Office of Utilities Regulation

Estimate of the Weighted Average Cost of Capital for Telecommunications Carriers

Consultation Document

OFFICE OF UTILITIES REGULATION

2020 June 24

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Abstract

The existing Determination on the Weighted Average Cost of Capital (WACC) to be used in the telecommunications sector was issued in 2016 and is due to be updated. This Consultation Document contains the Office of Utilities Regulation's (OUR's) approach to updating the parameters that are involved in the estimation of the WACC for fixed and mobile telecommunications carriers in the Jamaican telecommunications sector. The calculation of the WACC involves the estimation of a number of parameters, including the cost of equity (following the Capital Asset Pricing Model) and the cost of debt. The data sources and the methodology followed to calculate the WACC parameters are consistent with what was determined by the OUR in the 2016 WACC estimation which was largely consistent with the methodology that was determined by the OUR in the 2010 WACC estimation exercise.

Consultation Process

COMMENTS FROM INTERESTED PARTIES

Persons who wish to express opinions on this Consultation Document are invited to submit their comments in writing to the Office of Utilities Regulation ("OUR") by post, delivery, facsimile or e-mail addressed to:

Office of Utilities Regulation
P.O. Box 593,
36 Trafalgar Road,
Kingston 10

Attention: Fay Samuels
Fax: (876) 929-3635
E-mail: WACCConsultation@our.org.jm

Responses are requested by 2020 July 22.

Any confidential information should be submitted separately and clearly identified as such. The submission of confidential information should be accompanied by a detailed justification in keeping with section 7(6) of the Telecommunications Act.

Responses that are not confidential, pursuant to sections 7(6) and 7A of the Telecommunications Act, will be posted to the OUR's website (http://www.our.org.jm/). Respondents are therefore requested, where possible, to supply their responses in electronic form to facilitate such postings.

COMMENTS ON RESPONSES

There will therefore be a specific period for respondents to view other responses (non-confidential) and to make comments on them. The comments may take the form of either correcting a factual error or putting forward counterarguments and/or providing data relating to the project. As in the case of the responses, comments which are not confidential pursuant to the Telecommunications Act will be posted to the OUR's website.

Comments on responses are requested by 2020 August 5.

ARRANGEMENTS FOR VIEWING RESPONSES

This Consultation Document and responses and comments received by the OUR will also be made available to the public through the OUR's Information Centre ("OURIC"). Persons who wish to view the Consultation Document, responses and comments should make an appointment by contacting:

Ms. Colleen Mignott
Coordinator OURIC/Information Officer
Telephone: (876) 968-6053
Fax: (876) 929-3635
Email: colleen.mignott@our.org.jm

Individuals with appointments should visit the OUR's offices at:

3rd Floor, PCJ Resource Centre,
36 Trafalgar Road,
Kingston 10

Photocopies of selected responses and comments may be provided on request, at a price which reflects the cost to the OUR.

CONSULTATIVE TIMETABLE

The timetable for the consultation is summarized in the table below:

Event	Date
Publish Consultation Document	2020 June 24
Responses to the Consultation Document	By 2020 July 22
Comments on Responses	By 2020 August 5
Issue Determination Notice	By 2020 November

Abbreviations

ATWACC	After-tax Weighted Average Cost of Capital
CAPM	Capital Asset Pricing Mechanism
CRP	Country Risk Premium
D	Debt
E	Equity
ERP	Equity Risk Premium
GOJ	Government of Jamaica
MRP	Market Risk Premium
N/A	Not Available
NRA	National Regulatory Authority
OUR	Office of Utilities Regulation
OURIC	Office of Utilities Regulation Information Centre
RFR	Risk Free Rate
US	United States

WACC	Weighted Average Cost of Capital

Chapter 1: Introduction

Background

1.1. It is important that an appropriate cost of capital be estimated for the telecommunications sector as it serves as a measure of the return on capital which companies in the sector are allowed to earn. The estimate of the WACC therefore serves as a critical input into any pricing model to be developed or approved by the Office of Utilities Regulation (OUR).

1.2. On 2016 November 15, the Office of Utilities Regulation (OUR) published the *"Determination Notice - Estimate of the Weighted Average Cost of Capital for Telecommunications Carriers"* document No. 2016/TEL/016/DET.002, ("the 2016 Determination Notice"). The document presented the decisions of the Office regarding the estimation of a weighted average cost of capital for fixed and mobile telecommunications carriers. Determination 1 of the document stated, "*The WACC will be updated every five years from the effective date of this Determination Notice*". The effective date of the 2016 Determination Notice was 2016 November 28.

1.3. Therefore, in line with the 2016 Determination Notice, the OUR now considers it appropriate to update the cost of capital for the telecommunications sector. Further, the OUR still believes that the WACC parameters should continue to be updated every five (5) years, as has occurred since the 2010 determination exercise.

1.4. It should be noted that, the approach that has been followed to determine the current values for the parameters needed to estimate the WACC, will in general, be consistent with that which was approved by the Office in the 2016 Determination Notice. Additionally, methods that are based on international best practices will also be utilised to estimate some of the parameters that are presented in this consultation document.

1.5. As presented in Determination 2 of the 2016 Determination Notice, "The Office will estimate separate WACCs for fixed and mobile carriers". The Office is still of the view that in order to take account of the differences in

the risk and capital structure of fixed carriers and that of mobile carriers, separate WACCs should be calculated for the fixed and the mobile sector. Additionally, each computed WACC will be utilised as an input for separate fixed and mobile cost models.

1.6. As the WACCs will be representative of a generic fixed or mobile carrier operating in Jamaica, it is unnecessary to calculate the WACC for any individual company in the industry. Additionally, the sources of information used to calculate the parameters for the generic operators in Jamaica, will include international references, following international best practices.

1.7. The OUR will continue to specify a range estimate for most variables with the point estimate for those variables being the simple average of the minimum and maximum values from the range.

1.8. In order to provide full transparency to the industry~~,~~ the figures extracted from international sources utilised in this Consultation Document will remain as collected on the specific dates, but may be subject to updates before the issuance of the Determination Notice.

Question 1: Do you agree with the approach to estimate separate WACCs for fixed and mobile carriers? Please justify your position and provide supporting information and references.

Legislative Framework

1.9. Section 29 of the Telecommunications Act ("the Act"), states:

> *"29. - (1) Each carrier shall, upon request in accordance with this Part, permit interconnection of its public network with the public network of any other carrier for the provision of telecommunications services.*
>
> *…*
>
> *(4) The Office may, either on its own initiative in assessing an interconnection agreement, or in resolving a dispute between*

operators, make a determination of the terms and conditions of call termination, including charges.

(5) When making a determination of an operator's call termination charges, the Office shall have regard to the principle of cost orientation, so, however, that if the operator is non-dominant then the Office may also consider reciprocity and other approaches."

