> <p>Second, the Background section states “[i]n order to regulate prices for telecommunications services that are based on cost, the Authority is required to develop a Costing Methodology.”</p>	<p>TSTT needs clarification on which concessionaires the costing methodology applies to.</p> <p>TSTT suggests the following edit to the statement made in paragraph 3 of the Background section: The dominant service provider must be provided with a fair opportunity to compete without rules and regulations that are unnecessary or make it impossible to compete on a level playing field.</p> <p>TSTT seeks clarification on the type of services the Authority proposes to apply this costing</p>	<p>TSTT’s comment.</p> <p>All operators, where applicable, will be required to implement the costing methodology recommended. Further clarification has been provided in accordance with the relevant provisions in the Telecommunications Act 2001.</p> <p>The Authority has modified this section accordingly.</p> <p>The Authority has modified the Costing Methodology to explicitly state which services</p>

Sub-Section as Per First Draft of Document	Submission Made By: Stakeholder Category⁹	Comments Received	Recommendations Made	TATT's Decisions
		<p>Although the document ultimately settles into a discussion of interconnection exclusively, this statement raises the question of what services is the Authority proposing to apply this methodology to, leaves the scope of the application of the methodology unhelpfully broad and may mean that the list of issues set out in the document is incomplete.</p> <p>Relationship to existing regime</p> <p>The other major problem with the Background section is the absence of reference to the existing interconnection regime in Trinidad and Tobago. Many of the rates for access have already been the subject of negotiations and, now, dispute.</p> <p>We understand that the costing principles and methodology discussed in the consultation must be determined whether or not there are already rates in the market. However, the Authority, through its panel, has already reviewed a great deal of information and even made some determinations with respect to mobile rates and the principles of costing methodology.</p> <p>We do not believe that anything in this consultation necessarily conflicts with the panel's determinations. However, the panel's determinations have progressed many of the issues raised here and cannot be set aside by this</p>	<p>methodology to, as the scope of the application of the methodology is unhelpfully broad and means that the list of issues set out in the document is incomplete.</p> <p>TSTT recommends the inclusion of reference to the existing interconnection regime.</p>	<p>the methodology applies to. This costing methodology applies to all providers of access services.</p> <p>The Authority agrees with TSTT's recommendation. The appropriate amendment was made to the relevant section.</p> <p>The Authority notes that the work already done by the arbitration panel is very relevant to the costing methodology</p>

Sub-Section as Per First Draft of Document	Submission Made By: Stakeholder Category ⁹	Comments Received	Recommendations Made	TATT's Decisions
		consultation. In our comments below we note each instance in which the panel's determination relates to the issues raised in the consultation.		presented in this document. As a matter of fact the arbitration panel in its recommendation to the Authority suggests that " the Authority consider developing a sector specific cost model for the purposes of considering whether proposed charges comply with the regulatory framework, or for setting charges if so required".
Section 2				
Issues and Choices in Developing a Costing Methodology	Telecommunications Services of Trinidad and Tobago (TSTT)	<p>Although much of the discussion of the policy issues and choices relating to the methodology reflect a balanced and thoughtful weighing of approaches to costing, we find the treatment of the legal and policy basis for costing methodology provided in the document inadequate.</p> <p>The document rightly cites section 25(2)(m) of the Telecommunications Act which states the Authority must require Concessionaires to:</p> <p>...disaggregate the network and on a cost basis, in such manner as the Authority may prescribe, establish prices for its individual elements and offer the elements at the established prices to other concessionaires of public telecommunications networks and public telecommunications services.</p>	TSTT recommends that the Authority revise the document to include an adequate treatment of the legal and policy basis for costing methodology.	The Authority agrees with TSTT's recommendation. The appropriate amendment was made to the relevant section.

Sub-Section as Per First Draft of Document	Submission Made By: Stakeholder Category ⁹	Comments Received	Recommendations Made	TATT's Decisions
		<p>However, there are also a set of Interconnection Guidelines issued by the Authority which are also critical. Section 14 of the Guidelines states that</p> <p>(1) All interconnection charges shall be based on costs determined in accordance with such costing methodologies as the Authority shall from time to time specify, which may include termination rates or any other metric of costs agreed between concessionaires;</p> <p>(2) Where the relevant data for the application of the costing methodologies are unavailable within a reasonable time period, interconnection charges may be set with reference to benchmarks based on costs as determined by the Authority.</p> <p>These provisions are replicated in Schedule H of the Concessions of both TSTT and Digicel as well as in the Telecommunications (Interconnection) Regulations 2006.</p> <p>Finally, TATT's own previous policy statements should be taken into consideration. For example, in its recommended Interconnection and Access Policy, also on the Authority's website, includes a section on Pricing Interconnection, in which it emphasizes setting charges to reflect efficient costs and repeatedly refers to efficiency as a central policy aim of</p>		

Sub-Section as Per First Draft of Document	Submission Made By: Stakeholder Category⁹	Comments Received	Recommendations Made	TATT's Decisions
		<p>the Interconnection and Access Policy.</p> <p>Thus, the policy and statutory framework goes beyond simply stating the requirement of cost-based interconnection. It indicates what the objectives and cost standard of the interconnection ought to be. As TATT's panel put it, "regulation needed to facilitate competition in the telecommunications industry needs to be consistent with the principles of economic efficiency that inform modern telecommunications regulatory regimes. Competition policies based on economic efficiency ensure that the interests of the public are paramount by forcing operators to "flow through" the benefits of their relative efficiencies to users in the way of lower prices."</p>		
2.1.1 Maximizing Economic Welfare	Telecommunications Services of Trinidad and Tobago (TSTT)	<p>We agree with the key principle of maximizing economic welfare and the role that the cost standard plays in maximizing economic welfare, as discussed. Further, we concur that the cost standard that plays that optimal role is the one to which charges would tend in the fully competitive market.</p> <p>However, we think the document leaves an important gap between this general cost standard and the discussion of specific methodology to be applied to those services subject to the costing requirement. The idea that "[i]n a fully competitive market charges will tend to reflect costs as a matter of course"</p>		The Authority notes the valued points raised by TSTT and has provided more details in the relevant sections of the document.

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		<p>should be clarified with the notion that charges will tend to reflect their long-term, efficient cost. It is that long-term, efficient cost that we should pursue in the costing methodology.</p> <p>We believe that it is this concept of economic efficiency, as the central aspect of maximizing economic welfare that the consultative document touches on in section 2.1.1. In the recent arbitration decision, the panel succinctly put it this way:</p> <p>“In the panel’s opinion, the common theme underlying both the emphasis in the Act and Concessions on encouraging competition and the requirement of cost-based interconnection charging is to be found in the economic principle of efficiency. On the one hand, competition can be expected to promote economic efficiency as competitive forces lead operators towards more efficient choices of technology, deployment of infrastructure and operation. In a competitive environment, prices come under downward pressure, converging in the direction of costs as competitors pass relative efficiency gains through to customers for whom they are competing. And on the other hand, where competition cannot be relied upon to deliver such efficiency gains, such as in the interconnection market, the Act and Concessions cut directly to the point and provide for interconnection charges to be cost-based.</p>		<p>The Authority notes that TSTT chooses to quote selectively</p>

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		<p>Arbitration Panel Decision (TATT: 4/7/06/1) pg. 14 “Cost-based charging for interconnection in the statutory and regulatory framework, then, is meaningfully construed in terms of promoting economic efficiency...”</p> <p>This objective of economic efficiency has significant implications for the proposed approach for costing. Most importantly, as in any competitive market, for any particular service there is one price, in other words reciprocal or symmetric rates for providers of the same service. The Authority’s Panel recognized the importance of reciprocal rates and clearly stated that properly construed, the Act and the Concessions “would permit and even promote reciprocal charging in interconnection agreements”.</p> <p>To achieve that one price for the market the objective of the costing methodology for interconnection services cannot be simply to capture any given service provider’s own cost. The methodology must be designed to produce costs of a typical, efficient service provider in the industry.</p> <p>Another important point is that, although we welcome the statements made in 2.1.1 and 2.1.3 in respect of the need to encourage investment where economically justified, the Authority should be mindful that mandated access is by its nature a discouragement to facilities provision. Allowing a</p>		<p>from the panel decisions, by omitting the full discussion of the panel. The panel’s statement read “...promote reciprocal charging in interconnection agreements except in the following three circumstances: First, an operator should not be permitted to mandate reciprocal charging if the charges are not based on the costs of an efficient operator in a steady state of the market in the first place. If they are too high, they may perpetuate inefficiency; if they are too low, they may have anti-competitive effects, as claimed by Digicel in the case before the panel.</p> <p>Secondly, even if the charges contemplated by an interconnection agreement are based on efficient costs, it would not be appropriate for an interconnection agreement to</p>

