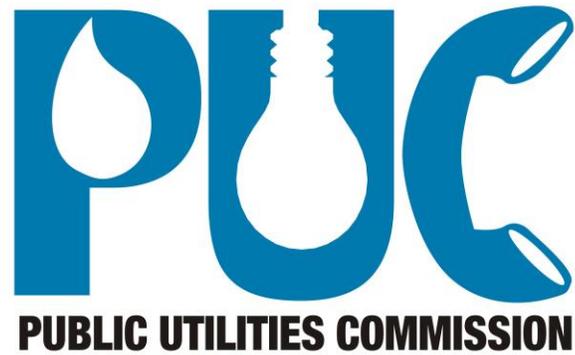


**Confidential**



**Proposal for Termination Rates in the Co-operative Republic  
of Guyana Using a Benchmarking Methodology as Commissioned  
by the Public Utilities Commission**

**12 July 2022**

# 1 Table of Contents

<b>2</b>	<b>INTRODUCTION</b> .....	<b>1</b>
<b>3</b>	<b>CURRENT STATUS OF TERMINATION RATES</b> .....	<b>2</b>
<b>4</b>	<b>METHODOLOGY FOR BENCHMARKING TERMINATION RATES</b> .....	<b>3</b>
4.1	SELECT THE BENCHMARK COUNTRIES - DEVELOP THE BENCHMARK SAMPLE.....	4
4.2	THE BENCHMARK SAMPLE SELECTION CRITERIA .....	4
4.3	DEVELOPING THE INITIAL BENCHMARK LIST .....	5
4.4	DEVELOPING THE INITIAL BENCHMARK SAMPLE COUNTRIES .....	6
4.5	DEVELOPING THE INITIAL BENCHMARK SAMPLE JURISDICTIONS.....	7
4.6	DEVELOPING THE COST-BASED BENCHMARK SAMPLE .....	10
<b>5</b>	<b>BENCHMARKING TERMINATION RATES INPUTS AND CONSIDERATIONS</b> .....	<b>12</b>
5.1	DATA COLLECTION .....	12
5.2	NORMALISING/STANDARDISING TERMINATION RATES .....	12
5.3	CURRENCY STANDARDISATION.....	13
5.4	VINTAGE OF TERMINATION RATES UTILISED FOR THE SAMPLE .....	14
5.5	TERMINATION RATES GLIDE PATH .....	14
<b>6</b>	<b>AVERAGE BENCHMARK RATE CALCULATIONS</b> .....	<b>15</b>
6.1	MTR AVERAGES .....	15
6.2	FTR AVERAGES .....	18
<b>7</b>	<b>TERMINATION RATE DETERMINATION</b> .....	<b>20</b>
7.1	TERMINATION RATE TREND PROJECTIONS .....	20
7.1.1	<i>MTR Benchmark Sample Average Rate Projections</i> .....	20
7.1.2	<i>FTR Benchmark Sample Average Rate Projections</i> .....	21
7.2	DATA NORMALISATION ADJUSTMENTS .....	23
7.3	TERMINATION RATES PROJECTIONS AND RECOMMENDATIONS .....	25
7.3.1	<i>Benchmark Sample Average Rates Projections</i> .....	25

7.3.2	<i>Benchmark Sample Recommended Rates</i> .....	27
<b>8</b>	<b>SENSITIVITY ANALYSIS</b> .....	<b>29</b>
	<b>APPENDIX 1: REFERENCES</b> .....	<b>32</b>

## **2 INTRODUCTION**

A key policy objective of regulatory authorities is to ensure that termination services are cost-based. While there are several methodologies which may be employed by the relevant market participants to facilitate cost-based termination services, most are costly, time-consuming, and require a significant amount of detailed data from service providers. Benchmarking, however, does not provide these challenges.

Benchmarks provide a simple yet effective solution to the cost model problem, acting as a cross-check tool used in conjunction with a cost model. Additionally, as in the case of this engagement, the benchmark may also function as a tool to develop the upper limits of termination prices, pending the introduction of a cost-model.

Having regard to the foregoing and per the terms of reference of the Public Utilities Commission (“the Commission”), this study which is intended to present a proposal for termination rates in Guyana, using a benchmarking approach was commissioned.

The specific rates considered in this study are the rates to be offered by dominant interconnection providers, to interconnecting operators and service providers, for:

- i. The termination of domestic fixed calls or the Fixed Termination Rate (“FTR”); and
- ii. The termination of domestic mobile calls or the Mobile Termination Rate (“MTR”).

This study provides details regarding the benchmarking methodology employed, the data and information considered, and the recommended costing benchmarks which shall be offered by dominant interconnection providers, to interconnecting operators and service providers.

### 3 CURRENT STATUS OF TERMINATION RATES

There are currently four licensed providers of telecommunications services in Guyana. Two have been declared jointly dominant with respect to Mobile Public Telecommunications Networks and Mobile Public Telecommunications Services in both the Retail and Wholesale space, whilst one has been declared dominant with respect to Fixed Public Telecommunications Networks and both Retail and Wholesale Fixed Public Telecommunications Services. Both licenced providers with declarations of dominance/joint dominance have thus, supplied Reference Interconnection Offers, for the Commission’s approval.

As it relates to this study, the termination rates currently charged by the dominant providers are as follows:

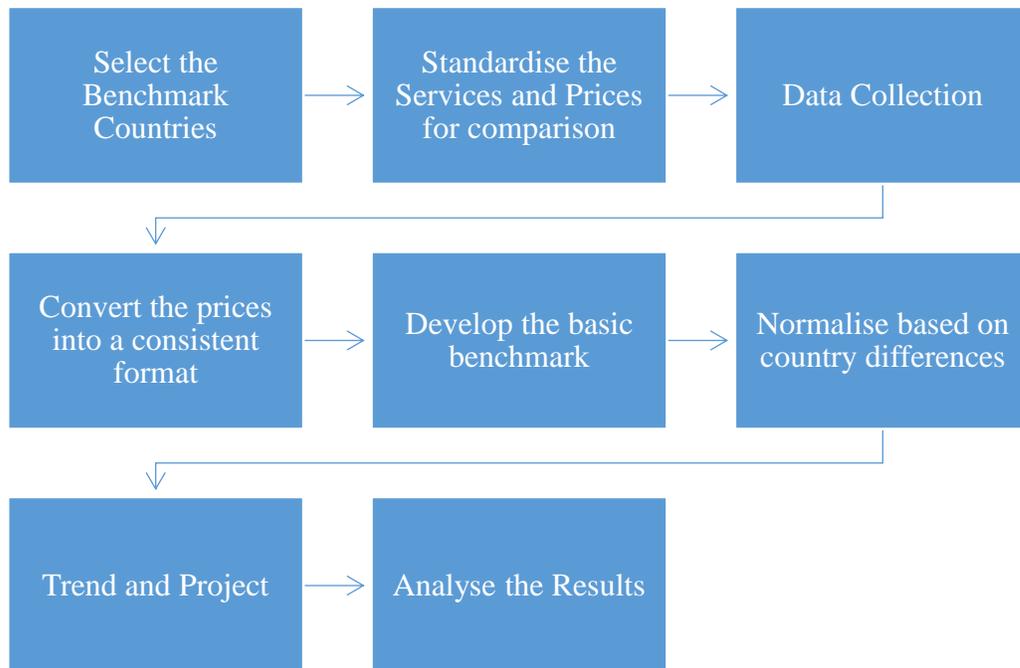
	Termination Rates GYD	
	Mobile	Fixed
GTT to Umobile	\$ 14.00	\$ 12.00
Umobile to GTT	\$ 14.00	\$ 12.00

As can be seen, symmetrical rates have been implemented by each operator for the domestic services under consideration. In addition to developing the benchmark, these rates were referenced several times in this document during the analysis of the rates provided by benchmark jurisdictions, as well as the proposed maximum rates considered to be fair and reasonable.

## 4 METHODOLOGY FOR BENCHMARKING TERMINATION RATES

There is no single methodology to be applied when developing a benchmark, and several approaches may be utilised with success. Figure 1 below, adapted from the ITU<sup>1</sup>, shows a general overview of the benchmarking process and the steps utilised in this benchmarking exercise, which will be discussed further below.

**Figure 1: Overview of the Benchmarking Process**



---

<sup>1</sup> [https://www.itu.int/en/ITU-D/Regulatory-Market/Documents/Publications/Benchmarking\\_guide\\_Final.pdf](https://www.itu.int/en/ITU-D/Regulatory-Market/Documents/Publications/Benchmarking_guide_Final.pdf).

## **4.1 Select the Benchmark Countries - Develop the Benchmark Sample**

The first and one of the most critical steps in benchmarking is the selection of the benchmark countries that will form the Benchmark Sample (“the Sample”) based on defined criteria. Selecting the appropriate jurisdictions to develop the Sample requires an element of regulatory discretion as very few countries are similar enough to allow them to be directly comparable without any adjustments.

Though geographically located in South America, Guyana is largely identified as a Caribbean country because of its strong cultural, historical, and political ties with other Caribbean countries and its status as a member of the Caribbean Community and Common Market (“CARICOM”). These similarities, along with several essential selection criteria (“the Criteria”), were considered and developed to facilitate a Benchmark Sample with the greatest level of suitability to allow for a reasonable degree of comparability with Guyana, for this benchmarking exercise.

## **4.2 The Benchmark Sample Selection Criteria**

For the exercise, the Criteria were utilised to identify the countries to be included in the Sample. The Criteria, which have been successfully utilised in other jurisdictions<sup>2</sup>, have been known to result in benchmark samples which most reasonably compared with the country under

---

<sup>2</sup> The selection criteria align with the guidelines provided in the International Telecommunications Union’s “*A Practical Guide on Benchmarking Telecommunication Prices*” 2014 Report. Additionally, a subset of the selection criteria utilised are based on criteria successfully considered in all three consultations regarding the setting of termination rates by the Turks and Caicos Islands Telecommunications Commission, which resulted in the following decisions: *Telecommunications Decision 2011 – 2, Decision on the Mobile Termination Rate Review* (January 24<sup>th</sup>, 2011); *Telecommunications Decision 2014 – 4 Decision on the Review of Interconnection Rates* (June 20<sup>th</sup>, 2014); and *Telecommunications Decision 2020 – 2 Decision on the Third Review of Interconnection Rates* (October 13<sup>th</sup>, 2013). These criteria were also successfully utilised by the Telecommunications Authority of Trinidad and Tobago, which also resulted in the following decision: *Notice of Determination 2021/01 International Wholesale Termination Rates*.

consideration and, because of their relevance, were utilised here, largely without modification. These Criteria are identified and discussed further below.

### **Benchmark Selection Criteria:**

- i. Geographic Criteria
  - a. Regional Geography – Territorial Status
  - b. Physical Geography – Island vs Continent
- ii. Market Structure
- iii. Interconnection Charges Payment Model
- iv. Public Availability and Non-confidentiality of Termination Rates
- v. Basis for the Development of Termination Rates

## **4.3 Developing the Initial Benchmark List**

### **First Level Selection Criteria**

The First Level Selection criteria were utilised to assist in developing the initial Benchmark List from which the sample was further developed. This is made up of two Selection Criteria based on geographic considerations.

