Commission for
Communications Regulation

Mobile Termination Rates:

Response to Consultation 14/29 and Supplementary Consultation 15/19 and Decision Document

Response to Consultation and Decision

Reference: ComReg 16/09

Decision: D02/16

Date: 12 February 2016

An Coimisiún um Rialáil Cumarsáide
Commission for Communications Regulation
Abbey Court Irish Life Centre Lower Abbey Street Dublin 1 Ireland D01W2H4
Telephone +353 1 804 9600 Fax +353 1 804 9680 Email info@comreg.ie Web www.comreg.ie

Redacted Information

Please note that this is a non-confidential version of the Response to Consultation and Supplementary Consultation and Decision Document. Certain information within the Response to Consultation and Supplementary Consultation and Decision Document has been redacted for reasons of confidentiality and commercial sensitivity, with such redactions indicated by the symbol ✂. In some cases, ComReg has presented information in an aggregated fashion in order to strike a balance between preserving the confidentiality of operator specific information whilst being as transparent as possible.

Contents

Chapter 1

1 Introduction

1.1 This response to consultation and final decision document (referred to throughout this document as the "**Decision Document**") sets out the Commission for Communications Regulation ("**ComReg's**") decision on the maximum mobile termination rates ("**MTRs**") for Ireland.

1.2 Voice call termination is a wholesale service provided by fixed service providers ("**FSPs**") and mobile service providers ("**MSPs**") (collectively "**Service Providers**") to the subscribers of other networks to terminate voice traffic on their respective networks.

1.3 A call may originate within Ireland or abroad from another MSP or FSP. The termination rate represents the wholesale price the termination service provider charges those other service providers for making calls to subscribers of its network (i.e., to the subscribers of the termination service provider). This Decision Document considers MTRs only.

1.4 In reaching its final decision ComReg has considered the submissions of interested parties to its consultation process. ComReg published two consultation papers as part of the consultation process.

1.5 The first consultation, ComReg Document No 14/29[1] (referred to throughout this document as the "**Original MTR Consultation**"), set out ComReg's proposed methodology and the proposed parameters for building a bottom-up ("**BU")** model to calculate MTRs for Ireland in accordance with the "pure" long-run incremental cost ("**pure LRIC**") cost standard). A draft model was also made available as part of the Original MTR Consultation.

1.6 The second consultation, ComReg Document No 15/19[2] (referred to throughout this document as the "**Supplementary MTR Consultation**"), considered *inter alia*, the proposed material modifications to the Draft MTR model (which was made available as part of the Original MTR Consultation) ("**Draft MTR Model**"). Please note that the Original MTR Consultation and the Supplementary MTR Consultation are, where appropriate, collectively referred to as "the Consultations" in this Decision Document.

[1] ComReg Document No 14/29: Mobile Termination Rates: Draft Bottom-Up Pure Long Run Incremental Cost Model; dated 14 April 2014.
[2] ComReg Document No 15/19: Mobile Termination Rates: Draft Bottom-Up Pure Long Run Incremental Cost Model; dated 26 February 2015.

1.7 This Decision Document provides a high-level summary of ComReg's preliminary views in the Consultations,[3] the views of respondents to the Consultations, ComReg's assessment of respondents' views and ComReg's final position.

1.8 ComReg has considered the views of its expert consultants Deloitte LLP ("**Deloitte**") and Analysys Mason Ltd. ("**Analysys Mason**") in arriving at this Decision Document.

1.9 This document is structured as follows:

- **Chapter 2:** This chapter provides an executive summary and sets out at a high level the purpose and description of the Final MTR Model.
- **Chapter 3:** This chapter summarises the background to the Decision Document. An overview of the responses received from interested parties to both the Original MTR Consultation and the Supplementary MTR Consultation is also set out in this chapter.
- **Chapter 4:** This chapter sets out the background to the costing methodology approach and the modelling principles considered in developing the MTR model.
- **Chapter 5:** This chapter sets out the modelling principle of **operator-related parameters** and considers operator specific parameters such as the assumed market share and structural implementation to be implemented in the MTR model.
- **Chapter 6:** This chapter sets out the modelling principle of **service-related parameters** and considers assumptions associated with traffic volumes etc. The services to be modelled in the MTR model are also set out in this chapter.
- **Chapter 7:** This chapter sets out the modelling principle associated with the appropriate **technology-related parameters** such as the scale of the operator; traffic forecasts; operator traffic load; and the defined increment.
- **Chapter 8:** This chapter sets out the **network element unit costs** in addition to the nominal capital expenditure ("**capex**") and operating expenditure ("**opex**") price indices that are applied to 2013 values.

[3] See paragraphs 1.5-1.6.

- **Chapter 9:** This chapter sets out the modelling principle associated with **implementation-related parameters**. This chapter considers the structure of the model and details the interlinked calculation modules; the load module, the network module and the cost module and the respective set of inputs/outputs.

- **Chapter 10:** This chapter sets out transparency obligations.

- **Chapter 11:** This chapter sets out the maximum MTRs for Ireland.

- **Annex 1:** This annex contains the Decision Instrument.

- **Annex 2:** This annex sets out other issues arising from the Original MTR Consultation and the Supplementary MTR Consultation.

- **Annex 3:** This annex compares MTRs across Europe with those calculated by the Final MTR Model.

- **Annex 4:** This annex sets out correspondence between Vodafone and ComReg

- **Annex 5:** This annex sets out correspondence between the European Commission and ComReg.

Chapter 2

2 Executive Summary

2.1 Callers expect to be able to make calls from their fixed and/or mobile telephone not just to other subscribers on their own Service Provider's network but also to subscribers on other Service Providers' networks. The same is true in respect of a call receipt. Where the customer originating the call subscribes to a different network from the customer receiving the call, two Service Providers will naturally be involved:

- the Service Provider on whose network the call originates; and
- the Service Provider on whose network the call terminates.

2.2 The Service Provider on whose network the call terminates makes a charge for each call terminated on its network, called a "termination rate," expressed in cent per minute. Ireland (and the rest of the EU) operates a "calling party pays" system, meaning that retail charges are borne in their entirety by the party originating the call. Where a call originates on one network and terminates on another network, the terminating Service Provider charges the originating Service Provider a call termination rate for the service provided (i.e., the termination Service Provider charges an MTR or a fixed termination rate ("**FTR**")). This decision document concerns MTRs.

2.3 The European Commission published a recommendation in 2009[4] in relation to MTRs (the "**2009 Termination Rate Recommendation**").[5] The 2009 Termination Rate Recommendation recommended that, by the end of 2012, all national regulatory authorities ("**NRAs**") such as ComReg should set: symmetric MTRs for MSPs; and further recommends that such MTRs should be set in accordance with a cost-orientation obligation based on the costs of an efficient operator using a BU pure LRIC approach (i.e., only those costs incurred by an efficient operator which are incremental to wholesale voice termination volumes).

The purpose of the Final MTR Model

2.4 The purpose of this Decision Document is to implement MTRs in the Irish market that have been calculated using a BU pure LRIC methodology.

[4] European Commission Recommendation: "The Regulatory Treatment of Fixed and Mobile Termination Rates in the EU" (2009/396/EC), dated 7 May 2009.
[5] ibid.

2.5 The final BU pure LRIC model described in this Decision Document (the "**Final MTR Model**") calculates an appropriate MTR to apply for the period 2016-2018 – the price control period will last from 1 September 2016 to 31 December 2018 (inclusive) (the "**Price Control Period**"). Pursuant to Regulations 13 and 18 of the Access Regulations, for each year of the price control period, each MSP designated with significant market power ("**SMP**") shall ensure that its MTR is no more than the rate determined for that year in accordance with the Final MTR Model.

2.6 Pursuant to Regulation 13 of the Access Regulations and in accordance with Section 12.1 of the Decision Instrument annexed to ComReg Decision D11/12, each MSP designated with SMP is subject to a cost orientation obligation as regards MTRs and prices charged by the MSP designated with SMP to any other Undertaking for Access to or use of those products, services or facilities referred to in Section 8 of that Decision Instrument.

2.7 ComReg has developed the Final MTR Model to calculate pure LRIC MTRs on the basis of a hypothetical efficient mobile telecommunications operator active on the Irish market. In other words, ComReg has sought to model the costs that would be incurred by an efficient mobile network operator ("**MNO**") in the Irish market.[6]

2.8 Characteristics of actual Irish MSPs, such as network costs and traffic patterns, have been used to inform what would represent a hypothetical efficient operator in the Final MTR Model.

2.9 ComReg believes that it is appropriate that the MTRs modelled on the basis of a single hypothetical efficient mobile operator should be the relevant charge applicable to each of the MSPs designated with having SMP in mobile voice call termination ("**MVCT**") (see paragraphs 3.8-3.10).

Description of the Final MTR Model

2.10 As the Final MTR Model models a hypothetical efficient mobile operator, in order to calculate the appropriate MTRs that would be efficiently incurred, ComReg deemed it necessary to estimate the precise nature (in terms of demand, network structure and costs incurred) that such a theoretical operator would take over the 30-year period of the model i.e., 2003-2032 "(**Modelled Timeframe**"). Therefore, ComReg estimated the relevant traffic load that a hypothetical efficient operator would have to accommodate on its network in order to fulfil demand.

[6] Regulation 13(3) of the Access Regulations specifies that ComReg should 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."* This approach in this Consultation Document is also consistent with models developed by other European NRAs.

2.11 Using the assumed traffic **load**, (which comprises voice, data and messaging), it is then possible to dimension the relevant mobile **network** in an efficient manner that would be capable of accommodating the demand arising from the traffic load. It is also necessary to attribute the relevant **cost,** that would be efficiently incurred by the hypothetical efficient operator in establishing and operating its network, to the various services carried on the network.

