

**Report for the Agency for
Electronic Communications**

**Initial Report: ERT and
associated WACC
calculation specification**

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Joan Obradors, Fabio Fradella, Alexander
Weigand, Samuele Mainardi, Federico
Fabris

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Analysys Mason Srl
Corso Venezia n. 37
20121 Milan
Italy
Tel: +39 02 76 31 88 34
milan@analysysmason.com
www.analysysmason.com

Registered in England: Analysys Mason Limited
North West Wing, Bush House, Aldwych
London WC2B 4PJ, UK
Reg. No. 5177472

1 Introduction

This introduction sets out the objectives and the relevant background and context of the project. It further contains a roadmap of the subsequent chapters of this report.

1.1 Project objectives

Analysys Mason and Grant Thornton LLP have been commissioned by the Agency for Electronic Communications of the Republic of Macedonia (AEC, or the Agency) to develop and implement an economic replicability test ('ERT') model. This model will be applied to certain wholesale fixed broadband services in the Republic of Macedonia. The scope of work requires also the calculation of the associated cost of capital¹ employed.

This report focuses on the proposed conceptual approach and methodology for the development of the ERT model and for the calculation of the associated WACC. During 2016 and 2017, AEC conducted analyses of the wholesale local access market and the central access market provided at a fixed location² in the Republic of Macedonia³. As a result of these market analyses, AEC decided that the ERT should be applied to next generation access ('NGA')-based wholesale fixed access services supplied by dominant operators on:⁴

- copper and fibre (or fibre-only) networks, i.e.
 - IP-level⁵ central access point bitstream
 - Ethernet-level⁶ local access point bitstream
- hybrid fibre-coaxial (HFC) networks, i.e.
 - national IP-level access point bitstream
 - local CMTS⁷ access point bitstream.

¹ The commonly used proxy is the Weighted Average Cost of Capital (WACC).

² Market 3(a) and Market 3(b), as defined by the European Commission (EC) in the 'COMMISSION RECOMMENDATION of 9 October 2014 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services', available at <https://ec.europa.eu/digital-single-market/en/news/commission-recommendation-relevant-product-and-service-markets-within-electronic-communications>.

³ Available at

http://www.aek.mk/index.php?option=com_k2&view=itemlist&layout=category&task=category&id=168&Itemid=581&lang=mk.

⁴ AEC, Terms of Reference for developing of a test model for economic replicability of wholesale services, Section 2.2.

⁵ Internet protocol.

⁶ Also known as virtual unbundled local access ('VULA').

⁷ Cable modem termination system.

The ERT model that will be developed in the course of the present project will test whether the retail products of operators that are dominant in the wholesale (or upstream) market can be replicated by an (efficient) retail operator based on the wholesale inputs from the dominant operators.

The model will be developed in accordance with the relevant deliberations of the European Commission (EC) on the regulation of NGA wholesale access products. The 2013 EC Recommendation on the subject stated, in summary, that ex-ante price control of NGA wholesale products should be replaced with an ERT⁸.

However, the EC guidance on some of the key parameters of such ERTs has been limited to date. National regulatory authorities (NRAs) are only now in the process of working through ERT implementations. There is therefore a lack of international best practice. Defining ERT model methodology and test parameters for the Republic of Macedonia is an important aspect of this project, ensuring consistency with regulatory objectives and creating regulatory certainty.

The WACC defines a reasonable return on capital employed by the relevant operators, and is an important input into the ERT calculation.

The Agency's ultimate objective is to conduct economic replicability tests using the ERT model throughout the period of the current market reviews.

1.2 Project background

As a result of the recent market analyses referred to in Section 1.1 above, AEC has determined that there is no effective competition in the wholesale local access market and the central access market provided at a fixed location.

The delineated markets are national in scope. The Agency has decided that cable TV (CATV) networks are relevant and need to be included in these markets. Makedonski Telekom AD Skopje ('Makedonski Telekom') and ONE.VIP DOO Skopje ('ONE.VIP') were designated as operators with significant market power (jointly referred to as 'SMP operators' or 'dominant operators' in this report) in each upstream market.

Makedonski Telekom is a vertically integrated SMP operator, and is already subject to obligations for accounting separation, cost accounting and provision of data and information to AEC regarding the services belonging to the analysed markets.

⁸ 'COMMISSION RECOMMENDATION of 11.9.2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment – C(2013) 5761', available at

<https://ec.europa.eu/digital-single-market/en/news/commission-recommendation-consistent-non-discrimination-obligations-and-costing-methodologies>

For wholesale fixed access services provided over legacy networks, compliance with the obligation for wholesale price control is imposed using long-run incremental cost (LRIC) methodology.

The Agency also imposed obligations for non-discrimination, including equivalence of input ('EOI'), technical and economic replicability, on the SMP operators with regards to the upstream services provided in these markets⁹.

The 2013 EC Recommendation aims to provide SMP operators with greater incentives to invest in NGA networks. The Recommendation allows NRAs to apply ERTs and to refrain from imposing cost-orientation obligations for NGA-based wholesale fixed access prices when the above safeguards of non-discrimination are in place. In addition, a “demonstrable retail price constraint” is required.¹⁰

This implies established and effective competitors in the retail market which result from either:

- Alternative infrastructure competition; or
- Competition on legacy networks based on a price anchor stemming from cost-oriented wholesale legacy network access prices.

AEC aim is to implement an ERT model that tests the replicability of the NGA-based retail offers of SMP operators in light of the current level of their NGA-based wholesale fixed access services.

1.3 Structure of this report

The remainder of this document is laid out as follows:

- Section 2 discusses the principles and methodology of the ERT model to be developed
- Section 3 discusses the principles and parameters of the associated WACC.

Annex A provides a list of abbreviations and acronyms used in the report.

⁹ 20170502 Decision to Makedonski Telekom for local access market; 20170502 Decision to ONE.VIP for local access market; 20170502 Decision to Makedonski Telekom for central access market; 20170502 Decision to ONE.VIP for central access market.

¹⁰ 'COMMISSION RECOMMENDATION of 11.9.2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment', par. 52–56.

2 ERT methodology

This section discusses the principles and methodology of the ERT model to be developed, and our proposed approach to model development.

2.1 Introduction to ERTs

2.1.1 Margin squeeze and ERT

In simple terms, a margin squeeze occurs when the retail products of the (vertically integrated) operator that is dominant in the wholesale (or upstream) market cannot be economically replicated by an (efficient) competitor in the downstream market on the basis of the upstream inputs from the dominant operator because the wholesale and retail prices set by the dominant operator do not allow a sufficient margin. This is in line with the definition provided by AEC in its manual for price-squeeze test in 2009¹¹ and confirmed in its margin squeeze test methodology document in 2012¹²:

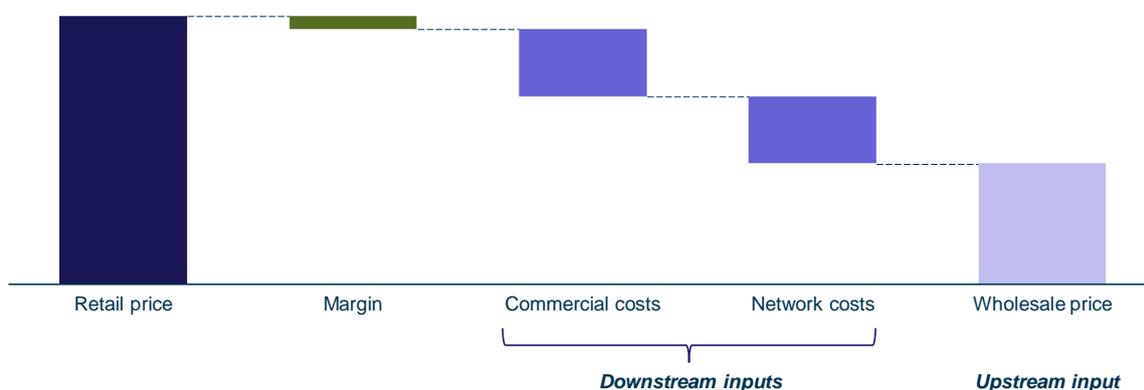
“The usage of prices to squeeze the competition (Price Squeeze) is a situation in which a vertically integrated operator having a substantial market power on a relevant wholesale market, on one hand on wholesale basis provides services to its competitors in the related retail markets, and on the other hand it forms prices for the retail services in a manner in which it makes unprofitable the activities of the competitors on the market for selling retail products and services”.