#### **i. Geographic Criterion – Territorial Status**

Only jurisdictions geographically located in the Caribbean region are included in the initial list. While some jurisdictions in the Caribbean differ from Guyana in terms of their topology and demographics, the relative similarities in socio-economic, industry and industrial development, as well as geographic and environmental factors, allow for a reasonable and acceptable level of comparability.

#### **ii. Geographic Criterion – Island vs Continent**

Only countries that are islands which are in the Caribbean region are included in the sample. Islands were selected given that relevant cost conditions may be more relatable here than to countries which exist on a continent.

Utilising the first level criteria shown above, a relatively long list of 32 countries was developed. These were further reviewed against other criteria to ensure a more comparable benchmark list.

#### **4.4 Developing the Initial Benchmark Sample Countries**

##### **Second Level Selection Criteria**

###### **i. Market Structure**

Based on this criterion, the Sample excludes jurisdictions where there exists a monopoly in the provision of mobile or fixed-line services and only considers countries with economically competitive telecommunications markets. Thus, only jurisdictions with more than one market player in the provision of fixed and mobile services were considered for inclusion in the benchmark sample country list.

###### **ii. Interconnection Charges Payment Model**

There are three main ways in which operators pay interconnection charges for carrying each other's traffic:

- Calling Party's Network Pays ("CPNP") — the originating operator pays the operator that terminates the traffic being exchanged. It is the most common interconnection regime.
- Bill and keep ("BAK") — each operator agrees to terminate calls from another network at no charge (usually on the condition that traffic is roughly balanced in each direction).
- Receiving Party's Network Pays ("RPNP") — the receiving operator pays the originating operator. Less common than CPNP, this system is used in North America and Japan.

Differences in the various regimes identified do not allow for ease of comparability. Thus, the application of this criteria required that the countries included in the Sample utilise the same interconnection payment model. Given that Guyana operates under a CPNP model,

the Benchmark Population was filtered to only include countries operating under a pure CPNP regime.

### **iii. Public Availability and Non-confidentiality of Termination Rates**

Access to sample countries' termination rates was necessary for data analysis, analytics, and comparison. Thus, the benchmark sample developed includes countries where termination rates are publicly available and countries where termination rates though not publicly available, were available via the operator's willingness or non-objection to disclosure, where the rates were not deemed commercially sensitive or confidential.

Application of the second level criteria to the initial list of 32 countries resulted in a benchmark list of 24 countries. This was further revised and reduced as follows.

## **4.5 Developing the Initial Benchmark Sample Jurisdictions**

A review of the benchmark list of 24 countries mentioned above revealed the existence of several countries that would have either been subject to the same regulatory authority or would have been under the same government control and thus potentially subject to the same regulatory governance approach on the matter of termination rates. As a result, in some cases, at least 2 countries would have had the same termination rates. Where this was the case, the potential for these termination rates to be more heavily weighted in the benchmark study, due to their existence in multiple countries was considered, and the steps that were taken to address the potential impact of this, are discussed below.

### **Eastern Caribbean Telecommunications Authority Member States**

The Eastern Caribbean Telecommunications Authority ("ECTEL") is the regulatory body for telecommunications in its Member States – the Commonwealth of Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, to whom it provides non-binding

regulatory advice, communicated to each country's National Telecommunications Regulatory Commission ("NTRC").

While relevant termination rates in all 5 ECTEL Member States mirrored each other up to the first quarter of 2010, this is no longer the case. Each of the Member States has termination rates that are different from each other in effect, and there is no risk of unfairly weighting these rates, if each country is treated as a separate entry in the benchmark sample. As a result, each of the ECTEL states was treated as a separate jurisdiction in the benchmark sample analysis.

### **Overseas Collectivity of France**

In the case of the 4 countries which form the Overseas Collectivity of France ("OCoF") – Guadeloupe, Martinique, St. Barthelemy (Saint Barts), and Saint Martin, all four countries had separate rates up to the second quarter of 2013. Prior to this, Guadeloupe and Martinique had the same rates, whilst St. Barts and St. Martin had the same rates. As a result, the two pairs of countries identified with the same rates, were treated as 2 separate sample group jurisdictions as opposed to 4 separate sample jurisdictions as follows:

- OCoF Group 1 - Guadeloupe and Martinique
- OCoF Group 2 - St. Barts and St. Martin

### **Kingdom of the Netherlands**

While the 5 countries of the Kingdom of the Netherlands are managed by more than one regulatory authority, termination rates have been the same in all of the Kingdom of the Netherlands countries except for Aruba, where rates have traditionally been lower for both fixed and mobile termination. As a result, Aruba, on its own will be treated as one jurisdiction, and the other 5 countries will be treated as one separate jurisdiction as follows:

- Group 1 - Aruba
- Group 2 - Bonaire, St. Eustasius, Saba, Curacao and St. Maarten

## **British Overseas Territories**

The countries identified as British Overseas Territories have all produced separate fixed and mobile termination rates. Thus, there is no value in seeking to combine these countries into one jurisdiction. The countries here were therefore considered as distinct and separate jurisdictions.

The above combination of countries with the same termination rates was grouped into distinct individual groups of a single jurisdiction, resulting in a reduction of the initial benchmark list of countries from 24 to a benchmark sample list of 18 jurisdictions:

1. The Bahamas
2. Barbados
3. The Dominican Republic
4. Jamaica
5. Trinidad and Tobago
6. Anguilla
7. British Virgin Islands (“BVI”)
8. The Cayman Islands
9. Turks and Caicos Islands (“TCI”)
10. Dominica
11. Grenada
12. Saint Kitts and Nevis
13. Saint Lucia
14. Saint Vincent and the Grenadines
15. OCoF 1 - Guadeloupe and Martinique
16. OCoF 2 - Saint Barthélemy (St. Barts) and Collectivity of Saint Martin (Saint Martin)
17. Aruba
18. Kingdom of the Netherlands – Curacao, Sint Maarten, Caribbean Netherlands (BES):  
Bonaire, Saba, and St. Eustatius

## **4.6 Developing the Cost-Based Benchmark Sample**

As discussed, one of the policy objectives of the Commission is ensuring that dominant operators and service providers comply with the requirement to price the termination of domestic fixed and mobile calls on its domestic fixed and mobile telecommunications networks on a cost-oriented basis or, “*based on those charges equal to the long-run incremental cost of an efficient operator or service provider, as the case may be, plus, if applicable, an appropriate portion of shared and common costs*”.

As a result, the Full Benchmark Sample Jurisdictions identified above were further sanitised to show those jurisdictions that utilised a costing approach or methodology, to derive cost-oriented rates, based on the long-run incremental cost (“LRIC”) approach, inclusive of a portion of shared and/or common costs, that is, LRIC<sup>+</sup>. This further sub-sample of Benchmark Jurisdictions is referred to as the “Cost-Based Sample”.

The following Selection Criteria provides a guide regarding the selection of Cost-Based Sample Jurisdictions.

### **Third Level Selection Criteria**

#### **i. Cost-Based Termination Rates**

The benchmarking sample jurisdictions utilised here included those countries where termination rates were set on a cost basis. This is to ensure alignment with the Act and Regulations which require cost-oriented rates for telecommunications termination services, as defined above.

In reviewing the cost methodologies utilised to set rates in the various sample jurisdictions, consideration was given to jurisdictions utilising the legally supported costing methodology of LRIC<sup>+</sup>. Jurisdictions which utilised a Pure LRIC approach would have developed costs which did not include contributions to common and joint costs and would have therefore not aligned with the cost-oriented approach defined for Guyana and resulted in lower than acceptable benchmark rates.

When the Third Level Selection Criteria of cost-based rates was applied, jurisdictions which did not develop termination rates based on LRIC<sup>+</sup> were eliminated from the sample. As a result, the following list of 7 jurisdictions was used to develop the Cost-Based Sample Jurisdictions as identified below:

**Table 1: Cost-Based Sample Jurisdictions**

No.	Jurisdictions	MTR	FTR
1	Barbados	LRAIC+	LRAIC+
2	Cayman Islands	LRAIC+	LRAIC+
3	Dominica	LRAIC+	LRAIC+
4	Grenada	LRAIC+	LRAIC+
5	Saint Kitts and Nevis	LRAIC+	LRAIC+
6	Saint Lucia	LRAIC+	LRAIC+
7	Saint Vincent	LRAIC+	LRAIC+

## **5 BENCHMARKING TERMINATION RATES INPUTS AND CONSIDERATIONS**

### **5.1 Data Collection**

The termination rate data which informed the structure of the benchmark was obtained via direct contact with regulatory authorities via email, letter, telephone conversations and online web portal messages. Data was also obtained directly from operators in the region and sourced from the websites of regulatory authorities, relevant publications, and via other forms of desk research.

Data collected during the exercise will be shared with the service providers upon request.

Documents obtained during the data collection phase will be provided in the references section.

### **5.2 Normalising/Standardising Termination Rates**

The mobile termination rate data collected for the study was based on a one-part tariff expressed on a per minute basis. The fixed termination rate data collected while largely based on a variable, one-part tariff expressed on a per minute basis, was, in a few cases based on a two-part tariff comprised of a fixed element or call-set-up and variable element, for each minute of a call.

In order to allow for comparability, the two-part fixed termination rates were standardised and expressed as a one-part per minute tariff. This was done using the following assumptions which have been successfully utilised by other regulatory authorities who have employed the use of benchmarking:

- i. A three-minute average call duration has been assumed;
- ii. Based on assumption (i) above, where a single tariff was set for the fixed and variable elements the standard formula:  $(\text{Set-Up Charge}/3) + \text{Price per minute elements}$ , was utilised to convert the hybrid rate to a per minute rate; and

- iii. Where countries did not set a single tariff for the fixed or variable element of the termination service and instead applied distinct rates for peak/off peak periods<sup>3</sup>, an average price was calculated using the distribution: Day/Peak= 50%; Evening/Off-Peak=25%; and Weekend = 25%.

As a result of these adjustments, all rates in this document are expressed on a per minute basis unless otherwise advised.

### **5.3 Currency Standardisation**

In the case of the jurisdictions considered, termination rates were quoted in the Local Currency Units (“LCU”) of the country under consideration. In conducting the required analysis, it was, therefore, necessary to convert rates recorded in LCUs to a standard currency to allow for ease of comparison.

Several jurisdictions operate within fixed exchange rate regimes, while others, such as the countries of the OCoF, Jamaica, and Trinidad and Tobago, operate within either floating exchange rate regimes or utilise a “managed float”. For the fixed-rate regimes, LCUs were converted to rates quoted in United States Dollars (“USD”) using the official exchange rate as determined by national authorities or the rate determined in the legally sanctioned exchange market <sup>4</sup>.

For countries with floating rates or managed float regimes, exchange rate changes, if not accounted for, have the effect of distorting termination rates denominated in the local currency and, can over or underestimate termination rates in general. Thus, a single average exchange rate was utilised for the entire period under consideration to eliminate this distorting effect of changes in the

---

<sup>3</sup> Some countries such as the ECTEL states previously set different rates for Day, Evening, Weekend while others set rates for Peak, Off-Peak, Weekend.