2.12 Accordingly, the Final MTR Model is in Microsoft Excel (.xlsm) and comprises the following three interlinked workbooks:

1. Load Module;
2. Network Module, and
3. Cost Module

2.13 The modelling exercise undertaken by ComReg is not specifically intended to reflect the precise, actual costs of one or more Irish MSPs currently active in the market. Indeed, it is unlikely, except by coincidence, that those would be exactly symmetric across operators. Nonetheless, ComReg considers that its modelling exercise pays reasonable and proportionate regard to Irish MSPs' costs since the model has been informed in material respects by data provided by the Irish operators, including data on their own actual, or at least stated, costs. In this context, Irish MSPs had multiple opportunities to submit relevant data and ComReg facilitated an industry workshop, subsequent bilateral workshops, and a number of formal information requests in this regard.

2.14 In some cases operator data was not available from Irish MSPs; in others it was incomplete or insufficiently granular for the purposes of the MTR Model; and in other cases reliance on such data was not deemed appropriate. Where data was absent, unavailable, incomplete or otherwise unsuitable, it has been necessary for ComReg and Deloitte to exercise judgment as to the relevant costs and other metrics for the purpose of the modelling exercise. Where appropriate, these assessments have been informed by similar modelling exercises carried out in other jurisdictions, as well as an assessment based on features of the Irish market.

2.15 The estimated demand volumes (in terms of voice, message and data traffic) facing the modelled hypothetical efficient operator are based on information submitted by the Irish MSPs to ComReg. This information is combined with population trends and mobile penetration statistics to derive historical and forecast traffic demands for all the various voice, message and data services, thereby ensuring that the modelled network is dimensioned with reference to all the traffic that is carried on Irish mobile networks.

Key parameters within the Final MTR Model

2.16 The Final MTR Model is developed with reference to the following key parameters:

- **operator-related parameters** – including the form of the modelled operator (hypothetical efficient) and market share assumptions;
- **service-related parameters** – including the size of the market, the scale of the operator and traffic forecasts;
- **technology-related parameters** – including technology standards, the degree of mobile network sharing and unit costs;
- **Implementation-related parameters** – asset lives, the economic depreciation methodology and the cost of capital.

These parameters are addressed in turn in Chapters 5, 6, 7 and 9.

2.17 A selection of modelled parameters including ComReg's final decision in relation to same is detailed below[7]. It is beyond the scope of this chapter to provide an overview of all the various modelling considerations — which are detailed in full in Chapters 5-9 and in the Deloitte Final MTR Model Specification Document for Ireland.[8]

Operator-related parameter: Market share

2.18 The market share assumed for the hypothetical efficient operator determines the share of each traffic service that the hypothetical operator's network will be expected to carry.

2.19 Having considered the responses to the Consultations and in light of the significant uncertainty that was highlighted in those responses with regard to the future number of MNOs likely to be active in the Irish market, ComReg believes it appropriate – at this time – to allow for a constant market share of 25% throughout the modelled timeframe.

2.20 This is further detailed in Chapter 5 (section 5.3).

[7] A limited number of examples have been provided for illustrative purposes only and these are not reflective of significance of priority.
[8] For information purposes only, Final Deloitte MTR Model Specification Document for Ireland is published as ComReg Document No. 16/09a: https://www.comreg.ie/_fileupload/publications/ComReg1609a.pdf. Deloitte's views expressed are not necessarily the views of ComReg.

Service-related parameter: Traffic patterns and forecasts

2.21 ComReg assessed total historical and forecast traffic demands in terms of voice, message and data (SMS and MMS) traffic to generate an estimate of the size of the Irish mobile market for each year modelled.

2.22 The model analyses operator's service demands by technology (i.e., 2G, 3G and Long Term Evolution ("**LTE**") (i.e., 4G), and from a geographic perspective in the context of urban, suburban and rural geotypes. This analysis was primarily informed by information that ComReg received from Irish MSPs (see paragraphs 3.21 and 3.26).

2.23 The relationship of on-net/off-net in the Final MTR Model continues to be based on a linear regression but the data informing this regression has been expanded from the more limited number of 2013 data points used in the Original MTR Consultation. The dataset now incorporates data from Q3 2012 – Q4 2014, thereby increasing the number of observations in the regression to 32.

2.24 In terms of traffic forecasts, the Final MTR Model assumes a moderate decline in SMS traffic beyond current per subscriber levels, while it also assumes positive slow growth in voice traffic and more significant growth in mobile data usage.

2.25 Projections for mobile data traffic growth in the Final MTR Model are based on Irish MSP-led forecasts of mobile data traffic and in the context of a hypothetical efficient Irish mobile operator with 25% market share (i.e., referred to as Scenario A in the Supplementary MTR Consultation).

2.26 This is further detailed in Chapter 6.

Technology-related parameter: Network technologies

2.27 The hypothetical efficient existing operator[9] is assumed to deploy both 2G and 3G technologies in its Radio Access Network ("**RAN**") and an all IP core[10]. ComReg considers that these technology standards comply with the Modern Equivalent Asset ("**MEA**") methodology[11] for Irish MSPs and are consistent with international best practice and the 2009 Termination Rate Recommendation.

[9] Section 4.41 of this Decision Document defines a hypothetical efficient existing operator as a hypothetical operator, who is assumed to have entered the Irish market and deployed its network in 2003, and to have since acquired its hypothetical market share.
[10] An all IP core refers to the transformation of formerly telephone-centric networks toward Next Generation Network ("**NGN**").
[11] Deloitte has been able to align the modelled network for the hypothetical operator to the network design parameters provided by operators whilst ensuring the hypothetical operator network design is modern and efficient.

2.28 Long Term Evolution or 4G ("**LTE**") technologies are still in the early years of deployment in Ireland and are assumed to be exclusively used for data during the Price Control Period. However, LTE traffic is implicitly considered in the Final MTR Model by capping the volume of data carried over 2G and 3G in future years.

2.29 This is further detailed in Chapter 7 (section 7.4).

Technology-related parameter: Spectrum

2.30 The spectrum holding is based on an average of Irish MNO holdings and aligns with the assumed market share of the hypothetical existing operator. However, LTE network elements are not explicitly modelled. While re-farming of some spectrum currently used for 2G is accounted for, bands used for LTE are not included in the Final MTR Model.

2.31 For modelling purposes, spectrum is treated as a fixed cost and only network equipment / infrastructure is allowed to vary in response to changes in traffic loads. This approach has also been adopted in BU models developed in other jurisdictions on the principle that, for an efficient network operator, there is a trade-off between the opportunity costs of spectrum and additional network roll-out.

2.32 This is further detailed in Chapter 7 (see section 7.5).

Technology-related parameter: Network sharing

2.33 The Final MTR Model assumes some passive network sharing, where operators can share sites and the passive elements on sites (such as the physical space and radio masts). However, active sharing (i.e. where operators agree to share active network elements in the RAN) is assumed not to take place.

2.34 While there is evidence of Irish MSPs entering into active sharing agreements, the Final MTR Model is developed on the basis of a hypothetical efficient operator that has achieved significant market share. As such, an operator would be less likely to enter into an active network sharing agreement than might an MNO that has still to reach efficient scale.

2.35 This is further detailed in Chapter 7 (see section 7.12).

Technology-related parameter: Network dimensioning

2.36 Dimensioning rules are a major factor in determining the extent to which the costs of each network element will be modelled as being avoidable in the context of the pure LRIC calculation. Avoidable costs are defined as only those costs that would not be incurred if the service in question (i.e., wholesale MVCT) were no longer provided.

2.37 Having considered evidence from other NRA models and reviewed the information provided during the consultation process, the GMSC in the core network is now treated as being incremental with respect to termination traffic in the Final MTR Model.[12]

2.38 Common costs are defined as costs which are not directly attributable to a specific service but are incurred in common with the provision of two or more services. The Final MTR Model assumes that the costs arising from the following network elements are common with respect to the relevant increment (see section 7.15):

- signalling platform;
- number portability platform;
- spectrum fees; and
- wholesale billing platform.

2.39 This is further detailed in Chapter 7 (section 7.15).

Implementation-related parameters: Asset lives and time period of the model

2.40 The asset lives used in the Final MTR Model are intended to reflect the economic life of the network assets and so may differ from the statutory asset lives adopted by MNOs in their financial accounts. However, the proposed asset lives have been sense checked against the operator-provided data and those adopted in MTR models in other jurisdictions.

[12] The impact on the MTR from this amendment is positive, albeit minor.

2.41 The choice of a 30 year time period is sufficiently long such that it captures two life-cycles of spectrum and is therefore deemed appropriate to sufficiently capture the long-term costs associated with operating a mobile network. This time period is also sufficiently long such that if the time horizon was extended even further, the discounted future years' costs and traffic would only have a negligible effect on current costs. In other words, if the model time frame was extended to 2037 (i.e., a 35 year period) applying discount factors to costs and traffic in the final years would have very little effect on the base year costs (i.e., 2013)[13]. A 30-year timeframe is also in line with the time frames adopted in other European NRA models.

2.42 This is further detailed in Chapter 9 (section 9.2).

Implementation-related parameters: Network costs and economic depreciation

2.43 The network unit cost are informed by values submitted by the Irish MSPs in response to The First Information Request. The Final MTR Model estimates the network element requirements and consequent equipment purchasing profiles over a 30 year period. Therefore, it is necessary to identify an appropriate unit cost for each year of the Final MTR Model and this is achieved by applying a series of capex and opex price indices to the operator submitted values of the various network elements.

2.44 These indices reflect the implied price change for the MEA of each network element and are based on indices observed in MTR models developed by other European NRAs.

2.45 Economic depreciation considers service volumes and costs across the lifetime of the Final MTR 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.

