ECOI
Electronic Communications
Office of Iceland

Appendix I
Weighted Average Cost of Capital (WACC) for 2022

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1 Introduction

(1) According to Article 16 of the Regulation no. 564/2011 on accounting and cost analysis in the operation of electronic communications companies, the cost of capital shall be calculated for the assets used in the provision of telecommunication services. The rate of return shall be based on weighted average cost of capital (WACC) which is calculated from the cost of equity and the cost of debts in accordance with said regulation. The CAPM model shall be used when calculating the cost of equity and the cost shall reflect the time value of money and the risk related to operations on the market in question. The cost of debts shall be calculated as the sum of risk-free rate and risk premium which reflects normal mark-up by companies on the market. The Electronic Communications Office of Iceland (ECOI) decides at least once a year the WACC for the telecommunication markets based on market premium, economic gearing and the position with respect to working capital and debts.

(2) The WACC depends on how much of a company's assets are funded by debt, on the one hand, and equity, on the other, and the cost of the funds used.

(3) The WACC is used to calculate the cost of capital investment tied up in assets used in connection with the provision of services or products. When determining the investment on which these calculations are based, ECOI has in most cases relied on historical costs, where investments are valued at purchase price and indexed to the operating year that is being analysed in each case. The indexed investment base is then used as a basis for calculating the fee for the service. Another way to determine the investment base is to use replacement cost of the equipment used to provide the service in question. The equipment needed to provide the service is then assessed based on the number of service units sold at that time, and the capital investment is calculated based on the cost of purchasing and installing the necessary equipment.

(4) The European Commission (EU) has issued a notice with guidelines for calculating infrastructure cost of capital[1] (the WACC Notice). The primary purpose of these guidelines is to harmonize the calculation of the WACC and make them more accessible and predictable. ECOI takes these guidelines into account where applicable.

(5) Section 6.2. in the WACC Notice discusses inflation and how it is taken into account. It says:

„Investors maximise their inflation-adjusted or real returns. There are typically two ways in which NRAs take inflation into account:

> *a) inflation is compensated for through the annual indexation of the company's assets and only a real WACC return is allowed; or*

[1] Commission Notice on the calculation of the cost of capital for legacy infrastructure in the context of the Commission's review of national notifications in the EU electronic communications sector.

b) inflation expectations are included in the return on capital, by using a nominal WACC, without any adjustment to the company's asset base."

(6) The ECOI considers the use of real WACC to be most appropriate for calculating the rate of return when deciding annuity on investments when the investments are based on historical costs and the investment base is updated with indexation. The ECOI considers it to be real costs when the investment base is calculated using indexed historical costs, and that one should therefore use real interest rate in calculations of the WACC. Otherwise, the result would be distorted as inflation is included in the nominal interest rate.

(7) ECOI believes that when a company's investment base is calculated using replacement cost, it is more appropriate to use nominal interest rates ($WACC_{nominal}$) when evaluating the annual return on investments. Then the inflation expectations are included in the nominal interest rate and hence taken into account when calculating the annual investment cost. This approach is consistent with the WACC Notice.

(8) Chapter 3 "Assumptions common to several WACC parameters" of the WACC Notice sets out guidelines for the implementation of some variables of the required rate of return. These guidelines are taken into account and the methods used are as follows:

- The length of the averaging period: 5 – years.
- The averaging method: arithmetic average.
- The frequency of the sampling period: weekly.

(9) In chapter 7 of the WACC Notice role of BEREC in the calculation of WACC parameters is addressed. BEREC issued its first report on the WACC parameters in 2020 and will from now on issue these reports annually. The calculations for the WACC for the year 2022 are based on BECER report dated 9 June 2022: *Report on WACC parameter calculations according to the European Commission's WACC Notice of 6th November 2019 (WACC parameters Report 2022), BoR (22) 70.* In the report BEREC's results on risk free rate, peer group, debt premium, cost of debt, beta, gearing and equity risk premium is presented. The conclusions presented in the report are discussed in the following sections, where applicable.

2 The WACC formula

(10) In order to decide the WACC real, the following formula is used:

$$WACC = R_e \, x \, \frac{E}{(D+E)} + R_d \, x \, \frac{D}{(D+E)}$$

where:

R_e = cost of equity

E = equity

R_d = cost of debt

D = interest-bearing debt

(11) When calculated post-tax:

$$WACC_{post-tax} = R_e \, x \, \frac{E}{(D+E)} + (1-t) \, x \, R_d \, x \, \frac{D}{(D+E)}$$

where:

t = corporate income tax rate

(12) When WACC is calculated pre-tax:

$$WACC_{pre-tax} = \frac{WACC_{post-tax}}{(1-t)}$$

(13) The formulas used in the WACC Notice are in accordance with ECOI's (formerly Post and Telecom Authority; PTA) practice for many years.

