The Long Run Average Incremental Cost (LRAIC) Data Request

For the LRAIC Model

October 23, 2012

1 Introduction

In accordance with the Costing Methodology,[1] the Telecommunications Authority of Trinidad and Tobago (TATT) has developed a top-down long run average incremental cost (LRAIC) model of fixed and mobile networks in Trinidad and Tobago. Concessionaires are required to submit cost information and volume information as part of this process. This data request should be read in conjunction with the LRAIC Specification Paper[2]. The LRAIC Specification Paper sets out guidelines on the model's underlying principles and methodology and has been consulted upon by the Authority with all relevant concessionaires within the market.

Concessionaires are requested to submit information to TATT within six(6) months of their respective financial year end. Such information must include audited financial statements. As part of the LRAIC model data request, concessionaires are requested to submit information on:

- Operating costs and balance sheet items;
- External service volumes
- Usage and routing factors;
- Current number of employees, vehicles, power and floor space requirement; and

A Microsoft Excel spreadsheet template has been developed which sets out the data required for the LRAIC model as a pro forma.

TATT has issued a current cost accounting (CCA) data request separately to collect capital cost data. This also consists of an Excel data template and detailed guidelines.

The role of concessionaires is fundamental in ensuring that the model inputs, and ultimately the model results and any regulatory decisions based on the results thereafter, reflect the operating environment faced by concessionaires in Trinidad and Tobago. Data provided by concessionaires for the purposes of this study shall, in all instances, be treated as highly confidential and will not be made available to other concessionaires.

The rest of this section sets out an overview of the data collection process, the spreadsheet contents and some general guidance for completing the spreadsheet.

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1 "The costing methodology for the communications sector", TATT, 29 May 2008

2 "The Long-Run Average Incremental Cost (LRAIC) Model Specification Paper", TATT, 01 March 2010 and updated April 2012

This document sets out guidelines on completing each sheet and therefore follows the structure of the spreadsheet:

- Cover;
- Contact details;
- Labour costs and volumes;
- Other opex;
- Balance sheet items;
- Transmission allocation;
- Service volumes; and
- Routing factors.

Information on cost volume relationships (CVRs) and conversion factors will not be updated on an annual basis and thus do not form part of the annual data collection.

1.1 Overview of the data collection process

The table below summarises the next steps in the data collection process. This document represents the detailed data request.

Table 1. Overview of the data collection process

Stage	Role of the Authority	Role of concessionaire	Timeline
Issue of detailed data request	Issue LRAIC specification paper that sets out the requirements for the LRAIC modelling process and reflects the level of data available, the time scale for data collection and the LRAIC model requirements	Seek clarification on any aspects of the data request not fully understood	**2 weeks**
Submission of initial LRAIC data	Review LRAIC data as it is submitted Request clarification of data submitted where necessary Provide clarification of data requested as required by operators Assist operators in methodological issues and identifying potential data sources	Submit data as it becomes available and before the deadline for data submission Provide clarification/validation of data requested as required within a reasonable time period	**6 weeks**
Submission of final version of LRAIC data		Submit final version of LRAIC data and full documentation of methodology, sources and results	**5 weeks**
Input data submitted into LRAIC model	Input data into LRAIC model and sense check the outputs	Provide clarification where necessary	**5 weeks**

It is envisaged that concessionaires will need to work closely with TATT in order to prepare the requested data. Therefore, if further clarification is required with respect to the data requested and the data collection process, concessionaires should contact TATT as soon as queries arise rather than waiting until the final

deadline for submissions. After the initial submission of data, TATT may require a revised submission of data if there are errors or omissions in the data supplied.

2 Completing the data request

This section sets out:

- An overview of the spreadsheet contents; and
- General guidelines on completing the data request.

2.1 Overview of spreadsheet contents

The spreadsheet is split into a number of sheets with areas where concessionaires are required to provide data clearly highlighted in yellow (see Section 2.2 for more guidance on the formatting used). Short notes to provide concessionaires with guidance on how to complete the data request are also provided within the spreadsheet. The contents of the spreadsheet and the data requested are summarised in the table below.

