Results of an Interconnection Benchmarking Study for the Telecommunications Sector of Trinidad and Tobago

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1. Introduction

1.1 Requirements for Interconnection Benchmarking Study

The main objective of this report is to provide the results of a robust international benchmarking study of interconnection rates, in fulfillment of Regulation 15(2) of the Telecommunications (Interconnection) Regulations (2006) for the local telecommunications sector.

On the subject of network interconnection, Section 25(2)(m) of the Telecommunication Act Chap 47:31 states that:

> *… the Authority shall require a concessionaire to … disaggregate the network and, on a cost oriented basis such 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.*

Furthermore, Regulation 15 (2) (3) of the Telecommunications (Interconnection) Regulation (2006) stipulates:

> *15 (2) Where the relevant data for the establishment of the costing methodologies, models or formulae are unavailable within a reasonable time, the concessionaire may set interconnection rates with reference to such costing benchmarks, as determined by the Authority, that comport with internationally accepted standards for such benchmarks.*
>
> *(3) A concessionaire shall within twenty-eight days of a written request from the Authority, unless this period is expressly extended by the Authority in writing, supply to the Authority such data as the Authority may require, for the purpose of determining that its interconnection rates are in accordance with this regulation.*

Ensuring that prices for interconnection services are cost-based is a standard policy objective of National Regulatory Authorities (NRAs) around the world. It is commonly accepted that moving wholesale call termination rates closer to costs promotes both static and dynamic (i.e., longer term) economic efficiency and, as a result, competition. In addition, moving termination rates closer to costs may have the effect of lowering consumer prices which may in turn stimulate consumer demand for the operators' services.

1.2 Review Cycle

Given the dynamic nature of the sector, the need may arise to amend the Study to support the implementation of any new costs or prices which may be identified. In such a case, the Study would be modified in consultation with the public and with stakeholders as the Authority deems appropriate. The Study's maintenance history would be revised accordingly.

1.3 Consultation Process

The consultation process adopted by the Authority on the *Results of an Interconnection Benchmarking Study* is in accordance with the Authority's "*Procedures for Consultation in the Telecommunications Sector of Trinidad and Tobago" (2010).* The document will be revised with consideration given to the comments and recommendations made during the consultation process.

The first round of consultation will commence on Monday 27th March 2017 for a period of four (4) weeks, concluding on 28th April 2017.

2. Structure of the Interconnection Benchmarking Study

The ***draft*** Consultative Report appears in Appendix 1. The Report is structured as follows:

- Chapter 3 sets out the proposed benchmark sample jurisdiction selection criteria.
- Chapter 4 identifies and discusses the specific interconnection rate and related data collected for benchmarking analysis, sensitivity and normalization purposes.
- Chapter 5 provides the full- sample or "full-sample" benchmarking results for the primary interconnections services covered in the study.
- Chapter 6 describes the methodology used to benchmark domestic mobile and fixed call termination and presents the Authority's recommendations.
- Chapter 7 describes the methodology used to benchmark international fixed and mobile call termination rates and presents the Authority's recommendations.
- Chapter 8 provides an assessment of the flow- through effects.
- Annexes A to C provide supplementary or more detailed information in support of the report's findings and recommendations, which provide added value to the preceding Chapters.

3. Appendix 1 – The Interconnection Benchmarking Study

Consultative Document

Results of an Interconnection Benchmarking Study for the Telecommunications Sector of Trinidad and Tobago

Telecommunications Authority of Trinidad and Tobago TATT: 2/17/8

March 27th 2017

Maintenance History		
Date	**Change Details**	**Version**
March 28, 2017	Consultative study issued for 1st Round of Consultation	0.1

Contents

List of Acronyms

2012 IAs	2012 Interconnection Agreements
BEREC	Body of European Regulators of Electronic Communications
BU-LRIC	Bottom-up Long Run Incremental Cost
BVI	British Virgin Islands
CPP	Calling Party Pays
EU	European Union
FDC/FAC	Fully Distributed/Allocated Costs
FICC	Fixed International Carriage Charge
ICC	International Carriage Charge
IFTR	International Fixed Termination Rate
IMTR	International Mobile Termination Rate
LCU	Local Currency Unit
MICC	Mobile International Carriage Charge
MTR	Mobile Termination Rate
NRA	National Regulatory Agency
RIAO	Reference Interconnection and Access Offer
RPP	Receiving Party Pays
SMS	Short Message Service
TATT	Telecommunications Authority of Trinidad and Tobago
TCI	Turks & Caicos Islands
TR	Transit Rate
TTD	Trinidad and Tobago Dollar
T&T	Trinidad and Tobago
USD	U.S. Dollar

Executive Summary

The Telecommunications Authority of Trinidad and Tobago (the Authority) engaged an independent Consultant to consult and provide an Interconnection Benchmarking Study for Trinidad and Tobago. The main objective of the Interconnection Benchmarking exercise is to provide the findings of a robust international benchmarking study of interconnection rates in fulfilment of Regulation 15(2) of the Telecommunications (*Interconnection*) Regulations (2006). The key interconnection rates under consideration by the Authority, presented herein, include the domestic and international mobile termination rate (MTR); and domestic and international fixed termination rate (FTR). Information for these rates is provided in the benchmarking exercise, covering a ten-year period 2008 to March 2017. The Authority recommends that operators consider the results of the benchmarking study for these rates as regulatory maxima rather than "point recommendations."

It is to be noted that the Authority is not, within the ambit of this Consultation Document making any recommendations on other interconnection rates including, *inter alia,* short messaging service (SMS), transit and directory assistance.

The first step in the benchmarking process involved the establishment of a benchmark sample consisting of twenty-three (23) Caribbean benchmark jurisdictions. The focus on the Caribbean region was intended to ensure maximum comparability with Trinidad and Tobago. Thirty-six (36) European jurisdictions were also considered, but solely for sensitivity and cross-check purposes.

The second step involved the compilation of data into an extensive database of interconnection rates for the Caribbean benchmark jurisdictions. For the key rates under consideration—the domestic and international mobile termination rate (MTR); and domestic and international fixed termination rate (FTR)—this included monthly rate information covering a ten-year period 2008 to March 2017.

Third, a detailed analysis of the full-sample benchmarking database revealed that in a number of jurisdictions the vintage of the current interconnection rates (that is, the years in which they were established) is dated. Given the historical downward trend in interconnection rates observable in the Caribbean and European countries, the current rates in such jurisdictions are now likely overstated. Therefore, further analysis was conducted to identify jurisdictions with interconnection rates established in 2012 or later (the Post-2012 Sub-Sample) and those jurisdictions within this sub-sample that were established on a cost-basis (Cost-Based Sub-Sample).[1] These two benchmark sub-samples were used as the basis for developing recommended interconnection rates.

Fourth, to develop forward-looking recommendations, statistical trend analyses were used to project end-point benchmark rates for the Post-2012 and Cost-Based Sub-Samples. As well, levels and trends in European

[1] The other jurisdictions would have established interconnection rates based on either benchmarking or on commercial negotiations.

interconnection rates were also considered as a cross-check. On this basis, recommended FY2019/20 end-point rates for the MTR, FTR and TR were established.

Fifth, with respect to implementation, a three-year glide path (involving roughly equal step-wise rate reductions) is recommended for the establishment of end-point rates to provide operators with a transition period. Glide-path approaches are common in other jurisdictions and also consistent with the trend line projections for the benchmark rates.

This benchmarking process revealed that domestic MTR and FTR in Trinidad and Tobago are much higher than the recommended regulatory maxima and therefore should be reduced. With respect to the benchmarking analysis for international call termination rates it should also be noted that explicit international carriage charges (ICC), as applied in Trinidad and Tobago, are relatively rare, at least within the benchmark jurisdictions used for this study. Nevertheless, international call termination rates often are set at a higher rate compared to domestic call termination charges. For benchmarking purposes, the differential between the two were examined and it was discovered that the mobile and fixed ICCs currently in place in Trinidad and Tobago are much higher than comparable explicit and implicit international call termination premiums. Therefore, significant reductions are recommended for both mobile and fixed ICCs.

Table E1 summarises the benchmarking-based recommendations, including FY2019/20 end-points and three-year glide paths. Owing to the fact that Trinidad and Tobago's operators have expressly deemed local interconnection rates as confidential, the current Trinidad and Tobago rates are redacted from this report and would be made available to local operators only, upon request.

Table E1: Summary of the Authority's Benchmarking-Based Recommendations

Interconnection Rates	Current-Mar17		Apr17-Mar18	Apr18-Mar19	Apr19-Mar20
	TTD	USD			
Domestic Mobile Termination Rate (MTR)	[redacted]	[redacted]	3.50¢	2.75¢	2.00¢
Domestic Fixed Termination Rate (FTR)	[redacted]	[redacted]	0.65¢	0.55¢	0.45¢
International carriage charge (ICC) for mobile termination	[redacted]	[redacted]	5.50¢	3.50¢	1.50¢
ICC for fixed termination	[redacted]	[redacted]	1.30¢	0.80¢	0.30¢

Additional sensitivity and normalization analyses were carried out to further assess the reasonableness of these recommendations. Based on the results, no additional adjustments were found to be warranted.

Again, the Authority recommends that operators consider the results of the benchmarking study as regulatory maxima rather than "point recommendations." Further, all parties are obligated to comply with Section 5(1) of the Telecommunications (Interconnection) Regulations (2006), wherein interconnection terms and conditions, including rates, are to be provided on a non-discriminatory and equal basis to all interconnecting parties.

In considering the flow through effects, reducing interconnection rates is likely to have mixed impacts on operators: Gains or losses for an individual operator depend on relative call traffic volume flows between operators.

For consumers, reduced interconnections rates offer several potential benefits. Reductions in domestic interconnections rates should allow for potential reductions in average retail call prices. To the extent reductions in interconnection rates do in fact lead to lower average retail calling prices, increased use of mobile and fixed services by end-users should be expected. This could also promote greater inter-operator (intra-modal) competition as well as fixed-mobile competition (inter-modal) competition. As well, to the extent reductions interconnection rates lead to lower average retail prices, increased take-up of both fixed and mobile wireless services could be expected.

1. Introduction

The main objective of this report is to provide the results of a robust international benchmarking study of interconnection rates, in fulfilment of Regulation 15(2) of the Telecommunications (Interconnection) Regulations (2006) for the local telecommunications sector.

Ensuring that prices for interconnection services are cost-based is a standard policy objective of National Regulatory Authorities (NRAs) around the world. It is commonly accepted that moving wholesale call termination rates closer to costs promotes both static and dynamic (that is, longer term) economic efficiency and, as a result, competition. In addition, moving termination rates closer to costs may have the effect of lowering consumer prices which may in turn stimulate consumer demand for the operators' services.

This Consultative Report is structured as follows:

- **Chapter 3** sets out the proposed benchmark sample jurisdiction[2] selection criteria.
- **Chapter 4** identifies and discusses the specific interconnection rate and related data collected for benchmarking analysis, sensitivity and normalization purposes.
- **Chapter 5** provides the full-sample benchmarking results for the primary interconnections services covered in the study.
- **Chapter 6** describes the methodology used to benchmark domestic mobile and fixed call termination rates and presents the Authority's recommendations.
- **Chapter 7** describes the methodology used to benchmark international fixed and mobile call termination rates and presents the Authority's recommendations.
- **Chapter 8** provides an assessment of the flow- through effects**.**
- **Annexes A to C** provide supplementary or more detailed information in support of the report's findings and recommendations.