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		<p>facilities provider an adequate return on its investment is a necessary condition for not discouraging investment, but it is not a sufficient condition. The Authority must be very careful what facilities it requires to be provided under this costing requirement in the first place. We discuss the process by which the Authority intervenes in access markets in our comments in the regulated pricing framework consultation.</p> <p>Finally, the comments at the end of section 2.1 are also welcome. Given the current divergence between costs and prices in the retail markets, the telecommunications market in Trinidad & Tobago are particularly susceptible to cream-skimming and distorted investment. The degree to which interconnection and access pricing will have to address this problem will depend a great deal on whether the distortion in regulated retail rates is corrected. Of course, the Authority may not take full remedial action on that distortion. If this is the case, we note that one of the ways regulators have tried to address the adverse financial implications of retail price distortion is through access deficit charges (or, in the case of the United States, above-cost fixed line origination and termination charges), where a part of the cost of providing the fixed access line is effectively attributed to the interconnection service.</p> <p>However, the Authority has, on a number of occasions, stated</p>		<p>require them to be applied reciprocally if the other operator is not providing the same service under similar conditions such that even in a state of static efficiency it cannot reasonably be expected to match the efficient costs of the first. This might be due, for example, to the operators effectively providing different services, or having different frequency spectrum or licence rights.</p> <p>Thirdly, an interconnection agreement should not mandate reciprocal charging if it would frustrate the objects of the Act as they relate to the development of fair competition and encouragement of investment. In the case before the panel, Digicel's arguments concern its situation as a new entrant facing a market</p>

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		<p>that it does not believe access deficit charges are an appropriate policy tool. Here, the Authority states that “Setting cost-based prices for interconnection and access is an important means of achieving this balance.” We are at loss as to what the Authority may have in mind and ask that it clarify how exactly cost-based pricing will assist in discouraging cream-skimming of the most lucrative parts of the market.</p>	<p>TSTT asks that the Authority clarifies how exactly will cost-based pricing assist in discouraging cream-skimming of the most lucrative parts of the market.</p>	<p>approaching maturity which has been highly penetrated by TSTT.”</p> <p>This section has been revised.</p>
	<p>Digicel Trinidad Limited</p>	<p>Digicel disagrees with the Authority’s general remark that where interconnection and access are set to reflect the costs of provisions this will “<i>encourage investment in new facilities where this is economically justified</i>”. While this may be true it is also important for the Authority to be cognizant of the fact that operators are often required through roll-out obligations to invest in new facilities that are not economically justified but where failure to make such investments would constitute a breach of concession. Therefore, in “setting” cost based rates the Authority must recognize the higher costs associated with investment decisions being enforced upon operators. Furthermore, this market reality in Trinidad and Tobago needs</p>		<p>The Authority notes Digicel’s comment.</p>

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		<p>to be considered against the further over simplified remark by the Authority that <i>“when charges are based on costs they do not distort the build/buy decision of new entrants”</i> because the build/buy decisions of new entrants are not necessary entirely in the control of new entrants.</p> <p>The Authority notes <i>“in a fully competitive market charges will tend to reflect costs as a matter of course. If one operator fails to offer cost-based prices another will exploit the opportunity to offer lower prices whilst retaining profit”</i>.</p> <p>Digicel again note that this represents significant over simplification by the Authority as to how telecommunications markets works. The general remark may hold true in a static theoretical world with homogenous products but in a dynamic market such as telecom’s where technologies are constantly changing or converging leading to a diverse array of evolving product portfolios and where operators compete on much more pricing, it would be irrational for the Authority to use such a simplified tenet as the premise on which to regulate the market.</p>		<p>The Authority disagrees with the argument put forward by Digicel that cost-based prices would only be achievable in a static theoretical world with homogeneous products. This contravenes basic economic principles for a competitive market.</p> <p>The Authority agrees with Digicel’s argument that in a dynamic environment, especially in the telecommunications industry, new products and evolution in technology forces the operators to effectively compete in order efficiently deliver more goods and services.</p>

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2.1.2 Meeting the requirements of the WTO Agreement	Digicel Trinidad Limited	<p>Digicel is pleased to note that the Authority has acknowledged Trinidad and Tobago's commitments to the WTO. However, it should be noted that on all five principles outlined by the Authority, Trinidad and Tobago has indisputably fallen severely short of its commitments in every instance to date. This has to a significant extent been the case due to TSTT's (the Major Supplier in Trinidad and Tobago) agenda to frustrate and damage competition for its own financial gain and the financial gain of its significant shareholder; Cable and Wireless plc. The Authority notes the following WTO regulatory principles:</p> <ul style="list-style-type: none"> • A range of anti-competitive safeguards need to be established, covering non-discrimination and the prohibition of cross-subsidies. These safeguards need only apply to "major supplier". <p>TSTT has engaged in a plethora of anti-competitive activity against Digicel since the liberalization process has begun yet no action has been taken by the Authority despite a mountain of evidence before it in this regard. Furthermore, TSTT are attempting to actively engage in anti-competitive cross subsidization of services as submitted by TSTT themselves in a dispute currently before the Authority. While the Act and the concession clearly prohibit cross-subsidization TSTT are arguing that they are heavily cross-subsidizing interconnect</p>		The Authority notes Digicel's comments. However, the Costing Methodology has been developed in accordance with the relevant provisions in the Telecommunications Act 2001

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		<p>services (which is extremely damaging to Digicel) and furthermore attempting to force Digicel to cross-subsidize services provided by Digicel. While the validity of Digicel's and TSTT arguments on this matter will be resolved through arbitration process in the event that arbitrator rules in TSTT's favor on such matters then the Authority will have failed to have made any provisions to prevent ant-competitive cross-subsidization of interconnect services contrary to Trinidad and Tobago's commitments, yet have argued as to its right to do so.</p> <ul style="list-style-type: none"> • Major suppliers must offer interconnect services at transparent, cost oriented rates. <p>TSTT has provided zero transparency in this regard and so there is no evidence to support their claims that rates they have offered are cost oriented. This reality is heavily supported by the fact that the Authority is only now consulting on the matter of separated accounting.</p> <ul style="list-style-type: none"> • Major suppliers must offer unbundled interconnect at any technically feasible point. <p>TSTT blatantly refuse to comply with this WTO principle as well as their ability to 'get away with it' reflects poorly on the Authority's and indeed Trinidad and Tobago's commitment to enforce the principles they outline in this consultation process.</p>		

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		Digicel hopes that issuance of this consultation represents a turning point for the Authority in this regard.		
2.1.3 Attracting Investments	Digicel Trinidad Limited	Digicel wholeheartedly agrees with the Authority's statements regarding the need to attract investment in telecommunications. Unfortunately, Digicel's experience of liberalization to date in Trinidad and Tobago would not be an endorsement for attracting such investment largely due to the unchecked and contemptible behavior of the incumbent operator, TSTT which is majority owned by the government of Trinidad and Tobago. Unless the government begin to exercise its control over TSTT and reign in its renegade behavior and unless the Authority begins to avail of the powers it has under the Act to impose sanctions on TSTT the prospect of attracting significant investment to Trinidad and Tobago in telecommunications, which would be required if the government's 2020 vision is to be realized, looks very grim indeed.		The Authority assures Digicel and all other providers, and potential market entrants that it will address all market behavior that prevents or seeks to prevent competition in the telecommunications markets in Trinidad and Tobago.
2.2 Choosing An Appropriate Costing Standard	Telecommunications Services of Trinidad and Tobago (TSTT)	As we have stated in the introduction, we do not have an issue with many of the general statements made with respect to the costing principles outlined in the document. We naturally reserve the right to comment on how these principles should be implemented in a subsequent round of consultation on costing methodology (for example, asset revaluation and depreciation treatment to achieve current costing). Here we raise those issues that we believe deserve more immediate comment.	TSTT suggest that the Authority provide more detailed discussion of the methodological issues involved in each of the topics discussed in this section in a subsequent consultation.	The Authority agrees with TSTT's recommendation. Revisions were made to this section in the revised document. TSTT should note that this document is intended to outline the general principles that will be adopted in the establishment

