An Coimisiún um
Rialáil Cumarsáide
Commission for
Communications Regulation

Price Consultation

Further Specification of Proposed Price Control Obligations for Fixed and Mobile Call Termination Rates

Consultation and Draft Decisions

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Responses to Consultation

All responses to this consultation should be clearly marked-

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Chapter 1

1 Introduction

1.1 This consultation and draft decisions document ('**this Consultation'**) sets out ComReg's preliminary views on proposed future maximum call termination rates for fixed service providers ('**FSPs**') and mobile service providers ('**MSPs**') found to have significant market power ('**SMP**') in their respective call termination markets.

1.2 Service providers of fixed and mobile telephone networks ('**Service Providers**') in Ireland connect calls to and from their subscribers. They charge their subscribers at a retail level for calls made to subscribers on their and other networks. They also charge other telecommunications operators at a wholesale level for connecting calls to their subscribers. These charges are called fixed termination rates ('**FTRs'**) and mobile termination rates ('**MTRs'**) depending on whether the subscribers being called are on fixed or mobile networks. In this consultation, where appropriate, FTRs and MTRs are collectively referred to as '**Termination Rates'**.

1.3 ComReg has published a market review consultation[1] (the '**Market Review Consultation**') on its analysis of the wholesale markets for the provision of fixed voice call termination ('**FVCT**') and mobile voice call termination ('**MVCT**'). The purpose of the market review is to determine whether such markets are effectively competitive and, if not, what specific regulatory obligations should be imposed. Interested readers may wish to familiarise themselves with some or all of the content of the Market Review Consultation. This Consultation sets out the detailed nature and implementation of the price control obligations which ComReg proposes to impose on Service Providers found to have SMP as a result of the Market Review Consultation and any subsequent decision. If, after considering this Consultation, respondents wish to comment further on the Market Review Consultation with specific regard to the proposed price control obligation of cost orientation[2], they are invited to do so by responding to question 17 in this Consultation.

[1] ComReg Document 17/90r, "Market Review – Fixed Voice Call Termination and Mobile Voice Call Termination", Consultation and Draft Decisions, 27/10/2017.
[2] The price control obligation is discussed in detail in paragraphs 8.98 to 8.125 and 8.198 to 8.201 in the case of FVCT and paragraphs 8.258 to 8.274 in the case of MVCT of the Market Review Consultation.

1.4 This Consultation examines and consults on specific cost orientation pricing methodologies having regard to ComReg's objectives to, *inter alia*, promote efficiency, sustainable competition and maximise consumer benefits. In terms of consumer benefits, cost based termination rates (on the assumption they are passed through into retail prices) lower the cost to subscribers on one network of making calls to subscribers on other networks. This, in turn, should encourage increased competition amongst Service Providers. Setting termination rates at cost also promotes efficiency, as it encourages the efficient consumption of call services by enabling retail call prices to reflect underlying costs (which would not likely be the case where excessive termination charges are levied). These issues are assessed, further to specific methodologies, later in this document.

1.5 Currently FSPs and MSPs previously found to have SMP in their respective call termination markets are subject to regulation on the maximum FTRs and MTRs they can charge. Details on those FSPs and MSPs are provided in Chapter 3.

1.6 ComReg previously consulted on FTRs and MTRs in 2012[3] ('the **2012 Pricing Consultation'**) and thereafter issued the 2012 Pricing Decision ('the **2012 Pricing Decision**')[4]. In that decision termination charges were to be based on pure long run incremental cost[5] ('**LRIC**') developed on a bottom up ('**BU**') basis consistent with EU Commission recommended practice, this approach being known as "pure BU LRIC". Specifically, in regard to recommended practice, the European Commission in 2009 had issued a recommendation, The Regulatory Treatment of Fixed and Mobile Termination Rates in the EU[6] (the '**2009 Termination Rates Recommendation'**).

[3] ComReg Document 12/67, "Voice Termination Rates in Ireland – Proposed Price Control for Fixed and Mobile Termination Rates", Consultation and Draft Decisions, 28/06/2012, ('the **2012 Pricing Consultation'**), https://www.comreg.ie/csv/downloads/ComReg1267.pdf

[4] ComReg Decision D12/12, Document 12/125, "Mobile and Fixed Voice Call Termination Rates in Ireland", 21/11/2012,('the **2012 Pricing Decision**'), https://www.comreg.ie/csv/downloads/ComReg12125.pdf

[5] The approach favoured by the European Commission is referred to as a "**pure LRIC**" approach i.e. it includes all fixed and variable costs associated with the provision of the wholesale termination service and excludes common costs that would be incurred regardless of whether this service is provided or not.

[6] European Commission Recommendation: "*The Regulatory Treatment of Fixed and Mobile Termination Rates in the EU (2009/396/EC)*"; dated 7 May 2009 (the '**2009 Termination Rates Recommendation**').

1.7 In the 2012 Pricing Decision, maximum FTRs were determined by means of a bottom up long run incremental cost model[7]. MTRs were, in the absence of the requisite cost model at that time, to be based on a benchmark derived from EU Member States in which NRAs had already adopted BU pure LRIC models. However on 18 December 2012, Vodafone Ireland Limited ("Vodafone") appealed elements of the 2012 Pricing Decision to the High Court. Vodafone were successful in part of their appeal and as a result any obligation arising from benchmarking rates derived from EU Member States sought to be imposed under the 2012 Pricing Decision were set aside by the Court.

1.8 Subsequently, ComReg further consulted on proposed regulated maximum MTRs using a BU LRIC model in 2014[8] and 2015[9]. A final decision on regulated maximum MTRs was issued in February 2016[10] ('the **2016 MTR Decision')**, based on a BU pure LRIC model.

1.9 The BU LRIC models that were built to set the current regulated maximum FTRs and MTRs used network traffic levels and forecasts, equipment costs, and technology available at the time of consultation as inputs for the models. Over time network usage and equipment costs can change e.g. data volumes have grown substantially compared to voice in recent years. There has also been technological change e.g. the use of 4G in mobile networks for faster data transmission. ComReg has updated the existing cost models for determining the maximum regulated Termination Rates as part of the current pricing consultation process. ComReg used information provided by Service Providers for the purpose of ComReg's Quarterly Key Data Report ('**QKDR**'). ComReg also obtained additional up to date data on costs, network traffic levels and forecasts from FSPs and MSPs through detailed Statutory Information Requests[11] ('**SIRs**'). Thus the BU LRIC models used in this Consultation take into account changes in technology and usage since the previous consultations.

1.10 The structure of this Consultation Document is as follows:

- Chapter 2 is an executive summary.

[7] Section 4.2 of this consultation document provide an explanation of bottom up incremental cost models.
[8] ComReg Document 14/29, "Mobile Termination Rates: Draft Bottom Up Pure Long Run Incremental Cost Model", Consultation and Draft Decision, 11/04/2014, https://www.comreg.ie/csv/downloads/ComReg1429.pdf
[9] ComReg Document 15/19, "Mobile Termination Rates: Draft Bottom Up Pure Long Run Incremental Cost Model", Supplementary Consultation, 26/02/2015, https://www.comreg.ie/csv/downloads/ComReg1519.pdf
[10] ComReg Decision D02/16, Document 16/09,"Mobile Termination Rates: Response to Consultation 14/29 and Supplementary Consultation 15/19 and Decision Document", 12/2/2016, ('the **2016 MTR Decision'**), https://www.comreg.ie/csv/downloads/ComReg1609.pdf
[11] ComReg may issue information requests to Service Providers pursuant to its powers under section 13D(1) of the Communications Regulation Act 2002 (as amended).

- Chapter 3 provides the background to this Consultation.
- Chapter 4 sets out ComReg's views on the implementation of a price control obligation of cost orientation.
- Chapter 5 details the cost modelling that was used to calculate the proposed Termination Rates.
- Chapter 6 contains the regulatory impact assessment ('**RIA**').
- Chapter 7 sets out the next steps in this consultation process.
- Annex 1 contains the draft Decision Instrument in relation to FTRs.
- Annex 2 contains the draft Decision Instrument in relation to MTRs.

Chapter 2

2 Executive Summary

ComReg's proposed further specification of price control obligations of cost orientation for FVCT and MVCT markets

2.1 This Consultation is being carried out in conjunction with a Market Review of the FVCT and MVCT markets. This Consultation is concerned with the further specification of the cost orientation obligation as proposed in the Market Review Consultation. A price control obligation of cost orientation may be imposed under Regulation 13 of the Access Regulations[12]. Under Regulation 13 ComReg needs to ensure that any cost recovery or pricing methodology that it imposes serves to promote efficiency and sustainable competition and to maximise consumer benefits. In addition, ComReg has to take into account relevant investments made by operators and allow a reasonable rate of return taking into account any risks involved specific to a particular new investment project. This document, together with associated documents[13], form the basis of a consultation on how cost orientation may best be implemented and what cost methodology is most appropriate. Having come to the provisional view that the BU pure LRIC approach is most appropriate the document also considers the precise parameters of the draft BU pure LRIC models. Finally the paper proposes, based on these models, maximum FTRs and MTRs that would apply to FSPs and MSPs found to have SMP in their respective markets.

2.2 The European Commission issued the 2009 Termination Rates Recommendation to National Regulatory Authorities ('**NRAs**') across Europe with the aim of avoiding competitive distortions and to ensure a common EU approach to regulating these wholesale charges between networks. The 2009 Termination Rates Recommendation provides guidance for NRAs on the appropriate cost-based methodology that should be used when calculating the maximum Termination Rates to be charged by FSPs and MSPs designated as having SMP. It recommends that the evaluation of efficient costs be based on current cost and the use of a bottom-up modelling approach using long-run incremental costs as the relevant cost methodology. ComReg is obliged to take utmost account of this recommendation.

[12] European Communities (Electronic Communications Networks and Services)(Access) Regulations 2011 ("Access Regulations")(SI No 334 of 2011).
[13] A pricing principles and methodologies report, an FTR cost model and model specification, and an MTR model and model specification.

2.3 The FVCT markets are currently regulated pursuant to ComReg Decision D06/07 ('**2007 FVCT Decision**')[14]. The obligation of cost orientation is further specified pursuant to the 2012 Pricing Decision. The MVCT markets are currently regulated pursuant to ComReg Decision D11/12 ('**2012 MVCT Decision**')[15]. The obligation of cost orientation is further specified pursuant to ComReg Decision D02/16, ('the **2016 MTR Decision**'). The 2012 Pricing Decision and the 2016 MTR Decision adopted BU LRIC models to determine maximum regulated FTRs and MTRs respectively.

2.4 This Consultation examines the merits of using LRIC versus using long run average incremental costs plus[16] ('**LRAIC+**') to determine Termination Rates. It consults on FVCT and MVCT BU LRIC models that have been used to determine the proposed future maximum regulated FTRs and MTRs.

2.5 ComReg engaged Analysys Mason Limited ('**AM**') to consider the appropriate economic principles for setting both fixed and mobile call termination prices and to present their findings in a report (the '**AM Pricing Report**')[17]. The report provides a detailed economic analysis of wholesale call termination markets and recommendations for their regulation. This includes recommendations on the choice of cost increment, the structure of the cost models, the costing approach and the degree of consistency in the approaches for FVCT and MVCT. AM recommend the use of BU pure LRIC for regulated FTRs and MTRs.

2.6 ComReg engaged TERA Consultants ('**TERA**') and AM to determine proposed maximum FTRs and MTRs respectively using the recommended approach. ComReg also requested that the models calculate the LRAIC+ of services as recommended in the AM Pricing Report. See Chapter 5 for further details of the modelling approaches. Both TERA and AM, in their work on FTRs and MTRs respectively, were required to ensure that the cost models that they built followed the recommendations in the AM Pricing Report and the preliminary findings of the Market Review Consultation.

2.7 In preparation for this Consultation process ComReg requested traffic and cost data from FSPs and MSPs. That data served as input for the two BU LRIC models.

[14] ComReg Decision D06/07, Document 07/109,"Market Analysis:- Interconnection Market Review Fixed Wholesale Call Termination Services", 21/12/2007, ('**2007 FVCT Decision'**).
[15] ComReg Decision D11/12, Document 12/124,"Market Review Voice Call Termination on Individual Mobile Networks" Response to Consultation and Decision Notice, 21/11/2012, ('the **2012 MVCT Decision**')
[16] Section 4.2.2 of this document explains the difference between LRIC and LRAIC+.
[17] Analysys Mason Report for ComReg, "Pricing principles and methodologies for future regulation of wholesale voice call termination services", 9 March 2018" See ComReg document 18/19a

Policy context

2.8 ComReg has considered the regulatory impact of this Consultation in its Regulatory Impact Assessment ('**RIA'**) in Chapter 6.

Summary proposal

2.9 This Consultation proposes that the methodology of determining maximum Termination Rates be through BU LRIC models.

2.10 Currently the maximum rate for FTRs is 0.072 euro cent per minute. Alternatively the maximum rate can also be set as a combination of a per call charge of 0.060 euro cent and a per minute rate of 0.049 euro cent. These maximum rates have been in force since 1 July 2015 and are not subject to any automatic expiry date. The results of the preliminary FTR cost modelling are in Figure 1 below:

Figure 1: Preliminary FTR Maximum on a Per Minute and Per Call Basis

Year	Maximum cost per minute euro cent	Maximum Cost per Call euro cent
2018	0.035	0.060
2019	0.034	0.058
2020	0.034	0.057
2021	0.033	0.055
2022	0.032	0.053

2.11 On a per minute basis only, i.e. the per call cost is included in the per minute rate[18], the proposed rates are in Figure 2 below:

Figure 2: Preliminary FTR Maximum per Minute Basis only

Year	Maximum cost per minute euro cent
2018	0.055
2019	0.054

[18] A per minute only call rate has been calculated from the per call and per minute costs using an average call duration of 2.98 minutes.

Year	Maximum cost per minute euro cent
2020	0.053
2021	0.052
2022	0.050

2.12 If the above rates are found to be appropriate, ComReg proposes imposing the mid-point of the rates as the maximum rate for the entire regulatory control period in recognition of the administrative cost of implementing rate changes where there would be relatively small changes in maximum rates on an annual basis.

2.13 It is anticipated that a decision on maximum regulated FTRs will be taken, at the earliest, by mid-2018. ComReg is proposing that any change to the FTR be implemented within 90 days of the Effective Date.

2.14 The current maximum rate for MTRs is euro cent 0.79 per minute. This was determined as the rate for the period from 1 January 2018 to 31 December 2018[19]. As a result ComReg proposes that any maximum regulated MTRs arising from this Consultation and subsequent decision would first apply from 1 January 2019.

2.15 The proposed maximum per minute rates for MTRs (as per the MTR model) are as follows in Figure 3:

Figure 3: Preliminary Maximum per Minute Rates for MTRs

Year	Maximum cost per minute euro cent
2019	0.33
2020	0.31
2021	0.31
2022	0.30

2.16 If the above rates are found to be appropriate, ComReg proposes imposing the rates on an annual basis as the impact of rate changes is significant compared to expected administrative costs.

[19] SMP operators' obligations of cost orientation continue after that date.

Chapter 3

3 Background

3.1 Overview

3.1 This chapter outlines the current regulatory obligation of price control for those Service Providers that are designated with SMP in the FVCT and the MVCT markets. These are markets 1 and 2 respectively, as identified in the European Commission's 2014 Recommendation ('**2014 Recommendation'**)[20] on relevant markets.

3.2 This chapter then outlines what is involved in the further specification of the proposed price control obligation of cost orientation for those Service Providers that may be found to have SMP in their respective voice call termination markets arising from the Market Review Consultation.

3.3 This chapter is divided into the following sections:

- Current FVCT Price Control Obligation
- Current MVCT Price Control Obligation
- European Commission Recommendations
- The Access Regulations

3.2 Current Fixed Voice Call Termination Price Control Obligation

3.4 The FVCT market is currently regulated pursuant to the 2007 FVCT Decision. Having determined that the markets for wholesale call termination on fixed networks were not effectively competitive, ComReg, in accordance with Regulation 27(4) of the Framework Regulations[21], designated the following seven FSPs with SMP in their relevant markets:

- BT Communications Ireland Limited ("BT Ireland");
- Colt Telecom Ireland Limited;
- Eircom Limited ("Eircom");
- Magnet Networks Limited;
- Ntl Communications (Ireland) Limited and Chorus Communications Limited (rebranded as "Virgin Media");

[20] EC 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 (OJ L 344, 28.12.2007, p. 65).
[21] http://www.irishstatutebook.ie/eli/2011/si/334/made/en/print

- Smart Telecom (acquired by “Digiweb");
- Verizon Ireland Limited ("Verizon")

3.5 The current price control obligation of cost orientation is further specified pursuant to the 2012 Pricing Decision. Section 4.5 of the FTR Decision Instrument directed that with effect from 1 July 2013, each SMP FSP must ensure that its FTR(s) are set in accordance with a pure LRIC costing methodology. The current maximum FTR that an SMP FSP can charge on a per minute basis is Euro cent 0.072. This rate has been in effect since 1 July 2015.

3.3 Current Mobile Voice Call Termination Price Control Obligation

3.6 The MVCT market is currently regulated pursuant to the 2012 MVCT Decision. In that decision, ComReg stated that each of the following MSPs providing mobile voice call termination services had SMP in their relevant market:

- Three (H3GI);
- Lycamobile;
- Meteor (rebranded as “eir Mobile”);
- Telefónica (now part of H3GI);
- Tesco Mobile; and
- Vodafone.

3.7 Paragraph 12.1 of the 2012 MVCT Decision imposed a price control obligation in the form of a cost orientation obligation regarding MTRs charged by the above MSPs.

3.8 The details of the cost orientation obligation were further specified in the 2012 Pricing Decision and subsequently finalised in the 2016 MTR Decision.

3.9 Paragraph 4.2 of the 2016 MTR Decision stated that for each year of the period of further specification of the obligations relating to price control, each SMP Mobile Service Provider shall ensure that its MTR is no more than the rate determined for that year in accordance with the BU pure LRIC Model. The rates determined in accordance with the BU pure LRIC Model for the years 2016 to 2018 will remain in effect from 1 September 2016 until 31 December 2018. The rates are as follows in euro cent per minute:

1 Sept 2016 – 31 Dec 2016	Euro cent 0.84
1 Jan 2017 – 31 Dec 2017	Euro cent 0.82
1 Jan 2018 – 31 Dec 2018	Euro cent 0.79

3.4 European Commission Recommendations

3.4.1 2009 Termination Rates Recommendation

3.10 In May 2009, the European Commission ('**EC**') issued its 2009 Termination Rates Recommendation. Different regulatory approaches to Termination Rates across European Union member states led to this intervention. The EC considered that high Termination Rates could lead to competitive distortions and consequent pricing distortions for consumers. It was also evident that Termination Rates varied significantly from one member state to another. This could create significant barriers to the functioning of the internal market. The EC investigated the issues in detail to see whether the differences were justified, and if not, whether a harmonised approach across all member states should be recommended. The outcome of the review gave rise to the 2009 Termination Rates Recommendation.

3.11 ComReg is obliged by virtue of Article 19(2) of the Framework Directive[22] to take "utmost account" of the 2009 Termination Rates Recommendation. The Recommendation states "NRAs should set termination rates based on the costs incurred by an efficient operator. This implies that they would also be symmetric." Note that symmetric in this context means that the termination rates for each FSP designated with SMP in its respective termination market should be the same as every other FSP designated with SMP in its respective termination market. The equivalent applies to MSP designated with SMP in their respective termination markets. Chapter 4 of this document goes into further detail on symmetry. It is recommended that the evaluation of efficient costs be based on current costs and the use of a bottom-up modelling approach using LRIC as the relevant cost methodology.

3.4.2 2014 Recommendation

3.12 Under Article 15 of the Framework Directive the European Commission is obliged to adopt periodically a recommendation on relevant product and services markets. This identifies those product and service markets within the electronic communications sector the characteristics of which may be such as to justify the imposition of regulatory obligations. National Regulatory Authorities such as ComReg are obliged to take "utmost account" of such recommendations.

[22] Directive 2002/21/EC on a common regulatory framework for electronic communications networks and services, as amended by Directive 2009/140/EC (the '**Framework Directive**').

3.13 The most recent such recommendation, the 2014 Recommendation, sets out a list of markets which warrant ex-ante regulation. This includes fixed and mobile call termination markets and identifies:

- Wholesale call termination on individual public telephone networks provided at a fixed location as a relevant market susceptible of ex-ante regulation ('**Market 1**')
- Wholesale voice call termination on individual mobile networks as a relevant market susceptible of ex-ante regulation ('**Market 2**')

3.14 The Market Review Consultation takes full account of the 2014 Recommendation.

3.15 ComReg has also considered recent relevant European Commission comments/ serious doubts decisions made pursuant to Article 7/Article 7a of the Framework Directive, regarding NRAs market analyses and the implementation of the price control remedies imposed by those NRAs. Having examined those decisions, ComReg is of the opinion that this consultation is consistent with the various positions adopted by the European Commission.

3.5 The Access Regulations

Regulation 13 of the Access Regulations provides *inter alia* that:

"……the Regulator shall, when considering the imposition of obligations under paragraph (1), take into account the investment made by the operator which the Regulator considers relevant and allow the operator a reasonable rate of return on adequate capital employed, taking into account any risks involved specific to a particular new investment network project.

The Regulator shall ensure that any cost recovery mechanism or pricing methodology that it imposes under this Regulation serves to promote efficiency and sustainable competition and maximise consumer benefits. In this regard, the Regulator may also take account of prices available in comparable competitive markets"

Chapter 4

4 Cost Orientation Approach

4.1 Overview

4.1 In July 2016 ComReg appointed AM to produce a report to assess all relevant price control models/methodologies relating to MTRs/FTRs that are consistent with the Market Review Consultation and ComReg's regulatory objectives, and to recommend a preferred option.

4.2 AM has prepared a report entitled "Pricing principles and methodologies for future regulation of wholesale voice call termination services" ('**AM Pricing Report**') for ComReg. A non-confidential version of this report is published on ComReg's website, document number 18/19a.

4.3 This chapter discusses cost orientation under the following headings:

- Approaches to Implement a Cost Orientation Methodology
- Economic Cost Recovery
- Network Nodes
- Symmetry of Termination Rates
- Consistency in Approaches to FVCT and MVCT
- Cost Modelling Principles

4.2 Approaches to Implement a Cost Orientation Methodology

4.4 There are two potential means of implementing a cost orientation methodology: benchmarking and cost modelling.

4.5 ComReg has, in the past, applied a benchmarking approach to set Termination Rates (see the 2012 Pricing Decision). Following an appeal by Vodafone against the 2012 Pricing Decision, the High Court in its judgement found that the benchmarking approach adopted by ComReg in this instance (and accepted by the European Commission) for setting MTRs was outside the scope of what is provided for in the relevant EU and Irish legislation[23]. ComReg therefore proposes not to adopt a benchmarking approach with respect to FTRs and MTRs. Benchmarking is therefore not considered further in this consultation document.

4.6 In building a cost model, there are two key questions that need to be considered:

- Is the model bottom-up ('BU') or top-down ('TD')?
- What increment should be used?

These questions are considered in the following two sections.

4.2.1 Bottom Up or Top Down Model

4.7 The type of cost model to be built is dependent on the choice of modelled operator. The 2009 Termination Rates Recommendation states that "NRAs should set termination rates based on the costs incurred by an efficient operator". ComReg recognises that the form that the modelled operator takes can have a significant impact on the estimated cost profile. The AM Pricing Report (see Section 5.1) identifies four types of operator that can be modelled and recommends modelling a hypothetical existing operator. ComReg is of the preliminary opinion that this allows for the modelling of efficient costs and scale, whilst at the same time enabling costs and technology assumptions to be closely aligned with those actually faced by the operators currently in the Irish market.

4.8 Cost modelling of networks can be carried out using two structures, referred to as 'top-down models' and 'bottom-up models'.

4.9 In a top-down model (**'TD Model'**) costs are determined from an existing network cost base and then incremental costs are identified. AM considers that there may be efficiency adjustments and potential cost adjustments to reflect the costs of modern assets. AM notes that while this method can be useful for an operator to determine its own cost base, it is not necessarily the best modelling approach to determine the cost of an efficient operator for transparent regulatory purposes.

[23] See ComReg Information Notice 13/80 'High Court Judgment on Mobile Termination Rates' (paragraph 5). ComReg appealed the High Court finding but the matter was later settled before trial.

4.10 ComReg is of the opinion that a TD Model, based on operator accounts, is not appropriate to model the costs of an efficient operator[24]. There may be insufficient detail available within the operator accounts to analyse costs down to unit cost level. There could be inconsistent data inputs across operators, in terms of the level of detail of data, the dimensions and the data structure etc. The direct use of operator data runs the risk of internalising operator inefficiencies into the cost calculations.

4.11 The Explanatory Note to the 2009 Termination Rates Recommendation[25] (page 13) notes however that:

"TD models are said to avoid disincentives to invest, since incurred costs are usually allowed to be recovered, even if this does not necessarily promote efficiency".

4.12 In a bottom-up model (**'BU Model'**) costs can be more readily constructed to reflect the choices of a hypothetically efficient operator from both a technical and operational perspective.

4.13 Section 4.1 of the AM Pricing Report identifies that a BU Model provides the most commonly used approach to determine the costs of a hypothetical efficient operator. The network is built from the bottom up starting with the traffic/subscribers carried by the operator modelled. Only the assets required to handle this traffic (in a forward-looking situation) are taken into account, and so inefficiencies are excluded. AM explains however that the level of efficiency can be 'selected' through the choice of technologies modelled and assets used, e.g. only modern equivalent assets[26] ('**MEA**'), and various other parameters such as maximum utilisation factors.

4.14 The Explanatory Note to the 2009 Termination Rates Recommendation (page 13) states that:

"BU models use demand data as a starting point and determine an efficient network capable of serving that demand by using economic, engineering and accounting principles. BU models give more flexibility regarding network efficiency considerations and reduce the dependence on the regulated operator for data."

[24] See ComReg Consultation Document 14/29 "Mobile Termination Rates: Draft Bottom Up Pure Long Run Incremental Cost Model".
[25] Explanatory Note accompanying the document Commission Recommendation 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. (SWD(2014) 298).
[26] Modern Equivalent Asset (**'MEA'**) cost refers to what it would cost to replace an old asset with a technically up to date new asset with the same service capability as the old asset.

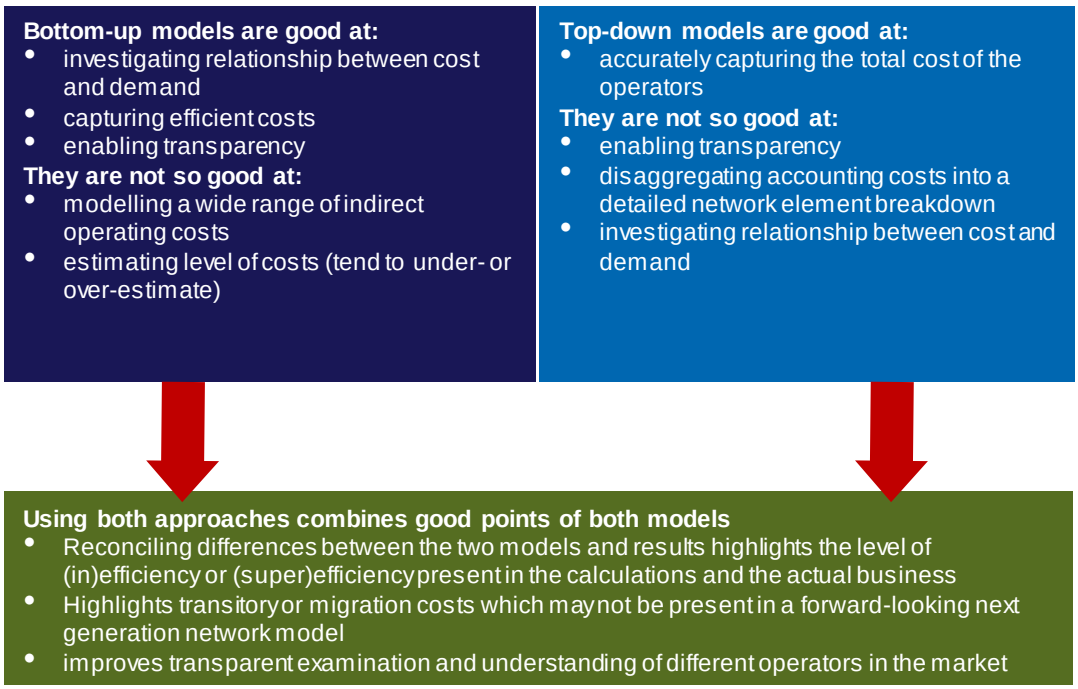
4.15 The Explanatory Note also notes that a BU model does not guarantee that all costs that were actually incurred are recovered because it focuses on the theoretical concept of developing a network of an "efficient" operator using the relevant equipment rather than taking account of the equipment actually provided or the associated legacy costs.

4.16 In light of this, Recital 11 of the 2009 Termination Rates Recommendation notes that:

"Given the fact that a bottom-up model is based largely on derived data.., regulators may wish to reconcile the results of a bottom-up model with the results of a top-down model in order to produce as robust results as possible and to avoid large discrepancies in operating cost, capital cost and cost allocation between a hypothetical and a real operator."

4.17 Figure 4.1 in the AM Pricing Report provides a comparison of the merits of the two approaches and a "hybridised" approach (combination of both approaches), which is reproduced below in Figure 4.

Figure 4: Comparison of Top-down and Bottom-up Models



Source: AM Pricing Report, Figure 4.1

4.18 Recitals 2 and 3 of the 2009 Termination Rates Recommendation recommend that the evaluation of efficient costs be based on the use of a bottom-up modelling approach and says that NRAs may compare the results with a top-down model with the view to verifying and improving the robustness of the results and may make adjustments accordingly. Section 4.2 of the AM Pricing Report also recommends the use of a BU model, with top down validation of the BU model outputs where appropriate.

ComReg's Preliminary View

4.19 Having considered the views of AM and the 2009 Termination Rates Recommendation, ComReg is of the preliminary opinion that BU models for hypothetical efficient existing operators for the FVCT and MVCT markets should be developed.

Q. 1	Do you agree or disagree that the cost orientated models for setting maximum FTRs and MTRs should be bottom-up models of hypothetical efficient operators? Please explain the reasons for your answer, clearly indicating the relevant paragraph numbers to which your comments refer, along with all relevant factual or other evidence supporting your position.

4.20 Once the choice of model has been determined, the next step is to determine the choice of increment. This is discussed in detail below.

4.2.2 Choice of Increment

4.21 ComReg needs to identify the cost to the operator of providing this service. ComReg has previously calculated this cost by examining the additional costs associated with providing a wholesale call termination service i.e. the incremental cost.

4.22 ComReg identifies that the relevant increment can be determined under one of the costing methodologies set out in the table below. This table also summarises the key differences in the five variants:

Method	Description
LRAIC ('A' is for 'average')	This considers a large increment (e.g. all traffic services provided by the network) and allocates the incremental cost of traffic between the volumes of these services, using 'average traffic routeing factors'. Each service, including voice termination, therefore receives a share of intra-traffic network common costs.

Method	Description
LRAIC+	This is calculated in the same way as LRAIC, except that one or more mark-ups are applied to the network costs to capture other costs (e.g. business overheads).
(Pure) LRIC	This considers a small increment (e.g. each individual service). The pure incremental cost of a service is considered to be the costs avoided by not providing that service on the network, treating it as the last service in the service stack. This is the approach specified in the 2009 Termination Rates Recommendation, with the relevant costs being the traffic-sensitive costs of a network providing all services, less the traffic-sensitive costs of a network providing all services except wholesale voice termination.
LRIC+	As calculated for the (pure) LRIC, except that one or more mark-ups are applied to capture common costs. In Annex A of the 2009 Termination Rates Recommendation, business overhead costs are specifically excluded from the mobile case (along with retail and coverage costs).
Marginal cost (MC)	This can consider even smaller increments than pure LRIC (e.g. part of the volume of an individual service, perhaps only one unit e.g. one voice minute). The marginal cost is considered to be the additional network costs of serving that additional volume with the network.