[2] Jurisdictions can also refer to countries and/or regions

2. Legislative Basis

On the subject of network interconnection, Section 25(2)(m) of the Telecommunications Act, Chap. 47:31 states that:

> *… the Authority shall require a concessionaire to … disaggregate the network and, on a cost oriented basis such 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.*

Furthermore, Section 5(1) of the Telecommunications (Interconnection) Regulations (2006) identifies that interconnection between parties should be provided under non-discriminatory terms, as specified hereunder:

> *5. (1) A concessionaire shall provide interconnection under the same terms and conditions and of the same quality as it provides for its own networks and services, the networks and services of its subsidiaries and partners, or the networks and services of any other concessionaire to which it provides interconnection.*

In addition, Sections 15 (2) and (3) of the Telecommunications (Interconnection) Regulations (2006) mandates the parameters for the setting of interconnection rates in the local telecommunications industry, which is specified as follows:

> *15 (2) Where the relevant data for the establishment of the costing methodologies, models or formulae are unavailable within a reasonable time, the concessionaire may set interconnection rates with reference to such costing benchmarks, as determined by the Authority, that comport with internationally accepted standards for such benchmarks.*
>
> *(3) A concessionaire shall within twenty-eight days of a written request from the Authority, unless this period is expressly extended by the Authority in writing, supply to the Authority such data as the Authority may require, for the purpose of determining that its interconnection rates are in accordance with this regulation.*

3. Benchmark Sample Selection Criteria

3.1. Sample Section Criteria

The selection of the jurisdictions is the first and one of the most critical steps in the process of benchmarking analysis. Selected jurisdictions are directly comparable to the target market, in this case Trinidad and Tobago. The Consultant (SCI) conducted a number of studies in the Caribbean region, all of which focussed primarily on Caribbean jurisdictions for benchmarking purposes.[3] Drawing on best practice and benchmark jurisdiction selection criteria established in previous SCI studies in the Caribbean, the criteria used in this study are as follows:

i) **Regional Geography**: Only states in the Caribbean Region are included in the benchmark sample. This criterion ensures a reasonable degree of comparability because operators are providing service in relatively comparable geographic and climatic conditions.

ii) **Physical Geography**: Only island nations and jurisdictions are included in the benchmark sample. This criterion ensures a reasonable degree of comparability because operators face comparable cost conditions specifically related to island states that may be different from those cost conditions that apply to continental states.

iii) **Calling Party Pays ("CPP") versus Receiving Party Pays ("RPP") Regime**: CPP and hybrid RPP/CPP regime jurisdictions are included in the benchmark sample. RPP and CPP regimes are conceptually different and hence the resulting interconnection rates may not be comparable. Therefore, this criterion excludes jurisdictions in which "pure" RPP regimes are in effect, but includes those jurisdictions that have hybrid RPP/CPP regimes and where some or all interconnection rates in such cases are deemed to be reasonably comparable for benchmarking purposes.

iv) **Number of Operators**: Only multi-mobile and fixed operator jurisdictions are included in the benchmark sample. This criterion excludes jurisdictions that have a monopoly integrated fixed-mobile operator because the concept of interconnection, for our purposes, includes competition.

v) **Availability of Interconnection Rates**: Only jurisdictions where interconnection rates are publicly available and can be independently verified are included in the benchmark sample. This criterion excludes jurisdictions where the interconnection rates are not publicly available or where they cannot be independently confirmed.

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[3] For example, this includes two consultations conducted by Turks and Caicos Islands Telecommunications Commission which led to the following decisions: Telecommunications Decision 2011-2, *Decision on the Mobile Termination Rate Review*, Turks and Caicos Islands Telecommunications Commission, January 24, 2011 and Telecommunications Decision 2014 – 4, *Decision on the Review of Interconnection Rates,* Turks and Caicos Islands Telecommunications Commission, June 20, 2014.

vi) **Confidentiality of Interconnection Rates**: Only jurisdictions where the interconnection rates are not claimed to be commercially confidential by all operators are included in the benchmark sample. In jurisdictions where some mobile operators claimed confidentiality, the interconnection rates of those that did not claim confidentiality or have disclosed the interconnection rates are used. This criterion excludes jurisdictions where interconnection rates are claimed to be commercially confidential by all operators.

These selection criteria allow the establishment of a consistent benchmarking sample of reasonable scope, thereby limiting the influence of any one jurisdiction on the results, while at the same time maintaining an appropriate degree of comparability to Trinidad and Tobago.

3.2. Selected Benchmark Sample Jurisdictions

The benchmark selection criteria, resulted in a benchmark sample of twenty-three (23) Caribbean jurisdictions:

- Anguilla
- Aruba
- The Bahamas
- Barbados
- British Virgin Islands (BVI)
- Cayman Islands
- Dominican Republic
- **Eastern Caribbean Telecommunications Authority (ECTEL) Member States**:
    - Dominica
    - Grenada
    - St. Kitts and Nevis
    - St. Lucia
    - St. Vincent and the Grenadines
- **French West Indies (FWI)**
    - Guadeloupe
    - Martinique
    - St. Martin
    - St. Bartholomew

- Jamaica
- **Former Netherlands Antilles (excluding Aruba):**
    - Curacao
    - St. Maarten
    - Bonaire
    - Saba
    - St. Eustatius
- Turks & Caicos Islands (TCI)

There are several other notable Caribbean island-jurisdictions that were excluded from the benchmark sample because they fail to satisfy one or more of the selection criteria:

- Antigua and Barbuda, Montserrat and Haiti - Interconnection information not publicly available and/or confidential
- Bermuda, Puerto Rico and the U.S. Virgin Islands -Pure RPP regimes
- Cuba- Monopoly provision of mobile service

3.3. Benchmark Sample Jurisdiction Grouping

The twenty-three (23) benchmark sample jurisdictions constitute the universe of jurisdictions that meet the selection criteria. However, there were instances where groupings of the jurisdictions were more appropriate for benchmarking purposes. For instance, the jurisdictions included in the ECTEL Member-States, the French West Indies and the Former Netherlands Antilles all have strong political, economic and, above-all, regulatory commonalities. This raises the question as to whether, for benchmarking analysis purposes, some or all of the jurisdictions should be treated separately or grouped in one more groups. Any grouping would have the effect of reducing the effective sample size under some analytical scenarios while reducing the relative weight of each jurisdiction.

In this respect, it was determined that each of the ECTEL Member-States should be treated as a separate jurisdiction given that they each have different interconnection rates despite those rates having been recommended by a single regional regulatory body (ECTEL) to the respective national regulators. On the other hand, the five former Netherlands Antilles jurisdictions (excluding Aruba), each have exactly the same interconnection rates and those rates were set through a legal decision by the same Court. Therefore, these five jurisdictions were grouped together as a single jurisdictional observation. As well, in the case of the FWI, there are the two sets of interconnection rates corresponding to the operators in Guadeloupe and Martinique and in St. Martin and St. Bartholomew. Therefore, the four FWI jurisdictions were grouped into pairs of observations.

This resulted in the following three benchmark sample groupings:

i) **Former Netherlands Antilles Grouping:** Curacao, St. Maarten, Bonaire, Saba and St. Eustatius

ii) **FWI Group 1**: Guadeloupe and Martinique

iii) **FWI Group 2**: St. Martin and St. Bartholomew

Therefore, the effect of these groupings is to reduce these nine (9) initially separate sample jurisdictions to 3 grouped jurisdictions, resulting in a net reduction of 6 sample observations. Consequently, the effective full benchmark sample size reduces from 23 to 17.

3.4. Supplementary Benchmarking Data

While only Caribbean jurisdictions meeting the selection criteria were included in the primary benchmarking sample, relevant interconnection rate information for European countries were taken into account as well.[4] In this respect, interconnection rate information collected by the Body of European Regulators of Electronic Communications (BEREC) for the twenty-eight (28) members of the European Union (EU) along with 8 other European countries, for a total of 36 countries were relied on. European countries are generally not directly comparable to Caribbean jurisdictions, including Trinidad and Tobago.[5] Therefore, for this benchmarking analysis, the European rates are used for sensitivity and cross-check purposes.

[4] It is pertinent to note that we also reviewed and considered the North American experience with respect to interconnection policies and rates, including those of the US Federal Communications Commission (FCC) and the Canadian Radio-Television and Telecommunications Commission (CRTC), however, since neither has a CPP regime in place, neither were considered relevant to the benchmarking analysis conducted for this study.

[5] For instance, European countries are generally far larger in size, geography, and population and also have significantly different socio-economic characteristics, telecommunications markets and regulatory histories.

4. Benchmarked Interconnection Rates

4.1. Interconnection Service Rates

The interconnection services considered in this study can be placed into one of two categories: Primary and Secondary. This categorization was used strictly as a tool of convenience by the Consultant to reflect those interconnection services for which extensive monthly benchmarking data is available (that is, Primary Services) and others for which relatively limited benchmarking data is available (that is, Secondary Services). These categories are:

- **Primary Interconnection Services:**
    - domestic call termination to a mobile network (mobile termination rate—MTR)
    - domestic call termination to a fixed network (fixed termination rate—FTR)
- **Secondary Interconnection Services:**
    - international carriage charge (ICC) for mobile termination
    - international carriage charge (ICC) for fixed termination

As noted above, one of the selection criteria is that interconnection rate information must be publicly available. The primary sources for interconnection rate information include decisions and orders issued by the respective NRAs and/or operator-specific Reference Interconnection and/or Access Offers (RIAOs).

In the first case, NRA decisions, which are generally public documents and are generally made available on NRA websites, typically focus on primary interconnection services (MTRs, FTRs and TRs) and to a lesser extent ICCs for mobile and fixed termination. In some cases, publicly-available RIAOs were required to collect such information.

4.2. Interconnection Data Compilation Process

An existing Caribbean interconnection rate database (developed by the Consultant) was used as a starting point for this benchmarking process. This database was expanded and updated to include:

1) Additional jurisdictions (including the confidential interconnection rate data for Trinidad and Tobago);

2) Secondary interconnection services;

3) Added observations to update the database to March 2017 (previously current up to January 2014); and

4) Updated exchange rates.

A data compilation process was carried out from mid-October to mid-December, 2016. The process involved the assessment of publicly-available data from NRA websites (see References for full bibliographic details) and correspondence with NRAs. Data to March 2017 was based on a short-term assessment of a continuation of

current arrangements or expected changes, as the case may be, based on NRA websites and or correspondence.

4.3. Other Benchmarking Related Data

For sensitivity and normalization purposes (elaborated in subsequent chapters), data were collected on a wide range of demographic, economic, market-related, technological, regulatory as well as other variables for each of the jurisdictions included in the benchmark sample:

- **Demographic/Geographic Variables:**
    - population
    - land area
    - population density
- **Demographic/Geographic Variables:**
    - currency exchange rates (to convert local currencies to U.S. dollars)
    - GDP per capita (measured in U.S. dollars)
- **Market Characteristic Variables:**
    - number of mobile and fixed competitors
    - number of mobile and fixed subscribers
    - mobile and fixed penetration

- **Regulatory Variables:**
    - Party(s) who set the interconnection rates (e.g., an NRA, court or arbitration panel, or the operators themselves).
    - Basis of the interconnection rates (e.g., whether they have been set on a long run incremental cost (LRIC), fully distributed cost approach, commercial negotiation, benchmarking or other approach).
    - Vintage of the interconnection rates (that is, the time at which the rates were last set, which also reflects the current relevance or weighting of those rates).

5. Full -sample Benchmarking Results

This chapter presents the full-sample data of the benchmarking analysis for the Primary Interconnection Services. As discussed above, these results are presented for completeness only and do not constitute the recommended interconnection charges (included in subsequent chapters). Two issues should be borne in mind to appreciate the full-sample benchmarking results:

- **Interconnection Rate Units.** Interconnection rates are typically expressed on a per-minute basis. All of the benchmark sample jurisdictions express their MTRs in this manner. However, in a minority of jurisdictions, for some services, there is a combination of per-call set-up and other per minute charges, or differential time-of-day charges. To make these rates comparable to those of the other jurisdictions that only have per-minute charges, such multi-part or time-of-day rates were converted into average per minute rates using a standard three-minute call and time of day traffic assumptions.[6] Such an approach is commonly used in benchmarking studies to allow rate comparability across jurisdictions and, in any event, benchmarking results are not sensitive to reasonable changes to these assumptions.