2.46 The cost of capital in the form of a preliminary nominal pre-tax weighted average cost of capital ("**WACC**") used in the Final MTR Model is 8.63% as per ComReg Decision D15/14[14]. This provides mobile operators with a reasonable rate of return on investment further to Regulation 13(2) of the Access Regulations (see section 9.8).

2.47 This is further detailed in Chapter 8 (sections 8.2 and 8.3) and Chapter 9 (section 9.4).

[13] Furthermore, any effect of extending the modelled time horizon could impact current costs upward or downward, depending on the forecasted service volumes. Forecasts beyond 2032 are however very uncertain.

[14] http://www.comreg.ie/_fileupload/publications/ComReg14136.pdf

The Final MTRs for Ireland

2.48 The purpose of this Decision Document is to implement pure LRIC based MTRs. ComReg has finalised an MTR Model in line with the pure LRIC methodology described and evaluated in the 2012 Price Control Decision[15].

2.49 In reaching its final Decision ComReg has considered and agrees with the conclusions of the Analysys Mason Final Report; and the Deloitte Final MTR Specification Document which sets out the modelling parameters adopted in this Decision Document. This Decision Document has been published along with the Deloitte Final MTR Specification Document and the Analysys Mason Final Report (please refer to ComReg Document Numbers 16/09a and 16/09b respectively[16]).

2.50 Therefore, for the reasons set out in this Decision Document and the Final Deloitte MTR Model Specification (published separately as ComReg Document No. 16/09a[17]), ComReg is adopting the Final MTR Model, which sets out the maximum wholesale MTR charge that the following MSPs should charge for MVCT:

1. Eircom (i.e. Meteor)
2. Lycamobile
3. Telefonica[18]
4. Tesco Mobile
5. Hutchison 3G Ireland Limited ("**Three**")
6. Vodafone

[15] https://www.comreg.ie/_fileupload/publications/ComReg12125.pdf
[16] ComReg Document No. 16/09a https://www.comreg.ie/_fileupload/publications/ComReg1609a.pdf and ComReg Document No. 16/09b https://www.comreg.ie/_fileupload/publications/ComReg1609b.pdf
[17] ComReg Document No. 16/09a https://www.comreg.ie/_fileupload/publications/ComReg1609a.pdf
[18] Telefónica, although designated with SMP in D11/12 has since been acquired by Three. Whilst that remains the case Telefónica shall be deemed to be included within the definition of Three for the purposes of this Decision. This Decision is nonetheless addressed to both Three and Telefónica as, for the time being at least, both entities continue in being.

2.51 The Final MTR Model calculates the pure LRIC maximum MTR for Ireland on an annual basis (2016 – 2018)[19], as below:

a. 0.84 Euro cent per minute for 2016;

b. 0.82 Euro cent per minute for 2017; and

c. 0.79 Euro cent per minute for 2018.

2.52 Pursuant to Regulation 13 of the Access Regulations and in accordance with Section 12.1 of the Decision Instrument annexed to ComReg Decision D11/12, each MSP designated with SMP is subject to a cost orientation obligation as regards MTRs and prices charged by the MSPs designated with SMP to any other Undertaking for Access to or use of those products, services or facilities referred to in Section 8 of that Decision Instrument. Pursuant to Regulations 13 and 18 of the Access Regulations, for each year of the Price Control Period, each MSP designated with SMP shall ensure that its MTR is no more than the rate determined for that year in accordance with the Final MTR Model. The rates determined in accordance with the Final MTR Model for the years 2016 to 2018 are as set out above.

2.53 ComReg notified the European Commission, the Body of European Regulators for Electronic Communications ("**BEREC**"), and other National Regulatory Authorities ("**NRAs**") on 17 November 2015 regarding the draft measure. The European Commission subsequently issued ComReg with two separate Requests for Information ("**RFI**") to which ComReg responded. On 15 December 2015, the European Commission issued ComReg with a "no comments" letter. In other words, the European Commission examined the notification and the additional information provided by ComReg and had no comments in accordance with Article 7(3) of the Framework Directive[20] as transposed by Regulation 13 of the Framework Regulations.

2.54 On 8 December and 14 December 2015, ComReg together with its consultants Deloitte, held individual workshops for each of the MSPs designated with SMP on the notified MTR model which had been shared with the MSPs in advance of the workshop. The purpose of these workshops was to provide a general overview of the notified MTR model as well as background to the updates to the model since the previous versions of the model which had been shared previously with each of the MSPs designated with SMP, as detailed in section 3.2 below.

[19] Please see paragraph 2.5 above for the definition of the Price Control Period.
[20] See Annex 5

2.55 In the case of Vodafone Ireland Limited –v– Commission for Communications Regulations - In the matter of an appeal pursuant to Regulation 4 of the European Communications (Electronic Communications Networks and Services) (Framework) Regulations 2011- High Court 2012 No 465 MCA, (the Vodafone Appeal), Vodafone appealed against ComReg's choice of a Pure LRIC cost standard and the adoption of an interim benchmarked MTR rate. The High Court found in part against ComReg and, in relation to consequential orders, ordered that Vodafone's maximum MTR should be no more than 2.6 cent per minute "until such time as the proceedings have been determined or until further order"[21]. ComReg has informed the High Court in the Vodafone Appeal of its intention to adopt this decision. Please see Section 3.1 for further detail on this case.

[21] Judgment of the High Court of 14 August 2013 (the "Judgment"), the High Court Order of 11 October 2013 and a Supplemental Judgement of 21 November 2013

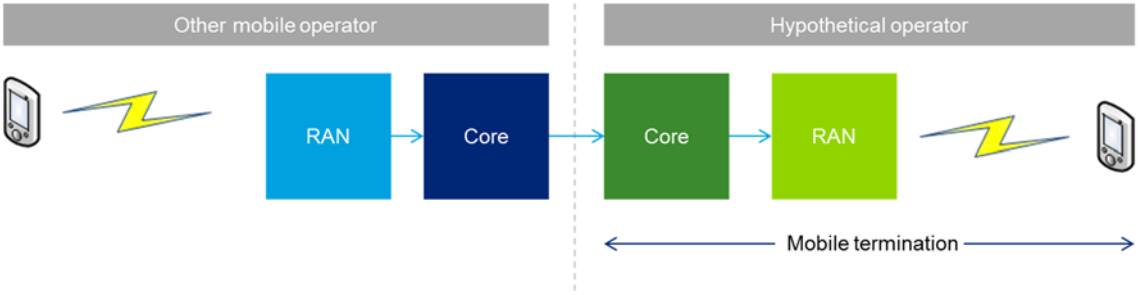
Chapter 3

3 Background

3.1 Introduction

3.1 MVCT is a wholesale service provided by an MSP to the subscribers of other networks to terminate voice traffic on its network. A simple illustration is provided below. This terminating traffic may also have originated from another national or international MSP or FSP.

Figure 1: Simple illustration of a mobile originated termination service



3.2 On 7 May 2009 the European Commission issued the 2009 Termination Rate Recommendation to NRAs across Europe. The adoption of the 2009 Termination Rate Recommendation followed long-standing divergence between termination rate price control measures that prevailed across the Member States. While recognising that termination rates were on a downward trend due to NRA intervention, the European Commission was of the view that they were too high, particularly for calls to mobile phones. The European Commission attributed the divergence between termination rate levels to the inconsistent approaches adopted by NRAs and expressed concern that inconsistent regulation would distort competition, impede investment and lead to higher tariffs for end-users.

3.3 In summary, the 2009 Termination Rate Recommendation recommends that by the end of 2012, NRAs should adopt symmetric MTRs for MSPs. It recommends that such MTRs should be set in accordance with a cost-orientation obligation based on the costs of an efficient operator using a BU pure LRIC approach.

3.4 Under a pure LRIC approach, the increment is the wholesale termination service and it excludes a mark-up for any common costs which would not be avoided if the wholesale voice call termination service was no longer supplied.

3.5 Setting Termination Rates based on a pure LRIC methodology is also consistent with ComReg's statutory objective to contribute to the development of the internal market. Differing rates and methodologies across the EU have important implications for cross-border competition and investment. A common approach to call termination markets based on efficient costing principles should encourage a stable and effective regulatory environment for future investments and establish a level playing field and enhanced competition between different Service Providers and networks (fixed and mobile).

3.6 In defining the relevant increment as the wholesale voice call termination service provided to third parties, pure LRIC allows for the recovery of all fixed and variable costs which are incremental to the supply of the wholesale voice call termination service (i.e., those costs that are incremental to terminating voice call traffic incoming from other Service Providers). This wholesale voice call termination increment can be calculated by identifying the total long-run cost of a Service Provider providing a full range of services and then identifying the long-run costs of this same Service Provider in the absence of the wholesale call termination service.

3.7 ComReg is obliged by virtue of Article 19(2) of the Framework Directive[22], as transposed by Regulation 30(1) of the Framework Regulations[23], to take "utmost account" of the 2009 Termination Rate Recommendation.

3.8 The starting point for ComReg in setting MTRs for Ireland was the designation of six MSPs with SMP in the wholesale MVCT market [24][25] (also referred to in this Document as the wholesale MVCT market) and the consequent imposition of *ex ante* remedies[26] (as a result of ComReg Decision D11/12, Document No. 12/124: Response to Consultation, Decision and Decision Instruments Market Review – Voice Call Termination Rates on Individual Mobile Networks ("**2012 MVCT Decision**")).

[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'**).
[23] European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. No. 333 of 2011) (the '**Framework Regulations'**).
[24] Published on 21 November 2012, please refer to the following link: http://www.comreg.ie/_fileupload/publications/ComReg12124.pdf
[25] This corresponds to Market 7 listed in the Annex to the European Commission Recommendation dated 17 December 2007 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 (the **"2007 Relevant Markets Recommendation**").
[26] http://www.comreg.ie/_fileupload/publications/ComReg12124.pdf

3.9 Further to Regulation 27(6) of the Framework Regulations, ComReg made an official request on 29 July 2015 to the European Commission for a two year extension (until November 2017) to the existing MVCT market analysis. The European Commission did not object[27].