Table 2. Data request contents

Sheet name	Description	Information requested from concessionaires
Cover	Version history, spreadsheet description (purpose and contents).	To update the version history table when submitting data to the Authority. To enter the time period the data relates to.
Contact_details	Contact details for the main people involved in the data collection should TATT require clarifications on data submitted.	To provide contact details for relevant staff.
Labour costs and volumes	Labour costs and volumes by department.	To provide total pay costs, number of employees, number of vehicles and number of computer workstations by department.
Other OPEX	Operating costs for assets and other activities.	To provide total operating costs for each of the categories listed.
Balance sheet items	Current assets and liabilities in the concessionaire's balance sheet.	To provide opening and closing values for the balance sheet items listed and to calculate year average values.
Transmission allocation	Data on the total capacity of transmission equipment in terms of links and length.	To provide data for each of the different transmission network elements.
Service volumes	Retail and wholesale volumes.	To provide volumes for fixed access, fixed call and mobile services.
Routing factors	Data on the average use of network elements by different call types.	To provide routing factors for fixed call and mobile services.

Source: Frontier Economics

2.2 General guidance for completing the spreadsheet

The spreadsheet has been developed so that it can be used by all concessionaires participating in the LRAIC modelling process. This means that it contains categories which may not be applicable to all concessionaires. Concessionaires are required to only provide data for the cost categories and services which are relevant to them.

A guide to the formatting used in the spreadsheet is presented below

2.2.1 Formatting guide

To assist concessionaires in providing the data required, the spreadsheet has been colour coded and annotated. The table below sets out a guide to the formatting used.

Table 3. Formatting guide

Formatting type	Example	Description
Input cells	*120*	Concessionaires are requested to enter data in these cells
Calculation cells	1,932	Cell values calculated by the spreadsheet - these cells should not be altered by concessionaires
Help cells	*Type description of asset*	Instructions and guidance notes for concessionaires

Source: Frontier Economics

2.2.2 Time period for data submission

The first request for data was made in the year 2010 and concessionaires were required to submit data for the reporting year that ended in the calendar year 2009. For example,

- concessionaires with April to March financial reporting years were required to submit data for the period April 2008 to March 2009 and
- for concessionaires with January to December reporting years, information was submitted for the period January 2009 to December 2009..

In this regard, upon annual request of the data by the Authority, concessionaires are required to provide information for the financial reporting period that ended in the calendar year previous from the year in which the request is being made.

All financial data, service volumes and operational data should be for the same period. For example, subscriber numbers should reflect the average number for the reporting year.

2.2.3 Further guidance

The LRAIC data request template is a generic template. As such, not all requested information may be relevant to each concessionaire. The Authority is happy to provide further guidance on what information is needed from each concessionaire.

Furthermore, certain parts of the LRAIC data request templates are focussed on mobile and fixed wireline network operations. In recognition of significant differences between these networks and, in particular, cable TV networks and fixed wireless network, annex 1 provides further guidance.

3 Cover

The "Cover" sheet of the spreadsheet provides general information about the contents of the spreadsheet and the data required from concessionaires.

The first table on this sheet is a version log. As described in Section 1, the data submission process may require the submission of revised information after the initial submission. Therefore, concessionaires are requested to enter in brief details of how versions of the data submitted vary from previous versions submitted. This will also help concessionaires to manage the data collection process internally.

Figure 1. Sample version log table

Date	User	Action
23-Feb-10	Jo Bloggs	Service volumes added

The remaining tables in this sheet set out:

- the spreadsheet purpose;
- spreadsheet contents (as set out in Table 2 above); and
- formatting guide (as set out in Table 3 above);

These tables do not require any input from concessionaires.

The table at the bottom of this sheet sets out the time period covered (this is used for labelling in other parts of the spreadsheet). Concessionaires are requested to enter the month in which their statutory reports start, from the drop-down menu (see the figure below) and to type in the year of the last reporting year.

Figure 2. Selecting starting month of reporting year

Source: Frontier Economics

4 Contact details

TATT requires contact details for key personnel should additional clarifications on the data submitted be required. Concessionaires should provide details (name, role, e-mail address and phone number) for a main point of contact in the "Contact details" sheet. Concessionaires should provide contact details for the people responsible for collecting financial information and technical network information where these people are different to the main point of contact.