- **Currency Exchange Rates.** Most exchange rates are reported in local currency units (LCU). All such LCU rates have been converted to U.S. dollar value (USD). Of the jurisdictions in the benchmark sample, one was denominated in USD (that is, Dominican Republic) and 13 others have fixed official exchange rates during the period under investigation. In these latter cases, the official fixed exchange rates are used. The FWI and Jamaica have floating exchange rates and Trinidad and Tobago has a managed floating exchange rate. With the objective of being able to separate out changes in exchange rates from changes in LCU interconnection rates, a single long-term (9 year) average exchange rate (weighted more heavily for the last two years) for each of these latter jurisdictions, including Trinidad and Tobago[7] was used. As discussed further below, the benchmarking results are not sensitive to reasonable changes in these exchange rate assumptions.

Owing to the fact that Trinidad and Tobago's operators have expressly deemed local existing interconnection rates to be confidential, the assessment of the full-sample benchmarking results were redacted from this report and would be made available to local operators only upon request[8].

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[6] Such methodology and assumptions have been accepted in prior benchmarking exercises. For example, this includes two consultations conducted by Turks and Caicos Islands Telecommunications Commission which led to the following decisions: Telecommunications Decision 2011-2, *Decision on the Mobile Termination Rate Review*, Turks and Caicos Islands Telecommunications Commission, January 24, 2011 and Telecommunications Decision 2014 – 4, *Decision on the Review of Interconnection Rates,* Turks and Caicos Islands Telecommunications Commission, June 20, 2014.

[7] All foreign exchanges rates were sourced from the International Monetary Fund (IMF). The local currency-USD exchange rates used in the case of FWI is 1.25, for Jamaica 0.0100 and T&T 0.1550.

[8] Requests to view confidential data apply only to authorized service providers

The full-sample results, excluding Trinidad and Tobago, are shown in Figures 1 and 2 below. The results for both mobile and fixed termination rates depict a general downward trend in average rates over the period investigated.

Figure 1 shows the entire MTR benchmarking sample results for the full-sample period April 2008 to March 2017, covering a total of 9 years for all 17 benchmark sample jurisdictions. The figure also shows the MTR full benchmark sample average (shown in red).

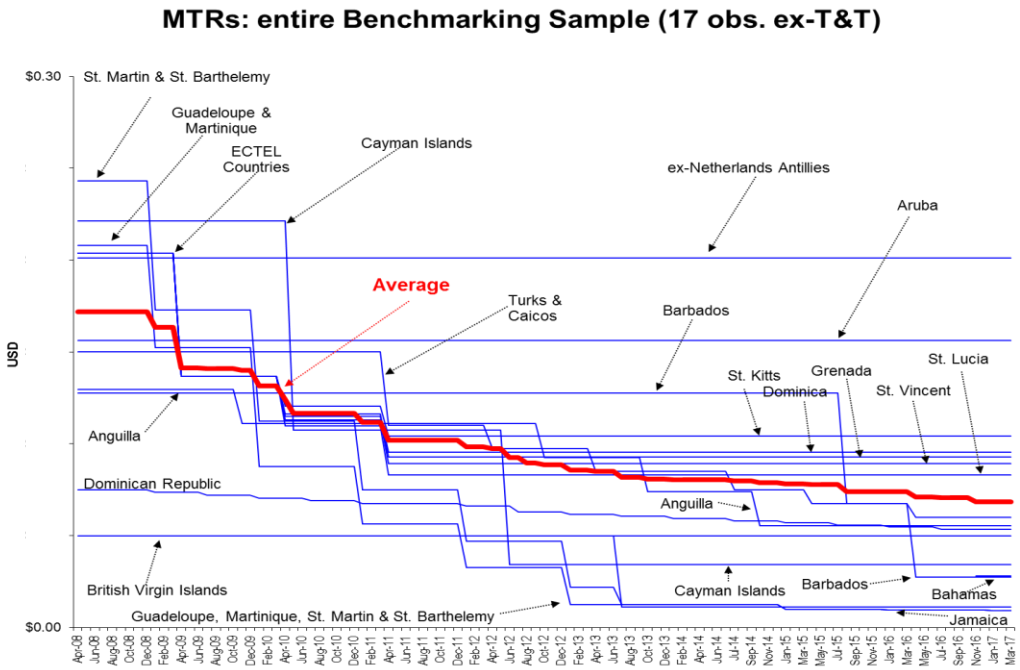

Figure 1: MTRs entire Benchmarking Sample (17 observations Excluding -T&T)

Figure 2 shows the entire FTR benchmarking sample of 17 jurisdictions from April 2009 to March 2017. The FTRs for Aruba (over USD$0.05 per minute) and the ex-Netherlands Antilles (over USD$0.08 per minute) are very high, relative to the rest of the benchmark sample and, as a result, compress excessively the scaling of the other benchmark jurisdictions in Figure 2.

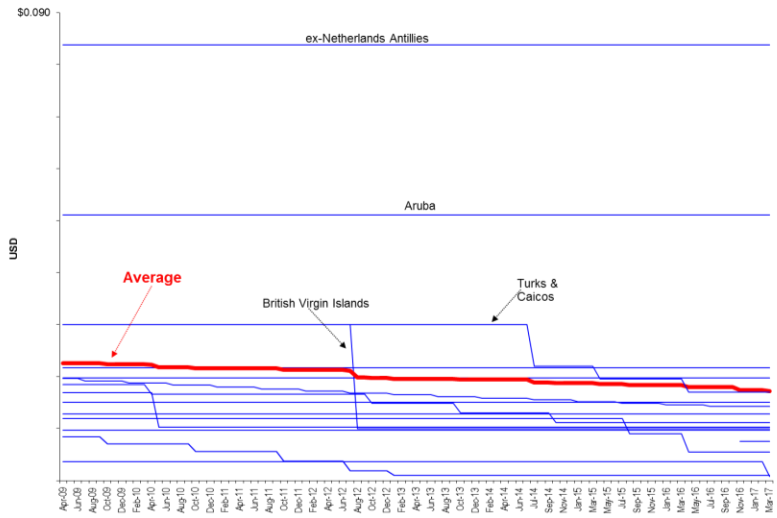

Figure 2: FTRs entire Benchmarking Sample (17 observations excluding T&T)

To account for the effect of these outliers, Figure 3 presents the same FTR data excluding Aruba and the ex-Netherlands Antilles.

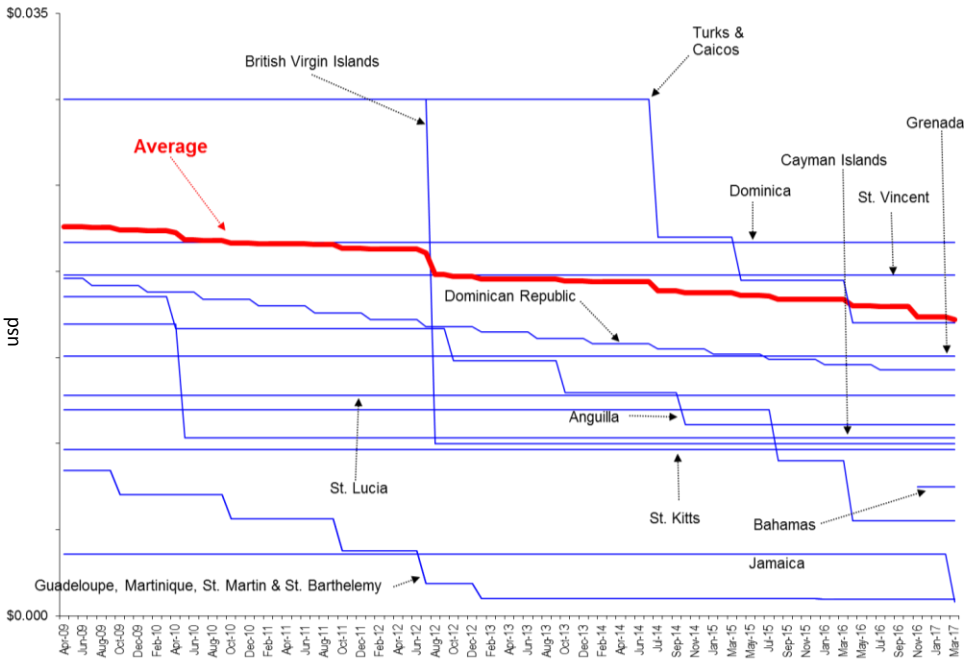

Figure 3: FTRs Benchmarking Sample (15 obs. ex NL, T&T)

6. Primary Services Recommendations

This chapter presents the benchmarking analysis methodology and interconnection rate recommendations for the Primary Interconnection Services.

6.1. Benchmarking Analysis Methodology

To develop a relevant, sound and reliable benchmarking methodology, several factors were taken into account in the analysis of the full-sample benchmarking data:

- **The vintage of interconnection decisions in the benchmark sample jurisdictions**. There were variations in the vintage of ***current*** interconnection rates in each of the benchmark sample jurisdictions. "Vintage" refers to the date of the decision that determined ***current*** interconnection rates. Some interconnection rate decisions are very recent, that is, issued in the last two years. In contrast, some decisions date back to 2007 and 2009 and, moreover, the data and information underlying these older vintage decisions are older still. The average vintage of the current observed interconnection rates is about 2012 (that is, roughly 5 years old).

  The greatest weight was given to relatively current decisions, which were those issued in 2012 or afterwards, as these were more reflective of current cost levels. The rates set in 2011 and earlier were too dated to provide a reliable basis for developing recommended interconnection rates. They were also out of step with more recently established rates in the Caribbean and internationally.[9] It is also worth noting that in many cases (e.g., the five ECTEL Member States) pre-2012 vintage rates are under review and are expected to be reduced shortly. On this basis, therefore, it was considered that any current rates that were determined in 2011 or earlier should not form part of the basis for the recommendations. Of the seventeen (17) full benchmark sample jurisdictions, the following met this threshold:

  - Anguilla
  - The Bahamas
  - Barbados,
  - Cayman Islands
  - Dominican Republic
  - Guadeloupe and Martinique
  - Jamaica
  - St. Martin and St. Bartholomew
  - Turks and Caicos Islands ("TCI")

[9] See for instance, Annex A, which shows historical rate level and trends in Europe.

Together, these nine (9) benchmark sample jurisdictions are referred to as the "Post-2012 Sub-Sample".

- **Historical trends in benchmark sample interconnection rates.** For the most part, historical benchmark interconnection rates have trended downward over time. This is evident from not only the Caribbean benchmark sample constructed for this study, but also trends in international jurisdictions, such as Europe. Therefore, as part of the benchmarking analysis, benchmark sample average rates were statistically projected to three years to March 2020 on a "best fit" statistical trend line basis. These historical trends and related projections informed recommended interconnection rates for Trinidad and Tobago, for the immediate term as well as over the course of the next several years.

- **Alternative benchmark sample averages considered.** Further analysis was conducted to arrive at the recommended interconnection rates. As a result, three alternative benchmark sample averages were considered:

    - The first benchmark average is based on the Post-2012 Sub-Sample. This sub-sample average is calculated for the historical period March 2012 to date and also projected to March 2020.

    - The second benchmark average is based on the subset of Post-2012 Sub-Sample jurisdictions that have cost-based interconnection rates (that is, Pure LRIC, LRAIC or some other cost standard). Six jurisdictions have such rates in place: The Bahamas, Barbados, Cayman Islands, Guadeloupe and Martinique, St. Martin and St. Bartholomew and Jamaica. This group of six jurisdictions is referred to as the Cost-Based Sub-Sample. The other three jurisdictions (TCI, Dominican Republic and Anguilla) determine their rates based on benchmarking or commercial negotiation. .