4.23 In assessing which variant should be adopted, the AM Pricing Report (Section 3.2.1) identifies the following factors that need to be considered i.e.:

- The two-sided market structure
- Associated externalities
- Relationship to market competitiveness and efficiency
- Impact on relevant markets
- Regulatory best practice

4.24 ComReg proposes to use this structure to frame its own consideration of this issue while having regard to the findings of the AM Pricing Report. The impact of each approach on competition between operators is considered e.g. the effects of differences in price between on-net and off-net calls and the impact on competition between operators with asymmetric market share. ComReg also considers the approach that would provide the best outcome for the consumer.

Two-sided Market Structure

4.25 The market for call termination is a two-sided market in that the subscriber of any operator can call a subscriber of any other operator and vice-versa. What distinguishes a 'two-sided' from a 'one-sided' market is that consumers on either side derive value from the presence of the other group.

4.26 If we consider the FVCT markets on their own, then if traffic is balanced between operators the FTR rate could be set at any level e.g. very high or very low and the net financial position of all operators would be zero. The same is true for the MVCT markets. As FTRs and MTRs are not likely to be the same, then even under balanced traffic between a FSP and a MSP, the net financial position of each operator would be impacted by the size of the Termination Rates. Given current Termination Rate levels this net impact would be small in the context of their overall business.

4.27 The two sided nature of the market means that while the originating and terminating operator share the benefits of the call, they both also compete against each other and other operators in downstream markets. This has the potential to create competitive distortions. Each operator will have an incentive to raise its rivals' costs (by charging high Termination Rates) in order to give itself a relative competitive advantage.

4.28 Excessive pricing could have an impact at both wholesale and retail levels. At the wholesale level, operators that send more traffic off-net than they receive would face overall higher costs than operators that have a more favourable on-net / off-net profile. Higher wholesale charges could have an impact at the retail level in the form of higher tariffs that the customer would have to pay.

4.29 Furthermore if smaller operators chose to pass these higher termination tariffs on, for example by way of higher off-net retail tariffs, they would place themselves at a significant competitive disadvantage since, on average, the opportunities for on-net calling for consumers will by definition be fewer for customers of smaller operators. As noted below, in considering the impact on end users, lower Termination Rates lower the floor at which off-net retail prices would be set.

4.30 A further distortion can arise between fixed and mobile players collectively. The payment of excessive MTRs by fixed operators would amount to a subsidy to mobile operators. This benefit could then be passed onto the retail customers of the mobile operators in the form of reduced prices. The same would be true in the reverse situation were FTRs to be set at an excessive level. Even if such subsidies were competed away at the retail level, there would nevertheless be a distortion of competition given that retail prices would not reflect the efficient underlying costs.

4.31 In general, setting wholesale Termination Rates at incremental cost will alleviate these problems. In this context it is worth noting that in telecommunications networks most costs are fixed and long term in nature with such networks supporting a range of services.

4.32 The two sided nature of termination markets imply that the closer prices are set to an incremental cost specific to that service over the long term, the more likely the regulatory objectives of avoiding competitive distortions and encouraging efficient investment will be met. This implies that methods involving broader increments such as LRAIC or LRAIC+ will be less appropriate than for other regulated services which lack this two sided nature.

4.33 A further consideration is whether a mark-up should be included to allow for the recovery of costs which are common to services outside the defined increment (for example business costs such as corporate overheads).

4.34 AM is of the opinion that the common costs incurred relating to incoming and outgoing traffic can be recovered from either an operator's own subscribers (e.g. outgoing on-net charges and/or fixed monthly fee), or from its competitors subscribers (via Termination Rate charged) but the operator concerned would also experience the reverse situation for the recovery of the competitor's common costs (via Termination Rate charged).

4.35 ComReg (consistent with the 2009 Termination Rates Recommendation and current practice) agrees with AM's view that such costs should be excluded from termination costs by virtue of the considerations set out above. In the case of MNOs and FNOs, other than Eircom, these costs can be allocated to other services by operators as they see fit. In Eircom's case they may need to be recovered, at least in part, from other regulated services and this will be considered under separate price setting exercises.

4.36 ComReg for the reasons set out above is of the preliminary opinion that a LRIC approach is more appropriate given the two sided nature of termination markets.

Associated Externalities

4.37 ComReg now addresses whether the presence of externalities would justify a deviation from cost either by way of mark up or mark down of termination prices. An externality is the cost or benefit that affects a party who did not choose to incur that cost or gain that benefit.

4.38 There are three types of relevant externality: network, call and tariff-mediated externality.

Network Externalities

4.39 Network externalities occur when existing users benefit from maintaining additional (marginal) subscribers on the network. There is therefore an argument to structure tariffs so as to encourage increased subscriber numbers. By reducing the cost to new subscribers of joining a network, existing subscribers may benefit in terms of increased calling opportunities. Accordingly under this argument, a cross subsidy from network usage tariffs to reduce the cost of joining a network (such as for example by way of handset subsidies) may be justified. This could be implemented by way of a mark up to termination prices.

4.40 ComReg does not however agree with this view for the following reasons:

- Firstly as set out in the AM Pricing Report, the Irish market is substantially saturated and the benefits of increased subscriber penetration are likely to be de minimus.
- Secondly the LRIC of termination has been established as being at a level that is no longer particularly material to operators. Analysys Mason in its AM Pricing Report notes that the share of termination revenue as a proportion of total revenues for MNOs and FNOs is 2% and 0.1% respectively. A mark up on termination that would have any material positive impact on subscriber numbers would likely have to be so large as to exacerbate the competitive distortions referred to above.

4.41 Having considered the above, ComReg is of the preliminary opinion that it would not appear necessary to provide additional subsidies to maintain marginal users and therefore a deviation from cost in the form of a mark-up or mark down of termination prices is not justified.

Call Externalities

4.42 Call externalities arise under a 'Calling Party Pays' (CPP)[27] regime as only the calling (retail) party is charged for the call. The recipient of the call receives a benefit from answering an incoming call without paying for it. This is regarded as a positive externality.

4.43 The AM Pricing Report refers to the Pigouvian subsidy[28] which involves adjusting for the positive externality by charging the recipient for answering a call (a subsidy) and reducing the amount the calling party pays. AM recognises the difficulties for ComReg in imposing this in a wholesale calling-party-network-pays regime as it would impose an incoming call retail tariff on the recipient subscribers. ComReg does not believe this is practicable under current legislative arrangements.

4.44 Another option provided by AM to stimulate the call externality would be to reduce the proportion of the cost paid by the calling party – by way of a mark down of termination charges and allow the recipient network to recover this cost using other indirect methods unrelated to specifically answering the call. While this is of relevance at the wholesale level, it is of no relevance at the retail level. Furthermore it creates the risk of under recovery with consequent under investment referred to above.

4.45 ComReg is of the opinion that given the person making the call pays for the call setting Termination Rates above incremental costs could result in the calling party initiating an inefficiently low number of calls from the receiver party's perspective. As identified above, the party receiving the call does derive some benefit from the call as otherwise they would not answer the call.

4.46 ComReg, having considered the above, is of the preliminary opinion that a pure LRIC methodology potentially goes further than a LRAIC+ methodology in recognising this call externality as the receiving operator can allocate the common costs to other services as they see fit. The customers of the receiving operator will therefore indirectly pay for such costs and thus contribute to the costs of the incoming calls for which they receive a benefit.

[27] CPP is where the calling party pays for the calls made and nothing for the calls received.
[28] A Pigouvian subsidy (tax) is one which is directly applied to the activity that generates the external benefits (harm).

Tariff-mediated Externality

4.47 A tariff-mediated network externality ('**TMNE**') arises when an operator charges its retail customers lower prices for on-net usage than for off-net usage. This can be positive for on-net users and negative for predominantly off-net users who would likely face higher tariffs.

4.48 The AM Pricing Report argues that operator specific TMNE's (and setting higher FTRs/MTRs to support overall cost recovery as a result) are distortive to overall market competitiveness since they encourage closed user group calling to the detriment of market-wide communication. AM for this reason concludes that TMNE's are not economically justified for setting regulated FVCT and MVCT rates.

4.49 While ComReg does not regulate retail tariffs, it is of the opinion that the matter is relevant because there is the potential for excessive termination revenues to facilitate a TMNE in a way that distorts competition. Pure LRIC Termination Rates should enable smaller operators to compete more easily with larger operators whereas Termination Rates that exceed incremental cost i.e. LRAIC+ can lead to more pronounced tariff based network externalities which may cause inertia in the retail market and make it difficult for smaller operators to win customers from larger operators. This could therefore pose a higher barrier to entry and expansion than under a pure LRIC methodology. Pure LRIC Termination Rates lower the floor for retail pricing of off-net calls which should strengthen the ability of smaller operators to construct competitive packages, leading to a more competitively neutral framework.

4.50 Having considered the above, ComReg is of the preliminary opinion that the potential for the distortive effect of a TMNE enhances the argument for prices to be set on an incremental cost basis, specifically pure LRIC. This in ComReg's opinion would facilitate increased competition in fixed and mobile termination markets.

Relationship to Market Competitiveness and Efficiency

4.51 Section 3.2.3 of the AM Pricing Report discusses market competitiveness. In a perfectly competitive market operators maximise profit at the point where marginal cost equals marginal revenue and within that equilibrium market prices have the property of being allocatively efficient. In such circumstances, where prices equal marginal costs all operators should then earn a "normal profit" (including a reasonable rate of return) or "economic profit".

4.52 In principle therefore, first-best pricing, i.e. marginal cost pricing, can be approximated by a pure LRIC price in wholesale voice termination markets. However, termination markets are not perfectly competitive in all aspects due to:

- The existence of product differentials (e.g. network coverage)
- Termination is not a substitutable product
- Economies of scale and scope
- Call and network externalities (see Section 4.40 to 4.47 above)
- Regulations or capital restrictions/obligations

4.53 AM is of the opinion that a price equal to marginal cost (i.e. first-best pricing) cannot be applied to all quantities produced due to the presence of large fixed costs. An average price approach that recovers all costs e.g. LRAIC+ or LRIC+ can be applied, or an approach where some services are priced at marginal costs (i.e. first-best pricing for those services) is also possible, provided that other services recover the large fixed costs to maintain overall cost recovery. AM does however recognise that where prices increase above marginal cost, call volumes would decline, which could lead to a welfare loss.

4.54 AM goes on to state that due to the two-sided structure of the voice termination market and with traffic that is largely balanced, most of the common costs that are notionally recovered via LRIC+/ LRAIC+ based Termination Rates are counterbalanced by outpayments to other operators for the recovery of their common costs.

4.55 AM, having considered the traffic balances (and some imbalances) together with the fact that call termination is now a minor service in an operator's portfolio, is of the opinion that first-best pricing (approximated by pure LRIC) can be used to price termination traffic without any significant impact on the net financial position of the operators.

4.56 Having considered the above and given that first based pricing reflects a fully competitive market price, ComReg is of the preliminary opinion that there is no evidence that pure LRIC based MTRs (for example) would have an adverse impact on competition for voice calling.

Impact on Relevant Markets

Impact on Relevant Retail Markets

4.57 The AM Pricing Report discusses the impacts price regulation of FTRs and MTRs has on fixed/mobile retail pricing and competition.

Impact on Retail Pricing in the Fixed Market

4.58 As MTRs fall, retail prices for calls to mobile should also fall. However the full MTR reduction may not pass through to the customer depending on competition across bundles, call types and contractual terms between operators.

4.59 FSPs charge the same retail price for calls to fixed numbers, regardless of who the terminating party is. As identified by AM, this means that there are no material fixed-network tariff-mediated network externalities generated by groups of customers choosing one fixed network over another. This is discussed further in section 3.2.4 of the AM Pricing Report.

Impact on Retail Pricing in the Mobile Market

4.60 The AM Pricing Report identifies that in order for the consumer to benefit from discounted or free on–net calls, the consumers must be on the same mobile network. As regards off-net calls, mobile price plans do not typically differentiate between price to call off-net mobile numbers and price to call off-net fixed numbers. AM identified that even though the FTR is currently lower than the MTR, MSPs are not passing the lower FTR onto the consumer in the form of a lower retail tariff to call fixed networks.

4.61 Given the continuing increase in size of bundle packages (with minutes and/or megabytes of data) priced at more standard packages, AM concludes that MTRs which are currently priced at pure LRIC are no longer a significant barrier to MSPs offering competitive packages with unlimited off-net voice bundles.

Impact on Competition

4.62 This section sets out the impact of Termination Rates on the level of competition in the fixed and mobile markets. This is discussed under the following headings:

- Impact of MTR and FTR regulation on Mobile Competition
- Impact of MTR and FTR regulation on Fixed Competition
- Impact of MTR and FTR regulation on Fixed-Mobile Competition

4.63 ComReg is required to ensure that there is no distortion or restriction of competition with a view to promoting the interests of users in terms of price, choice and quality of service. It can however be argued that Termination Rates create a floor to retail pricing. If Termination Rates exceed an efficient level of cost, difficulties will arise for carriers to offer flat-rate calling plans involving off-net calls due to the uncertainty regarding the level of customer take-up of such plans. Reducing Termination Rates to the efficient cost on the other hand will provide Service Providers with greater scope for developing new retail packages (as lower wholesale costs will reduce their exposure in the event of increased usage at the retail level).

Impact of MTR and FTR Regulation on Mobile Competition

4.64 AM in section 3.24 refers to the work of Genakos and Valletti[29], where it identifies that the nature of mobile competition is oligopolistic.

4.65 One of the observed profit maximising approaches used by MSPs is to set MTRs and retail off-net charges above cost and to discriminate between retail prices for on-net and off-net calls. Such price discrimination generates tariff-mediated externalities resulting in a competitive advantage for larger Service Providers and a potential reduction in competition. Tariff mediated externalities can reinforce barriers to entry/expansion and put smaller MSPs at a disadvantage in offering outgoing call services given their asymmetric position and initial significant off-net traffic while benefitting networks with a larger customer base. ComReg is of the preliminary opinion that low MTRs alleviate this.

4.66 NRAs have previously not intervened in setting termination rates for new entrants with the result that new entrants have benefitted from higher asymmetric Termination Rates, relative to more established incumbents. However, higher MTRs for smaller MSPs also help the larger MSPs to justify higher off-net retail tariffs, reinforcing tariff mediated externalities further. ComReg is of the preliminary opinion that symmetric MTRs alleviate this.

4.67 AM anticipates a low impact on mobile competition of changes to FTRs given MSPs do not often offer lower prices for calls to fixed networks. The difference between the impact of FTRs on MSPs and the impact of MTRs on FSPs can be attributed to the relative importance of the Termination Rates within their cost bases. This is discussed further in the AM Pricing Report in Figure 3.11.

[29] Testing the “Waterbed” Effect in Mobile Telephony; Genakos and Valetti; 2008

Impact of MTR and FTR Regulation on Fixed Competition

4.68 Although MTRs have no direct impact on fixed competition (as all FSPs pay the same MTR to any given MSP), there is an indirect impact. As set out in the AM Pricing Report, this indirect impact arises from the way in which MTRs can constrain what FSPs can do on the retail side.

4.69 Although difficult to predict the precise impact on retail prices, lower MTRs will help ease barriers to creating packages with off-net mobile calls which may promote retail competition. These points are also reflected in section 3.2.4 of the AM Pricing Report.

4.70 Just like a MSP, a FSP has profit-maximisation incentives to set its FTRs at high levels. NRAs have therefore found it necessary to intervene in setting FTRs in order to address such competition problems.

4.71 AM identifies that setting FTRs at pure LRIC (with no mark-up for non-avoidable common costs) could impact the incumbent if they also face ex-ante regulation on wholesale origination in the form of cost orientation. For its wholesale call origination customers, the incumbent would have little or no opportunity to recover common costs from retail services. This would therefore allow a Service Provider to purchase wholesale origination and termination services from the incumbent without contributing to the common costs. This is discussed further in section 3.2.4 of the AM Pricing Report.

Impact of MTR and FTR Regulation on Fixed-Mobile Competition

4.72 Wholesale MTRs are currently higher than FTRs, resulting in net transfers of resources from the fixed to mobile sector, leaving FSPs at an investment and competitive disadvantage. AM identifies that in the past it was claimed that high MTRs have adversely affected fixed customers and operators and damaged competition between fixed and mobile operators.

4.73 Regulation of FTRs and MTRs have evolved differently, with cost based pricing for fixed networks implemented some time ago. This, as identified in the AM Pricing Report, has given MSPs a competitive advantage over FSPs, as they have benefitted from cost-based FTRs while having unregulated MTRs.

4.74 Having considered the impact on relevant markets, ComReg is of the opinion that the closer the Termination Rate moves to zero, under a Pure LRIC approach, the tariff mediated network externalities are reduced or removed. This will mean that the incentives for differential on-net and off-net pricing policies are reduced and so smaller Service Providers face lower barriers to entry and expansion.

4.75 ComReg is also of the opinion that a lower Termination Rate achieved under a pure LRIC methodology would lead to greater pricing flexibility (for calls and other services), greater competition and diversity in consumer offerings (by facilitating more off-net calls being offered in bundles).

Regulatory Best Practice

4.76 Regulatory best practice in the choice of the increment is discussed in Section 3.2.5 of the AM Pricing Report. It identifies that ComReg's existing pricing decisions for FVCT/MVCT comply with the 2009 Termination Rates Recommendation and use a BU pure LRIC approach.

4.77 The 2009 Termination Rates Recommendation requires that:

"NRAs should set termination rates based on the costs incurred by an efficient operator. This implies that they would also be symmetric."

4.78 It goes on to recommend:

"…. that the evaluation of efficient costs is based on current cost and the use of a bottom-up modelling approach using long-run incremental costs (LRIC) as the relevant cost methodology."

4.79 BEREC in its study 'Termination Rates at a European Level' as of July 2017 identified that of the 28 EU countries, three do not apply a BU pure LRIC costing/benchmarking approach for FTR's and only one does not apply the same approach for MTRs - See Figure 5 and Figure 6 below.

4.80 ComReg has to ensure that the approach chosen contributes to the development of the internal market. As set out in the AM Pricing Report, AM is of the opinion that this is best achieved by Ireland having a similar pricing regime as most other EU Member States, so as not to distort the market for wholesale services in Ireland versus other Member States, nor to (dis)advantage consumers in Ireland and other Member States. ComReg agrees with AM's view and is of the preliminary opinion that this can be achieved by the use of LRIC to set symmetric termination rates in Ireland.

4.81 Having considered regulatory best practice, ComReg is of the preliminary opinion that cost orientated tariffs should continue to be calculated by means of a pure LRIC approach.

Figure 5: Regulatory Models Applied to Determine FTRs

Member State		FTR Cost Accounting Model	Methodology
AT	Austria	Pure LRIC	BU
BE	Belgium	FDC/FAC	
BG	Bulgaria	Pure LRIC	BU
CY	Cyprus	Pure LRIC	Benchmark
CZ	Czech Republic	Pure LRIC	BU
DE	Germany	Pure LRIC	Benchmark
DK	Denmark	Pure LRIC	BU
EE	Estonia	Pure LRIC	Benchmark
EL	Greece	Pure LRIC	BU
ES	Spain	Pure LRIC	BU
FI	Finland		FDC CC
FR	France	Pure LRIC	BU
HR	Croatia	Pure LRIC	BU
HU	Hungary	Pure LRIC	BU
IE	Ireland	Pure LRIC	BU
IT	Italy	Pure LRIC	BU
LT	Lithuania	Pure LRIC	BU
LU	Luxembourg	Pure LRIC	BU
LV	Latvia	Pure LRIC	Benchmark
MT	Malta	Pure LRIC	BU
NL	Netherlands	Pure LRIC	BU
PL	Poland	FDC	TD
PT	Portugal	Pure LRIC	BU
RO	Romania	Pure LRIC	BU
SE	Sweden	Pure LRIC	BU
SI	Slovenia	Pure LRIC	BU
SK	Slovak Republic	Pure LRIC	BU
UK	United Kingdom	Pure LRIC	BU

Source: BEREC Report BoR (17)227, 'Termination rates at European Level' July 2017 (dated 7 December 2017), Annex 3, Table 4.

Figure 6: Regulatory Models Applied to Determine MTRs

Member State		MTR Cost Accounting Model	Methodology
AT	Austria	Pure LRIC	BU
BE	Belgium	Pure LRIC	BU
BG	Bulgaria	Pure LRIC	BU
CY	Cyprus	Pure LRIC	Benchmark
CZ	Czech Republic	Pure LRIC	BU
DE	Germany	Pure LRIC	BU
DK	Denmark	Pure LRIC	BU
EE	Estonia	Pure LRIC	Benchmark
EL	Greece	Pure LRIC	BU
ES	Spain	Pure LRIC	BU
FI	Finland	Other (FDC/FAC)	
FR	France	Pure LRIC	BU
HR	Croatia	Pure LRIC	BU
HU	Hungary	Pure LRIC	BU
IE	Ireland	Pure LRIC	BU
IT	Italy	Pure LRIC	BU
LT	Lithuania	Pure LRIC	Benchmark
LU	Luxembourg	Pure LRIC	BU
LV	Latvia	BU LRIC	Benchmark
MT	Malta	Pure LRIC	BU
NL	Netherlands	Pure LRIC	BU
PL	Poland	Pure LRIC	BU
PT	Portugal	Pure LRIC	BU
RO	Romania	Pure LRIC	BU
SE	Sweden	Pure LRIC	BU
SI	Slovenia	Pure LRIC	BU
SK	Slovak Republic	Pure LRIC	BU
UK	United Kingdom	Pure LRIC	BU

Source: BEREC Report BoR (17)227, ' Termination rates at European Level' July 2017 (dated 7 December 2017), Annex 8, Table 8.

ComReg's Preliminary View

4.82 A price control obligation of cost orientation may be imposed under Regulation 13 of the Access Regulations. Under that Regulation ComReg has to ensure that an imposed price control obligation serves to promote efficiency and sustainable competition and to maximise consumer benefits. In addition ComReg has to take into account relevant investments made by operators and allow a reasonable rate of return taking into account any risks involved specific to a particular new investment network project.

4.83 ComReg is of the preliminary opinion that pure LRIC best achieves the objectives of Regulation 13. This is supported by the views of AM in the AM Pricing Paper, see Figure 1.1 of its report. For example pure LRIC best approximates marginal cost pricing which is the best means of achieving allocative efficiency. Lower Termination Rates help in the promotion of competition. Pure LRIC also contributes to the development of the internal market.

4.84 ComReg is also obliged to take utmost account of the 2009 Termination Rates Recommendation. The Recommendation advises that maximum regulated Termination Rates be set using a BU pure LRIC methodology.

4.85 Having considered the above, ComReg is of the preliminary opinion that cost orientation by means of a BU pure LRIC methodology is the most appropriate approach to set Termination Rates in Ireland.

Q. 2	Do you agree that cost orientation by means of a pure LRIC methodology is the most appropriate approach to set Termination Rates in Ireland? Please explain the reasons for your answer, clearly indicating the relevant paragraph numbers to which your comments refer, along with all relevant factual or other evidence supporting your position.

4.3 Economic Cost Recovery

4.86 Costs can be recovered over the lifetime of a model in numerous different ways hence the depreciation method is a key factor in determining the level of costs to be recovered each year. Section 5.2 of the AM Pricing Report notes that there are four main types of depreciation methods for determining the recovery of capital investments, as described in the following figure:

Figure 7: Types of Depreciation

Type of depreciation	Subtype	Description
Historical cost accounting (HCA)		The capex recorded in the fixed asset register (the gross book value, GBV) is depreciated over the defined financial lifetime of the asset, usually with a constant depreciation charge per annum
Current cost accounting (CCA)	Operating capital maintenance (OCM)	Seeks to maintain the operating or output capacity of the asset
	Financial capital maintenance (FCM)	Seeks to maintain the value of the original capital investment
Annuities	Standard annuity	An annualised cost is derived to allow for full recovery of both the investment and the capital employed, at a constant level per year.
	Tilted annuity	An annualised cost is derived to allow for full recovery of both the investment and the capital employed, with the

Type of depreciation	Subtype	Description
		recovery tilted according to the forecast price trend of the asset
	Modified tilted annuity	An annualised cost is derived to allow for full recovery of both the investment and the capital employed, with the recovery tilted according to the forecast price trend of the asset, with an adjustment to reflect constant changes in economic output over time
Economic depreciation		Takes into account all the underlying factors that influence economic value, i.e.: • projected trends in the opex of the asset • projected trends in replacing the asset with its modern equivalent unit • the output generated by the asset (i.e. demand)

Source: AM Pricing Report, Figure 5.3

4.87 Accounting depreciation methods such as HCA and CCA distribute the costs of an investment in a systematic manner over the life of an asset. However this means that the resulting annuities do not evolve in a smooth way and this can be problematic for setting cost oriented prices, particularly when asset prices are changing over time.

4.88 The standard annuity approach consists of calculating an annual charge – the annuity – which is identical (although the balance between depreciation charge and cost of capital charge will vary between years) every year and is aligned to the cost recovery criteria. The standard annuity approach therefore calculates an increasing depreciation charge and a decreasing return on capital employed as the annuity remains stable over time. This method is appropriate when asset prices and volumes of outputs produced by the assets are stable over time (i.e. no change over time).

4.89 The tilted annuity approach is probably the most widespread depreciation approach used for regulatory purposes. It incorporates a tilt which enables the calculation of annuities to evolve in line with asset price changes: if an asset price increases by 5 per cent per annum, annuities will also increase with 5 per cent per annum. This method is appropriate therefore when asset prices are changing by a constant percentage and volumes of outputs produced by the assets are stable over time (i.e. no change over time).

4.90 The tilted annuity approach sends appropriate 'build or buy' signals to market players and replicates the annual charges an operator would face in a competitive market. The tilted annuity approach allows for a smooth evolution of annual costs despite price changes and investment cycles. At the end of the useful life of an asset, i.e. when the asset needs to be renewed, the annuities calculated with the tilted annuity method will be similar just before and just after the renewal of the asset. Therefore, annuities evolve without the discontinuities which are the case of the standard annuity approach.

4.91 The modified (adjusted) tilted annuity modifies the tilted annuity formula to compute annuities which take into account the evolution of the number of outputs produced by the assets. It does so, for example, by recognising the average/constant change in economic output over a period of time. This method is therefore appropriate when asset prices and volumes of outputs produced by the assets are changing by a constant percentage.

4.92 The economic depreciation approach modifies the tilted annuity formula in order to compute annuities which take into account the evolution of the number of outputs produced by the assets. This approach uses the same formula as in the tilted annuity, except that instead of a constant total annuity, a constant unit annuity is used (and the total annuity varies with the number of outputs). The annuity in this approach varies with the number of outputs produced by the assets and with the price trend. When the asset produces a low number of outputs (for example, FTTH in early years when there are few customers), then the total annuity is low at first and subsequently increases when the number of outputs produced increases (for example, FTTH penetration rate increases). This method is therefore appropriate when asset prices and volumes of outputs produced by the assets are fluctuating from year to year.

4.93 Figure 8 below summarises the factors which determines the choice of appropriate depreciation method.

Figure 8: Factors affecting choice of Depreciation Method

Depreciation Method	Change in Asset Prices	Change in Demand
Standard Annuity	Stable	Stable
Tilted Annuity	Constant Change	Stable
Modified (Adjusted) Tilted Annuity	Constant Change	Constant Change
Economic Depreciation	Fluctuating	Fluctuating

4.94 AM assesses the suitability of all the depreciation approaches for informing cost oriented prices – see Figure 9 below.

Figure 9: Factors Considered by each Depreciation Method

Aspect	HCA	CCA	Standard annuity	Tilted annuity	Modified tilted annuity	Economic depreciation
MEA cost today		✓	✓	✓	✓	✓
Forecast MEA cost				✓	✓	✓
Output of network over time					✓[30]	✓
Financial asset lifetime	✓	✓	✓	✓	✓	✓[31]
Economic asset lifetime			✓	✓	✓	✓

Source: AM Pricing Report, Figure 5.4

4.95 While the AM Pricing Report identifies that only the modified tilted annuity and economic depreciation approaches consider all potentially relevant factors for setting cost oriented prices, it recognises that other annuity approaches e.g. tilted annuity can generate a similar depreciation profile, particularly when the year-on-year change in output is stable and asset prices are changing by a constant percentage from year to year.

4.96 Recital 18 of the 2009 Termination Rates Recommendation states a preference for economic depreciation, although it does not prohibit the use of the other methods, provided that the depreciation profile of each major asset is examined separately in each case.

4.97 The economic depreciation approach does however require forecasts on the outputs produced over a long time period and so as a consequence, could be more subjective than other methods, but it depends on how the development path is expected to be, and may be a more complex method to implement. However, it tends to give better economic signals than other depreciation methods when the number of outputs produced by an asset is not stable and expected to change significantly over the forecast period.

[30] An approximation for output changes over time (with a compound annual growth rate of x%) can be applied in a tilted annuity by assuming an additional output tilt factor of x% per annum.
[31] Economic depreciation can use financial asset lifetimes, although strictly it should use economic lifetimes (which may be shorter, longer or equal to financial lifetimes).

ComReg's Preliminary View

4.98 ComReg, having considered the views of AM, and the Termination Rates Recommendation, is of the preliminary opinion that the economic depreciation approach is appropriate for the MVCT market. This in ComReg's opinion is appropriate given that this market is capital intensive, will continue to be subject to significant changes in asset prices and is expected to experience considerable growth in service demand over the period of the proposed model.

4.99 The use of economic depreciation in the proposed BU pure LRIC Model will ensure that the pure LRIC for MVCT will represent the economic value of the network resources that the hypothetically efficient operator could avoid if it didn't have to provide MVCT. This approach considers service volumes and costs across the lifetime of the proposed BU pure LRIC Model to ensure that the operator is able to recover all relevant costs in an economically efficient manner. In effect, this means that costs are depreciated more when the network and its elements are used more intensively and vice versa.

4.100 Under the economic depreciation approach, the algorithm assumes that the PV (present value) of expenditures equates to the PV of revenues over the time horizon of the proposed BU LRIC Model. It does this by considering not just the trends in operating and capital expenditure associated with the assets, but also the levels of economic output that can be generated by those assets over the time horizon of the proposed BU pure LRIC Model. This methodology therefore better aligns the attribution of cost over time in line with the usage of the network, particularly in the presence of large scale up-front investment in anticipation of future capacity needs. This leads to the fundamental equation of the economic depreciation calculation that is:

$$PV\ (expenditures) = PV\ (unit\ cost \times output)$$

where "unit cost ×output" is representative of the cost-oriented revenues that can be generated by the operator.

4.101 As regards the FVCT market, ComReg is of the opinion that the pure incremental cost of terminating a fixed call is likely to be quite small, with capital costs generally not varying under the different methodologies. The impact of the depreciation approach chosen is therefore not likely to be material.

4.102 ComReg, having considered the views of AM, and the Termination Rates Recommendation, is of the preliminary opinion that depreciation determined on the basis on a tilted annuity approach is appropriate for the FVCT market given that the change in demand is likely to be small and the tilt would reflect price changes in assets.

4.103 TERA is of the opinion that tilted annuities implemented in the model are a good proxy for economic depreciation in the context of a mature network and as demand is not forecasted to follow any significant take-up.

4.104 This approach has also been consistently applied by ComReg for modelling the Eircom core network services (voice, broadband, TV and leased lines services).

4.105 The annuity formula implemented by TERA in the proposed FTR cost model is as follows:

$$A_1 = \frac{I}{(1+w)^{T+\frac{1}{2}}} \times \frac{w-P}{\left[1-\left(\frac{1+P}{1+w}\right)^N\right]}$$

Where:

- A1, the annual charge is year one (used for price calculation)
- I, the investment value of the asset
- w, the cost of capital (parameter)
- P, the real annual change in the price of the asset
- N, the useful life of the asset
- T, the average payment term

Q. 3	Do you agree with the preliminary opinion of ComReg regarding the choice of depreciation methods used in the calculation of the MTRs and FTRs? Please explain the reasons for your answer, clearly indicating the relevant paragraph numbers to which your comments refer, along with all relevant factual or other evidence supporting your position.

4.4 Network Nodes

4.106 BU models estimate the costs of building an operator's network using modern technology. Mobile networks for example can be considered as a series of nodes (with different functions) and links between them. When developing a deployment algorithm for these nodes, it is necessary to consider whether the algorithm accurately reflects the actual number of nodes deployed. Allowing an MTR model to deviate from the operators' actual number of nodes may be justified in the situation where the operators' network is not viewed as efficient or modern in design. Consequently, when a BU methodology is adopted, it can be approached using a number of options for the network topology, i.e.:

- Actual network;
- Scorched earth;
- Scorched node and
- Modified scorched node.