3 Cost of equity

(14) The ECOI considers that when deciding the WACC, the Capital Asset Pricing Model (CAPM) should be used. This is in accordance with Regulation no. 564/2011 on accounting and cost analysis in the operation of electronic communications companies and the WACC Notice. The main argument for using CAPM is that this model is easy-to-use and transparent. It is also the most commonly used method for calculating the rate of return on capital which facilitates comparison.

(15) The CAPM model is used for calculating the cost of equity:

$$R_e = RFR + \beta \times ERP$$

where:

RFR = risk-free rate

ERP = market risk premium

β = beta parameter which indicates the risk of the sector in question in comparison with the market as a whole

(16) In the chapters here below are the main parameters in the CAPM model and the ECOI conclusion on how the Administration decides them.

4 Risk-free rate

(17) The ECOI considers it appropriate to follow the guidance in the WACC Notice of using 10-year government bonds when deciding the risk free rate (RFR), cf. section 4.1 of the Notice. However, the situation in this country must also be taken into account, e.g. if the supply of such bonds is limited.

(18) In accordance with paragraph 61, item a), of the WACC Notice, FST uses real interest rates ($WACC_{real}$) in the calculation of annual investment costs, where the investment base of the electronic communications undertaking is determined through an annual indexation of investment costs. The WACC Notice proposes to use an inflation forecast and adjust the government-guaranteed nominal interest rate with it to derive real interest rates. The reason is that most countries do not have an active market for indexed Treasury bond series. It is an accepted methodology to use the differential between indexed and non-indexed Treasury bonds, where there is an active market for them, to estimate future inflation. Using real market interest rate expectations in WACC calculations yields the same result as calculating the real interest rate using inflation expectations and nominal interest rates. ECOI therefore considers it best to use indexed Treasury bond series instead of adjusting for inflation in the yield on nominal Treasury bond series.

(19) ECOI has decided to use the series of indexed Treasury bonds that are closest to 10 years to maturity at any given time. The decision on RFR is based on the arithmetic average of the yield of this bond over 5-years, with a weekly frequency. The data were obtained from the Kodiak data provider and were based on the period 1.4.2017 - 31.3.2022, which is the period used in BEREC's calculations.

(20) When calculating the real risk-free rate, the following government bonds were considered: RIKS 26 0216, RIKS 30 0701, RIKS 33 0321 and RIKS 37 0115. The average yield of real interest rates during the period was 1.08% according to the weekly end-of-day prices. RIKS 30 0701 and RIKS 33 0321 turned out to be the bonds that were closest to the 10-year maturity at each point in the reference period.

(21) When calculating the nominal risk-free rate, the following government bonds were considered: RIKB 22 1026, RIKB 23 0515, RIKB 24 0415, RIKB 25 0612, RIKB 28 1115, RIKB 31 0124 and RIKB 42 0217. The average yield for the period is calculated as 4.17%, according to the weekly end-of-day prices. RIKB 28 1115 and RIKB 31 0124 turned out to be the bonds that were closest to the 10-year maturity date at each point in the reference period.

5 Beta risk parameter β

(22) In order to estimate the Beta parameter, BEREC's conclusion on asset beta is used. BEREC selected a peer group in accordance with the WACC Notice.

(23) The following table shows the BEREC conclusion on levered beta, debt ratio and unlevered beta for all the companies in the peer group:

Company	β_{equity}	Gearing	β_{assets}
Deutsche Telekom AG	0.78	0.5269	0.43
DIGI Communications N.V.	0.46	0.666	0.22
Elisa Oyj	0.43	0.1328	0.38
Koninklijke KPN N.V.	0.65	0.3855	0.44
NOS	0.7	0.3539	0.49
Orange S.A.	0.7	0.5058	0.4
Proximus S.A.	0.53	0.2666	0.41
Tele 2 AB	0.58	0.2241	0.47
Telecom Italia	1.02	0.7052	0.38
Telefónica	1.01	0.5801	0.49
Telekom Austria AG	0.68	0.3435	0.48
Telenet Group Holding N.V.	0.62	0.5117	0.35
Telenor	0.33	0.2971	0.26
Telia Company AB	0.62	0.3627	0.43
Vodafone Group plc	0.9	0.5006	0.5
Average	**0.67**	**42.42%**	**0.41**

(24) The average unlevered beta for the telecom companies is 0.41. The ECOI has decided to follow the guidance of the WACC Notice and use the result from BEREC's calculations, i.e. to use value 0.41 for unlevered beta.