A margin squeeze test therefore checks whether the difference between the wholesale and the retail price is sufficient to cover the downstream costs that are required to produce the retail product in addition to the wholesale input. In telecoms, the downstream cost inputs will consist of both commercial and network costs. This overall principle is illustrated in Figure 2.1 below.

¹¹ AEC, 'Instructions for establishing prices for squeezing the competition from the electronic communication services market in the Republic of Macedonia', October 2009, par. 5.

¹² AEC, 'Methodology to be used for the margin-squeeze model', March 2012, par. 2.1.

Figure 2.1: Illustration of a typical margin squeeze test [Source: Analysys Mason, 2018]



The concept of ‘margin squeeze’ was developed in the ex-post/competition authority world, due to concerns that a company pursuing a margin squeeze strategy could harm, limit and restrict competition in the downstream market. This would be to the detriment of the end user, who could end up with higher retail prices and/or lower quality products and services. A margin squeeze strategy can frustrate the efforts made through reforms and acts to increase competition in the downstream market. As is the practice in the antitrust field, margin squeeze tests were mostly developed through a series of cases.

Margin squeeze tests (or ‘no-margin-squeeze rules’) are not on the list of formal ex-ante remedies defined by the EC, but have nonetheless been implemented by several NRAs. Margin squeeze tests have been applied as a tool either:

- to ensure that a regulated price does not lead to a margin squeeze by the SMP operator; or
- to verify compliance by the SMP operator where the prices of retail and/or wholesale services are regulated; or
- to verify that the offers of the SMP operator are replicable by competitors.

In this regard, the EC and the Body of European Regulators for Electronic Communications (‘BEREC’¹³) have commented in the past that they do not object to NRAs implementing margin squeeze tests. They have also stated that the margin squeeze tests should be aligned with the principles established in ex-post/antitrust interventions.

As mentioned above, the 2013 EC Recommendation indicated that margin squeeze tests are a suitable ex-ante remedy for NGA-based wholesale products and that margin squeeze tests should, for those NGA-based wholesale products, replace cost-orientation under certain conditions¹⁴. In its Recommendation, the EC provided limited guidance on the implementation of the test. It also renamed the test as the ‘economic replicability test’ to distinguish it from ex-post margin squeeze

¹³ Formerly the European Regulators Group (ERG).

¹⁴ ‘COMMISSION RECOMMENDATION of 11.9.2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment’, section ‘Non-imposition of regulated wholesale access prices on NGA networks’.

tests¹⁵. BEREC also issued a guidance document on the implementation of this Recommendation¹⁶. The limited guidance currently available means that there will continue to be a certain reliance on alignment with ex-post best practice and principles¹⁷.

There are some important differences between the ex-ante and ex-post contexts, and these should be considered when designing an ERT. Some of the main differences are summarised in Figure 2.2 below.

Figure 2.2: Differences between ex-ante and ex-post margin squeeze tests [Source: Analysys Mason, 2018]

	Forward-looking (ex-ante)	Backward-looking (ex-post)
Purpose of regulation	<ul style="list-style-type: none"> Ensure competition in the market by testing whether efficient alternative operators can effectively compete with the SMP operator 	<ul style="list-style-type: none"> Identify and penalise anti-competitive practices
Outcome of the margin squeeze test	<ul style="list-style-type: none"> Adjust or approve retail pricing of the dominant operator (if retail prices are subject to ex-ante regulation) Block or allow launch of new products Adjust or approve wholesale pricing of the dominant operator (retail-minus approach) 	<ul style="list-style-type: none"> Apply fines to operators engaging in anti-competitive behaviour (up to 10–15% of their annual revenue in some jurisdictions) Fines can typically also pave the way for civil lawsuits filed by access seekers
Implications	<ul style="list-style-type: none"> Need to be forward-looking Need to be aligned with maturity of the market and regulatory objectives Should start from the point of view of an alternative operator (although it may use the costs incurred by the dominant operator) 	<ul style="list-style-type: none"> Focus on historical behaviour (although some assumptions will need to be made regarding the future) Focus on the dominant operator's behaviour

The lack of best practice in the design and implementation of ERTs has led to somewhat inconsistent interpretations of the methodology and principles being applied by NRAs for such ex-ante tests and subsequently different implementations.

¹⁵ This is a reflection of the fact that the methodology used can sometimes differ.

¹⁶ BEREC Guidance on the regulatory accounting approach to the economic replicability test (i.e. ex-ante/sector specific margin squeeze test), BoR (14) 123, 26 September 2014.

¹⁷ Ex-post principles have been developed mainly by the Directorate General for Competition (DG COMP) over the course of several margin squeeze cases investigated in various industries. While these principles are very general and often non-sector-specific, the following margin squeeze investigations have occurred in the telecoms industry: Deutsche Telecom (Germany, 2003, line rental margin squeeze); Wanadoo vs. Telefónica (Spain, 2007, broadband margin squeeze) and TeliaSonera (Sweden, 2011, broadband margin squeeze).

Proposed approach 1: In designing the ERT, it will be important to carefully consider the key methodological principles in the Macedonian market context, taking into account the guidance provided by the EC.

2.1.2 Process for administrating an ERT

Criteria to run an ERT

An NRA may choose to conduct an ex-ante ERT for various reasons, as summarised in Figure 2.3 below.

Figure 2.3: Possible reasons for carrying out an ERT, and their benefits and disadvantages [Source: Analysys Mason, 2018]

Reason/situation	Benefits	Disadvantages
When SMP operators change their retail offer (and every time they do so)	<ul style="list-style-type: none"> Ensures strict replicability 	<ul style="list-style-type: none"> Increases the administrative burden on SMP operators and AEC, especially if prices change often
When wholesale prices change	<ul style="list-style-type: none"> Closely tied to the market(s) in which the SMP operators are present 	<ul style="list-style-type: none"> May allow too much room for SMP operators if there are no checks on retail products
Regularly forward-looking (e.g. quarterly/annually)	<ul style="list-style-type: none"> Consistent with ex-ante premise Ensures wholesale price certainty 	<ul style="list-style-type: none"> Leaves room for abuse of market position The more often the ERT is carried out, the greater the administrative burden
Regularly backward-looking (quarterly/annually)	<ul style="list-style-type: none"> Closer alignment with ex-post Ensures strict replicability 	<ul style="list-style-type: none"> The more often the ERT is carried out, the greater the administrative burden Borders on ex-post regulation (depends on the remedy)
When a complaint is made (or an investigation is initiated by the NRA)	<ul style="list-style-type: none"> Lower administrative burden (provided the market functions well) 	<ul style="list-style-type: none"> Risk of regulation by litigation May not be sufficient on its own

‘Ex-ante’ generally implies that the regulation intervenes before the event. The purpose is not to penalise actual behaviour but to set the conditions for the market to function properly. In an ERT context this would imply that the test is done in advance, setting a wholesale price for a certain future period. The complication with this approach is that the fixed market is undergoing continuous change and retail pricing is not static. The assumptions used by the NRA and how the NRA tests the wholesale prices in the ERT will have to be made known to the dominant operator for regulatory certainty and predictability reasons.

It is proposed to run the ERT when a new retail flagship offer is launched or changed and/or when wholesale prices of relevant wholesale inputs are changed; such approach is consistent with the guidelines included in the 2013 EC Recommendation¹⁸.

Therefore, it must then be defined:

- What a *retail flagship offer* is; and
- When it is considered as new/changed¹⁹.

This is treated in detail in Section 2.2.1.

ERT implementation

The NRA needs also to set out what will happen if the ERT is not passed for regulatory certainty purposes, e.g.:

- Should SMP operators not be allowed to launch the retail product?
- Should SMP operators lower their wholesale prices?
- Should SMP operators retroactively lower their wholesale prices for the previous testing period (in the case of a backward-looking test)?