1.10. Further, section 30 of the Act requires that dominant public telecommunications carriers provide interconnection in accordance with various principles. In particular section 30 (1)(a)(iii) requires that charges for interconnection services "…*be cost oriented and guided by the principles specified in section 33".*

1.11. Regarding infrastructure sharing, the same principles apply. Section 29A(2) of the Act states that:

"(2) All infrastructure sharing arrangements made by the Office shall include the making of rules, after consultation with the Minister, for the apportionment of the costs of sharing infrastructure; and the rules shall be made in accordance with the principles set out in section 33.

1.12. The abovementioned section 33 outlines, among other things, the principle of cost orientation for interconnection and infrastructure services. More specifically, paragraph d) of this section provides that "…*costs shall include attributable operating expenditure and depreciation and an amount estimated to achieve a reasonable rate of return;"*

1.13. The OUR considers the WACC as the most accurate measure of the reasonable rate of return to meet the objectives of cost orientation defined in the Act.

1.14. Therefore, in accordance with the principles of the Telecommunications Act, the WACC will be used by the Office when making a determination on wholesale charges in order to maintain the principle of cost orientation.

Structure of Consultation Document

1.15. The remainder of this Consultation Document is structured in the following manner:

- **Chapter 2** outlines the general framework for estimating the WACCs.
- **Chapter 3** discusses the methodology utilised to estimate the gearing appropriate for Jamaican telecommunications networks.
- **Chapter 4** estimates the cost of debt.
- **Chapter 5** estimates the cost of equity.
- **Chapter 6** presents the methodology for the conversion of the United States dollar WACCs to their Jamaican dollar equivalent.
- **Chapter 7** presents the estimated WACC values.
- **Annex A** gives a summary of the consultation questions.
- **Annex B** and **Annex C** provides the references used throughout the document.

Chapter 2: General Framework for Estimating the Cost of Capital

WACC Framework

2.1. The cost of capital is the opportunity cost of investing a portfolio of debt and equity in one activity versus alternative activities. Thus, the cost of capital is the cost of financing a company's activities and it is typically utilised in regulatory proceedings to estimate the expected return in a well-functioning capital market.

2.2. The WACC refers to the average rate of return a company expects to compensate all its different investors, weighing each financing source in the company's capital structure, which typically consists of equity and debt. The weights reflect the share of each financing source. Specifically, the nominal WACC is estimated using the following equation:

$$WACC = w_d * k_d + w_e * k_e$$

where,

- w_d – is the fraction of debt in the capital structure,
- k_d – is the forward-looking cost of debt,
- w_e– is the fraction of equity in the capital structure,
- k_e – is the forward-looking cost of equity.

2.3. As indicated in the 2016 Determination Notice and in order to be aligned with international best practice, the approach that will be taken by the OUR to estimate the WACCs for fixed and mobile carriers is considered from the point of view of a foreign operator investing in the local (Jamaican) market, in US dollars.

2.4. The OUR will estimate the cost of capital for an efficient operator in a developed market and then add the necessary premium to account for the additional risk of investing in the Jamaican market.

2.5. Specifically, and in order to be consistent with the approach followed in 2016, the country risk premium will then be added to account for risk factors specific to Jamaica after which the result will be converted from a United States (US) dollar rate to the Jamaican dollar equivalent.

Tax Adjustment

2.6. As indicated in the 2016 Determination Notice, an after-tax cost of capital and a pre-tax cost of capital will also be estimated.

2.7. The after-tax cost of capital reflects the fact that interest paid to debt holders is tax deductible (that is, corporate taxes are applicable after interest is deducted). Thus, the cost of debt is also calculated as an after-tax cost to ensure that it is comparable with the cost of equity, which is calculated after-tax.

2.8. The corporate tax rate for Jamaica related to a regulated company is 33.33%[1].

2.9. The after-tax nominal weighted average cost of capital is calculated as shown in the following equation.

$$After - Tax\ WACC = w_d * k_d * (1 - t) + w_e * k_e$$

where,

- w_d – is the fraction of debt in the capital structure,
- k_d – is the forward-looking cost of debt,
- w_e – is the fraction of equity in the capital structure,
- k_e – is the forward-looking cost of equity.
- t – is the tax rate.

[1] Jamaica- Corporate - Taxes on corporate income. http://taxsummaries.pwc.com/ID/Jamaica-Corporate-Taxes-on-corporate-income

2.10. The nominal pre-tax cost of capital represents a grossing up of the calculated after-tax WACC such that the return allowed to the regulated company before it pays taxes is equivalent to the return allowed after it pays taxes. This is estimated based on the following equation:

$$Pre - Tax\ WACC = \frac{After - Tax\ WACC}{1 - t}$$

Chapter 3: Gearing

Gearing - Methodology

3.1. Gearing shows how much of a firm's capital is comprised of debt versus equity. It is defined as the ratio between liabilities and the total capital employed. The Gearing is calculated as follows:

$$Gearing = \frac{D}{D + E}$$

3.2. Where:

- D represents the **Debt**.
- E represents the **Equity**.

3.3. There are three approaches to determining the level of gearing to be utilised in the estimation of the WACC:

- Book-value gearing
- Market value gearing
- Optimal gearing

3.4. As stated in the 2016 Determination Notice, the OUR prefers the use of optimal (notional) gearing rather than book-value gearing. This is due to the fact that the WACC is an input to the models developed by the OUR that are based on the network of a hypothetical efficient operator. The methodology was also used in the calculation of the WACCs determined in the 2010 WACC Determination Notice[2].

3.5. The OUR is of the view that optimal gearing is still the best approach to calculate the WACCs for the proposed period.

[2] "Determination Notice - Estimate of the Weighted Average Cost of Capital for Telecommunications Carriers" document No. TEL2009005_DET001, (2010 Determination Notice).

Gearing – Estimated Values

3.6. In the 2010 Determination Notice, the Office established a gearing range of 10%-30% for fixed carriers and a range of 10%-20% for mobile carriers.

3.7. In the 2016 Determination Notice, the Office established a gearing range of 15%-30% for fixed carriers and a range of 15%-25% for mobile carriers. The figures were revised to reflect observed changes in the market conditions of telecom operators worldwide.

3.8. To validate the ranges considered for the gearing, the OUR analysed the current average gearing for operators in different regions across the world, as well as its evolution since 2010. These figures are shown in Exhibit 1 below.