Figure 3. Table for concessionaires to complete with contact detail information

Information required	Please type in yellow cells
Name	[First name] [Surname]
Concessionaire name	[Concessionaire X]
Role	[Job title/ description]
E-mail address	[e-mail address]
Phone number	[phone number]

5 Labour costs and volumes

Concessionaires are requested to enter the following data in the "Labour costs and volumes" sheet for each of the activities listed:

- All direct labour costs (including salaries, benefits and so on);
- Number of employees (full time equivalents – FTEs);
- Number of vehicles used; and
- Number of workstations used.

Figure 4. Extract from "Labour costs and volumes" sheet

Activity Category number	Activity category description	Notes	Total pay costs (TT$)	Number of employees (Full Time Equivalents)	Number of vehicles used (units)	Number of workstations (PCs/laptops)
NA01	Network executive management	Management of network activities and staff				
NA02	Network strategy, planning and procurement					

Source: Frontier Economics

5.1 Total pay costs

Concessionaires are requested to provide information on the total pay costs (including salaries, benefits and so on) for all staff including temporary staff and contractors split between each of the activity categories listed. This information should be available from the general ledger (GL). Costs should be entered in TT$ on an annual basis for the reporting year.

5.2 Number of employees

Concessionaires are requested to provide information on the average number of full-time employees (FTEs) including temporary staff and contractors working in each activity category during the reporting year. This may be estimated using company organisation charts. Where concessionaires are unable to provide the level of disaggregation required, concessionaires are requested to provide information on the total number of employees. These will then be allocated to the different activity categories in proportion to total pay costs.

5.3 Number of vehicles used

Concessionaires are requested to provide information on the average number of vehicles used by the staff in each work activity category during the reporting year. Where concessionaires are unable to provide the level of disaggregation required,

concessionaires are requested to provide information on the total number of vehicles. These will then be allocated to the different activity categories in proportion to the number of FTEs.

5.4 Number of workstations

Concessionaires are requested to provide information on the average number of computer workstations (PCs and laptops) used by the staff in each activity category during the reporting year. Where concessionaires are unable to provide the level of disaggregation required, concessionaires are requested to provide information on the total number of workstations. These will then be allocated to the different activity categories in proportion to the number of FTEs.

6 Other opex

For each of the categories listed, concessionaires are requested to provide information on the operating costs in the "Other OPEX" sheet. This information should be available from the general ledger (GL). Costs should be expressed on an annual basis in TT$ for the reporting year.

Figure 5. Extract from the "Other OPEX" sheet

Operational expenditure

OPEX category number	OPEX category description	Notes	Total Opex (TT$)
NET01	Utilities (energy and fuel)	Energy, fuel and other utilities required for network equipment	
NET02	Site rental costs	Rental of sites for buildings and external equipment	
NET03	Network maintenance fees	Fees for 3rd party maintenance of equipment	
NET04	Frequency fees	Fees for usage of frequency	

Source: Frontier Economics

7 Balance sheet items

For each of the balance sheet items listed in the "Balance sheet items" sheet, concessionaires are requested to provide information on the year's opening and closing values. Concessionaires should inform TATT if the annual average for items is believed to be materially different from a simple average of the opening and closing values.

Figure 6. Current assets and liabilities

Current assets and liabilities

Balance sheet category number	Balance sheet category description	Notes	Opening value (TT$)	Closing value (TT$)	Average value in year (TT$)
BS01	Cash and cash equivalents				
BS02	Investments				
BS03	Inventory - Network				
BS04	Inventory - Non Network				
BS05	AR - Wholesale				
BS06	AR - Retail				
BS07	Short term loans				
BS08	AP - Employees				
BS09	AP - Trade Creditors				
BS10	Provisions				
BS11	Vat Payable				
BS12	Vat Receivable				
BS13	Deferred Income				
BS14					
BS15					

Source: Frontier Economics

8 Transmission allocation

Concessionaires are requested to enter information on how transmission capacity is split between different network elements in the "Transmission allocation" sheet.