    - The third benchmark average is based on the European interconnection rate experience. The European benchmarks are used as a reasonableness check. A detailed summary of the European benchmark data is provided in Annex A.

- **Glide path to recommended interconnection rates.** It is proposed that interconnection rate changes be phased over a three-year period. This is a common practice in other jurisdictions. As well, the proposed glide-path is consistent with the projected rate trends. Therefore, all of the interconnection rate recommendations that follow are based on a three-year glide path to the end point date of March 2020. In each case, the recommended end point rate is generally reflective of the projection of the Post-2012 Sub-Sample average projection to March 2020.

6.2. Primary Service Recommendations

As noted, Primary Services include the domestic MTR and FTR rates. The benchmark-based recommendations for each of these Primary Services are presented below.

For the historical and projected period April 2012 to March 2020, Figure 4 shows sample averages and projections for the MTR Post-2012 Sub-Sample (in red), Cost-Based Sub-Sample (in blue) and European country sample (in grey). The Post-2012 Sub-Sample average and projection show a decrease from about USD$0.09 in 2012 to about USD$0.03 in 2017. The Post-2012 Sub-Sample statistical trend line projection shows a further decrease to about USD$0.02 by 2020. The Cost-Based Sub-Sample average is stable at around USD$0.02 over the 2014-2017 period and is projected to remain at this same level to 2020. The two projections intersect at USD$0.02 in 2020. As a reasonableness check, the European average was included here: That average has declined from USD$0.05 in 2008 to below USD$0.02 in 2016. It is likely to further decrease, but as a conservative measure a flat line projection of the 2016 figure to 2020 has been used.

Owing to the fact that current Trinidad and Tobago interconnection rates are deemed confidential, current rates will be shared upon request.[10]

Based on these benchmark projections, a three-year MTR end-point of USD$0.020 is reasonable and appropriate and, therefore, it is the Authority's recommendation for the end-point MTR to be in 2019/20. As noted above, it is considered reasonable to transition from the current MTR to the recommended end-point of USD$0.020 in three roughly equal steps, that is, USD$0.0350 in 2017/18; USD$0.0275 in 2018/19; and USD$0.0200 in 2019/20.

[10] Requests to view confidential data apply only to authorized service providers

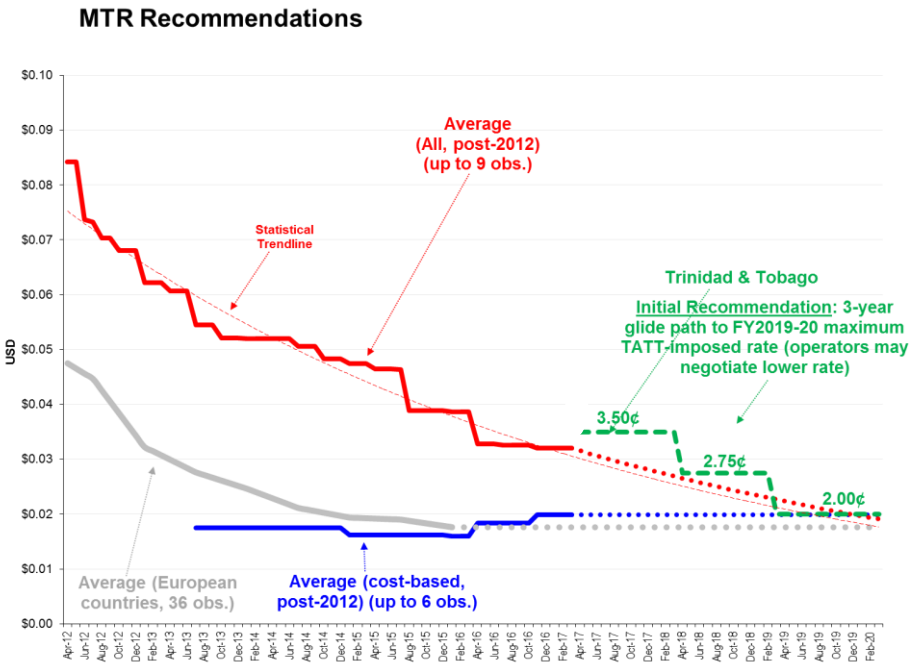

Figure 4 MTR Recommendations

For the same time frame, Figure 5 shows sample averages and projections for the FTR Post-2012 Sub-Sample, Cost-Based Sub-Sample and European Country Sample. In this case, and following the same rationale used to arrive at a recommended end-point MTR, a three-year FTR end-point of USD$0.0045 is reasonable and appropriate and, therefore, there is a recommendation for the end-point FTR in 2019/20. Again, it is reasonable to transition from the current FTR to the recommended end-point of USD$0.0045 in three roughly equal steps, that is, USD$0.0065 in 2017/18; USD$0.0055 in 2018/19; and USD$0.0045 in 2019/20.

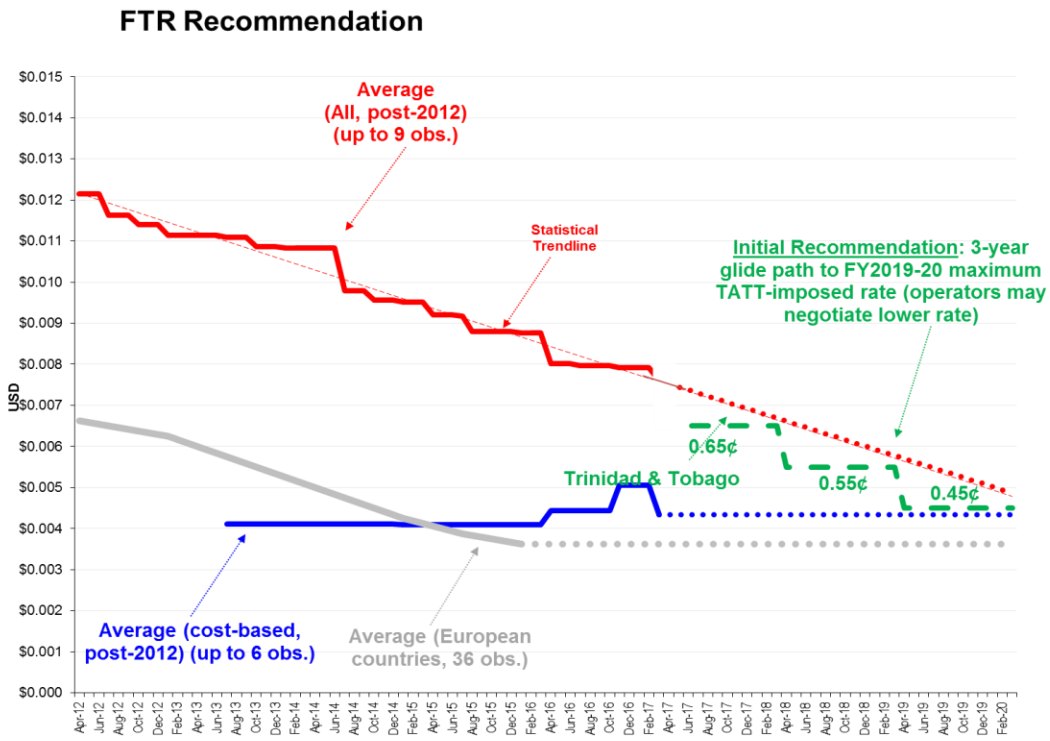

Figure 5 FTR Recommendations

A full summary of the Primary Mobile and Fixed Termination rate recommendations would be provided to authorised service providers only, upon request.

6.3. Sensitivity Analyses

Two sensitivity analyses were carried out, including one relating to exchange rates used in the benchmarking analysis and, the second, one relating to benchmarking sample inclusions.

6.3.1. Exchange Rate Sensitivity

As noted, most exchange rates are reported in local currency units (LCU). For benchmarking purposes these were converted into USD, using official exchange rates. Most benchmark sample jurisdictions have rates that are either in USD currency or have fixed, official USD exchange rates. In these cases, official fixed exchange rates were used. However, four other jurisdictions have floating or managed-floating exchange rates: Guadeloupe and Martinique; St. Martin and St. Bartholomew; and Jamaica and Trinidad and Tobago.

To separate out changes in exchange rates from changes in LCU interconnection rates, a single average long-term (9 year) exchange rate was used. Specifically, these are calculated as a rounded average of the last nine (9) years, with 2015 and 2016 having three times the weight of the earlier years. The exchange rate results for each of these jurisdictions under this approach were 1.2500, 0.0100 and 0.1550, respectively.

Sensitivities for these assumptions are provided in Annex B, which shows the sensitivity of using only average 2016 exchange rates, that is, 1.100, 0.008 and 0.1500, respectively. As shown in Annex B, for the MTR, the results of this sensitivity do not vary significantly from the base results described above.

The exchange rate sensitivity applies to historical data, but also relates to how all of the data should be taken into account for benchmark projection purposes. In this respect, the exchange rates used to convert historical interconnection rate data into USD can equally be used for the rate projection period.

6.3.2. Benchmark Sample Inclusion Sensitivity

The Post-2012 Sub-Sample and Cost-Based Sub-Sample benchmark jurisdictions were relied upon to develop the recommendations. It was considered that these Caribbean jurisdictions provide the most appropriate basis for interconnection rate recommendation purposes.

For sensitivity analysis purposes, an interconnection rate benchmarking projection analysis was conducted by using the Full Benchmarking Sample, including jurisdictions with rates set by decision(s) made prior to 2012. The results of the sensitivity analysis are shown in Annex B for the MTR. However, it is considered that the results from this sensitivity analysis may be flawed since it is largely driven by out-of-date interconnection rates. Furthermore, the results of this sensitivity analysis are completely out of line with interconnection rate trends in the Caribbean as well as Europe (see Annex A). Consequently, it is considered that the full-sample only does not provide a valid basis for developing benchmark interconnection rate recommendations.

6.4. Normalization Analysis

The benchmarking sample used for this study includes only Caribbean island-jurisdictions. As outlined in Chapter 2, the objective of this approach is to ensure the maximum comparability of the benchmark jurisdictions to Trinidad and Tobago. All the same, even within the Caribbean region there are differences amongst the benchmark jurisdictions in terms of demographic, socio-economic and other environmental factors. Therefore, considerations were made as to whether any such factors may warrant a "normalization" adjustment (that is, either increases or decreases) to the Interconnection Rate Recommendations.

For normalization analysis purposes, the following demographic, socio-economic and other environmental variables were considered:

a) population size

b) land area (square kilometres)

c) population density (a/b)

d) income measured as GDP per capita (USD)

e) fixed subscribers

f) mobile subscribers

g) fixed density (e/a)

h) mobile density (f/a)

i) number of mobile service providers (as a measure of market competitiveness)

j) indicator of whether or not interconnection rates were set on the basis of a costing of some other approach (Yes/No)

Table 1 summarises these variables for each jurisdiction in the Full Benchmark Sample and the Post-2012 Sub-Sample along with sample averages in each case. Trinidad and Tobago is listed separately at the bottom of the table and is not included in any of the sample averages. All data were collected for the latest available annual period--2015.

A comparison of demographic, socio-economic and other environmental variables for Trinidad and Tobago and the benchmark sample jurisdictions, whether on the basis of the Full-Sample or Post-2012 Sub-Samples, reveals that:

i) T&T's population, land area and population density (that is, 261/km^2) are relatively close to the Full and Post-2012 Sub-Sample averages (that is, 274 and 266, respectively). There is very little correlation between these demographic variables and either the MTRs or FTRs in the other benchmark jurisdictions for the Full-Sample.[11] The correlation is somewhat higher in the case of the Post-2012 Sub-Sample, but still limited with a correlation coefficient of roughly -0.50.

ii) Trinidad and Tobago's GDP per capita (that is, roughly USD$17,000) is very close to the Full- Sample average and somewhat lower than the Post-2012 Sub-Sample average. Here again, there is virtually no correlation between this economic variable and the level of either the MTRs or FTRs in the other benchmark jurisdictions.

iii) Trinidad and Tobago's fixed density (20%) is below the Full-Sample and Post-2012 Sub-Sample benchmark averages (of just of 30% in both cases). On the other hand, T&T's mobile density (156%) is higher than the benchmark averages (of about 115% in both cases). Once again, there is very little correlation between these subscriber density variables and either the MTRs or FTRs in the other benchmark jurisdictions.

iv) Consideration of the number of mobile operators has greatest relevance to the mobile market and the level of the MTR. Simply splitting the benchmark jurisdictions between those with 2 mobile operators versus those with 3 mobile operators indicates that, on average, the MTR is lower in jurisdictions with more operators. Therefore, jurisdictions with less mobile competition generally have higher MTRs. The same finding could very likely apply to the fixed market as well.