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		<p>With respect to Fully Allocated Costing vs. LRIC set out in section 2.2.2, we believe that the Authority's treatment of FAC vs. LRIC oversimplify matters. For example, depending on how costs are allocated and what efficiency adjustments are made to FAC models, their results may be quite similar to LRIC results that are marked-up for joint and common costs. However, we have no disagreement with the implementation of a properly structured LRIC model. We also concur with the Authority that the LRAIC is a practical approach to incremental costing.</p> <p>The discussion of actual vs. hypothetical costs in 2.2.3 is burdened by its focus on one operator, the incumbent. As discussed before, the costs of interconnection services in which any firm is dominant will have to be measured. More significantly the most important consideration in measuring actual vs. hypothetical costs is that the Authority seeks to find the efficient cost of providing the service irrespective of what company is providing it. This consideration should run throughout the entire methodology.</p> <p>With respect to the scorched node assumption, we would agree that this is the most practical approach to fixed and mobile operations, because the location of switches and base stations are known and not likely to generate significant cost</p>		<p>of a cost model. The Authority will have subsequent consultation while developing the cost model which would involve the implementation of these principles.</p>

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		<p>differences between operators.</p> <p>With respect to mark-up and cost of capital, TSTT does not disagree with what is set out in sections 2.2.4 and 2.2.5. However, again, there will, of course, need to be more detailed discussion of the methodological issues involved in each of these topics in a subsequent consultation.</p>		
2.2.1 Historic or Current Cost?	Windward Telecom	<p>Windward Telecom believes that Historic Cost Accounting (HCA) should be utilized for the following reasons:</p> <ol style="list-style-type: none"> 1. Subscribers and alternative carriers would be subject to an arbitrary upward revision in costs should TSTT decide to value its facilities at replacement cost; 2. Subscribers have already paid for a substantial portion of the costs in their existing tariffs; 3. TSTT lacks the cost accounting and detailed depreciation mechanisms to properly reassess each network element and determine a replacement life value; 4. There is no evidence that TSTT would be subject to stranded costs, particularly given the divestment of customer premise wiring to subscribers and its recovery in the form of installation tariffs; 	Windward Telecom recommends the use of Historic Cost Accounting as the most appropriate standard for costing access services.	<p>The Authority disagrees with Windward Telecom's recommendation. International best practices suggest the use of the Current Cost Accounting approach to value telecommunications assets, especially within jurisdictions where accounting separation is required.</p> <p>Historical Cost Accounting is not the most suited to an industry like telecommunications where the prices decline steadily given advances in technology and other new developments.</p>

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		<p>5. Telecommunications capital costs are constantly deflating on a unit basis (as measured by switch costs per NAS, cost per fibre kilometer, router costs per gigabit, etc.) and the incumbent carrier has access to all of these technologies on a basis consistent with emerging carriers;</p> <p>6. TSTT enjoys a significant capital cost advantage from a civil cost perspective in the form of its depreciated physical premises and outside plant where competitors would be subject to 2007 replacement costs (at higher unit cost);</p> <p>7. TSTT is not regulated on an overall Return on Asset basis so they are not competitively disadvantaged by virtue of an inflated rate base. TSTT is able to price its services in the context of the market;</p> <p>8. Any Universal Service Subsidy mechanism (i.e. the subsidy requirement) would be inflated by any derivation from historic cost accounting;</p>		<p>Historic Cost Accounting will not encourage efficiency, as operators who are inefficient can afford to continue as they are guaranteed a return on investment (whether economical or not).</p> <p>The Authority recognizes that operators are not currently using CCA but would be given sufficient time to start implementing it.</p>
	Columbus Communication s Trinidad	This proposal in principle is an extremely strong disincentive to investment in infrastructure and facilities by operators, and encourages operators to use the facilities of others who invest.	CCTL recommends that concessionaires be able to set prices at the higher of the current	The Authority will ensure that the costing methodology used will promote efficiency by

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	Limited	<p>This carte blanche use of current costs can harshly penalize operators that have made historic investments, where the current costs of the investments are less than the historic, as this would mean that the operator that made the historic investment would under-recover on its incurred costs. Such a proposal would provide enormous disincentives to operators seeking to make investments today, if the cost of the materials related to the investment is trending downward. This is so because new competitors would be able to access an operator's infrastructure at a later date at a price lower than the cost incurred by the operator providing the infrastructure. This is in effect a double-penalty to the operator that invests, as the new competitors would be able to save and earn interest on their capital with little or no risk, and then access the investing operator's facilities at a price lower than the cost incurred by the operator, as soon the investing operator's facilities become available, with the investing operator thus incurring a loss on its investment.</p> <p>In the event the current cost is lower than the historic cost, then the new competitor has every incentive to construct its own facilities, as it will then have a lower cost base than the competitor who constructed earlier – this does not constitute overinvestment, but rather investment in more efficient infrastructure, which by definition is economically efficient. But new operators should not be able to accept better pricing</p>	<p>or historic cost, so as to ensure economically efficient investment decisions by potential market entrants.</p> <p>This will ensure that if historic costs are higher, the earlier operator would not incur a financial loss, while the new operator can make the tradeoff to pay the higher historic cost but gain fast entry to the market and reduced risk, as opposed to paying the lower current cost but having to shoulder greater risk, and a delay in market entry. Conversely, if current costs are higher, the earlier operator would earn a margin (therefore acting as an incentive to invest at an early stage) on its facilities, with the later entrant not being financially disadvantaged by any means, while gaining timely access to infrastructure.</p>	<p>service providers. Since current cost is the most suited method to encourage efficiency then it will be used. In addition, the Authority will provide incentives for service providers to offer access services at cost based rates.</p> <p>The Authority is of the view that the lower of the current cost and the historic costs should be paid. If the higher of both costs was to be paid then operators who made bad investment or whose network were built with high inefficiencies will not be penalized and therefore not encouraged to be more efficient.</p>

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		for facilities without any risk, while the operator providing the underlying facilities incurs a loss.		
2.2.3 Fully Allocated or Long-run Incremental Costs?	Windward Telecom	<p>Windward Telecom recommends adoption of a Fully Allocated Cost methodology over LRIC on the basis that:</p> <ol style="list-style-type: none"> 1. Historic asset costs for individual network elements can be readily utilized in the model; 2. Costs can be more easily quantified and are not subject to the number of variables inherent in LRIC estimations; 3. LRIC can be subject to price inflation at the whim of the service provider; 4. Pricing can be adjusted yearly dependent upon actual unit volumes. 	Windward Telecom recommends adoption of a Fully Allocated Cost methodology over the LRIC methodology.	The Authority does not agree that a fully allocated cost methodology is the most suited approach in achieving cost oriented rates for access services.
2.2.5 Choice of Rate of Return	Windward Telecom	Windward Telecom concurs with the Authority's approach, but notes that an annual hearing should be held to enable all parties to make representation with respect to the Weighted Average Cost of Capital and to ensure that distortions in the cost of capital are not imbedded in the system for a prolonged period of time (three to five years) during a Price Cap regime.	Windward Telecom recommends that an annual hearing be held to facilitate representations for the WACC and to ensure that distortions in the cost of capital are not embedded in the system for a prolonged period of time.	The Authority will conduct a review on the WACC in consultation with stakeholders and operators. The document has been revised accordingly.