3.10 The six MSPs are Vodafone Ireland Limited ("**Vodafone**"), Telefónica Ireland Limited ("**Telefónica**" or "**O2**"), Meteor Mobile Communications Limited ("**Meteor**")[28], Hutchison 3G Ireland Limited ("**H3GI**" or "**Three**"), Tesco Mobile Ireland Limited ("**TMI**") and Lycamobile Ireland Limited ("**Lycamobile**").

3.11 The 2012 MVCT Decision imposes a price control obligation of cost-orientation on all six MSPs who are designated with SMP pursuant to Regulation 13 of Access Regulations[29], which transposes Article 13 of the Access Directive[30] [31].

3.12 As a result of the 2012 MVCT Decision and after a separate consultation process, ComReg published ComReg Document No. 12/125 entitled *Mobile and Fixed Voice Call Termination Rates in Ireland* (the "**2012 Price Control Decision**")[32].

3.13 In the 2012 Price Control Decision, ComReg further specified the price control obligation of cost-orientation by imposing a pure LRIC cost standard — as the most appropriate means of calculating the appropriate level of cost to be recovered when determining the termination fee to be charged by all Service Providers.

3.14 ComReg's choice of pure LRIC as the appropriate cost standard means that the increment considered is the wholesale voice call termination service and it excludes a mark-up for any common costs which would not be avoided if the wholesale voice call termination service was no longer supplied (as set out in the 2012 Price Control Decision)[33]. The approach adopted by ComReg is also consistent with the 2009 Termination Rate Recommendation.

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[27] https://circabc.europa.eu/sd/a/19271105-71b4-49ad-8480-ca7bfc320454/MVCT%20Letter%20to%20DG%20Connect%20-%2029%20July%202015%20NON-CONFIDENTIAL.pdf

[28] Throughout this paper, we refer to "Eircom's" Response to the Original and Supplementary MTR Consultations, and this collectively represents those comments and views of Meteor Mobile Communications Ltd. (MMC) and eircom Ltd (eircom).

[29] European Communities (Electronic Communications Networks and Services) (Access) Regulations 2011 (S.I. No. 334 of 2011) (the '**Access Regulations'**).

[30] Directive 2002/19/EC of the European Parliament and of the Council of 7 March 2002 on access to, and interconnection of, electronic communications networks and associated facilities, as amended by Directive 2009/140/EC on 25 November 2009 (the '**Access Directive'**).

[31] See also Chapter 3 of the 2012 Price Consultation Document which sets out the previous cost-orientation obligations imposed respectively on SMP MSPs.

[32] Published on 21 November 2012 and which can be found at the following link: http://www.comreg.ie/_fileupload/publications/ComReg12125.pdf

[33] http://www.comreg.ie/_fileupload/publications/ComReg12125.pdf

3.15 On 18 December 2012[34], Vodafone appealed to the High Court against the 2012 MVCT Decision[35] as well as ComReg's 2012 Price Control Decision (the "**Vodafone Appeal**"). Pursuant to the Vodafone Appeal, the High Court found in part in its judgment of 14 August 2013 (the "**Judgment**") against ComReg, namely, in relation to the issue of benchmarking.[36] However, it deferred its ruling on Vodafone's challenge to the legality of ComReg's choice of pure LRIC as the relevant cost standard pending the adoption of the model (which is the subject of this Decision Document, the Original MTR Consultation document and the Supplementary MTR Consultation document – see paragraph 1.5). The Court's Order was made on 11 October 2013 (perfected on 17 October 2013) (the "**Order**") and it included an order imposing an interim maximum MTR of 2.60 cent per minute[37]. A further statement of reasons for the Judgment was provided by the High Court on 21 November 2013. The Court also clarified that the interim maximum MTR of 2.60 cent per minute imposed in its Order applied from 1 July 2013.[38]

3.16 The High Court thus held over its decision on the lawfulness of ComReg's choice of pure LRIC as the relevant cost standard until such time as a specific model is completed by ComReg. This Decision Document is the final step in the completion of the specific MTR model.

3.17 ComReg appealed the High Court Order and Judgment to the Supreme Court[39]. This appeal has recently been transferred to the newly formed Court of Appeal pursuant to a Direction issued by the Supreme Court on Wednesday 29 October 2014[40] but has not yet been heard.

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[34] ComReg Document No 12/139: Information Notice: Appeal of ComReg's Decision on Mobile Termination Rates; published on 20 December 2012.

[35] This 2012 MVCT Decision is available at the following link: http://www.comreg.ie/_fileupload/publications/ComReg12125.pdf

[36] See ComReg Document No 13/80: Information Notice: High Court Judgment on Mobile Termination Rates; published on 16 August 2013. Please refer to the following link: http://www.comreg.ie/publications/high_court_judgment_on_mobile_termination_rates.583.104434.p.html

[37] ComReg Document No 13/97: Information Notice: High Court Order following its Judgment of 14 August 2013 on Mobile Termination Rates; published on 21 October 2013. Please refer to the following link: http://www.comreg.ie/_fileupload/publications/ComReg1397.pdf

[38] ComReg Document No 13/108: Information Notice: Mobile Termination Rates Case; published on 21 November 2013. Please refer to the following link: http://www.comreg.ie/_fileupload/publications/ComReg13108.pdf

[39] ComReg Document No 13/99: Information Notice: Supreme Court Appeal – Mobile Termination Rates Case; published on 6 November 2013. Please refer to the following link: http://www.comreg.ie/_fileupload/publications/ComReg1399.pdf

[40] The direction is available at the following link: http://courts.ie/Courts.ie/library3.nsf/(WebFiles)/9F1FFE0ADBFC27F580257D80006193F2/$FILE/Supreme%20Court%20-%20Article%2064.3%20of%20the%20Constitution%20Direction%20by%20the%20Chief%20Justice%2029.10.14.pdf

3.18 As noted above, in the Vodafone Appeal, the High Court ordered that Vodafone's maximum MTR should be no more than 2.6 cent per minute "until such time as the proceedings have been determined or until further order"[41]. ComReg has informed the High Court in the Vodafone Appeal of its intention to adopt this decision.

3.2 The Consultation Process

3.19 ComReg developed a model with the purpose of informing the appropriate maximum MTRs for the Irish market in accordance with the pure LRIC cost standard. Before arriving at a final decision on the maximum MTRs, ComReg consulted publicly on this process, details of which are set out below.

3.20 On 14 April 2014, ComReg published the Original MTR Consultation setting out its proposed views regarding the parameters within the draft BU pure LRIC Model (the "**Draft MTR Model**") for determining the maximum MTRs that MSPs designated with SMP in the Irish MVCT market could apply over the price control period which was envisaged to commence in 2015.

3.21 In advance of the publication of the Original MTR Consultation, in order to identify the costs and technologies facing Irish MNOs ComReg contacted each of the six MSPs designated with SMP (see paragraph 3.10) and issued a draft data request on 10 June 2013. Following engagement with the MSPs the data request was refined and finalised, taking account of feedback received, before being issued to each of the six MSPs as a Section 13(D) Information Request on 9 July 2013 ("**the First Information Request**"). A two month timeframe for completion was provided for, which was subsequently extended by two weeks at the request of industry (from 9 September 2013 until 23 September 2013).

[41] Judgment of the High Court of 14 August 2013 (the "Judgment"), the High Court Order of 11 October 2013 and a Supplemental Judgement of 21 November 2013

3.22 Following the response to the First Information Request, ComReg issued each of the six MSPs with an initial draft version of a BU pure LRIC Model in addition to a Draft MTR Model Specification Document[42] on 19 December 2013. The six MSPs were invited to attend a group workshop held by ComReg on 20 January 2014, at which five of the six MSPs had representatives present. This was followed by an invitation from ComReg to hold bilateral workshops. Two MSPs availed of this opportunity on 20 January and 21 January, respectively. ComReg communicated feedback to queries raised at both the group workshop and bilateral workshops to each of the six MSPs. Throughout this process, the information received from operators was treated in confidence due to the competitively-sensitive nature of much of the information provided and requests from MSPs that confidential data not be divulged as part of the consultation process, or otherwise.

3.23 To maintain the confidentiality of operator data while at the same time maximising transparency, ComReg developed a non-confidential Draft MTR Model that contained anonymised operator data where necessary (i.e., indicative numbers which cannot be traced to any operator were used in the model).

3.24 To assist with consultation responses, the non-confidential Draft MTR Model was provided to each of the six MSPs on the same date that the Original MTR Consultation was published[43]. The direct unit capex costs were adjusted for the confidential version of the Draft MTR Model. All other parameters, including the percentages for deriving opex unit costs and the level of indirect costs associated with each network element were consistent in both models (i.e., in both the Draft MTR Model and non-confidential Draft MTR Model).

3.25 Six responses were received to the Original MTR Consultation:

- Eircom Group[44]
- Vodafone
- Telefónica
- Three
- Verizon
- Tesco mobile.

[42] The *"MTR Model Specification Document for Ireland – A Draft Consultation Report for ComReg"* provides a description of the proposed approach to construct a BU pure LRIC MTR model for Ireland.
[43] It was subsequently provided to BT Ireland during the consultation process (23 May 2014) as an interested party following a formal request to ComReg. Similarly the model was provided to Carphone Warehouse Mobile Ireland as an interested party on 8 September 2014.
[44] Please refer to footnote 28.