Exhibit 1: Market Value Gearing by Region for the 2010-2020 period

Telecom Services Fixed	2010	2015	2020	Telecom (Wireless) Mobile	2010	2015	2020
US	31.99%	43.85%	44.19%	US	16.55%	60.09%	56.75%
Europe	48.70%	44.72%	54.12%	Europe	33.33%	39.60%	56.95%
Japan	47.18%[3]	31.18%	34.01%	Japan	23.98%[3]	38.27%	44.29%
Emerging	**26.85%**	**26.75%**	**31.80%**	**Emerging**	**16.32%**	**26.16%**	**34.83%**
Global	37.75%	39.41%	43.30%	Global	24.16%	35.64%	43.20%

Source: Damodaran[4]

3.9. The data presented above shows that the average market value gearing in emerging markets (and globally) has increased significantly between 2010 and 2020. Furthermore, the figures for market value gearing for 2020 fall above the range defined in the 2016 Determination Notice.

[3] Values from 2011 since it corresponds to the oldest available data
[4] Damodaran (2020). http://pages.stern.nyu.edu/~adamodar/New_Home_Page/dataarchived.html

3.10. Therefore, the OUR considers that the range considered in the calculation of the market value gearing should be updated to reflect the trends observed in emerging and global markets.

3.11. These findings are aligned with the latest WACC regulatory decisions made by NRAs worldwide[5]. Exhibit 2 below summarizes the most recent gearing estimates established by a number of NRAs.

Exhibit 2: Gearing Used in Recent WACC Regulatory Decisions from NRAs Worldwide

Telecom fixed services	Min	Max	Point Esti.
ANACOM	27.38%	56.89%	41.89%
MCA	40.00%	50.00%	45.00%
ictQatar	20.00%	42.50%	32.00%
ComReg	40.00%	40.00%	40.00%
PTS	17.00%	64.00%	38.00%
BIPT	15.18%	72.37%	46.00%
IFT	55.37%	55.37%	55.37%
SUTEL	15.41%	15.41%	15.41%
ENACOM	27.14%	27.14%	27.14%
ECTEL	34.27%	34.27%	34.27%
Bundesnet zagentur.	31.26%	73.82%	50.28%
GNCC	12.00%	78.00%	46.00%
Average	**27.92%**	**50.81%**	**39.28%**

Telecom mobile services	Min	Max	Point Esti.
ANACOM	27.38%	56.89%	41.89%
MCA	35.00%	45.00%	40.00%
ictQatar	20.00%	42.50%	32.00%
ComReg	35.00%	35.00%	35.00%
PTS	35.00%	35.00%	35.00%
BIPT	15.18%	72.37%	32.00%
IFT	50.30%	50.30%	50.30%
SUTEL	15.41%	15.41%	15.41%
ENACOM	27.14%	27.14%	27.14%
ECTEL	34.27%	34.27%	34.27%
Bundesnet zagentur.	31.26%	73.82%	50.28%
GNCC	12.00%	78.00%	46.00%
Average	**28.16%**	**47.14%**	**36.61%**

Source: OUR based on data from NRAs[6]

3.12. Based on the above, the OUR proposes to update the gearing ranges to reflect the changes in market conditions in the last few years. The OUR proposes to define a range based on:

i) the gearing observed for emerging markets for 2020 (as can be seen in Exhibit 1) and

[5] Only decisions from 2016 or later have been considered to ensure the relevancy of the figures
[6] Please see Annex B for the sources employed for each country

3.13. gearing from recent WACC regulatory decisions from NRAs worldwide (as can be seen in

ii) **Exhibit 2**).

3.14. Therefore, the Office proposes to update the range of values considered for the gearing to **31.80% - 39.28%** for fixed and **34.83% - 36.61%** for mobile network.

3.15. Therefore, aligned with the 2016 methodology, the gearing for each of the sectors will be obtained by averaging the minimum and maximum values of the range. Therefore, the values that will be used in the determination of the WACC will be **35.54% for fixed and 35.72% for mobile.**

Question 2: Do you agree that a gearing ratio of 35.54% for fixed and a gearing ratio of 35.72% for mobile is reasonable? Please justify your position and provide supporting information and references.

Chapter 4: Cost of Debt

4.1. The cost of debt is associated with the interest payments that a going concern business needs to make to the lending banks, financial institutions and other creditors. Cost of debt is typically higher for companies that experience (or may experience) more difficulties repaying their debts, while it is lower for the ones that have a better ability to repay their debts.

4.2. To be aligned with the methodology presented in the previous WACC Determination Notices, the cost of debt will be estimated using the following equation.

$$k_d = r_f + CRP + D_p$$

where,

- r_f is the risk free rate
- CRP is the sovereign default spread
- D_p is the debt premium

4.3. It should be noted that this approach is consistent with the approach followed by other regulators in recent regulatory decisions.

Risk-Free Rate

Risk-Free Rate - Methodology

4.4. The risk-free rate reflects the remuneration for assets that are free of risk. It shows investors' expectations of the return from a risk-free asset over a period. A debt instrument that is closest to being free of default risk is generally used as the risk-free rate.

4.5. In order to be aligned with the methodology established in the 2016 Determination Notice and with recent regulatory best practices, a United States of America (US) Government Treasury security will be used as the risk-free asset.

Risk-Free Rate – Estimated Values

4.6. The risk-free rate will be calculated based on the average market yield on U.S. ten (10) year Treasury Bonds at constant maturity using monthly data for the most recent five (5) years.

4.7. The monthly data of the market yield on U.S. ten (10) year Treasury Bonds is extracted from Damodaran[7].

4.8. Based on the data from Damodaran, the monthly average of the most recent five years will result in a risk-free rate of **2.26%**.

4.9. As can be seen in Exhibit 3, the proposed value is aligned with the latest WACC regulatory decisions observed in other countries.

Exhibit 3: Risk-Free Rates from Recent Regulatory Decisions and OUR values

Regulator	Risk-free rate
ANACOM	2.80%
MCA	1.95%
ictQatar	3.50%
ComReg	3.43%
PTS	1.39%
BIPT	0.80%
IFT[8]	4.90%
SUTEL	2.31%
ENACOM	3.46%
ECTEL	2.71%
Bundesnetzagentur	2.41%
GNCC	9.92%
Average	**2.48%**
OUR	**2.26%**

[7] Damodaran (2020). http://www.stern.nyu.edu/~adamodar/pc/implprem/ERPbymonth.xlsx
[8] Not considered in the average since it is considered an outlier, this is because the risk-free rate used corresponds to the country's own risk.

Source: OUR based on data from NRAs[9]

4.10. Based on the methodology for the estimation of the risk-free rate, a risk-free rate of **2.26%** will be utilised for the WACC calculation. This is unlike the other parameters where a range (minimum and maximum), is calculated.

Question 3: Do you agree that a risk-free rate of 2.26% for both segments (fixed and mobile) is reasonable? Please justify your position and provide supporting information and references.

Country Risk Premium

Country Risk Premium - Methodology

4.11. The country risk premium (CRP) is a measure of the additional risk premium that investors require for investing in securities issued by the Government of Jamaica (GOJ) relative to comparable risk-free securities. Specifically, the CRP is a measure of the specific risk associated with investing in Jamaica.