Alternatively, the NRA can also use the ERT to explicitly set a ceiling wholesale price for the next period (with an ex-ante determination of a minimum margin, which could be equal to zero).

The administration process of the ERT needs to be aligned with the NRA's regulatory objectives, e.g. short-term and long-term impact on end users and competitors, incentives for dominant operators and competitors to invest in NGA networks.

The implementation of AEC intended ERT administration process in the Republic of Macedonia will have an impact on the methodological choices and data sources for the ERT model.

Proposed approach 2: It is proposed to run the ERT when a new retail flagship offer is launched or changed and/or when wholesale prices of relevant wholesale inputs are changed. It is also proposed to run the test on the current flagship offers (or a sub-set of them), always on a forward-looking basis (i.e. on the forecast gross adds).

¹⁸ 'COMMISSION RECOMMENDATION of 11.9.2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment', ANNEX II – Parameters of the ex ante economic replicability test, (iv).

¹⁹ The definition of a change in the relevant wholesale inputs looks conversely more straightforward.

2.1.3 Key decisions to be made

To use the ERT model for an effective regulation, AEC will need to make a number of decisions regarding the following methodological aspects:

- the relevant retail products and their aggregation level (Section 2.2)
- the relevant wholesale inputs and their treatment (Section 2.3)
- the perspective and level of operator efficiency that will be considered to analyse the situation (Section 2.4)
- the cost standards that will be used to evaluate downstream costs (Section 2.5)
- the modelling approach and time period for running the test and evaluating profitability (Section 2.6).

These methodological decisions will impact the relevant data that is required for developing the ERT model and are discussed in the following sub-sections.

2.2 Relevant retail inputs to be considered

In defining the relevant set of retail inputs to be considered, AEC needs to consider both the offer dimension and the time dimension of these retail inputs. This is discussed in more detail below.

2.2.1 Offer dimension

The 2013 EC Recommendation specifies that an ERT should be conducted on (only) the most relevant ‘flagship’ product(s) offered by the SMP operators²⁰. These are to be identified by the NRA based on observations regarding the products’ relevance for current and future competition (including retail market shares in terms of volumes and value, and advertising expenditure, where available).

The EC Recommendation also notes that NRAs can consider testing niche or lower-quality products which are not among the flagship retail products of the SMP operator, if these are important or are likely to be important to the access seekers.

The EC introduced the ERT to allow more pricing flexibility for the dominant operator’s NGA products. This pricing flexibility is intended to offset the uncertain demand for NGA networks. The EC notes that the ERT needs to give the SMP operator room for penetration pricing (low initial pricing to increase demand)²¹. Therefore, the commercial freedom of the SMP operator and its

²⁰ ‘COMMISSION RECOMMENDATION of 11.9.2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment’, ANNEX II – Parameters of the ex ante economic replicability test, (iv).

²¹ Ibid., paras. 49 and 62.

ability to engage in rational non-discriminatory commercial pricing strategies should not be unduly limited.

The EC does not specify how many flagship products it expects to be tested. A single product, in any case, may not be adequate – there may be additional products that are important to alternative operators in the market.

Typically, a standard offer should be tested. The EC notes that flagship products are likely to be offered as a bundle. A relevant stipulation for the selection of a bundle is that the alternative operator can source and offer all the components of the SMP operator’s retail bundle. ‘Innovative variations’ of bundles may be relevant if these are likely to become more important for competition in the future.

In addition, time-limited promotions on the SMP operator’s standard retail pricing is often offered. The EC Recommendation is not specific on how to treat such promotions (e.g. when to consider a promotion to be time-limited in nature and when to treat promotion changes as a new offer or an average).

Consistently with the 2013 EC Recommendation guidelines and with the proposed approach for running the ERT (see Section 2.1.2), it must then be defined:

- What a *retail flagship offer* is; and
- When it is considered as new/changed²².

Definition of retail flagship offer

It is worth splitting the definition of retail flagship offer between the one of retail offer and the indication of when it can be considered as a flagship one.

► *Definition of retail offer*

The proposed definition of retail offer includes the following elements:

- A product (family) name
- A pricing scheme
- A voice traffic allowance included in the subscription agreement (monthly fee)
- A broadband access nominal throughput
- An IPTV channel offering included in the subscription agreement (monthly fee)
- Pre-defined add-on packages (e.g. additional voice traffic / IPTV channels)
- Out-of-bundle / add-on packages service tariff conditions (voice traffic, additional IPTV content, etc.).

²² The definition of a change in the relevant wholesale inputs looks conversely more straightforward.

► *Assessment of a retail offer 'flagshipness'*

To assess when a retail offer can be considered as a flagship one we propose to adopt the same approach used by the ILR, the Luxembourg regulator, according to which flagship offers are the ones that in descending order, represent in sum a revenue share of 70% of all retail products of the SMP operator in the broadband market; [the offers that represent] at least 10% of revenues on an individual basis are treated as flagship products as well²³. A couple of caveats are to be considered in the Macedonian context:

- Since there are two SMP operators, the criteria must be applied separately to each of them
- The exact value of the thresholds will be set-up at a later stage, once data will be provided, to seek an appropriate balance between accuracy (examination of a certain amount of retail offers) and efficiency (limitation of the number of retail offers to examine).

Definition of retail offer change

An offer changes if any of the below characteristics varies:

- Offer type
 - Customer – From residential to business or vice-versa
 - Product – New services are included (e.g. inclusion of IPTV packages in an offer that previously included only voice and broadband)
- Offer features
 - Broadband – The nominal download and/or upload speeds in a way that would imply a change in the corresponding wholesale fixed access product
 - IPTV – For offers including TV services, inclusion of premium content (non-free by standard pricelist, e.g. live football matches) irrespective of a parallel modification in the pricing conditions
- Pricing conditions (e.g. recurring charges, including promotions) change.

It is worth noting that the conditions defined to assess a retail offer change are quite similar to the ones defined during the margin squeeze test model implementation exercise, widely accepted by the industry and by Makedonski Telekom in particular²⁴.

²³ See règlement 14/179/ILR, available at <http://legilux.public.lu/eli/etat/leg/rilr/2014/08/28/n4/jo>

²⁴ See 'Consultation on the AEC margin squeeze test model', par. 4.1, April 2012, according to which An offer is deemed to be a new one if any of the below characteristics change:

- customer type – from residential to business or vice-versa
- product type – new services are included (e.g. inclusion of IPTV packages in an offer that previously included only voice and broadband)

In order to allow the industry to familiarize with the test, it is proposed to run the test on the current flagship offers (or a sub-set of them), always on a forward-looking basis (i.e. on the forecast gross adds). This would not be an application upon new retail offers or in case of retail offer change but would represent a useful ‘test environment’ for all the involved parties.

The options for the level of aggregation of the retail products into the ERT are:

- all the packages of an SMP operator, on an individual basis
- only single packages which are the most relevant (‘flagship’)
- at a market level.

Rationales and considerations for the options are reported in Figure 2.4 below.

Figure 2.4: Offer dimension choices for retail inputs [Source: Analysys Mason, 2018]

	Each package	Single packages	Entire market
Rationale	<ul style="list-style-type: none"> • Often used when there is a process for pre-approval of retail packages 	<ul style="list-style-type: none"> • Used on ‘flagship’ products only 	<ul style="list-style-type: none"> • Consistent with the NRA’s market definition
Considerations	<ul style="list-style-type: none"> • Less useful to set wholesale prices (multiple ceilings) • Puts limits on pricing freedom (may not be consistent with Ramsey pricing²⁵) • Heavy administrative burden and complex calculations 	<ul style="list-style-type: none"> • Simple calculations • Allows pricing freedom • May allow incumbent to continue ‘abuse’ on other products • Easy to use in a forward-looking manner 	<ul style="list-style-type: none"> • Allows pricing freedom • Includes certain segments in which the other licensed operators (OLOs) are <i>de facto</i> not competing (e.g. legacy subscribers) • More natural for a backward-looking test • May or may not allow for fibre vs. copper differentiation

Consistently with what the definitions above, it also proposed to be run on a ‘single package’ basis.