4.107 The actual network approach uses the existing network nodes of a real operator. However, the proposed new MTR model is modelling a hypothetically efficient existing operator and an actual operator's node location may not necessarily be representative of such a hypothetical efficient operator.

4.108 The scorched earth approach makes no reference to actual network layouts and so applies no constraints on the number, location or configuration of nodes to be dimensioned. Instead, the scorched earth approach assumes that the required equipment quantities can be deployed at locations optimal to the overall network design, as if the network was being designed on a greenfield site.

4.109 As such, the results of this methodology are driven purely by the defined dimensioning rule set and the area to be covered. The resulting dimensioning would imply the most theoretically efficient network design to an extent that it may not closely resemble the actual network layout that even an efficient operator would be practically capable of deploying.

4.110 The scorched-node approach is one that recognises the historical evolution of the actual networks that have been deployed by the existing operators. This method uses the historic location of network nodes, but allows for example the new MTR model rule set to deploy the appropriate technology and network configuration to make efficient use of these nodes.

4.111 As an operator rolls out a network, the location of network nodes will be dictated mainly by factors such as the level and extent of coverage the operator is trying to achieve and by forecasts of demand for services the network is expected to support; it will also, to some extent, be constrained by the availability of suitable sites and by topological constraints such as the geographical terrain the network is going to serve.

4.112 Consequently, as the operator develops a network over time there are a number of real world factors that often limit the extent that an existing network can be considered truly optimal for the current or anticipated conditions in the market.

4.113 The scorched node approach assumes that the historical locations of the actual network node buildings are fixed, and that the operator can choose the best technology to configure the network at and between these nodes to meet the optimised demand of an efficient operator. For example, this could mean replacing legacy equipment with best-in-service equipment.

4.114 The scorched node approach, therefore, determines the efficient cost of a network that provides the same services as the incumbent network, taking as given the current location and function of the incumbent's nodes. The main concern with this approach is that there could be embedded inefficiencies associated with the existing network design.

4.115 The modified scorched node approach attempts to address the shortcomings inherent in the other approaches by modifying the scorched node principle in order to replicate a more efficient network topology than that currently in place. Consequently, this approach takes the existing topology so as to maintain the linkage with actual node information provided by operators, as part of **SIR's**, whilst also having the flexibility of selecting the appropriate efficient network specification and technologies.

4.116 AM noted in its *report entitled 'Specification for the draft new MTR model' ('***MTR Specification Document'**[32]) that:

> *"The modified scorched-node approach dimensions a hypothetical network that is comparable to actual operator node counts, whilst ensuring that the network design is modern and reasonably efficient, reflecting for example the modern approach to deploying equipment functionality at different nodes in the network*[33]".

4.117 The ERG (European Regulators Group) has stated that:

> *"It can be appropriate to modify the scorched node approach in order to replicate a more efficient network topology than is currently in place. Such a modified scorched node approach could imply taking the existing topology as the starting point, followed by the elimination of inefficiencies. This may involve changing the number or types of network elements that are located at the nodes to simplify and decrease the cost of the switching hierarchy. Other important issues in this respect are how to deal with spare capacity in the network and the existence of stranded costs. When the modified scorched node approach is not applicable because the elimination of inefficiencies is not practical, it could be more appropriate to use a scorched earth approach."*[34]

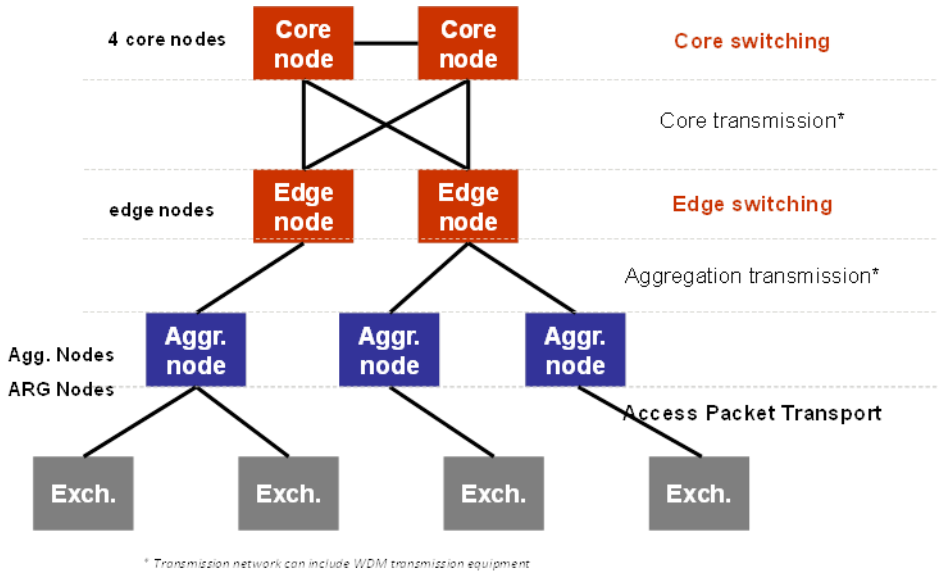
[32] See ComReg document 18/19c for a Non Confidential MTR Specification Document.
[33] MTR Specification Document (ComReg 18/19c), Section 3.2.
[34] ERG (05) 29 "ERG COMMON POSITION: Guidelines for implementing the Commission Recommendation C (2005) 3480 on Accounting Separation & Cost Accounting Systems under the regulatory framework for electronic communications", http://berec.europa.eu/doc/publications/consult_accounting_sep/erg_05_29_erg_cp_rec_as_and_cas_final.pdf

ComReg's Preliminary View

4.118 In light of the above discussion and given that the 2016 MTR model adopted a modified scorched-node approach, ComReg is of the preliminary opinion that the proposed MTR model should be based on data provided by MSPs using a modified scorched node approach. This in ComReg's opinion allows for the modelling of efficient costs and scale, whilst at the same time enabling costs and technology assumptions to be closely aligned with those actually faced by the mobile network operators currently in the Irish market.

4.119 As regards the proposed model for FTRs, ComReg is of the preliminary opinion that the network topology should be based on a scorched node approach. The network would therefore be modelled based on Eir's current deployment of NGN nodes as set out in Figure 10 below. ComReg is of the opinion that this is representative of an efficient network topology over which fixed voice will be delivered over the next few years and beyond.

Figure 10: Overview of Eir's NGN



*Source: TERA report entitled 'Assessment of Pure LRIC FTRs in Ireland Specification and results' ('**FTR Specification Document**[35]'), Figure 1*

4.120 For further discussion of this topic, please see the MTR Specification Document and the FTR Specification Document.

[35] See ComReg document 18/19b for a Non Confidential FTR Specification Document.

Q. 4 Do you agree with ComReg's preliminary view that a modified scorched node approach is appropriate for the modelling of mobile networks? Please explain the reasons for your answer, clearly indicating the relevant paragraph numbers to which your comments refer, along with all relevant factual or other evidence supporting your position.

Q. 5 Do you agree with ComReg's preliminary view that a scorched node approach is appropriate for the modelling of fixed networks? Please explain the reasons for your answer, clearly indicating the relevant paragraph numbers to which your comments refer, along with all relevant factual or other evidence supporting your position.

4.5 Symmetry of Termination Rates

4.121 The 2009 Termination Rates Recommendation recommends that NRAs set termination rates based on the costs incurred by an efficient operator. The Recommendation states that this implies that the termination rates would also be symmetric.

4.122 The Recommendation proposes that any determination of efficient cost levels that deviates from the principles set out in the Recommendation should be justified by objective cost differences which are outside of the control of the operators concerned. This could be due to uneven spectrum assignments in the mobile termination markets or a new mobile entrant incurring higher per-unit incremental costs where it has been determined that there are impediments on the retail market to market entry and expansion.

4.123 In Slovakia the regulator recently proposed that new entrant mobile operators should have an MTR 10% higher than for other operators. This proposal was however challenged by the European Commission.

4.124 BEREC in its report 'Termination rates at European Level' July 2017 (dated 7 December 2017), identified that of the 28 Member States (identified above), 26 apply FTR symmetry of rates and only two[36] apply it partially.

4.125 In the Market Review Consultation, ComReg is proposing to designate two mobile operators, Virgin Media Ireland Limited and Carphone Warehouse Ireland Mobile Limited (trading as ID Mobile[37]) with SMP for the first time.

[36] Luxembourg and Poland.
[37] A provisional liquidator was appointed to iD Mobile on 6 March 2018. ComReg continues to monitor the situation. For the avoidance of doubt, the draft Decision Instrument annexed to this consultation may be amended in the final decision taken.

4.126 ComReg is also proposing to designate 15 FSPs with SMP for the first time as set out in the following figure:

Figure 11: Newly Proposed SMP FSPs

	Newly Proposed SMP FSPs
1	Airspeed Communications Limited
2	Blue Face
3	Dialoga Servicios Interactivos, SA
4	Equant Networks Systems Limited
5	Finarea SA
6	Imagine Telecommunications Business Limited
7	In2com Ltd
8	Intellicom Ireland Limited
9	IP Telecom[38]
10	Magrathea
11	Modeva Interactive Ltd / Modeva Networks Ltd
12	Plannet 21
13	Telcom Ltd
14	Vodafone Ireland Limited
15	Voxbone

[38] IP Telecom has a fixed number allocation but does not currently supply FVCT. It has negotiated, or has concrete plans to negotiate, interconnection with relevant wholesale partners, including FTRs to be applied, and has formal plans regarding prospective wholesale and/or retail activity.

ComReg's Preliminary View

4.127 ComReg is of the opinion that symmetric Termination Rates create a level playing field which removes impediments to competition (i.e. operators no longer risk incurring higher Termination Rates charged by competing operators). ComReg recognises that pure LRIC symmetric Termination Rates should promote competition for the benefit of efficient operators as it prevents inefficient operators from recovering inefficiently incurred costs from their competitors through Termination Rates. This will also, in ComReg's opinion, provide broad benefits to consumers (i.e. by promoting efficiency and competition).

4.128 ComReg is of the preliminary view that Termination Rates should be set based on the costs incurred by an efficient operator and hence should be symmetric. ComReg takes this view having considered whether there is any justification for differentiating between operators, as discussed above.

Q. 6	Do you agree that regulated maximum Termination Rates should be symmetric? Please explain the reasons for your answer, clearly indicating the relevant paragraph numbers to which your comments refer, along with all relevant factual or other evidence supporting your position.

4.6 Consistency in Approaches for FVCT and MVCT

4.129 Section 6 of the AM Pricing Report identifies a need for consistency of treatment between the FVCT and MVCT, particularly with regard to symmetry, dynamic efficiency, voice market forecasting, treatment of unrecovered common costs, price path and model updating. These are discussed in turn below

Symmetry

4.130 Symmetry is discussed in section 4.5 above.

Dynamic efficiency

4.131 Several major technological improvements are likely to be implemented over the period for which FTRs and MTRs have been provisionally estimated e.g. LTE[39], voice over LTE ('**VoLTE**')[40], single radio access network ('**S-RAN'**)[41] equipment for mobile networks, and next-generation access networks and voice over Internet Protocol ('**VoIP**') for fixed networks. Section 6.2 of the AM Pricing Report states that such innovations (to the extent that they can be quantified) should be reflected in the MTR and FTR models. They do however recognise that it is important that assumptions are realistic and should not for example cause market distortions or be detrimental to consumer welfare.

Voice market forecasting

4.132 Section 6.3 of the AM Pricing Report recommends the use of a single voice market forecast for both MTR and FTR models. This will ensure that, for example, fixed voice origination volumes to mobile users included in the FTR model is consistent with voice termination volumes from fixed users in the MTR model.

Treatment of common costs not recovered under pure LRIC

4.133 Common costs are costs which are not directly incurred in the provision of a service but are common to two or more services.

4.134 A pure LRIC approach excludes a mark-up for common costs which would be incurred whether or not the wholesale voice call termination service is provided. This approach is consistent with the 2009 Termination Rates Recommendation.

4.135 A LRAIC+ approach includes a mark-up for the common costs. The cost under this approach is typically higher than under a pure LRIC approach

4.136 In order to assess the materiality of such costs, Section 6.4 of the AM Pricing Report recommends that the FTR model and MTR model should also calculate the LRAIC+ of termination services.

4.137 As discussed in paragraph 4.35 ComReg is of the preliminary view that FSPs and MSPs, other than Eircom, can allocate common costs not recovered through TRs to other services as they see fit. In the case of Eircom as a FSP these costs may need to be recovered, at least in part, from other regulated services. This will be considered under other price-setting exercises.

[39] Long-Term Evolution (LTE) is a standard for high-speed wireless communication for mobile devices and data terminals, based on the GSM/EDGE and UMTS/HSPA technologies. LTE may be regarded as an implementation of the 4G mobile standard.
[40] Voice over Long-Term Evolution is voice calls over a 4G LTE network.
[41] Single Ran (S-RAN) refers to base stations that provide 2G and/or 3G and/or 4G functionality.

Price path

4.138 This is discussed under Section 5.3.6 for FTR rates and Section 5.4.7 for MTR rates. AM is of the opinion that pricing MVCT using the same structure as FVCT is not appropriate as it is likely to increase operators costs in their wholesale billing structure and most mobile network costs are minute rather than call driven. As set out in Sections 5.3.6 and 5.4.7, ComReg is of the preliminary opinion that a combination of per call and per minute or a pure per minute rate could be used for FVCT while a per minute basis should be used for MVCT.

4.139 Options for setting Termination Rates are discussed in Section 6.5 of the AM Pricing Report. The Report recommends using unaveraged costs for individual years as the starting points for FVCT/MVCT in those years. This is consistent with ComReg's existing pricing decisions.

Model updating

4.140 In Section 6.6 of the AM Pricing Report whilst recognising the importance of regulatory best practice for the market, it is recommended that an update of the MTR/FTR models should only occur if there is evidence of significant divergence of model inputs and assumptions from reality which leads to a material change in the results.

ComReg's Preliminary View

4.141 ComReg's preliminary view with regard to symmetry is set out in section 4.5 above.

4.142 Having considered the information available to ComReg, including the views of AM in its Pricing Report, ComReg is of the preliminary opinion that the FTR and MTR models should:

- Reflect technological improvements over the regulatory control period.
- Use single voice market forecast for both FTRs and MTRs.
- Calculate the LRAIC+ cost of termination so that the materiality of common costs can be assessed.
- Produce FTR and MTR rates. For FTRs, a combination of per call and per minute or a pure per minute rate could be used while for MTRs a per minute basis should be used.
- Be updated if there is evidence of a significant divergence of model inputs and assumptions from reality and which leads to a material change in the results.

Q. 7	Do you agree or disagree that there is a need for consistency in the setting of regulated Termination Rates between the FVCT and MVCT markets? Is there in your opinion any other aspects where there is a need for consistency between those markets? Please provide reasons for your response.

4.7 Cost Modelling Principles

4.143 The AM Pricing Report set out pricing principles that need to be considered in the development of models for setting Termination Rates. These principles can be summarised as follows:

- Cost-oriented pricing using a pure LRIC approach, consistent with the 2009 Termination Rates Recommendation
- Bottom-up modelling with top-down validation of the outputs where appropriate
- Model should be capable of costing each year in the period 2017-2022 (inclusive) in nominal currency
- Hypothetical efficient operator (with productively efficient scale), with reasonable demand forecasts assumed across all modelled services carried by the networks
- Use of modern technologies for the future regulatory period should be chosen to ensure future dynamic efficiency benefits are captured
- The modelled termination services should assume an efficient number of points of interconnect and layers of interconnection
- Use of economic depreciation or an equivalent approach that provides an approximation to the economic cost recovery over the lifetime of the network assets
- Consistency of treatment between FVCT and MVCT, particularly with regard to a single, internally consistent forecast of the voice market in Ireland

4.144 The above principles have been applied in the development of the FTR and MTR cost models which are the subject of the next section.

Chapter 5

5 Cost Modelling of Termination Rates

5.1 Overview

5.1 In this chapter we discuss the proposed models used to determine the appropriate level of costs associated with FTRs and MTRs. We also discuss the proposed inputs and assumptions used in the underlying models to derive cost orientated fixed and mobile Termination Rates.

5.2 Background

5.2 ComReg engaged AM in 2016 to produce the AM Pricing Report which (amongst other objectives) was to consider all relevant price control models/methodologies relating to FTRs and MTRs, which are consistent with the Market Review Consultation and ComReg's regulatory objectives and recommend a preferred option.

5.3 The key considerations in the AM Pricing Report include:

- The choice of costing increment
- The model structure to be used for costing purposes
- Aspects of the costing approach
- The degree of consistency in the approach taken for FVCT and MVCT

5.4 ComReg also appointed TERA and AM to update existing or develop new FTR/MTR models (respectively) consistent with the findings of the Market Review Consultation and guided by the key principles identified in the AM Pricing Report.

5.5 The remainder of this chapter is discussed under the following headings:

1. FTR Modelling
    - Overview of the Proposed FTR Model
    - Choice of Operator
    - Appropriate Efficient Network Topology
    - Demand for Services
    - Efficient Network and Operating Costs
    - Preliminary FTR Calculation Results

- ComReg's Preliminary Opinion

2. MTR Modelling

- Overview of the Proposed MTR Model
- Operator Related Parameters
- Service Related Parameters
- Technology Related Parameters
- Implementation Related Parameters
- Main Changes in the Proposed MTR Model
- Preliminary MTR Calculation Results
- ComReg's Preliminary Opinion

5.3 FTR Modelling

5.3.1 Overview of the Proposed FTR Model

5.6 The FVCT market is currently regulated pursuant to the 2007 FVCT Decision. A price control obligation of cost orientation was imposed as part of that decision. It was decided in the 2012 Pricing Decision that FTRs be determined using a BU LRIC model ('**2012 BU LRIC Model**'). The 2012 BU LRIC Model determined FTRs to apply from 1 July 2013. The 2012 BU LRIC Model was built as an add-on to ComReg's "NGN core cost model" which had been used in the 2007 FVCT Decision.

5.7 In 2016/17 ComReg conducted an analysis of markets 3a[42], 3b[43] and 4[44] and developed a new draft version of its next generation network ('**NGN**') core network model ('**NGN Core Model**')[45]. The NGN Core Model is used to determine LRAIC+ costs for the provision of core network services. The core network supports a range of services including voice, leased lines, broadband and IPTV / multi-casting. It is proposed that this model be used as a starting point for the FTR modelling. The **FTR Specification Document** provides the details on how the proposed FTR Model has been built.

5.8 In order to determine the proposed FTRs as a result of the BU modelling, the FTR Specification Document in Section 2.3 identifies a number of adjustments and calculations that needs to be performed to the existing NGN Core Model, in particular:

- Revised voice traffic volumes for the period 2013-2016.
- Revised routing factors for voice services.
- Forecast voice traffic from 2017. This involves using a historical compound annual growth rate (**'CAGR')** for the 2014-2016 period and forecasts submitted by Eircom.

5.9 In addition to the adjustments, two Excel worksheets have been added to the NGN Core Model. One of these, 'Voice services – Platform costs', facilitates the calculation of voice platform and billing costs on a LRIC basis. The other spreadsheet derives the transmission costs associated with voice services.

- Transmission costs arise as a result of the difference in cost calculation with or without wholesale terminating traffic in the FTR model. These costs arise due to the number of line cards required to handle traffic between Aggregation Nodes and Edge Nodes. Other costs, e.g. for cables and trenches, are largely unchanged due to the removal of wholesale voice terminating traffic.

[42] Market 3a 'Wholesale local access provided at a fixed location' as defined in the COMMISSION RECOMMENDATION 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.

[43] Market 3b 'Wholesale central access provided at a fixed location for mass-market Products' as defined in the COMMISSION RECOMMENDATION 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.

[44] ComReg Response to Consultation and Further Consultation and Draft Decision document No.18/08 'Market Review: Wholesale High Quality Access at a Fixed Location'

[45] See ComReg document 17/26 'Pricing of wholesale services in the Wholesale Local Access (WLA) market and in the Wholesale Central Access (WCA) markets: Further specification of price control obligations in Market 3a (WLA) and Market 3b (WCA)' for detailed discussion of the NGN Core Model.

- Voice platform cost calculations are based on the methodology in the 2012 BU LRIC FTR model given that interconnection technical arrangements have not significantly evolved and the views of Eircom that the move from TDM to SIP is likely to be slow and insignificant in volume over the FTR and MTR modelled period. If SIP does however become a reality within this period, ComReg proposes to assess material impacts on costs. Eircom in its response to ComReg's SIR confirmed that as most material costs are fixed, it is only the variable voice specific costs of the Internet Protocol Multimedia Sub System Core ('**IMS Core'**[46]**)** /Telephony Application Server ('**TAS**'[47]), the Session Boarder Controller (**'SBC'**[48]) and Media Gateway Controller (**'MGC'**[49]) / Media Gateway ('**MGW**'[50]) that need to be recognised in the model. Section 2.4.2 of the FTR Specification Document explains in greater depth how the variable elements are calculated and recognised in the proposed FTR model.

5.10 Billing costs calculations are based on information received from Eircom relating to its billing capex and maintenance costs, asset life, price trends and usage provided as a response to a SIR. Using forecasts of traffic volumes and titled annuities, a total incremental cost of billing is calculated. Section 2.4.3 of the FTR Specification Document, sets out this process in greater detail.

5.11 In order to assist ComReg in developing a new, up to date proposed BU LRIC FTR model SIRs were issued to 21 FSPs[51] in November/December 2016, requesting information relating to traffic, technology and costs. An eight week timeframe for response was granted. With the assistance of our consultants, TERA, confidential and non-confidential versions of a proposed BU LRIC FTR model have been produced using the information provided.

[46] The Internet Protocol Multimedia Sub System Core (IMS Core) provides the set of functions and interfaces in the IP Multimedia Subsystem ('IMS') responsible for and to support call session control. For the purpose of this Consultation the functionality for IMS data management is also included in the IMS Core.

[47] Telephony Application Server ('TAS') provides originating and terminating telephony services for call sessions that are controlled in the IMS Core.

[48] Session Border Controller ('SBC') provides security and topology hiding functionality at the access to the IMS Core for signalling and media.

[49] Media Gateway Controller ('MGC') provides functionality for control of Media Gateways, conversion to and from IMS and PSTN based signalling protocols as well as interworking of intra PSTN signalling.

[50] Media Gateway ('MGW') provides conversion to and from IP based media streams and Time Division Multiplexing ('TDM') for interfacing between IMS and PSTN as well as providing intra PSTN switching functionality.

[51] Fixed Service Providers: Airspeed Communications Limited, Blue Face, BT Communications Ireland Limited, Colt Technology Services Limited, Dialoga Servicios Interactivos, SA, Digiweb Limited, Eircom, Equant Networks Systems Limited, Finarea SA, In2com Ltd, Intellicom Ireland Limited, Imagine Telecommunications Business Limited, Magnet Networks Limited, Magrathea, Modeva Interactive Ltd / Modeva Networks Ltd, Plannet 21, Telcom Ltd. , Verizon Ireland Limited, Virgin Media Ireland Limited, Vodafone Ireland Limited and Voxbone.

5.12 A top down validation has been performed in the development of the proposed FTR model that includes assets, operating costs, number of exchanges, aggregation, edge and core nodes etc. (see Section 1.4.2 and 2.1 of the FTR Specification Document).

5.3.2 Choice of Operator

5.13 In Section 5.1 of the AM Pricing Report four choices of operator that can be modelled are identified i.e. an actual market player, an average/typical operator, a hypothetical existing operator and a hypothetical new entrant.

5.14 Having considered the requirements of the 2009 Termination Rates Recommendation and the Access Regulations together with the advantages and disadvantages associated with hypothetical operators, the AM Pricing Report recommends modelling based on a hypothetical existing operator as this facilitates the capture and reflection of past constraints e.g. number of operators, use of existing nodes in the fixed network etc.

5.15 Regarding the scale of the modelled operator, Section 5.3 of the AM Pricing Report recommends the use of the average scale of the actual number of large network operators having near 100% national population coverage. Eircom is the only fixed operator with this coverage. ComReg has used Eircom's scale for the modelled fixed network operator.

5.3.3 Appropriate Efficient Network Topology

5.16 As set out above in paragraph 5.7 above, ComReg proposes that the BU pure LRIC FTR model be based on the NGN Core Model. This proposal is consistent with the AM Pricing Report recommendation and the 2009 Termination Rates Recommendations (see Section 5.4 of the AM Pricing Report).

5.17 The existing model uses internet protocol ('**IP**') switching[52] equipment at the switching layer and wavelength division multiplexing[53] ('**WDM**') at the transmission layer as the modern equivalent assets ('MEA') together with the fibre and trench of Eir. The core network also includes cables as well as civil engineering infrastructure (trenches, ducts). The core network is organised in several hierarchical levels (APT, aggregation, core) as shown in Figure 10 above.

[52] For the purpose of this consultation the term IP Switching refers to the conveyance of data or packetised voice at either layer 2 or 3 of the Open Systems Interconnection model.
[53] WDM is a method of combining multiple optical carrier signals at various wavelengths for transmission along a single fibre optic cable.

5.18 Throughout Europe there is a transition (albeit quite slow) from TDM[54] to SIP[55] interconnection. Eircom as part of this process, was requested to provide details of its plans to migrate to SIP interconnection. This is important because TDM and SIP interconnection do not require the same equipment. For example the MGW for call termination would not be required when the originating operator moves from C7[56] to IP interconnection. Accordingly the resulting costs of FTR could be different in these 2 scenarios.

5.19 Eircom has confirmed that SIP interconnection is unlikely to develop significantly in the years to come. Based on this, ComReg is of the preliminary opinion that it appears reasonable to keep the current interconnection modelling based on TDM. See also the FTR Specification Document, sections 1.4.3.2 and 2.4.2, for a detailed discussion of this issue.

5.20 ComReg is of the preliminary opinion that the BU LRIC model should be based on a scorched node approach based on Eircom's current deployment of NGN nodes as set out in Section 4.122 above. ComReg is of the opinion that this is representative of an efficient network topology over which fixed voice will be delivered over the next few years and beyond.

5.3.4 Demand for Services

5.21 Section 5.3 of the AM Pricing Report identified that demand forecasts should allow reasonable economies of scope and scale to be captured, while assuming a reasonable efficient utilisation of the network technologies over their lifetimes.

5.22 Section 2.12 of the FTR Specification Document sets out a number of steps taken by the NGN Core Model to determine the network capacity demands for voice services. The model categorises the traffic between the different traffic topologies i.e. voice, broadband and leased lines (using exchange sites) and splits the voice capacity demand between various call types i.e. local, national, primary termination etc. as each call type can use the network assets in different ways.

[54] TDM (time-division multiplexing) is a technique that divides a circuit into multiple channels based on time.
[55] SIP (session initiation protocol) is a communications protocol for signalling and controlling multimedia communication sessions in applications of Internet telephony for voice and video calls.
[56] C7 also known as Signaling System No. 7 (SS7) is the core signaling/control protocol used within fixed and mobile networks. This is used to set up and tear down most of the world's public switched telephone network (PSTN) telephone calls. It also performs number translation, local number portability, prepaid billing, Short Message Service (SMS), and other mass market services.

5.23 Given different services can use different network assets, TERA recommend using routing factors to capture the consumption of resources of each network asset by each unit of service demand. Voice routing factors have been updated and provided by Eircom to ComReg for input into the NGN Core Model. This process permits the allocation of network costs to voice products.

5.24 Section 2.1.2 of the FTR Specification Document discusses this topic in greater depth.

5.3.5 Efficient Network and Operating Costs

5.25 As set out in Section 2.1.3 of the FTR Specification Document, the NGN Core Model calculates the main network costs associated with the provision of voice services i.e.

- Node costs

  The NGN Core Model calculates the cost of the nodes in the network i.e. aggregation nodes, edge nodes, core nodes together with the WDM equipment connecting node locations (i.e. Reconfigurable optical add-drop multiplexer (**'ROADM'**[57]) which is used to facilitate high capacity connectivity over the fibre cable network). Section 2.1.3.1 of the FTR Specification Document sets out in detail the inputs and outputs from the FTR model associated with such calculations.

- DSLAM costs

  The NGN Core Model determines the sites where there are Digital Subscriber Line Access Multiplexers (**'DSLAM'**[58]) and the associated number of cards at exchanges (eVDSL) and cabinets (FTTC) (based on the number of end users). It also determines where there are Optical Line Terminations (**'OLT'**[59]) for Fibre To The Home (**'FTTH'**). Section 2.1.3.2 of the FTR Specification Document sets out the detail behind this calculation.

- Trench and pole costs

[57] A reconfigurable optical add-drop multiplexer is a form of optical add-drop multiplexer that adds the ability to remotely switch traffic from a wavelength-division multiplexing system at the wavelength layer.
[58] Digital Subscriber Line Access Multiplexers ('DSLAMs'). A DSLAM connects multiple customer digital subscriber line (DSL) interfaces to a high-speed digital communications channel using multiplexing techniques.
[59] Optical Line Terminations ('OLTs'). An OLT is the port or card of the active equipment upon which the fibre terminates in the exchange or at the point of inter-connection between the access and core networks.

In calculating trench costs, the NGN Core Model considers trench and fibre lengths, trench size and type of surface of the trench that needs excavation and reinstatement. Section 2.1.3.3 of the FTR Specification Document sets out the assumptions employed by TERA in deriving such results.

Part of the core network corresponding to the latest deployment are deployed on poles. Costs of poles are assessed considering 1 pole every 50m and a sharing of half the poles with the access network.

- Dense wavelength division multiplexing (**'DWDM'**[60]) / Code or coarse wavelength division multiplexing (**'CWDM'**[61]) system costs / Access Packet Transport (**'APT'**[62]) costs, and re-configurable optical add drop multiplexer or next generation high speed WDM ('ROADM') costs.

  Section 2.1.3.4 of the FTR Specification Document sets out the basis of the calculation of the DWDM equipment, the unit cost for CWDM and the APT costs. Information provided by Eircom (as part of a response to a SIR) on cost and engineering rules associated with the deployment of APT has been included in relevant calculations.

- Depreciation

  TERA proposes that depreciation be based on a tilted annuity approach. This has been consistently applied by ComReg for modelling of Eircom's core network and is regarded as a proxy for economic depreciation as recommended in Section 5.2 of the AM Pricing Report.

  The annuity formula implemented by TERA in the BU LRIC FTR model is as follows:

$$A_1 = \frac{I}{(1+w)^{T+\frac{1}{2}}} \times \frac{w-P}{\left[1-\left(\frac{1+P}{1+w}\right)^{N}\right]}$$

  Where:

  - A1, the annual charge in year one (used for price calculation)

[60] Dense wavelength division multiplexing ('DWDM') is a technology that puts data from different sources together on an optical fibre, with each signal carried at the same time on its own separate light wavelength.

[61] Code / Coarse wavelength division multiplexing ('CWDM') is a method of combining multiple signals on laser beams at various wavelengths for transmission along fibre optic cables, such that the number of channels is fewer than in DWDM but more than in standard wavelength division multiplexing ('WDM').

[62] Access Packet Transport ('APT') is used to connect the remote sites to the aggregation nodes.

- I, the investment value of the asset
- w, the cost of capital (parameter)
- P, the real annual change in the price of the asset
- N, the useful life of the asset
- T, the average payment term

A nominal pre-tax weighted average costs of capital[63] ('**WACC**') rate of 8.18% is used in the proposed BU LRIC FTR model. This is consistent with the rate set out in ComReg Decision D15/14[64] for the fixed line telecommunications sector. A pre-tax rate of 10.21% was used in the 2012 BU LRIC FTR model consistent with ComReg Decision D01/08[65].

- Operating Costs

  It is proposed that operating costs be based on the core network costs contained in Eircom's audited regulatory or separated accounts, adjusted for efficiencies. The NGN Core Model allocates the operating costs from Eircom's accounts to each part of the NGN network by category (e.g. exchange to Aggregation links, Aggregation node, Edge node, Core node and all other relevant links connecting the locations of the routers – See Section 5.25 above). The cost of each network asset is then allocated to each of the NGN network regions using allocation keys based on the capital cost for equipment and trench length. The NGN Core Model allocates the operating costs between the three services its supports i.e. Broadband, Voice and Leased Lines. This process is set out in greater detail in Section 2.1.3.5 of the FTR Specification Document.