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2.3 Measuring against the Price Standard	Windward Telecom	<p>Windward Telecom prefers the use of Interconnect Benchmarks to determine the Interconnect Price Standard. This methodology will enable the regulator to establish productivity standards (targets) for TSTT and will not subject alternative carriers to payment for their competitor's inefficiencies. Experience in other jurisdictions indicates that benchmarks can be established for specific islands such as Trinidad to reflect: economies of scale, capital expenditure differentials and comparative wage scales.</p> <p>The top-down approach fails to provide any incentive for the network element supplier to improve its productivity. Should the Authority adopt top-down methodology, it should include a productivity improvement factor on an annual basis.</p> <p>The bottoms-up approach will not likely be practical in Trinidad absent full disclosure of TSTT's detailed cost structures and network design and will be subject to continual challenge from the incumbent operator.</p>	Windward Telecom recommends the use of Interconnect Benchmarks to determine the Interconnect Price Standard.	<p>TATT will use benchmark to set interconnection rates for the initial period in the absence of a costing model.</p> <p>A productivity factor will be included in the Price Cap Mechanism to be developed by the Authority.</p>
	Telecommunications Services of Trinidad and Tobago (TSTT)	The Consultative document presents a comparative view of three approaches to measuring incremental costs: top-down, bottom up and benchmarking. While we do not have an issue with the comparative strengths and weaknesses of the top down and bottom-up approaches, we disagree with a number of the pros and cons listed for the benchmarking approach. The disagreement arises from the fact that much of the		The Authority notes TSTT's comments and will use cost-based benchmarks to reflect the conditions applicable to Trinidad and Tobago. The section on benchmarking has been amended accordingly.

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		<p>benchmarking data available for interconnection services are not cost-based. In this case, available benchmarks reflect neither “real-world operations, both in technical design of the network and in operating conditions” nor do they offer “a realistic interpretation of an efficient operator”.</p> <p>We emphasize that the Trinidad and Tobago Act and Regulations constrain the Authority to implement any benchmarking exercise with care. Thus, any benchmarking exercise must of necessity, speak to interconnect costs not prices.</p> <p>In section 5 of the consultative document, the Authority proposes using benchmarks in the short-run while the LRIC models are being constructed. In principle, we are not opposed to using cost benchmarks for guidance. However, again, available benchmarking can be very misleading. The consultative document states that in choosing benchmark operators, they “should be in markets that have embarked on liberalization and have regulated rates, so that there can be some assurance that the benchmark rates are cost-based.” This criterion is not enough to assure that the benchmark rates are cost-based.</p> <p>Firstly, it is clear from the current dispute on mobile termination rates that most of the available evidence on</p>		

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		<p>benchmarks is flawed. Mobile termination rates until recently have been largely unregulated. Although many cost-studies have been conducted the actual rates do not yet reflect the costs, but rather are transitioning down to cost-based rates.</p> <p>The finding and recommendations from the Authority's Panel decision supports this position on benchmarks. Page 51 of the Panel's decision stated that "Upon review of benchmark evidence, the panel finds that the Caribbean and European benchmark evidence presented lacks relevance and does not represent the sort of cost-based benchmarking approach that would be appropriate in the context of establishing cost-based interconnection charges in Trinidad and Tobago under the Act and Concession."</p> <p>In its submission to the panel TSTT pointed out the following requirements for a proper benchmark study;</p> <ul style="list-style-type: none"> • The countries used for comparison must be carefully selected objective criteria • The reasons why the markets in the selected countries are considered suitable for comparison must be indicated • The prices selected for comparison must have been set based on an appropriate cost accounting model 		

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		<p>TSTT also provided alternative cost based benchmark information prepared by the New Zealand Commerce Commission. This study expressly excluded the European benchmarks because the rates were not cost-based. In fact in most of these jurisdictions, the operators were on a “glide path” to cost-based rates. The benchmarks included in this consultative document are predominantly European and as such are very reflective of those proposed by Digicel, and were explicitly rejected by the panel.</p> <p>Regarding benchmarks for fixed interconnection rates, TATT has presented predominantly European benchmarks. TSTT has similar concerns as with the benchmarks for mobile termination rates. In its response to complaint # 4 from Digicel, TSTT provided its own list of benchmarks for fixed interconnection rates from the Caribbean and Latin American region. From this list the mean average fixed termination rate is 2.1 US cents. This is 71% higher than the average of 1.23 US cents reflected in figure 10 of TATT's document. Again this underscores the problems with the use of benchmarks. See the attached Appendix. TSTT wishes to emphasize that it introduced these benchmarks in Complaint #4 in order to counter erroneous claims by Digicel and highlight the limited utility of benchmarks.</p>		

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		<p>More generally, the Authority's outlining of the stages involved in undertaking benchmarks for the purpose of approximating costs in Trinidad and Tobago ignores the fact that the discourse in relation to the use of benchmarks has long evolved beyond such a starting point. TSTT is of the view that given all the evidence that was put before the panel, as well as the panel's findings, it is unnecessary and unproductive for the Authority to be now outlining, in a preliminary way, the stages of a benchmarking study. TSTT believes that it would be more useful if the Authority were to focus on building on the recommendations of the panel.</p> <p>The Authority seems to be going in the other direction, however, retreating from the ground that has already been covered. In the final step of its recommendation for conducting benchmarks - Step 7 Adjust for differences in operating conditions - the Authority stated that "This step is optional, and may not be required if operating environments of the benchmark operator are similar to the environment in Trinidad and Tobago." TSTT is of the view that where inter country differences exists, and to the extent that differences affect the levels of benchmarks rates then there should be some form of adjustment to reflect the differences.</p> <p>Ultimately, however, TSTT must query the value of revisiting the issue of benchmarking analysis as an interim approach</p>	<p>TSTT is of the view that given all the evidence that was put before the panel, as well as the panel's findings, it is unnecessary and unproductive for the Authority to be now outlining, in a preliminary way, the stages of a benchmarking study. TSTT believes that it would be more useful if the Authority were to focus on building on the recommendations of the panel.</p> <p>TSTT is of the view that where inter country differences exists, and to the extent that differences affect the levels of benchmarks rates then there should be some form of adjustment to reflect the differences</p>	<p>The Authority disagrees with TSTT's recommendation.</p> <p>It is the Authority's responsibility to set out appropriate guidelines in respect of a costing methodology and benchmarking (in the absence of cost models) so that future dispute resolution panels would have a framework within which to make its decisions.</p>

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		<p>with respect to mobile termination NERA Fixed Interconnection Study – Latin America rates. Adequate and reliable information in respect of costs of service provision in Trinidad and Tobago as well as extensive evidence in respect of bench marks has been presented to the Panel in the dispute on interconnection rates. The Panel has given its determination and TSTT considers that it would be entirely improper to re-open the issue.</p>		
2.3 Measuring against the Price Standard	Digicel Trinidad Limited	<p>Digicel is perplexed by the following statement from the Authority :</p> <p><i>“Adapting the operator’s accounts. This is a top-down approach <u>which starts with the reality of the incumbent’s</u> actual costs and seeks to modify the basis of calculation to meet the interconnect pricing standard.”</i></p> <p>Using the incumbent’s costs, following heavily policed accounting separation procedures set by the Authority, might not be reasonable in setting interconnect rates immediately prior to the market entry of new operators, although if a forward looking approach were advocated this would still make the approach unreasonable for setting rates for new entrants. However, by the time the Authority is requiring that top-down LRAIC models are produced in accordance with its ‘statement’ on the same, Digicel will have been in the market over two years and it will be appropriate for it to produce its</p>	<p>Digicel therefore seeks clarification from the Authority on the highlighted statement above (with respect to mobile interconnect services) which contradicts the Authority’s later ‘statement’ on operators developing their own top-down models as makes sense.</p>	<p>The Authority notes that this section was meant to provide a discussion on the different types of models used in other jurisdictions, however revision was made to provide greater clarity.</p>