<sup>4</sup> Source: Data from database: World Development Indicators with source International Monetary Fund, International Financial Statistics.

exchange rate on the termination rates being analysed in floating and managed exchange rate regimes.

In the case of several of the jurisdictions such as the Bahamas, BVI, the Dominican Republic and the TCI, termination rates were already quoted in USD and there was therefore no exchange rate conversion required.

It is to be noted that unless otherwise stated in the document, all currency is expressed in USD.

#### **5.4 Vintage of Termination Rates Utilised for the Sample**

The full data set collected from 2008 to 2021 has been utilised in arriving at the decision on the proposed rates. The termination rates for all the jurisdictions were deemed valid observations and there currently is no evidence to support omitting any of these on the basis of their vintage. This helps maintain reasonable sample sizes and avoids rate inclusion bias based on what may be considered an arbitrary decision, which would have ultimately led to unnecessarily driving the benchmarked rates down.

#### **5.5 Termination Rates Glide Path**

It is recommended that glide paths be used to implement rates developed as a result of the introduction of cost models, and a flash-cut approach be used to implement rates based on benchmarks. However, this is based on the assumption that cost model based rates result in a significant step-change in rates and rates based on benchmarks do not. Nonetheless, it is not uncommon to use glide paths to implement rates based on benchmarking. This phased approach allows operators to adjust as necessary and helps avoid any potential rate shock. A three-year glide path, with equal steps, which aligns with the proposed terms of the draft Reference Interconnection Offers of the dominant providers, is therefore considered appropriate for phasing in any termination rate changes developed.

## **6 AVERAGE BENCHMARK RATE CALCULATIONS**

Historical monthly termination rates were collected for each of the benchmark jurisdictions for the period April 2008 to December 2021, in their LCUs and converted to a common currency which was in this case, the United States Dollar (“USD”). Utilising the converted termination rates collected, average monthly and annual benchmark termination rates were calculated for each year. This is discussed further below.

### **6.1 MTR Averages**

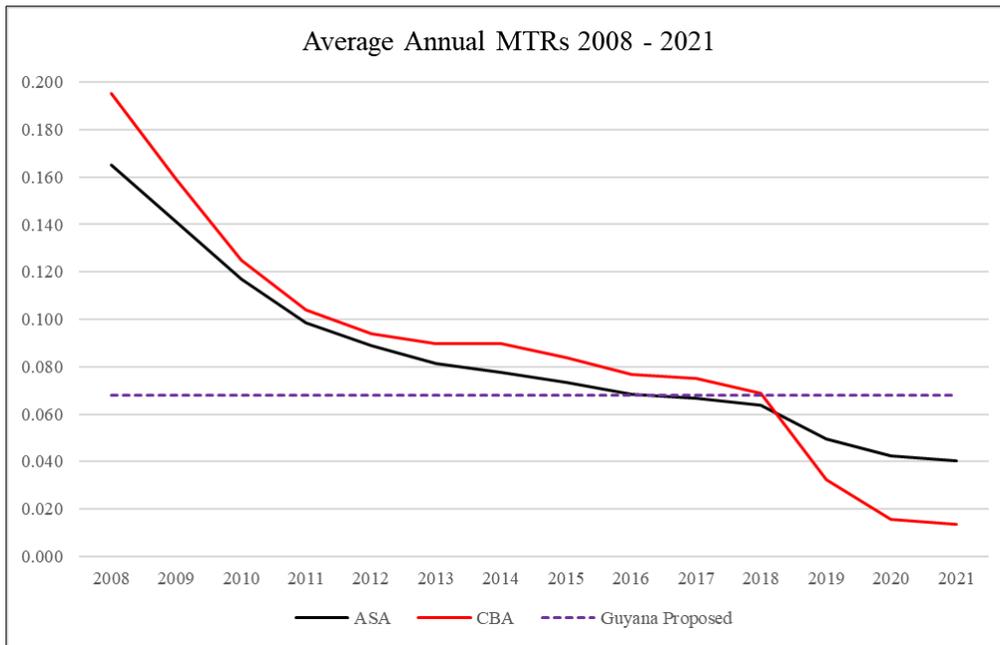
Chart 1 shows the annual average MTRs for the full benchmark sample (“the All-Sample Benchmark”), and for the Cost-Based Benchmark Sample jurisdictions (“the Cost-Based Benchmark”), for the period April 2008 to December 2021.

As can be seen, MTRs have declined significantly over the period with the All-Sample Benchmark moving from an average annual rate of USD 0.165 in 2008 to USD 0.040 in 2021, reflecting an Average Annual Growth Rate (“AAGR”) of -10.10 % over the period and a Compound Annual Growth Rate (“CAGR”) of -9.61%.

In the case of the Cost-Based Benchmark the average annual MTR experienced a more significant decline over the period moving from USD 0.195 in 2008 to USD 0.014 in 2021, reflecting an AAGR of -16.5 % over the period and a CAGR of -17.34%. It is to be noted that the jurisdictions which comprise the Cost-Based Benchmark did or may not all utilised termination rates based on costs for the full period of the study.

*In each of the following diagrams, the MTR proposed by the dominant providers in Guyana is provided for illustrative purposes only.*

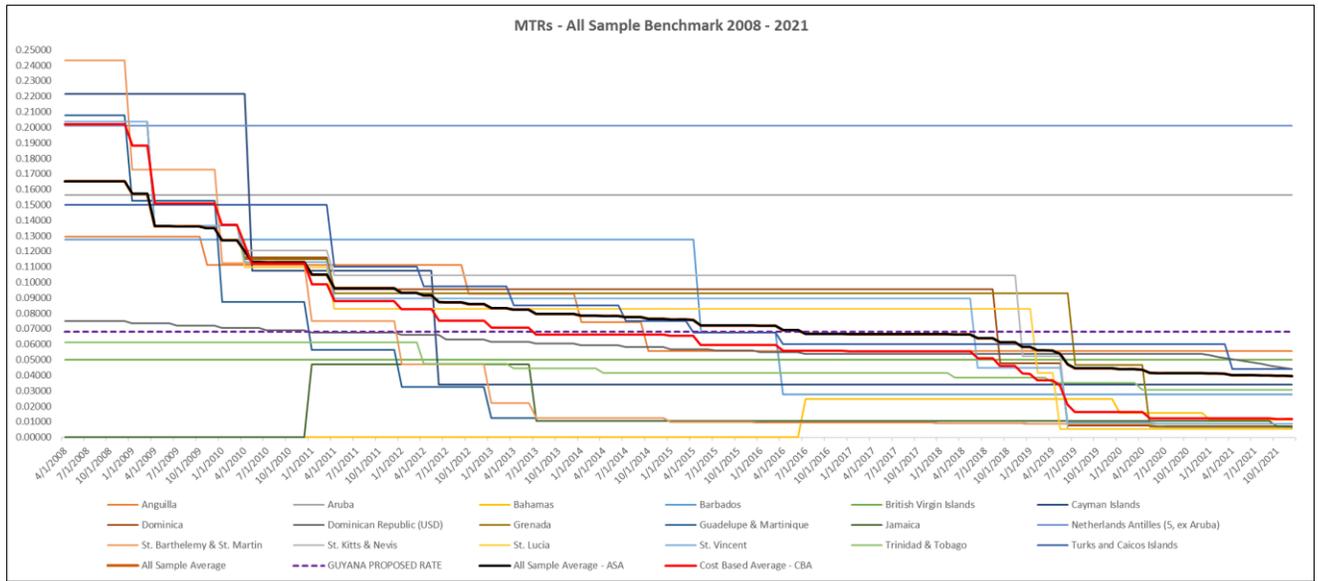
**Chart 1: Average Annual MTRs 2008 - 2021**



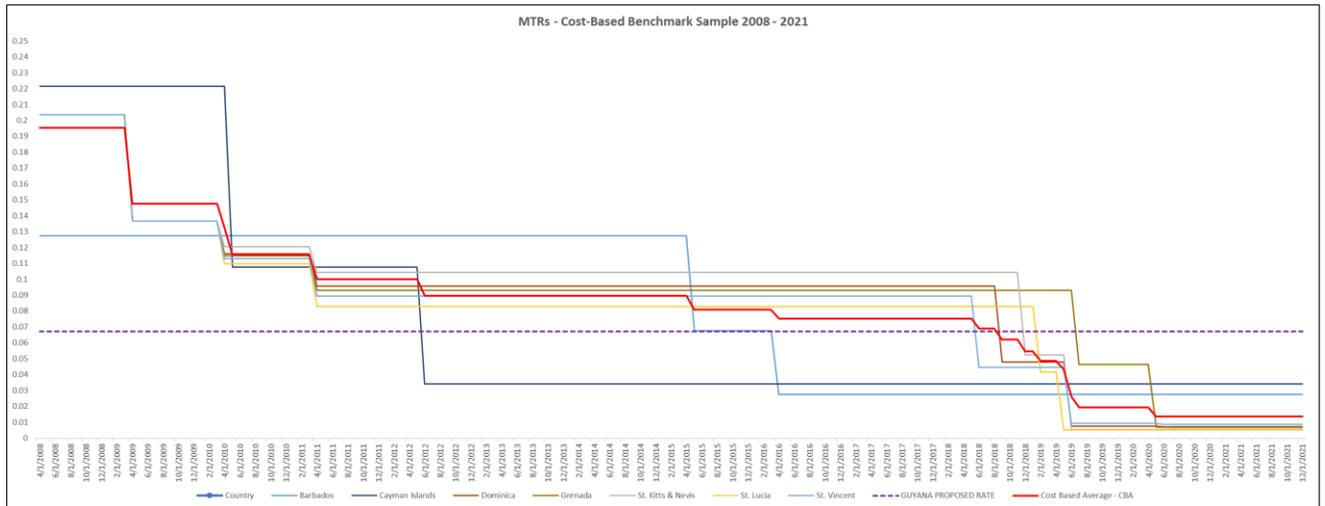
Charts 2 and 3 below, show the monthly MTRs for each jurisdiction in the All-Sample Benchmark and the Cost-Based Benchmark respectively, and shows how each jurisdiction contributed to the overall monthly and annual MTR averages for the period.

The average monthly All-Sample Benchmark and Cost-Based Benchmark are also displayed in each of the charts, to allow for ease of comparison.

**Chart 2: MTRs All Sample Benchmark 2008-2021**



**Chart 3: MTRs Cost-Based Benchmark Sample 2008-2021**



It is to be noted that in charts 2 and 3 above, there are no observations for the Bahamas and Jamaica from the start of the series. This is because, in the case of the Bahamas, BTC provided zero-rate domestic call termination to its cellular mobile network due to the then Receiving Party Pays (RPP/MPP) regime, which existed for domestic fixed to mobile calls. In the case of Jamaica, MTRs were confidential at that time and thus unavailable.