- Other material costs such as buildings, power and network management systems are included in the NGN Core Model. The process of calculation of such costs is set out in Section 2.1.3.6 of the FTR Specification Document.

[63] A weighted average cost of capital is the rate that a company is expected to pay on average to all its security holders to finance its assets

[64] ComReg Decision D15/14, Document 14/136,"Cost of Capital – Mobile Telecommunications – Fixed Line telecommunications – Broadcasting (Market A and Market B)" Response to Consultation and Decision" 18/12/2014, https://www.comreg.ie/media/dlm_uploads/2015/12/ComReg14136.pdf

[65] *Response to Consultation and Decision Notice, Eircom's Cost of Capital"* Decision No. D01/08, Document No: 08/35, dated 22 May 2008, https://www.comreg.ie/publication/response-to-consultation-and-decision-notice-d0108-eircoms-cost-of-capital/

ComReg's Preliminary Opinion

5.26 ComReg is of the preliminary opinion that the proposed cost model inputs and assumptions as set out above are appropriate to determine a proposed pure LRIC model for FTRs in Ireland.

Q. 8 Do you agree or disagree with the proposed inputs and assumptions in the proposed BU pure LRIC FTR model for the purposes of determining the fixed termination rate? Please provide reasons for your response.

Q. 9 Do you believe that there is any other data that is relevant to the proposed BU pure LRIC FTR model? If so, this data should be provided to ComReg for consideration in any decision.

5.3.6 Preliminary FTR Calculation Results

5.27 On the basis of the BU pure LRIC modelling as discussed above and in the FTR Specification Document, the proposed Pure BU LRIC FTRs (maximum rates) for the FVCT market are set out in Figure 12 below.

Figure 12: Existing/ Proposed Maximum FTR Rates

€cent	Existing FTR Rate - 2017	Revised FTR Rate 2017	2018	2019	2020	2021	2022
Maximum "cost per minute" FTR	**0.037**	**0.039**	**0.035**	**0.034**	**0.034**	**0.033**	**0.032**
Maximum "cost per call" FTR	**0.065**	**0.062**	**0.060**	**0.058**	**0.057**	**0.055**	**0.053**
All costs on per Minute Cost	**0.072**	**0.060**	**0.055**	**0.054**	**0.053**	**0.052**	**0.050**

Source: FTR Model

5.28 The existing cost (for all costs on a per minute basis) is 0.072 euro cent and with the revised model this is expected to fall to 0.060 euro cent (based on an average call duration of 2.98 minutes). This reduction is primarily due to the following factors:

- Reduction in the WACC rate (from 10.21 % prior to 2014 to 8.18%)
- Change in equipment price trends (-10% per annum to -5% per annum)[66]
- Decline in transmission costs attributed to voice service
- Increase in the average call duration, which reduces the share of the call function costs which are attributed to a blended cost per minute.

ComReg's Preliminary Opinion

5.29 Given that the existing FTR is based on both a "cost per minute" and a "cost per call" basis, ComReg is of the preliminary opinion that this should continue in circumstances where a SMP Fixed Service Provider charges other undertakings for FVCT on such a basis. This is also consistent with the recommendation of AM that "…a per call price component is set only if the per call cost is a material proportion of the overall blended average cost per minute of termination".

5.30 If the proposed maximum regulated FTRs are found to be appropriate, ComReg proposes imposing the mid-point of the rates as the maximum rate for the entire regulatory control period in recognition of the cost of implementing rate changes where there would be relatively small changes in maximum rates on an annual basis. If using a simple average of yearly maximum rates then mid-points would be 0.034 euro cent per minute and 0.057 euro cent per call on a cost per minute and cost per call basis. Where calls are charged on a per minute basis only then the mid-point would be 0.053 euro cent per minute if using a simple average.

[66] Equipment price trends reflect a slower rate of decline, reducing the risk faced by early investors in such technology. The proposed new FTR model recovers capital costs through the use of tilted annuities. These are designed to compensate investors who invest early in a technology to ensure they recover sufficient costs to align with a later market entrant in the future. Where the rate of decline in prices slows then the required level of compensation of invested funds calculated via a tilted annuity is reduced in the early years of cost recovery. This effectively marginally reduces the capital cost recovery required in those early years and so reduces the cost oriented tariff.

5.31 The current maximum regulated FTR was imposed on 1 July 2015. It is anticipated that a decision on maximum regulated FTRs will be taken, at the earliest, by mid-2018. ComReg is proposing that any change to the FTR be implemented within 90 days of the Effective Date. This corresponds with the proposed draft FVCT Decision Instrument in the Market Review Consultation, Section 11.5, where it states "Each SMP Fixed Service Provider, other than Eircom, shall publish its RIO within 90 days of the Effective Date".

Q. 10 Do you agree or disagree with ComReg's preliminary views regarding the maximum FTRs that FSPs should charge as set out in this document? Please provide reasons for your response, clearly indicating the relevant paragraph numbers to which your comments refer, along with relevant factual evidence supporting your views.

Q. 11 Do you agree or disagree with the use of a mid-point of the proposed maximum rates as the maximum rate for the entire regulatory control period? Please provide reasons for your response, clearly indicating the relevant paragraph numbers to which your comments refer, along with relevant factual evidence supporting your views.

Q. 12 Do you agree or disagree with ComReg's preliminary views regarding the implementation of any decision on maximum FTRs that can be charged by FSPs found to have SMP in their respective call termination markets? Please provide reasons for your response, clearly indicating the relevant paragraph numbers to which your comments refer, along with relevant factual evidence supporting your views.

5.4 MTR Modelling

5.4.1 Overview of the Proposed MTR Model

5.32 As described in Section 3 of this document the wholesale market for MVCT on individual mobile networks is currently regulated pursuant to the 2012 MVCT Decision. In that Decision, ComReg defined six separate relevant markets and stated that each of the MSPs providing mobile voice call termination services at that time had significant market power. A price control obligation in the form of cost orientation was imposed on the six MSPs designated with SMP. The details of the price control obligation were finalised in the 2016 MTR Decision, in which the model implementing the bottom-up pure LRIC costing methodology was decided upon ('**2016 MTR model**').

5.33 Whilst AM has proposed no changes to the general approach to modelling the costs of MVCT, there are aspects of the modelling process that require to be reviewed and updated in order that the MTR model reflects the latest service and technological developments in the Irish mobile market. These include the increased use of LTE technology, the adoption of S-RAN equipment by Irish Mobile Network Operators ('**MNO**s'[67]) and the potential growth in VoLTE and voice over WiFi ('**VoWiFi**'[68]) services.

5.34 The 2016 MTR model did not explicitly model 4G radio technologies and modelled certain aspects of the network (such as backhaul assets) at a high level. ComReg recognises that attempting to incorporate the latest service and technological developments and allow for more detailed modelling of other aspects of the network would require extensive redevelopment of the 2016 MTR model and, having considered how best to reflect these developments, ComReg agree with its advisors, AM, that the most appropriate approach is to construct a new MTR model specifically for this process (the '**proposed MTR model**'). The proposed MTR model reflects aspects of its predecessor but also uses the most recent data available in relation to the Irish mobile market.

5.35 In order to identify the costs, volumes and technologies faced by MSPs active in the Irish market for MVCT services, ComReg (in consultation with AM) issued SIR's in September 2016 to seven MSPs that are proposed to be designated with SMP as part of the Market Review Consultation[69]. A seven week timeframe for response was granted and this was subsequently extended (at the request of industry) by four weeks to 14 December 2016.

5.36 This data to produce the proposed MTR model (confidential and non-confidential versions). The next sections of this Consultation discuss the main modelling principles and methodologies that are applied in the proposed MTR model and sets out ComReg's preliminary views in relation to each of the key parameters. This is then followed by an overview of the main differences between the proposed MTR model and the 2016 MTR model.

5.37 Following the publication of this Consultation document, it is proposed that group/bilateral workshops will be held with the proposed designated MSPs to review the approach taken in the proposed MTR model and provide them with an opportunity to discuss the proposed modelling assumptions and parameters directly with ComReg and its advisors.

[67] A mobile network operator (MNO) is a MSP that operates its own mobile network.
[68] Voice over WiFi (VoWiFi) allows a user to originate or terminate voice calls over a WiFi Router.
[69] Vodafone Ireland Limited ('Vodafone'), Three Ireland Hutchison Limited, Meteor Mobile Communications Limited ('Meteor'), Tesco Mobile Ireland Limited ('TMI'), Lycamobile Ireland Limited ('Lycamobile'), The Carphone Warehouse Limited and Virgin Media Ireland Limited.

5.38 ComReg discusses the cost modelling of MTRs in the following sections. The modelling parameters have been grouped as follows:

- **operator-related parameters** – the form of the modelled operator (hypothetical efficient existing operator), structural implementation (bottom-up model using scorched node approach reflecting actual operator data), market share assumptions, network footprint and wholesale/retail costs;
- **service-related parameters** – the service set, service volumes, voice traffic, data traffic, operator demand and busy hour service demand;
- **technology-related parameters** – geotypes, points of interconnect, network nodes, radio access network, network coverage, S-RAN, VoLTE and VoWifi, treatment of spectrum, mobile switching network, mobile transmission network and network expenditure;
- **implementation-related parameters** – increment, depreciation, WACC, modelling timeframe and mark up.

5.4.2 Operator Related Parameters

Form of the modelled operator

5.39 As noted above, the AM Pricing Report considers four types of operator that can be modelled and concludes that cost modelling should be based on a hypothetical efficient existing operator. Modelling a hypothetical efficient existing operator means that the proposed MTR model can better reflect reality by capturing the network technologies currently deployed by Irish mobile network operators (MNOs) to support MVCT services and considering scale similar to the actual scale achievable in the Irish market while maximising transparency for industry.

5.40 In modelling a hypothetical efficient mobile operator, the proposed MTR model is not intended to mirror the costs of a specific Irish operator as its objective is not to identify operator-specific costs. Modelling an actual operator or an average operator could lead to the capture of past inefficiencies and this is inconsistent with the 2009 Termination Rates Recommendation which envisages an efficient operator rather than an actual operator (see Recital 1).

5.41 Modelling an efficient new entrant would be consistent with the 2009 Termination Rates Recommendation but such an approach would require additional assumptions around the pace of subscriber migration and network roll-out. Modelling a hypothetical efficient new entrant would also require an assumption about the most efficient technology that would be adopted by a new operator rolling out its network today (for example, it could be assumed that a new operator would not invest in 3G technology, but rather in LTE technology only). This could lead to network design and technology assumptions that are very different from those of the MNOs currently active in the market and produce outputs that are more difficult to calibrate against existing operator data.

5.42 ComReg's preferred approach is to establish the cost for MVCT of an efficient existing MNO operating in an Irish context so as to derive a maximum symmetric MTR that can be applied to all MSPs operating in Ireland. However, as has been noted, the proposed MTR model has been based on data provided by MSPs using a modified scorched node methodology. This allows for the modelling of efficient costs and scale, whilst at the same time enabling costs and technology assumptions to be closely aligned with those actually faced by the MNOs currently in the Irish market. Modelling a hypothetical existing operator in this way also allows for past constraints to be reasonably captured and, if relevant, reflected (e.g. different levels of spectrum scarcity, different numbers of network operators, use of existing network node locations).

Structural implementation

5.43 As noted in Section 4.2.1 above, the AM Pricing Report identifies two options for the model structure, referred to as TD models and BU models. Ofcom has described the general differences in both approaches as follows:

"In a top-down approach, relationships between outputs and costs are estimated from historical accounting information, and costs are projected forward on the basis of output forecasts. In a bottom-up approach, the components of cost are identified at a more granular level. Cost causation relationships are then defined to link the quantity of each of these cost components with output and other cost drivers, based on practical and theoretical evidence"[70].

[70] Please refer to Section A7.1 in http://stakeholders.ofcom.org.uk/binaries/consultations/mtr/statement/MCT_statement_Annex_6-10.pdf

5.44 The AM Report considers that a TD approach "is not necessarily the best modelling approach to determining the costs of an efficient operator for transparent regulatory purposes". The report further notes "that it is extremely difficult to use a top-down model to calculate a "pure LRIC" of any service (a small, final increment cost), since the cost-volume relationships of all cost categories would require a detailed definition. Also, top-down models do not exist for hypothetical operators and may not reflect efficient deployment, scale or choice of modern technologies".

5.45 This is particularly relevant in the case of the proposed MTR model. While there is only one fixed network operator (Eircom) with close to 100% population coverage there are three MNOs that fulfil this criteria. Consequently, the hypothetically efficient existing operator that is the basis for the proposed MTR model is unlikely to correspond to an actual operator. Moreover, adopting a TD approach based on the data of a particular MNO would not necessarily be representative of the hypothetically efficient existing operator.

5.46 ComReg has constructed the proposed MTR model based on information sourced from actual operators in the Irish market through SIR's. Such information includes:

- demand, e.g. subscriber usage, busy hour traffic profile;
- network design e.g. cell radii, mix of backhaul technologies, planned asset capacities;
- and cost e.g. unit capex, asset lives.

5.47 Certain key outputs of the proposed MTR model are subsequently calibrated with reference to the network and financial data of actual operator(s). This helps ensure that the proposed MTR model is consistent with the 2009 Termination Rates Recommendation which requires that a cost model should *"produce as robust results as possible and to avoid large discrepancies in operating cost, capital cost and cost allocation between a hypothetical and a real operator*[71]*."*

Market share

5.48 The market share assumed for the hypothetical efficient operator is an important design principle as this determines the share of each traffic service that the hypothetical operator's network will be expected to carry.

[71] 2009 Termination Rates Recommendation, Recital 11.

5.49 The 2009 Termination Rates Recommendation states that the minimum efficient scale that can be assumed in the BU LRIC model is 20% and while it does not indicate a maximum market share, it accepts that Member States may deviate from the minimum efficient scale[72]. Regarding the scale of the modelled operator, the AM Pricing Report notes that *"a neutral approach to both fixed and mobile markets is to use the average scale of the actual number of large network operators having near 100% national population coverage. This is therefore 33.3% for a national mobile network operator (as there are three such operators for mobile serving 100% of the mobile market)"*.

5.50 Previously, in the 2016 MTR Decision, ComReg, while accepting "1/N" methodology as an appropriate basis for determining the modelled market share, also recognised the significant uncertainty that persisted at that time as a result of the then recent merger between Three and O2. Consequently, having considered concerns raised by a number of respondents to the consultation in relation to the market share assumptions, ComReg deemed it to be prudent, at that time, to assume a 25% market share throughout the modelled timeframe of the 2016 MTR model.

5.51 However, now that the merger between Three and O2 has occurred and given that there is no evidence of a fourth MNO emerging in the Irish market at this stage, ComReg is of the preliminary view that it is appropriate to apply a 33.3% market share in the proposed MTR model for all years after 2013. As a result the proposed MTR model uses a 25% market share for the hypothetical efficient operator up to 2013 on the basis of the four MNOs that were active up to that time and then assumes a 33.3% market share thereafter to reflect the merger between Three and O2 that resulted in only 3 MNOs remaining active after 2013.

5.52 Applying the 1/N approach in this way means that the assumed market share for the period of the price control is 33.3% as per the table below.

Figure 13: Market Share of Hypothetical Efficient Operator

Market Share	2018	2019	2020	2021	2022
	33.3%	33.3%	33.3%	33.3%	33.3%

Source: MTR Specification Document, page 9, Figure 3.4,

[72] Minimum efficient scale is the point in the average total cost curve beyond which no significant economies of scale can be achieved, i.e., the minimum level of output at which average total costs are minimised. This measure is a widely used starting point for assumed efficient size based on a number of network operators active in the territory.

Network footprint

5.53 The hypothetically efficient existing operator in the proposed MTR model is assumed to have similar network coverage to that achieved by the three MNOs identified as having near 100% population coverage[73]. While the proposed MTR model expresses coverage in terms of population, the 2016 MTR model expressed coverage in terms of area. However, in developing the proposed MTR model, AM have assumed input levels of population coverage that lead to similar levels of area coverage as found in the 2016 MTR model– see Figure 14 below:

Figure 14: Input Coverage of the Country (unless otherwise stated) by Technology in the 2016 and Proposed MTR Models

Technology	Population coverage (proposed MTR model)	Resulting area coverage (proposed MTR model)	Area coverage (2016 MTR model)
2G (from 2003)	98.7%	84.7%	84.7%
3G (2100MHz, up to 2012)	84.3%	35.5%	35.5%
3G (900MHz, by 2019, in the two rural geotypes only)	92.6% (of Rural 1 / Rural 2)	77.3%	62.8%
4G (by 2019)	98.7%	84.7%	Not applicable

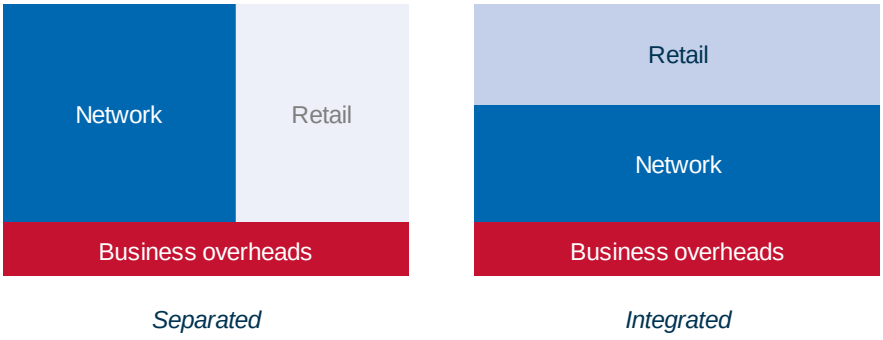
Source: MTR Specification Document, page 9, Figure 3.4

5.54 Further information on the technologies used to achieve the modelled level of coverage can be found below in the section on Technology Related Factors.

Wholesale/retail costs

5.55 In Section 3.3.4 of the MTR Specification Document, AM considers that the costs of an operator's retail activities can be assumed to be either separated or integrated within the operator's business, as illustrated below:

Figure 15: Options for Consideration of Retail Costs



Source: MTR Specification Document, Figure 3.13

[73] Meteor (eir Mobile), Three and Vodafone.

5.56 In a *separated* approach, network services (such as voice traffic) are costed separately from retail activities (such as marketing or handset subsidies). Business overheads are then marked up between network and retail activities, and the wholesale cost of supplying mobile termination is only concerned with the costs of the network plus a share of business overheads attributable to the network.

5.57 In an *integrated* approach, retail costs are considered integral to network services and included in service costs through a mark-up, along with business overheads. Consequently, there is no concept of 'wholesale' access to mobile termination in the integrated case, as all retail costs are included in the service costing.

5.58 AM concludes that a separated approach is preferable given that ComReg, to date, has identified its market analysis as that relating to the *wholesale* MVCT market (see the Market Review Consultation). As a result, wholesale and retail can be considered as different parts of a vertically structured company and the proposed MTR model only includes those costs that are relevant, either directly or indirectly, to the provision of the wholesale network termination service.

5.4.3 Service Related Parameters

Service set

5.59 Service parameters are a necessary input to the model which calculates long-run costs. The proposed MTR model includes information on subscriber numbers, service volumes and traffic patterns. In developing the cost model, it is therefore first necessary to gain an understanding of the aggregate historic and forecast traffic in the Irish mobile market over the timeframe of the model.

5.60 The provision of both voice and data services across a single infrastructure will generate economies of scale and scope (reducing the unit costs for voice and data services). As a proportion of network costs will need to be allocated to all such services, a full list of services must be included in the proposed MTR model.

5.61 As noted in Section 3.3.1 of the MTR Specification Document, while some of the non-voice services are proven services (particularly services like SMS on mobile networks), other non-voice services, such as 4G mobile broadband or VoLTE, can give rise to forecast uncertainty when included in the regulated prices for voice. ComReg is aware that some MNOs are trialling VoLTE and consequently have included a feature in the proposed MTR model to assess the impact that carrying VoLTE services might have on the MTR charges across the modelled period. For example, including VoLTE in the service set would reduce the 2018 pure LRIC of MVCT by 3%.

5.62 However, ComReg is of the preliminary view that as VoLTE is not an established service it should not be included in the service set for the next price control period. Therefore, in developing the proposed MTR model, the following mobile traffic services are considered:

- 2G and 3G on-net mobile calls
- 2G and 3G outgoing calls to other mobile operators
- 2G and 3G outgoing calls to fixed
- 2G and 3G outgoing calls to international
- 2G and 3G domestic incoming
- 2G and 3G international roaming (inbound) to mobile
- 2G and 3G on-net SMS[74]
- 2G and 3G outgoing SMS
- 2G and 3G incoming SMS
- 2G and 3G on-net MMS[75]
- 2G and 3G outgoing MMS
- 2G and 3G incoming MMS
- 2G packet data
- Release-99 (low speed) packet data
- High Speed Downlink Packet Access ('**HSDPA**[76]') packet data
- High Speed Uplink Packet Access ('**HSUPA**[77]') packet data
- 4G packet data

5.63 Section 3.3.1 of the MTR Specification Document discusses this further, in particular its concerns around the treatment of non-voice services (e.g. 4G mobile broadband).

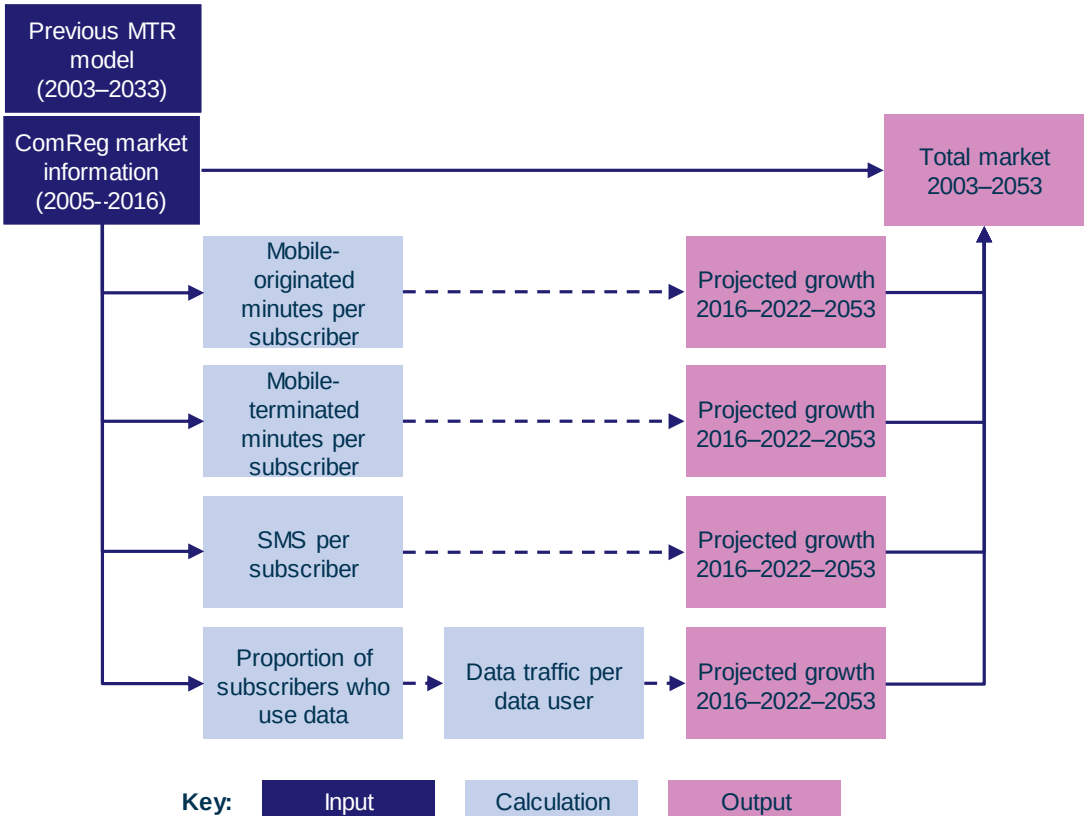
[74] On-net SMS is a Short message service between two subscribers (retail, MVNO or inbound roamer) of the modelled operator.
[75] Multimedia Message Service between two subscribers (retail, MVNO or inbound roamer) of the modelled operator.
[76] High Speed downlink Packet Access (HSDPA) packet data are Megabytes of packet data (excluding IP overheads) transferred to and from a subscriber (retail, MVNO or inbound roamer) using the HSPA network.
[77] High Speed Uplink Packet Access (HSUPA) packet data are Megabytes of packet data (excluding IP overheads) transferred to and from a subscriber (retail, MVNO or inbound roamer) using the HSPA network.

Service volumes

5.64 The proposed MTR model uses ComReg statistics on the total market in Ireland, supplemented by information provided by Irish mobile network operators (in the form of their responses to SIR's and Quarterly Key Data Reports requests) together with data extracted from the 2016 MTR model, to quantify historical demands and derive forecast trends for both mobile market subscribers and traffic. This is to ensure that the modelled network is dimensioned with reference to all the traffic that is carried on Irish mobile networks.

5.65 Traffic volumes are modelled at the market level by considering the historic demand and forecast volume trends of all the different services carried on mobile networks and restating these in terms of per subscriber usage. AM base the population time series on sources published by the CSO while the historical penetration rates are derived with reference to the modelled subscriber numbers and population levels for each year up to 2016. The penetration rate is then assumed to be constant after 2016 so that subscriber numbers evolve each year after 2016 in line with the forecast population trend.

Figure 16: Market Calculation Framework



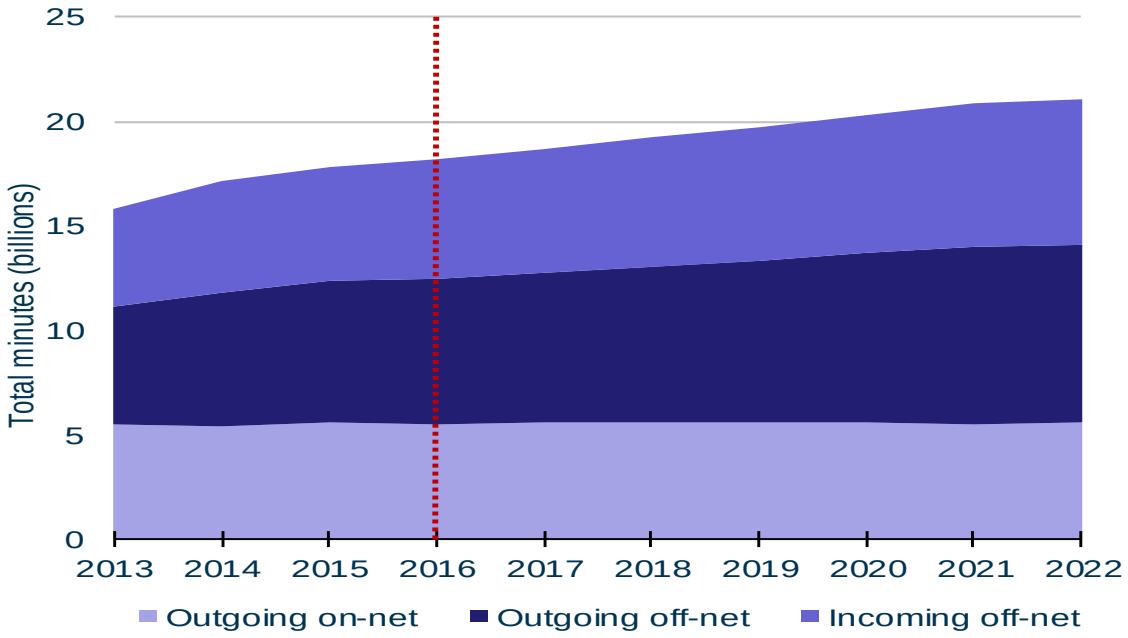
Source: MTR Specification Document, Figure 4.1

5.66 This market information is then rearranged to suit the categories used in the proposed MTR model, with voice, SMS[78] and data traffic treated separately. Voice and SMS are further split into sub-categories: incoming, outgoing and on-net traffic. All three are also split into the different radio technologies modelled. Further information on the market calculations can be found in Chapter 4 of the MTR Specification Document.

Voice traffic

5.67 Historical total voice traffic and subscribers from 2005 to 2016 are used to derive a forecast for the duration of the proposed MTR model. Voice usage per subscriber is then assumed to peak in 2021 and remain constant thereafter, so that total voice usage will then evolve in line with population growth.

Figure 17: 'Evolution of Total Voice Usage in Ireland'



Source MTR Specification Document, Figure 4.5.

5.68 Section 6 of the AM Pricing Report notes that a degree of consistency needs to be maintained in the approaches for deriving FVCT and MVCT. With regard to voice market forecasting, it recommends that:

> *"…. a single voice market forecast feeds into both models to dimension the network assets required. This can ensure, for example, that the volumes of fixed voice origination to mobile users assumed in the fixed model are consistent with the volumes of mobile voice termination from*

[78] SMS volumes do not have a material impact on the costs modelled for voice services.

fixed users assumed in the mobile model, given the market shares of the selected hypothetical operators."

5.69 In developing the proposed MTR model, Section 3.3.2 of the MTR Specification Document recognises that the voice forecasts for the FVCT and MVCT need to be aligned.

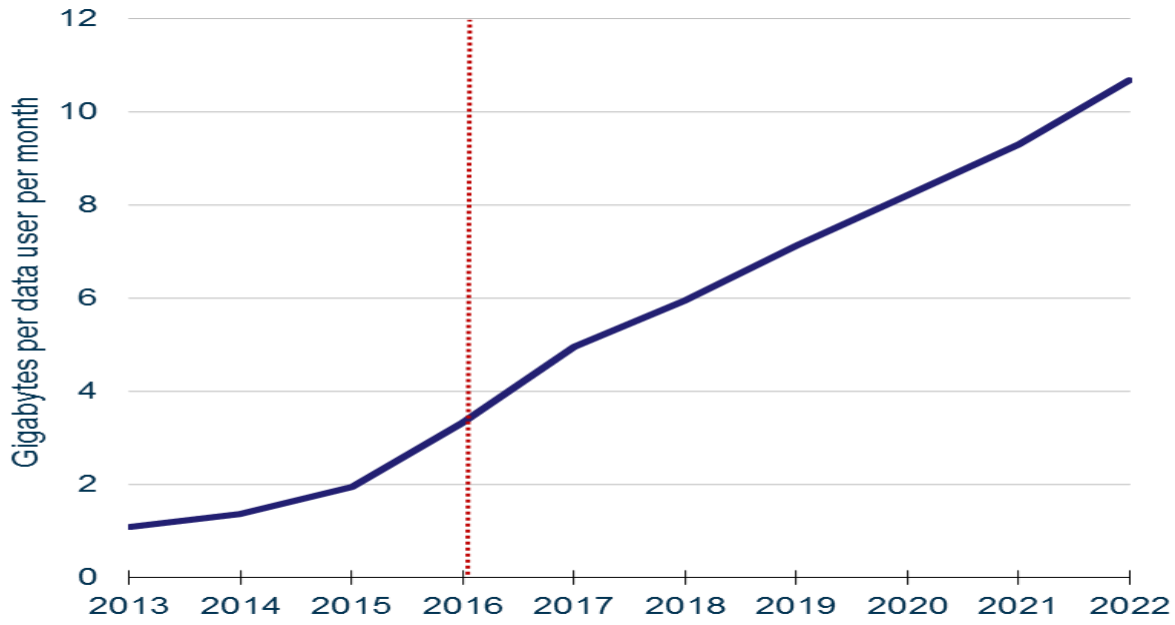
5.70 Further information on the voice traffic calculations can be found in Section 4.2 of the MTR Specification Document.

Data traffic

5.71 AM has based the data forecasts on the forecasts underlying ComReg's cost-benefit analysis of a change in use of 700MHz band that was published in 2015[79]. These forecasts run to 2035 and were developed taking into account increased mobile penetration and usage per device, population growth, WiFi offload and declining use of legacy technology handsets.