As described in the LRAIC Specification Paper, there are two types of transmission equipment. The first is capacity dependent domestic transmission which consists of network components for which the cost is dependent on the number and capacity of links but largely independent of the length of links. Examples include transmission terminal equipment and cross connects. The second is length dependent domestic transmission which consists of network components for which the cost is dependent on the length of links they serve (which may also be dependent on the number and capacity of links). Examples include fiber cables and the duct which houses the cables.

For each of the network elements listed in this sheet, concessionaires are requested to provide details of the total capacity (in T1 equivalents or E1 equivalents as appropriate) and the total length (in T1/E1 km equivalents, for example, a T 1 link of 10km length should be recorded as 10 T1 km equivalents).

The figure below provides an extract from the "Transmission allocation" sheet.

Figure 7. Transmission allocation

Network element number	Network element description	Notes	Total capacity (T1 equivalents)	Total capacity by length (T1 km equivalents)
TR-N1-N2	Transmission N1-N2	Voice (TDM) transmission between remote concentrators and local switches (or other concentrators)		
TR-N2-N2	Transmission N2-N2	Voice (TDM) transmission between 2 local switches		
TR-N2-N3	Transmission N2-N3	Voice (TDM) transmission between a local switch and a tandem switch		
TR-N3-N3	Transmission N3-N3	Voice (TDM) transmission between 2 tandem switches		

Source: Frontier Economics

The majority of the entries in the transmission allocation sheet are directed at those concessionaires who operate complex core transmission networks supporting hierarchical switching networks, for example, the incumbent's wire line network or mobile networks. Other concessionaires will only need to enter data in a small number of rows, for example detailing transmission links to other network.

8.1.1 Ethernet versus SDH networks

Next generation networks may use packet switched transmission (e.g. Gigabit Ethernet links over fibre) in addition to legacy TDM transmission links (e.g. SDH). While the two transmission technologies may provide substitute functionality, the cost allocation to services will be more accurate if the costs of the two technologies are separately identified and allocated. Where concessionaires operate both technologies they are requested to provide data on the costs of the related transmission equipment separately and to provide separate allocations in the 'Transmission Allocation' sheet of the LRIC data request.

9 Service volumes

Concessionaires are requested to provide annual volumes for the services listed in the "Service volumes" sheet of the data request using the units specified. For calls, volumes should be calculated based on call duration on a per second basis (in other words, there should be no rounding of minutes) and recorded in minutes.

The units used for the total volume of service are typically:

- conversation minutes in the case of circuit switched services;
- messages in the case of SMS services;
- bytes in the case of packet switched services.

Care must be taken when measuring volumes of similar services, to ensure a consistent approach is used or to ensure the estimates are adjusted to take account of differences in measurement. For example, data from retail billing systems often present data in terms of "billed minutes" where conversation time is rounded up to the nearest billing increment, while interconnection minutes are usually billed on a per second basis and so output from interconnection billing systems is generally on a per second basis. In the case where retail billing increments are of similar duration to average call length there can be a significant difference between "billed" minutes from the retail billing system and minutes on a per second basis from the interconnection system, with "billed" minutes being materially higher than minutes on a per second basis. In this case a conversion factor should be used to convert to a per second basis.