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		own top-down LRAIC model. Digicel therefore seeks clarification from the Authority on the highlighted statement above (with respect to mobile interconnect services) which contradicts the Authority's later 'statement' on operators developing their own top-down models as makes sense.		
Section 3				
3. Proposed Approach	Ministry of Public Administration and Information, (MPAI)	<p>The Costing Methodology provides no sample of the “suitable format” required for concessionaires to commence work in preparation for the long run incremental costing.</p> <p>The document does not address the questions of reasonableness of the 12-month timeframe for operator compliance with the top-down LRAIC model. MPAI's independent consultant seems to also believe that such answer is necessary, as evidence by the following:</p> <p>“Usually it takes much longer to develop a top-down LRAIC model than the estimated 12-months – at least 24 to 36 months. Moreover, the effort is often highly contentious and costly, and the results are not always clear-cut. As Trinidad and Tobago needs to take decisions more immediately we would recommend defining the interconnection rates based on benchmarking, at least for a two to three year period and possibly as a full alternative to LRAIC.</p> <p>Even the much less intricate requirements of benchmarking</p>	MPAI recommends that TATT define the interconnection rates based on benchmarking, at least for a two to three year period and possibly as a full alternative to LRAIC.	The Authority notes the concern raised by MPAI with regard to the timeframe being too short and as such has revised the time for the implementation of a LRAIC model. In addition the Authority will use a cost-based benchmark for the period where there is no LRAIC costing model available, but not as a substitute for LRAIC. The Act states that such rates should be cost-based and therefore the Authority cannot go contrary to the Act in using benchmark as a full alternative to LRAIC.

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		<p>can required a considerable effort (albeit a generally much less costly one than LRAIC model development), in that it may be difficult to obtain valid and reliable cost data for a robust set of comparable Caribbean operators.”</p>		
	<p>Ministry of Public Administration and Information, (MPAI)</p>	<p>Please consider the following comment on the topic of negotiation context:</p> <p>“Cost analysis and related negotiation is a long process and usually requires most of the information from the incumbent (i.e., other than a bottom-up model). In defining the appropriate accounting methodology, it is important to note that fixed telecom market in Trinidad [sic] is relatively small – US\$110 million for fixed lines, US\$ 57 million for international services, US\$20 million for internet services. There are about 58,000 fixed lines, 18% of which generates 53% of the revenues.</p> <p>At the same time, the incumbent is part of a large, multi-country operating group (C&W), with extensive experience in cost negotiations, including “gaming” thereof. This includes experience in the UK in prodding the regulator to impose a separations accounting framework on BT as C&W was entering the market as a new operator (Mercury). It also includes detailed understanding of the cost structure of many of the Caribbean operators that maybe used as “comparables”</p>		<p>The Authority notes the comment on the data presented on the fixed line and international market, however the Authority is concerned about the accuracy of the figures.</p>

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		<p>in benchmarking.</p> <p>These realities are not reflected in the “textbook” approach to costing reflected in the Authority’s proposals. Possibly this is due to a desire to be neutral in respect to all operators in its formal presentation of the framework. However, in the process the Authority may be foregoing the benefits of regulatory experience from other jurisdictions as well as overlooking the practical context within which the framework will be implemented.”</p>		
	Telecommunications Services of Trinidad and Tobago (TSTT)	<p>In general, we can support implementation of a top-down approach, and will focus our comments on that approach. The TATT should consider further, however, some alternatives.</p> <p>Since the objective is not to calculate any specific operator’s actual costs, but establish the efficient cost of service provision, building two bottom-up models--one of an efficient fixed and the other of an efficient mobile operation in Trinidad and Tobago--and allowing industry to comment on the structure and inputs (obviously subject to appropriate confidentiality restrictions) to the model is another approach that should be considered. This approach is being implemented in both the Cayman Islands and the OECS islands.</p> <p>We understand from the document that the Authority is averse to implementing a bottom-up approach when tele-density is</p>	TSTT recommends that TATT consider alternative approaches to a top-down costing model.	The Authority will consider alternative approaches in relation to implementation of a top-down model in the long-run, however in the short-term the top-down modelling approach is the most suited.

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		<p>not at saturation levels. This is certainly the case in Trinidad & Tobago for fixed line services, but not for mobile services. Another alternative could therefore be that the Authority mandates a top-down model for fixed line services and a single bottom-up model for mobile services.</p> <p>With respect to interim benchmarking, we refer the Authority to our more extensive comments given in the preceding section.</p> <p>Efficiency factors</p> <p>The foregoing suggested alternatives notwithstanding, we agree that a top-down approach implemented including appropriate adjustments could result in the accurate measurement of the efficient cost of service provision. However, the Authority's document needs to propose how it intends to use the information from various concessionaires to determine the interconnection rate for a service that more than one operator provides. As we have discussed before the principle of economic efficiency requires that a single rate prevail. This implies that the Authority, having received models from a number of different concessionaires, will have to reconcile them. We suggest that the Authority go through a process similar to that undertaken by the panel's experts in the recent mobile termination dispute arbitration. Efficiency</p>	<p>TSTT suggests that the Authority go through a process similar to that undertaken by the panel's experts in the recent mobile termination dispute arbitration. Efficiency adjustments were made to arrive at a narrow cost range. The Authority can then, for example, take the average within that cost range.</p>	<p>The Authority notes TSTT's recommendation.</p>

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		<p>adjustments were made to arrive at a narrow cost range. The Authority can then, for example, take the average within that cost range.</p> <p>Timeframe for implementation</p> <p>The Authority proposes that it impose the costing requirement 12 months after adoption of the policy and its associated regulations or 18 months after the granting of a concession, whichever is the later. It is difficult for us to comment on whether the 12 month timeframe is adequate as it is yet unclear what has to be accomplished in that 12 months. For example, is the Authority proposing that, after the policy and regulations—by which we understand a detailed costing methodology—is produced, it will subject the draft results of the existing concessionaires to consultation. Or is the Authority proposing the Authority will determine whether the concessionaires have implemented the methodology appropriately and consistently without consultation?</p> <p>As the initial modeling involved in this requirement will be crucial for the viability of the interconnection regime, we suggest that the Authority would be well advised to run a consultation on each concessionaire's application of the methodology and non-confidential results. In this case, the</p>	<p>TSTT suggests that the Authority conducts a consultation on each concessionaire's application of the methodology and non-</p>	<p>After the costing methodology has been finalized the Authority will also develop a generic top-down LRAIC cost model in accordance with the principles of the costing methodology that concessionaires will only be required to adopt after the completion of cost model.</p> <p>The Authority has revised the timeframe proposed to allow concessionaires adequate time to implement the LRAIC model.</p>

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		<p>Authority may wish to alter the 12 month period to allow for such consultation.</p> <p>Other issues</p> <p>Much of what is being proposed on the other aspects of the top-down approach— i.e., routing factors and common cost mark-ups--is fairly standard or discussed at a level of generality that makes it difficult to comment usefully at this stage. However, of course, reserve the right to comment further at subsequent stages of this consultation.</p>	<p>confidential results and therefore will need to alter the 12 month period to allow for such consultation.</p>	
	<p>Digicel Trinidad Limited</p>	<p><i>The Authority proposes a top-down long run average incremental cost (LRAIC) model, <u>that recognizes the need to promote dynamic efficiency in the national interest</u>, where assets values are based on current cost accounting, CCA, shall be used as a suitable costing methodology for access services in the telecommunications sector. In the absence of such model, a benchmarking approach shall be used in the interim period. The Authority shall require concessionaires to implement a top down LRAIC model, 12 months after the adoption of this Methodology and its associated Regulations or 18 months after the granting of a concession, whichever is the later.</i></p> <p>Digicel believes that it is important for the Authority to</p>	<p>Digicel therefore respectfully suggests an amended statement to include the underlined insertion as outlined above.</p>	<p>The Authority notes Digicel's recommendation. However, there is no need to include the suggested insertion as the LRAIC model that will be developed, would capture such dynamic efficiency concerns</p> <p>The Authority notes Digicel's</p>