4.12. In line with the methodology followed previously by the OUR, the bond default spread will be considered as a valid measure of the CRP. This is the difference between the yield to maturity of a debt instrument issued by an AAA rated (risk free) government and the yield to maturity of an internationally traded debt instrument with comparable features issued by the government of the country for whom the CRP is being calculated.

4.13. Specifically, the CRP will be estimated based on the following equation:

$$CRP = Domestic\ bonds - r_f$$

where,

- CRP is the Country Risk Premium

[9] Please see Annex B for the sources employed for each country

- $Domestic\ bonds$ is the yield to maturity on GOJ ten (10) year US$ bonds
- r_f is the risk free rate (calculated previously)

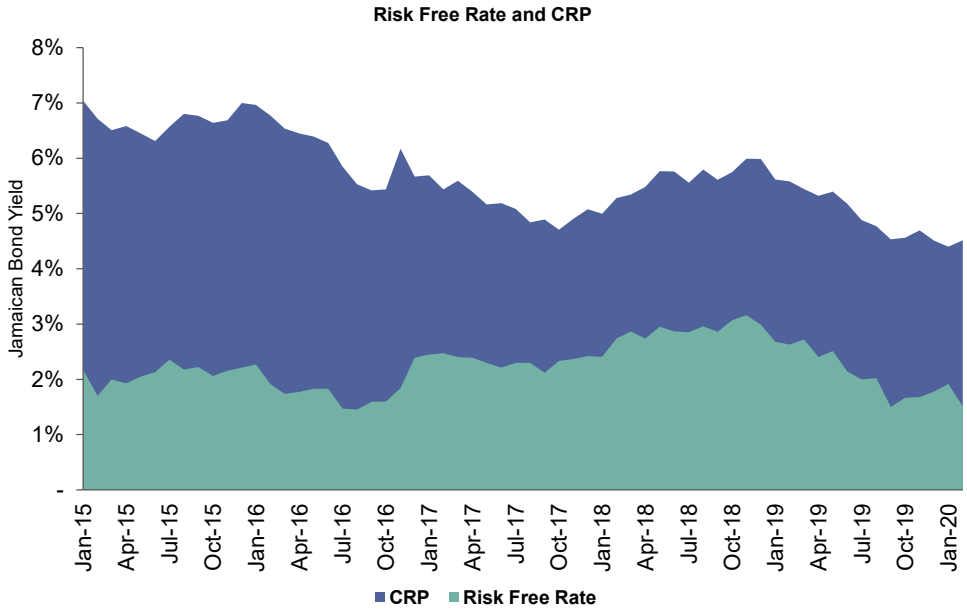
Country Risk Premium – Estimated Values

4.14. As indicated above, the CRP is calculated based on the following parameters:

- **Domestic Bond:** Corresponds to a ten (10) year US$ bond issue by the Government of Jamaica (GOJ). This parameter was extracted from Bloomberg. Particularly, the figures from the BV10JAMA BVLI Index, which represents the yield of a 10-year bond issued by the Government of Jamaica denominated in USD, were considered. To be consistent with the risk-free rate, the domestic bond is calculated based on an average of the monthly data for the most recent five (5) years. Based on this source, the yield of a 10-year bond issued by the GOJ presents an average of **5.68**%. Further, similarly to the case of the risk-free rate, this figure will be utilised for each of the ranges established in the WACC calculation (minimum, maximum and point estimate)**.**
- **Risk-free Rate:** As presented in the previous section, the risk-free-rate has been evaluated at **2.26**%, based on the yield of an equivalent bond issued by the government of the United States of America.

4.15. In Exhibit 4 below, the evolution of the risk-free rate and the domestic bond is presented.

Exhibit 4: Evolution of the Risk-Free Rate and Country Risk Premium



Source: Damodaran and Bloomberg

4.16. To be consistent with the other parameters, a reasonable range was defined for the CRP. Following from the CRP equation presented earlier in the document, the country risk premium will be obtained by subtracting the risk free rate from the domestic bond (see respective values in Exhibit 5 below). Therefore, the CRP value that will be used in the determination of the WACCs for fixed and mobile carriers will be **3.42%.**

Exhibit 5: Country Risk Premium

Parameter	Lower limit	Higher limit	Point estimate
Domestic Bond [a]	5.68%	5.68%	5.68%
Risk-free rate [b]	2.26%	2.26%	2.26%
Country Risk Premium [a-b]	**3.42%**	**3.42%**	**3.42%**

Source: OUR based on data from financial sources

Question 4: Do you agree that a Country Risk Premium (CRP) of 3.42% for Jamaica is reasonable? Please justify your position and provide supporting information and references.

Debt Premium

Debt Premium - Methodology

4.17. The debt premium is company specific and represents the average excess premium on the company's bond relative to the yield on a comparable sovereign bond of the country in which the company operates.

4.18. Due to a lack of available data on bonds issued by Jamaican operators, the OUR still believes that in order to estimate the debt premium a benchmark of recent regulatory decisions should be used.

Debt Premium – Estimated Values

4.19. Similar to other parameters in the calculation of the WACC, a benchmark of recent regulatory decisions has been utilised in the calculation of the debt premium.

Exhibit 6: Recent Regulatory Decisions on Debt Premium

Regulator	Minimum	Maximum	Average
ANACOM	1.58%	1.58%	1.58%
MCA	1.00%	2.00%	1.50%
ictQatar	1.37%	1.68%	1.53%
ComReg	1.45%	1.50%	1.48%
PTS	1.90%	1.90%	1.90%
IFT	1.35%	1.35%	1.35%
SUTEL[10]	4.15%	4.15%	4.15%
ENACOM	1.50%	1.50%	1.50%
ECTEL	1.75%	1.75%	1.75%
BIPT	1.90%	1.90%	1.90%
Bundesnetzagentur	1.47%	1.47%	1.47%
GNCC	1.51%	1.51%	1.51%
Average	**1.53%**	**1.65%**	**1.59%**

Source: OUR based on data from NRAs[11]

[10] Not considered in the average since it is considered an outlier
[11] Please see Annex B for the sources employed for each country

4.20. A reasonable range has been defined in order to calculate the debt premium. The limits have been calculated as follows:

- The lower limit has been calculated as the average of the minimum values of the benchmarked regulators
- The higher limit has been calculated as the average of the maximum values of the benchmarked regulators.

4.21. Therefore, the proposed range will be the following: 1.53% – 1.65% for the debt premium. Thus, the debt premium used in the calculation of the WACC will be the average of the proposed limit values, i.e. **1.59%.**

Question 5: Do you agree that a Debt Premium parameter of 1.59% for the Jamaican telecom sector is reasonable? Please justify your position and provide supporting information and references.