Proposed approach 3: The ERT will be run on the retail flagship products only on a single package basis. The proposed approach is consistent with the 2013 EC Recommendation where it is suggested to conduct the test only on the most relevant flagship products (i.e. single packages).

• the nominal download and/or upload speeds in a way that would imply a change in the corresponding wholesale bitstream access product

• the subscription monthly fee (e.g. from MKD1000 to MKD800 per month).

²⁵ See Section 2.5.2 below.

2.2.2 Time dimension

The time dimension of the retail offer relates to the SMP operators' end users and the product take-up and parameters over time. There are three possibilities for considering the time dimension of users and products, as summarised in Figure 2.5 below.

Figure 2.5: Time dimension choices for retail inputs [Source: Analysys Mason, 2018]

Choice of retail input	Rationale
All users	<ul style="list-style-type: none"> • Takes into account all users who are currently active • Accurately mimics the full user base and allows pricing freedom • Requires adequate consideration of one-off costs when legacy users joined the user base; also, data may be difficult to source and interpret
New users	<ul style="list-style-type: none"> • Models all new subscribers over a set period • Easier to implement than taking into account 'all users' • Provides a more accurate representation of the competitive context (competition is for new users) • But past anti-competitive actions would go unpunished
Cohort(s)	<ul style="list-style-type: none"> • A number of vintages/cohorts are modelled. A 'cohort approach' refers to grouping and testing groups of users according to their time of joining • Mimics the pricing decisions: competition in each period is for the gross additions in that period • If retail prices and costs are stable, then a single cohort can be modelled

There is a direct interplay between this retail offer time dimension and the relevant period over which to run the ERT (discussed in Section 2.6). The decisions for these two aspects need to be considered in combination to ensure consistency.

Selecting all the SMP operator's users could be considered as backward-looking – it considers existing users but not necessarily future users (who may have different characteristics). Considering new users is a more forward-looking choice. Choosing a cohort approach is, however, more aligned with the EC Recommendation with regards to the relevant time period of the test. The EC recommends an ERT based on a dynamic multi-period analysis (as further discussed in Section 2.6).

The EC refers to the ERT being conducted on the retail price and not on the (blended) average revenue per user (ARPU), which seems to indicate a preference for conducting the test on new users. In practice, however, this may not be entirely possible as some data, such as take-up of add-on packages or out-of-bundle usage, may not be available for new users or even new packages. Further, conducting the test on prices instead of revenues may be misleading and lead to inappropriate results, as other revenue components (e.g. one-offs, out-of-bundles services) may not be accurately reflected/captured.

Proposed approach 4: It is proposed to run the ERT test on new users only. The proposal on whether to base the ERT on average/all subscribers, new joiners or on some type of cohort analysis and on whether to base it on a single (average) customer or on an aggregate has been taken in alignment with AEC regulatory objectives and the decisions taken on other methodological test parameters, such as the choice of time period over which to run the ERT.

2.3 Relevant wholesale inputs to be considered

In defining the upstream inputs to be used in the ERT, AEC needs to take decisions on both the most relevant wholesale access offer to select for the test and, if relevant, on the wholesale price levels to consider.

2.3.1 Wholesale products

In its market analyses, AEC has outlined that the SMP operators' NGA-based fixed broadband retail offers which must be subject to ERT are offered based on the following NGA-based wholesale fixed broadband access services:

- Fibre and potentially a mix of fibre and copper, i.e.
 - IP-level bitstream at central level
 - Ethernet-level local access point (VULA)
- HFC networks based on DOCSIS 3.0 technology, i.e.
 - IP-level bitstream at national level
 - local CMTS level²⁶.

The 2013 EC Recommendation sets out that the NRA should identify the most relevant regulated upstream inputs that are likely to be used by access seekers to offer equivalent retail offers to the chosen flagship products/bundles (referred to in Section 2.2.1) in the timeframe of the current market review period²⁷. This selection of most relevant upstream inputs needs to consider the current and expected wholesale offer take-up and the SMP operator's network roll-out plans and network topology. The EC notes that the dominant operator's network characteristics and the wholesale offer take-up might vary geographically. If this is the case, the NRA should assess the feasibility of performing the ERT by geographical area.

In (ex-post) precedents, margin squeeze tests were conducted for one wholesale input on each wholesale market on which an operator is dominant (including auxiliary wholesale services on the same market, e.g. co-location). In contrast, the guidance from the EC states that only the most

²⁶ AEC, *Third market analysis for "wholesale local access provided at a fixed location" and fourth market analysis of the "wholesale central access provided at a fixed location for consumer goods"*, May 2017

²⁷ 'COMMISSION RECOMMENDATION of 11.9.2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment', ANNEX II – Parameters of the ex ante economic replicability test, (iii).

relevant wholesale inputs should be tested, which can be interpreted as less of an administrative burden. In the case of dominance on both Markets 3a and 3b, as is the case in the Republic of Macedonia, this would mean that the ERT needs to be conducted (and passed) only in the market that is considered the most relevant and only on the wholesale service(s) that has or have been considered an essential input to the test. Wholesale products in other markets do not need to be included unless necessary (e.g. if they are essential to provide the service and cannot, in practice, be replicated by an (efficient) access seeker).

Proposed approach 5: Given market conditions, AEC will test all the relevant wholesale products. Therefore, the ERT model will have the capability to assess the NGA-based access upstream products outlined by AEC in its market analyses.

2.3.2 Wholesale prices

The price of the wholesale products used by the NRA should be the price that the SMP operators effectively charge the third-party access seekers for the relevant wholesale input. Given the obligations for non-discrimination on the SMP operators which AEC has put into place (see Section 1.2), these prices should be equivalent to the prices that the SMP operator charges to its own (hypothetical) retail arm²⁸.

The EC also states that NRAs should take due account of volume discounts and long-term pricing agreements between the SMP operators and the access seekers. This is required to “ensure the right balance [...] between incentivising efficient and flexible pricing strategies at the wholesale level and at the same time ensuring a sufficient margin for access seekers to maintain sustainable competition”²⁹.

The pricing structures that the SMP operators charge the access seekers in the Republic of Macedonia need to be reviewed and evaluated. If volume discounts are relevant, then the appropriate access seeker scale and corresponding (prospective) upstream product volumes need to be defined considering the competitive environment. Commitment time periods should reflect the length of the actual commitments made in the market if these arrangements allow for effective competition.

Proposed approach 6: The upstream input prices used in the ERT will reflect an access seeker scale that is appropriate for the local market and corresponding volume and time-period commitments.

²⁸ ‘COMMISSION RECOMMENDATION of 11.9.2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment’, ANNEX II – Parameters of the ex ante economic replicability test, (iii).

²⁹ Ibid.

2.4 Level of operator efficiency to be considered

There are typically two options for the operator efficiency level considered in testing the profitability of the relevant retail products:

- **Equally efficient operator ('EEO')**, where the assumption is that the downstream operations have the same efficiency level and scale of those of the operator that is dominant on the wholesale market
- **Reasonably efficient operator ('REO')**, which is, typically, expected to be less efficient and to have a smaller scale than the EEO, thus resulting in higher unit costs.

The EEO test aims to assess whether the downstream division of the dominant operator could make a profit if it had to pay the same input prices that the upstream division charges to access seekers for the provision of the essential inputs. In other words, the EEO test assesses whether a player that has the same cost structure as the downstream division of the SMP operator would be able to be profitable in the downstream market in light of both wholesale and retail prices set by the SMP operator.

The REO test assesses whether the retail and wholesale prices of the SMP operator are sufficient for a 'reasonably efficient' operator to make a 'normal' profit in the downstream market. The REO test involves an alternative operator operating in the downstream market whose services are based on essential inputs purchased from the upstream operations of the SMP operator. However, the REO is generally not able to achieve the same economies of scale and scope as the SMP operator, implying that it should have higher unit costs than an EEO.

The main difference between the two tests is therefore that the EEO test takes the downstream cost (non-essential input network costs and commercial costs) of the SMP operator as inputs, whereas the REO test uses the costs of (potentially theoretical) alternative operators.

In some cases, reference is also made to a hybrid operator type which has the same overall efficiency level as the EEO but a smaller scale, thus resulting in higher unit costs in an industry (such as telecoms) that is characterised by high economies of scale. This is sometimes referred to as the **similarly efficient operator (SEO)** test.