3.26 Having assessed the responses to the Original MTR Consultation, ComReg considered that a further information request was required for the purposes of updating the Draft MTR Model – so that it would more accurately enable the determination of the maximum wholesale MTRs. Thus, a second 13D(1) Information Request was sent to the six MSPs in August 2014 ("**the Second Information Request**") and responses were received in September 2014. ComReg also obtained data for the purposes of analysing whether there were any material changes in the Irish market that might affect the analysis undertaken by Analysys Mason on behalf of ComReg in 2012 i.e., that Pure LRIC is the appropriate costing methodology for the calculation of maximum MTRs in the Irish market. Having reassessed market developments in the Irish market over the period 2012-2014, Analysys Mason has concluded that its original conclusion in 2012 to recommend a pure LRIC cost standard for regulated MTRs in Ireland to ComReg still holds. ComReg is informed by this Analysys Mason Final Report in arriving at this Decision which calculates the maximum MTRs for the Irish market using a BU Pure LRIC MTR Model.

3.27 Having received the updated information in September 2014 ComReg proceeded to update the Draft MTR Model in addition to a new report by Analysys Mason which updates its analysis of the Irish mobile market that was undertaken in 2012[45] [46].

3.28 ComReg subsequently published the Supplementary MTR Consultation, on 26 February 2015, which set out ComReg's proposed maximum MTRs for Ireland in light of modifications made to the Draft MTR Model set out in the Original MTR Consultation. It provided each of the six MSPs designated with SMP with the Updated MTR Model at this time ("**Updated MTR Model**").

3.29 Four responses were received to the Supplementary MTR Consultation Document:

- Eircom Group
- Vodafone
- Three
- Tesco mobile.

3.30 The non-confidential responses received in response to the Original MTR Consultation and Supplementary MTR Consultation were published on 15 October 2014[47] and 17 November 2015[48] respectively.

[45] http://www.comreg.ie/_fileupload/publications/ComReg1519b.pdf
[46] http://www.comreg.ie/_fileupload/publications/ComReg12125a.pdf
[47] http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[48] http://www.comreg.ie/_fileupload/publications/ComReg1519s.pdf

3.31 The main points made by respondents to the Original MTR Consultation and Supplementary MTR Consultation are addressed in full in the main body of this document. Other responses are addressed in Appendix 1.

3.32 ComReg has taken full account of all of the responses in reaching its final decision. In its response to the Supplementary MTR Consultation Eircom stated that: "*[i]n general eircom considers the adjustments to the model to be appropriate. Indeed a number of the adjustments reflect the input that eircom provided in its response to the previous consultation.*"[49] Tesco expressed the view that "*it very much appreciates the modifications which ComReg has made to the model, in particular in Chapter 2, based on: (a) operators' feedback to the previous consultation; and (b) the changes in the market place…*".[50] Three stated that "…*it would be premature for Three to provide specific responses to ComReg at this time*…".[51] Vodafone stated that while it has "*concerns about its exact form and implementation, Vodafone welcomes the principled move towards a symmetric cost-orientation obligation across individual Irish mobile voice termination markets.*"[52]

3.33 Due to the varying nature of the responses to both the Original MTR Consultation and Supplementary MTR Consultation, ComReg has not repeated in each instance respondents' views where they did not object to or comment on our proposed approach. However, where respondents specifically commented on, expressed a view or raised an issue with respect to any of our preliminary views from the Original and Supplementary MTR Consultations we have set out the main points raised and response to these comments in this document[53].

3.34 ComReg believes that the Original MTR Consultation, the Supplementary MTR Consultation, the Draft MTR Model, the Updated MTR Model, the Draft Deloitte MTR Model Specification Document and the Updated Deloitte MTR Model Specification Document[54] ensured that the six MSPs[55] had sufficient information to assess the appropriateness of the modelling parameters.

[49] Eircom Response to the Supplementary MTR Consultation, Page 4.
[50] Letter enclosing Tesco Response to the Supplementary MTR Consultation.
[51] Letter from Three to ComReg in respect of Supplementary MTR Consultation.
[52] Vodafone Response to the Supplementary MTR Consultation, Page 25.
[53] See also paragraph 3.30.
[54] Original MTR Consultation http://www.comreg.ie/_fileupload/publications/ComReg1429a.pdf and "*MTR Model Specification Document for Ireland. A draft for Consultation Report for ComReg*" updated to include initial feedback from MSPs and published at: http://www.comreg.ie/_fileupload/publications/ComReg1519a.pdf
[55] This reflects Three's acquisition of Telefónica who had also been designated with SMP. This Decision is nonetheless addressed to both Three and Telefónica as, for the time being at least, both entities continue in being.

3.35 This Decision Document summarises the proposals put forward by ComReg in the Original MTR Consultation and Supplementary MTR Consultation, the views of respondents on these proposals (see also paragraph 3.32) and ComReg's final position regarding the MTR cost model and the maximum MTRs subject to the Price Control Period.

3.36 As noted above, subsequent to the notification of the draft measure to the European Commission pursuant to Article 7 of the Framework Directive as transposed by Regulation 13 of the Framework Regulations, ComReg together with its consultants Deloitte held individual workshops for each of the MSPs designated with SMP on the notified MTR model which model had been shared with the MSPs in advance of the workshop. The purpose of these workshops was to provide a general overview of the notified MTR model as well as background to the updates to the model since the previous versions of the model which had been shared previously with each of the MSPs designated with SMP, as detailed above.

Chapter 4

4 Costing Methodology

4.1 Introduction

4.1 This chapter sets out the details of the modelling approach, as well as the modelling principles used in developing the MTR cost model.

4.2 ComReg's conclusion in the 2012 Price Control Decision was that MTRs should be based on a cost-orientation obligation using a pure LRIC cost methodology. ComReg considered that this would allow for the recovery of the level of costs that would be efficiently incurred by a MSP in the Irish market which offers wholesale voice call termination services.

4.3 As set out in the Original MTR Consultation, cost models developed for regulatory purposes can be constructed using either a top-down ("**TD**") or a BU modelling approach.

Overview

4.4 In the Original MTR Consultation, ComReg proposed that a BU methodology was the most appropriate means of developing an MTR Model for the purposes of MVCT in the Irish market.

4.5 In the Original MTR Consultation, ComReg stated that a major difficulty in developing TD models for mobile operators is the lack of sufficient detail within operator accounts and the fact that the information available can contain inefficient costs and other legacy issues. In addition, if ComReg were to model the respective individual Irish mobile operator inputs directly this would inevitably create asymmetric costs and therefore asymmetric MTR rates. This could lead to a distortion of competition with regard to how costs are recovered from mobile and fixed operators and would be inconsistent with the 2009 Termination Rate Recommendation.

4.6 As noted in the Original MTR Consultation, the proposed MTR Model is a BU model of a hypothetical efficient mobile operator and, therefore, is not specifically intended to mirror the actual costs of any specific Irish operator(s). The model is not a purely theoretical exercise since it has, in very material respects, been based on data provided by the Irish 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 active in the Irish market.

4.7 The modelling principles of the proposed BU approach to developing an MTR model were set out as follows in the Original MTR Consultation:

- **operator-related parameters** – including the form of the modelled operator (hypothetical efficient mobile operator in an Irish context); structural implementation (BU model using a scorched node approach informed by actual Irish operator data); and market share assumptions;
- **service-related parameters** – including the size of the market, the scale of the operator; traffic forecasts; traffic load and definition of the increment;
- **technology-related parameters** – including the scale of the coverage network; technology standards; degree of network sharing; use of spectrum; logical network structure; network design parameters; unit costs; and price indices; and
- **implementation-related parameters** – model structure; asset lives; the timeframe of the model; calculation of pure LRIC; economic depreciation methodology; and the cost of capital.

4.8 The remainder of this chapter sets out: the views of respondents to the Original MTR Consultation; ComReg's assessment of those views and ComReg's final position.

4.9 The Supplementary MTR Consultation considered material modifications to the Draft MTR Model that accompanied the Original MTR Consultation. Consequently, the costing methodology and modelling principles were not considered in the Supplementary MTR Consultation as there were no proposed modifications to these matters.

4.1.1 Submissions to the Original MTR Consultation

4.10 The majority of submissions to the Original MTR Consultation favoured a BU approach in line with ComReg's preliminary view. However, some respondents suggested that a top-down model may be more appropriate.

4.11 Eircom considered "*the proposed Bottom Up (BU) approach to be the most* appropriate *among the approached considered, as a means of establishing a pure LRIC MTR as required in the Recommendation".*[56] In addition, Eircom agreed that "*an actual operator approach which would likely result in differing MTRs across the operators would be inconsistent with the Termination Rate Recommendation, particularly with respect to ensuring that MTRs are based on efficiently incurred costs*."[57]

4.12 Telefónica stated that ComReg had not explained "*why it is appropriate to apply BU approaches to mobile but not in other markets regulated by ComReg, for example, broadcasting. The applicable BU approach does address inefficiency and legacy costs but top down analysis is lighter touch in terms of cost to industry"*.[58]

4.13 Tesco Mobile stated that "*[w]hile bottom up may have its merits, such as addressing both inefficiencies and legacy costs, top down analysis is lighter touch in terms of cost and burden which is placed on the industry."*.[59]

4.14 Three did not raise any specific points in relation to the choice and application of operator parameters in the Draft MTR model.