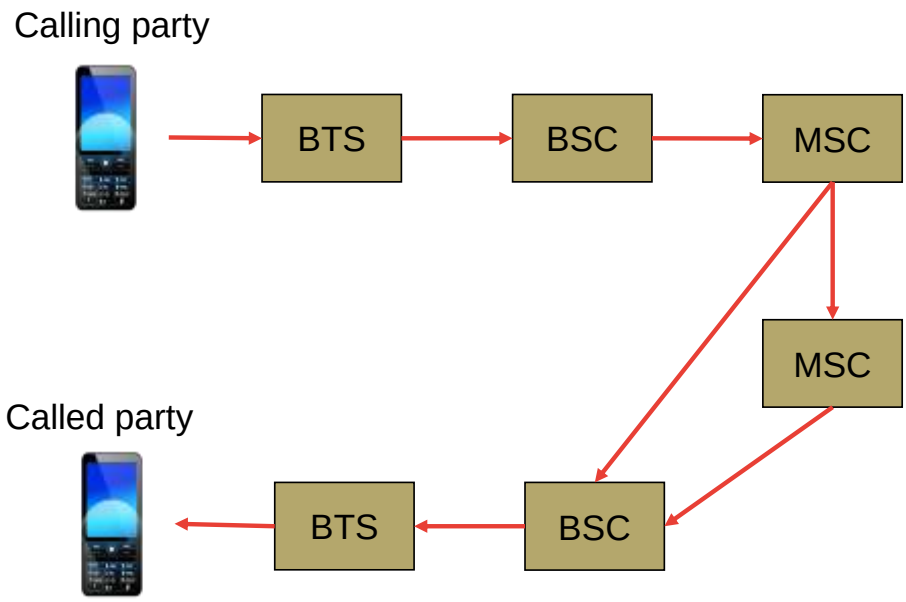
10 Routing factors

Concessionaires are requested to provide routing factors for each of the call types listed in the "Routing factors" sheet.

Routing factors are used to describe the way in which a call makes use of different network elements. Concessionaires are requested to provide routing factors for each of the network services listed in this sheet.

The figure below shows a simplified diagram of how mobile calls are routed in different ways over the mobile network and therefore make different use of network elements in order to explain how concessionaires should calculate routing factors.

Figure 8. Simplified network diagram



Source: Frontier Economics

In this simplified example, an on-net call could be routed in two different ways, either:

- It would be routed via a BTS, a BSC, an MSC and then directly to the BSC and BTS of the called party (A); or
- It would be routed via a BTS, a BSC, an MSC and to another MSC before being routed to the BSC and BTS of the called party (B).

If 70% of on-net calls are routed in the first way (A) and 30% in the second way, (B) the routing factors would be calculated as set out in the table below.

Table 4. Simplified calculation of routing factors for an on-net call

	BTS	BSC	MSC	% of on-net calls routed in this way
On-net call (A)	2	2	1	70%
On-net call (B)	2	2	2	30%
Average on-net call	2	2	1.3 =(1*0.7)+(2*0.6)	n/a

Source: Frontier Economics

This information should be readily available from concessionaires' network engineers as this information is typically used for network planning purposes.

Annexe 1: Technology specific guidance

Treatment of CATV network assets in the data request

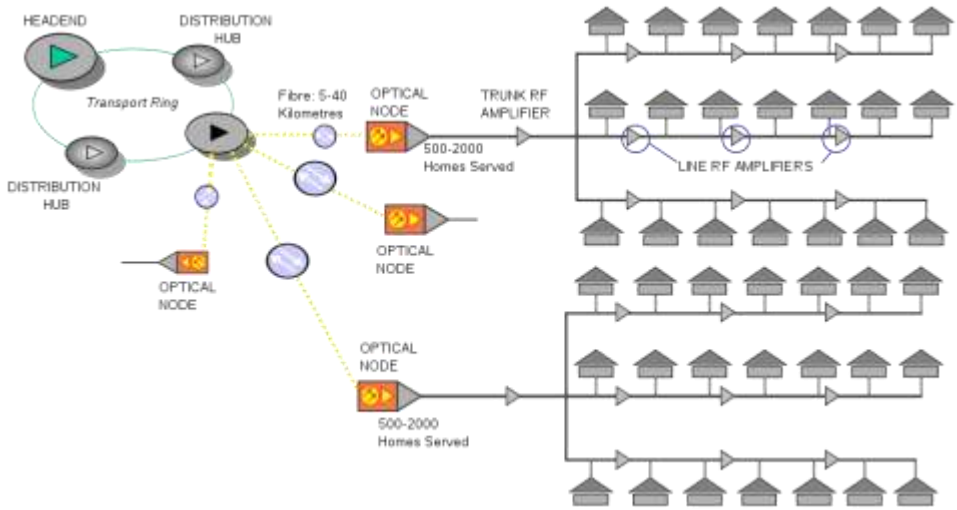
Below we outline our proposed treatment of CATV network assets, including:

- a mapping CATV networks to the asset categories;
- how to recover cost components across services; and

10.1.1 Mapping CATV networks to the asset categories

The Figure below provides an overview of a common hybrid fibre-coaxial (HFC) network structure.