(25) Unlevered beta shall be levered using the appropriate gearing. According to the WACC notice it is recommended to lever the unlevered beta using the Miller formula::

$$\beta_{asset} = \beta_{equity} \frac{\mathrm{E}}{\mathrm{D} + \mathrm{E}} + \beta_{debt} \frac{D}{D + E}$$

(26) Beta assets, $\beta_{assets,}$ is equivalent to unlevered beta and beta equity, β_{equity}, is equivalent to levered beta. According to the WACC notice the β_{debt} should be set at 0.1.

(27) ECOI's conclusion is that β_{equity} is 0.64.

6 Equity Risk Premium

(28) The WACC Notice proposes the use of a single EU-wide Equity Risk Premium (ERP). One of the reasons for this is that the financial markets in the EU are increasingly integrated and

therefore have convergent ERPs. Ownership of electronic communications companies within the EU is not limited to the Member States concerned[2].

(29) To calculate the ERPs of the EU Member States, BEREC uses data series on historical returns of Member States' equities over and above the RFR from the Morningstar data set and, where such data were not available in the Morningstar database, BEREC uses data from Bloomberg using the implied pricing method on historical returns from Member States.

(30) BEREC's conclusion is that the appropriate value of the ERP is 5.70% in the EU but for Norway and Iceland BEREC concludes that an ERP of 5.69% should be used.

(31) The situation in Iceland is different from other European countries as the correlation between the Icelandic market and European markets is not necessarily strong. Icelandic electronic communications companies also operate exclusively in the Icelandic market and not in international or European markets.

(32) This time ECOI intends to take BEREC's result into account and use 5.69% ERP in its calculations.

(33) If the ERP in Iceland will in the future start to diverge from ERPs in Europe compared to present situation, the ECOI will assess whether it will be necessary to re-evaluate the ERP in Iceland instead of using BEREC's conclusion.

7 Debt Premium

(34) In order to calculate the debt premium BEREC assesses the yield on long-term corporate bonds above the RFR.

(35) The BEREC result can be seen in the following table:

[2] See also section 5.2.1.4 of the Staff working document, dated 5.11.2019, accompanying the WACC Notice.

Company	Dept premium (basis point)	RFR	Cost of dept
Deutsche Telekom AG	125	-0.09	116
DIGI Communications N.V.	260	4.23	683
Elisa Oyj	69	0.19	88
Koninklijke KPN N.V.	117	0.05	122
NOS	-	1.12	-
Orange S.A.	84	0.30	114
Proximus S.A.	96	0.30	126
Tele 2 AB	142	0.31	173
Telecom Italia	133	1.70	303
Telefónica S.A.	41	0.84	125
Telekom Austria AG	72	0.20	92
Telenet Group Holding N.V.	317	0.30	347
Telenor	100	1.45	245
Telia Company AB	139	0.31	170
Vodafone Group plc	141	0.91	232
Average	**131**	**0.81**	**210**

(32) According to the above table, the arithmetic average of the debt premium of telecommunications companies is 1.31%. ECOI uses this results in its calculations.

8 Gearing and Tax rate

(36) The ECOI considers it appropriate to use gearing of a reference group of electronic communications companies in Europe when assessing the gearing on the telecommunications market. To determine the gearing, the peer group selected by BEREC are taken into account. The table in section 5 above specifies the gearing of these companies, with an average debt ratio of 42.42%. The ECOI conclusion is to use this value for domestic telecommunications companies.

(37) The ECOI considers that the use of corporate tax rate is in each instance the best measure for tax rate when calculating WACC and that is in accordance with the WACC Notice. Its use is more transparent and simpler than using the effective tax rate. The ECOI intends to use the corporate tax rate in force for the period of time in question in each instance in these calculations, which was 20% in 2022.

9 ECOI conclusion on WACC

(38) The WACC for the operational year 2022 using the above ECOI criteria is shown in the table here below.

WACC 2022	*WACC real*	*WACC nominal*
RFR	1,08%	4,17%
Unlevered beta	0,41	0,41
Levered beta	0,64	0,64
Debts/equity ratio	0,74	0,74
ERP	5,69%	5,69%
Cost of equity	**4,70%**	**7,79%**
		0,00%
RFR	1,08%	4,17%
Debt premium	1,31%	1,31%
Cost of debt	**2,39%**	**5,48%**
		0,00%
Interest bearing debt %	42,42%	42,42%
Equity %	57,58%	57,58%
Corporate tax rate	20,00%	20,00%
WACC (post-tax)	**3,52%**	**6,35%**
WACC (pre-tax)	**4,40%**	**7,93%**

(36) In accordance with the above it is the conclusion of the ECOI that real weighted average cost of capital (WACC real) for a telecom company in Iceland is 4.40% and the nominal rate ($WACC_{nominal}$) is 7.93% for the year 2022 in calculations of rate of return for capital tied in assets used in connection with the company's provision of services.