4.15 Verizon welcomed and fully supported ComReg's intention to set MTRs using a BU "pure" long run incremental cost methodology in Ireland. It stated that *"there can be no doubt that BU-LRIC is the appropriate cost methodology to use"*.[60]

4.16 Vodafone expressed the view that *"[i]n line with the text of the Termination Recommendation ComReg should carry out a reconciliation of the results of a bottom-up model with the results of a top-down model in order to produce as robust results as possible".*[61] In this context it also stated that Vodafone's costs "*…are therefore a reflection of the real cost which should be taken in to account in deriving a network model*".[62]

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[56] Eircom Response to the Original MTR Consultation, page 8.
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[57] Eircom Response to the Original MTR Consultation, page 7.
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[58] Telefónica Response to the Original MTR Consultation, page 2.
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[59]Tesco Mobile Ireland Response to the Original MTR Consultation, page 3.
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[60] Verizon Response to the Original MTR Consultation, page 2.
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[61] Vodafone Response to the Original MTR Consultation, page 8.
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[62] Vodafone's response to the Original MTR Consultation, page 8.

4.17 Vodafone stated that its review of the Draft MTR Model *"…revealed many small calculation errors but also more fundamentally, [the Draft MTR Model] produces results which do not seem to be in line with reality and contradict logical expectations*."[63]

4.18 At a high level, respondents did not raise any issue with the proposed modelling principles for developing an MTR model, as set out in paragraph 4.7. The components of these modelling principles are addressed separately in Chapter 5–Chapter 9.

4.1.2 ComReg's Position

4.19 ComReg notes that Eircom agreed with ComReg's choice of a BU approach in developing an MTR model and that Three and Verizon did not raise any issues with this proposed approach.

4.20 In respect to Telefónica's and Tesco's views that a TD approach may be a "*lighter touch*" in terms of cost to industry, ComReg does not agree. A TD approach would result in an increased regulatory burden — as the associated data for a TD model would need to be received from each MNO.

4.21 With respect to Vodafone's request for a TD reconciliation of the model, ComReg does not consider a TD approach to be appropriate in this context. Following the approved merger of Three and Telefónica, the now merged MNO entity is unlikely to be in a position to provide a combined and meaningful TD model due to its limited history. Therefore, a TD approach would only be more burdensome. Furthermore, there is a risk that a TD approach would be less capable of calculating appropriate symmetric MTRs for a hypothetical efficient existing mobile Irish operator. In particular, due to the recent merger, a reconciliation between TD and BU could only be meaningfully derived for Meteor and Vodafone[64]. Finally, the issue of TD reconciliation must be seen in the context of the fact that, in arriving at a BU MTR model, ComReg has taken into account operator provided data (received from all six MSPs designated with SMP) and having regard for efficiencies and economies of scale, calibrated the model accordingly (see paragraph 4.23).

[63] Vodafone's response to the Original MTR Consultation, page 3.
[64] It is important to note that while separated accounts by service could guide further calibration these are not available from Vodafone.

4.22 Further to Vodafone's view specified in paragraph 4.16, ComReg considers that it is not appropriate to model an actual operator or an average operator (see paragraph 2.48). The objective of the Final MTR Model is not specifically to identify operator-specific costs. Rather it is to establish the cost for MVCT of an efficient MNO operating in an Irish context so as to derive a maximum symmetric MTR that can be applied to all Irish MSPs.[65] ComReg therefore proceeded to model a hypothetical efficient mobile operator (see further section 5.1)..

4.23 The Final MTR Model has also been calibrated to the extent data availability allowed for a TD calibration[66]. Specifically:

- Unit costs (Opex and Capex) have been compared against information submitted to ComReg by Irish mobile operators in response to the First Information Request in addition to data from other publicly available MTR models;[67] [68]
- The modelled operator costs in the Final MTR Model have been compared against publicly available segmented financial statements of Eircom in the financial year ending 2012 for its mobile operator (Meteor);[69] and
- The number of network elements deployed by the modelled operator in 2013 (i.e., the base year) in the Final MTR Model has been compared on an element-by-element basis against information submitted to ComReg by Irish mobile operators in response to the First Information Request.

4.1.3 ComReg's Final Position

4.24 ComReg remains of the view that the MTR model should be developed using a BU approach and the Final MTR Model has been finalised on this basis.

[65] See paragraph 3.19 and 3.20 of the Original MTR Consultation http://www.comreg.ie/_fileupload/publications/ComReg1429.pdf
http://www.comreg.ie/_fileupload/publications/ComReg1429.pdf
[66] In this regard, a calibration has been carried out with respect to the dimensioning of the hypothetical efficient operator's network and this did not result in a reconciliation of modelled outputs.
[67] See 6.1.1 of the Final Deloitte MTR Model Specification Document.
[68] As the model does not include elements related to, for example LTE, as these would have no impact on voice termination, the overall modelled network costs may not as accurately reflect actual total costs incurred by operators.
[69] ibid.

Chapter 5

5 Operator-Related parameters

5.1 Form of Modelled Operator

Overview

5.1 In the Original MTR Consultation, as set out in Chapter 4, ComReg's proposed approach was to develop a BU MTR Model on the basis of a hypothetical efficient operator in an Irish context.

5.2 ComReg was of the preliminary view that the modelled operator would be a hypothetical efficient 'new entrant' in 2003 — at which point the proposed 30-year model commenced.

5.3 ComReg was of the preliminary view that the modelled operator would reach the market share associated with minimum efficient scale (based on a 1/N methodology)[70] within three to four years of entering the market. In the Original MTR Consultation, ComReg was of the preliminary view that the assumed market share for the modelled hypothetical efficient operator should reflect the market conditions in Ireland — consistent with the 2009 Termination Rate Recommendation. In addition, ComReg stated that this approach is adopted in the majority of other European jurisdictions — where a generic operator is modelled with an associated market share equal to a 1/N methodology. This parameter is also relevant for the market share parameters, which is discussed in section 5.3.

5.4 The remainder of this chapter sets out: the views of respondents the Original MTR Consultation; ComReg's preliminary view in the Supplementary MTR Consultation; the responses from interested parties to the Supplementary MTR Consultation; ComReg's assessment of those views; and ComReg's final position.

[70] Where N is the number of active MNOs in the Irish market. The assumed progression of market share was presented accordingly in Table 1 of the Original MTR Consultation.

5.1.1 Submissions to the Original MTR Consultation

5.5 Referring to the hypothetical efficient new entrant approach Eircom welcomed the fact that the Draft MTR Model included *"legacy technologies and the associated investments"* as *"those technologies continue to be used in the delivery of call termination service"*.[71] Eircom agreed with ComReg's preliminary views regarding the appropriateness of the operator-related parameters and their application in the Draft MTR Model, noting that "*an actual operator approach which would likely result in differing MTRs across the operators would be inconsistent with the Termination Rate Recommendation, particularly with respect to ensuring that MTRs are based on efficiently incurred costs*"[72]. In particular, Eircom stated that that "*[g]iven the diverging characteristics across the 4 Irish mobile operators with respect to market share and the profile of each customer base, an average operator approach would constitute a very inaccurate means of achieving a representative model."*[73]

5.6 With regard to ComReg's preliminary view on the progression of market share, Eircom stated that this "*does not reflect the experience of new entrants to the Irish market*".[74] However, Eircom stated that "*in the interest of reflecting the current reality we consider this to be a reasonable approach as a more gradual increase in market share would necessitate a model that extends further back in time, adding to the complexity and uncertainties in the modelling exercise*".[75]

5.7 Telefónica did not comment specifically on the form of modelled operator (i.e., the hypothetical efficient operator) but rather on certain assumptions that it was based on. Telefónica considered that a number of assumptions associated with the form of modelled operator "*are not consistent with reality*"[76]. For example, "*ComReg assume an efficient operator would only invest in LTE not 3G whereas operators are investing 3G to enhance service in rural areas before considering 4G*"[77]. This is discussed separately in paragraph 6.75.

[71] Eircom Response to the Original MTR Consultation, page 8. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[72] Eircom Response to the Original MTR Consultation, page 7.
[73] ibid.
[74] ibid.
[75] ibid.
[76] Telefónica response to the Original MTR Consultation page 2 http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[77] ibid.

5.8 Vodafone stated that "*the principles underlying ComReg's proposed use of a scorched node approach accords with its view that the competitive conditions in the Irish market mean that the modelling of a hypothetical efficient existing operator should yield results which align strongly with the actual deployments of MNOs normalised for market share*".[78] This point is also relevant to the nodal layout of the Draft MTR Model, as detailed in section 7.2 (see paragraph 7.22).

5.1.2 Supplementary MTR Consultation

5.9 Having considered responses received, ComReg modified the Draft MTR Model where it considered appropriate. These material modifications were set out in the Supplementary MTR Consultation with the intention of addressing the concerns raised by interested parties.

5.10 Specifically, in the Supplementary MTR Consultation, ComReg no longer modelled a hypothetical efficient new entrant from 2003 and instead modelled a hypothetical efficient operator with 25% market share from 2003. In the Supplementary MTR Consultation, ComReg was of the preliminary view that the modelled operator should be a hypothetical efficient existing mobile operator — in an Irish context — throughout the entire Modelled Timeframe. The Updated MTR Model was modified in this manner to be more consistent with the 1/N methodology (as specified in paragraph 5.3). This implies that a hypothetical efficient existing operator is being modelled as opposed to a hypothetical efficient new operator who builds to sufficient scale such that it becomes a hypothetical efficient existing operator.

5.1.3 Submissions to the Supplementary MTR Consultation

5.11 Respondents to the Supplementary MTR Consultation did not raise any issue with ComReg's revised preliminary view to model a hypothetical efficient existing operator i.e., an operator with minimum efficient scale (25% market share) from 2003.

5.1.4 ComReg's Position

5.12 ComReg is of the view that it is appropriate to model a hypothetical efficient existing operator from 2003 as opposed to a hypothetical efficient new entrant from 2003 which then reaches a market share associated with minimum efficient scale after a number of years.

[78] Vodafone Response to the Original MTR Consultation, page 13. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

5.1.5 ComReg's Final Position

5.13 ComReg has finalised the Final MTR Model on the basis of a hypothetical efficient existing operator i.e., an operator with minimum efficient scale (25% market share) from 2003.