4.22. Finally, the cost of debt will be calculated based on the following equation (as stated in the beginning of Chapter 4):

$$k_d = r_f + CRP + D_p$$

4.23. Based on the above equation, the cost of debt was estimated to be between **7.21% - 7.33%** as shown in Exhibit 7 below. The point estimate of the cost of debt used in determining the cost of capital will be **7.27%** for fixed and mobile carriers.

Exhibit 7: Calculation of the cost of debt

Parameters	Min	Max	Point estimate
Risk Free Rate	2.26%	2.26%	2.26%
Country Risk Premium	3.42%	3.42%	3.42%
Debt premium	1.53%	1.65%	1.59%
Cost of debt (K_d)	**7.21%**	**7.33%**	**7.27%**

Source: OUR

Chapter 5 : Cost of Equity

5.1. The cost of equity is the return that is required by shareholders for their investment in a company.

5.2. As indicated in the previous Determination Notices, many approaches can be followed in order to estimate the cost of equity. In line with the methodology followed in the previous Determination Notices and with international best practice, the capital asset pricing model (CAPM) remains the preferred method for estimating the cost of equity.

5.3. The CAPM is a theory that describes the relationship between a security's risk or a portfolio of securities' risk and the expected rate of return associated with that risk.

5.4. For the calculation of the cost of equity, it is recommended to use the CAPM methodology, adding a risk measure associated with the Jamaican market (or country risk), so that the volatility associated with the operation of the company in that environment is taken into account. Based on this, the cost of equity is calculated using the following equation.

$$k_e = r_f + \beta_e(MRP + CRP)$$

where,

- k_e is the forward-looking cost of equity,
- r_f is the risk-free rate, equivalent to the one calculated in Chapter 4
- β_e is the Equity Beta
- MRP is the market risk premium,
- CRP is the country risk premium.

Beta

Beta - Methodology

5.5. The equity beta of a company shows the systematic risk that the company is facing relative to the average company in the market. It is measured by

the relationship between returns of the selected company's shares and the returns of a market index.

5.6. As proposed and established in the 2016 Determination Notice, in order to estimate beta, it is necessary to benchmark comparable fixed and mobile companies.

5.7. A comparable company is a company that operates in the same sector with a business mix similar to that of the operators in Jamaica.

5.8. These companies were taken from more developed markets where the required data is readily available. In choosing the set of comparable companies, and in line with the previous Determination Notice, the following criteria were used:

a) The comparable companies were:
    1. Pure fixed line operators[12]
    2. Pure mobile operators
b) The companies chosen must be publicly traded on a major stock exchange so that reliable and extensive data for the company can be obtained.

5.9. The beta coefficient for comparable companies shall be calculated with figures from the last five (5) years, sampled on a monthly basis. Figures should reflect the most recent data.

5.10. The betas for the comparable companies will be un-levered using the following formula:

$$\beta_u = \frac{\beta_l}{1 + (1 - t)(D/E)}$$

where,

- β_l is the levered (raw) adjusted beta

[12] It should be noted that the fixed network companies usually offer triple play services (fixed line, internet, and entertainment/cable).

- β_u is the unlevered beta
- t is the tax rate of the company´s country
- D/E is the debt/equity ratio of each individual company

5.11. Then, the unlevered beta from each company will be re-levered based on the following formula:

$$\beta = \beta_u \cdot (1 + (1 - t)(D/E))$$

where,

- β is the re-levered beta
- β_u is the unlevered beta
- t is the tax rate in Jamaica
- D/E is the debt/equity ratio used for the WACC calculation (see Chapter 2)

5.12. The resulting re-levered betas will be adjusted using the Blume adjustment. The Blume adjustment is a forward-looking approach based on the assumption that over time the betas of all companies tend towards one. The calculation of the Blume adjustment is based on the following formula.

$$\beta_{Blume-adjusted} = \frac{2}{3}\beta + \frac{1}{3}$$

where,

- $\beta_{Blume-adjusted}$ is the Blume adjusted beta
- β is the re-levered beta

5.13. In the 2016 Determination Notice, the Office proposed to use an upper 95% confidence interval level in the estimation of the high range of the beta. The formula to obtain the 95% confidence interval level beta is the following:

$$\beta_{95\%} = \beta_{Blume-adjusted} + \frac{\sigma}{\sqrt{\#\ samples} \cdot z}$$

where,

- $\beta_{95\%}$ is the 95% confidence interval level Beta
- $\beta_{Blume-adjusted}$ is the average of re-levered beta (considering the Blume adjustment)
- σ is the standard deviation of the re-levered Blume beta samples
- $\#\ samples$ is the number of companies included in the sample for the calculation of beta (7 for fixed and 10 for mobile)
- z is the confidence level value, which in this case for 95% is 1.96

The OUR considers that the application of the 95% confidence interval is reasonable to ensure the representativeness of the calculated beta.

Beta – Estimated Values

5.14. Based on the natural evolution of the telecommunications operators worldwide, it is difficult to find pure-play operators (only fixed or only mobile operator), since the stakeholders tend to expand the services that they offer (fixed operators tend to offer mobile services as well as mobile operators tend to offer fixed services).

5.15. In line with the methodology of the previous Determination Notice, the list of peer companies has been updated. These changes are as a result of one or more of the following:

i) the company is no longer a pure play operator;
ii) the company is not a small or medium cap operator;
iii) the company has been acquired by another operator or
iv) other exceptional matters (e.g. bankruptcy).

The OUR is of the view that companies to which any of these circumstances apply, should not be considered in the current peer group. The companies from the 2016 peer group to which the circumstances apply are as follows: Otelco, Idea Cellular, Millcom International Cellular, SK Telecom Co, Smartone Telecommunications Holdings, Far Eastone Telecommunications, Fairpoint Communications, Windstream Holdings and Cincinnati Bell. All other operators included in the 2016 peer group have been maintained.

5.16. The OUR has decided to replace the aforementioned operators in the peer group with additional operators. The OUR has ensured that the new operators included are small to medium cap companies to ensure comparability. The final peer group considered is presented in the exhibit below.

Exhibit 8: 2020 Comparable Companies (Peer Group) for the Calculation of Beta

Operators	Country	Included in the 2016 Determination Notice?
Fixed Operators		
Alaska Communications Systems Group	United States	Existing
Consolidated Communications Holdings	United States	Existing
Frontier Communications Corporation	United States	Existing
Cable One	United States	New
A1 Telekom Austria Group	Austria	New
Tele Columbus AG	Germany	New
Mobile Operators		
United States Cellular Corporation	United States	Existing
Cellcom Israel Ltd	Israel	New
Etisalat Misr	Egypt	New
Forth Smart Service Public Company Limited	Thailand	New
Tim Participacoes SA ADR (TSU)	Brazil	New
Telecom Argentina SA ADR- TEO	Argentina	New
Samart Digital Public Company Limited	Thailand	New
Turkcell	Turkey	New
VEON Ltd	Netherlands	New
Mobile TeleSystems	Russia	New

Source: OUR

5.17. The beta coefficient for the comparable companies was extracted from the financial firm *MorningStar*[13]. The five (5) year monthly beta values were directly extracted using the most recent data available. In addition, the Debt

[13] MorningStar (2020). https://www.morningstar.com/

and Equity values to obtain the corresponding ratio (D/E) were also extracted from *MorningStar* using the most recent available data.