The key features of these approaches are summarised in Figure 2.6.

Figure 2.6: Key features of EEO, REO and SEO approaches [Source: Analysys Mason, 2018]

	EEO	REO or SEO
Definition	<ul style="list-style-type: none"> An assessment is made on whether the dominant operator's own downstream operations could trade profitably based on the upstream price charged by the upstream operating arm of the dominant company to the access seekers 	<ul style="list-style-type: none"> An assessment is made on whether a hypothetical reasonably or similarly efficient operator using wholesale inputs from the dominant operator can trade profitably REO is typically used, but some regulators³⁰ use SEO which is intended to be similarly efficient as EEO but on a lower scale
Benefits	<ul style="list-style-type: none"> Measures costs in an objective manner Requires only few assumptions on cost structure and the business model Makes information available to the dominant operator (and can also be made available to the NRA) Is widely accepted in legal proceedings³¹ Provides better incentives for investment by dominant operator 	<ul style="list-style-type: none"> Provides a more accurate reflection of the real challenges faced by new entrants, including lower economies of scale and scope in network operations due to a lack of national presence, a targeted market strategy or a less diversified product portfolio, and a higher cost of capital due to higher relative risk. Can be more suited to ex-ante tests if purpose is to promote competition
Disadvantages	<ul style="list-style-type: none"> May not be sufficient to remove barriers to entry or growth (particularly in immature markets where new entrants need to gain scale) 	<ul style="list-style-type: none"> Subjective Cannot be applied ex-post Requires a larger number of assumptions about network configuration and the business model Requires more complex data collection, and information is often not audited Definition of REO inevitably introduces subjectivity Potentially reduces the dominant operator's incentives for investment and innovation

The EEO approach is recognised as providing more incentives for the SMP operator to continue investing in NGA networks and NGA-based services. In avoiding adjustments for efficiency or scale it is also regarded as the most objective measure.

According to the EC, costs are to be estimated on the basis of the SMP operator's own downstream business (the EEO approach) using its own audited downstream costs (provided they are sufficiently

³⁰ Such as Ofcom and Agcom (Delibera n. 499/10/CONS).

³¹ For example Ofcom, European Court of Justice and EC (Decision on Case COMP/C-1/37.451, 37.578, 37.579 – Deutsche Telekom AG, 2003/707/EC, May 2003).

disaggregated), but may be adjusted for scale where “*market entry or expansion has been frustrated in the past*” and/or “*market conditions do not favour the acquisition of scale by alternative operators*”³². Therefore, the default option to use is the EEO test; the NRA needs to demonstrate the need for any adjustments. The EC is clear in its Recommendation that an EEO approach should be applied for the ERT³³. However, adjustments reflecting the actual capability of the alternative operators may be justified if these are needed to ensure that economic replicability is a realistic prospect and to promote effective competition. New players that may initially be less efficient would be given time to become more efficient in the long run. The position that the alternative operator occupies in the value chain would also be considered. This implies that the alternative operator makes rational choices based on its infrastructure level and efficiency, irrespective of the levels achieved by the SMP operators.

In addition to practical questions on how to adjust the EEO’s downstream costs to a hypothetical REO or SEO, the adjustment also introduces certain risks into the ERT, such as introducing a degree of subjectivity because of the required definition of reasonable efficiency or similar efficiency.

If based on existing operators, there is a risk of *de facto* protection of (possibly) inefficient actual competitors. On the other hand, the assumption that dominant, often incumbent, operators have a higher efficiency due to economies of scale than large alternative operators may not necessarily be true. These alternative operators are typically leaner than an incumbent and have more modern and geographically focused networks which they may be able to expand in a more efficient way.

Further, in the Macedonian context there are two SMP operators with significant and broadly comparable market share of retail broadband subscribers (respectively approx. 40% for Makedonski Telekom and approx. 30% for ONE.VIP), and then the EEO appears as a reasonable approach.

Proposed approach 7: Following the EC Recommendation, the EEO approach will be applied as the default operator efficiency level.

2.5 Relevant downstream cost standard

This section outlines the possible approaches for calculating the downstream costs to be included in the ERT and the EC related guidance. It then goes on to discuss the implications of the EC Recommendation for the practical implementation of the ERT.

2.5.1 Possible cost standard approaches

Two approaches to calculate downstream costs for the purposes of the ERT can generally be considered:

³² ‘COMMISSION RECOMMENDATION of 11.9.2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment’, ANNEX II – Parameters of the ex ante economic replicability test, (i).

³³ Since in Macedonia there is a joint dominance, two EEOs are likely to have to be defined.

- an accounting approach, known as the fully allocated (or distributed) cost ('FAC') method, which uses the accounts of the company
- an economic approach, implemented by e.g. using the long run incremental cost ('LRIC') method³⁴, which uses the cost of a single service.

For each approach different ways of measuring costs can be employed. Both LRIC and FAC identify the cost of services and their causes. The main difference lies in the definition of increments and the allocation of common costs. Figure 2.7 provides a summary of both approaches.

Figure 2.7: Key features of FAC and LRIC approaches [Source: Analysys Mason, 2018]

	FAC	LRIC
Definition	<ul style="list-style-type: none"> • Uses financial accounts • Implies a top-down costing method where all costs incurred are attributed to services based on their component activities 	<ul style="list-style-type: none"> • Uses the (unit) cost of one service • Measures incrementally, i.e. considers the cost to procure or produce one more unit • Refers to the service-specific costs associated with the output volume of that service
Methodology	<ul style="list-style-type: none"> • Can be undertaken using historical or current audited costs • Allocates costs that are both directly and indirectly attributed to services using various measures (activity-based costing ('ABC'), samples and surveys, revenue or price-proportional mark-ups) • Services comprise a series of activities, each of which use resources and therefore contributes to costs • Identifies cause of costs ('cost drivers') by mapping and allocating inputs, outputs and costs onto each activity 	<ul style="list-style-type: none"> • Is calculated as difference between the total cost when producing all services, and the total cost when the output volume of the examined service is zero (while keeping all other output volumes fixed) • Measures those costs caused directly by the production of the examined service • Takes into account only the incremental costs directly attributable to a service, i.e. not shared or common costs.
Treatment of common costs	<ul style="list-style-type: none"> • Common costs are shared between the upstream and the downstream divisions • Accounting separation is useful to split common costs between individual divisions 	<ul style="list-style-type: none"> • Common costs are allocated using a mark-up (then getting to the so-called 'LRIC+' measure)

³⁴ It should be noted that 'LRIC' is a broad concept. Over time, several other concepts have been associated with LRIC in ex-ante cost-oriented regulation. These include adjustments to current cost accounting or modern equivalent assets, forward-looking dimensioning, efficiency adjustments, and different amortisation methodologies such as economic depreciation or tilted annuities. In an ERT downstream cost context, however, it is not necessarily the case that all these associations are appropriate.

	FAC	LRIC
	<ul style="list-style-type: none"> • However, level of separation often not sufficient for common, retail and non-regulated network costs³⁵ 	
Benefits	<ul style="list-style-type: none"> • Based on real data and can be audited using objective criteria • Costs are fully recovered, i.e. total cost of services in any given year can be reconciled with the total operating costs, depreciation and the cost of capital incurred that year • Could be more suitable in a mature market 	<ul style="list-style-type: none"> • Overcomes the problem of attributing common costs to different services • Could produce more reasonable results when the market presents strong growth

The 2013 EC Recommendation provides the following guidance on the relevant standard for the downstream costs³⁶:

“The incremental cost of providing the relevant downstream service is the appropriate standard. A LRIC+ model should be used to calculate the incremental cost (including sunk costs) and to add a mark-up for common costs related to the downstream activities.”

AEC deems appropriate to be consistent with the methodology proposed in the 2013 EC Recommendation.

Proposed approach 8: The LRIC(+) method will be used to run the ERT.