Figure 9. Overview of HFC Infrastructure



Source: Wikipedia

We assume that upgraded CATV networks have a basis topology that reflects the diagram above. Based on this topology the components would be mapped to the following asset categories.

Table 5. Mapping CATV network components to LRAIC Asset Categories

Network component	Notes	LRAIC cost code	LRAIC description
Cable modem/MTA		ACN010	Customer premise equipment - fixed
Co-axial cable	Including RF amplifiers	ACF009	Co-axial cable
Optical node		ACF012	HFC optical node
Fibre	Including all fiber connecting Optical nodes/Distribution hubs, head ends and core	ACI012	Fibre cables (core)
Duct	Including both access and core duct	ACI001	Duct
Distribution hub		ACF025	CATV distribution hub
Cable Modem Termination System (CMTS)		ACF019	Cable headend equipment - DOCSIS receiver
Television head end equipment	Broadcast and other (e.g. VOD)	ACF018	Cable headend equipment - television broadcast
IP Routers		ACF022	Packet switched router
Call Management Server		ACF006	VOIP soft switch or media gateway
Media/Signalling Gateway		ACF006	VOIP soft switch or media gateway

Source: Frontier Economics

10.1.2 Recovery of cost components across services

Upgraded (HFC) cable networks typically carry a triple play of services (video, broadband and voice) over a common set of network components. In order to

derive cost -oriented prices for individual services, costs of network components must be attributed across the services that use the component.

One of the critical concepts in regulatory service costing for fixed networks is the division between subscriber sensitive and traffic sensitive elements of the network. In traditional TDM networks the subscriber sensitive elements of the network are considered to be the copper access network and the subscriber dedicated parts of remote concentrators and local exchanges (e.g. line cards). In the case of CATV networks, we propose to consider the co-axial network and CPE to be subscriber sensitive (i.e. the cost of the network is partially dependent on the number of subscribers but independent of traffic) with the remaining network components assumed to be traffic sensitive.

Based on our proposed definition of the split between subscriber- and traffic-sensitive network components, there are no components which are both subscriber- and traffic-sensitive. Thus, there is no need to define CVRs for CATV network components.

The table below sets out Frontier's view on how costs should be attributed to services.

Table 6. Allocation of CATV network components to services

Network component	Services recovered from	Attribution method	Notes
Cable modem/MTA	Monthly subscription fee	Direct to subscribers	Where CPE owned and maintained by the operator
Co-axial cable	Monthly subscription fee	Direct to subscribers	Co-axial cable assumed to be incremental to number of subscribers but independent of service (traffic) volume
Optical node	Television, broadband and voice	Combination of channels used (as between TV and other services) and bandwidth (as between VoIP and broadband services	HFC optical node
Fibre	Television, broadband and voice	Allocated to network elements on the basis of c capacity length	Network elements common to broadband and voice then allocated on the basis of routing tables and conversion factors
Duct	Television, broadband and voice	Allocated to network elements on the basis of c capacity length	Network elements common to broadband and voice then allocated on the basis of routing tables and conversion factors
Distribution hub	Television, broadband and voice	Allocated on the basis of capacity used for television services and broadband/voice	

		services	
Cable Modem Termination System (CMTS)	Broadband and voice	Allocated on the basis of routing and conversion factors	Conversion factor reflecting the voice codec bit rate and average traffic usage by broadband subscribers
Television head end equipment	Television only	N/A	
IP Routers	Broadband and voice	Allocated on the basis of routing and conversion factors	Conversion factor reflecting the voice codec bit rate and average bandwidth traffic for broadband subscribers
Call Management Server	Voice	N/A	
Media/Signalling Gateway	Voice	N/A	