[11] The measured correlation coefficients are relatively close to zero.

v) Examination of the jurisdictions with cost-based versus other MTRs and FTRs, as itemised above, shows that jurisdictions with cost-based rates have lower MTRs and FTRs on average. Therefore, examining cost and setting interconnection rates on the basis of a cost study generally results in lower MTRs and FTRs.

On balance, while the first three above-noted considerations provide little if any basis for implementing a normalization adjustment of any magnitude (whether positive or negative), the latter two factors suggest that, if any anything, a downward adjustment to the benchmark rates may be warranted. However, no normalization adjustment is proposed and for this reason the Interconnection Rate Recommendations, made herein, are considered to be conservative in nature.

Table 1

Benchmark Jurisdiction Demographic, Socio-Economic and Other Variables												
Jurisdictions	**Population**	**Land Area**	**Population**	**GDP/cap**	**Fixed**	**Mobile**	**Fixed**	**Mobile**	**Mobile**	**Costs**	**FTR (USD)**	**MTR (USD)**
		(km2)	**Density**	(USD)	**Subs**	**Subs**	**Density**	**Density**	**Operators**		DEC-16	DEC-16
Anguilla	15,000	91	165	$21,493	6,000	26,000	40%	173%	2	No	0.0111	0.0556
Aruba (NA)	103,889	180	577	$25,751	35,000	141,000	34%	136%	3	No	0.0511	0.1564
Bahamas	388,019	10,010	39	$22,817	120,925	311,175	31%	80%	2	Yes	0.0075	0.0279
Barbados	284,215	430	661	$15,429	156,857	334,792	55%	118%	2	Yes	0.0055	0.0275
British Virgin Islands	30,117	151	199	$30,502	12,000	42,000	40%	139%	3	No	0.0100	0.0500
Cayman Islands	59,967	264	227	$58,808	33,534	93,244	56%	155%	2	Yes	0.0103	0.0341
Dominican Republic	10,528,391	48,310	218	$6,468	1,304,968	8,797,247	12%	84%	3	No	0.0143	0.0536
ECTEL - Dominica	72,680	750	97	$7,116	15,123	77,254	21%	106%	2	Yes	0.0217	0.0956
ECTEL - Grenada	106,825	340	314	$9,212	27,034	119,767	25%	112%	3	Yes	0.0151	0.0930
ECTEL - St. Kitts & Nevis	55,572	260	214	$15,772	19,748	73,009	36%	131%	3	Yes	0.0097	0.1043
ECTEL - St. Lucia	184,999	610	303	$7,736	34,874	187,741	19%	101%	2	Yes	0.0128	0.0830
ECTEL - St. Vincent	109,462	390	281	$6,739	24,865	113,371	23%	104%	2	Yes	0.0198	0.0894
FWI - Guadeloupe & Martinique	865,894	2,829	306	$24,068	348,651	1,383,797	40%	160%	3	Yes	0.0010	0.0095
FWI - St. Barthelemy & St. Martin	39,121	79	493	$20,186	15,855	10,783	41%	28%	3	Yes	0.0010	0.0095
Jamaica	2,725,941	10,830	252	$5,232	252,630	3,137,213	9%	115%	2	Yes	0.0036	0.0110
Turks & Caicos Islands	34,339	950	36	$23,615	4,000	39,342	12%	115%	2	No	0.0078	0.0600
ex-Netherlands Antilles (exc.Aruba)	221,952	806	275	$21,898	7,007	263,271	32%	119%	2.1	No	0.0838	0.2011
Full Sample Average	**930,964**	**4,546**	**274**	**$18,991**	**142,298**	**891,236**	**31%**	**116%**	**2.4**		**0.0168**	**0.0683**
Correlation Coefficient (FTR)	*-0.08*	*-0.09*	*0.14*	*0.03*	*-0.14*		*-0.05*					
Correlation Coefficient (MTR)	*-0.16*	*-0.18*	*0.06*	*-0.11*		*-0.20*		*0.13*				
Post-2012 Sub-Sample Average	**1,660,099**	**8,199**	**266**	**$22,013**	**249,269**	**1,570,399**	**33%**	**114%**	**2.3**		**0.0069**	**0.0321**
Correlation Coefficient (FTR)	*0.51*	*0.54*	*-0.45*	*0.13*	*0.44*		*-0.16*					
Correlation Coefficient (MTR)	*0.26*	*0.29*	*-0.50*	*0.06*		*0.19*		*0.25*				
Trinidad & Tobago	**1,360,088**	**5,130**	**261**	**$17,322**	**270,872**	**2,123,374**	**20%**	**156%**	**2**	**No**	[redacted]	

Sources: GSMA-WI, World Bank, UN Data, FWI; INSEE/ARCEP

7. Secondary Service Recommendations

This chapter presents the benchmarking analysis methodology and interconnection rate recommendations for the Secondary Interconnection Services, including international interconnection charges.

7.1. International Call Termination Charges

International call termination rates in Trinidad and Tobago consist of three components:

i) The domestic mobile or fixed network termination rate depending on the termination point of the call;

ii) An international mobile or fixed carriage charge (ICC) which varies depending on the termination point of the call (that is, MICC or FICC); and

iii) The transit charge in the case of an international call terminating to TSTT BMobile's network.

Therefore, international call termination rates – that is, the IMTR or IFTR—consist of the sum of two or more rate elements:

IMTR = MTR + MICC + TR

IFTR = FTR + FICC

While available benchmarking data are more limited in the case of international call termination rates, there is sufficient data available to provide benchmarking-based recommendations for these rates in Trinidad and Tobago. For the purpose of benchmarking international call termination rates, there was a focus on measured differences between international domestic termination rates–the ICC equivalent in other benchmarking jurisdictions. Only two other countries in the benchmark sample have a directly comparable, explicit ICC rate element: Barbados and Jamaica.

Table 2 provides the averages of the benchmarking results for the ICC associated with mobile and fixed call termination. These are presented for the Full-Sample and the Post 2012- Sub-Sample, including/excluding a domestic transit charge (where applicable). The benchmark averages are presented as ratios of international to domestic interconnection charges (that is, IMTR/MTR and IFTR/FTR) and also USD difference between the two charges (IMTR-MTR and IFTR-FTR).

Owing to the fact that Trinidad and Tobago's operators have expressly deemed local existing interconnection rates to be confidential, the full assessment of IMTR and IFTRs were redacted from this report and would be made available to local operators only, upon request.

Table 2: International Interconnection Benchmarking Results (USD)			
		IMTR*	**IFTR***
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
All-Sample**	Ratio Inter/Domestic	**1.38**	**1.34**
	Diff. Inter/Domestic	**$0.018**	**$0.003**
Post-2012 Sub-Sample***	Ratio Inter/Domestic	**1.73**	**1.77**
	Diff. Inter/Domestic	**$0.023**	**$0.005**

Notes: ** is the average of the "with" and "without" domestic transit IMTR and IFTR, respectively.*
*** the All-Sample had an average of 16 observations with an average vintage of the corresponding decision of between October 2011 to January 2012.*
**** the Post-2012 Sub-Sample had an average of 6 observations with an average vintage of the corresponding decisions of between April to August 2015.*

As Table 2 shows, T&T's IMTR and IFTRs are significantly higher than the benchmark averages from both an international/domestic rate ratio and difference perspective. For example, the average IMTR ratio in T&T is [redacted] (that is, the average of with and without domestic transit), which is significantly higher than the 1.38 average for the All-Sample group and the 1.74 average for the Post-2012 Sub-Sample. Similarly, the average IFTR ratio average in T&T of [redacted] is significantly higher than the 1.34 and 1.77 averages for the All-Sample and Post-2012 Sub-Sample groups.

Similar results were found when considering international/domestic rate differences. In T&T the average IMTR and IFTR differences are USD$[redacted] and USD$[redacted], respectively. The corresponding benchmark international/domestic rate differences are well below these levels –USD$0.018 and USD$0.003, respectively, for the All-Sample and USD$0.023 and USD$0.005, respectively, for the Post-2012 Sub-Sample groups.

Therefore, the ICC premium relative to domestic call termination, measured on an international/domestic rate ratio and difference bases, is much higher in T&T than in the benchmark jurisdictions and should be reduced.

To determine the extent to which the ICCs in T&T should be reduced, the study was guided by three considerations:

1) The benchmark IMTR and IFTR international/domestic rate ratios range from 1.34 to 1.77;

2) The benchmark differences for the IMTR and IFTR are in the range $0.018 to $$0.023; and $0.003 to $0.005 (with mid-points of $0.020 and $0.004), respectively; and

3) The ratio between the MICC and FICC in T&T is [redacted].

Taking into account the recommendations for the Primary Services, the international call termination benchmarking results and the three considerations noted above, an iterative process was carried out to jointly calculate the MICC and FICC. This process began by setting the MICC and FICC at the mid-points of the

respective benchmarking difference mid-points of $0.020 and $0.004 respectively and then conducting various iterations that best met the three considerations. In this manner, it was recommended that the MICC be reduced from its current level of USD$[redacted] to USD$0.0150 by 2019/20; and the FICC be reduced from its current level of USD$[redacted] to USD$0.0030 by 2019/20.

Consistent with the Primary Service Recommendations, these proposed rate reductions should be phased in roughly equal steps of over three years. The proposed intermediate and end-point rate MICC and FICC Recommendations are summarized in Figure 10.

8. Assessing the potential Flow-Through effects

The interconnection rate recommendations, including the associated glide-path to FY2019/20, are summarized in Table 4.

Table 4: Interconnection Rate Actuals and Recommendations
(USD per minute)

	2016 Actual	2017/18	2018/19	2019/20
1. MTR*	[redacted]	0.0350	0.0275	0.0200
2. FTR	[redacted]	0.0065	0.0055	0.0045
3. Mobile ICC	[redacted]	0.0550	0.0350	0.0150
4. Fixed ICC	[redacted]	0.0130	0.0080	0.0030
5. IMTR (1+4)*	[redacted]	0.0900	0.0625	0.0350
6. IFTR (2+5)	[redacted]	0.0195	0.0135	0.0075

** An additional transit charge may apply in some cases.*

8.1. Impacts on Operators

There are two mobile network operators in T&T (that is, TSTT/BMobile and Digicel) and there are a number of fixed network operators (including TSTT, Digicel Fixed, CCTL/Flow and Lisa Communications, among others). Reducing the MTR and FTR, as proposed in the recommendations, would have the effect of reducing all fixed and mobile domestic call traffic interconnection payments and, correspondingly, revenues.

The Authority has reviewed traffic and revenue data shared between operators. Due to the confidential nature of this data, such impact assessment is excluded from this consultative report. In summary, however, in considering the likely impacts of reducing both domestic and international termination rates, as per the recommendation, gains or losses for an individual operator depend on relative call traffic volume flows between operators.

Reducing interconnection rates to cost-based levels should, in principle, provide a number of positive impacts including benefits to consumers or end-users. While these benefits are difficult to quantify, they can be described in qualitative terms.