5.72 The proposed MTR model then calculates its own data forecast using these inputs, by calculating the megabytes of usage per data subscriber per month until the first year of flat usage (2036), and then applying this usage per subscriber to the forecast subscriber base in future years. The resulting forecast usage per data subscriber per month is illustrated below:

Figure 18: Forecast of Gigabyte Consumption per Subscriber per Month



Source: MTR Specification Document, Figure 4.9

[79] ComReg Information Notice 15/62. In particular, see https://www.comreg.ie/csv/downloads/ComReg1562a.pdf, Figure 4.

5.73 This significant increase in volume on a year-to-year basis leads to a corresponding increase in the number of sites and base stations, as no new spectrum is made available in the proposed MTR model.

Operator demand

5.74 Given that the proposed MTR model assumes that the hypothetical efficient existing operator has a market share of 33.3%, this market-average scale is applied to the total applicable market volumes to determine per operator demand. This is done for all services with one exception, as described below.

5.75 In the 2016 MTR model, actual data volumes for the period 2007–2013 were reduced by 33% before being included in the model. ComReg took the decision to reduce data traffic volumes in this way as a review of the historic data usage experienced by the 4 MNOs active in the market at that time concluded that a level of dongle traffic appeared to be an outlier in the market — as it did not seem to be representative of the data traffic carried by a hypothetical efficient mobile operator with 25% market share. To maintain consistency with this aspect of the 2016 MTR model, AM has continued to apply a 33% reduction to actual market data volumes for the period 2007–2013 in the proposed MTR model, but for 2014 onwards no reduction is applied and the full market data volumes are modelled.

Busy hour service demand

5.76 Service demand for the hypothetical efficient existing network operator is calculated on an annual basis but, for network dimensioning purposes, the busy hour load for each service also has to be considered. This is calculated based on the share of traffic in the busy hour, the average duration of voice calls, and the proportion of data traffic in the busiest data path (uplink or downlink).

5.77 The proposed MTR model assumes that there are 250 busy days in a year for voice and 365 for data and SMS. Other key assumptions relating to peak hour dimensioning include the proportion of busy-day traffic that occurs in the voice busy-hour and the data busy-hour.

5.78 The calculation of busy-hour Erlangs (**'BHE'**[80]) for each 2G and 3G voice service in both the voice busy hour and the data busy hour is further uplifted by 10% to allow for fluctuations in busy-hour loading, as was assumed in the 2016 MTR model. Other voice related inputs include call attempts per successful call, additional ringing time per call and average call duration.

[80] An Erlang is a measurement of traffic traditionally used in telephone networks (one Erlang represents the continuous use of one voice path).

5.79 Further details of the basis for determining the service volumes that the modelled operator is expected to carry, both on an annual basis and at peak times, can be found in Section 5 of the MTR Specification Document appended to this document.

5.4.4 Technology Related Parameters

5.80 Having determined the level of voice and data services pertaining to the hypothetical network operator it is then necessary to consider the technology parameters that will inform the types and quantities of network equipment and infrastructure that will be required to deliver those services to end users.

5.81 There are a number of key cost drivers that the 2016 MTR model considered in order to dimension the network. Service demand from all traffic services is combined with network usage/routing factors to form aggregated cost drivers to capture the relative usage of each network element by each unit of service demand. This enables the current MTR model to calculate the required deployment of appropriate network elements in order to meet the demands for capacity and coverage.

5.82 However, as capacity and coverage requirements are not uniform across the country it is also necessary to consider the extent to which geographical factors can influence the costs of delivering services to end users. Consequently, the service demand has to be attributed to the different geotypes in the proposed MTR model.

Geotypes

5.83 The definition of geotypes is central to the modelling as they provide a means of classifying different geographical areas of a region according to the factors that might influence relative costs and demand. This allows the modelling of the different dynamics of network deployments in different geographies (for example, coverage-driven deployments in rural areas, versus capacity-driven deployments in urban areas).

5.84 AM has defined geotypes for the proposed MTR model based on the 2011 Census Electoral Divisions available from the CSO[81]. AM has undertaken an analysis of the CSO data on land area[82] and population for each of the 3,409 electoral divisions to derive a population density for that area. AM then uses the derived population densities to categorise each electoral division into one of five categories as presented in Figure 19 below.

Figure 19: Characteristics of Geotypes

Geotype	Population density	Population	Land area (km^2)	Proportion of national population	Proportion of national land area
Dense urban	>2500	1 210 282	302	26.38%	0.44%
Urban	500–2500	886 677	878	19.32%	1.28%
Suburban	100–500	813 354	3 921	17.73%	5.73%
Rural 1	20–100	1 339 366	34 749	29.19%	50.75%
Rural 2	<20	338 573	28 616	7.38%	41.80%

Source: CSO and MTR Specification Document, Figure 6.1

5.85 Further information on the approach taken to the modelling of geotypes in the proposed MTR model can be found in Section 6.1.1 of the MTR Specification Document.

5.86 AM has also undertaken a calibration exercise to cross check the number of sites per geotype derived in the proposed MTR model against an estimate of the number of base station locations in each of the five geotypes that has been derived from ComReg's mobile site database. The results of this calibration exercise are contained in Section C.1 (Annex C) of the MTR Specification Document.

5.87 ComReg is of the preliminary view that the use of 2011 CSO data on population and land area for each of the 3,409 electoral divisions is a reasonable basis to model geotypes in the proposed MTR model and captures the key characteristics such as population density, commuting spread around urban centres and topological / civil planning variation that can influence MNOs' planning decisions.

[81] 2011 Census Boundaries, Electoral Divisions, published by Central Statistics Office, licensed under Creative Commons Attribution 4.0 (CC BY4.0), available at https://data.gov.ie/dataset/census-2011-boundary-files. 2011 data is used to inform the geotype classifications as this was the latest data available at the time the Current MTR model was first developed. While 2016 data is now available Analysys Mason have assessed this data and found that, as the geotype analysis is undertaken at a very granular level, updating for the 2016 data would have no material impact on the resulting geotype classifications.

[82] Analysys Mason use "land area" rather than "total area", to exclude lakes and inlets (e.g. the Shannon Estuary).

Points of interconnect

5.88 Fixed networks interconnection can be offered at a national or local level and the interconnecting operators can be charged different termination rates depending on the location of the fixed line customer relative to the interconnection point[83]. For example, Eircom charges a higher termination rate to terminate a call to a Cork number if the call is handed over at an interconnect point in a Dublin exchange rather than a local Cork exchange. This means that an operator interconnecting into a fixed network can reduce the level of charges it pays for call termination by having more points of interconnect located across the fixed operators network.

5.89 However, interconnection to mobile networks is typically offered at a national level because the interconnecting operator cannot be expected to know where on the host MNO's network the handset of the mobile subscriber is located. Consequently it is sometimes necessary to route a call across the mobile network when the handset is in another region of the country. As a result, the average number of points of interconnection is expected to be higher on a fixed network than on a mobile network although, even on a mobile network, the need for network resilience will mean that an efficient operator might choose to have interconnection in more than one location.

5.90 ComReg, as part of its SIRs, sought information from operators relating to points of interconnection. AM conducted a review of the subsequent data returns and identified that, on average, operators have points of interconnection at two distinct locations and therefore are of the opinion that interconnection to other networks can be carried out efficiently at two distinct locations.

Network Nodes

5.91 Network nodes have been discussed in Section 4.4 above and in Section 3.2.6 of the MTR Specification Document.

Radio access network

5.92 For modelling purposes, the hypothetical efficient mobile operator's network needs to be designed and dimensioned on the basis of a specified modern technology. The Radio Access Network (**'RAN'**) comprises the base station sites and equipment required to implement a radio access technology connecting the end user to the mobile core network.

[83] Connections at primary exchanges are subject to the maximum FTRs while connections at tandem and double tandem layer can also include a charge for transit to the primary layer. Transit rates are not regulated.

5.93 The network design for the radio layer considers the three radio technologies: 2G Global System for Mobile Communications (**'GSM'**[84]**)**, 3G Universal Mobile Telecommunications System ('**UMTS'**[85]), and 4G LTE. This includes not only a layer of coverage, but also capacity upgrades, and the physical site requirements (single technology sites, co-located sites, own tower sites and third-party installations). The network design first considers sites for coverage and then considers the radio interface traffic loading to calculate the additional assets required to carry this loading. There is also a need to consider the potential impact of VoLTE, VoWIFI and S-Ran deployments.

5.94 The 2016 MTR model explicitly considered both 2G and 3G technologies and ComReg is of the preliminary view that it is still appropriate to include both technologies in the proposed MTR model as an efficient mechanism for delivering mobile services including MVCT over the coming years. In developing the proposed MTR model, AM has implemented a cell-breathing calculation in the 3G dimensioning to capture the fact that when traffic loads increase in a 3G network the subsequent rise in the signal-to-noise ratio acts to reduce the range of the cell.

5.95 In the 2016 MTR model it was concluded that although 4G mobile technologies such as LTE could be deployed in the long term, 4G was expected to be largely focused on delivering higher-rate mobile data services. Therefore the previous MTR model only considered 4G to the extent that it was assumed that an element of future data demand would be carried on 4G and did not explicitly model the costs associated with 4G deployment.

5.96 ComReg remain of the view that it is unlikely that a 4G overlay would be used to deliver large volumes of wholesale mobile voice termination in the short to medium term. However, there are economies of scale and scope associated with deploying a 4G overlay with the 2G/3G networks, due to asset sharing. While these are only likely to have a small impact on the pure LRIC of wholesale MVCT they could have a larger impact on the LRAIC+ of wholesale MVCT.

5.97 Also, 4G has now emerged as a proven technology in Ireland to an extent that was not evident when the 2016 MTR model was being developed. Therefore, ComReg is of the preliminary view that the costs of 4G technology should now be captured in the proposed MTR model to fully understand its impact on the costs of MVCT (as a minimum from increased economies of scope).

[84] The Global System for Mobile Communications (**GSM**) is a second generation (2G) standard for mobile networks.
[85] The Universal Mobile Telecommunications System (**UMTS**) is a third generation mobile cellular system for networks based on the GSM standard.

Network coverage

5.98 Coverage is considered a central aspect of mobile network deployment and of the radio network in particular. All mobile networks in Ireland currently provide significant coverage using their 2G/3G networks, as required by their licences. These actual levels of coverage should be reflected in the proposed MTR model, as they were in the 2016 MTR model.

5.99 The 2016 MTR model expressed coverage in terms of geographic area, whilst the proposed MTR model expresses coverage in terms of population. On this basis, AM has assumed input levels of 2G and 3G 2100MHz population coverage that lead to similar levels of area coverage for those technologies as found in the 2016 MTR model. The input population coverage (and corresponding area coverage) for the proposed MTR model are summarised in Figure 3.4 of the MTR Specification Document (re-produced in Figure 14 above) and compared to those found in the previous MTR model.

5.100 The proposed MTR model assumes that both 3G and 4G deployments reach the same level of coverage as the modelled 2G network in the long term. The 3G and 4G coverage deployments have been calibrated to ensure that the 2016 base station counts of the modelled operator are in the range of the asset counts of actual operators, as derived using ComReg's licence data. A similar calibration using the actual 2G base station deployments is not undertaken since they comprise both coverage and capacity base stations.

5.101 AM has also used a set of multipliers in the proposed MTR model to estimate radii for different spectrum bands, based on the assumed 2100MHz radii. These are consistent with those that AM has used in cost models in other jurisdictions, see Figure 20 below:

Figure 20: Multipliers to Convert Cell Radii across Spectrum Bands

Band	800MHz	900MHz	1800MHz	2100MHz
Multiplier	1.7	1.5	1.1	1.0

Source: MTR Specification Document, Figure 3.5

S-RAN

5.102 The 2016 MTR model assumed that 2G Base Transceiver station ('**BTS**'[86]) and 3G NodeBs[87] would remain as separate pieces of equipment in the long term. However, in recent years, vendors have designed base stations that provide 2G and/or 3G and/or 4G functionality. This is referred to as single-RAN (**'S-RAN'**) equipment and there is evidence of S-RAN being used in Ireland.

5.103 The use of S-RAN in the proposed MTR model would give rise to greater economies of scope between technologies resulting in fewer base station units (i.e. one per site rather than one per technology per site).

5.104 This would lead to lower operating costs per site (e.g. through more efficient power use), but there would be a significant capex outlay for new base station units (which have a higher unit cost than any one of three radio technologies standalone, due to their greater functionality). AM has identified two options for modelling the impact of S-RAN:

- To dimension new 'combined base station' assets and sub-components, which are deployed as replacements for existing base stations over a defined period, or
- To adjust the unit cost levels of the standalone units and model a wide-scale replacement of these units to trigger appropriate levels of capex.

5.105 Given the complexity involved in modelling the first option AM has opted for the second, which can be implemented through modification of the MEA unit costs of the standalone deployments to achieve the expected levels of capex and opex. S-RAN is assumed to be activated from 2014 onwards in the proposed MTR model and further detail on the cost modelling approach taken is described in Section 3.2.1 of the MTR Specification Document.

[86] The Base Transceiver station (BTS) is the electronics equipment and antennae that together comprise a 2G access site.

[87] Node B is the access node of the 3G network that transmits and receives communication signals from user equipment and the rest of the mobile network.

VoLTE and VoWiFi

5.106 The proposed MTR model also includes the functionality of a VoLTE platform (as the next generation of mobile telephony) and of VoWiFi, in order to understand the possible cost impact of these technologies on wholesale MVCT within the forthcoming regulatory period. However, ComReg is of the preliminary view that there is still significant uncertainty both in terms of modelling the costs of such platforms in the Irish context and in understanding the extent of their use to carry mobile voice traffic in the long-run. Consequently the proposed MTR model assumes that both platforms are not deployed and that all forecast voice continues to be carried using 2G and 3G networks.

Treatment of spectrum

5.107 The spectrum holding of the existing mobile network operators in Ireland is set out in Figure 21 below. Prior to 2013, the spectrum holdings for the modelled operator are consistent with the spectrum holdings from the 2016 MTR model and from 2013 onwards the modelled operator's assumed spectrum holding is based on an average of all operator holdings and aligns with its assumed market share, i.e. the modelled operator is assumed to hold one-third of the available spectrum within each band, rounded to the nearest block size of 5MHz.

Figure 21: Paired Spectrum Holdings by Operator and Band

Operator	800MHz	900MHz	1800MHz	2100MHz	3.6GHz
Three	2×10	2×5 + 2×10	2×20 + 2×15	2×30	100
Vodafone	2×10	2×10	2×25	2×15	85/105
Meteor	2×10	2×10	2×15	2×15	80/85
Total	2×30	2×35	2×75	2×60	265/290
Generic operator	2×10	2×10	2×25	2×20	2×45

Source: MTR Specification Document, Figure 3.7

5.108 Each band is assumed to be used for either capacity or coverage for one of the three radio technologies and this notional spectrum holding is not assumed to differ in the modelled scenario of full traffic and the modelled scenario of traffic without mobile termination. As a result the spectrum licence costs will not be part of the pure LRIC for MVCT.

5.109 For a more detailed overview of spectrum allocations, please see Section 3.2.2 of the MTR Specification Document.

5.110 In the proposed MTR model, AM uses the values for spectrum usage fees for the years prior to 2013 implied by the 2016 MTR model and have used the following sources for the spectrum payments for subsequent years:

- the 2100MHz spectrum licences, as published on the "Mobile licences" page of ComReg's website

- ComReg's information notice, document 12/123, published following the auction of 800MHz, 900MHz and 1800MHz spectrum in 2012
- Ofcom's analysis of the Irish 2012 spectrum auction
- ComReg's publications on the 3.6GHz auction

5.111 The calculation of spectrum payments include the access fees and annual usage fees that are paid by Irish operators and take into account the level of payments and the time value of money. As a result spectrum fees are calculated on a year-by-year basis with upfront fees calculated as a capex and annual spectrum usage fees calculated as an opex. For each modelled year fees are allocated between 2G, 3G and 4G technologies.

5.112 Please see Section 3.2.2, 3.23 and Section 6.10 of the MTR Specification Document for a more detailed discussion of how the costs associated with spectrum payments are derived for the hypothetical operator in the proposed MTR model.

Mobile switching network

5.113 The mobile switching network comprises the nodes and equipment necessary to provide the various services such as call routing, message transfer and internet access for the subscribers connected through the RAN. The 2009 Termination Rates Recommendation stipulates that the switching network layer could be specified as NGN-based for the purposes of BU LRIC modelling of MTR costs.

5.114 Mobile switching networks have been evolving for many years in Ireland and long established operators have upgraded legacy MSC switches in conjunction with 3G deployment and then again for 4G deployment. As all Irish operators have upgraded their networks for 4G deployments an all IP-core appears to be a reasonable assumption for the hypothetical operator to deploy.

5.115 To capture the upgrades necessary for a 4G network, AM has assumed the use of an industry standard enhanced packet core (**'EPC'**) architecture while the introduction of VoLTE requires the deployment of an IP Multimedia subsystem (**'IMS'**[88]).

[88] IP Multimedia Sub system (IMS) is a framework for delivering IP multimedia services.

5.116 Different types of switches are necessary to ensure the network of the operator modelled is able to function as planned to offer mobile services. Figure 20 presents these switches and states the minimum number required in any network. The traffic load on the network may then require larger numbers of units to be deployed. Some switches are assumed to have redundant deployments.

Figure 22: Overview of the Switch Capacity Assumptions

Asset	Assumed capacity driver	Minimum deployment	Asset	Assumed capacity driver	Minimum deployment
GSM MSC[89]	BHCA[90]	2	IN[91]	Subscribers	1
MSS[92]	BHCA	2	VMS[93]	Subscribers	1
MGW[94]	BHE[80]	2 × 2 (for redundancy)	MMSC[95]	Per second	1
SGSN[96]	SAU[97]	2	SMSC[98]	Per second	2 × 2 (for redundancy)
GGSN[99]	PDP[100]	2	Billing	CDR[101]s	1
4G MME[102]	Gbit/s	2	PoI[103]	BHE	2
4G SGW[104]	Gbit/s	2	I-SBC[105]	Mbit/s	2
HLR[106]	Subscribers	2	Call server	BHCA	1

[89] Global system for mobile communications mobile switching centre
[90] Busy-hour call attempts (BHCA) refers to the average number of times per hour each subscriber tries to make a call.
[91] The intelligent network (IN) platform provides value-added traffic services (e.g. call screening, reverse charges and premium rate number provision) mainly related to voice calls.
[92] MSC Server (MSS) is a 2G core network element which controls the network switching subsystem elements.
[93] Voicemail system (VMS) is a computer based system which sends, stores and retrieves voice messages.
[94] Media Gateway (MGW) acts as a bridge between different networks (2G, 3G IP, etc.).
[95] MMS Centre (MMSC) receives and stores multimedia messages sent to subscribers on the network.
[96] Subscriber GPRS Serving Node (SGSN) locates mobile devices and routes traffic between them.
[97] Simultaneously attached users (SAU)
[98] SMS centre (SMSC) is the short message switch centre which receives and stores short messages sent to subscribers on the network.
[99] Gateway GPRS support node (GGSN) allows 2G and 3G networks to interface with the internet.
[100] Packet data protocol (PDP) is a network **protocol** used by packet switching external networks to communicate with GPRS (General Packet Radio Services) networks.
[101] Call Data Record (CDR) is a data record produced by a telephone exchange or other telecommunications equipment that documents the details of a telephone call or other telecommunications transaction (e.g., text message).
[102] Mobility Management Entity (MME) handles the signalling related to mobility and security for the 4G radio access network.
[103] Point of Interconnect (POI) is the physical linking of a carrier's network with equipment or facilities that belongs to another carrier's network.
[104] Serving Gateway (SGW) acts as a router for data between the subscriber device and external networks.
[105] Interconnect session border controller (I-SBC) – manage voice services
[106] Home location register (HLR) stores details of subscribers authorised to use the network.

Asset	Assumed capacity driver	Minimum deployment	Asset	Assumed capacity driver	Minimum deployment
AUC[107]	Subscribers	1	TAS[108]	BHCA	1
EIR[109]	Subscribers	1	SBC	BH[110] voice Mbit/s	1

Source: MTR Specification Document, Figure 6.9

5.117 Please see Section 3.2.4 and Section 6.8 of the MTR Specification Document for more detailed discussion of the modelling of the mobile switching network and support systems.

Mobile transmission network

5.118 Transmission infrastructure connects the active equipment to ensure the transport of voice, message and data traffic between the different network equipment nodes. The transmission in a mobile network can be further classified in terms of:

- Base station last-mile access (**'LMA'**) to a hub
- hub to BSC[111] or RNC[112] (if applicable)
- BSC or RNC to main switching sites (containing MSC[113] or MGW) if not co-sited
- Core transmission between main switching sites (between MSC or MGW).

5.119 The first three classifications relate to the transmission links in the access network and between the access and the main switch sites in the core network and are often categorised as backhaul links. Providing backhaul presents a significant cost to the mobile operator and can vary substantially depending on the network topology, traffic load and geographic conditions. Typical solutions for providing transmission can include a variety of technologies, such as:

- leased lines (E1, STM 1[114] and higher, 100Mbit/s and higher)
- self-provided microwave links (2-4-8-16-32, STM1 microwave links, Ethernet microwave)
- leased fibre network (leased/dark fibre with either STM or Gbit fibre modems).

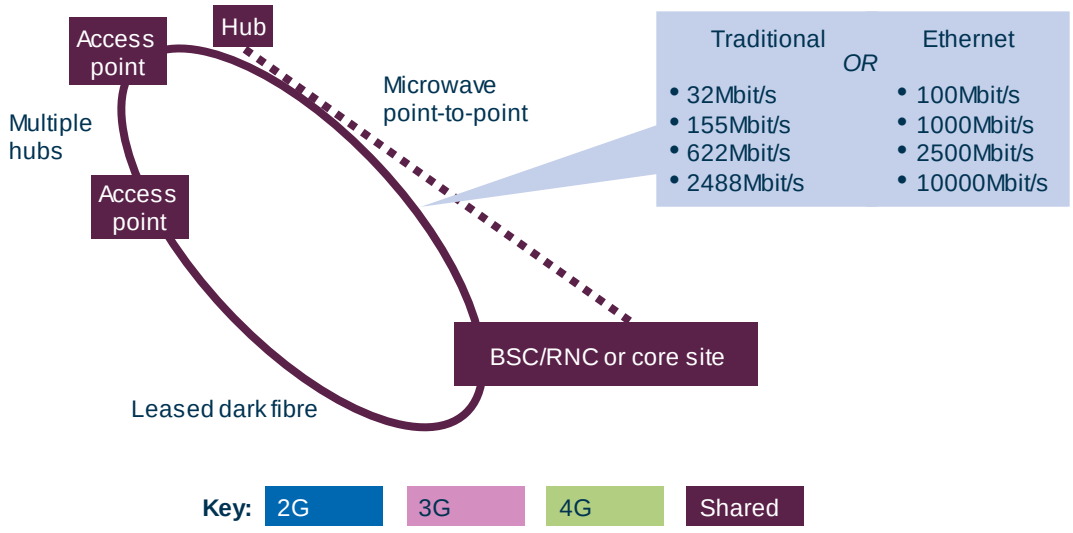
[107] Authentication Centre (AUC) confirms the identity of SIM cards attempting to attach to the network.
[108] Telephony Application Server (TAS) manage voice services e.g. call forwarding, call wait and call transfer.
[109] Equipment identity register (EIR) provides IMEI verification services
[110] Busy Hours (BH)
[111] Base Station Controller (BSC) controls Base Transceiver stations (BTSs).
[112] Radio Network Controller (RNC) is 3G equivalent of a BSC.
[113] Mobile Switching Centre (MSC) is a 2G core network element which controls the network switching subsystem elements.
[114] Synchronous transport module (STM) is a Fiber optic network transmission standard. It has a bit rate of 155.52 Mbit/s. Higher levels go up by a factor of 4 at a time.

5.120 The choice of mobile network transmission varies among the actual mobile operators and can change over time. In the proposed MTR model, AM models a modern mobile network transmission architecture. This implies a national fibre network for collecting and carrying traffic back to the main switching sites (assumed to be located at several geographically separate locations in Dublin) and carrying traffic between these sites.

5.121 While the choice between leasing managed STM/Gbit services and self-supply of transmission equipment is likely to vary by operator, AM has assumed the hypothetical operator leases dark fibre and self-supplies transmission equipment. The model also assumes that backhaul is predominantly provided using microwave links with a smaller number of leased lines (in Dublin and smaller cities).

5.122 The LMA and hub to core transmission networks are common to all three radio network technologies. The model allows for capacity upgrades and the physical transmission infrastructure for both networks can be either leased lines or microwave links. Microwave links are deployed point-to-point but in the case of the hub to core transmission network the leased lines can be deployed in rings as shown in Figure 23:

Figure 23: Overview of the Modelled Transmission between Hubs and the Core Network



Source: MTR Specification Document, Figure 6.5

5.123 Base Station Controllers (BSCs) and Radio Network Controllers (RNCs) aggregate 2G and 3G traffic respectively. In both cases, all urban radio traffic is routed through BSCs/RNCs in its own geotype, with the remaining traffic all routed through the dense urban geotype. There are capacity upgrades implemented in the proposed MTR model for this level as well.

5.124 Some BSCs and RNCs are co-located with core nodes, but others are remote and so require BSC or RNC to core transmission links. The core network is assumed to be a ring within Dublin, with another ring to remote BSC/RNC locations. It carries a proportion of the data traffic and a proportion of the voice traffic.

5.125 Please see Section 3.2.5 and Sections 6.3 to 6.7 of the MTR Specification Document for more a detailed discussion of the modelling of the various transmission network deployments.

Network expenditure

5.126 Network element unit capex and opex costs need to reflect the costs that a mobile operator in Ireland would incur. For this reason the values used in the proposed MTR model have been based, to the maximum extent possible, on data collected from the Irish mobile network operators. Where data is absent, unavailable, or incomplete, it has been necessary for ComReg and its advisers to exercise complex judgments and appreciation as to the relevant inputs and costs associated with them. Where appropriate, such judgment has also been exercised in the light of experience in other jurisdictions.

5.127 The network design algorithms in the proposed MTR model compute the assets (network elements) that are required to support a given demand in each year. A series of steps are then undertaken in order to arrive at the schedule of capex and opex over the modelling period. These steps include defining and quantifying the assets to be purchased in each year, deriving unit costs (capex and opex) for these assets, calculating unit cost trends over time and then applying the calculated costs to the computed network asset quantities each year to derive total capex and opex over time.

5.128 The model includes standard costs inputs for each asset category specifying an assumed lifetime, planning period, proportion of asset replaced per annum and opex as a proportion of capex for each category. The network design algorithms have to factor in a planning period to allow time for provisioning, installation, configuration and testing of the assets before they are activated.

5.129 As the cost of purchase of network assets varies over time, AM has applied a MEA approach to provide the appropriate cost basis for purchase. Real-term unit asset cost trends are applied to 2017 unit asset costs to reflect the evolution of the modern technology unit asset costs over past and future time. In the proposed MTR model AM has largely applied the cost trends assumed in the 2016 MTR model.

5.130 Section 7 of the MTR Specification Document sets out a more detailed discussion of the approach taken in the proposed MTR model to calculate expenditure.

5.4.5 Implementation Related Parameters

5.131 A key issue to consider when implementing a bottom-up cost model is the model structure. ComReg's intention is that the proposed MTR model can estimate the costs of a hypothetical efficient existing operator in Ireland based on the technologies and spectrum bands actually used by Irish mobile operators during the period of the price control.

5.132 To this end, the proposed MTR model has been developed using demand and network parameter information submitted by Market 2 stakeholders in Ireland in response to SIR's, combined with estimates and calculations performed by AM to calculate long-run incremental costs for mobile network operations in Ireland.

5.133 The proposed MTR model is capable of deriving service costs using both long-run LRAIC+ and pure LRIC principles. The AM Pricing Report recommends that the model be capable of calculating a pure LRIC as this is the primary purpose of the proposed MTR model. However, having the ability to calculate a LRAIC+ allows a comparison of the total costs of the operator, rather than just the avoidable costs.

Increment

5.134 The requirement to calculate a pure LRIC for the purposes of setting MTRs necessitates that the wholesale termination increment be defined. The proposed MTR model defines the increment for the wholesale MVCT service to comprise the following services:

- 2G domestic incoming to mobile voice minutes
- 2G international/roaming (inbound) to mobile voice minutes
- 3G domestic incoming to mobile voice minutes
- 3G international/roaming (inbound) to mobile voice minutes

5.135 This service set is consistent with 2009 Termination Rates Recommendation (Recommendation 6) which states that:

> *"Within the LRIC model, the relevant increment should be defined as the wholesale voice call termination service provided to third parties".*

5.136 See also Section 4.22 above for a discussion around the choice of increment.

Depreciation

5.137 The proposed MTR model uses economic depreciation to determine the cost recovery of capital investments. A general overview of the treatment of economic cost recovery is provided in Section 4.3 of this document. For more details on this in relation to the proposed MTR model see Section 3.4.2 and Section 8 of the MTR Specification Document.

WACC

5.138 The calculation of the cost recovered in the proposed MTR model needs to reflect the time value of money. In the proposed MTR model this is accounted for by the application of a discount factor on future cash flows, and, as with the 2016 MTR model, AM has based the discount factor on the regulated WACC (currently 8.63% as per ComReg decision D15/14) for MNOs.

5.139 Since the proposed MTR model works in real 2017 EUR, the 8.63% figure for WACC is first transformed into a real-terms WACC over time by removing inflation (in the same way as in the 2016 MTR model). AM bases inflation on the consumer price index (CPI).

5.140 The proposed MTR model discounts costs recovered in the years after a network element is purchased by an amount equal to the WACC. This ensures that the cost of capital required for the network element is also returned to the operator.

Modelling timeframe

5.141 Under economic depreciation it is not necessary to recover specific investments within a particular time horizon (e.g. the lifetime of a particular asset), but rather throughout the lifetime of the business. Consequently, the time series, namely the period of years across which demand and asset volumes are calculated in the proposed MTR model, should approximate the lifetime of the operator. Given that it is impractical to identify the lifetime of an operator AM has, instead, assumed that the time series should be at least as long as the longest asset lifetime used in the proposed MTR model.

5.142 Using a long time-series:

- allows the consideration of all costs over time, providing the greatest clarity within the proposed MTR model as to the implications of adopting economic depreciation
- provides greater clarity on the recovery of all costs incurred from services
- provides a wide range of information with which to understand how the costs of the modelled operator vary over time and in response to changes in demand or network evolution.

5.143 The 2016 MTR model had a modelling timeframe of 2003–2033 and ComReg believe it is reasonable to continue using 2003 as the assumed first year of the modelled operator. However, since the proposed MTR model must also consider 4G deployments (which the proposed MTR model assumes are deployed from 2013 onwards), there is merit in considering a longer timeframe than 2033, since 20 years after 2013 may be insufficient bearing in mind the long-run costs of the 4G network (particularly if additional sites are required).

5.144 For a cost model of mobile networks, the longest-lived assets (such as owned sites) are normally of the order of 25 years, and a longer modelling time series of 50 years is often used. The discounting of costs and revenues in years beyond this period would be such that any terminal value would be minimal. Therefore, ComReg is of the preliminary view that a modelling timeframe of 2003–2053 is appropriate for the proposed MTR model.

Mark Up

5.145 The 2009 Termination Rates Recommendation specifically excludes the recovery of non-incremental costs from voice termination. The pure LRIC calculation in the proposed MTR model allows the recovery of the costs incurred solely due to provision of the services in the wholesale termination increment.