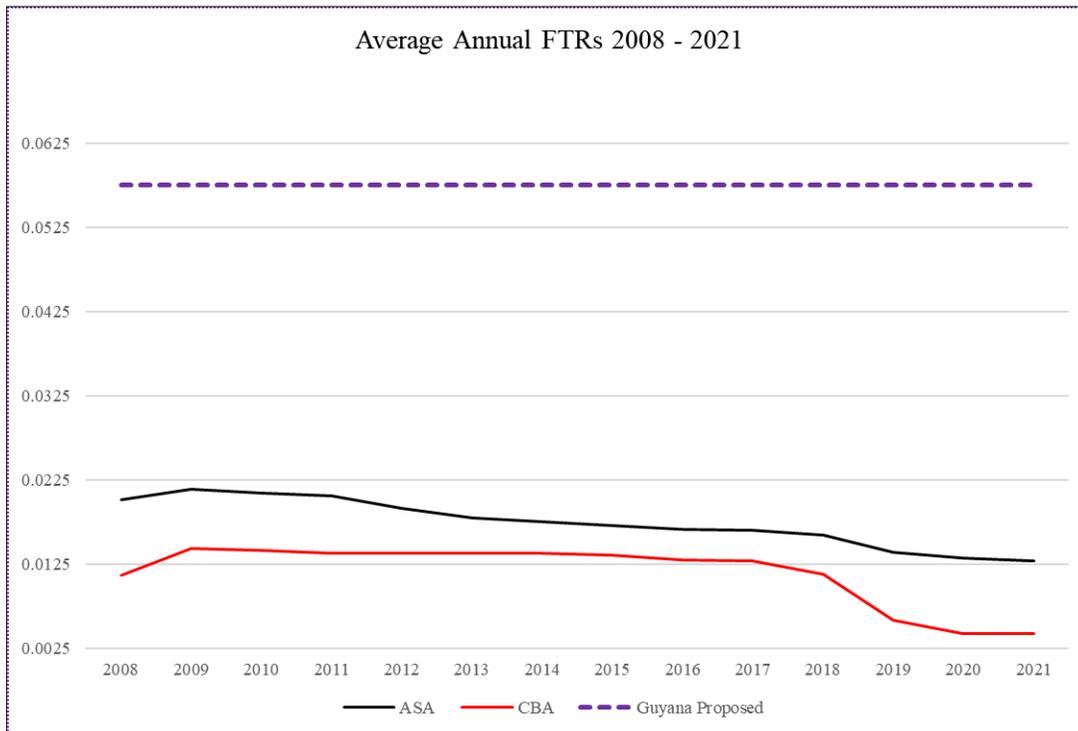
## 6.2 FTR Averages

Chart 4 below shows the average annual FTRs for the All-Sample Benchmark and the Cost-Based Benchmark, for the period April 2008 to December 2021.

The All-Sample Benchmark showed a comparatively modest decline moving from an average annual rate of USD 0.0202 in 2008 to USD 0.0129 in 2021, reflecting an AAGR of -3.30 % over the period and a CAGR of -3.15%.

Over the period 2008 to 2021, the annual average Cost-Based Benchmark experienced a more significant decline moving from USD 0.0112 in 2008 to USD 0.0043, in 2021, reflecting an AAGR of -5.40 % over the period and a CAGR of -6.66%.

**Chart 4: Average Annual FTRs 2008 – 2021**

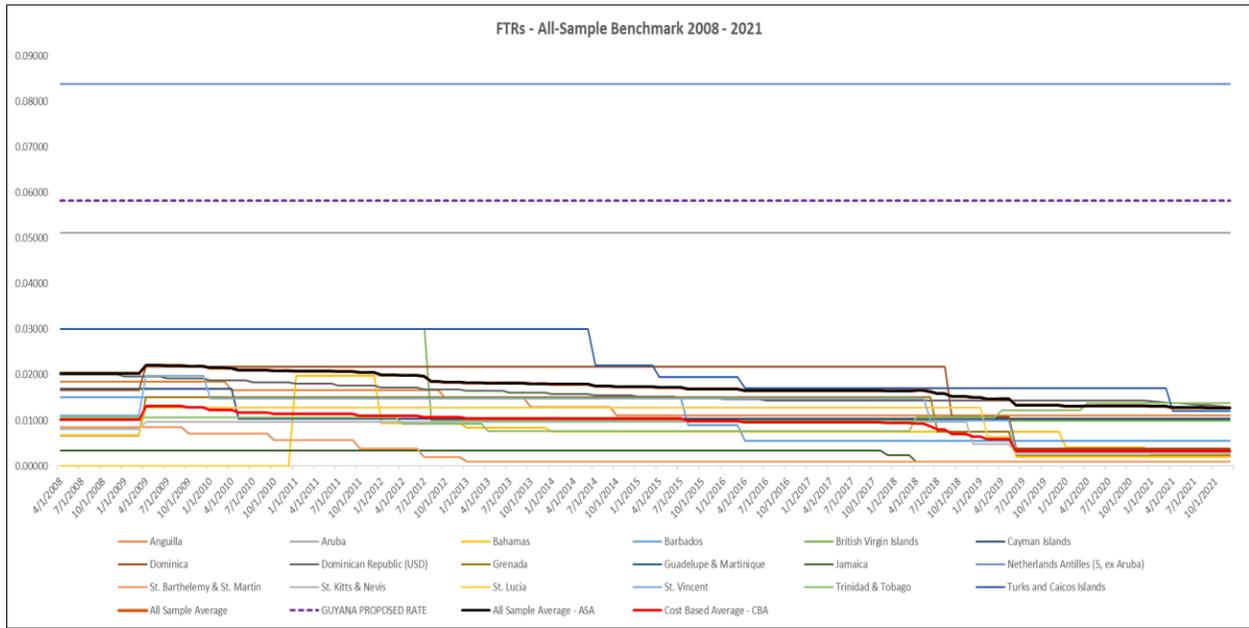


The average monthly FTRs over the period 2008 to 2021 for both the All-Sample Benchmark jurisdictions as well as the Cost-Based Benchmark jurisdictions are provided in Charts 5 and 6

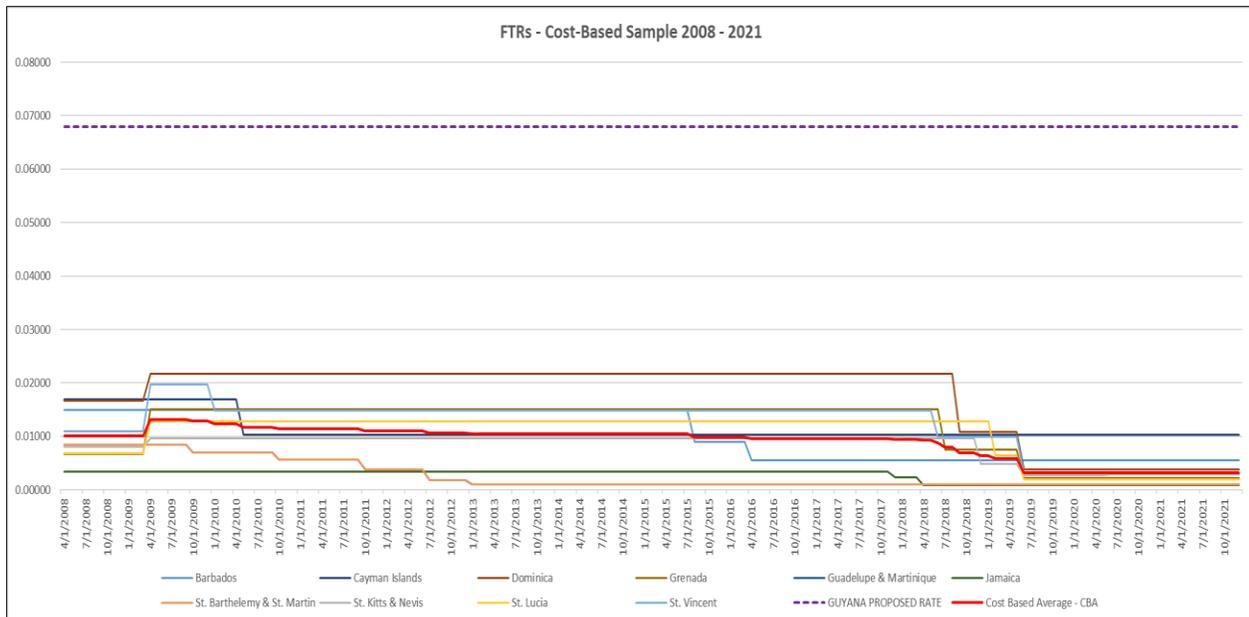
below allowing for some insight into how each jurisdiction contributed to the levels of the average annual All-Sample and Cost-Based FTRs over the period.

*In each of the following diagrams, the FTR proposed by the dominant providers in Guyana is provided for illustrative purposes only.*

**Chart 5: FTRs All Sample Benchmark 2008-2021**



**Figure 2: FTRs Cost-Based Benchmark Sample 2009-2021**



## **7 TERMINATION RATE DETERMINATION**

The Termination rates proposed are based on a “forward-looking” benchmarking approach which is reliant on available historical data, projected based on best-fit trends and, where necessary, adjusted for normalisation. This is discussed further below.

### **7.1 TERMINATION RATE TREND PROJECTIONS**

In keeping with other accepted benchmarking approaches, average rate projections were made for three years, using statistical trending and starting at the most recent data point of December 2021 and projected to an “end point” of December 2024, for both the All-Sample and the Cost-Based, annual averages.

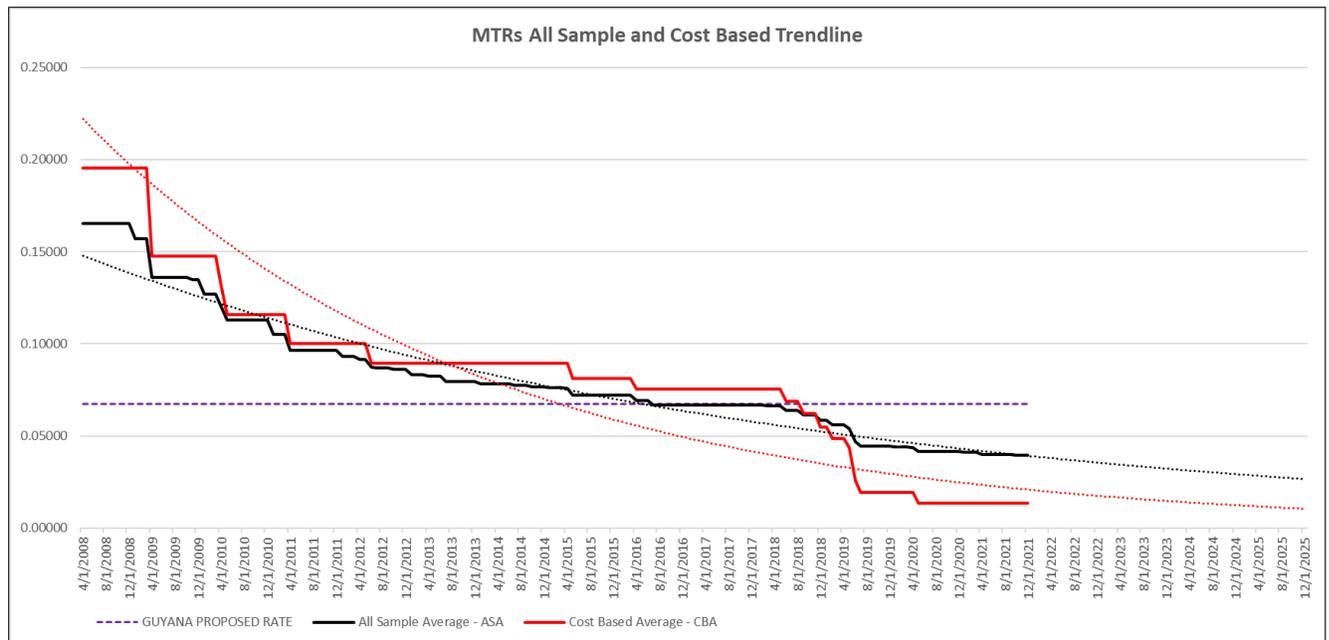
#### **7.1.1 MTR Benchmark Sample Average Rate Projections**

Chart 6 below displays the application of best-fit trendlines to the full suite of All-Sample Benchmark jurisdictions as well as the Cost-Based Benchmark jurisdictions, for the full period identified above.