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		<p>recognize that the Act envisages that interconnection rates can and preferably be negotiated. While TSTT has identified that there is no benefit to it in ever reaching a negotiated settlement on interconnect rates the Authority should nevertheless not ignore the requirements of the Act and what it anticipates. Other operators may happily enter into negotiated arrangements in which case there would be no need to produce such resource consuming cost models. In the absence of a negotiated settlement then what is being proposed by the Authority here seems sensible but this in itself can not brush aside significant aspects of the Act simply because the incumbent operator in Trinidad and Tobago has to date been able to sidestep those aspects of the Act for its own gain i.e. the requirement to negotiate in good faith should still be strongly promoted by the Authority.</p> <p>In addition, it is important that the Authority recognize the need for operators to remain dynamically efficient and in particular in light of the government's 2020 vision for Trinidad and Tobago which recognizes the need for the country to adopt and continue to adopt 'state of the art' technology. Digicel therefore respectfully suggests an amended statement by the Authority as outlined above.</p> <p>In addition, it is crucial that the Authority remains cognizant of the pitfalls of placing too much faith in what is essentially a</p>		<p>comment on negotiations, but would like to point out that section 25(m) of the Act requires concessionaires "...to disaggregate the network and on a cost basis, in such manner as the Authority may prescribe, establish prices for its individual elements and <i>offer the elements at the established prices to other concessionaires...</i>"</p>

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		<p>model based on theory rather than reality. Virtually all regulatory Authorities that have engaged in LRIC process recognize that it should only be used as a guide as opposed to something that provides a precise answer e.g. Digicel are not aware of any regulator that has simply imposed LRAIC generated results as an end in themselves. Some regulators provide headroom given the uncertainties about model inputs to ensure operators are not severely disadvantaged by being forced to sell below cost and a large number of regulators advocate movement to LRAIC results only through a glide path over several years. Indeed the majority of EU countries have been circumspect when it comes to over relying on LRAIC as an end it itself and if anything the debate over its validity has intensified in recent years;</p> <p><i>“A further reason for wishing to limit regulatory uncertainty is that the social costs of over versus under provision of allowed revenues may be asymmetric i.e. a small loss of consumer surplus when prices are a little too high, versus a large loss of surplus if non-supply or deteriorating quality of supply results from prices that are a little too low. The efficient response to this is to “bias” allowed revenues taking account of both level of uncertainty and the social “loss function” associated with upside and downside errors. Unnecessary uncertainty may therefore result in consumers paying an excess margin, or risking consequences of having an under-funded network.</i></p>		

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		<p><i>Uncertainty can also reduce the power of incentive contracts within firms since it becomes more difficult for owners (and the senior executive) to monitor and provide incentives for profit maximizing behavior. Lower powered incentive contracts and self selection of less capable management are the predicted outcomes, and both would result in poorer productivity performance.</i></p> <p>January 2004, "Access Pricing in Telecommunications –Time to Revisit LRIC?" Brian Williamson</p>		
	<p>Columbus Communications Trinidad Limited</p>	<p>1. This is an extremely costly and time consuming requirement that the Authority is proposing to impose on all concessionaires, particularly where this requirement may not be necessary at all. Where concessionaires have agreed to and established rates for interconnection, that are of similar magnitude to other cost-based rates determined internationally, this requirement should not be imposed. Only in the event of rates in contention, should the Authority seek to attain cost accounting data in a manner suitable for long run incremental costing.</p> <p>In this regard, CCTL reminds the Authority of its stated policy in relation to its regulatory framework – "This framework is based on the principle of proportionality: the minimum possible interference to correct for any failures that may exist in the competitive market." Surely, a requirement for all concessionaires to "redesign" their entire cost accounting</p>	<p>CCTL recommends that the Authority remove this proposal that all concessionaires need to redesign their cost accounting systems to capture data in a suitable format for long run incremental costing, and seek more pragmatic approaches to determining interconnection charges.</p>	<p>The Authority disagrees with CCTL's recommendation. The Authority has the right as outline in Section 24 (h) of the Act, "...requiring the concessionaire to</p> <p>(h) account for cost and keep books of accounts and where the Authority prescribes by regulation the manner in which such books are to be kept, to keep such books of accounts in accordance with such regulations..."</p> <p>The prescribed CCA framework</p>

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		<p>system where they have established reasonable and accepted interconnection rates that are in line with interconnection costs internationally does not speak to proportionality as defined above.</p> <p>In this regard, CCTL appeals to the Authority that more pragmatic and practical solutions are explored for determining interconnection charges, rather than engaging in possibly lengthy time-consuming processes that are subject to challenge by operators in terms of the various elements and assumptions that comprise the lengthy time-consuming process. It is critical that competition be fostered and be allowed to thrive, rather than burdening the industry with onerous obligations, and lengthy determinations and litigation.</p> <p>2. CCTL would appeal to the Authority to seek to adopt a practical approach to establishing prices for interconnection. The approach being proposed seems to be lengthy in its determination as each operator's accounts would have to be reviewed and analyzed, and open to challenge and litigation by various parties in relation to competing concerns of confidentiality of information and transparency of process, as operators would seek to ensure that they are treated equivalently, but once the outputs of a common process are known, it may be very likely to deduce the inputs, hence risking breach of confidentiality. CCTL also foresees great</p>	<p>CCTL recommends the Authority use of more practical approaches to determining/estimating costs of interconnection for the industry that could be determined in a more timely and less challengeable manner. This would also save individual operators the expense of redesigning their cost accounting</p>	<p>is necessary for the implementation of a LRAIC model to all access services.</p> <p>The Authority recognizes that time is of a concern to CCTL for the implementation of a top-down LRAIC model, however until such time as cost studies are performed and a cost model is implemented, the Authority will utilize cost-based benchmarks for interconnection rates.</p>

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		<p>difficulty with utilizing a top-down approach in a market with multiple operators, unless the Authority is seeking to develop an interconnection charge for each operator, which contradicts the Authority's stated intention to determine costs of an efficient operator, as specified in its proposed Price Regulation Framework. As such, a top-down method may not be the most appropriate for having a single standard as being proposed by the Authority in its Framework.</p> <p>CCTL proposes that either benchmarking of cost model outputs in combination with retail rate packages are more than sufficient for small economies such as Trinidad and Tobago, rather than these lengthy, costly and burdensome analyses, which even in developed countries have still proven inconclusive. In the worst case, an interconnecting operator should have the option to select an existing retail package offered by a concessionaire to that concessionaire's customers, to allow an interconnecting operator to call the customers of the concessionaire at the rates offered by the concessionaire to the market.</p>	<p>systems.</p> <p>Such approaches include benchmarking of outputs of cost models in other jurisdictions comparable with the existing retail rates that pertain in the Trinidad and Tobago market, and allowing an interconnecting operator to access a concessionaire's customers at the very rates the concessionaire allows its own subscribers to call the concessionaire's customers.</p>	<p>The Authority disagrees with CCTL's recommendation. The Interconnection Guidelines states that the Authority will employ benchmark in the absence of costing data or cost model, in accordance with the benchmarking approach prescribed in this costing methodology.</p> <p>In the absence of costing data or a cost model, benchmarks will be used.</p>
Section 4				
4.2 Asset Revaluation	Windward Telecom	Windward Telecom believes that any adoption of revaluation of assets and departure from Historic Costs represents a distortion as noted in our response to section 2.2.1 above. Furthermore, the process does not provide any reward for a concessionaire who is more efficient in the construction and		The Authority notes Windward Telecom's comments and has revised the Asset Revaluation Section accordingly.