2.5.2 Practical considerations in applying the EC Recommendation

The key downstream cost elements (non-essential input network costs and commercial costs) that may be relevant for the ERT include:

- multi-service access nodes (MSANs)/switches in local exchanges
- backhaul, aggregation and core network
- service platforms appropriate to the retail product, e.g. broadband remote access server (BRAS), IPTV and Voice over IP (VoIP) platforms, information management system (IMS)
- content costs (TV content)
- promotions (see Section 2.2.1 above)
- customer-premises equipment (CPE)
- subscriber acquisition and retention costs

³⁵ Cost assessment must cover the involved retail activities but also the network activities that are not an essential upstream input. The alternative operator could decide to either outsource the latter (not necessarily from the SMP operator) or perform these activities in-house.

³⁶ ‘COMMISSION RECOMMENDATION of 11.9.2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment’, ANNEX II – Parameters of the ex-ante economic replicability test, (ii).

- personnel costs
- marketing costs
- sales network costs
- billing and collection costs
- general and administration costs
- customer care costs
- bad debt.

As explained in Section 2.4 above, the EEO approach relies on the use of the SMP operators' own downstream costs and the EC states these should be based on the audited accounts of the operator³⁷. However, operators' accounts are rarely sufficiently disaggregated to be used as direct inputs into an ERT model. Therefore, a top-down cost allocation methodology generally needs to be used for some of the downstream costs³⁸. The REO and SEO approaches may also rely heavily on these cost account inputs, although they may in those cases need to be complemented with *ad hoc* bottom-up models³⁹ or estimates as actual data may not be available.

For the LRIC approach, it will be necessary to identify those costs that are incremental (or specific to produce the examined product) and those that are not. The EC states that a 'reasonable' percentage of common costs should be included in the downstream costs in addition to the incremental costs (LRIC+)⁴⁰.

The definition of the 'reasonable' share of common costs to be included, and the fact that there is no formula for establishing the reasonable share, is likely to become a key consideration for the ERT and should ensure that:

- The SMP operator has sufficient pricing flexibility and can choose from which products to recover common costs according to typical unregulated retail pricing logic. It is economically rational to recover fewer (than i.e. an equi-proportionate mark-up, EPMU, would imply) common costs from products subject to the most demand elasticity⁴¹. Flagship products typically represent such products as they are the products where competition is the most intense.

³⁷ 'COMMISSION RECOMMENDATION of 11.9.2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment', ANNEX II – Parameters of the ex-ante economic replicability test, (i).

³⁸ A Copenhagen Economics study on applied margin squeeze confirms that some NRAs have taken this approach. See https://eng.nkom.no/market/market-regulation-smp/financial-regulation/margin-squeeze/_attachment/3391?_ts=13a405f63fb.

³⁹ It should be noted, however, that a large share (typically the majority) of the downstream costs in an ERT context (such as TV content and subscriber acquisition costs) will be variable (direct/fully incremental) costs for which bottom-up models are rarely necessary.

⁴⁰ 'COMMISSION RECOMMENDATION of 11.9.2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment', recital 64

⁴¹ This is sometimes referred to as 'Ramsey pricing'.

- The ERT does not allow the SMP operator to abuse its market position by setting wholesale prices at a level relative to its retail prices that does not allow access seekers to compete.

The definition of the reasonable share is also closely tied to the level of retail product aggregation. The more granular the test is, the more costs can be considered common as the increment becomes smaller.

Proposed approach 9: The level of aggregation used to run the ERT will be consistent with that of the retail offer dimension.

2.6 Model time period considerations

This section outlines the options for the time period over which to assess a product profitability, the EC related guidance as well as the implications of the EC Recommendation for the practical implementation of the ERT.

2.6.1 Methodological options

The launch of a retail product in the downstream market can be considered as an investment undertaken by the operator. For the investment to be considered profitable, total revenues generated must exceed all incurred costs. To evaluate the investment profitability, other parameters (notably time and risk) should be considered in addition to estimates of investment's costs and revenue. To evaluate the profitability of a retail product subject to an ERT, a range of techniques and methods are available. In particular, two methods need to be considered:

- the **discounted cashflow** (DCF) method, which is based on expected cashflows over the investment lifetime
- the **period-by-period** (PbP) method, which considers the product revenues and costs in a single time period⁴².

The DCF method

The value calculated through the DCF approach is a function of three variables⁴³:

- cashflows generated by the investment
- the time horizon in which these cashflows are generated
- the associated risk.

⁴² These two methods were also examined by AEC in its legacy document about price-squeeze tests (in this document, DCF was referred to as the 'dynamic method' and PbP was referred to as the 'static method'). See AEC, 'Instructions for establishing prices for squeezing the competition from the electronic communication services market in the Republic of Macedonia', October 2009, par. 39–41.

⁴³ Aswath Damodaran, *Investment valuation*, Wiley Finance, 2002.

The DCF method puts together these three variables, calculating the value of an activity as the present value of its expected future cashflows according the following formula:

$$NPV = \sum_{t=0}^n \frac{FC_t}{(1+r)^t}$$

Where:

- NPV = *net present value*, i.e. the present (or discounted) net value of the expected cashflows
- n = activity lifetime
- FC_t = net cashflow in the period t
- t = index representing the considered period to estimate the present value of cashflow FC_t
- r = discount factor reflecting the risk of the estimated cashflow (usually using the WACC).

A model based on expected cashflows requires estimates to be used, which requires the formulation of hypotheses about the evolution of revenues and costs of the activity.

In addition, a DCF evaluation usually includes a *terminal value* (V_T) which considers that the examined activity can have a value at the end of the analysis period. This is required to reflect that the number of periods for which detailed cashflow estimates are made must be limited and that at the end of the investment lifetime some assets may still have a value, even if they are no longer used for that investment (a so-called *scrap value*). By isolating the terminal value, the DCF formula becomes:

$$NPV = \sum_{t=0}^T \frac{FC_t}{(1+WACC)^t} + \frac{V_T}{(1+WACC)^T}$$

where T represents the investment time horizon for which detailed cashflow estimates are made (thus $T < n$).

EBITDA⁴⁴ from a profit and loss account minus the capital expenditure (capex) of the investment is often used as a proxy to estimate the net cashflows (FCs) for a DCF.

The PbP method

A PbP analysis evaluates the offer using an approach which is more accounting-based than the financial approach of the DCF method. For a PbP analysis, profit and loss account items (i.e. revenues, costs and depreciation) are used instead of cashflows. Results are produced separately for a single period. Figures

⁴⁴ Earnings before interest, taxes, depreciation, and amortisation. EBITDA reflects operating expenses (opex) and revenue (assuming there is no significant discrepancy between revenue recognition/cost occurrence and cash movement).

that are forecast for a future period are not discounted and investments are amortised along the considered assets lifetimes.

The (accounts-based) EBITDA of the activity can also be used for a PbP analysis. The capex of the activity is considered by deducting from the EBITDA the asset's depreciation (which allocates a share of the capex to the examined period through a defined allocation method) and a capital charge to reflect the cost of capital in the examined period. The period length considered is usually one year but could be shorter (e.g. a quarter or single month).

Method comparison: DCF vs. PbP

As explained above, the two methods address cost recovery over time in a different manner. Figure 2.8 below illustrates the key methodological difference between the two methods.

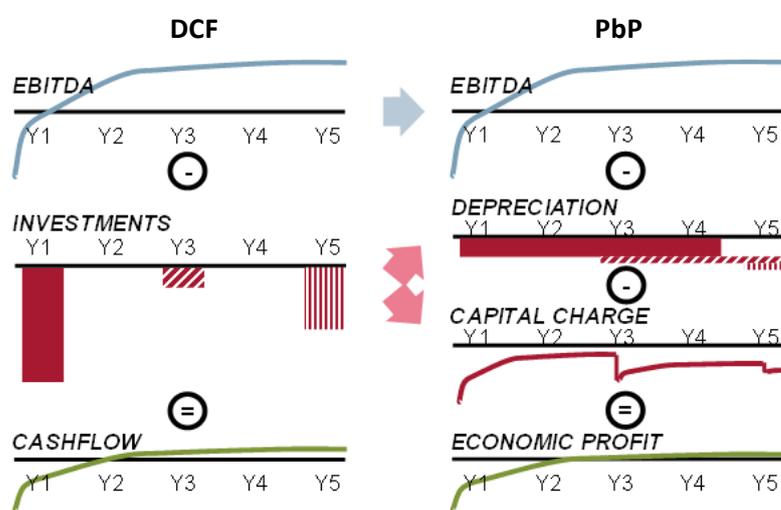


Figure 2.8: Calculation differences between DCF and PbP methods
[Source: Analysys Mason, 2018]

A DCF approach examines profitability over a reasonably long horizon (usually a number of years, thus with a more dynamic view). A PbP approach examines a single period by considering some of the costs as expenses (in the year in which they are incurred) and other costs as capitalised costs (allocated over a number of periods, usually using straight-line depreciation). A DCF approach does not specify how and when these capitalised costs are recovered (i.e. in which single sub-periods). Profitability of the activity is assessed based on the NPV of all future expected cashflows over the whole investment period. If the NPV is positive, then the activity creates value (i.e. it is profitable) for the operator.