5.146 Therefore the pure LRIC calculation excludes a mark-up for any common costs which would not be avoided if the wholesale voice call termination service was no longer supplied. However, the implementation of LRAIC+ in the proposed MTR model does require the recovery of non-incremental costs, i.e. costs that are common to more than one increment. Where common costs are not directly allocable to a service, an alternative allocation mechanism is required if the common costs are to be included in the final cost results from the MTR model. AM, in its MTR Specification Document sets out two approaches to allocate common costs:

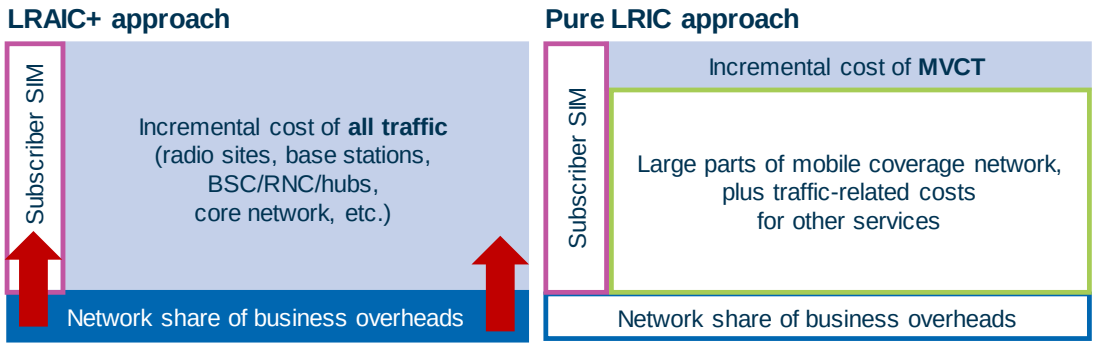
- Equi-proportionate mark-up (EPMU) - In this method, the incremental cost of all increments is increased by the same percentage. The percentage is calculated as the ratio of total common costs to total incremental costs.

- Ramsey Pricing – In this method, the common costs are marked up on the incremental cost of all increments using a calculation that relies upon the elasticities of the various services consumed.

5.147 Having considered the practical difficulties of applying Ramsey pricing to mobile services, AM opts to use EPMU to mark up the LRAIC+ in the proposed MTR model. Please see Section 3.4.5 of the MTR Specification Document for a more detailed discussion of this topic.

5.148 Figure 24 below sets out the process employed by AM in developing the proposed MTR model. This allows a comparison between the total costs of the network and the avoidable costs of MVCT.

Figure 24: Comparison of LRAIC+ with the Pure LRIC Approach



Source: MTR Specification Document, Figure 9.3

5.149 In the LRAIC+ approach, business overheads are marked up onto each incremental service cost in an equi-proportionate manner, according to the ratio of common to incremental network costs. See Section 9.1 of the MTR Specification Document for the proposed MTR model for a more detailed explanation of this process.

ComReg's Preliminary Opinion

5.150 ComReg is of the preliminary opinion that the proposed cost model inputs and assumptions as set out above are appropriate to determine a pure LRIC model for MTRs in Ireland.

Q. 13 Do you agree or disagree with the proposed inputs and assumptions used in the development of the proposed BU pure LRIC MTR model for the purposes of determining the mobile termination rate as set out above and detailed in the MTR Specification Document? Please provide reasons for your response with references to specific paragraphs in this Consultation.

Q. 14 Do you believe that there is any other data that is relevant to the proposed MTR model? If so, this data should be provided to ComReg for consideration in the final decision.

5.4.6 Main Changes in the Proposed MTR Model

5.151 The proposed MTR model follows the same general approach as the 2016 MTR model and takes many inputs from its predecessor. There are some differences in the design and implementation of the proposed MTR model when compared with the 2016 MTR model.

5.152 AM has recommended incorporating the latest network and costing algorithms that are used in equivalent models developed in other jurisdictions. These include:

- Calculation of sites by type (single versus multi-technology)
- Improved modelling of transmission costs
- Modelling of data-congested 3G/4G networks
- Consideration of the networks without mobile-terminated voice according to best practice used in other jurisdictions
- Modelling of S-RAN

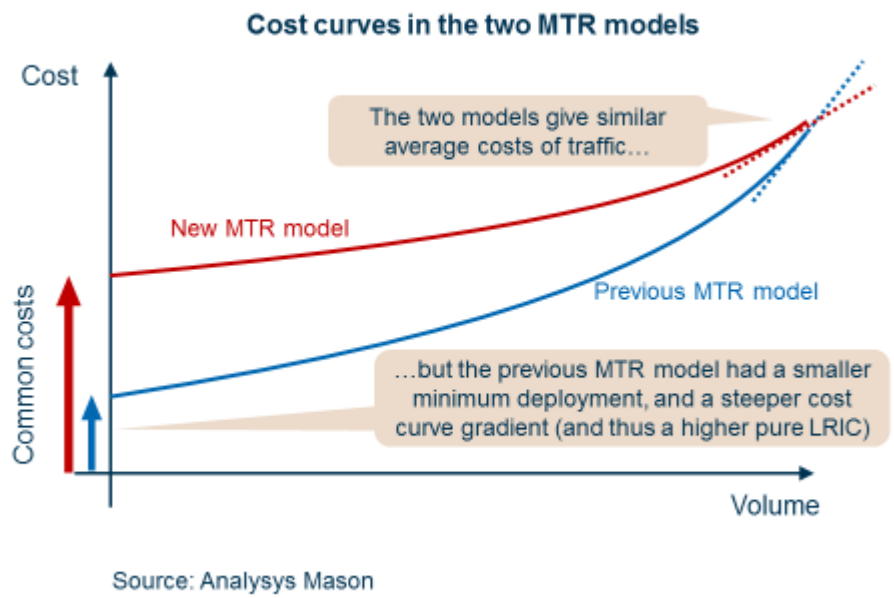
5.153 AM has also recommended refining the geotype classifications with the result that the proposed MTR model has five classifications whereas the 2016 MTR model had three. The proposed MTR model also includes updated traffic forecasts and contains network/costs inputs that are calibrated to more recent operator data. The proposed MTR model also explicitly models the costs of 4G services, technology and spectrum, whereas the 2016 MTR model assumed a share of data traffic would be carried over 4G but did not model the costs associated with 4G deployment.

5.154 The proposed MTR model includes more efficient technologies such as dual carrier high speed packet access ('**DC-HSPA**'), S-RAN and 4G.To better understand the impact of modifications in the proposed MTR model AM has undertaken a "rollback" exercise by, for example:

- Switching off of S-RAN, 4G, cell breathing and DC-HSPA
- Reverting to the 2016 MTR model's assumptions regarding:
  - Population/demand over time
  - Spectrum allocations
  - Market share
  - Modelling period (2003-2033)
  - 2G/3G coverage and cell radii
  - Utilisation factors
  - Opex (i.e. 20% of capex in all cases)
  - Inflation

5.155 However, even allowing for this attempted rollback there are still differences in the two MTR models. This is arising, at least in part, from the different implementations leading to different cost-volume relationships in the two MTR models. This effect is illustrated in the following chart:

Figure 25: Cost Curves in the Previous and Proposed MTR Models



Source: Analysys Mason

5.156 As the chart indicates, even when the inputs in the proposed MTR model are realigned with the inputs in the 2016 MTR model, there are still elements of the 2016 MTR model that use different formulae in areas such as network dimensioning, traffic routing and economic depreciation that mean it is not possible to completely "rollback" the proposed MTR model to the 2016 MTR model, even though the pure LRIC arising from the partial "rollback" (euro cent 0.5 – 0.6) is higher and thus closer to the 2016 MTR model (euro cent 0.8).

5.157 The key differences from the 2016 MTR model that lead to different pure LRIC MTRs include:

- The 2016 MTR model had significantly larger maximum cell radii leading to smaller coverage networks and therefore more traffic sensitive equipment
- The 2G network design in the 2016 MTR model leads to different number of coverage sites in the "with MVCT" and "without MVCT" scenarios. The effect is not present in the proposed MTR model
- The 2016 MTR model included a peak-to-average ratio of 5 applied to voice traffic compared to 2 for data traffic, which increases the sensitivity of the network dimensioning algorithms to the removal of the MVCT increment

5.158 Revising these parameters in the 2016 MTR model would lead to a reduction in the pure LRIC, for example, reducing the peak-to-average ratio for voice from 5 to 3 would reduce the derived pure LRIC for 2017 in the 2016 MTR model from euro cent 0.8 to euro cent 0.6.

5.4.7 Preliminary MTR Calculation Results

5.159 The proposed MTR model calculates proposed MTRs based on both LRAIC+ and pure LRIC principles – see Figure 26 below

Figure 26: Proposed MTR Rates

		2016	2017	2018	2019	2020	2021	2022
Existing MTR Rate		0.84	0.82	0.79				
Pure LRIC	Nominal euro cent	0.41	0.39	0.36	0.33	0.31	0.31	0.30
Blended LRAIC+		1.02	1.01	0.99	0.96	0.94	0.93	0.92

5.160 The regulated maximum MTR for 2018 is 0.79 euro cent per minute. With the new model this has been preliminarily calculated as 0.36 euro cent per minute.

5.161 The existing price control will expire on 31 December 2018. ComReg proposes that any decision on regulated maximum MTRs will be effective from 1 January 2019.

5.162 There are a number of options for setting MTRs for the regulatory control period i.e.

- Glide Path – This approach involves setting the price of the last year of the control period at a rate as per the cost per minute of the model. The glide path is determined from the current price to the rate for the last year.
- Unaveraged – This approach sets the rate equal to the cost per minute for each year of the model
- Unweighted average – This approach sets a single price per minute over the regulatory control period equal to the average of the costs per minute in each year of the control period.
- Weighted average - This approach sets a single price per minute equal to the weighted average of the costs per minute of all the years in the control period.
- Levelised – This approach sets a single price per minute so that the NPV of the revenues is equal to the NPV of the costs included in the model.

5.4.8 ComReg's Preliminary Opinion

5.163 While ComReg recognises that choosing an average rate over the regulatory control period would reduce the administrative burden on operators (e.g. updating price lists), ComReg is of the preliminary opinion that the MTR should be calculated for each year over the regulatory control period from the model as the rate changes on an annual basis have a significant impact.

5.164 ComReg proposes that the MTRs set out above will be maximum rates applicable to all SMP MSPs from the date of implementation of ComReg's final decision.

Q. 15	Do you agree with ComReg's preliminary views regarding the maximum regulated MTR that MSPs with SMP should charge for the forthcoming price control period? Please provide reasons for your response, clearly indicating the relevant paragraph numbers to which your comments refer, along with relevant factual evidence supporting your views.

Q. 16	Is there any other issue raised in this Consultation for which you would like to provide a response? Please provide reasons for your response, clearly indicating the relevant paragraph numbers to which your comments refer, along with relevant factual evidence to support your opinion/position.

Q. 17	Having considered this Consultation are there any further comments you would like to make on the proposed decision to impose a price control of cost orientation in the associated Market Review Consultation? If so can you please refer in your comments to the relevant paragraphs in that decision and support any comments with economics based argumentation and facts. Please note that the text of the draft decision instruments at Annexes 1 and 2 of this document may be subject to change to reflect any final decision taken in regard to the decision instruments proposed in the Market Review Consultation.

Chapter 6

6 Regulatory Impact Assessment ("RIA")

6.1 Overview

6.1 A Regulatory Impact Assessment ("RIA") is an analysis of the likely effect of proposed new regulation or regulatory change. The RIA should help to identify regulatory options, and should establish whether the proposed regulation is likely to have the desired impact. The RIA is a structured approach to the development of policy, and analyses the impact of regulatory options on various stakeholders.

6.2 A RIA should be carried out as early as possible in the assessment of potential regulatory options, where appropriate and feasible. The consideration of the regulatory impact facilitates the discussion of options, and a RIA should therefore be integrated into the overall preliminary analysis. This is the approach which ComReg follows in this Consultation and this RIA should be read in conjunction with the overall Consultation. A RIA will be finalised in the final Decision arising from this Consultation, having taken into account responses to this Consultation, and any comments from the European Commission.

6.3 ComReg's approach to the RIA is set out in the Guidelines published in August 2007 in ComReg Document Nos. 07/56 & 07/56a. In conducting the RIA, ComReg takes into account the RIA Guidelines[115], issued by the Department of An Taoiseach in June 2009 under the Government's Better Regulation programme. Section 13(1) of the Communications Regulation Act 2002 (as amended) requires ComReg to comply with Ministerial Policy Directions. Policy Direction 6 of February 2003[116] requires that, before deciding to impose regulatory obligations on undertakings, ComReg shall conduct a RIA in accordance with European and international best practice and otherwise in accordance with measures that may be adopted under the Government's "Better Regulation" programme.

[115] See "Revised RIA Guidelines How to Conduct a Regulatory Impact Analysis", June 2009. http://publicspendingcode.per.gov.ie/wp-content/uploads/2012/07/Revised_RIA_Guidelines_June_20091.pdf

[116] Ministerial Policy Direction made by the Minister for Communications, Marine and Natural Resources on 21 February 2003.

6.4 In conducting the RIA, ComReg has regard to the RIA Guidelines, while recognising that regulation by way of issuing decisions e.g. imposing obligations or specifying requirements in addition to promulgating secondary legislation may be different to regulation exclusively by way of enacting primary or secondary legislation. Our ultimate aim in conducting a RIA is to ensure that all measures are appropriate, proportionate and justified. ComReg will take a common sense approach to ensure that a decision is proportionate and does not become overly burdensome. As decisions are likely to vary in terms of their impact, if after initial investigation, a decision appears to have relatively low impact ComReg may carry out a lighter RIA in respect of that decision.

6.5 The following sections, along with the analysis and discussion set out elsewhere in this Consultation represent a RIA. It sets out a preliminary assessment of the potential impact of a regulatory price control obligation of cost orientation that ComReg proposes to impose on the Proposed SMP Service Providers.

6.2 Steps for Assessing Regulatory Options

6.6 In assessing the available regulatory options, ComReg's approach to the RIA is based on the following five steps:

Step 1: describe the policy issue and identify the objectives

Step 2: identify and describe the regulatory options

Step 3: determine the likely impacts on stakeholders

Step 4: determine the likely impacts on competition

Step 5: assess the likely impacts and choose the best option.

6.7 Each step is discussed in detail below.

6.3 Step 1: Describe the Policy Issue and Identify the Objectives

6.8 Section 12 of the Communications Regulation Act 2002 (as amended) states that ComReg shall take all reasonable measures which are aimed at achieving its objectives, including:

- Ensuring that there is no distortion or restriction of competition in the electronic communications sector;
- Encouraging efficient investment in infrastructure and promoting innovation;
- Promoting the interests of users within the Community; and

- Encouraging access to the internet at reasonable cost to end-users.

6.9 The European Commission published its 2009 Termination Rates Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates on 7 May 2009. The 2009 Termination Rates Recommendation emphasises that regulated termination rates should be brought down to the costs of an efficient operator as soon as possible and that there should be a consistent application in all EU Member States.

6.10 The proposed measures in this Consultation should continue to provide legal certainty in this area and should ensure maximum benefit to consumers in terms of affordable prices and the efficient development of innovative services.

6.11 The 2009 Termination Rates Recommendation requires termination rates to be set based on long-run incremental costs ("pure LRIC"). The 2009 Termination Rates Recommendation aims to address:

- Fundamental competitive distortions, substantial transfers between fixed and mobile markets and consumers, significant payments from smaller to larger competitors and high retail prices for originating calls and correspondingly lower usage rates, thus decreasing consumer welfare.

- The regulatory uncertainty created by the lack of harmonisation in the setting of termination rates, which may deter potential investors, and imposes a regulatory burden on operators active in several EU Member States.

6.12 The development of the internal market and consistent regulatory practice are important factors for ComReg in the context of the proposed measures assessed throughout this Consultation and also as set out below. As recognised in the 2009 Termination Rates Recommendation, although cost orientation is generally provided for in most EU Member States, a divergence between price control measures has prevailed across the EU Member States. Significant divergences in the regulatory treatment of FTRs and MTRs create fundamental competitive distortions.

6.13 The 2009 Termination Rates Recommendation allows for asymmetric termination rates for new mobile entrants for a transitional period of up to four years where such entrants have objectively higher efficient costs and face impediments to reaching an efficient scale, so that they have sufficient time to recoup their higher incremental costs.

6.14 It has also been necessary for ComReg to consider the implications of the 2009 Terminations Rate Recommendation on related regulated markets where relevant. When pure LRIC is used to set prices for traffic termination then common costs will not be recovered from that traffic.

6.4 Step 2: Identify and Describe the Regulatory Options

6.15 The regulatory options considered in the context of setting the FTRs and MTRs are as follows:

- Options on the various forms of cost orientation
- Options for implementation of cost orientation
- Options on implementation timelines
- Options on symmetric Termination Rates
- Options on recovery of common costs

6.4.1 Options on the Various Forms of Cost Orientation

6.16 The two options considered for cost orientation are:

- Pure LRIC
- LRAIC+

6.17 These options are considered in light of Regulation 13(3) of the Access Regulation which states that: *the Regulator shall ensure that any cost recovery mechanism or pricing methodology that it imposes under this Regulation serves to promote efficiency and sustainable competition and maximise consumer benefits*.

6.18 These options were considered in detail in this Consultation in chapter 4 and also in the AM Pricing Report. The potential impact on the various stakeholders is discussed in more detail below.

6.4.2 Options for Implementation of Cost Orientation

6.19 There are two options in terms of implementing cost orientation:

- Cost modelling
- Benchmarking.

6.20 Regulation 13(3) of the Access Regulations states that the Regulator shall ensure that any cost recovery mechanism or pricing methodology, that it imposes, serves to promote efficiency and sustainable competition and maximise consumer benefits. In this regard, the Regulator may also take account of prices available in comparable competitive markets.

6.21 As noted in the AM Pricing Report, the High Court rejected the use of benchmarking to calculate call Termination Rates on the basis that it did not reflect costs specific to operators in Ireland and was not as transparent as using a model. AM therefore recommends against using benchmarking to implement cost orientation.

6.22 The cost modelling option is considered in detail in this consultation document in Chapter 4 and in the AM Pricing Report.

6.4.3 Options on Symmetric Termination Rates

6.23 This consultation document and the AM Pricing Report both consider the merits of using symmetric Termination Rates versus using asymmetric Termination Rates.

6.24 The 2009 Termination Rates Recommendation sets out that the rates for termination should be set on a symmetric basis unless an operator can justify higher costs on entry into the market. The potential impact of symmetry versus asymmetry on the various stakeholders is discussed in more detail below.

6.4.4 Options on Recovery of Common Costs

6.25 As discussed in Section 4 of this consultation document, unavoidable common costs are not recovered under a pure LRIC approach.

6.26 As stated in paragraph 4.35 in the case of MSPs and FSPs, other than Eircom, these costs can be allocated to other services by operators as they see fit. In Eircom's case they may need to be recovered, at least in part, from other regulated services. This will be considered under separate price setting exercises.

6.5 Step 3: Determine the Likely Impacts on Stakeholders

6.27 This section summarises the potential impact of the proposed options, set out above in Section 10.4 on the various stakeholders for FVCT and MVCT.

6.28 The impact on stakeholders has been discussed under the following headings:

- Mobile termination (impacts based on the options regarding the form and implementation of cost orientation including recovery of common costs)
- Fixed termination (impacts based on the options regarding the form and implementation of cost orientation including the recovery of common costs)

- Mobile termination (impacts based on the option of symmetry versus asymmetry)
- Fixed termination (impacts based on the option of symmetry versus asymmetry)

6.29 As regards the MVCT market, the potential impact on consumers is set out in a separate table.

6.5.1 Mobile Termination (impacts based on the options regarding the form and implementation of cost orientation including the recovery of common costs)

Option 1: Pure LRIC

Impact on Large Mobile Service Providers[117]	Impact on Small Mobile Service Providers[118]	Impact on Fixed Service Providers
1) Currently MTRs are set using a BU pure LRIC model. This Consultation proposes to continue with a BU pure LRIC model to set MTRs. The proposed updated MTRs are lower in value than the current regulated MTRs. This will result in a reduction in revenue for large MSPs – assuming same volumes of traffic. **2)** Pure LRIC MTRs result in a reduction in the cost faced by MSPs associated with terminating calls on other networks (off-net calls) compared with LRAIC+ based costs. **3)** Lower MTRs (by virtue of pure LRIC) means that MSPs may face a lesser risk of retail revenues being eroded by the cost of terminating off-net calls. This may encourage MSPs to be more innovative and flexible in devising retail plans and tariffs e.g. offering bundles that include more	**1)** The proposed updated MTRs are lower in value than the current regulated MTRs. This will result in a reduction in revenue for small MSPs – assuming same volumes of traffic. Those MSPs that were not designated previously with SMP will face a higher relative reduction in their revenues. **2)** Pure LRIC MTRs result in a reduction in the cost faced by MSPs associated with terminating calls on other networks (off-net calls) compared with LRAIC+ based costs. This impact is likely to be more significant for smaller MSPs, since a larger number of calls made from the smaller MSPs networks tend to be off-net.	**1)** The pure LRIC approach provides a benefit for fixed operators resulting from reduced out-payments to mobile networks for MVCT services compared to a LRAIC+ approach. **2)** LRIC based MTRs may encourage FSPs to be more innovative and flexible in devising retail plans and tariffs e.g. offering bundles that include more off-net calls. This might generate more fixed to mobile traffic, and further facilitate the development of combined fixed and mobile subscription bundles. LRIC based MTRs should allow FSPs to compete with MSPs in providing retail calls to mobile subscribers.

[117] ComReg considers that the large MSPs in Ireland are Vodafone, H3GI and Meteor, based on ComReg Document 17/108 - Quarterly Key Data Report data as at Q3 2017.
[118] ComReg considers that the small MSPs in Ireland are the other MSPs apart from the three mentioned above.

Impact on Large Mobile Service Providers[117]	Impact on Small Mobile Service Providers[118]	Impact on Fixed Service Providers
off-net calls. Depending on the demand elasticity this could stimulate further usage and revenue opportunities for MSPs. **4)** MTRs based on pure LRIC mean that MSPs will only be able to recover *efficiently* incurred costs through their MTRs. This is likely to encourage MSPs to make efficient investments to reduce their costs. For example, by deploying new technology that reduces the cost of terminating traffic thus improving dynamic efficiency. Dynamic efficiency is further discussed in this consultation document and in the AM Pricing Report. **5)** Lower MTRs (under pure LRIC) allow all MSPs to include more off-net calls in call bundles, and on that basis reduce tariff-mediated network externalities. These externalities might otherwise hold retail customers 'captive' to the MSP of their friends and family. Pure LRIC MTRs therefore enable retail customers of MSPs to switch to alternative MSPs without facing significantly increased costs associated with high off-net call costs.	**3)** Lower MTRs (by virtue of pure LRIC) means that MSPs may face a lesser risk of retail revenues being eroded by the cost of terminating off-net calls. This may encourage MSPs to be more innovative and flexible in devising retail plans and tariffs e.g. offering bundles that include more off-net calls. Depending on demand elasticity this could stimulate further usage and revenue opportunities for MSPs. **4)** MTRs based on pure LRIC mean that MSPs will only be able to recover efficiently incurred costs through their MTRs. This is likely to encourage MSPs to make efficient investments to reduce their costs. This might be achieved for example by deploying new technology that reduces the cost of terminating traffic thereby improving dynamic efficiency. Dynamic efficiency is further discussed in this consultation document and in the AM Pricing Report.	

Impact on Large Mobile Service Providers[117]	Impact on Small Mobile Service Providers[118]	Impact on Fixed Service Providers
6) Lower MTRs (under pure LRIC) should mean that large MSPs may face greater competition in the retail calls market from FSPs and smaller MSPs. The threat of competition should ensure that investment incentives faced by large MSPs will be preserved, despite lower termination revenue. **7)** Large MSPs will need to recover common costs from other retail/wholesale services and from their own customers, rather than subscribers of other MSPs. This should ensure that large MSPs are as efficient as possible, since they would not be able to transfer their own inefficiently incurred costs to other MSPs or FSPs.	**5)** The pure LRIC approach means that it is cheaper for smaller MSPs to terminate calls on another mobile network (i.e. the cost of an off-net call) compared to a LRAIC+ approach. For this reason smaller MSPs can more easily include off-net calls in (larger) call bundles and possibly converged fixed–mobile offers. This means that small MSPs should be able to compete for the individual customers of other MSPs. Given the reduced on-net/off-net price differentials for smaller MSPs, reduced tariff-mediated externalities should benefit the smaller MSPs the most, since a larger portion of calls made on smaller networks are off-net. **6)** Lower MTRs should mean that small MSPs should be better able to compete, but may face greater competition in the retail calls market from FSPs and potentially other smaller MSPs. The threat of competition should ensure that investment incentives faced by all MSPs will be preserved, despite lower termination revenue	

Impact on Large Mobile Service Providers[117]	Impact on Small Mobile Service Providers[118]	Impact on Fixed Service Providers
	7) The pure LRIC approach means that the small MSPs cannot recover the unavoidable common costs of termination from mobile termination revenues. Therefore, the small MSPs will need to recover common costs from other retail/wholesale services and from their own customers, rather than subscribers of other MSPs. This should ensure that small MSPs are as efficient as possible, since they would not be able to transfer their own inefficiently incurred costs to other MSPs or FSPs.	

Impact on Consumers

Consumers: Mobile Network Low Spend	Consumers: Mobile Network High Spend	Consumers: Fixed Network
1) MTRs based on pure LRIC reduce the revenue available to MSPs from providing call termination, compared to LRAIC+. To accommodate lower per-customer termination revenue, MSPs may focus on attracting retail customer groups that generate more direct revenue. **2)** MSPs incur significant fixed costs in building and operating a mobile network. The incremental cost of serving additional customers over the mobile network is relatively low. The incremental costs of receiving calls would be covered by a pure LRIC MTR, and therefore should not be borne by the receiving MSP or receiving retail customer. **3)** Lower MTRs due to a pure LRIC approach should facilitate lower off-net retail charges for outgoing calls. **4)** MSPs can design products in a way that extracts revenues from low spend customers. For example, by offering SIM only packages with off-peak minutes included (when spare capacity exists on the network).	**1)** MTRs based on pure LRIC reduce the revenue available to MSPs from providing call termination, compared to LRAIC+. To accommodate lower per-customer termination revenue, MSPs may focus on attracting retail customer groups that generate more direct revenue. **2)** MSPs incur significant fixed costs in building and operating a mobile network. The incremental cost of serving additional customers over the mobile network is relatively low. The incremental costs of receiving calls would be covered by a pure LRIC MTR, and therefore should not be borne by the receiving MSP or receiving retail customer. **3)** Lower MTRs due to a pure LRIC approach should also facilitate lower off-net retail charges for outgoing calls. **4)** If MSPs were to recover their costs by increasing retail prices MSPs may seek to recover some of the lost mobile termination revenue from low and high spend consumers. However the aligning of MTRs to efficient cost should facilitate a more neutral competitive framework between FSPs and MSPs and between Service Providers of different size. Enhanced competition should help ensure that retail prices are set at a competitive level.	**1)** MTRs based on pure LRIC pricing, as compared to LRAIC+ pricing, should be likely to benefit all fixed consumers, including vulnerable user groups such as elderly fixed-only consumers (if the reduction in the wholesale cost of connecting fixed to mobile calls is passed on to fixed consumers). **2)** LRIC-based MTRs should facilitate development of more innovative fixed calls packages such as products that include more bundled mobile minutes at a lower price. **3)** Where fixed networks have increased funds available from reductions in outgoing wholesale termination payments, these may be used for important investments in network and service upgrades/innovations to the benefit of fixed consumers.

Consumers: Mobile Network Low Spend	Consumers: Mobile Network High Spend	Consumers: Fixed Network
5) If MSPs were to recover their costs by increasing retail prices, MSPs may seek to recover some of the lost mobile termination revenue from low and high spend consumers (probably through reduced handset subsidies etc.). However the aligning of Termination Rates to efficient cost should facilitate a more neutral competitive framework between FSPs and MSPs and between Service Providers of different sizes. Enhanced competition should help ensure that retail prices are set at a competitive level. **6)** Lower MTRs may encourage MSPs to be more innovative and flexible in devising retail plans and tariffs e.g. offering bundles that include more off-net calls. Even if heavy users benefit more from these product offerings, low-usage customers can also benefit e.g. by receiving additional calls (i.e. benefits accrued via call externalities). **7)** Enhanced competition resulting from reduced tariff mediated network externalities should facilitate lower retail prices and facilitate increased customer usage (depending on demand elasticity). **8)** Mobile handset subsidies may be reduced. This may increase the cost faced by mobile consumers in purchasing a mobile handset.	**5)** Lower MTRs may encourage MSPs to be more innovative and flexible in devising retail plans and tariffs e.g. offering bundles that include more off-net calls. **6)** Enhanced competition resulting from reduced tariff mediated network externalities should facilitate lower retail prices and facilitate increased customer usage (depending on demand elasticity). **7)** Mobile handset subsidies may be reduced. This may increase the cost faced by mobile consumers in purchasing a mobile handset.	

Mobile Termination contd.

Option 2: LRAIC+

Impact on Large MSPs	Impact on Small MSPs	Impact on FSPs	Consumers
1) MTRs based on a LRAIC+ pricing methodology would be higher in price than MTRs based on pure LRIC. This is because LRAIC+ prices include a share of common costs. **2)** Therefore, LRAIC+ MTRs, compared to LRIC-based MTRs, would result in an increase in call termination revenues associated with incoming (off-net) calls for all MSPs. **3)** LRAIC+ MTRs would result in an increase in the cost faced by MSPs associated with terminating calls on other networks. **4)** LRAIC+ based MTRs would be higher than pure-LRIC MTRs, and therefore may render it less attractive for larger MSPs to incorporate significant volumes of off-net mobile calls into call bundles and packages. **5)** Under a LRAIC+ approach MSPs can recover some of the common costs which cannot be recovered from MTRs under a pure LRIC approach.	**1)** MTRs based on a LRAIC+ pricing methodology would be higher in price than MTRs based on pure LRIC. This is because LRAIC+ prices include a share of common costs. Therefore, LRAIC+ MTRs, compared to LRIC-based MTRs, would result in an increase in call termination revenues associated with incoming (off-net) calls for all MSPs. **2)** LRAIC+ MTRs would result in an increase in the cost faced by MSPs associated with terminating calls on other networks (off-net calls). **3)** Higher MTRs (by virtue of LRAIC+ pricing) compared with pure LRIC means that the margins of small MSPs would be partly eroded by the cost of terminating off-net calls. This cost is significant for small MSPs, since a large proportion of their calls are off-net. This may limit the extent to which MSPs can be innovative and flexible in devising retail plans and tariffs e.g. by limiting their ability to provide retail customers with off-net calls at a competitive price.	**1)** MTRs based on a LRAIC+ pricing methodology would be higher in price than MTRs based on pure LRIC. This is because LRAIC+ prices include a share of common costs. **2)** Under the LRAIC+ approach, FSPs would pay a somewhat higher MTR and therefore the out-payments to mobile networks would be higher than under a pure LRIC approach.	**1)** Please refer to the table above regarding the impacts of higher and lower MTRs on the consumer. The same general points are relevant in the context of assessing the LRAIC+ approach with some clarifications below. **2)** A higher wholesale MTR under LRAIC+ compared to a pure LRIC approach creates a higher floor for retail pricing and also implies lower flexibility to build innovative retail plans and tariffs e.g. offering bundles that include more off-net calls.

Impact on Large MSPs	Impact on Small MSPs	Impact on FSPs	Consumers
6) LRAIC+ based MTRs may mean that large MSPs face a lesser degree of competition (relative to pure LRIC MTRs) from other MSPs in the provision of mobile calls. For example, it would be easier for large MSPs to retain customers by offering cheap on-net calls because the relative price of off-net calls to each MSP would be higher. On the other hand, it would be more difficult to win individual customers from other large MSPs.	**4)** This means that (compared with pure LRIC pricing) small MSPs would find it more difficult to compete for the individual customers of other MSPs due to a degree of tariff-mediated network externalities. **5)** Under a LRAIC+ approach, smaller MSPs can recover common costs from their MTRs, which cannot be recovered from MTRs under a pure LRIC approach.	**3)** LRAIC+ based MTRs (compared with pure LRIC prices) may limit the extent to which FSPs can be innovative and flexible in devising retail plans and tariffs that include calls to mobile networks e.g. by limiting their ability to provide retail customers with off-net calls at a competitive price.	**3)** Tariff-mediated network externalities are likely to be more pronounced under LRAIC+ than under pure LRIC. This may limit competitively driven retail price and service innovations compared to a more competitively neutral framework facilitated by a pure LRIC approach. **4)** Consumers who make high volumes of off-net calls would benefit less from LRAIC+ compared to pure LRIC (assuming that in each case the relevant reduction in MTR is passed through to the consumer).