5.18. The actual data involved in this calculation is included in Annex C.

5.19. Considering the approach presented above, the proposed 95% confidence interval betas are as follows:

- **0.697 for the fixed sector; and**
- **0.918 for the mobile sector**.

5.20. To validate these figures, the betas determined by other regulatory entities around the world in recent WACC decisions were analysed, to verify that the figures determined fell within the ranges identified in these decisions.

Exhibit 9: Recent Beta Regulatory Decisions and OUR Beta Values

β	Fixed	Mobile
ANACOM	0.856	0.856
MCA	0.850	0.650
ictQatar	0.990	0.990
ComReg	0.670	0.660
PTS	0.890	0.770
IFT	0.610	0.520
SUTEL	0.950	0.950
ECTEL	0.664	0.547
ENACOM	0.940	0.940
BIPT	0.710	0.810
Bundesnetzagentur.	0.910	0.910
GNCC	0.890	0.890
OUR	**0.697**	**0.918**

Source: OUR based on data from NRAs[14]

5.21. Based on the above, the Beta values to be used in the WACC calculation will be **0.697** for the fixed sector and **0.918** for the mobile sector.

[14] Please see Annex B for the sources employed for each country

Question 6: Do you agree with the approach to estimating beta? Do you agree that a Beta of 0.697 for fixed and a Beta of 0.918 for mobile are reasonable? Please justify your position and provide supporting information and references.

Market Risk Premium

Market Risk Premium - Methodology

5.22. The market risk premium (MRP), also referred to as the equity risk premium (ERP), corresponds to the difference between the returns expected from equities and the return expected from risk-free assets (i.e. long-term bonds).

5.23. To be aligned with the methodology followed in 2016, the OUR proposes to continue using the average of historical returns to estimate the MRP. Specifically, the OUR will use the MRP derived from 1928 – 2018, which continues to be a sufficiently long enough time period to neutralise the effects of outliers on both sides of the estimate.

5.24. Similar to the 2016 Determination Notice, a reasonable range has been defined in order to calculate the Market Risk Premium. The limits are calculated as follows:

- The lower limit has been calculated as the geometric average of the Market Risk Premium for the period 1928-2018, extracted from Damodaran.
- The higher limit has been calculated as the arithmetic average of the Market Risk Premium for the period 1928-2018, extracted from Damodaran.

Market Risk Premium – Estimated Values

5.25. Based on the methodology indicated previously, the proposed range for the MRP, as extracted from Damodaran will be the following: **4.66% – 6.26%**. Therefore, the MRP used in the calculation of the WACCs will be the average of the proposed limits (i.e. **5.46%**)

5.26. With regard to the latest WACC regulatory decisions made by NRAs worldwide, the vast majority are consistent with the methodology defined by the OUR. However, the data sources considered differ in some cases. The exhibit below presents the MRPs determined in recent regulatory decisions for a number of NRAs, along with the data sources used.

Exhibit 10: Recent Regulatory Decisions on MRPs from NRAs worldwide

Regulator	MRP	Source and Methodology
ANACOM	6.98%	Average of 3 sources: Pablo Fernandez, Credit Suisse Global Investment Returns Yearbook and Damodaran
MCA	5.25%	Average of an international report (Brattle Report) and the average of the ERP of the NRAs from Europe
ictQatar	4.90%	Mean of the ERP of other countries extracted from the Dimson, Marsh and Staunton (DMS) report
ComReg	4.60%	ERP extracted from Dimson Marsh and Staunton's ("DMS") report
PTS	5.54%	Average of three values: Implicit prices (Bloomberg), historic (Credit Suisse and Damodaran) and studies (Pablo Fernandez study)
IFT	5.57%	ERP extracted from Damodaran
SUTEL	6.38%	Average of the Difference of the S&P 500 returns and the US Bonds. Source: Fred, Damodaran, investing
ECTEL	5.67%	ERP extracted from Damodaran
ENACOM	4.11%	ERP extracted from Damodaran
Bundesnetzagentur	4.73%	Average of the Arithm. Mean and Geom. Mean of the U.S., U.K. and Germany. Source: Stehle study
GNCC	6.00%	Brattle study and PwC best practice
BIPT	6.70%	Weighted average of three values: Implicit prices, historic evolution and studies (Pablo Fernandez study)
Average	**5.54%**	
OUR	**5.46 %**	**Geometric average and Arithmetic average of the historical MRP calculated by Damodaran for the period 1928-2018**

Source: OUR based on data from NRAs[15]

[15] Please see Annex B for the sources employed for each country

Question 7: Do you agree with the approach to estimating the MRP? Please justify your position and provide supporting information and references.

5.27. Finally, the cost of equity will be calculated based on the following equation (as stated in the beginning of Chapter 5):

$$k_e = r_f + \beta_e(MRP + CRP)$$

5.28. Based on the above equation, the cost of equity will be between **7.38%-8.66%** for the fixed sector and **9.63% - 11.20%** for the mobile carriers as shown in the Exhibit 11 below. The point estimate for the cost of equity used in determining the cost of capital will be **8.44%** for fixed carriers and **10.41%** for mobile carriers.

Exhibit 11: Calculation of the Cost of Equity

Parameters	Fixed			Mobile		
	Min	Max	Point estimate	Min	Max	Point estimate
Risk Free Rate	2.26%	2.26%	2.26%	2.26%	2.26%	2.26%
Equity Beta	0.63	0.66	0.70	0.91	0.92	0.92
Country Risk Premium	3.42%	3.42%	3.42%	3.42%	3.42%	3.42%
Market Risk Premium	4.66%	6.26%	5.46%	4.66%	6.26%	5.46%
Cost of equity (K_e)	**7.38%**	**8.66%**	**8.44%**	**9.63%**	**11.20%**	**10.41%**

Source: OUR

5.29. The OUR considers that the cost of equity calculated is aligned with those determined by other regulatory entities around the world in recent WACC decisions. A summary of the figures determined by other NRAs is presented in the Exhibit 12 below.