Both methodologies can be used for backward-looking and forward-looking tests. Figure 2.9 below summarises the features of the two approaches.

Figure 2.9: Comparison of approaches for test time period consideration [Source: Analysys Mason, 2018]

	DCF	PbP
Logic	<ul style="list-style-type: none"> Financial Simulation of an investment decision 	<ul style="list-style-type: none"> Economic/accounting Simulation of a profit and loss account
Investment treatment	<ul style="list-style-type: none"> As cashflows 	<ul style="list-style-type: none"> Depreciated along the underlying asset lifetime
Time value of money	<ul style="list-style-type: none"> Considered through WACC Discount of expected future cashflows 	<ul style="list-style-type: none"> Not explicitly considered (no actualisation)
Time period	<ul style="list-style-type: none"> Financial A single, defined period A timeframe similar to an operator's typical investment period 	<ul style="list-style-type: none"> Economic/accounting Single periods Often accounting periods or the period for which the data has been collected Variable lengths: year by year or month by month
Output	<ul style="list-style-type: none"> One single value (NPV) 	<ul style="list-style-type: none"> One value for every considered period
Potential issues	<ul style="list-style-type: none"> Expected cashflow estimate needed (especially long term) Cost of capital estimate needed Terminal value estimate needed 	<ul style="list-style-type: none"> Misleading about economic value creation (short-sighted approach) Constant cost recovery over time for capitalised costs (even for different asset usage over time)
Best for	<ul style="list-style-type: none"> Growth/dynamic markets 	<ul style="list-style-type: none"> Stable markets

The DCF approach provides a better framework for investment decisions. The DCF result is sensitive to the time period considered.

The PbP approach is more straightforward as a concept and does not require any terminal value adjustments. A PbP test can easily be expressed as a result per average user month which is informative to understand the wholesale price ceiling. The PbP approach is, however, less suitable to model initial one-off costs needed to commence an activity. In growing markets with significant variations of demand, PbP can introduce distortions. This is because investment recovery is often allocated equally to each period of the asset lifetime, while the actual utilisation of the asset could be lower during the first years of its service life. In this case it would be more appropriate to recover different portions of capitalised costs over time. Using an economic depreciation method instead of a straight-line depreciation would better reflect the asset utilisation in the examined period. But such an economic depreciation is more complex and needs an estimation of the demand take-up curve.

2.6.2 Practical considerations in applying the EC Recommendation

The EC recommends that the ERT should evaluate the retail products based on a ‘dynamic multi-period analysis’, i.e. the DCF approach⁴⁵. The time horizon over which this evaluation is carried out should be based on estimated average customer lifetimes (which is a relatively short horizon). The EC also specifies that downstream costs for shared assets (for example, the core network or platforms) shall be included in the DCF test on an annualised basis.

In practice, it can be difficult to estimate the average customer lifetime as consideration should be given to issues such as product maturity and migration between products. Also, setting the test period equal to the average subscriber lifetime at a given point in time (without other adjustments) would mean that investments for the acquisition of later subscriber cohorts are included in the DCF test but that (part of) the recovery of these investments (future margins) is excluded. As such the test would be punitive towards the SMP operator unless the time period is long enough to capture the benefits expected by the investments of such later subscribers explicitly, or unless terminal values are included.⁴⁶

Alternatively, a single- (average-) user or cohort DCF over the lifetime of that specific user (cohort) can be calculated and annualised costs for assets which have a longer lifetime than the time period tested can be used. Subscriber-specific investments, such as subscriber acquisition costs or wholesale activation fees, would be treated as investments that are annualised over the lifetime of the cohort. This is consistent with the EC Recommendation:

“Such average customer lifetime would be the period of time over which the customer contributes to the recovery of the (a) downstream costs that are annualised according to a depreciation method that is appropriate to the asset in question and the economic lifetime of the corresponding assets required for the retail operations (including network costs that are not included in the wholesale NGA access service) and (b) other downstream costs that are normally not annualised (typically the subscriber acquisition costs) and which the operator incurs to gain customers and should seek to recover over the latter’s average lifetime”⁴⁷.

Because of the short time horizon over which the test is to be conducted and because shared assets are to be annualised, the DCF and the PbP approach should yield similar results (if conducted correctly and over the same period).

⁴⁵ ‘COMMISSION RECOMMENDATION of 11.9.2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment’, ANNEX II – Parameters of the ex ante economic replicability test, (v).

⁴⁶ See e.g. Section 3.2 in the Wanadoo vs. Telefónica case decision of the DG COMP (Case COMP/38.784).

⁴⁷ ‘COMMISSION RECOMMENDATION of 11.9.2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment’, ANNEX II – Parameters of the ex ante economic replicability test, (v).

Proposed approach 10: The ERT will use the DCF approach as default method.

3 Cost of capital methodology

The ERT model will require definition of a reasonable return on capital employed by the relevant operator. This return on capital required is generally measured by the weighted average cost of capital ('WACC'). This section explains the overall concept for the calculation of the WACC and proposes approaches for the specification of its elements for the purpose of this project; whenever possible, we have maintained a similar approach vs. the one used for the calculation of WACC in previous AEC decisions⁴⁸.

3.1 WACC

The capital employed is generally composed of equity and debt. The cost of capital borne by the operator should fairly remunerate both shareholders and lenders through the application of the WACC. The generic formula for the WACC is:

$$WACC_{post-tax} = C_d \times \frac{D}{D + E} + C_e \times \frac{E}{D + E}$$

where:

- C_d is the cost of debt
- C_e is the pre-tax cost of equity
- D is the value of the operator's debt
- E is the value of the operator's equity.

Estimation of the WACC used in the ERT model is generally a key task affecting the model results.

The initial question to address is which operator's WACC should be applied in the context of this project. The ERT model is to be applied to test the NGA-based wholesale services supplied by the two Macedonian operators that have been designated as SMP operators in the relevant markets, i.e. Makedonski Telekom and ONE.VIP. If the operator efficiency level recommended by the EC, namely EEO⁴⁹, can be applied, then the relevant WACCs of Makedonski Telekom and ONE.VIP are applicable. If deviation from the EEO approach is deemed appropriate (the REO or SEO approach), then consideration should be given to an adjustment of the WACCs of the SMP operators to better reflect the WACC of a suitably defined hypothetical competitor.

⁴⁸ E.g. in the context of the free-to-air digital terrestrial transmission service cost model development, see Analysys Mason, *Final report for cost-based model for broadcasting free to air services on the DTT platform and associated WACC for AEC*

http://signal.aek.mk/index.php?option=com_k2&view=item&id=1885:final-report-for-cost-based-model&Itemid=469&lang=en

⁴⁹ As discussed in Section 2.4.

Makedonski Telekom and ONE.VIP are fixed and mobile operators. Strictly speaking, the WACCs that are relevant for the ERT are the WACCs that apply to their fixed line businesses. The WACCs used by AEC for the cost modelling of the SMP operators' other regulated fixed wholesale services may be suitable in case these reflect the cost of capital of the whole (integrated) fixed business and not a (lower) wholesale-only WACC. In this case, a (higher) de-averaged WACC needs to be used for the ERTs.

Proposed approach 11: The cost of capital will be calculated for the SMP operators that are subject to the ERT, based on the weighted average of the cost of debt and the cost of equity ('WACC').