Cost-based Determinations resulting in reduced termination rates based largely in the ECTEL States in 2019, resulted in a major reduction in the average annual rate for the All-Sample Benchmark, (the All-Sample Average or the ASA). This was also the case for the Cost-Based Benchmark, (the Cost-Based Average or the CBA).

As can be seen from the chart, the MTRs proposed by the dominant providers in Guyana is approximately 40% or USD 0.03, above the ASA as of December 2021. In the case of the Cost-Based Sample, the rates proposed by the dominant providers are USD 0.05 or 80% above what obtains for the CBA. Based on the trendline of both the ASA and the CBA, if the rates proposed by the operators are implemented, these gaps will only increase.

**Chart 6: MTRs All Sample and Cost-Based Trend Line and Projections**



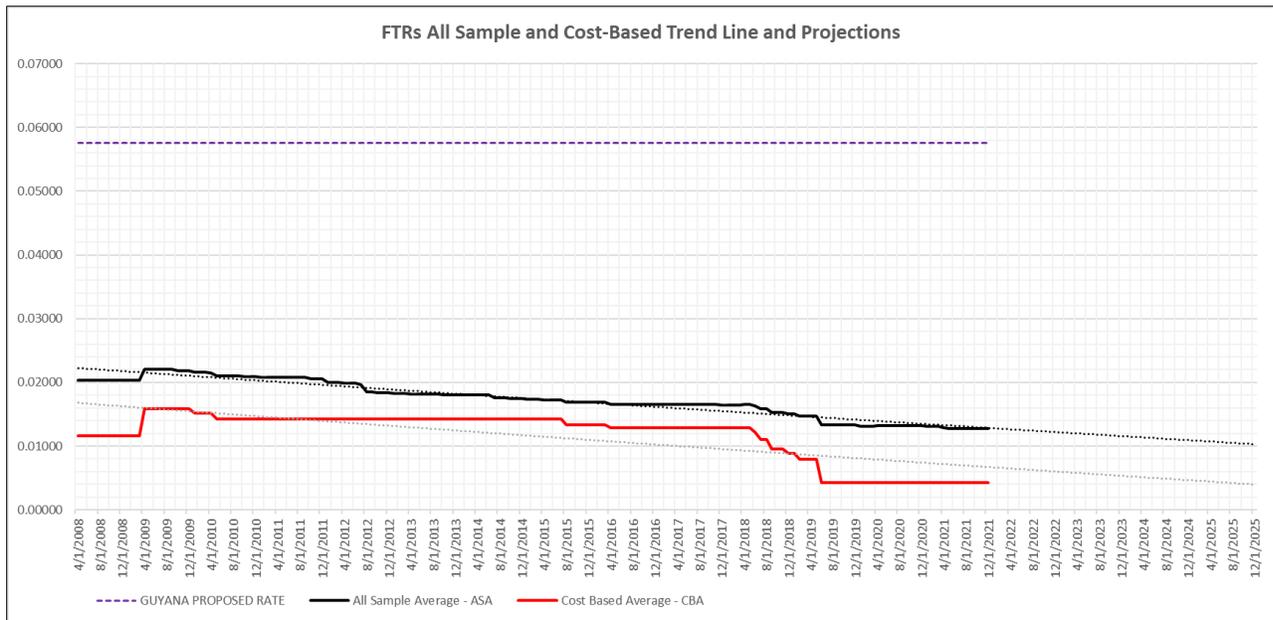
**7.1.2 FTR Benchmark Sample Average Rate Projections**

Chart 7 below shows the trendlines derived for the ASA, and the CBA for the full period identified above.

Determinations implementing new cost-based termination rates largely in the ECTEL States circa 2019, resulted in a noticeable reduction in both the ASA and the CBA.

As can be seen from the chart, the FTRs proposed by the dominant providers in Guyana are above the average annual FTRs of the All-Sample Benchmark by USD 0.045 or 78%, as of December 2021. In the case of the Cost-Based Sample, the rates proposed by the dominant providers are USD 0.053 above or approximately 93% above the average annual FTRs. Based on the trendlines of the ASA and the CBA, if the rates proposed by the operators are implemented, these gaps are expected to increase moving forward.

**Chart 7: FTRs All Sample and Cost-Based Trend Line and Projections**



## 7.2 DATA NORMALISATION ADJUSTMENTS

The following table shows key national differences between the benchmark jurisdictions which were reviewed to determine if adjustments were required to the benchmark database. Specifically, the relationship or correlation between the various factors identified and the FTRs and MTRs were analysed to determine any strong positive or negative correlations which exist. Where such strong relationships did in fact exist adjustments to the benchmark database were considered.

Jurisdiction	Population	Land Area (sq km)	GDP per Capita (USD\$)	Population Density	Fixed Subs	Mobile Subs	Fixed Density (%)	Mobile Density (%)	FTR (USD\$) Dec-21	MTR (USD\$) Dec-21
Anguilla	15,003	91	17,226	165	6,000	26,000	40	173	0.01111	0.05556
Aruba	106,766	180	30,253	593	35,000	141,000	33	132	0.05112	0.15642
Bahamas	393,248	10,010	25,194	39	91,000	466,000	23	119	0.00240	0.01120
British Virgin Islands	30,237	151	34,200	200	7,000	35,163	23	116	0.01000	0.05000
Dominican Republic	10,847,904	48,310	7,268	225	1,155,493	8,989,587	11	83	0.01296	0.04406
Trinidad and Tobago	1,399,491	5,130	15,426	273	323,905	1,987,996	23	142	0.01378	0.03061
Turks and Caicos Islands	38,718	950	23,880	41	8,445	45,816	22	118	0.01200	0.04400
Kingdom of the Netherlands (exc.Aruba)	221,952	806	21,898	275	7,007	263,271	3	119	0.08380	0.20112
Barbados	287,371	430	15,374	668	128,000	295,000	45	103	0.00550	0.02750
Cayman Islands	65,720	264	85,083	249	36,000	100,000	55	152	0.01032	0.03408
ECTEL-Dominica	71,991	750	7,004	96	1,000	76,000	1	106	0.00385	0.00715
ECTEL-Grenada	112,519	340	9,262	331	16,000	122,000	14	108	0.00222	0.00678
ECTEL- St. Kitts and Nevis	53,192	260	18,438	205	15,000	78,000	28	147	0.00285	0.00559
ECTEL- St. Lucia	183,629	610	8,805	301	38,000	203,000	21	111	0.00196	0.00519
ECTEL- St. Vincent and the Grenadines	110,947	390	7,278	284	12,483	97,059	11	87	0.00307	0.00874
Jamaica	2,961,161	10,830	4,665	273	436,249	2,873,259	15	97	0.00088	0.00650
FWI - Guadeloupe & Martinique	865,894	2,829	24,068	306	348,651	1,383,797	40	160	0.00096	0.00850
FWI - St. Barthelemy & St. Martin	39,121	79	20,186	493	15,855	10,783	41	28	0.00096	0.00850
<b>All Sample Average</b>	<b>989,159</b>	<b>4,578</b>	<b>20,861</b>	<b>279</b>	<b>148,949</b>	<b>955,207</b>	<b>25</b>	<b>117</b>	<b>0.013</b>	<b>0.040</b>
Correlation Coefficient FTR	(0.04)	(0.05)	0.14	0.18	(0.10)		(0.23)			
Correlation Coefficient MTR	(0.03)	(0.05)	0.19	0.21		(0.05)		0.18		
<b>Cost-Based Average</b>	<b>475,155</b>	<b>1,678</b>	<b>20,016</b>	<b>321</b>	<b>104,724</b>	<b>523,890</b>	<b>27</b>	<b>110</b>	<b>0.003</b>	<b>0.012</b>
Correlation Coefficient FTR	(0.36)	(0.36)	0.81	(0.01)	(0.35)		0.47			
Correlation Coefficient MTR	(0.19)	(0.22)	0.77	0.38		(0.19)		0.25		
<b>Guyana</b>	<b>786,559</b>	<b>196,849</b>	<b>6,956</b>	<b>4</b>	<b>125,000</b>	<b>856,000</b>	<b>16</b>	<b>109</b>	<b>0.057 (Proposed)</b>	<b>0.067 (Proposed)</b>

Sources: The World Factbook-CIA, The World Bank, telecommunication.tc and Arcep. It is important to note that the demographic, geographical, and socioeconomic indicators were assessed typically for the year 2020 because that was the year with the most consistent data.

The limited correlation between population, land area, population density and number of subscribers and fixed and mobile density and the termination rates shown, mean that no normalisation adjustment was required in any of these cases. GDP per capita however displays a strong positive correlation to the FTRs and MTRs provided. This suggests that higher GDPs are associated with higher termination rates. The GDP for Guyana is approximately 66% less than the average GDPs for both the ASA and the CBA suggesting the need for a downward normalisation adjustment to be considered in the proposed rates. However, no such adjustment is recommended or proposed. These are discussed below.

Population: The population of Guyana is significantly larger than most of the jurisdictions represented. While on average, it appears to be close to the All-Sample Average (“the ASA”), this is only the case because of the population of the Dominican Republic which is an anomaly in terms of this variable with a population of approximately 11 times the ASA and 13 times that of Guyana. Nonetheless, the correlation coefficient for both the ASA and Cost-Based Average (“the CBA”) here were found to be low in relation to the levels of the MTRs and the FTRs.

Land Area (sq km): The land area for Guyana is more than twice the size of all the jurisdictions that comprise the ASA combined and a multiple of both the ASA and the CBA individually. However, the correlation coefficients for the FTR and MTR were low in relation to this variable, particularly in the case of the ASA, which stood at -0.05 for the levels of MTRs and FTRs.

GDP per Capita: Guyana has a GDP per capita that is less than half of both benchmark samples. While there is virtually no correlation between the GDP for the ASA and the level of MTRs and FTRs, a strong positive correlation of +0.81 and +0.77, exists for both the FTRs and the MTRs respectively in the case of the CBA. The relationship suggests that as the GDP per capita increases, the levels of FTRs and MTRs should also increase. Given that the GDP per capita of Guyana is below both benchmark samples, any normalisation adjustment would result in a revised benchmark of reduced levels of FTRs and MTRs. No normalisation adjustment was applied at this time.