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		<p>deployment of assets. Capex efficiency is discarded and promotes the construction of inefficient and unnecessary plant and constitutes a throwback to rate base regulation.</p> <p>Of greater concern is the fact that indexing of assets may be undertaken on a company wide basis without regard for the composition of assets (switching, transmission, network access, mobile, wireless spectrum, civil works and software) employed by a specific concessionaire. The TATT will have to establish a common barometer to be employed by all concessionaires to eliminate inter-carrier price differentials. Provision will also have to be made for treatment of redundant or obsolete assets. (There is little incentive in this approach to discard outmoded technology).</p> <p>Replacement costs are extremely difficult to determine on an annual basis and software packages and leases are even more problematic with vendors often charging widely different prices for similar products. Further complicating matters is the fact that the ever-changing nature of telecommunications technology implies that the replacement network infrastructure may bear no resemblance to the current network infrastructure.</p> <p>Of paramount concern is the fact that a network operator may not maintain or upgrade a particular network component for many years (40-years in the case of a pole structure or 10-15</p>		<p>The revised section addresses the issues raised with regard to the indexing of specific asset categories.</p> <p>The Authority agrees with Windward Telecom that replacement costs are difficult and costly. The recommended approach to be used for asset revaluation, indexing, addresses these concerns.</p> <p>Fully depreciated assets will not be included in the asset revaluation exercise.</p>

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		<p>years in the case of outside fibre). Nonetheless, the network operator garners the benefit of indexation well in advance of the reinvestment date.</p> <p>The Consultative Paper appears to view indexation as a means to inflate the value of the infrastructure employed by a specific concessionaire. However, investors may be concerned about price deflation and the potential for stranded investment if current deflation rates (read bandwidth increases) are maintained.</p> <p>Imposition of any indexed asset model will impose an undue administrative burden upon concessionaires. The administration costs of this approach may prove onerous to the Authority.</p>		<p>The Indices that will be used to adjust historic costs of specific asset groups will consist of parameters that will take into consideration price changes, technological changes and other capital costs that will be used to approximate the current cost of the asset. (Not all parameters will be positive, i.e. increase the value of the asset)</p>
	Telecommunications Services of Trinidad and Tobago (TSTT)	<p>We do not disagree with the approach proposed for asset revaluation and depreciation. However, it is obviously important that the approaches taken to asset revaluation and depreciation are consistent. The Authority should be mindful that the approach will require a “backward looking” indexation of the gross book value of the asset to bring it to current cost, an “forward looking” price trend, an assessment of the length of life of the asset and a determination the age of asset.</p> <p>Further, we note that each of these variables for any given asset or asset group will be the same for each operator, and we</p>	<p>We recommend that each of these variables for these asset groups will be determined at the end of a consultation process that gives interested parties the opportunity to make representations on their treatment.</p>	<p>The Authority agrees with TSTT's recommendation and will develop the relevant indices in consultation with stakeholders.</p>

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		urge that each of these variables for these asset groups will be determined at the end of a consultation process that gives interested parties the opportunity to make representations on their treatment.		
	Digicel Trinidad Limited	<p><i>“The Authority proposes the adoption of indexation for revaluing assets concessionaires in Trinidad and Tobago.”</i></p> <p>Digicel believes the Authority has not sufficiently expanded their views on this issue in order that it can provide a more helpful response. Digicel does not object to the idea of indexation for revaluing assets where assets need to be replaced in a forward looking model. However, it is not clear that this is what the Authority is proposing. Furthermore, assets evolution or more precisely the need to remain dynamically efficient. One method for making allowances for the need to remain dynamically efficient is to assume shorter asset lives on certain types of equipment.</p>	The Authority need to provide more information on this section.	The Authority agrees with Digicel's comments and recommendation and has revised the Asset Revaluation Section accordingly.
4.3 Depreciation	Windward Telecom	<p>Windward Telecom objects to the use of tilted-straight-line depreciation for the following reasons:</p> <ol style="list-style-type: none"> 1. The depreciation cost is significantly increased in upfront years as a consequence provides an artificial incentive for existing (taxable) concessionaires to invest in unwanted/unnecessary assets; 2. The methodology is commonly employed in “bottoms’-up” models and elsewhere in this model, the 		<p>The Authority notes Windward Telecom comments but disagrees with the position put forward.</p> <p>Economic depreciation is the most suited approach for depreciating assets in a top-down model. The tilted-straight line approach is the best</p>

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		<p>Authority has discarded use of this approach;</p> <p>3. It is impossible to accurately estimate upfront medium and longer-term deflation rates for telecommunications equipment and contrary to the assertions on page 23. No potential competitor would defer construction on the basis of lower capital expenditures in years hence;</p> <p>4. The actual straight-line taxation allowance for depreciation will be the predominant influence upon management's capital expenditure plans after the actual need for the asset. Enhanced regulatory depreciation rates will not promote capital investment;</p> <p>5. Investment in network assets by new (untenable) market participants will not be bolstered by accelerated regulatory depreciation rates;</p> <p>6. The methodology favors taxable incumbent entities whereas new market participants will not likely be taxable during the start-up phase;</p> <p>7. It is impossible to predict capital investment pricing with any degree of certainty; and</p>		<p>approach in achieving economic depreciation, given the alternatives as shown in Appendix A.</p>

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		8. The total cumulative costs of tilted straight line depreciation exceed that of straight-line depreciation (using the assumptions contained in Figure A3) by a factor of 7.5% during a 10-year life span. This cost differential benefits incumbents to the detriment of new market entrants.		
	Digicel Trinidad Limited	Digicel believe that a tilted straight line depreciation methodology is acceptable.		The Authority notes Digicel's comment.
4.4 Cost of Capital	Ministry of Public Administration and Information, (MPAI)	MPAI's independent consultant offers the following comment regarding WACC: "We recommend highly that the Authority use WACC (Weighted Average Capital Cost) that is based on a detailed benchmark of similar countries but which takes into consideration Trinidad and Tobago's operating context. Correspondingly, the main parameters in the WACC formula – in particular, the debt to equity ratio – should be based on TSTT's financial result with some normative adjustments. For example, if the ratio of debt to equity in similar countries is 60:40 and TSTT's debt to equity ratio is 50:50, then a ratio in between these two levels may need to be considered.	We recommend highly that the Authority use WACC (Weighted Average Capital Cost) that is based on a detailed benchmark of similar countries but which takes into consideration Trinidad and Tobago's operating context	The Authority notes the concerns of MPAI and will determine the WACC for an efficient operator in consultation with stakeholders.
	Telecommunications Services of Trinidad and	The presentation of the estimate of cost of capital is straightforward, but we suggest that for any integrated concessionaire such as TSTT a different WACC be used for	The presentation of the estimate of cost of capital is straightforward, but we suggest	The Authority agrees with TSTT's comment, but this will be done after accounting

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	Tobago (TSTT)	fixed services and one for mobile services. This will facilitate the objective of obtaining a single industry cost for any given interconnection service.	that for any integrated concessionaire such as TSTT a different WACC be used for fixed services and one for mobile services.	separation has been implemented. In the interim, a WACC will be developed by the Authority for an efficient operator, in consultation with stakeholders.
	Digicel Trinidad Limited	<p>Digicel note the Authority's comment that with respect to the debt risk premium:</p> <p><i>"This premium is normally about 2.0%, which is an international benchmark for telecommunications companies in developing markets."</i></p> <p>Digicel believe that it would be inappropriate to allow for such a premium with respect to TSTT's operations given the majority ownership of the Government on the company. The government share in the company should enable TSTT to acquire cheaper debt on the international market by comparison to a new entrant like Digicel who in essence faces competition from the government (government normally divest interest in the incumbents prior to liberalization) which in turns leads to higher systematic risk for a new entrant. Being the majority shareholder in TSTT should also lead to lower systematic risk for TSTT by comparison to incumbents elsewhere, who will always have a lower beta's than new</p>		The Authority notes Digicel's comments.

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		<p>entrant in any event. It is also widely accepted that incumbent operators that have both fixed and mobile networks have lower betas than operators with mobile only networks due to advantages afforded to it via horizontal integration. This in itself, notwithstanding the fact that the government is the majority shareholders in TSTT. Systematic risk in Trinidad and Tobago has also been greatly increased by virtue of the government's failure to put in place regulations pursuant to the 2001 Telecommunications Act prior to liberalization. The uncertainty associated with the governments failure in this regard should be considered as further premium to the standard country risk premium which might be used as a guide for other industries in the country.</p>		
4.5 Cost-Volume Relationships	Telecommunications Services of Trinidad and Tobago (TSTT)	<p>We seek clarification on the use of cost-volume relationships. The key element distinguishing this proposed approach from a CCA FAC approach would appear to be the use of cost-volume relationships. In section 4.5, the document states the LRAIC concept that "has been preferred because, where regulators have engaged in full LRIC program, specifying cost volume relationships (CVRs) for each network element, economy of scale effects have not been found to be nearly as profound as initially expected. Furthermore the process of identifying separate CVRs for each network element is a hugely time-consuming and costly task." What role will CVRs then play? Will they be restricted to non-network element costs? Will they resemble standard activity-based cost drivers?</p>	We seek clarification on the use of cost-volume relationships.	The Authority agrees with TSTT's comment and has revised this section to provide clarification on the use of CVRs in the LRAIC model.