3.2 Cost of equity

It is considered best practice to estimate the cost of equity with the capital asset pricing model (CAPM). The Independent Regulators Group (IRG) has acknowledged that the use of the CAPM is supported by its relatively simple implementation and by its wide use among regulators and practitioners⁵⁰.

According to the CAPM, the cost of equity C_e is calculated as follows:

$$C_e = R_f + \beta \times R_e$$

where:

- R_f is the risk-free rate of return
- R_e is the equity risk premium
- β is a measure of how risky a particular company or sector is relative to the national economy as a whole.

Proposed approach 12: The cost of equity is calculated using the CAPM.

3.2.1 Risk-free rate

The risk-free rate of return is the return expected on a risk-free asset, i.e. an asset that carries zero risk. The risk-free rate is conventionally approximated by the expected return on government bonds with a long (e.g. 10- or 15-year) maturity, as they are likely to carry the lowest default risk in a given market and are therefore the best proxy for a risk-free asset.

The ERT is expected to be calculated in Macedonian dinar terms (MKD). Therefore, MKD denominated bonds issued by the Government of the Republic of Macedonia are suitable indicators of the risk-free rate. This could either be based on the yields of recent bond issues with a 10- or 15-

⁵⁰ IRG, *Regulatory accounting: Principles of implementation and best practice for WACC calculation*, February 2007.

year maturity or the average yield on 10- or 15-year bonds issued by the Macedonian authorities over a number of years⁵¹.

Proposed approach 13: The risk-free rate of return will be based on the yield of long-term maturity Macedonian Government bonds issued in MKD.

3.2.2 Beta coefficient

Beta (β) is a statistical measure of the sensitivity of the returns of an asset's equity in relation to the return from a fully diversified equity index. For example, if the beta coefficient is greater than one, this implies that the company's equity returns are more volatile (hence riskier) than the market returns. The theory compares the returns from the asset with the returns from the equity market with the view that equity investors can diversify their risks by investing equally in the full range of the assets available in the market. By holding such a market portfolio, the investors would receive the average return of the market.

For an actual beta coefficient to be derived for an operator, the operator would need to be listed on a stock exchange. Makedonski Telekom is listed on the Macedonian Stock Exchange. ONE.VIP, owned by Telekom Austria Group and Telekom Slovenije Group, is not listed on a stock exchange. Therefore, it is not possible to derive an actual beta coefficient for this operator.

A possible range of beta values based on benchmarks of similar companies is, therefore, likely to be required for this project. When benchmarking the beta coefficient, it is important to note that the value of the equity beta (i.e. the beta required by the CAPM calculation) will not only reflect the operational risk, but also the financial risk. The equity beta of the benchmark company can be adjusted based on the gearing to remove the financial risk and to give an asset beta (which only reflects operational risk) according to the following formula:

$$\beta_{equity} = \beta_{assets} \times (1 + (D/E))$$

The asset beta is therefore more likely to present a fair benchmark. This is a company-specific parameter whose value can be benchmarked with that of comparable operators in other countries.

Proposed approach 14: The beta value will be estimated based on available information and through benchmarks.

3.2.3 Equity risk premium

Equity risk premium is the increase over the risk-free rate of return that investors demand for providing equity financing. As it is riskier to invest in stocks (equity) than to invest in risk-free

⁵¹ To be sourced from the Republic of Macedonia Ministry of Finance on <https://www.finance.gov.mk/en/node/744>.

government bonds, investors demand a risk premium. Often, companies listed on the national stock market are taken as the sample over which this average is calculated.

The IRG recommends⁵² a balanced approach considering the relevance and quality of available information, using one or more of the following methods: (adjusted) historical premium, survey premium, benchmarking, or implied premium (ex-ante approaches based on, for example, the dividend growth model).

The market risk premium of the Macedonian stock market will be considered and benchmarked against the value of risk premiums in comparable international equity markets if required.

Proposed approach 15: The risk premium will be estimated based on available information and through benchmarks.

3.2.4 Gearing level

The gearing level describes the financing structure of an organisation. It identifies the debt capital as a proportion of the total financing needs of a company. Gearing is typically expressed in percentage terms and is defined as:

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

Gearing represents a parameter that can be estimated based on available financial information of the respective operator. In the absence of available or existing financial data, benchmarking against the capital structure of comparable operators across Europe may be required.

Proposed approach 16: The gearing level will be estimated based on available information and through benchmarks.

3.3 Cost of debt

The cost of debt (C_d) is calculated to reflect the applicable corporate bond yields of the relevant operator, represented by this formula:

$$C_d = (1 - t) \times (R_f + R_d)$$

where:

- R_f is the risk-free rate
- R_d is the company's debt premium

⁵² IRG, *Regulatory accounting: Principles of implementation and best practice for WACC calculation*, February 2007.

- t is the corporate tax rate.

3.3.1 Risk-free rate and debt premium

The risk-free rate calculated for the cost of equity (see Section 3.2.1 above) will also be used for the risk-free rate underlying the cost of debt.

Debt premium is defined as the company-specific risk premium for corporate debt above the risk-free rate and can be derived from an operator's financial information. If the required financial information is not available, the relevant operator's risk premium will be estimated based on a benchmark of debt premium values of comparable operators across Europe.

Proposed approach 17: The operator-specific debt premium will be determined based on available information or estimated through benchmarks.

3.3.2 Tax rate

The corporate profit tax rate applied in Macedonia is 10%⁵³. This is the relevant rate to be applied in the ERT calculations.

Proposed approach 18: The model will use the current corporate tax rate in the Republic of Macedonia of 10%.

3.4 Pre- and post-tax WACC

The ERT model will work in pre-tax terms, i.e. the corporate tax liabilities of the relevant operator are not included in the considered costs. Therefore, the calculated post-tax WACC must be translated into a corresponding pre-tax WACC. The relation between pre- and post-tax WACC is represented by the following formula:

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

A benchmark sample of the WACC of operators comparable to the calculated WACC for the purposes of the ERT is likely to prove useful to ensure a reasonable calculated value. The choice of the operator benchmarks for the sample needs to be carefully undertaken, as the degree of similarity can be evaluated from several points of view (e.g. operations in place, years from launch, market share, reference market).

⁵³ See <http://www.ujp.gov.mk/en/plakjanje/category/21>.

Proposed approach 19: The WACC will be expressed in nominal, pre-tax terms. If required, its value will be cross-checked against a benchmark of comparable operators.

Annex A List of acronyms and abbreviations used

Figure A.1 below lists the acronyms and abbreviations used in this report.

Figure A.1: List of acronyms and abbreviations used [Source: Analysys Mason, 2018]

Acronym	Meaning
ABC	Activity-based costing
AEC	Agency for Electronic Communications of the Republic of Macedonia
ARPU	Average revenue per user
BEREC	Body of European Regulators for Electronic Communications (formerly ERG)
BRAS	Broadband remote access server
Capex	Capital expenditure
CAPM	Capital asset pricing model
CATV	Cable TV
CMTS	Cable modem termination system
CPE	Customer-premises equipment
DCF	Discounted cashflow (approach)
DG COMP	Directorate General for Competition
DOCSIS	Data over cable service interface specification
EBITDA	Earnings before interest, taxes, depreciation, and amortisation
EC	European Commission
EEO	Equally efficient operator
EOI	Equivalence of inputs
EPMU	Equi-proportionate mark-up
ERG	European Regulators Group (now BEREC)
ERT	Economic replicability test
FAC	Fully allocated cost
HFC	Hybrid fibre coaxial
IMS	Information management system
IP	Internet protocol
IPTV	Internet protocol television
IRG	Independent Regulators Group
LRIC	Long-run incremental cost
MKD	Macedonian dinar
NGA	Next-generation access
NPV	Net present value
NRA	National regulatory authority
OLO	Other licensed operator
Opex	Operating expenditure
PbP	Period by period (approach)

Acronym	Meaning
REO	Reasonably efficient operator
SEO	Similarly efficient operator
SMP	Significant market power
VULA	Virtual unbundled local access
VoIP	Voice over IP
WACC	Weighted average cost of capital