Source: Frontier Economics

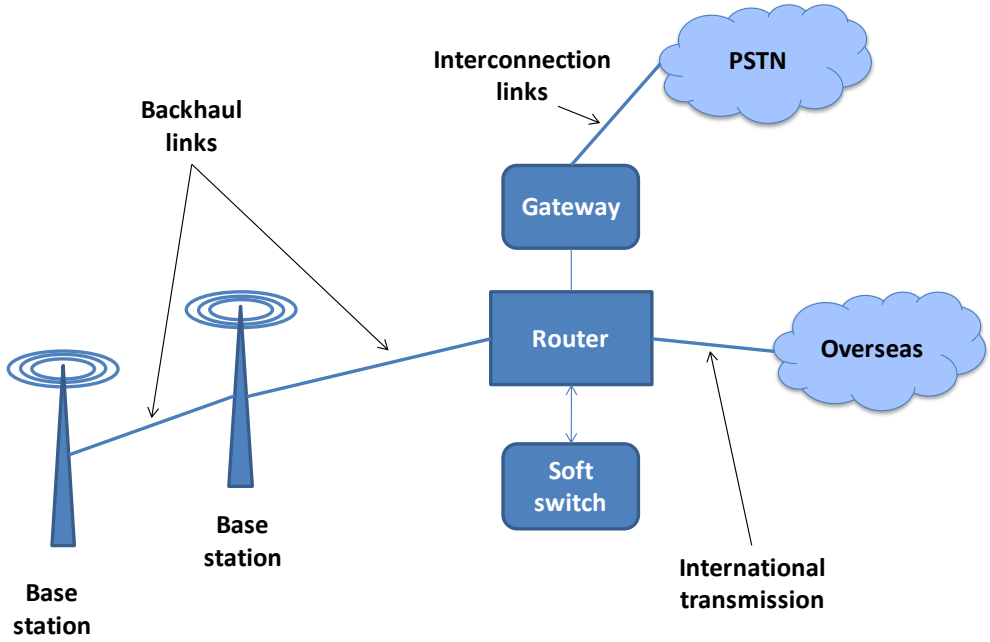
The sheet 'Access Allocation' requests the information required to allocate the costs of the CATV access network between broadcast television, including Near Video on Demand (NVOD) and services delivered over the IP network, including voice over IP (VoIP), broadband Internet Access and true Video on Demand (VOD) services.

The allocation of costs to voice and non-voice services will be based on estimates on the proportion of bandwidth used by VoIP services (see section below). In general, given the relatively flat network hierarchy, routing factors should be relatively straightforward (i.e. either 1 or 0). Furthermore it is not necessary for concessionaires operating CATV networks to provide information on Cost Volume Relationships (CVRs).

Fixed Wireless Access Networks

Concessionaires operating fixed wireless networks typically have a relatively simple network structure as shown in the diagram below.

Figure 10. Fixed wireless network structure



Source: Frontier

Point to multipoint fixed wireless access networks consist of a number of base stations which provide the final connection to the end user. These base stations are then connected to a router in the core network through as series of 'backhaul' transmission links. These links can be in various configurations. For example, they can set up as direct connections to a core network site in a star topology or the base stations are 'daisy chained' with distant base stations connected to the core network via nearer base stations. As no switching occurs in the access network, the combination of the base stations and backhaul transmission can be considered a single network element.

Internet traffic to and from the access network will then be routed to the Internet. Voice traffic to and from the access network may be routed to the PSTN via a gateway and interconnection links, under the control of a soft switch.

10.1.3 Network Elements

The table below sets out the Authority's view on how the network elements of FWA networks should be treated in the updated LRAIC data request template.

Table 7. Allocation of FWA network elements

Network Element	Components include	Notes
Access network	Base stations Backhaul links	Transmission for backhaul links identified in sheet 'Transmission allocation' in category 'TR-FWA' Use of access network by VoIP indentified in sheet 'Access allocation' as set out below
Router	Router	Use of router identified in sheet 'Routing factors' as network element 'N3'
Soft switch	Soft switch	Use of soft switch identified in sheet 'Routing factors' as network element 'VOIP'
Interconnection	Gateway Interconnection links	Interconnection links with operators in Trinidad & Tobago should be identified in sheet 'Transmission allocation' in category 'TR-IX' Use of interconnection link identified in sheet 'Routing factors' as network element 'TR-IX'
Overseas transmission	Transmission links for voice and data traffic	Transmission for backhaul links to cable landing stations identified in sheet 'Transmission allocation' in category 'TR-INT' Use of international transmission identified in sheet 'Routing factors' as network element 'TR-INT'