It is emphasised that the full benefits of reduced rates on operators can be materialized where all parties comply with Section 5(1) of the Telecommunications (Interconnection) Regulations (2006), wherein interconnection terms and conditions, including rates, are provided on a non-discriminatory and equal basis to all interconnecting parties.

8.1.1. Benefits from Reductions in Domestic the MTR and FTR

The proposed reductions in domestic MTRs and FTRs offer several potential benefits to consumers.

Firstly, reductions in domestic interconnections rates would reduce the off-net, call termination costs to originating operators and, therefore, should allow for potential reductions in average retail call prices and, perhaps to even a greater degree, in the average retail call for off-net calling (where such differentials may exist). In effect, the cost floor for such calls is reduced as a result of interconnection rate reductions and, therefore, retail call prices could be reduced.

There is debate as to whether the savings associated with lower call termination costs would in fact be passed on to consumers, since an operator's cost savings are offset to one degree or another by reduced revenues from the call termination services provided on its own network. Thus, the net benefit to consumers could be limited to some degree. This potential outcome or effect is referred to in the regulatory economics literature as the "waterbed effect". According to this theory, higher than otherwise prices for call termination may allow an operator to maintain other service prices lower than otherwise. If interconnection rates are reduced, then other prices may increase to some degree as a direct result. This is referred to as the waterbed effect. The empirical literature which has attempted to confirm the existence and measure the magnitude of this effect, however, is mixed and inconclusive. In fact, if anything, it appears to suggest that to the extent it does exist, it is at best partial in nature.[12]

Second, to the extent reductions in interconnection rates do in fact lead to lower average retail calling prices, increased usage of mobile and fixed services by end-users should also be expected, based on the direct price elasticity effects of a price decrease.[13] If reduced interconnection rates result in lower retail off-net calling prices, for instance, then increased off-net call volumes would be expected.[14] The reduction in retail off-net call prices would result in a decrease in the off-net/on-net differentials (to the extent they exist), which would promote greater inter-operator (intra-modal) competition as well as fixed-mobile competition (inter-modal) competition.

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[12] See, for instance, C. Genakos and T. Valletti , "Mobile regulation and the 'waterbed effect," 4 January 2010, see: http://www.voxeu.org/index.php?q=node/4448.

[13] In addition, there could also be some indirect effects based on the behavioral response amongst some or all affected consumers. The specific avenues via which such effects take place, and their individual and cumulative impact on demand are the subject of behavioral economics and are outside the scope of this Project.

[14] It should also be noted that any such retail-price change driven call traffic stimulation would have impacts on operators' retail revenues and wholesale revenues/payments. In the latter case, operators' net call termination revenues/payments could be affected depending on the nature of any such call traffic volume changes and, as suggested by the operator impact analysis above, some operators may be better off while others are worse off. In any event, retail revenue impacts from such retail price changes would normally be far larger than any underlying wholesale call termination revenue/payment impacts.

Third, to the extent that reduced interconnection rates lead to lower average retail prices, increased take-up of both fixed and mobile wireless services could be expected.

On the subject of reducing MTRs to cost levels, Ofcom, the national regulatory agency in the United Kingdom, has concluded in 2010 that:[15]

> *Reduction in MTRs ... will reduce call prices and promote competition, furthering the interests of consumers.*
>
> *Our proposals continue a long term trend during which time MTRs have fallen from more than 23 ppm in 1995 to less than 5 ppm today ... During that time mobile penetration has increased enormously, prices have fallen considerably and MCPs [Mobile Communications Providers] have invested heavily in delivering new services, such as mobile broadband.*
>
> *As with previous MTR charge controls, the mobile industry will continue to face steady and sustained reductions in MTRs. We anticipate that the market will be capable of adapting to these changes, which will be implemented over four years and which are broadly in line with previous trends. As the market adapts, we believe that further reductions in termination rates will promote competition, the development of innovative tariff packages and the growth of genuinely converged fixed and mobile services.*

Ofcom's conclusions support the view that competition would be promoted and end-users would benefit from a reduction in interconnection rates to cost-based levels as proposed under the recommendations.

8.1.2. Supporting Empirical Evidence

SCI previously conducted an empirical analysis on the relationship between retail call prices and interconnections rates (specifically MTRs) in the Caribbean Region in 2010.[16] The analysis included data collected for 14 Caribbean jurisdictions[17] on postpaid and prepaid mobile-to-mobile, on-net and off-net retail average calling prices and fixed-to-fixed and fixed-to-mobile average calling prices in each jurisdiction.[18] The

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15 Ofcom, *Wholesale mobile voice call termination, Market Review* (Volume 1 – Executive summary). Published April 1, 2010, paragraphs 1.11 to 1.13.

16 This analysis was conducted for the Turks and Caicos Islands Telecommunications Commission in 2010 as part of a public consultation process to review the level of the MTR in TCI.

17 Anguilla, Barbados, British Virgin Islands, Cayman Islands, Dominican Republic, ECTEL Member States (Dominica, Grenada, St. Kitts and Nevis, St. Lucia and St. Vincent and the Grenadines), French West Indies (Guadeloupe and Martinique), Trinidad & Tobago and Turks and Caicos Islands

18 Details of the empirical analysis are provided in the Turks and Caicos Islands Telecommunications Commission, Review of Mobile Termination Rate Consultation Document, issued 19 July 2010, Annex C. Available at: http://www.telecommission.tc/content/root/files/20100719112927-TCI-MTR-Consultation-Document-_July-19-2010.pdf.

analysis shows that there is a statistically significant relationship between termination rates and retail prices—the call termination rates are positively correlated with retail call prices. More specifically, the results of the Consultant's empirical analysis[19] indicate the following:

Mobile-to-Mobile

a) Off-net Postpaid calling prices are correlated with the level of the MTR: Off-net call prices tend to be lower when the underlying MTR is lower. While the statistical relation is not strong, it nevertheless suggests that end-users benefit from lower MTRs.

b) On the other hand, on-net Post-paid calling prices are not correlated with the level of the MTR: On-net call rates do not appear to be influenced by the level of the underlying MTR.

c) The ratio of off-net to on-net Post-paid pricing is higher in countries with higher MTRs. This is consistent with the expectation that allocative efficiency is negatively affected and intra-modal (mobile-mobile) competition hindered by higher MTRs.

Fixed-to-Mobile

d) Fixed-to-mobile off-net per minute call prices are correlated with the level of the MTR: Fixed off-net call prices to mobile tend to be lower when the underlying MTR is lower.

e) The ratio of off-net fixed-to-mobile to on-net fixed-to-fixed pricing is higher in countries with higher MTRs. This result is consistent with the expectation that allocative efficiency is negatively affected and inter-modal (fixed-mobile) competition hindered by higher MTRs.

The supporting empirical evidence for these findings is provided in Annex C. This evidence supports the proposed reductions in the MTR in Trinidad and Tobago as set out in the recommendations. The Consultant considers that these findings equally support the proposed reductions in the in the local FTR as set out herein.

8.1.3. Benefits from Reductions in International MTR and FTR

As in the case of domestic interconnection rates and retail call prices, reductions in international interconnection rates should also, in principle, lead to reductions in international retail call prices. However, the linkage between IMTR and IFTR reductions and retail international call prices is less direct compared to retail domestic call prices. Reductions in IMTRs and IFTRs, as proposed, should lead to greater competition for international traffic carriage in and out of Trinidad and Tobago. This in turn could put downward pressure on inter-carrier settlement rates and ultimately retail international call prices. These are all potential benefits for consumers, and the latter is also a benefit to operators.

[19] Ibid.

8.2. Likely Impacts in Trinidad and Tobago

There is a strong basis to believe that competitive pressures, precipitated by the implementation of these recommendations, should lead to lower retail call prices, over the course of the glide-path time period.

The evidence from other jurisdictions also supports this prediction. As described above, interconnection rates are correlated with lower retail prices in the Caribbean region–lower interconnection rates are consistent with lower retail prices in the region. Similarly, efforts by regulators in Europe to ensure interconnection rates are consistently reduced over time as corresponding costs decline also supports that lower interconnection rates should lead to lower retail prices. The above-noted conclusions of Ofcom (2010) clearly reflect this view. Therefore, there is good reason to believe that this same relationship would apply in Trinidad and Tobago. In other words, reductions in interconnection rates in Trinidad and Tobago should result in lower retail prices locally.

9. Conclusion

The results of the benchmarking analysis demonstrate that current interconnection rates in Trinidad and Tobago –specifically the MTR, FTR, IMTR and IFTR– are above the benchmark rates and it is recommended that these rates be reduced, as set out in this report.

A risk assessment of the recommendations can be considered from two perspectives–the costs/benefits associated with not implementing the recommendations versus implementing the recommendations. These are effectively two sides of the same coin.

Should the local telecommunications sector ignore the benchmarking evidence presented in this study, which shows that current interconnection rates are very likely to be well above costs, several negative potential impacts can be expected. Leaving interconnection rates at current levels would allow operators to continue charging above-cost rates for interconnection services. This would imply that those operators with net in-payments would be allowed to continue profiting from excessive rates. On the other hand, those with net out-payments would continue incurring excessive interconnection costs. The combined effect will allow interconnection pricing inefficiencies to remain in place which are distorting retail prices and/or barring market entry/expansion and, as a result, impacting consumer usage of retail call services.

From the consumers' perspective, as discussed in the previous chapter, above-cost call termination service pricing very likely results in higher than otherwise retail call prices, since retail prices reflect operators' underlying costs, which include call termination costs. As a consequence, consumers are potentially harmed by excessive retail prices, which have the compounded effect of suppressing consumer demand in terms of usage as well as subscriptions. More specifically, allowing above-cost call termination rates to remain in place also distorts competition in the retail market by serving to promote higher than retail off-net calling prices.

Therefore, there is a very high risk that allowing the existing interconnection rates to remain in place would in effect endorse existing network interconnection pricing inefficiencies, harm consumers through higher than necessary retail prices, and distort competitive market outcomes.

The recommendations of this report, if implemented will:

i) Fulfill the cost-based interconnection pricing objectives of the Act and Regulations

ii) Lower net call termination revenues (in-payments) for some operators while lowering net call termination (out-payments) costs for other operators

iii) Benefit consumers by supporting the implementation of lower retail call prices over time,

iv) Benefit consumers and operators by promoting increased demand, in terms of both usage and subscription and, more generally, by supporting increased competition to the extent retail prices decline over time.

It is also important to reiterate that lowering call termination rates over time, to ensure they reflect costs as closely as possible, is an interconnection policy objective pursued by virtually all NRAs including the Telecommunications Authority of Trinidad and Tobago. Evidence from the Caribbean region and further abroad (e.g., Europe) testifies to this fact. Consequently, the Authority would be in step with international regulatory policy as it relates to regulating interconnection rates.

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Annex A: European Benchmarking Data

This Annex includes data and analysis on interconnection rates in Europe. As discussed above, this is secondary analysis that is used as a reasonableness-check on the primary analysis, which is based on the Caribbean benchmarking. As such, these results are a complement to, not a substitute for the primary Caribbean benchmarking.

The Body of European Regulators of Electronic Communications (BEREC) provides regular survey reports on interconnection rates in Europe, including on 28 members of the European Union (EU) along with 8 other European countries, for a total of 36 countries.[20] As noted above, the countries included in this analysis are generally not directly comparable to Caribbean jurisdictions, including Trinidad & Tobago. There are, however, 9 less populous countries with populations of less than 2 million included in the BEREC surveys that can be considered more comparable to Trinidad & Tobago. The rates observed in this sub-sample of smaller-scale European countries are considered separately in what follows for cross-check purposes.

Mobile Termination Rates

BEREC collects information on the MTRs for each major mobile network operator in each of the 36 European countries it surveys. For each country, an average MTR is calculated using market shares as weights. BEREC also provides a summary of the methodologies used by the NRAs to set MTRs in each country. In this respect, a bottom-up, long run incremental cost (BU-LRIC) approach is used by the majority of the NRAs (21 of the 36) – roughly half of which are "Pure" BU-LRIC approaches. Benchmarking is the next most often used approach (7 of 38), whereas the remaining approaches vary from country to country and in some cases are unreported. MTRs in Europe have been steadily declining for years. As shown in Figure A1, between 2008 and 2016, the simple-average European MTR has dropped to USD$0.018.