Exhibit 12: Comparison of Recent Cost of Equity Regulatory Decisions with OUR values

Cost of Equity	Fixed	Mobile
ANACOM	8.77%	8.77%
MCA	6.40%	6.40%
ictQatar	9.25%	9.25%
ComReg	6.49%	6.49%
PTS	6.32%	6.32%
IFT	11.86%	11.15%
SUTEL	12.61%	12.61%
ECTEL	12.57%	10.83%
ENACOM	11.86%	11.86%
BIPT	8.00%	7.60%
Bundesnetzagentur.	6.72%	6.72%
GNCC	15.26%	15.26%
OUR	**8.44%**	**10.41%**

Source: OUR based on data from NRAs[16]

[16] Please see Annex B for the sources employed for each country

Chapter 6: Converting the United States Dollar WACC to the Jamaican Dollar WACC

6.1. In order to convert the parameters from US$ in which they were estimated to their J$ equivalent, the OUR will use the following equation.

$$Parameter_{J\$} = (1 + Parameter_{US\$}) * \left(\frac{1 + Expected\ Inflation_J}{Expected\ Inflation_{US}}\right) - 1$$

6.2. It is important to note that the previous equation should be followed to estimate only the WACC parameters (inputs), instead of the WACC results. Specifically, the previous equation should be followed to estimate the following parameters:

- $Cost\ of\ Debt_{J\$}$
- $Cost\ of\ Equity_{J\$}$

6.3. On the other hand, the Nominal WACC in J$ should be obtained based on the following equation:

$$WACC_{J\$} = w_d * kd_{J\$} + w_e * ke_{J\$}$$

where,

- w_d – is the fraction of debt in the capital structure,
- $kd_{J\$}$ – is the forward-looking cost of debt expressed in Jamaican dollars (J$),
- w_e- is the fraction of equity in the capital structure,
- $ke_{J\$}$ – is the forward-looking cost of equity expressed in Jamaican dollars (J$).

6.4. As was stated in the 2016 Determination Notice and is still the view of the OUR, the IMF is considered to be the best source of data for the extraction of the US and Jamaican inflation parameters.

6.5. Therefore, in line with the methodology presented in the 2016 Determination Notice, the inflation parameters are calculated as the arithmetic average of the projected inflation for a five (5) year period (2020-2024).

6.6. Based on the outlined methodology, the inflation parameters to be considered in the calculation of the WACC will be **4.76%** for Jamaica and **2.32%** for USA.

Question 8: Do you agree with the values, 4.76% and 2.32% to be used for expected inflation for Jamaica and the United States of America respectively? Please justify your position and provide supporting information and references.

Chapter 7 : Results

7.1. Combining the various parameters estimated in the previous sections gives the following results:

- **Fixed telecommunication sector**: A nominal pre-tax WACC of **10.75%** in US$ terms and **14.16%** in J$ terms as shown in Exhibit 13 below.
- **Mobile telecommunication sector:** A nominal pre-tax WACC of **12.63%** in US$ terms and **16.09%** in J$ terms as shown in Exhibit 14 below.

Exhibit 13: Fixed Sector WACC

Parameter	Variable	Minimum	Maximum	Point Estimate
Cost of debt (K_d)				
Risk Free Rate	rf	2.26%	2.26%	2.26%
Gearing	D/(D+E)	31.80%	39.28%	35.54%
Country Risk Premium	CRP	3.42%	3.42%	3.42%
Debt premium	Dp	1.53%	1.65%	1.59%
Cost of Debt	**Kd**	**7.21%**	**7.33%**	**7.27%**
Cost of Debt - J$	**Kdj**	**9.76%**	**9.89%**	**9.83%**
Cost of Equity (K_e)				
Market Risk Premium	MRP	4.66%	6.26%	5.46%
Equity Beta	Be	0.634	0.662	0.697
Tax Rate	T	33.33%	33.33%	33.33%
Expected Inflation - Jamaica	ij	4.76%	4.76%	4.76%
Expected Inflation - U.S.	ius	2.32%	2.32%	2.32%
Cost of Equity	**Ke**	**7.38%**	**8.66%**	**8.44%**
Cost of Equity - J$	**Kej**	**9.94%**	**11.25%**	**11.03%**
Nominal WACC (USD)				
WACC	**WACC**	**7.33%**	**8.14%**	**8.03%**
After-Tax WACC	**After-Tax WACC**	**6.56%**	**7.18%**	**7.17%**
Pre-Tax WACC	**Pre-Tax WACC**	**9.84%**	**10.77%**	**10.75%**

Parameter	Variable	Minimum	Maximum	Point Estimate
Nominal WACC (JMD)				
WACC	**$WACC_j$**	**9.88%**	**10.72%**	**10.60%**
After-Tax WACC	**After-Tax $WACC_j$**	**8.85%**	**9.42%**	**9.44%**
Pre-Tax WACC	**Pre-Tax $WACC_j$**	**13.27%**	**14.13%**	**14.16%**

Source: OUR

Exhibit 14: Mobile Sector WACC

Parameter	Variable	Minimum	Maximum	Point Estimate
Cost of debt (K_d)				
Risk Free Rate	rf	2.26%	2.26%	2.26%
Gearing	D/(D+E)	34.83%	36.61%	35.72%
Country Risk Premium	CRP	3.42%	3.42%	3.42%
Debt premium	Dp	1.53%	1.65%	1.59%
Cost of Debt	**Kd**	**7.21%**	**7.33%**	**7.27%**
Cost of Debt - J$	**Kdj**	**9.76%**	**9.89%**	**9.83%**
Cost of Equity (K_e)				
Market Risk Premium	MRP	4.66%	6.26%	5.46%
Equity Beta	Be	0.912	0.924	0.918
Tax Rate	T	33.33%	33.33%	33.33%
Expected Inflation - Jamaica	ij	4.76%	4.76%	4.76%
Expected Inflation - U.S.	ius	2.32%	2.32%	2.32%
Cost of Equity	**Ke**	**9.63%**	**11.20%**	**10.41%**
Cost of Equity - J$	**Kej**	**12.24%**	**13.86%**	**13.04%**
Nominal WACC (USD)				
WACC	**WACC**	**8.78%**	**9.79%**	**9.29%**
After-Tax WACC	**After-Tax WACC**	**7.95%**	**8.89%**	**8.42%**
Pre-Tax WACC	**Pre-Tax WACC**	**11.92%**	**13.34%**	**12.63%**
Nominal WACC (JMD)				
WACC	**$WACC_j$**	**11.38%**	**12.40%**	**11.89%**
After-Tax WACC	**After-Tax $WACC_j$**	**10.24%**	**11.20%**	**10.72%**
Pre-Tax WACC	**Pre-Tax $WACC_j$**	**15.37%**	**16.80%**	**16.09%**

Source: OUR

7.2. As a final comparison, Exhibit 15 below presents the nominal pre-tax WACC (in USD) of recent regulatory decisions from NRAs worldwide. As can be seen, the WACCs estimated for the fixed and the mobile sector in Jamaica is relatively aligned with the benchmarked regulators

Exhibit 15: WACC Benchmark

Regulator	Fixed	Mobile
ANACOM	9.07%	9.07%
MCA	6.98%	6.34%
ictQatar	10.45%	10.45%
ComReg	6.42%	6.53%
PTS	6.30%	7.80%
IFT	8.75%	8.67%
SUTEL	12.20%	12.20%
ECTEL	15.50%	16.25%
ENACOM	15.68%	15.68%
BIPT	6.86%	7.98%
Bundesnetzagentur	6.40%	6.40%
GNCC	14.95%	14.95%
Average	**9.96%**	**10.19%**
OUR	**10.75%**	**12.63%**

Source: OUR based on data from NRAs[17]

Question 9: Do you agree with the estimated WACC for fixed carriers (10.75%) and mobile carriers (12.63%)? Please justify your position and provide supporting information and references.