5.2 Structural Implementation

Overview

5.14 As set out in the Original MTR Consultation, a BU model is better equipped to reflect the choices of a hypothetical efficient operator from both a technical and an operational point of view, compared to a TD model.

5.15 In the Original MTR Consultation, ComReg noted that while the Draft MTR Model is not intended specifically to mirror the actual costs of a specific Irish mobile operator currently active in the market, it should reflect Irish conditions and therefore should be informed by actual or stated cost or other data that Irish operators submitted to ComReg.[79] In determining the structural implementation of the Draft MTR Model, ComReg proposed that the model should be developed using a modified scorched node methodology. This allows for the modelling of efficient costs and scale while also enabling costs and technology assumptions to be more closely aligned with those actually faced by the MSPs in the Irish market.

5.16 In developing the Draft MTR Model, ComReg considered operator data provided by each of the six MSPs with the view to ensuring that the model inputs adequately took account of the actual cost; network design; and service demand parameters as provided by the operators.

5.2.1 Submissions to the Original MTR Consultation

5.17 Vodafone raised a number of issues, which it claimed were evidence that ComReg and its consultants had not carried out the necessary level of calibration analysis to ensure that the Draft MTR model was sufficiently aligned with actual MSP data. Specifically, Vodafone claimed the following:

[79] The operator data received was assessed by ComReg and its external advisers with the view of identifying data which was most representative of a hypothetical efficient mobile operator in an Irish context.

(i) *"…the model documentation highlights stark differences between assumed inputs, model outputs and actual operator costs or network deployments which must be regarded as being highly indicative that the model is not an accurate reflection of an operator in the Irish market.... Vodafone [have operated in a competitive environment and so] the costs incurred by Vodafone are therefore a reflection of the real cost which should be taken in to account in deriving a network model."*[80]

(ii) *"…there are a number of assumptions contained in the model which individually and/or cumulatively produce an unrealistic figure for the termination increment. In addition, there are significant simplifications in the network model, which make comparison with real model figures difficult."*[81]

(iii) *"ComReg has not carried out the most basic level of calibration of comparing the model inputs and outputs with either known historical facts or data relating to actual network deployments….The calibration referenced in paragraph 3.34 of the consultation document is limited and is flawed as the maximum and minimum range which is used for comparison includes those operators who use National Roaming and/or are 3G only."*[82]

(iv) A financial calibration "*should have been carried out using real financial data obtained from operators [and] [t]o assist this Vodafone submitted extensive financial data as part of the data gathering exercise. No reference has been made to a suitable financial calibration."*[83]

(v) Consistency checks carried out by ComReg and its consultants "*have not been sufficient to identify stark misalignments in parameters which are straightforward to check. This must call into question whether similar deficiencies in the model exist in parameters which are less easy to check. But also, more fundamentally, it calls into question the appropriateness of the current model to assess the relevant costs of mobile termination."*[84]

5.18 The structural implementation of the Draft MTR Model was not considered in the Supplementary MTR Consultation. As noted, the scope of the Supplementary MTR Consultation was to consider material modifications to the Draft MTR Model only and there was no such proposed modification to the structural implementation.

[80] Vodafone Response to the Original MTR Consultation, page 8. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[81] ibid.
[82] Vodafone Response to the Original MTR Consultation, page 9. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[83] ibid.
[84] ibid.

5.2.2 ComReg's Position

5.19 In relation to the various points set out by Vodafone as detailed in paragraph 5.17 and 7.57, ComReg does not agree. ComReg and Deloitte (in advance of the Original MTR Consultation being published) had undertaken a series of calibration exercises that examined the modelled outputs and included a series of sensitivity tests across parametric assumptions and input data. However, the full detail of this analysis was not included in the Original MTR Consultation, as the sharing of these results would have risked the commercial confidentiality regarding operator provided traffic and network data. This was the rationale for presenting the calibration and comparison exercise more broadly without reference to the specific operator input data.

5.20 Similarly, a top-down calibration was carried out based on the limited financial data submitted to ComReg by mobile operators. However, as this information was explicitly marked as confidential it was not appropriate to directly quote the results of this analysis. Furthermore, as the model results were provided to all operators, an absolute or relative comparison against these outputs would have potentially led to operators being able to infer certain MNO cost data.

5.21 With respect to Vodafone submission set out in paragraph 5.17 (i), ComReg can confirm that traffic volumes; network parameters; and cost inputs received from Irish mobile operators in response to ComReg's The First Information Request and the Second Information Request were used in developing the Draft MTR Model. The resulting outputs (i.e., network elements and cost outputs) were compared against data provided by Irish mobile operators and data from other publicly available MTR models. See paragraph 4.23. Consequently, ComReg maintains the view that it is appropriate to use operator data provided by each of the six MSPs in order to ensure that the modelled inputs adequately account for the actual cost; network design; and service demand parameters as provided by the operators (i.e., the structural-implementation).

5.2.3 ComReg's Final Position

5.22 ComReg remains of the view that it is appropriate that the structural-implementation of a hypothetical efficient operator be used in the Final MTR Model.

5.3 Market Share

Overview

5.23 Based on the Irish market at the beginning of 2014, the 1/N methodology implied a 25% market share consistent with a market comprised of four MNOs — to reflect the fact that the two MVNOs designated with SMP are not MNOs. However, in assessing market share, ComReg was also cognisant that Three had made an offer to acquire O2, which at the time of the Original MTR Consultation had the potential to reduce the number of MNOs in Ireland from four to three.

5.24 Given this uncertainty in the Original MTR Consultation, ComReg assumed a 25% market share in the Draft MTR Model and indicated that alternative market share scenarios could be considered should the acquisition of O2 by H3GI proceed. These scenarios included an assumption of a 33% market share across the modelled time period in addition to incorporating a 1/N market share trend into the cost model (i.e., 25% rising to 33.3%).

5.3.1 Submissions to the Original MTR Consultation

5.25 Following publication of the Original MTR Consultation the European Commission conditionally approved the proposed Three/O2 merger (though the conditions of its clearance had not been published at that time). As such, respondents to the Original MTR Consultation had knowledge of this market development and the impact on the alternative market share scenarios as originally presented by ComReg.

5.26 Eircom stated "*now that the outcome of the proposed H3GI/O2 acquisition, is known ComReg should adopt the…scenario…which assumes a forward looking 33% market share…*"[85].

5.27 Telefónica accepted "*ComReg's approach to market shares for all active MNOs in the market*".[86]

5.28 Tesco's response suggested that "*the relevant conditions attached to the European Commission's decision*" regarding the merging of two MNOs "*would call into question ComReg's key assumptions as regards market shares*".[87]

[85] Eircom Response to the Original MTR Consultation, page 7.
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[86] Telefónica Response to the Original MTR Consultation, page 2.
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[87] Tesco Response to the Original MTR Consultation, page 2.
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

5.29 Vodafone stated that "*it would be unsafe and disproportionate to assume a modelled market share higher than 25% at this time*".[88]

5.3.2 Supplementary MTR Consultation

5.30 Having considered interested party views and in particular the European Commission's approval of the proposed Three/O2 merger,[89] in the Supplementary MTR Consultation, ComReg revised its preliminary view on the market share assumed for the modelled hypothetical efficient operator.

5.31 Consequently, in order to reflect the merger and in line with the 1/N methodology (where N represents the number of active MNOs in the Irish market), ComReg's preliminary view (in the Supplementary MTR Consultation) was that the market share in the model should be 25% over the period 2003-2014 and 33% from 2015.

5.3.3 Submissions to the Supplementary MTR Consultation

5.32 Tesco Mobile Ireland's response indicated that it "*very much appreciates*" the modifications made by ComReg to the Draft MTR Model based on "*…the changes in the market place (in particular, the recognition in the Consultation (e.g., pages 12, 18 and 19) of the Telefónica/Hutchinson Whampoa transaction in regard to O2"*.[90]

5.33 Three's response to the Supplementary MTR Consultation stated that it is "*concerned that ComReg's model assumes a three-operator market from 2015 to 2032"*.[91] Three suggested a further consultation was required by ComReg on this specific matter due to the "*remedies imposed on Three as part of the merger [which] include entry of two new MVNOs, with at least one to have the option of becoming a full MNO"* which it stated may make ComReg's preliminary on market share "*invalid"*.[92]

[88] Vodafone Response to the Original MTR Consultation, page 9. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[89] http://europa.eu/rapid/press-release_IP-14-607_en.htm
[90] Tesco Response to the Supplementary MTR Consultation.
[91] Three Response to the Supplementary MTR Consultation.
[92] ibid.

5.34 Vodafone asserted that "*ComReg has failed to assess the impact on effective market shares among players"*.[93] It further asserted that ComReg's assumption that two distinct networks merge overnight is not realistic as "*[t]he impact of the merger on the market cannot be pictured in a simplified way that market shares of each market player (or hypothetical market player) suddenly increase from 25 to 33%"* and stated that "*the current merger control which requires Three-O2 to host two new MVNOs on their network in order to ensure effective competition is unlikely to bring about a hypothetical 1/N market split"*.[94]

5.35 Furthermore, Vodafone stated that "*ComReg has not provided any substantive reasoning, which reflects the full range of market conditions, to justify a sudden change towards a 33% market share"* and in its view this issue warrants "*a full consultation setting out [ComReg's] detailed reasoning for the proposed market share level"*.[95]

5.36 Vodafone also argued that the 2009 Termination Rate Recommendation sets out that the efficient market shares to be used by NRAs in modelling MTRs is 20% and that NRAs must "prove" that market conditions would imply a different minimum efficient scale before it can deviate from this scale.[96]

5.3.4 ComReg's Position

5.37 In respect of Vodafone's submission set out in paragraph 5.36, the 2009 Termination Rate Recommendation states that the *minimum* efficient scale should be at least 20%. It is therefore possible to have a market share in excess of 20% and remain consistent with the 2009 Termination Rate Recommendation. Specifically, the 2009 Termination Rate Recommendation states that "[i]n case an NRA can prove that the market conditions in the territory of that Member State would imply a different minimum efficient scale, it could deviate from the recommended approach"[97]. It is also important to note that the 20% recommendation is only based on the situation in a "number of Member States" and is not therefore intended to be definitive as to all Member States (and particularly smaller Member States like Ireland which may exhibit different patterns). As such, ComReg considers that an assumed market share greater than 20% has no necessary inconsistency with the 2009 Termination Rate Recommendation.