[20] BEREC, *Termination rates at European level*, January 2016, BoR (16) 90, issued May 2016 and related reports, available at: http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/6086-termination-rates-at-european-level-january-2016C.

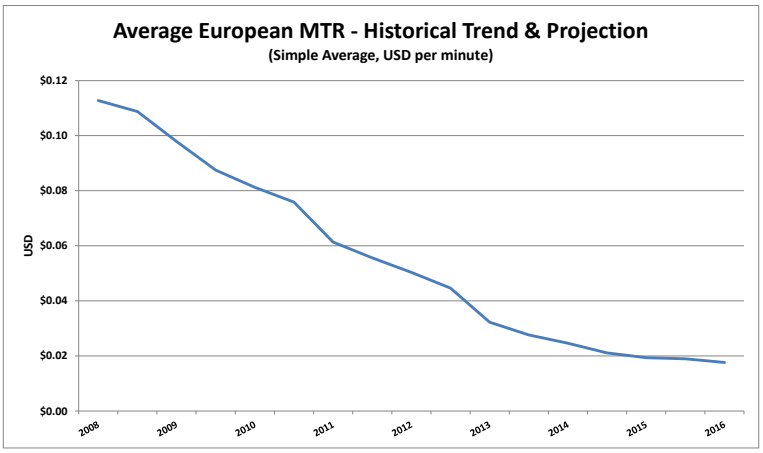

Figure A1- Average European MTR – Historical Trend and Projection

Figure A2 provides a snapshot of the country-specific European MTRs reported for January 2016, ranked from lowest to highest. The figure also includes simple averages for the entire group of European countries as well as the 28 EU member states – USD$0.018 and USD$0.013, respectively. Figure A2 also highlights the set of smaller European countries included in BEREC's survey. To a considerable extent, the MTRs for this sub-group of countries are equally distributed on either side of the European-wide average rates. Of note is that Malta (MT) has the lowest MTR of the group at USD$0.005. Otherwise, the simple average of the smaller European countries is USD$0.021 for January 2016, which is very close to but slightly higher than the average for the group as a whole.

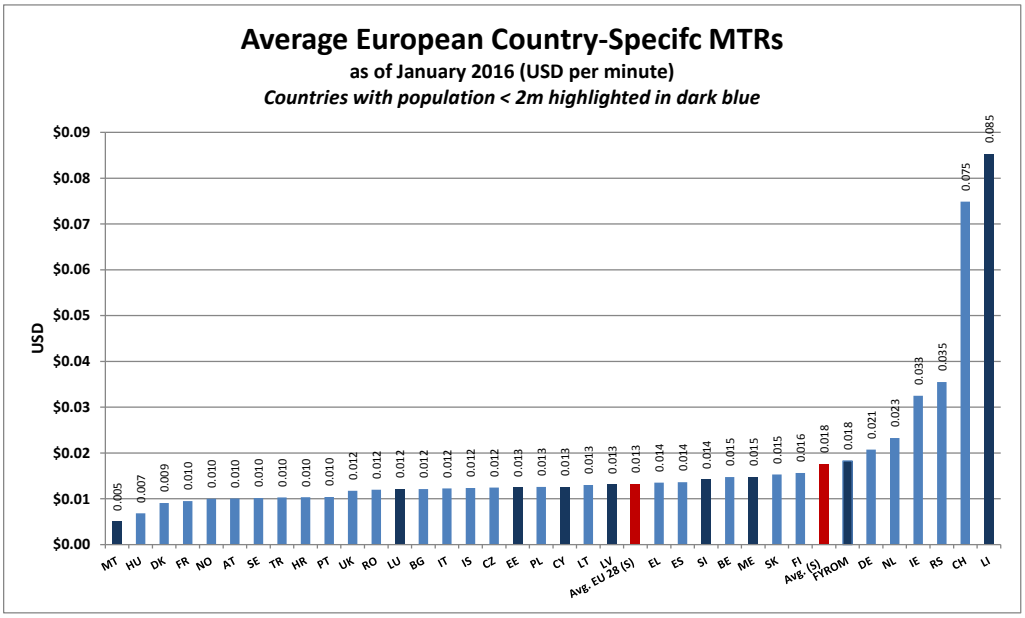

Figure A2 – Average European Country-Specific MTRs

Fixed Termination Rates

BEREC notes that fixed network interconnection services in Europe are typically provided at different levels or "layers" of the operators' networks. In general three main interconnection layers are defined: (i) Layer 1, or local level service provision, (ii) Layer 2, or regional level service provision (single transit), and (iii) Layer 3, national level service provision (or double transit). In this section, there is a focus on Layer 1 FTRs given they are the most comparable FTRs to those in effect in the Caribbean region. In the following section, the difference between Layer 1 and Layer 2 FTRs is use to derive implicit fixed transit rates. Otherwise, the remaining Layer 3 FTRs are not considered to be comparable with the Caribbean given the differences in geographic scale.

In terms of alternative methodologies used by NRAs to set FTRs, the most common approach is Pure BU-LRIC (which is used in 18 of 36 countries). The next most popular approaches, in order of use, are fully distributed costing or fully allocated costs (FDC/FAC), LRAIC+ and benchmarking. As shown in Figure A3, FTRs in Europe have also been declining over time as well, and have dropped to USD$0.0036 by January 2016.

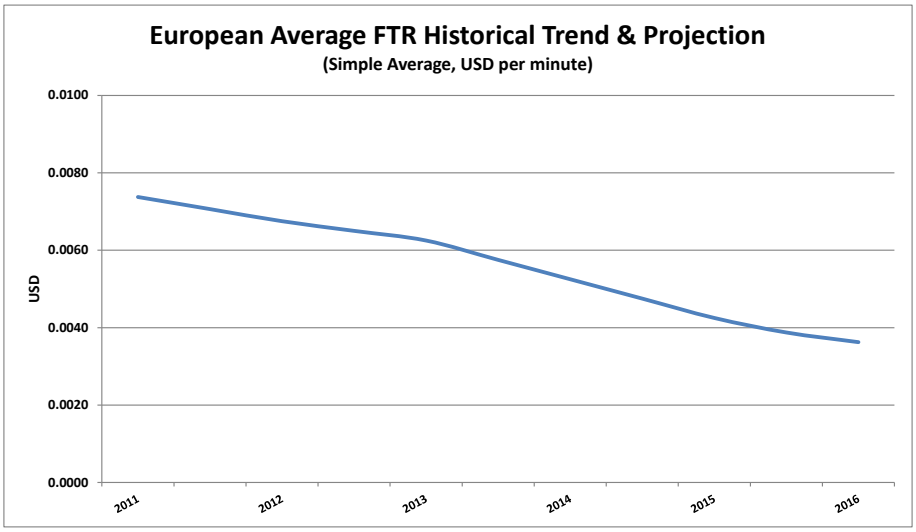

Figure A3 – European Average FTR Historical Trend & Projection

Figure A4 provides a snapshot of the country-specific European FTRs for January 2016. The figure also includes simple FTR averages for the entire group of European countries as well as the 28 EU member states – USD$0.0036 and USD$0.0033, respectively. Figure A4 highlights (in dark blue) the set of smaller European countries included in BEREC's survey. For the most part, they are equally distributed on either side of the European-wide averages. Of note is that Malta (MT) has the second lowest FTR of the group at USD$0.0005. Otherwise, the simple average of the full sub-group of smaller European countries is USD$0.0028, which is below the average for the group as a whole.

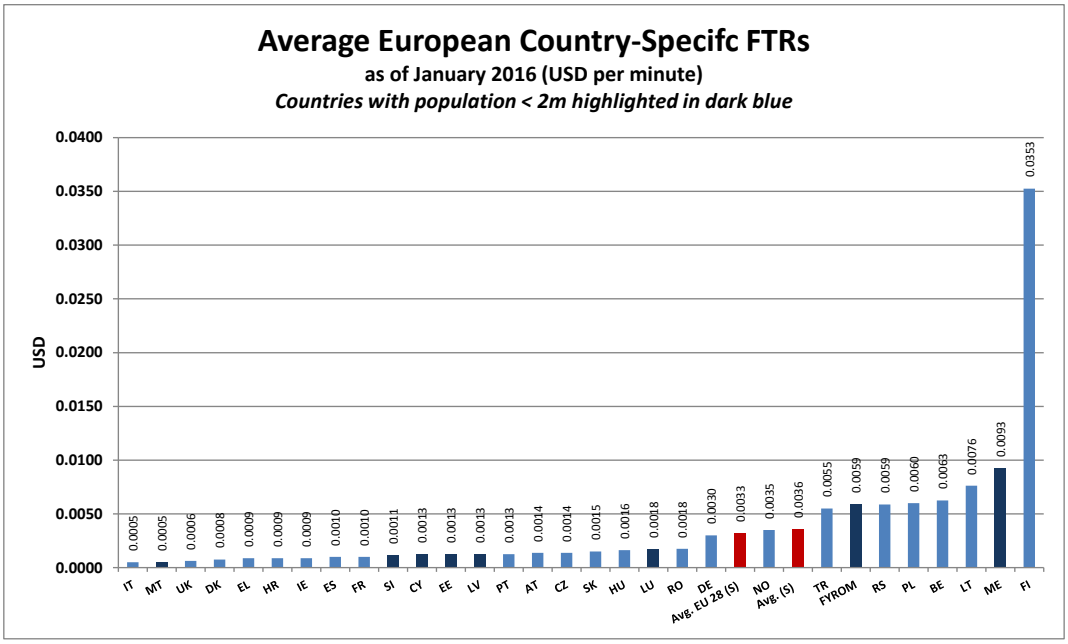

Figure A4 – Average European Country-Specific FTRs

Annex B: Sensitivities

This Annex presents the results of the exchange rate (Figure B1) and Full-Sample (Figure B2) sensitivities (excluding Trinidad and Tobago) discussed in Chapter 5. Note that the sensitivity results shown for the MTR alone, since very similar results also apply for the FTR rates.