6.5.2 Fixed Termination (impact based on the options regarding the form and implementation of cost orientation including recovery of common costs)

Option 1: BU pure LRIC Model for Eircom and other SMP FSPs

Eircom	Impact on Other FSPs	Impact on MSPs	Consumers
1) FTRs based on a pure LRIC pricing methodology are lower than LRAIC+ FTRs. **2)** The proposed new pure LRIC FTRs are lower than the existing FTRs. Therefore the proposed pure LRIC FTRs will result in a reduction in call termination revenues associated with incoming (off-net) calls for Eircom for the same level of traffic. **3)** However, in overall revenue terms FVCT is a relatively small component of Eircom's fixed revenues which are dominated by line rental and broadband packages. **4)** Pure LRIC-based FTRs results in a reduction in the cost faced by Eircom associated with terminating calls on other FSPs (off-net calls) compared to LRAIC+ based FTRs. **5)** The pure LRIC approach for setting FTRs only allows for the recovery of efficiently incurred costs. Therefore, pure LRIC-based FTRs should encourage Eircom to make efficient investments in order to reduce its costs of providing FVCT.	**1)** FTRs based on a pure LRIC pricing methodology are lower than LRAIC+ FTRs. **2)** The proposed new pure LRIC FTRs are lower than the existing FTRs. Therefore, the proposed pure LRIC FTRs will result in a reduction in call termination revenues associated with incoming (off-net) calls for other FSPs. **3)** However, FVCT is a relatively small component of other FSPs' revenues. **4)** Pure LRIC-based FTRs results in a reduction in the cost faced by other FSPs associated with terminating calls on other FSPs (off-net calls), particularly calls to Eircom's network, compared to LRAIC+ based FTRs. **5)** The pure LRIC approach for setting FTRs only allows for the recovery of efficiently incurred costs. Therefore pure LRIC-based FTRs should encourage the other FSPs to make efficient investments in order to reduce their costs of providing FVCT.	**1)** The pure LRIC approach represents a benefit for MSPs of reduced out-payments to fixed networks for FVCT services compared to a LRAIC+ approach.	**1)** Pure LRIC-based FTRs may facilitate the development of more innovative fixed calls packages such as products that include more off-net bundled call minutes to fixed numbers at a lower price. **2)** A pure LRIC approach should give rise to greater retail pricing flexibility and a continued downward momentum in retail prices. This depends on the level of pass through of reductions in FTRs.

Eircom	Impact on Other FSPs	Impact on MSPs	Consumers
6) The pure LRIC approach for FTRs should facilitate a more efficient distribution of financial transfers between Service Providers and thereby contribute to a level playing field between all FSPs and MSPs (including Eircom). **7)** Pure LRIC-based FTRs do not allow Eircom to recover unavoidable common costs from regulated wholesale termination charges.	**6)** A pure LRIC approach for FTRs should facilitate a more efficient distribution of financial transfers between Service Providers and thereby contribute to a level playing field between all FSPs and MSPs (including other FSPs). **7)** Pure LRIC-based FTRs would not allow FSPs to recover unavoidable common costs from the regulated wholesale termination charge. FSPs would instead need to recover common costs through other retail and wholesale services. This should provide incentives for these FSPs to maximize efficiency in the provision of FVCT, since they would be unable to transfer their own inefficiently incurred costs to other MSPs or FSPs (as would be allowed under a LRAIC+ FTR).		**3)** Enhanced competition resulting from any reduced tariff mediated network effects may result in lower retail prices and potentially facilitate increased customer usage. However, these impacts are less pronounced in relation to assessing pure LRIC versus LRAIC+ for FTRs. (compared to MTRs) due to fixed retail offers already frequently including free or discounted minutes to both on-net and off-net fixed numbers.

Fixed Termination (continued)

Option 2: BU LRAIC+ Model for Eircom and other SMP FSPs

Eircom	Impact on other FSPs	Impact on MSPs	Consumers
1) FTRs based on LRAIC+ are higher than pure LRIC FTRs. **2)** Therefore, LRAIC+ FTRs would result in an increase in call termination revenue associated with incoming (off-net) calls for Eircom. **3)** However, FVCT is a relatively small component of Eircom's fixed revenues (which are dominated by line rental and broadband packages). **2)** LRAIC+ based FTRs would result in Eircom facing higher out-payments when terminating calls on other FSP networks (compared with a pure LRIC FTRs). **3)** Unlike the pure LRIC pricing methodology, LRAIC+ based FTRs would allow Eircom to recover common costs from other Service Providers through FTRs. Eircom would therefore potentially face lesser incentives to improve efficiency and reduce costs (particularly common costs).	**1)** FTRs based on LRAIC+ are higher than pure LRIC FTRs. **2)** Therefore, LRAIC+ FTRs would result in an increase in call termination revenue associated with incoming (off-net) calls for other FSPs. **3)** However, FVCT is a relatively small component of the other FSPs' revenues. **4)** LRAIC+ based FTRs would result in an FSP facing higher out payments when terminating calls on Eircom and other FSP networks (compared with pure LRIC FTRs). **5)** Unlike the pure LRIC pricing methodology, LRAIC+ based FTRs allow FSPs to recover common costs from other Service Providers through FTRs. FSPs other than Eircom would therefore potentially face lesser incentives to improve efficiency and reduce costs (particularly common costs).	**1)** Under the LRAIC+ approach, MSPs would have higher out payments costs to FSPs, compared with the pure LRIC approach.	**1)** A higher FTR under LRAIC+ compared to pure LRIC creates a higher floor for retail pricing and also implies lower flexibility to build innovative retail plans and tariffs e.g. offering bundles that include more off-net calls. In view of the current level of FTRs, however, these effects are likely to be less pronounced in absolute terms than for MTRs and depend on the level of pass-through of FTR reductions. **2)** Consumers who make high volumes of off-net calls would benefit less from LRAIC+ compared with pure LRIC (assuming that in each case the relevant reduction in off-net FTRs is passed through to the consumer).

6.5.3 Mobile Termination (impacts based on the option of symmetry versus asymmetry)

Option 1: Symmetric Mobile Termination Rates

Impact on Large MSPs	Impact on Small MSPs	Impact on FSPs	Consumers
1) Symmetric MTRs facilitate a level playing field which removes potential impediments to competition. For example, symmetric MTRs mean that MSPs do not risk incurring higher MTRs charged by competing networks and thus potentially reduces incentives for tariff-mediated network externalities. This is particularly so in the case of symmetric MTRs set at a pure LRIC level. **2)** Symmetric MTRs based on pure LRIC should help promote dynamic efficiency because they prevent inefficient MSPs from recovering inefficiently incurred costs from their competitors through MTRs. **3)** A symmetric MTR is simpler from a billing and retail product design perspective.	**4)** Since some small MSPs currently have higher MTRs (i.e. asymmetric MTRs), a move to symmetric pure LRIC MTRs would reduce the mobile termination revenues of those MSPs. **5)** Symmetry means that the out-payments for the smaller MSPs with higher MTRs would also reduce. However, the out-payments would not reduce as significantly as the wholesale revenues would for those smaller MSPs (assuming equal amount of incoming and outgoing calls to and from mobile networks). **6)** Symmetric MTRs facilitate a level playing field by potentially removing impediments to competition. For example, symmetric MTRs reduce incentives for large MSPs to invoke tariff-mediated network externalities. This is particularly so in the case of symmetric MTRs set at a pure LRIC level.	**1)** Symmetric MTRs mean that FSPs benefit from having to make lower out-payments to MSPs, particularly to those smaller MSPs that have charged higher asymmetric MTRs to date. **2)** A symmetric MTR is simpler from a billing and retail product design perspective. **3)** Symmetric MTRs provide greater certainty for FSPs in designing retail products that include bundled minutes to mobile numbers. This in turn provides more flexibility for FSPs to design retail packages that include larger or even unlimited off-net bundles and possibly converged fixed–mobile offers. This is particularly so in the case of symmetric MTRs set at a pure LRIC level.	**4)** For the reasons discussed in this table, symmetry at pure LRIC or LRAIC-plus based MTRs is likely to promote competition and dynamic efficiency, and therefore offer broad benefits to consumers in terms of promoting competition.

Impact on Large MSPs	Impact on Small MSPs	Impact on FSPs	Consumers
	7) Symmetric MTRs based on pure LRIC should help promote dynamic efficiency because they prevent inefficient MSPs from recovering inefficiently incurred costs from their competitors through MTRs. **8)** A symmetric MTR is simpler from a billing and retail product design perspective.		

Mobile Termination (continued)

Option 2: Asymmetric Mobile Termination Rates

Impact on Large MSPs	Impact on Small MSPs	Impact on FSPs	Consumers
1) Asymmetric MTRs can allow less efficient MSPs to recover inefficiently incurred costs from large MSPs through the imposition of MTRs. **2)** Large MSPs are therefore worse off under an asymmetric pricing approach, compared with small MSPs.	**1)** Asymmetric MTRs may enable small MSPs to recover additional costs through MTRs (potentially subsidising retail prices initially). This could encourage entry and competition in the short term. However, asymmetric MTRs typically lead to an increase in off-net retail tariffs, which in turn cause tariff mediated network externalities. **2)** Higher asymmetric MTRs allow less efficient MSPs to recover inefficiently incurred costs from competitors in the retail mobile calls market through the imposition of MTRs.	**1)** Asymmetric MTRs allow less efficient MSPs to recover inefficiently incurred costs from FSPs through the imposition of MTRs. **2)** Asymmetric MTRs mean that the FSPs may not have as much incentive to compete for calls to mobile telephone numbers since calls to certain mobile networks will carry a higher cost. **3)** Asymmetric MTRs provide less certainty for FSPs in designing retail products that include bundled minutes to mobile numbers, since calls to certain mobile networks would carry a higher cost. This may discourage FSPs from offering bundles that include fixed to mobile calls.	**1)** Higher rates through asymmetry may not be beneficial to consumers in terms of promoting competition. **2)** Large MSPs are likely to respond to asymmetric pricing by imposing higher tariffs for off-net calls, which can act as a barrier to entry/expansion in the retail market, and impose switching costs on consumers when changing Service Providers. **3)** Where inefficiently incurred costs are passed on from inefficient MSPs to other MSPs through MTRs, these costs are ultimately likely to be passed on to consumers through higher retail prices.

6.5.4 Fixed Termination (impacts based on the option of symmetry versus asymmetry)

Option 1: Symmetric Fixed Termination Rates

Eircom	Impact on other FSPs	Impact on MSPs	Consumers
1) Eircom currently charges a lower FTR than some other FSPs, and therefore is likely to be a net beneficiary of symmetric FTRs. Out-payments for termination of calls on other FSP networks would be likely to reduce. **2)** Symmetric FTRs create a level playing field which removes potential impediments to competition (for example, symmetric FTRs mean that Eircom no longer risks incurring higher FTRs charged by competing networks). **3)** Pure LRIC based symmetric FTRs should promote competition for larger FSPs, such as Eircom, because such FTRs prevent less efficient FSPs from recovering inefficiently incurred costs from competitors in the retail mobile calls market.	**1)** A number of smaller FSPs currently charge a higher FTR (than Eircom), and therefore are likely to be worse off as a result of symmetric FTRs. In particular, revenues would be likely to reduce more than out-payments (assuming traffic flows remain constant). **2)** Symmetric FTRs create a level playing field which removes potential impediments to competition (for example, symmetric FTRs mean that FSPs no longer risk incurring higher FTRs charged by competing networks). **3)** Pure LRIC based symmetric FTRs should promote competition for the benefit of efficient FSPs because it prevents inefficient FSPs from recovering inefficiently incurred costs from Eircom competitors through FTRs.	1) Symmetric FTRs mean that MSPs benefit from having to make lower out-payments to FSPs for off-net calls. However, FTRs are already relatively low therefore the impact will not be significant. 2) A symmetric FTR is simpler from a billing and retail product design perspective.	1) For the reasons discussed in this table, symmetry at pure LRIC is likely to promote competition, and therefore offer broad benefits to consumers in terms of promoting efficiency and competition.

Eircom	Impact on other FSPs	Impact on MSPs	Consumers
4) A symmetric FTR is simpler from a billing and retail product design perspective.	**4)** A symmetric FTR is simpler from a billing and retail product design perspective.		

Fixed Termination (continued)

Option 2: Asymmetric Fixed Termination Rates

Eircom	Impact on Other FSPs	Impact on MSPs	Consumers
1) Asymmetric FTRs may allow less efficient FSPs to recover inefficiently incurred costs from Eircom through FTRs.	**1)** Asymmetric FTRs may enable small FSPs to recover additional costs through FTRs (potentially subsidising retail prices initially). This could encourage entry and competition in the short term. However, asymmetric FTRs may ultimately lead to an increase in off-net retail tariffs, which in turn cause tariff mediated network externalities. This may pose a barrier to entry and growth for small FSPs and new entrants when competing with large FSPs for retail customers. **2)** Higher asymmetric FTRs allow less efficient FSPs to recover inefficiently incurred costs from competitors in the retail calls market through the imposition of FTRs	**1)** Higher asymmetric FTRs allow less efficient FSPs to recover inefficiently incurred costs from MSPs through the imposition of FTRs. **2)** Asymmetric FTRs provide less certainty for MSPs in designing retail products that include bundled minutes to fixed numbers, since calls to certain fixed networks would carry a higher cost.	1) Higher FTRs through asymmetry may not be beneficial to consumers in terms of promoting efficiency and competition.

6.6 Step 4: Determine the Likely Impacts on Competition

Competition in general

6.30 Chapter 4 of this document discusses competition problems in the light of the various options available. Section 3.2 of the AM Pricing Report discusses in detail the competitive issues associated with two-sided markets and how this explains the impact of wholesale termination on the level of competition in fixed and mobile telecoms markets.

LRIC vs LRAIC+ cost increment

6.31 Since pure LRIC only includes the incremental costs of call termination, the pure LRIC approach reduces the cost for FVCT and MVCT further than LRAIC+. Pure LRIC MTRs enable smaller MSPs to compete more easily with larger MSPs whereas MTRs that exceed incremental cost i.e. LRAIC+ can lead to more pronounced tariff-mediated network externalities, which may cause inertia in the retail market, and make it difficult for smaller MSPs to win customers from large MSPs. Pure LRIC MTRs lower the floor for the retail pricing of off-net calls which strengthens the ability of smaller MSPs to construct competitive packages. This easing of barriers to entry/expansion (associated with large financial transfers at wholesale level and tariff-mediated network externalities at retail level) therefore facilitates a more competitively neutral framework.

6.32 Similarly, pure LRIC based MTRs reduce the cost faced by FSPs for terminating calls on mobile networks Adopting pure LRIC based MTRs better enables FSPs to offer packages that include bundled mobile minutes. Pure LRIC based MTRs are also conducive to the development of converged fixed and mobile products with inclusive ‘any network’ voice bundles.

6.33 ComReg considers that these combined impacts create a more competitively neutral environment which facilitates increased competition in mobile and fixed retail voice markets.

6.34 In terms of fixed–fixed competition pure LRIC based FTRs facilitate development of more innovative fixed calls packages, such as products that include more off-net bundled call minutes to fixed numbers at a lower retail price. Since pure LRIC based FTRs result in lower outpayments to other FSPs for FVCT, they give rise to greater retail pricing flexibility and a continued downward momentum in retail prices of calls to fixed numbers (depending on the level of pass-through).

6.35 In general, ComReg considers that a pure LRIC approach for Termination Rates facilitates a more efficient distribution of financial transfers between Service Providers and thereby contributes to a level playing field between all FSPs and MSPs. Pure LRIC based Termination Rates remove the opportunity for MSPs and FSPs to recover inefficiently incurred common costs from their competitors.

6.36 The competitive effects of pure LRIC, compared with LRAIC+, may differ across customer groups. Since the termination revenue per customer will be lower under pure LRIC, FSPs and MSPs will rely more on direct spend of customers to cover common costs. For this reason, FSPs and MSPs have the ability to manage a greater proportion of cost recovery through their practice of segmenting different user groups using indicators such as affordability and willingness to pay. However, ComReg considers that operators will still compete for low-spend customers due to the economies of scale associated with fixed and mobile networks, and network effects (externalities), both of which attribute value to amassing scale.

6.37 ComReg considers that symmetric Termination Rates create a level playing field which removes potential impediments to competition (for example, symmetric MTRs means that large MSPs no longer risk incurring higher MTRs charged by competing networks). Symmetry, in particular at the level of pure LRIC, also removes tariff mediated network externalities, and therefore reduces switching costs faced by retail customers thereby facilitating the competitive process. Symmetric FTRs and MTRs also prevent inefficient FSPs or MSPs from passing on inefficiently incurred costs to other FSPs and MSPs, thereby enabling efficient FSPs and MSPs to compete more effectively in the retail markets.

6.7 Assess the Likely Impacts and Choose the Best Option

6.7.1 Mobile Termination

6.38 The preferred approach at this time, subject to consultation on this matter, for setting MTRs is by means of a BU LRIC model. This is consistent with the 2009 Termination Rates Recommendation and, based on the impact assessment above, this should not create a disproportionate burden on SMP MSPs given that current regulated MTRs have already been set using a BU LRIC model.

6.39 ComReg considers that in a dynamic context the overall impact of the pure LRIC approach for MVCT is positive in terms of mobile-to-mobile competition, as it facilitates a more competitively neutral framework for the smaller MSPs to compete in. In addition, the proposed approach is positive for fixed-to-mobile competition by lowering the revenues paid by FSPs to MSPs and by allowing more competitive innovative offerings such as the inclusion of calls to mobiles in fixed call bundles. These positive results should therefore be to the benefit of consumers. Furthermore, to the extent that customer usage increases as a result of competition rendering calls more affordable, this would facilitate additional revenue opportunities for MSPs.

6.7.2 Fixed Termination

6.40 The preferred approach, at this time, subject to consultation on this matter, for setting FTRs is by means of a BU LRIC model. This is consistent with the 2009 Termination Rates Recommendation and, based on the impact assessment above, should not create a disproportionate burden on SMP FSPs given that regulated FTRs are already at a relatively low level. In addition setting FTRs at pure LRIC will only have a marginal impact on FSP revenue flows because it is a very small component of overall fixed revenues.

6.41 ComReg proposes that the BU pure LRIC model for FVCT would be based on information obtained from Eircom and other FSPs (where available) in response to SIRs and adjusted to reflect the cost of FVCT for an efficient operator. The proposed cost modelling option is considered appropriate for setting the FTRs of Eircom and the other SMP FSPs given that an existing core model already exists for the fixed network. ComReg proposes to use the existing NGN Core Model, and add on a section for FVCT. This will allow pure LRIC FTRs to be calculated.

6.7.3 Symmetry versus Asymmetry

6.42 ComReg considers that the preferred approach is that all SMP FSPs and MSPs should be subject to a symmetric pure LRIC FTR and a symmetric pure LRIC MTR. This is in line with the 2009 Termination Rates Recommendation. It is also the approach recommended by our consultants AM.

6.43 ComReg proposes that symmetric MTRs should apply to all of the current SMP MSPs that ComReg proposes in the Market Review Consultation to designate with SMP, given that all of those MNOs have been in the market for more than 4 years and therefore the justification for higher costs for those MNOs are unlikely. As regards the MVNOs, ComReg believes that, in general, it is difficult to envisage a scenario as to why, absent any objective exogenous cost differences (which ComReg is open to considering), an MVNO could be justified in levying an MTR that differs from that of its host network, particularly as the MVNO has obtained the scale economy advantages accruing to the host network.

6.44 The 2009 Termination Rates Recommendation allows for asymmetric rates for new entrants for a transitional period of up to four years, so that new entrants have sufficient time to recoup their higher incremental costs. However, ComReg considers that any asymmetry will only be allowed in exceptional circumstance where there is clear evidence of objectively higher costs and a sufficient economic rationale that demonstrates that such asymmetry would be in the interests of competition and consumers in the long term. Please refer to Chapter 4 of this consultation document for further details on symmetry.

6.45 The impact on the various stakeholders in terms of symmetry and asymmetry has already been assessed above. While a move from asymmetric MTRs for smaller MSPs will result in a reduction of their wholesale revenues, symmetry should provide competition benefits with associated revenue opportunities in the medium to long-term. Asymmetric MTRs may encourage or support entry and competition in the short term, but in the medium/long-term, symmetry reduces the scope for tariff mediated network externalities by removing some of the justification for higher off-net retail charges. Therefore, symmetric MTRs should facilitate greater competition in the long-term. When small MSPs charge asymmetric MTRs, it provides larger MSPs with a justification for tariff mediated network externalities. These impose switching costs on consumers, which favour larger MSPs, and act as a barrier to entry/expansion in the retail markets.

6.46 The impact on FSPs will not be significant in terms of moving to symmetric FTRs given that the FSPs already charge relatively low FTRs.

6.7.4 Recovery of Common Costs

6.47 We consider that it is important to identify the amount of common costs unrecovered from voice call termination services (given the pure LRIC approach).

6.48 This has been discussed in Chapter 4 of this consultation document with a summary of ComReg's preliminary views set out below.

6.49 For the SMP FSPs (excluding Eircom) and the SMP MSPs, which are not regulated across other markets, ComReg considers that they should have discretion to recover the costs from other wholesale services or to recover them from retail services.

6.50 Eircom is regulated across several other wholesale markets. Eircom may need to recover common costs from other regulate services. This will be considered under separate price setting exercises.

6.8 Monitoring and Compliance

6.8.1 Complying with the Proposed Price Controls

6.51 ComReg is proposing to impose price control obligations of cost orientation on FSPs and MSPs found to have SMP in their respective markets. The price control obligations mean that, at certain dates, as may be defined in decision instruments arising from the Market Review Consultation and this Consultation, FSPs and MSPs, will need to have ensured that their FTRs and MTRs respectively, will be priced at or below those prices set out in the decision instruments. ComReg considers that the proposed transparency obligations regarding amendments to Termination Rates, as set out in the preliminary decision instruments in the Market Review Consultation, will ensure compliance with the proposed price controls.

6.8.2 Monitoring

6.52 ComReg will request confirmation from the FSP or MSP, at the dates where publication of new prices is due.

6.8.3 Enforcement Measures and Sanctions

6.53 Where there is *prima facie* evidence that a FSP or MSP has not complied with a price control obligation, ComReg will initiate a compliance investigation. Where justified, ComReg will take relevant enforcement action pursuant to either Regulation 19 or Regulation 21 of the Access Regulations.

Q. 18	Do you have any views on the Regulatory Impact Assessment? Are there other factors that ComReg should consider in completing its Regulatory Impact Assessment? Please explain the reasons for your answer, clearly indicating the relevant paragraph numbers to which your comments refer, along with all facts or argumentation supporting your position.

Chapter 7

7 Next Steps

7.1 All comments on this Consultation are welcome. It would make the task of analysing responses easier if comments were referenced to the relevant question numbers from this consultation document.

7.2 The consultation period will run from 14 March 2018 to 25 April 2018. During this time ComReg will welcome written comments on any of the issues raised in this Consultation.

7.3 ComReg will also run, in conjunction with TERA and AM, workshops on the FTR and MTR BU LRIC models. These will be arranged under separate notice.

7.4 Having analysed and considered the comments received, ComReg will review the main proposals set out in this Consultation, amend if necessary in light of representations received and will then notify the draft measures to the European Commission, other NRAs and BEREC pursuant to Regulation 13 of the Framework Regulations. Once the response under Regulation 13 is received, ComReg, taking utmost account of any comments received from the European Commission, will adopt and publish the final decisions.

7.5 In order to promote further openness and transparency, ComReg will publish all respondents' submissions in relation to this Consultation. Respondents should submit views in accordance with the instructions set out below.

7.6 Respondents should be aware that all non-confidential responses to this Consultation will be published, subject to the provisions of ComReg's guidelines on the treatment of confidential information[119]. Similarly, any associated correspondence received by ComReg from Service Providers in the course of the consultation process may also be published.

7.7 When submitting a response to this consultation that contains confidential information, respondents must choose one of the following options:

[119] See ComReg Document 05/24, "Guidelines on the treatment of confidential information", March 2005.

A. Submit both a non-confidential version and a confidential version of the response. The confidential version must have all confidential information clearly marked and highlighted in accordance with the instruction set out below. The separate non-confidential version must have redacted all items that were marked and highlighted in the confidential version.

OR

B. Submit only a confidential version and ComReg will perform the required redaction to create a non-confidential version for publication. With this option, respondents must ensure that confidential information has been marked and highlighted in accordance with the instructions set out below**. Where confidential information has not been marked as per our instructions below, then ComReg will <u>not</u> create the non-confidential redacted version and the respondent will have to provide the redacted non-confidential version in accordance with option A above.**

7.8 For ComReg to perform the redactions under Option B above, respondents must mark and highlight all confidential information in their submission as follows:

a. Confidential information contained within a paragraph must be highlighted with a chosen particular colour,

b. Square brackets must be included around the confidential text (one at the start and one at the end of the relevant highlighted confidential information),

c. A scissors symbol ✂ (Symbol code: Wingdings 2:38) must be included after the first square bracket.

For example, “Redtelecom has a market share of [✂ 25%].”

Annex: 1 Decision Instrument: Fixed Voice Call Termination

DECISION INSTRUMENT

1. STATUTORY POWERS GIVING RISE TO THIS DECISION INSTRUMENT

1.1 This Direction and Decision Instrument (hereinafter "**Decision Instrument**") is made by the Commission for Communications Regulation ("**ComReg**") and relates to the market for call termination on individual public telephone networks provided at a fixed location as identified by the European Commission in its Recommendation of 9 October 2014 on relevant product and service markets within the electronic communications sector susceptible to *ex ante* regulation[1] ("**the 2014 Recommendation**") and relates to a further specification of the cost-orientation obligation imposed by ComReg under Section [INSERT] of the Decision Instrument annexed to ComReg Decision [INSERT].

1.2 This Decision Instrument is made:

(i) Pursuant to, and having regard to, the functions and objectives of ComReg as set out, in particular, in Sections 10 and 12 of the Communications Regulation Act 2002,[2] as amended, and Regulation 6(1) of the Access Regulations[3] and Regulation 16 of the Framework Regulations;[4] and

(ii) Having had regard to the market definition, market analysis and reasoning in the consultation entitled [INSERT] (ComReg Document [INSERT]) and in the Response to Consultation and Decision Document entitled [INSERT] (ComReg Decision [INSERT]); and

(iii) Pursuant to and having regard to the Significant Market Power (**"SMP"**) designations on [INSERT] in the Relevant Markets as provided for in

[1] European 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 (C(2014) 7174 final) ("**the 2014 Recommendation**").
[2] Communications Regulation Act 2002 (No. 20 of 2002), as amended.
[3] European Communities (Electronic Communications Networks and Services) (Access) Regulations 2011 (S.I. No. 334 of 2011) (the "**Access Regulations**").
[4] European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. No. 333 of 2011) (the "**Framework Regulations**")

Section [INSERT] of the Decision Instrument annexed to ComReg Decision [INSERT]; and

(iv) Pursuant to and having regard to the cost-orientation obligation imposed on each of the Undertakings listed in Section 3.1 of this Decision Instrument as designated by Section [INSERT] of the Decision Instrument annexed to ComReg Decision [INSERT]; and

(v) Having, where appropriate, pursuant to Section 13 of the Communications Regulation Act 2002, as amended, complied with the policy directions made by the Minister for Communications, Climate Action and Environment;[5] and

(vi) Having taken the utmost account of the European Commission's Recommendation of 7 May 2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU ("**the Termination Rates Recommendation**");[6] and

(vii) Having taken account of the submissions received from interested parties in relation to ComReg Document [INSERT] following a public consultation pursuant to Regulation 12 of the Framework Regulations; and

(viii) Having regard to the analysis and reasoning set out in the Analysys Mason Pricing Report; and

(ix) Having regard to the analysis and reasoning set out in the TERA FTR Model Specification Document; and

(x) Having regard to the analysis and reasoning set out in ComReg Document 14/136 and the Decision Instrument at Annex 2 of Decision Instrument D15/14; and

(xi) Having notified the draft measure and the reasoning on which same is based to the European Commission, BEREC and the national regulatory authorities in other EU Member States in accordance with Regulation 13 of the Framework Regulations and having taken the utmost account pursuant to Regulation 13(6) of the Framework Regulations of any comments made by the European Commission, BEREC and any national regulatory authority in another EU Member State in accordance with Article 7(3) of the Framework Directive;[7] and

[5] Policy Directions made by Dermot Ahern TD, then Minister for Communications, Marine and Natural Resources, dated 21 February 2003 and 26 March 2004.
[6] European Commission Recommendation of 7 May 2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU (2009/396/EC) (OJ L124/67).
[7] Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services, as amended *inter alia* by

(xii) Pursuant to Regulations 25, 26 and 27 of the Framework Regulations and Regulations 8, 13 and 18 of the Access Regulations.

1.3 The provisions of the Consultation and Draft Decision entitled "[INSERT]", the Response to Consultation and Decision document entitled "[INSERT" shall, where appropriate, be construed with this Decision Instrument, however, if a conflict arises between the text of this Decision Instrument and Consultation "[INSERT] " and/or Response to Consultation "[INSERT] , the text of this Decision Instrument shall prevail.

1.4 If a conflict arises between this Decision Instrument, and any other obligation imposed by ComReg (including as hereby amended), the most restrictive obligation shall apply.

PART I – GENERAL PROVISIONS (SECTIONS 2 AND 3 OF THE DECISION INSTRUMENT)

2. Definitions

*[The definitions set out in this draft Decision Instrument may be subject to change following the consultation in the Market Review - Fixed Voice Call Termination and Mobile Voice Call Termination, ComReg Document 17/90r, dated 27 October 2017 ("**the Market Review Consultation**"), to reflect any final decision taken arising from the Market Review Consultation]*

2.1. In this Decision Instrument, unless the context otherwise suggests:

"**Access**" shall have the same meaning as under the Access Regulations; for the purposes of this Decision Instrument it shall include (but shall not be limited to) Access to FVCT and Associated Facilities where appropriate;

"**Access Regulations**" means the European Communities (Electronic Communications Networks and Services) (Access) Regulations 2011 (S.I. No 334 of 2011), as may be amended from time to time or replaced with equivalent effect;

"**Airspeed Communications**" means Airspeed Communications Unlimited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Analysys Mason Pricing Report**" means the document entitled "Pricing principles and methodologies for future regulation of wholesale voice call termination services", dated [INSERT] and published as ComReg Document [INSERT];

Directive 2009/140/EC of the European Parliament and of the Council of 25 November 2009 (the "**Framework Directive**").

"**Associated Facilities**" shall have the same meaning as under the Framework Regulations, and for the purpose of this Decision Instrument shall include information on call routing, which assists and/or has the ability to assist in the provision of Access to FVCT;

"**BEREC**" means the Body of European Regulators for Electronic Communications, as established pursuant to Regulation (EC) No 1211/2009 of the European Parliament and of the Council of 25 November 2009;

"**Blueface**" means Blue Face Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Bottom Up Pure Long Run Incremental Costs**" or "**BU Pure LRIC**" means the methodology used to estimate the Pure LRIC of an efficient operator which is derived from an economic/engineering model of an efficient network;

"**BU Pure LRIC Model**" means the model, as may be amended from time to time, used by ComReg to set FTRs in Ireland and as will be furnished by ComReg to each SMP Fixed Service Provider upon request. The operation and details of the BU Pure LRIC Model are more particularly described in the [INSERT] and published as ComReg [INSERT]**;**

"**BT Communications**" means BT Communications Ireland Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Colt Technology Services**" means Colt Technology Services Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**ComReg**" means the Commission for Communications Regulation, established under Section 6 of the Communications Regulation Act 2002, as amended;

"ComReg Decision DXX/XX" means [INSERT], Response to Consultation and Decision, ComReg Document /XX, Decision XX/XX" dated XX 201;

"ComReg Decision D12/12" means Annex 1 of ComReg Document 12/125 entitled "Mobile and Fixed Voice Call Termination Rates in Ireland, Response to Consultations, Decisions and Decision Instruments", dated 21 November 2012;

"**ComReg Decision D15/14**" means the decision instruments contained in annexes 1 to 4 of ComReg Document 14/136;

"**ComReg Document 14/136"** means "Cost of Capital: • Mobile Telecommunications, • Fixed Line telecommunications, • Broadcasting (Market A and Market B)", ComReg Document 14/136, dated 18 December 2014;

"**Dialoga Servicios Interactivos"** means Dialoga Servicios Interactivos, SA and its subsidiaries, and any Undertakings which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns.