[17] Please see Annex B for the sources employed for each country

Annex A: Summary of Questions

Question 1: Do you agree with the approach to estimate separate WACCs for fixed and mobile carriers? Please justify your position and provide supporting information and references.

Question 2: Do you agree that a gearing ratio of 35.54% for fixed and a gearing ratio of 35.72% for mobile is reasonable? Please justify your position and provide supporting information and references.

Question 3: Do you agree that a risk-free rate of 2.26% for both segments (fixed and mobile) is reasonable? Please justify your position and provide supporting information and references.

Question 4: Do you agree that a Country Risk Premium (CRP) of 3.42% for Jamaica is reasonable? Please justify your position and provide supporting information and references.

Question 5: Do you agree that a Debt Premium parameter of 1.59% for the Jamaican telecom sector is reasonable? Please justify your position and provide supporting information and references.

Question 6: Do you agree with the approach to estimating beta? Do you agree that a Beta of 0.697 for fixed and a Beta of 0.918 for mobile are reasonable? Please justify your position and provide supporting information and references.

Question 7: Do you agree with the approach to estimating the MRP? Please justify your position and provide supporting information and references.

Question 8: Do you agree with the values, 4.76% and 2.32% to be used for expected inflation for Jamaica and the United States of America respectively? Please justify your position and provide supporting information and references.

Question 9: Do you agree with the estimated WACC for fixed carriers (10.75%) and mobile carriers (12.63%)? Please justify your position and provide supporting information and references.

Annex B: References

NRA	Year	Country	Reference
ANACOM	2017	Portugal	Determinação da taxa de custo de capital da MEO (2017). https://www.anacom.pt/streaming/RelatorioWACC16maio2017..pdf?contentId=1413506&field=ATTACHED_FILE
MCA	2019	Malta	WEIGHTED AVERAGE COST OF CAPITAL (2019). https://www.mca.org.mt/sites/default/files/WACC%20Consultation.pdf
ictQatar	2017	Qatar	Determination of the Cost of Capital for Service Providers (2017). https://cra.gov.qa/-/media/System/0/E/E/3/0EE3AB7CD1CA5C73A6066858866F1F06/2017-12-06-Cost-of-Capital-2017---Consultation-Documents-EN.ashx
ComReg	2018	Ireland	Review of Weighted Average Cost of Capital (2018). https://www.comreg.ie/media/dlm_uploads/2019/05/ComReg-1954.pdf
PTS	2018	Sweden	Kalkylränta (WACC) för det fasta nätet (2018). https://www.pts.se/globalassets/startpage/dokument/ovrigt/kalkylmodell/2018/kalkylranta-wacc-for-det-fasta-natet.pdf
BIPT	2019	Belgium	Decision of the BIPT Council of 23 July 2019 regarding the cost of capital (WACC) for SMP operators in Belgium (2019) https://www.bipt.be/operators/publication/decision-of-the-bipt-council-of-23-july-2019-regarding-the-cost-of-capital-wacc-for-smp-operators-in-belgium
IFT	2019	México	DIARIO OFICIAL DE LA FEDERACIÓN (2019). http://www.ift.org.mx/sites/default/files/contenidogeneral/politica-regulatoria/dof-diariooficialdelafederacion.pdf
SUTEL	2018	Costa Rica	Actualización de las tasa de retorno de capital de la industria de telecomunicaciones (2018). https://sutel.go.cr/sites/default/files/audiencias/gco-tma-et-01396-2018.pdf
ENACOM	2018	Argentina	Diseño, construcción y desarrollo de modelos de costos de Servicios de TIC (2018). https://www.enacom.gob.ar/multimedia/noticias/archivos/201806/archivo_20180607072806_4532.pdf
ECTEL	2018	East Caribbean Telecommunication Authority	Cost Oriented Interconnection Rates in the ECTEL Member States (2018). https://www.ectel.int/wp-content/uploads/2018/09/PUBLIC_Determinaton_Interconnection_rates_2018-1.pdf
Bundesnetzagentur	2016	Germany	Setting the Telecom WACC (2016). https://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/Areas/Telecommunications/Companies/MarketRegulation/CostOfCapital/study2016.pdf;jsessionid=E6363F3B78339638E63D404089B33AE7?__blob=publicationFile&v=2

NRA	Year	Country	Reference
GNCC	2018	Georgia	Methodology and calculation of weighted average cost of capital (2018). https://www.gncc.ge/uploads/other/3/3278.pdf

Annex C: References used in the Estimation of the Beta

In the following exhibits, we present the data from the comparable companies used in the calculation of the beta.

Exhibit 16: Comparable Fixed Network Company Betas

Fixed Network Operators	Country	Tax rate	Market Cap (Millions)	D/E	Levered Beta
Alaska Communications Systems Group	United States	27.00%	109	1.00	0.91
Consolidated Communications Holdings	United States	27.00%	497	4.75	1.12
Frontier Communications Corporation	United States	27.00%	63	8.07	1.62
Cable One	United States	27.00%	10,109	1.47	0.50
A1 Telekom Austria Group	Austria	25.00%	5,495	0.96	0.58
Tele Columbus AG	Germany	30.00%	285	4.54	1.05

Source: OUR based on data from Morningstar

Exhibit 17: Comparable Mobile Network Company Betas

Mobile Network Operators	Country	Tax rate	Market Cap (Millions)	D/E	Levered Beta
Cellcom Israel Ltd	Israel	23.00%	520	1.49	1.07
United States Cellular Corporation	United States	27.00%	2,364	0.40	0.71
Etisalat Misr	Egypt	22.50%	1,404	0.82	0.47
Forth Smart Service Public Company Limited	Thailand	20.00%	4,696	0.16	0.57
Tim Participacoes SA ADR (TSU)	Brazil	34.00%	9,314	0.09	1.01
Telecom Argentina SA ADR-TEO	Argentina	30.00%	5,104	0.26	0.97
Samart Digital Public Company Limited	Thailand	20.00%	2,392	0.72	0.84
Turkcell	Turkey	22.00%	5,006	0.76	0.67
VEON Ltd	Netherlands	25.00%	2,904	6.33	1.61
Mobile TeleSystems	Russia	20.00%	7,557	5.60	1.10

Source: OUR based on data from Morningstar