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4.6 Service Routing Factors	Digicel Trinidad Limited	It is not clear to Digicel what is being proposed by the Authority with respect to routing factors. Whether it is the network busy hour or not the same network elements are required to make a call. Perhaps the limited information provided by the Authority on this issue is the reason for the lack of clarity.	The Authority needs to clarify this section.	Clarification is presented in the revised document to explain the use of service routing factors.
4.7 Common Cost Mark-up	Digicel Trinidad Limited	Digicel notes the Authority's desire to confirm with international norms in reference to equi-proportionate mark-ups that " <i>is standard treatment in virtually every regulatory cost model around the world</i> ". Digicel anticipates that Authority will equally give due regard to international norms in setting cost based rates for interconnection and ignore interests of the incumbent operator that has for sometime now attempted, for its own gain, to introduce an interconnect regime that is entirely out of sync with international norms.		The Authority notes Digicel's comment and reassures that appropriate measures will be put in place to treat all concessionaires equally. The proposed statement was amended accordingly.
4.8 Externality Mark-up	Digicel Trinidad Limited	Digicel is concerned about the Authority's statement that " <i>inclusion of an externality in its cost models may result in unjustified cross subsidies form fixed to mobile services</i> ". This is a loose remark that is based on no evidence whatsoever. In fact based on representations made by the incumbent TSTT in a recent dispute, it is TSTT's absolute intent that Digicel's mobile network has and should continue to heavily subsidize TSTT's fixed network until final interconnect rates are set.	Digicel recommends that the Authority include an externality mark-up in the event that a ruling is made in favor of TSTT charging an interconnection rate that encourages cross-subsidization.	The Authority notes Digicel's concern with regard to cross-subsidization, and reassures Digicel that the principles proposed in the final version of this document will carry forward to any arbitration panel with regard to the efficient costing of

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		<p>TSTT has stated that it will strenuously resist paying Digicel for several million minutes of calls from its fixed network to Digicel's mobile network since Digicel's launch in April 2006.</p> <p>However, even while taking this position TSTT has continued to charge its customers \$0.80 a minute (<u>Effective rate \$1.15 per minute</u>) for this entire period for calls to Digicel's network resulting in excess profits of <u>several thousand percent</u> on every single call and millions of dollars in total. If an arbitration panel or a court were to deem TSTT's position not to pay Digicel for these services acceptable i.e. not to pay Digicel a cost based rate for interconnection services as demanded by the Act, then this would represent a massive degree of cross-subsidization of the TSTT fixed network by Digicel's customers as the cost of termination services could then only be recovered from Digicel's customers. The quantity of money this represents for even a short period of 1 year would heavily outweigh the potential for fixed to mobile cross-subsidization for an external mark-up of several cents for many years. In this regard the Authority's comments can only suggest that it has chosen to blinker itself from the market realities that currently prevail in Trinidad and Tobago.</p> <p>These comments may carry weight in a telecommunications environment that was liberalized in accordance with processes envisaged by the Telecommunications Act. However, the</p>		<p>mobile termination rates.</p> <p>In addition, the Authority has adopted the position of the ITU in regard to externality. At present, there is no sufficient evidence to support the inclusion of externality in setting fixed interconnections rates.</p>

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		<p>liberalization process in Trinidad and Tobago has been unprecedented on a global scale in terms of the government and TATT's unwillingness or lack of power to call them to task on this. Consequently, an external mark-up is totally appropriate for mobile termination in the event that an arbitration panel or a court were to deem TSTT's unconscionable position not to pay for the service for an extended period acceptable. An external mark-up would then at least assist in somewhat redressing the balance for the massive cross-subsidization of TSTT's fixed network that would have been funded by Digicel and ultimately, Digicel's customers to date.</p>		
	<p>Columbus Communications Trinidad Limited</p>	<p>CCTL notes that the Authority recognizes that the fixed network penetration is less than that of mobile network penetration, and the Authority therefore concludes that an externality mark-up would not be reasonable. While CCTL agrees that an externality mark-up would not be reasonable for mobile networks based on the observation of the Authority, CCTL believes that it may be worth considering for fixed networks, in light of the Authority's intention to increase tele-density. As the mobile market is fully saturated, then inclusion of an externality mark-up for fixed operators may be warranted, especially to encourage increased fixed network development and penetration.</p>	<p>CCTL recommends that this read:</p> <p>Statement on Externality:</p> <p>The Authority shall not include any externality markups when calculating mobile interconnection costs and setting mobile interconnection rates. However, externality markups may be considered when determining fixed</p>	<p>The Authority disagrees with CCTL's recommendation and as such has adopted the position of the ITU in regard to externality. At present, there is no sufficient evidence to support the inclusion of externality in setting fixed interconnections rates.</p>

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			interconnection costs and setting fixed interconnection rates.	
Section 5				
5.2 Sample Benchmarks	Ministry of Public Administration and Information, (MPAI)	Notwithstanding the disclaimer placed before the sample benchmarks included in this document, it may be advantageous, even for illustrative purposes, to include more varied examples, or to categorize by region.	The Authority should include more varied examples, and categorize them by region.	The Authority notes MPAI comments. However, in light of a current dispute on interconnection rates the Authority has decided to delete the sample benchmark section, and enhance this section on the costing benchmark methodology, that would be used by the Authority.
	Digicel Trinidad Limited	Digicel notes the Authority's comments on benchmarking and in particular its opening remark that "Benchmarks may serve as a proxy for cost-based prices" . Establishing a proxy for cost based prices is precisely the reason that regulators have consistently adopted benchmarking. Digicel is satisfy that a benchmarking approach to setting Digicel's interconnection rates in accordance with the rates the Authority has collected from international consultancy, Ovum would be appropriate.		The Authority notes Digicel' comment, but advises that international cost-based benchmarks will only be an interim measure in the absence of a cost model.
	Columbus Communications Trinidad	CCTL notes that in Section 3, the Authority speaks to benchmarking retail prices when determining interconnection costs. CCTL agrees with this approach, to ensure the cost-	CCTL recommends that sample retail rates for fixed and mobile networks should also be included	The Authority notes CCTL comment but advises that the rates have not been included in

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	Limited	<p>based interconnection rates being benchmarked are reflective of rates for telecommunications services in Trinidad and Tobago's markets. At worse, a concessionaire should be able to access rates provided by a concessionaire for its own on-net calls, for interconnection rates. CCTL is however somewhat concerned about the sample benchmarks illustrated in the draft policy as they show a wide disparity between fixed and mobile interconnection rates. This wide disparity would have been caused by inclusion of the externality markups for mobile services in those jurisdictions, which the Authority has concluded are not relevant to Trinidad and Tobago, and the non-requirement for interconnection rates to be cost-based in many of those jurisdictions initially. CCTL has noted the disclaimer included by TATT indicating that the samples are for illustrative purposes only. In this regard, there is little justification for the interconnect costs between fixed and mobile networks to vary so widely, as in CCTL's experience, the cost of a wired fixed network is far greater than the cost of a mobile network, especially as it pertains to construction into rural and sparsely populated areas. CCTL also notes that retail rates were not included in the sample benchmarks presented, as intimated by the Authority earlier in the policy document.</p>	<p>in this section, as it is important that the underlying interconnect costs be reflective of the retail rates offered.</p> <p>CCTL also strongly recommends that the benchmarks used for evaluation be re-considered, to benchmarks that are more applicable to the rates that exist in Trinidad and Tobago's market.</p>	the revised document.