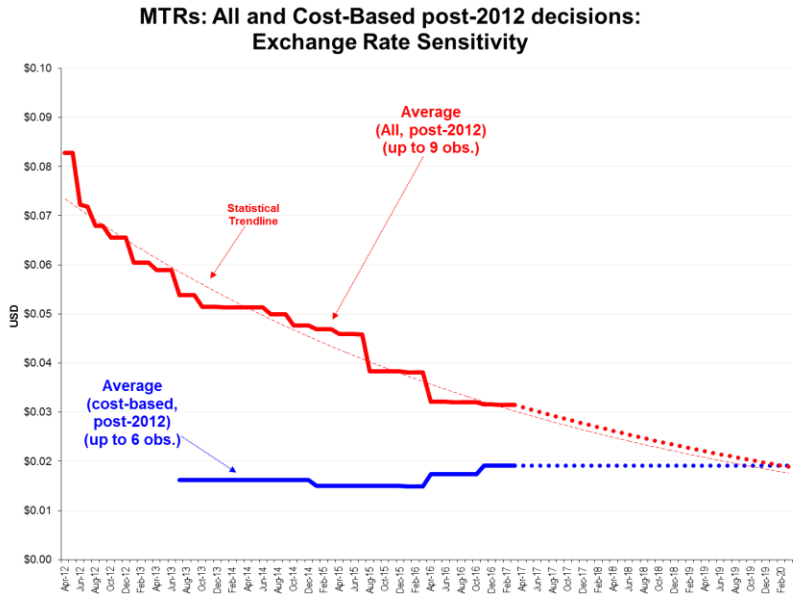

Figure B1 – MTRs: All and Cost-Based post 2012 decisions Exchange Rate Sensitivity

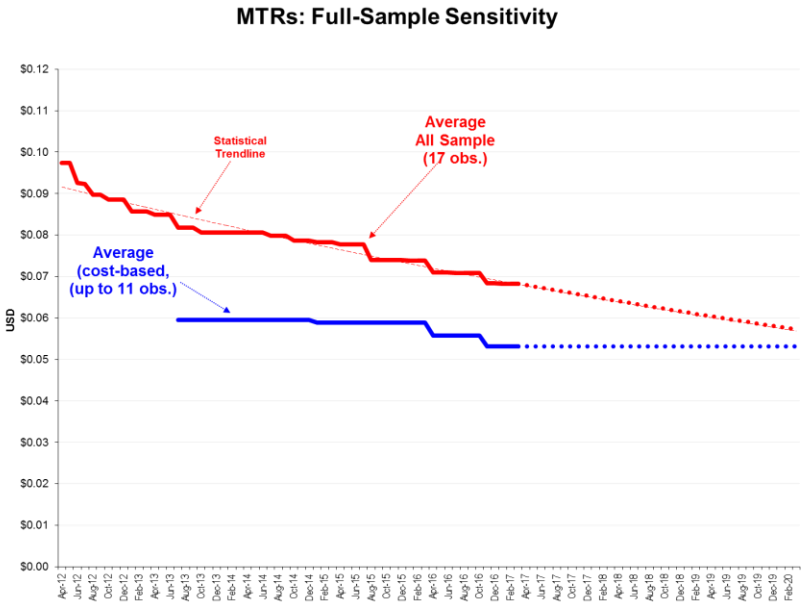

Figure B2 – MTRs: Full Sample Sensitivity

Annex C: Empirical Evidence of Consumer Benefits

This Annex provides a summary of the 2010 analysis of retail prices and MTRs in the Caribbean Region discussed in Chapter 8.

Figures C 1 to C3 show the relationship between postpaid retail mobile-to-mobile calling prices and MTRs for the 14 Caribbean jurisdictions surveyed. Figure C1 shows that postpaid off-net calling prices tend to be lower when the underlying MTR is lower. While the statistical relation is not strong, the results clearly do not support the contention that mobile prices increase as MTRs decrease. Figure C2 suggests that the level of MTRs do not tend to influence on-net retail prices for post-paid calling. Figure C3 shows that the ratio of off-net to on-net postpaid calling pricing is higher for higher MTRs. This is consistent with the expectation that allocative efficiency and competition are promoted by lowering MTRs.

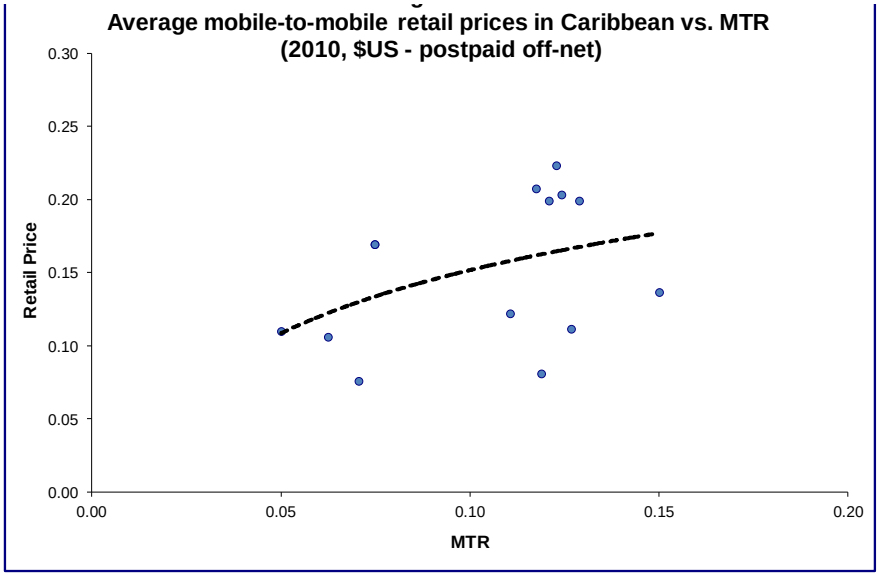

Figure C1 – Average Mobile-to Mobile retail process in Caribbean vs. MTR

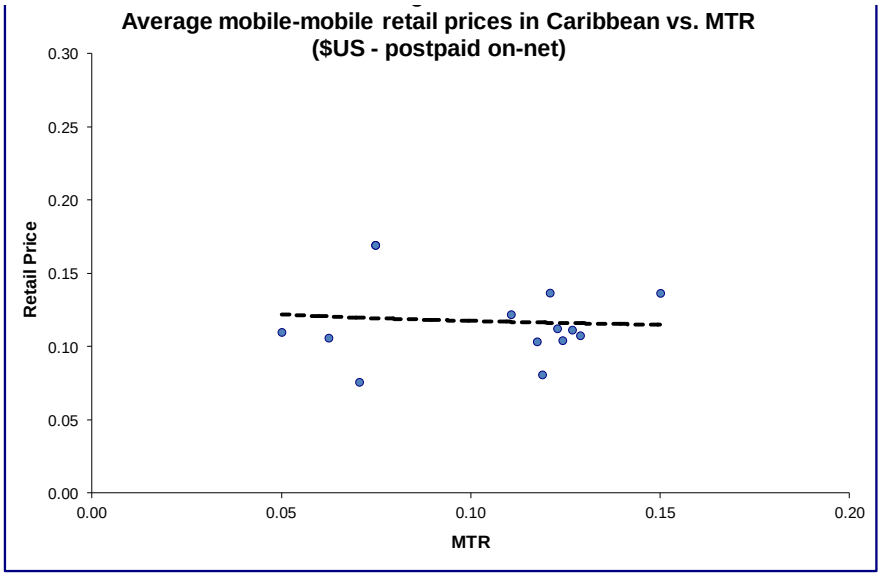

Figure C2 – Average mobile – mobile retail prices in Caribbean vs. MTR

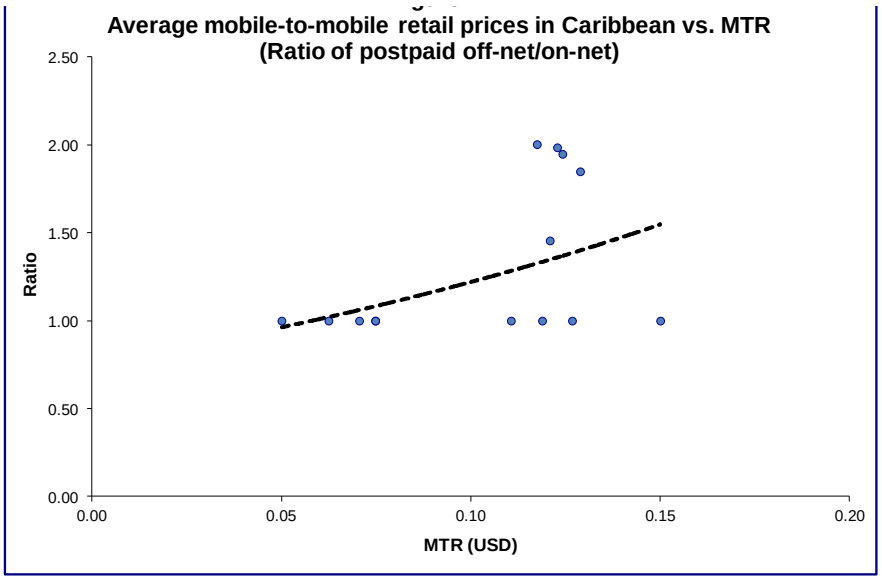

Figure C3 – Average mobile to mobile retail prices in Caribbean vs. MTR

Figures C4 and C5 show the relationship between retail fixed-to-fixed and mobile calling prices and MTRs for the 14 Caribbean jurisdictions surveyed. Figure C4 shows that fixed-to-mobile "off-net" call prices are correlated with the level of the MTR –off-net call prices tend to be lower when the underlying MTR is lower. Figure C5 shows that the ratio of "off-net" fixed-to-mobile to fixed-to-fixed pricing is higher in countries with

higher MTRs. This is consistent with the expectation that allocative efficiency and competition are promoted by lowering MTRs.

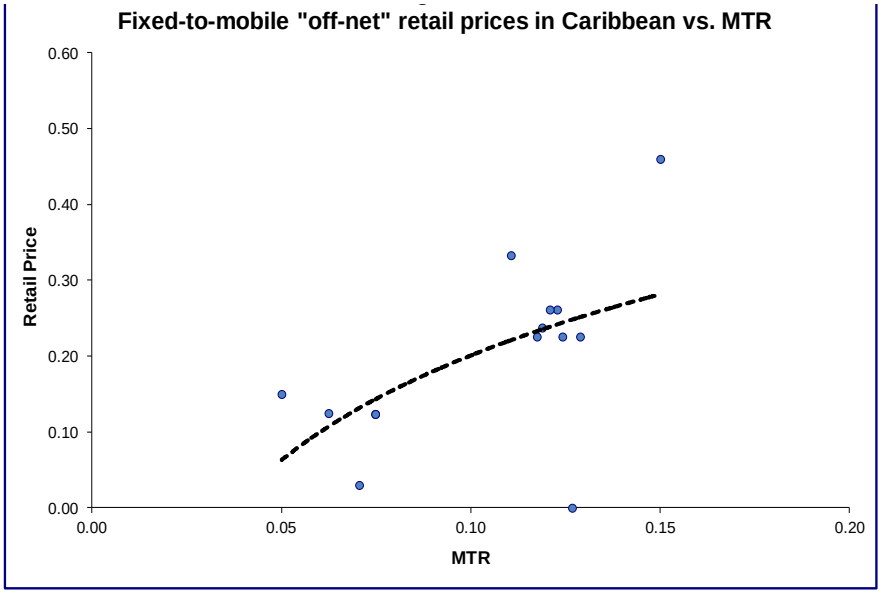

Figure C4 – Fixed to Mobile off net retail prices in Caribbean vs. MTR

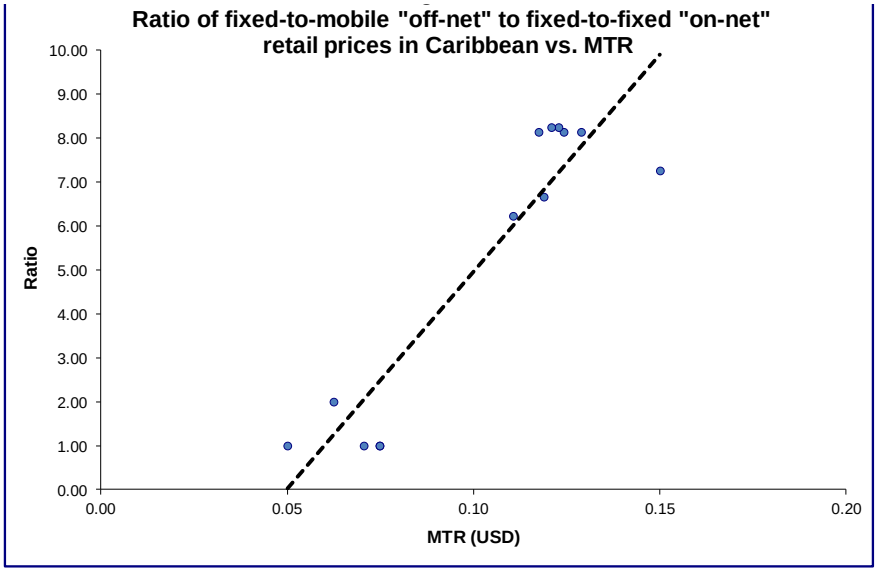

Figure C5 – Ratio of fixed-to-mobile off net to fixed-to -fixed on-net retail prices in Caribbean vs. MTR