"**Effective Date**" means the date set out in section 8 of this Decision Instrument;

"**Eircom**" means Eircom Limited and its subsidiaries, and any Undertaking which it owns or controls, and any Undertaking which owns or controls it and its successors and assigns;

"**End-User(s)**" shall have the same meaning as under the Framework Regulations;

"**Equant Network Services**" means Equant Network Services International Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Finarea**" means Finarea SA and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Fixed Number**" means a number from the Irish national numbering scheme as set out in the Numbering Conditions of Use, which, within the meaning of this Decision Instrument, is terminated at a fixed location and means a Geographic Number, a Nomadic Number, or an emergency access number (112 or 999);

"**Fixed Service Provider(s)**" or "**FSP(s)**" means an Undertaking providing End-Users with publicly available voice telephony services using a Fixed Number at a fixed location, irrespective of the underlying technology over which such services are delivered;

"**Fixed Termination Rate(s)**" or "**FTR(s)**" means the wholesale charge(s) levied by a Fixed Service Provider for the supply of Fixed Voice Call Termination;

"**Fixed Voice Call Termination**" or "**FVCT**" means the provision by a Fixed Service Provider of a wholesale call termination service to other Undertakings for the purpose of terminating incoming calls to a Fixed Number in respect of which that Fixed Service Provider is able to set the Fixed Termination Rate. For the avoidance of doubt, the provision of Fixed Voice Call Termination involves the provision of an Interconnection service;

"**Framework Regulations**" means the European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. No 333 of 2011), as may be amended from time to time or replaced with equivalent effect;

"**Geographic Number**" shall have the same meaning as set out in the Numbering Conditions of Use with the addition, for the purpose of this Decision Instrument, that the definition of Geographic Numbers shall include Nomadic Numbers and emergency access numbers (112 or 999);

"**Imagine Communications**" means Imagine Communications Ireland Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Intellicom**" means Intellicom Ireland Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Interconnection**" shall have the same meaning as under Regulation 2 of the Access Regulations;

"**In2com**" means In2com Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**IP Telecom**" means Internet Protocol Telecom Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Magnet Networks**" means Magnet Networks Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Magrathea Telecommunications**" means Magrathea Telecommunications (Ireland) Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Modeva Networks**" means Modeva Networks Unlimited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Nomadic Number(s)**" has the meaning assigned in the Numbering Conditions of Use;

"**Non-Geographic Number**" has the meaning assigned in the Numbering Conditions of Use;

"**Numbering Conditions of Use**" means the set of rules under which the Irish national numbering scheme is managed and administered as set out in the document entitled *Numbering Conditions of Use and Application Process,* ComReg 15/136*,* as may be amended by ComReg from time to time;

"**PlanNet 21 Communications**" means PlanNet 21 Communications Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Pure Long Run Incremental Costs**" or "**Pure LRIC**" means those costs and only those costs which would be avoided in the long run if a SMP Fixed Service Provider were to cease to provide FVCT. For the avoidance of doubt, it excludes all costs which are common to the provision of FVCT and to other services;

"**Relevant Market**" means, in the context of a particular SMP Fixed Service Provider, the specific market relating to that SMP Fixed Service Provider's supply of FVCT as identified in Section [INSERT] of ComReg Decision [INSERT];

"**Relevant Markets**" means all of the markets defined in Section [INSERT] of ComReg Decision [INSERT];

"**Significant Market Power (SMP) Fixed Service Provider**" or "**SMP FSP**" means a Fixed Service Provider designated with SMP in Section [INSERT] of ComReg Decision [INSERT] as may be amended from time to time;

"**Significant Market Power Obligations**" or "**SMP Obligations**" are those obligations as more particularly described in Part II of ComReg Decision [INSERT] as may be amended from time to time;

"**TERA FTR Model Specification Document**" means the document entitled "Assessment of PURE LRIC FTRs in Ireland, Specifications and results", dated [INSERT] and published as ComReg Document [INSERT];

"**Telcom**" means Telcom Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns, which for the avoidance of doubt includes Agility Communications Limited;

"**Undertaking(s)**" shall have the same meaning as under Regulation 2 of the Framework Regulations;

"**Verizon**" means Verizon Ireland Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Viatel**" means Viatel Ireland Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Virgin Media**" means Virgin Media Ireland Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Vodafone**" means Vodafone Ireland Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Voxbone**" means Voxbone SA and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns.

3. SCOPE AND APPLICATION

3.1. This Decision Instrument applies to each of the following Undertakings in respect of activities falling within the scope of the Relevant Markets defined in Section 4

of ComReg Decision [INSERT]. Furthermore, this Decision Instrument is binding upon each such Undertaking in the manner now set out below and each such Undertaking shall comply with this Decision Instrument to the extent that it applies to that Undertaking.

(i) Airspeed Communications;

(ii) Blueface;

(iii) BT Communications;

(iv) Colt Technology Services;

(v) Dialoga Servicios Interactivos;

(vi) Eircom;

(vii) Equant Network Services;

(viii) Finarea;

(ix) Imagine Communications;

(x) Intellicom;

(xi) In2com;

(xii) IP Telecom;

(xiii) Magnet Networks;

(xiv) Magrathea Telecommunications;

(xv) Modeva Networks;

(xvi) PlanNet 21 Communications;

(xvii) Telcom;

(xviii) Verizon;

(xix) Viatel;

(xx) Virgin Media;

(xxi) Vodafone;

(xxii) Voxbone.

3.2. This Decision Instrument relates to the imposition, amendment and withdrawal, pursuant to Regulation 8 of the Access Regulations, of certain obligations contained in Section 12 of the Decision Instrument contained in Appendix [INSERT] of ComReg Decision [INSERT] as it relates to Fixed Voice Call Termination. This Decision Instrument also relates to the further specification, pursuant to Regulation 18 of the Access Regulations, of certain obligations contained in Section 12 of the Decision Instrument contained in Appendix [INSERT] of ComReg Decision [INSERT].

PART II – SMP OBLIGATIONS IN RELATION TO SMP FIXED SERVICE PROVIDERS (SECTION 4 OF THE DECISION INSTRUMENT)

4. OBLIGATIONS RELATING TO PRICE CONTROL

4.1. Pursuant to Regulation 13(1) of the Access Regulations and in accordance with Section 12 of the Decision Instrument annexed to ComReg Decision [INSERT], each SMP Fixed Service Provider is subject to a cost-orientation obligation as regards FTRs and prices charged by the SMP Fixed Service Provider to any other Undertaking for Access to or use of those products, services or facilities referred to in Section 8 of the Decision Instrument annexed to ComReg Decision [INSERT].

4.2. For the purpose of further specifying requirements to be complied with relating to the cost-orientation obligations set out in Section 12 of the Decision Instrument contained in Appendix [INSERT], of ComReg Decision [INSERT], with effect from [INSERT] (proposed *date is 90 days from the Effective Date*, each SMP Fixed Service Provider is hereby directed to ensure that its Fixed Termination Rate(s) are set in accordance with a BU Pure LRIC Model.

4.3. Without prejudice to the generality of Section 4.2 of this Decision Instrument, pursuant to Regulation 18 of the Access Regulations and in accordance with Regulation 13(3) of the Access Regulations, with effect from [INSERT] (proposed *date is 90 days from the Effective Date*, insofar as a SMP Fixed Service Provider charges other Undertakings for FVCT on both a “cost per minute” and a “cost per call” basis, it shall ensure that its “cost per minute” and “cost per call” Fixed Termination Rates are no more than the relevant BU Pure LRIC Fixed Termination Rates, based on the BU Pure LRIC Model, which are set out in the table below.

Dates	Maximum "cost per minute" FTR (euro cent per minute)	Maximum "cost per call" FTR (euro cent per call)
From **[INSERT]** 2018	0.034	0.057

4.4. Without prejudice to the generality of Section 4.2 of this Decision Instrument, pursuant to Regulation 18 of the Access Regulations and in accordance with Regulation 13(3) of the Access Regulations, with effect from [INSERT] (proposed *date is 90 days from the Effective Date*), insofar as a SMP Fixed Service Provider charges other Undertakings for FVCT only on a "cost per minute" basis, it shall ensure that its "cost per minute" Fixed Termination Rate is no more than the relevant BU Pure LRIC Fixed Termination Rate, based on the BU Pure LRIC Model, which is set out in the table below.

Dates	Maximum "cost per minute" FTR (euro cent per minute)
From 1 **[INSERT]** 2018	0.053

4.5. With effect from [INSERT] (proposed *date is 90 days from the Effective Date*), each SMP Fixed Service Provider shall apply Section 4.3 or Section 4.4 (as appropriate) to all invoices and credit notes issued by it to any Undertaking in respect of the FVCT.

4.6. Without prejudice to Section 4.3 and Section 4.4, ComReg may review and if necessary, due to circumstances that ComReg considers exceptional, amend the maximum FTRs referred to in Section 4.3 and 4.4.

PART III – OBLIGATIONS AND EFFECTIVE DATE (SECTIONS 5 TO 8 OF THE DECISION INSTRUMENT)

5. STATUTORY POWERS NOT AFFECTED

5.1. Nothing in this Decision Instrument shall operate to limit ComReg in the exercise and performance of its statutory powers or duties conferred on it under any primary or secondary legislation (in force prior to or after the Effective Date of this Decision Instrument).

6. MAINTENANCE OF OBLIGATIONS

6.1. Unless expressly stated otherwise in this Decision Instrument, all obligations and requirements contained in Decision Notices and Directions made by ComReg applying to the SMP Fixed Service Providers and in force immediately prior to the Effective Date of this Decision Instrument, are continued in force by this Decision Instrument and the SMP Fixed Service Providers shall comply with same.

6.2. If any section, clause or provision or portion thereof contained in this Decision Instrument is found to be invalid or prohibited by the Constitution, by any other law or judged by a court to be unlawful, void or unenforceable, that section, clause or provision or portion thereof shall, to the extent required, be severed from this Decision Instrument and rendered ineffective as far as possible without modifying the remaining section(s), clause(s) or provision(s) or portion thereof of this Decision Instrument, and shall not in any way affect the validity or enforcement of this Decision Instrument.

7. AMENDMENT AND WITHDRAWAL OF EXISTING SMP OBLIGATIONS

7.1. For the avoidance of doubt, Annex 2 of ComReg Decision D15/14 applies to the Relevant Markets under consideration in this Decision Instrument.

7.2. Pursuant to Regulation 8 of the Access Regulations and in accordance with Regulation 13 of the Access Regulations, the Decision Instrument contained in Annex 1 of ComReg Decision D12/12 is withdrawn with effect from **[INSERT]** (proposed *date is 90 days from the Effective Date*).

8. EFFECTIVE DATE

8.1. The Effective Date of this Decision Instrument shall be, unless otherwise stated in this Decision Instrument, the date of its notification to the SMP Fixed Service Providers and it shall remain in force until further notice by ComReg.

8.2. Notwithstanding Section 8.1 and Sections 4.1 to 4.5 **[INSERT]** of this Decision Instrument shall apply to each SMP Fixed Service Provider with effect from **[INSERT]** (proposed *date is 90 days from the Effective Date)***.**

GERRY FAHY

CHAIRPERSON AND COMMISSIONER

THE COMMISSION FOR COMMUNICATIONS REGULATION

THE [INSERT] **DAY OF** [INSERT] **201**[INSERT].

Annex: 2 Decision Instrument: Mobile Voice Call Termination

DECISION INSTRUMENT

1. STATUTORY POWERS GIVING RISE TO THIS DECISION INSTRUMENT

1.1 This Direction and Decision Instrument (hereinafter "**Decision Instrument**") is made by the Commission for Communications Regulation ("**ComReg**") and relates to the market for voice call termination on individual mobile networks as identified by the European Commission in its Recommendation of 9 October 2014 on relevant product and service markets within the electronic communications sector susceptible to *ex ante* regulation[1] ("**the 2014 Recommendation**") and relates to a further specification of the cost-orientation obligation imposed by ComReg under Section [INSERT] of the Decision Instrument annexed to ComReg Decision [INSERT].

1.2 This Decision Instrument is made:

(i) Pursuant to, and having regard to, the functions and objectives of ComReg as set out, in particular, in Sections 10 and 12 of the Communications Regulation Act 2002[2] as amended, and Regulation 6(1) of the Access Regulations[3] and Regulation 16 of the Framework Regulations;[4] and

(ii) Having had regard to the market definition, market analysis and reasoning in the consultation entitled [INSERT] (ComReg Document [INSERT]) and in the Response to Consultation and Decision Document entitled [INSERT] (ComReg Decision[INSERT]); and

(iii) Pursuant to and having regard to the Significant Market Power ("**SMP**") designations on [INSERT] in the Relevant Markets as provided for in Section [INSERT] of the Decision Instrument annexed to ComReg Decision [INSERT]; and

[1] European 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 (C(2014) 7174 final) ("**the 2014 Recommendation**").
[2] Communications Regulation Act 2002 (No. 20 of 2002), as amended.
[3] European Communities (Electronic Communications Networks and Services) (Access) Regulations 2011 (S.I. No. 334 of 2011) (the "**Access Regulations**").
[4] European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. No. 333 of 2011) (the "**Framework Regulations**")

(iv) Pursuant to and having regard to the cost-orientation obligation imposed on each of the Undertakings outlined at Section 3.1 of this Decision Instrument as designated by Section [INSERT] of the Decision Instrument annexed to ComReg Decision [INSERT]; and

(v) Having, where appropriate, pursuant to Section 13 of the Communications Regulation Act 2002, as amended, complied with the policy directions made by the Minister for Communications, Climate Action and Environment;[5] and

(vi) Having taken the utmost account of the European Commission's Recommendation of 7 May 2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU ("**the Termination Rates Recommendation**");[6] and

(vii) Having taken account of the submissions received from interested parties in relation to ComReg Document [INSERT] following a public consultation pursuant to Regulation 12 of the Framework Regulations; and

(viii) Having regard to the analysis and reasoning set out in the Analysys Mason Pricing Report; and

(ix) Having regard to the analysis and reasoning set out in the Analysys Mason MTR Model Specification Document; and

(x) Having regard to the analysis and reasoning set out in ComReg Document 14/136 and the Decision Instrument at Annex 1 of Decision Instrument D15/14; and

(xi) Having notified the draft measure and the reasoning on which same is based to the European Commission, BEREC and the national regulatory authorities in other EU Member States in accordance with Regulation 13 of the Framework Regulations and having taken the utmost account pursuant to Regulation 13(6) of the Framework Regulations of any comments made by the European Commission, BEREC and any national regulatory authority in another EU Member State in accordance with Article 7(3) of the Framework Directive;[7] and

[5] Policy Directions made by Dermot Ahern TD, then Minister for Communications, Marine and Natural Resources, dated 21 February 2003 and 26 March 2004.
[6] European Commission Recommendation of 7 May 2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU (2009/396/EC) (OJ L124/67).
[7] Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services, as amended *inter alia* by Directive 2009/140/EC of the European Parliament and of the Council of 25 November 2009 (the "**Framework Directive**").

(xii) Pursuant to Regulations 25, 26 and 27 of the Framework Regulations and Regulations 8, 13 and 18 of the Access Regulations.

1.3 The provisions of the Consultation and Draft Decision entitled "[INSERT]", the Response to Consultation and Decision document entitled "[INSERT], ComReg Document [INSERT]/XX, Decision No. XX/XX" shall, where appropriate, be construed with this Decision Instrument, however, if a conflict arises between the text of this Decision Instrument and Consultation "[INSERT]" and/or Response to Consultation "[INSERT], the text of this Decision Instrument shall prevail.

1.4 If a conflict arises between this Decision Instrument, and any other obligation imposed by ComReg (including as hereby amended), the most restrictive obligation shall prevail.

PART I – GENERAL PROVISIONS (SECTIONS 2 AND 3 OF THE DECISION INSTRUMENT)

2. Definitions

*[The definitions set out in this draft Decision Instrument may be subject to change following the consultation in the Market Review - Fixed Voice Call Termination and Mobile Voice Call Termination, ComReg Document 17/90r, dated 27 October 2017 ("**the Market Review Consultation**"), to reflect any final decision taken arising from the Market Review Consultation]*

2.1. In this Decision Instrument, unless the context otherwise suggests:

"**Access**" shall have the same meaning as under the Access Regulations; for the purposes of this Decision Instrument it shall include (but shall not be limited to) Access to MVCT and Associated Facilities where appropriate;

"**Access Regulations**" means the European Communities (Electronic Communications Networks and Services) (Access) Regulations 2011 (S.I. No 334 of 2011), as may be amended from time to time or replaced with equivalent effect;

"**Analysys Mason MTR Model Specification Document**" means the document entitled "*Specification for the draft new MTR model*", dated [INSERT] and published as ComReg Document [INSERT];

"**Analysys Mason Pricing Report**" means the document entitled "Pricing principles and methodologies for future regulation of wholesale voice call termination services", dated [INSERT] and published as ComReg Document [INSERT];

"**Associated Facilities**" shall have the same meaning as under the Framework Regulations, and for the purpose of this Decision Instrument shall include information

on call routing, which assists and/or has the ability to assist in the provision of Access to MVCT;

"**BEREC**" means the Body of European Regulators for Electronic Communications, as established pursuant to Regulation (EC) No 1211/2009 of the European Parliament and of the Council of 25 November 2009;

"**Bottom Up Pure Long Run Incremental Costs**" or "**BU Pure LRIC**" means the methodology used to estimate the Pure LRIC of an efficient operator which is derived from an economic/engineering model of an efficient network;

"**BU Pure LRIC Model**" means the model, as may be amended from time to time, used by ComReg to set MTRs in Ireland and as will be furnished by ComReg to each SMP Mobile Service Provider upon request. The operation and details of the BU Pure LRIC Model are more particularly described in the [INSERT] and published as ComReg [INSERT]**;**

"**ComReg**" means the Commission for Communications Regulation, established under Section 6 of the Communications Regulation Acts 2002, as amended;

"ComReg Decision DXX/XX" means [INSERT], Response to Consultation and Decision, ComReg Document /XX, Decision XX/XX" dated XX 201;

"**ComReg Decision D02/16**" means Annex 1 of ComReg Document 16/09 entitled "Mobile Termination Rates Response to Consultation 14/29 and Supplementary Consultation 15/19 and Decision Document", dated 12 February 2016;

"**ComReg Decision D15/14**" means the decision instruments contained in annexes 1 to 4 of ComReg Document 14/136;

"**ComReg Document 14/136"** means "Cost of Capital: • Mobile Telecommunications, • Fixed Line telecommunications, • Broadcasting (Market A and Market B)", ComReg Document 14/136, dated 18 December 2014;

"**Effective Date**" means the date set out in section 8 of this Decision Instrument;

"**End-User(s)**" shall have the same meaning as under Regulation 2 of the Framework Regulations;

"**Framework Regulations**" means the European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. No 333 of 2011), as may be amended from time to time or replaced with equivalent effect;

"**iD Mobile**" means Carphone Warehouse Ireland Mobile Limited, trading as iD Mobile, and its subsidiaries, and any Undertaking which it owns or controls and any undertaking which owns or controls it, and its successors, affiliates and assigns[8];

[8] A provisional liquidator was appointed to iD Mobile on 6 March 2018. ComReg continues to monitor the situation. For the avoidance of doubt, this draft Decision Instrument may be amended in the final decision taken.

"**Interconnection**" shall have the same meaning as under Regulation 2 of the Access Regulations;

"**Lycamobile**" means Lycamobile Ireland Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Meteor**" means Meteor Mobile Communications Limited, and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns[9];

"**Mobile Network**" means a 2nd, 3rd, 4th, or 5th Generation digital wireless network, or any intermediate evolution of those, using Mobile Numbers, in which seamless handover and roaming features are provided;

"**Mobile Number(s)**" shall have the same meaning as set out in the Numbering Conditions of Use, as may be amended from time to time;

"**Mobile Service Provider(s)**" or "**MSP(s)**" means an Undertaking providing End-Users with land based/terrestrial publicly available mobile voice telephony services using a Mobile Network;

"**Mobile Termination Rate(s)**" or "**MTR(s)**" means the wholesale charge(s) levied by a Mobile Service Provider for the supply of Mobile Voice Call Termination;

"**Mobile Voice Call Termination**" or "**MVCT**" means the provision by a Mobile Service Provider of a wholesale call termination service to other Undertakings for the purpose of terminating incoming voice calls to a Mobile Number in respect of which that Mobile Service Provider is able to set the Mobile Termination Rate. For the avoidance of doubt, the provision of Mobile Voice Call Termination involves the provision of an Interconnection service;

"**Numbering Conditions of Use**" means the set of rules under which the Irish national numbering scheme is managed and administered as set out in the document entitled *Numbering Conditions of Use and Application Process,* ComReg 15/136*,* as may be amended by ComReg from time to time;

"**Pure Long Run Incremental Costs**" or "**Pure LRIC**" means those costs and only those costs which would be avoided in the long run if a SMP Mobile Service Provider were to cease to provide MVCT. For the avoidance of doubt, it excludes all costs which are common to the provision of MVCT and to other services;

[9] Meteor announced in July 2017 that its branding would be retired and replaced with Eircom branding from September 2017. At present Meteor is the licensed Mobile Service Provider and so for the purposes of this draft Decision Instrument, ComReg has continued to refer to Meteor, however this position may be amended in the final Decision Instrument should Eircom Limited, or some other Undertaking, become a successor or assign of Meteor or in any other way the appropriate Undertaking to be designated with SMP.

"**Relevant Market**" means, in the context of a particular SMP Mobile Service Provider, the specific market relating to that SMP Mobile Service Provider's supply of MVCT as identified in Sections [INSERT] of ComReg Decision [INSERT];

"Relevant Markets" means all of the markets defined in Section [INSERT] of ComReg Decision [INSERT];

"**Significant Market Power (SMP) Mobile Service Provider**" or "**SMP MSP**" refers to a Mobile Service Provider designated with SMP in Section [INSERT] of ComReg Decision [INSERT] as may be amended from time to time;

"**Significant Market Power Obligations**" or "**SMP Obligations**" are those obligations as more particularly described in Part II of ComReg Decision [INSERT] as may be amended from time to time;

"**Tesco Mobile**" means Tesco Mobile Ireland Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Three**" means Three Ireland (Hutchison) Limited and its subsidiaries, and any undertaking which it owns or controls and any undertaking which owns or controls it, and its successors, affiliates and assigns, which for the avoidance of doubt includes Three Ireland Services (Hutchison) Limited;

"**Undertaking(s)**" shall have the same meaning as under Regulation 2 of the Framework Regulations;

"**Virgin Media**" means Virgin Media Ireland Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns;

"**Vodafone**" means Vodafone Ireland Limited and its subsidiaries, and any Undertaking which it owns or controls and any Undertaking which owns or controls it, and its successors, affiliates and assigns.

3. SCOPE AND APPLICATION

3.1. This Decision Instrument applies to each of the following Undertakings in respect of activities falling within the scope of the Relevant Markets defined in Section 4 of ComReg Decision [INSERT]. Furthermore, this Decision Instrument is binding upon each such Undertaking in the manner now set out below and each such Undertaking shall comply with this Decision Instrument to the extent that it applies to that Undertaking.

(i) iD Mobile;

(ii) Lycamobile;

(iii) Meteor;

(iv) Tesco Mobile;

(v) Three;

(vi) Virgin Media; and

(vii) Vodafone.

3.2. This Decision Instrument relates to the imposition, amendment and withdrawal, pursuant to Regulation 8 of the Access Regulations, of certain obligations contained in Section 12 of the Decision Instrument contained in Annex [INSERT] of ComReg Decision [INSERT] as it relates to Mobile Voice Call Termination. This Decision Instrument also relates to the further specification, pursuant to Regulation 18 of the Access Regulations, of certain obligations contained in Section 12 of the Decision Instrument contained in Annex [INSERT] of ComReg Decision [INSERT].

PART II – SMP OBLIGATIONS IN RELATION TO SMP MOBILE SERVICE PROVIDERS (SECTION 4 OF THE DECISION INSTRUMENT)

4. OBLIGATIONS RELATING TO PRICE CONTROL

4.1. Pursuant to Regulation 13(1) of the Access Regulations and in accordance with Section 12 of the Decision Instrument annexed to ComReg Decision [INSERT], each SMP Mobile Service Provider is subject to a cost-orientation obligation as regards MTRs and prices charged by the SMP Mobile Service Provider to any other Undertaking for Access to or use of those products, services or facilities referred to in Section 8 of the Decision Instrument annexed to ComReg Decision [INSERT].

4.2. For the purpose of further specifying requirements to be complied with relating to the cost-orientation obligations set out in Section 12 of the Decision Instrument contained in Annex [INSERT] of ComReg Decision [INSERT], and pursuant to Regulation 18 of the Access Regulations, with effect from 1 January 2019, each SMP Mobile Service Provider is hereby directed to ensure that its Mobile Termination Rate(s) are set in accordance with a BU Pure LRIC Model.

4.3. Without prejudice to the generality of Section 4.2 of this Decision Instrument, pursuant to Regulation 18 of the Access Regulations and in accordance with Regulation 13(3) of the Access Regulations, with effect from 1 January 2019, insofar as a SMP Mobile Service Provider charges other Undertakings for MVCT, it shall ensure that its Mobile Termination Rates are no more than the rate determined for that year in accordance with the BU Pure LRIC Mobile Termination Rates, based on the BU Pure LRIC Model, which are set out in the table below.

Dates	Regulated maximum MTRs (euro cent per minute)
From 1 January 2019 to 31 December 2019	0.33
From 1 January 2020 to 31 December 2020	0.31
From 1 January 2021 to 31 December 2021	0.31
From 1 January 2022	0.30

4.4. With effect from 1 January 2019 each SMP Mobile Service Provider shall apply Section 4.3 to all invoices and credit notes issued by it to any Undertaking in respect of the MVCT.

4.5. Without prejudice to Section 4.3, ComReg may review and if necessary, due to circumstances that ComReg considers exceptional, amend the maximum MTRs referred to in Section 4.3.

PART III – OBLIGATIONS AND EFFECTIVE DATE (SECTIONS 5 TO 8 OF THE DECISION INSTRUMENT)

5. STATUTORY POWERS NOT AFFECTED

5.1. Nothing in this Decision Instrument shall operate to limit ComReg in the exercise and performance of its statutory powers or duties conferred on it under any primary or secondary legislation (in force prior to or after the Effective Date of this Decision Instrument).

6. MAINTENANCE OF OBLIGATIONS

6.1. Unless expressly stated otherwise in this Decision Instrument, all obligations and requirements contained in Decision Notices and Directions made by ComReg applying to the SMP Mobile Service Providers and in force immediately prior to the Effective Date of this Decision Instrument, are continued in force by this Decision Instrument and the SMP Mobile Service Providers shall comply with same.

6.2. If any section, clause or provision or portion thereof contained in this Decision Instrument is found to be invalid or prohibited: by the Constitution, by any other law or judged by a court to be unlawful, void or unenforceable, that section, clause or provision or portion thereof shall, to the extent required, be severed from this Decision Instrument and rendered ineffective as far as possible without

modifying the remaining section(s), clause(s) or provision(s) or portion thereof of this Decision Instrument, and shall not in any way affect the validity or enforcement of this Decision Instrument.

7. AMENDMENT AND WITHDRAWAL OF EXISTING SMP OBLIGATIONS

7.1. Pursuant to Regulation 8, 13 and 18 of the Access Regulations, the definition of relevant markets contained in Annex 1 of ComReg Decision D15/14 is hereby extended to include the Relevant Markets outlined in Sections 4.2(i) to (vii) of ComReg Decision [INSERT]. For the avoidance of doubt, Annex 1 of ComReg Decision D15/14 applies to the Relevant Markets under consideration in this Decision Instrument.

7.2. Pursuant to Regulation 8 of the Access Regulations and in accordance with Regulation 13 of the Access Regulations, the Decision Instrument D02/16 is withdrawn with effect from **[INSERT]**.

8. EFFECTIVE DATE

8.1. The Effective Date of this Decision Instrument shall be, unless otherwise stated in this Decision Instrument, the date of its notification to the SMP Mobile Service Providers and it shall remain in force until further notice by ComReg.

8.2. Notwithstanding Section 8.1, Section 4.1 to Section 4.5 of this Decision Instrument shall apply to each SMP Mobile Service Provider with effect from [INSERT] (*the proposed date is 1 January 2019*).

GERRY FAHY

CHAIRPERSON AND COMMISSIONER

THE COMMISSION FOR COMMUNICATIONS REGULATION

THE [INSERT] DAY OF [INSERT] 201[INSERT].

Annex: 3 Consultation Questions

Section Page

Annex: 4 Glossary

Acronym	Full Title
2G	Second generation of mobile telephony
3G	Third generation of mobile telephony
4G	Fourth generation of mobile telephony
APT	Access Packet Transport
B&K	Bill and Keep
BEREC	Body of European Regulators for Electronic Communications
BHE	Busy-hour Erlangs
BSC	Base station controller
BTS	Base Transceiver station *or* base station
BU LRIC	Bottom-up Long-Run Incremental Cost
BU Model	Bottom Up Model
CAGR	Compound Annual Growth Rate
CCA	Current Cost Accounting
CDR	Call detail record
CPI	Consumer price index
CSO	Central Statistics Office
CWDM	Code or coarse wavelength division multiplexing
DC-HSPA	Dual Carrier High Speed Packet Access
DSLAM	Digital Subscriber Line Access Multiplexers
E1	2Mbit/s unit of capacity
EC	European Commission
ED	Economic depreciation
EPC	Enhanced packet core
EPMU	Equi-proportionate mark-up
EU	European Union
DWDM	Dense wavelength division multiplexing
F&R	Fair and Reasonable
FA	Fixed Access
FCM	Financial Capital Maintenance

FL-LRIC	Forward Looking LRIC
FSP	Fixed Service Provider
FTR	Fixed Termination Rate
FTTH	Fibre To The Home
FVCT	Fixed Voice Call Termination
GGSN	Gateway GPRS SERVING Node
GHz	Gigahertz
GPRS	General packet radio system
GSM	Global system for mobile communications
GSM MSC	Global system for mobile communications Mobile switching Centre
GSN	Gateway serving node
HCA	Historic Cost Accounting
HSDPA	High-speed downlink packet access
HSPA	High-speed packet access
HSUPA	High speed uplink packet access
HLR	Home Location Register
IP	Internet Protocol
I–SBC	Interconnect session border controller
IMS	IP multimedia subsystem
IMS CORE	Internet Protocol Multimedia Sub System Core
LMA	Last Mile Access
LRAIC+	Long-run average incremental cost plus
LRIC	Long Run Incremental Cost
LTE	Long-term evolution
MC	Marginal Cost
MEA	Modern Equivalent Asset
MGC	Media Gateway Controller
MGW	Media gateway
MME	Mobility Management Entity
MMS	Mobility Management Entity
MMSC	MMS Centre
MNO	Mobile Network Operator
MSP	Mobile Service Provider
MSS	MSC server
MTR	Mobile Termination Rate
MVCT	Mobile Voice Call Termination
MVNO	Mobile Virtual Network Operator
NGA	Next Generation Access
NGN	Next-generation network

NodeB	Denotes the UMTS equivalent of a BTS
NPV	Net present value
NRA	National Regulatory Authority
OCM	Operating Capital Maintenance
OLT	Optical Line Terminations
PDP	Packet data protocol
PoI	Point of interconnect
PSTN	Public Switched Telephone Network
PV	Present value
ROADM	Reconfigurable optical add-drop multiplexer
RIA	Regulatory Impact Assessment
RNC	Radio network controller
RPP	Receiving Party Pays
S–RAN	Single radio access network
SAU	Simultaneously attached users
SBC	Session border controller
SGSN	Subscriber GPRS serving node
SGW	Serving gateway
SIM	Subscriber Identity Module
SIP	Session Initiation Protocol
SMP	Significant Market Power
SMS	Short Message Service
SMSC	SMS centre
STM	Synchronous transport module
TAS	Telephony application server
TDM	Time Division Multiplexing
TD – Model	Top down Model
TMNE	Tariff Mediated Network Externality
UMTS	Universal mobile telecommunications systems
VMS	Voicemail system
VoWIFI	Voice over WIFI
VoIP	Voice over Internet Protocol
VoLTE	Voice over LTE
WACC	Weighted Average Cost of Capital
WDM	Wavelength Division Multiplexing