Population Density: The population density of Guyana is 4, while that of the All Sample and Cost Based Benchmarks are 279 and 321 respectively. Population density is expected to affect network development costs and potentially termination rates however, the correlation coefficients here were relatively low in both samples. Thus, despite the large variance in population density between Guyana and both sample cases, given these relatively low correlation coefficients in relation to the MTR and FTR levels, did not result in the need for any normalisation adjustment.

Fixed Subscribers and Fixed Density: Guyana’s fixed subscriber base is approximately 19 % below the All-Sample average and 19% above the Cost-Based Sample while the fixed density is on average 61% above both samples. Despite this, in the case of both variables, the correlation coefficient was found to be low.

Mobile Subscribers and Mobidensity: Guyana’s mobile subscriber base is approximately 10% below the All-Sample average and 40% above the Cost-Based Sample while the mobidensity is

almost the same for the Cost-Based Sample and slightly above the All-Sample Benchmark. In the case of both variables the correlation coefficient was also found to be low and thus any adjustments to the termination data, could not be justified.

### **7.3 TERMINATION RATES PROJECTIONS AND RECOMMENDATIONS**

#### **7.3.1 Benchmark Sample Average Rates Projections**

The average annual MTR for the CBA, and for the ASA are \$0.0136 and \$0.0395, respectively as of December 2021.

Trending and projecting these MTRs three years forward to December 2024, results in an endpoint value of \$0.010 for the CBA and \$0.03 for the ASA. The rate currently proposed by both dominant providers in 2021 and shown on the chart stands at \$0.067 and is above the endpoint CBA and ASA values.

In the case of the FTRs, the CBA and the ASA are \$0.0043 and \$0.0129, as of December 2021. Utilising statistical trending and projecting these rates to December 2024, results in endpoint values of \$0.0040 for the CBA and \$0.011 for the ASA.

Based on the foregoing, three options were considered in developing the proposed benchmark values to be utilised by dominant providers, based on the following endpoint variations:

- i. Endpoint 1: The Cost-Based Average (CBA)
- ii. Endpoint 2: The All-Sample Average (ASA)
- iii. Endpoint 3: The average of the CBA and the ASA

The costing benchmarks for Guyana based on the three following endpoint options are provided in the following tables:

**Table 1: Benchmark Rates Utilising CBA Trended Endpoint**

Rate	\$\$	Dominant Providers' Proposed Rates	Projected Benchmark Rates - CBA		
			August 2022 - July 2023	August 2023 - July 2024	August 2024 - July 2025
MTR	USD	\$ 0.067	\$ 0.0480	\$ 0.0290	\$ 0.0100
	GYD	\$ 14.000	\$ 10.0299	\$ 6.0597	\$ 2.0896
FTR	USD	\$ 0.057	\$ 0.0393	\$ 0.0217	\$ 0.0040
	GYD	\$ 12.000	\$ 8.2189	\$ 4.5274	\$ 0.8358

**Table 2: Benchmark Rates Utilising ASA Trended Endpoint**

Rate	\$\$	Dominant Providers' Proposed Rates	Projected Benchmark Rates - ASA		
			August 2022 - July 2023	August 2023 - July 2024	August 2024 - July 2025
MTR	USD	\$ 0.067	\$ 0.0547	\$ 0.0423	\$ 0.0300
MTR	GYD	\$ 14.000	\$ 11.4229	\$ 8.8458	\$ 6.2687
FTR	USD	\$ 0.057	\$ 0.0417	\$ 0.0263	\$ 0.0110
FTR	GYD	\$ 12.000	\$ 8.7065	\$ 5.5025	\$ 2.2985

**Table 3: Benchmark Rates Utilising the Average of the CBA and ASA Trended Endpoints**

Rate	\$\$	Dominant Providers' Proposed Rates	Projected Benchmark Rates - ASA/CBA		
			August 2022 - July 2023	August 2023 - July 2024	August 2024 - July 2025
MTR	USD	\$ 0.067	\$ 0.052	\$ 0.036	\$ 0.021
	GYD	\$ 14.000	\$ 10.761	\$ 7.522	\$ 4.284
FTR	USD	\$ 0.057	\$ 0.040	\$ 0.024	\$ 0.007
	GYD	\$ 12.000	\$ 8.428	\$ 4.945	\$ 1.463

### 7.3.2 Benchmark Sample Recommended Rates

The regulatory instruments require that dominant providers offer cost-oriented rates for specific termination services based on a LRIC+ methodology, making rates benchmarked against the CBA most appropriate. It is to be noted however that the rates proposed by the dominant providers are on average significantly above the projected endpoint CBA values for MTRs and FTRs. In the circumstances, it is proposed that the most conservative of the options be considered and those dominant providers be transitioned to an endpoint value based on the projected ASA, utilising a 3-step glide path.

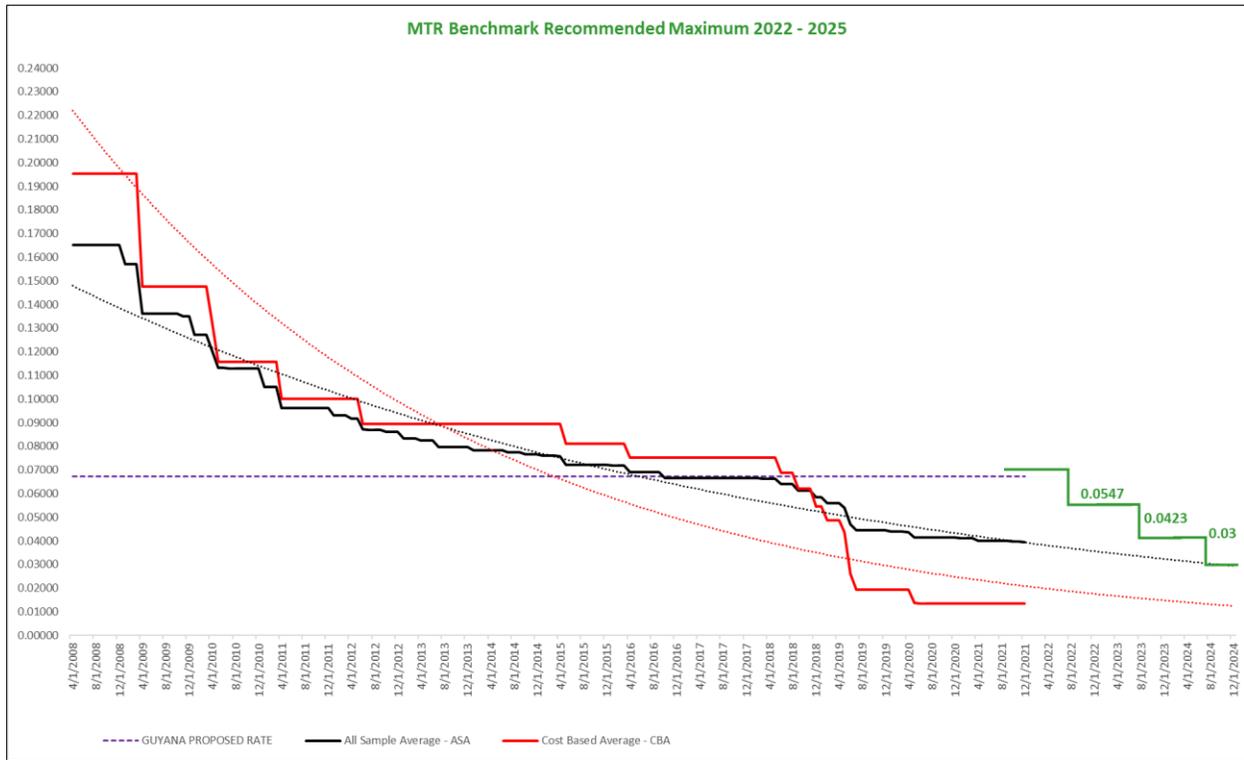
The benchmark recommendations are provided in the following table in GYD. They are also shown diagrammatically below in USD for illustrative purposes only.

**Table 4: Recommended Costing Benchmarks Rate Maximum**

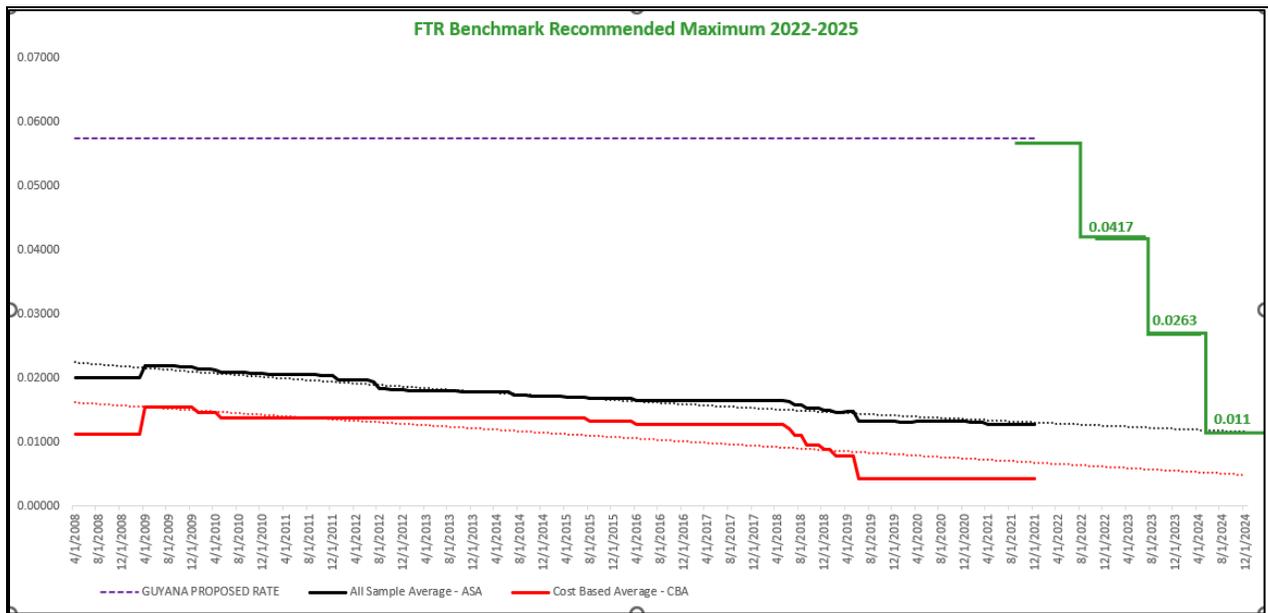
Rate		\$\$	Dominant Providers' Proposed Rates	Projected Benchmark Rates - ASA		
				August 2022 - July 2023	August 2023 - July 2024	August 2024 - July 2025
<b>MTR</b>	<b>GYD</b>	\$	<b>14.000</b>	\$ 11.4229	\$ 8.8458	\$ 6.2687
<b>FTR</b>	<b>GYD</b>	\$	<b>12.000</b>	\$ 8.7065	\$ 5.5025	\$ 2.2985

*Note: Recommended rate maximum should be quoted in GYD only, to avoid fluctuations in response to future exchange rate changes. The USD converted values for the proposed maximum rates are shown in Charts 12 and 13 only for ease of comparison.*

**Chart 8: Recommended MTR Rate Maximum**



**Chart 9: Recommended FTR Rate Maximum**



## 8 SENSITIVITY ANALYSIS

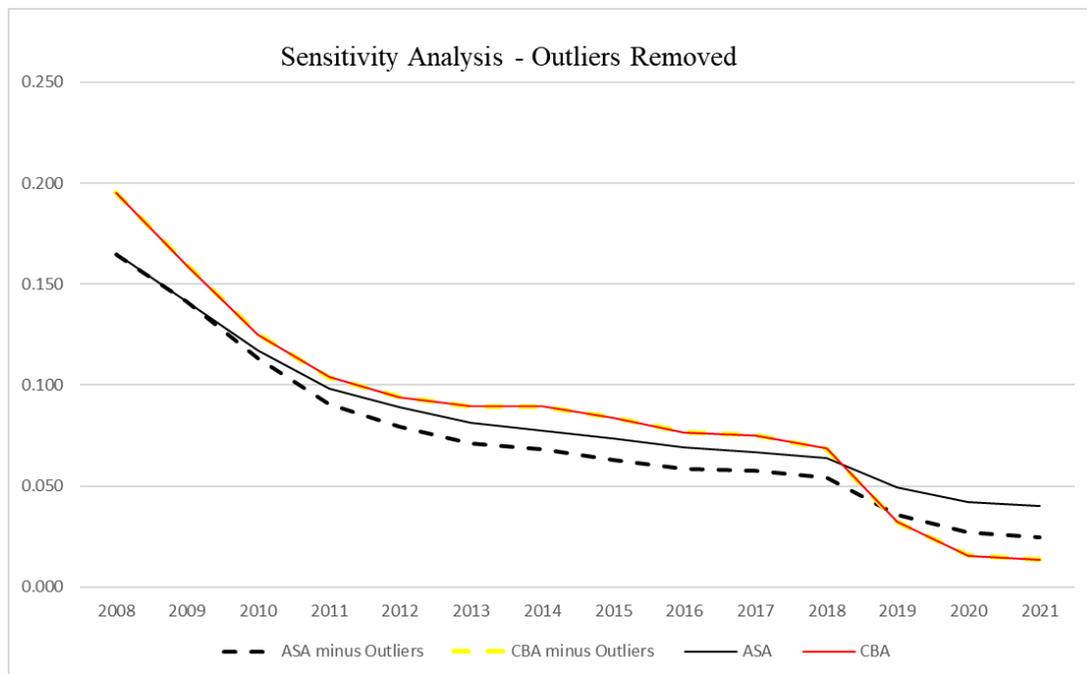
Several sensitivity analyses tests were conducted for the benchmark exercise and are discussed further below:

### i. Sensitivity Analysis #1 - Removal of Outlier Observations

Sensitivity analysis here was conducted by removing the following outliers in the FTR and the MTR samples:

MTR: In the case of the MTR, Aruba, Kingdom of the Netherlands, Jamaica and the Bahamas were removed from the sample given that the rates there are significantly higher than the rest of the sample for the duration of the study. In the case of Jamaica and the Bahamas, these countries displayed MTRs of zero for a period from the start of the study. These were thus considered to be outliers and were removed from the sample and the impact of the removal which is shown in Chart 10 below was considered.

**Chart 10: MTR Sensitivity – Removal of Outliers**



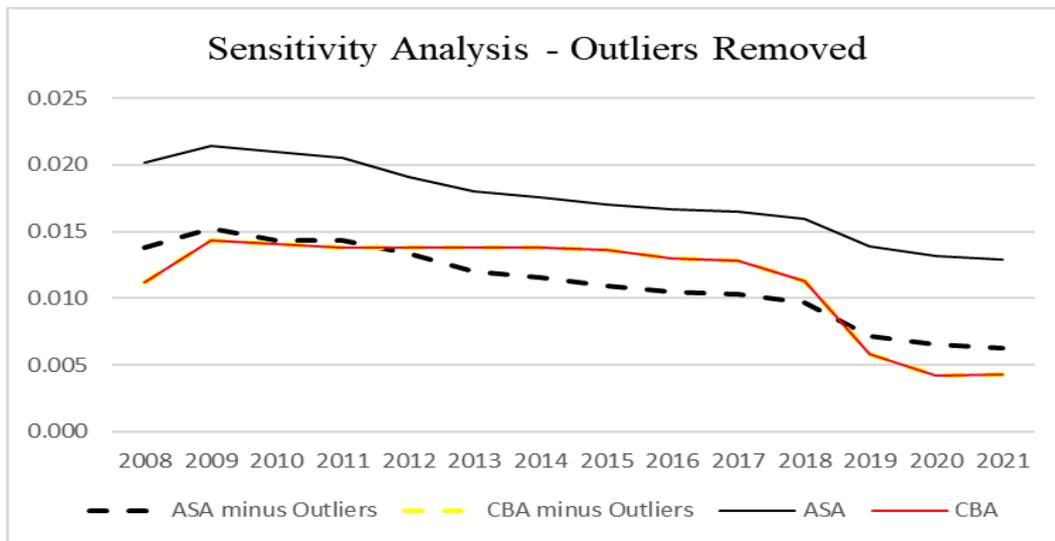
As can be seen from Chart 10 above, removing the outliers identified had no impact on the value of the CBAs over the period of the study. However, the ASAs before and after the exclusion of the

outliers remained the same up to 2019. Thereafter, the modified ASA began to depart in a negative direction from the original ASA at an increasing rate. This is evidence that the high rates of the Kingdom of the Netherlands and Aruba more than compensated for the lower rates displayed by the Bahamas and Jamaica. More importantly, the impact of this lower modified ASA on the maximum MTRs proposed would be to drive those rates even lower. Given the conservative approach to the implementation of the benchmark, adjusting for these outliers is not recommended.

FTRs: In the case of the FTRs, Aruba, the Kingdom of the Netherlands and the Bahamas were removed and the ASAs and CBAs recalculated. As can be seen from Chart 11 below removing the outliers identified resulted in a reduction of the ASAs over the period and had no effect on the CBAs.

The effect of the reduced ASAs would ultimately redound to lower projected FTRs. Given the conservative approach being considered, no changes are recommended based on this sensitivity analysis.

**Chart 11: FTR Sensitivity – Removal of Outliers**



ii. Sensitivity Analysis #2 - Correlation Coefficient

The Dominican Republic was deemed to be an outlier in terms of the population variable and was therefore removed from the Benchmark Sample, and the correlation coefficient recalculated. The resultant correlation between the new All Sample Benchmark and the FTR and the MTR, stood at -0.14 and -0.18. These values were still considered low and thus no adjustments were deemed necessary, based on this sensitivity test.

## Appendix 1: References

- Arcep.fr (2014). Retrieved 15 May 2022, from <https://en.arcep.fr/news/press-releases/view/n/arcep-launches-a-public-consultation-on-its-draft-analysis-of-the-market-for-fixed-and-mobile-voice-call-and-sms-termination-in-metropolitan-france-and-the-overseas-territories-from-2014-to-2017.html>.
- Arcep.fr (2011). Retrieved 15 May 2022, from <https://en.arcep.fr/news/press-releases/view/n/arcep-notifies-the-european-commission-and-submits-its-draft-decision-on-tariff-supervision-for-mobile-voice-call-termination-in-metropolitan-france-up-to-the-end-of-2013-to-public-consultation.html>.
- Arcep.fr (2021). Retrieved 6 May 2022, from <https://www.arcep.fr/la-regulation/grands-dossiers-thematiques-transverses/les-terminaisons-dappel.html#16875>.
- BEREC Termination rates at European level (July 2019). Retrieved 8 May 2022, [8900-termination-rates-at-european-level 0 \(1\).pdf](#).
- Cia.gov. (2022). Retrieved 4 May 2022, from <https://www.cia.gov/the-world-factbook/central-america-and-the-caribbean/>.
- Ectel.int. (2018). Retrieved 12 May 2022, from [https://www.ectel.int/wp-content/uploads/2018/08/Guidance\\_NTRCs\\_interconnection\\_rates\\_2018-13-Apr.pdf](https://www.ectel.int/wp-content/uploads/2018/08/Guidance_NTRCs_interconnection_rates_2018-13-Apr.pdf).
- Ectel.int. (2009). Retrieved 11 May 2022, from [https://www.ftc.gov.bb/library/rio/responses/2009-06-24\\_caritel\\_rio\\_submission\\_ectel\\_info\\_consolidated\\_rio.pdf](https://www.ftc.gov.bb/library/rio/responses/2009-06-24_caritel_rio_submission_ectel_info_consolidated_rio.pdf).
- Ftc.gov.bb. (2015). Retrieved 10 May 2022, from [https://www.ftc.gov.bb/library/2015-04-01\\_commission\\_decision\\_lric.pdf](https://www.ftc.gov.bb/library/2015-04-01_commission_decision_lric.pdf).
- Ftc.gov.bb. (2019). Retrieved 10 May 2022, from [https://www.ftc.gov.bb/library/rio/2019-04-17\\_commission\\_decision\\_rio.pdf](https://www.ftc.gov.bb/library/rio/2019-04-17_commission_decision_rio.pdf).
- Ftc.gov.bb. (2010). Retrieved 10 May 2022, from [https://www.ftc.gov.bb/index.php?option=com\\_content&task=view&id=168&Itemid=26](https://www.ftc.gov.bb/index.php?option=com_content&task=view&id=168&Itemid=26).
- Ftc.gov.bb. (2010). Retrieved 10 May 2022, from [2010-02-22\\_commission\\_decision\\_final RIO.pdf \(ftc.gov.bb\)](#).
- Indotel.gob.do. (2011). Retrieved 3 May 2022, from <https://www.indotel.gob.do/media/9120/resde-054-11.pdf>.
- Indotel.gob.do. (2012). Retrieved 3 May 2022, from <https://www.indotel.gob.do/media/5519/resoluci%C3%B3n-no-de-013-12.pdf>.
- Indotel.gob.do. (2013). Retrieved 5 May 2022, from <https://www.indotel.gob.do/media/5473/resoluci%C3%B3n-no-de-015-13.pdf>.

Indotel.gob.do. (2014). Retrieved 4 May 2022, from <https://www.indotel.gob.do/media/5478/resoluci%C3%B3n-no-de-003-14.pdf>.

Indotel.gob.do. (2016). Retrieved 9 May 2022, from <https://www.indotel.gob.do/media/5498/resoluci%C3%B3n-no-de-006-16.pdf>.

Itu.int (2014) Retrieved 11 April 2022, from <http://handle.itu.int/11.1002/pub/80cc987f-en>.

Itu.int. (2011). Retrieved 4 June 2022, from [https://www.itu.int/ITU-D/finance/work-cost-tariffs/events/tariff-seminars/elsalvador/pdf/Sesion4\\_Roaming\\_JThompson-en.pdf](https://www.itu.int/ITU-D/finance/work-cost-tariffs/events/tariff-seminars/elsalvador/pdf/Sesion4_Roaming_JThompson-en.pdf).

Itu.int. (2014). Retrieved 29 May 2022, from [https://www.itu.int/en/ITU-D/Regulatory-Market/Documents/Publications/Benchmarking\\_guide\\_Final.pdf](https://www.itu.int/en/ITU-D/Regulatory-Market/Documents/Publications/Benchmarking_guide_Final.pdf).

Ofreg.ky. (2013). Retrieved 11 May 2022, from [https://www.ofreg.ky/ict/upimages/agreement\\_documents/2013InfinityBroadbandInterconnectionAgreementLegalFramework\\_1613502198.pdf](https://www.ofreg.ky/ict/upimages/agreement_documents/2013InfinityBroadbandInterconnectionAgreementLegalFramework_1613502198.pdf).

Ofreg.ky. (2010). Retrieved 11 May 2022, from <https://www.ofreg.ky/ict/upimages/commonfiles/141726093620100429ICTADecision2010-5Interconnectiondispute.pdf>.

Ofreg.ky. (2013). Retrieved 8 May 2022, from [https://www.ofreg.ky/ict/upimages/agreement\\_documents/2013InfinityBroadbandInterconnectionAgreementTariffScheduleRedacted1\\_1613502779.pdf](https://www.ofreg.ky/ict/upimages/agreement_documents/2013InfinityBroadbandInterconnectionAgreementTariffScheduleRedacted1_1613502779.pdf).

Ofreg.ky. (2005). Retrieved 10 May 2022, from [https://www.ofreg.ky/ict/upimages/agreement\\_documents/14177085812005120502LegalFramework.pdf](https://www.ofreg.ky/ict/upimages/agreement_documents/14177085812005120502LegalFramework.pdf).

Ofreg.ky. (2005). Retrieved 10 May 2022, from [https://www.ofreg.ky/ict/upimages/agreement\\_documents/14177087602005120508TariffSchedule.pdf](https://www.ofreg.ky/ict/upimages/agreement_documents/14177087602005120508TariffSchedule.pdf).

Ofreg.ky. (2013). Retrieved 10 May 2022, from [https://www.ofreg.ky/ict/upimages/agreement\\_documents/141771115420130227LIMEDigicelVariationAgreement.pdf](https://www.ofreg.ky/ict/upimages/agreement_documents/141771115420130227LIMEDigicelVariationAgreement.pdf).

Ofreg.ky. (2011). Retrieved 10 May 2022, from [https://www.ofreg.ky/ict/upimages/agreement\\_documents/141771137520110426LIMEDigicel-LIMEICALegalFrameworkLFFINALMarch2011.pdf](https://www.ofreg.ky/ict/upimages/agreement_documents/141771137520110426LIMEDigicel-LIMEICALegalFrameworkLFFINALMarch2011.pdf).

Ofreg.ky. (2011). Retrieved 10 May 2022, from [https://www.ofreg.ky/ict/upimages/agreement\\_documents/141771201920110426LIMEDigicel-LIMEICAsched6TSFINALREDACTED.pdf](https://www.ofreg.ky/ict/upimages/agreement_documents/141771201920110426LIMEDigicel-LIMEICAsched6TSFINALREDACTED.pdf).

Ofreg.ky. (2012). Retrieved 10 May 2022, from [https://www.ofreg.ky/ict/upimages/agreement\\_documents/141771120020130227LIMEDigicelrevisedTariffScheduleredacted.pdf](https://www.ofreg.ky/ict/upimages/agreement_documents/141771120020130227LIMEDigicelrevisedTariffScheduleredacted.pdf).

Ofreg.ky. (2009). Retrieved 10 May 2022, from [https://www.ofreg.ky/ict/upimages/agreement\\_documents/141770916520070626CWWestelFirstAmendingAgreement.pdf](https://www.ofreg.ky/ict/upimages/agreement_documents/141770916520070626CWWestelFirstAmendingAgreement.pdf).

Ofreg.ky. (2020). Retrieved 11 May 2022, from [https://www.ofreg.ky/ict/upimages/agreement\\_documents/141770955020091012LIMEWestTelSched6TariffSchedule.pdf](https://www.ofreg.ky/ict/upimages/agreement_documents/141770955020091012LIMEWestTelSched6TariffSchedule.pdf).

Our.org.jm. (2013). Retrieved 13 May 2022, from [https://our.org.jm/wp-content/uploads/2021/02/cost\\_model\\_for\\_mobile\\_termination\\_rates\\_-\\_determination\\_notice\\_may\\_2013.pdf](https://our.org.jm/wp-content/uploads/2021/02/cost_model_for_mobile_termination_rates_-_determination_notice_may_2013.pdf).

Our.org.jm. (2017). Retrieved 15 May 2022, from <https://our.org.jm/wp-content/uploads/2021/05/Determination-Notice-Cost-Model-for-Fixed-Termination-Rates-Public-Version.pdf>.

Our.org.jm. (2020). Retrieved 13 May 2022, from [https://our.org.jm/wp-content/uploads/2021/04/update\\_of\\_the\\_cost\\_model\\_for\\_fixed\\_termination\\_rates\\_-\\_draft\\_model\\_-\\_public\\_consultation\\_9-12-20-3.pdf](https://our.org.jm/wp-content/uploads/2021/04/update_of_the_cost_model_for_fixed_termination_rates_-_draft_model_-_public_consultation_9-12-20-3.pdf).

Our.org.jm. (2021). Retrieved 16 May 2022, from [https://our.org.jm/wp-content/uploads/2021/09/Update-of-the-Mobile-Cost-Model-The-Decision-on-Rates-Determination-Notice20210901\\_11203750-2.pdf](https://our.org.jm/wp-content/uploads/2021/09/Update-of-the-Mobile-Cost-Model-The-Decision-on-Rates-Determination-Notice20210901_11203750-2.pdf).

Our.org.jm. (2013). Retrieved 13 May 2022, from [https://our.org.jm/wp-content/uploads/2021/02/reconsideration\\_of\\_the\\_offices\\_decision\\_determination\\_notice\\_tel2011002\\_det001\\_as\\_sessment\\_of\\_rio\\_6\\_-\\_may\\_2013.pdf](https://our.org.jm/wp-content/uploads/2021/02/reconsideration_of_the_offices_decision_determination_notice_tel2011002_det001_as_sessment_of_rio_6_-_may_2013.pdf).

Our.org.jm. (2007). Retrieved 13 May 2022, from [https://our.org.jm/wp-content/uploads/2021/02/rio\\_5a1.pdf](https://our.org.jm/wp-content/uploads/2021/02/rio_5a1.pdf).

Pucanguilla.com. (2012). Retrieved 11 May 2022, from <https://pucanguilla.com/wp-content/uploads/2018/08/DecisionPUC2012-102signed.pdf>.

Tatt.org.tt. (2020). Retrieved 1 June 2022, from [https://tatt.org.tt/DesktopModules/Bring2mind/DMX/API/Entries/Download?Command=Core\\_Download&EntryId=1325&PortalId=0&TabId=222](https://tatt.org.tt/DesktopModules/Bring2mind/DMX/API/Entries/Download?Command=Core_Download&EntryId=1325&PortalId=0&TabId=222).

Tatt.org.tt. (2019). Retrieved 4 April 2022, from [https://tatt.org.tt/Portals/0/Consultative\\_Documents/Interconnection%20Benchmarking%20Study/Final%20%20IBS%20Report%2029%20July%202019.pdf?ver=2019-08-06-121815-353](https://tatt.org.tt/Portals/0/Consultative_Documents/Interconnection%20Benchmarking%20Study/Final%20%20IBS%20Report%2029%20July%202019.pdf?ver=2019-08-06-121815-353).

Tatt.org.tt. (2017). Retrieved 4 April 2022, from [https://tatt.org.tt/DesktopModules/Bring2mind/DMX/API/Entries/Download?Command=Core\\_Download&EntryId=906&PortalId=0&TabId=222](https://tatt.org.tt/DesktopModules/Bring2mind/DMX/API/Entries/Download?Command=Core_Download&EntryId=906&PortalId=0&TabId=222).

Tatt.org.tt. (2008). Retrieved 15 April 2022, from <https://tatt.org.tt/Portals/0/Documents/Dispute%20Decision%20No.%202.pdf>.

Telecommission.tc. (2011). Retrieved 14 May 2022, from [https://telecommission.tc/wp-content/uploads/2021/03/20110124152043-TCI-MTR-Review-Decision-2011-01-24\\_-final.pdf](https://telecommission.tc/wp-content/uploads/2021/03/20110124152043-TCI-MTR-Review-Decision-2011-01-24_-final.pdf).

Telecommission.tc. (2010). Retrieved 14 May 2022, from <https://telecommission.tc/wp-content/uploads/2021/03/20100719112927-TCI-MTR-Consultation-Document- July-19-2010.pdf>.

Telecommission.tc. (2020). Retrieved 6 May 2022, from <https://telecommission.tc/wp-content/uploads/2021/03/20200224204717-TCI-Interconnection-Rate-Review-ConDoc-February-24-2020.pdf>.

Telecommunications.tc (2022). Retrieved 4 May 2022, from <https://telecommission.tc/industry-statistics/>.

Telecommission.tc. (2014). Retrieved 17 May 2022, from <https://telecommission.tc/wp-content/uploads/2021/03/20140620101740-TCI-ICR-Review-Decision-final-June-18-2014.pdf>.

Telecommission.tc. (2014). Retrieved 18 May 2022, from <https://telecommission.tc/wp-content/uploads/2021/03/20140210121640-TCI-IC-Rate-Review-ConDoc-February-7-2014-11-30.pdf>.

Theworldbank.org. (2022). Retrieved 4 May 2022, from <https://data.worldbank.org/country/>.

Theworldbank.org. (2022). Retrieved 4 May 2022, from <https://data.worldbank.org/indicator/>.

Theworldbank.org. (2022). Retrieved 4 May 2022, from <https://databank.worldbank.org/source/population-estimates-and-projections#>.

Trc.vg. (2011). Retrieved 9 May 2022, from [https://www.trc.vg/wp-content/uploads/2021/03/014\\_Market-Analysis\\_02\\_Interconnection-Short-Report-1.pdf](https://www.trc.vg/wp-content/uploads/2021/03/014_Market-Analysis_02_Interconnection-Short-Report-1.pdf).

Trc.vg. (2011). Retrieved 9 May 2022, from [http://www.trc.vg/wp-content/uploads/2021/03/015\\_Market-Analysis\\_01\\_Interconnection-Part-2.pdf](http://www.trc.vg/wp-content/uploads/2021/03/015_Market-Analysis_01_Interconnection-Part-2.pdf).

Urcabahamas.bs. (2016). Retrieved 12 May 2022, from <https://www.urcabahamas.bs/wp-content/uploads/2020/08/ECS-09-2020-Preliminary-Determination-on-Proposed-Ammendments-to-BTC-RAIO.pdf>.

Urcabahamas.bs. (2012). Retrieved 5 May 2022, from <https://www.urcabahamas.bs/wp-content/uploads/2017/02/ECS-25-2012-Statement-of-Results-and-Final-Decision-BTC-RAIO-Charges.pdf>.

Urcabahamas.bs. (2012). Retrieved 16 May 2022, from <https://www.urcabahamas.bs/wp-content/uploads/2017/02/Bahamas-Telecommunications-Companys-Response-RAIO-Charges-Going-Forward.pdf>.