[93] Vodafone Response to the Supplementary MTR Consultation. Page 9
[94] ibid.
[95] ibid.
[96] ibid.
[97] Page 12 2009 Termination Rate Recommendation. http://ec.europa.eu/smart-regulation/impact/ia_carried_out/docs/ia_2009/c_2009_3359_en.pdf

5.38 In any case, due to the changed structure of the market, owing to the merger between Three and O2, ComReg undertook extended scenario analysis regarding the market share of the hypothetical operator. In order to remain consistent with the "1/N" approach in the model, the change in market share from 25% in 2014 to 33% in 2015 has been considered to reflect the change of the number of MNOs from four to three in 2015. While precedent suggests that ComReg's assumptions with regard to an evolving market share have been made in other jurisdictions, there does not appear to be consistency as to how the market share might change in such circumstances.[98] However, ComReg considers that the sudden increase in the market share from 25% to 33% (as stated by Vodafone in paragraph 5.34) may be an oversimplified assumption and, coupled with the reasons identified below (paragraphs 5.39-5.41), ComReg has revised its approach.

5.39 An immediate change in the assumed market share (from 25% to 33%) between 2014 and 2015, as proposed in the Supplementary MTR Consultation, impacts the number of elements deployed by the hypothetical efficient operator due to the resulting increase in traffic demand. This assumed increase in market share also accounts for a higher ratio of on-net to off-net traffic volumes compared to what is actually observed in the Irish market. The impact on the modelled network is that a significant network investment assumed in 2015 may be an unrealistic representation of how an actual Irish MSP would behave under such circumstances.

5.40 In addition, while the merged entity (H3GI and O2) has led to the number of existing MNOs active in the Irish market reducing from four to three, it will take time to merge the two existing networks of H3GI and O2 such that the number of actual mobile networks will remain greater than three for a period of time.

5.41 Another factor that has been considered is the possibility that a new MVNO in the Irish market may evolve into a MNO in the coming years. It may therefore be premature for modelling purposes to assume that only three MNOs would be active over the Modelled Timeframe.

[98] For instance ANACOM's model assumes a market share that increases from 20% in 2011 to 33% in 2017.

5.42 While ComReg considers that the "1/N" methodology remains appropriate for determining the modelled market share, it also recognises the significant uncertainty surrounding the future number of active MNOs in the Irish market, as stated by Three and Vodafone (see paragraphs 5.33-5.35). Consequently, ComReg has deemed it to be prudent, at this time, to allow for a constant market share of 25% to persist throughout the modelled timeframe. ComReg will continue to monitor the level of network competition in the Irish mobile market and determine if the 25% market share should be increased for future price control periods (if appropriate).

5.3.5 ComReg's Final Position

5.43 The Final MTR Model assumes a constant 25% market share throughout the modelled time frame.

Chapter 6

6 Service-related parameters

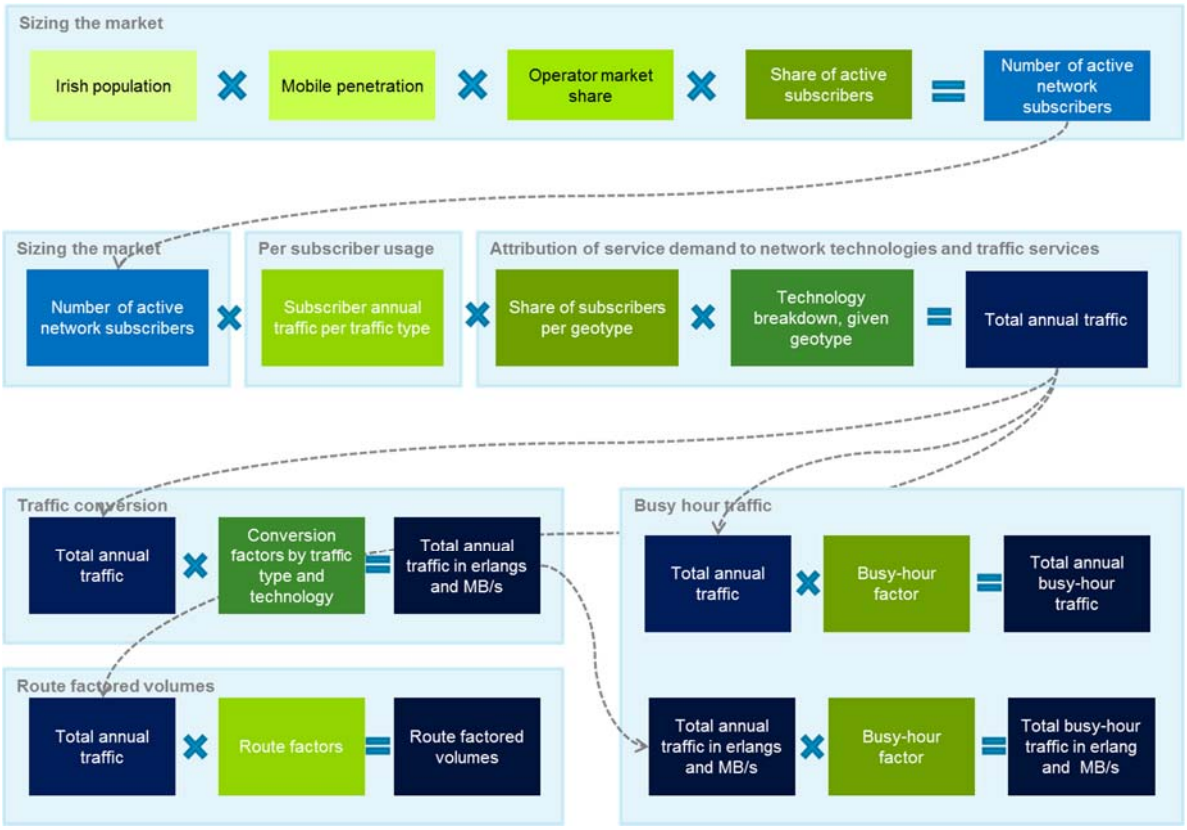
Overview

6.1 Service parameters are a necessary input to the model which calculates long-run costs and 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.

6.2 As set out in the Original MTR Consultation, traffic patterns indicate the size of the mobile market across the timeframe of the Draft MTR Model. These traffic patterns are then combined with information regarding population and the mobile penetration rate in order to derive trends in average subscriber usage.

6.3 Average subscriber usage factors can then be combined with market share assumptions to estimate the total annual traffic to be carried by the hypothetical efficient operator which is further analysed in terms of geography, technology and network load parameters to support network dimensioning.

Figure 2: Market, subscriber and operator demand



Source: Deloitte Final MTR Model Specification Document (published as ComReg Document No. 16/09a[99]).

6.4 The service-related parameters are discussed in turn below.

6.1 Sizing the Market

6.5 As set out in the Original MTR Consultation, the services modelled include 2G and 3G voice; messaging and data services. These associated traffic volumes were modelled by considering historic and forecast volume trends for each of these services carried on mobile networks and restating these in terms of per subscriber usage. An assessment of: operator-supplied traffic data; ComReg Quarterly Returns; and Deloitte analysis were used to quantify historical demands and to forecast the relevant traffic trends for each of the services.

[99] https://www.comreg.ie/_fileupload/publications/ComReg1609a.pdf

6.6 To size the market, ComReg sought information on the historical and forecast traffic demands for all the various voice, message and data services from each of the six MSPs designated with SMP in MVCT that were active in the Irish market. This information was used to ensure that the modelled network is dimensioned with reference to all the traffic that is carried on Irish mobile networks.

6.7 Consequently, in the Original MTR Consultation the market was sized so that it included all traffic carried on the mobile operator networks. Voice traffic services included: traffic from each of the MNOs' retail customers; and traffic due to MVNOs; national roaming and international roaming. Data traffic included traffic from data dongles, over-the-top content ("**OTT**")[100] and machine-to-machine communications ("**M2M**").

6.8 The resulting traffic trends indicated the size of the mobile market across the timeframe of the Draft MTR Model and these were then combined with population and mobile penetration data to derive average subscriber usage trends.

6.9 In turn, average subscriber usage factors were combined with market share assumptions to estimate the total annual traffic to be carried by the hypothetical efficient operator. This was further analysed in terms of geography, technology and network load parameters to support network dimensioning.

6.1.1 Submissions to the Original MTR Consultation

6.10 Eircom stated that it "*would like to stress the importance of ensuring a review in the next three years given the challenges that arise in reliability projecting beyond 2017 in such a dynamic market*".[101]

6.11 Telefónica queried whether the model incorporated MVNO access on the network and sought clarification from ComReg.[102]

[100] Over-the-top content (OTT) refers to the delivery of media content over the internet, such as voice traffic over internet protocol (VoIP), which arrives to the end user via a third party.
[101] Eircom Response to the Original MTR Consultation. Page 8
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[102] Telefónica Response to the Original MTR Consultation. Page 4
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

6.12 Vodafone expressed the view that the approach proposed by ComReg is "*deficient in a number of material respects*". The relationship of on-net/off-net is based on a linear regression but Vodafone believed that an analysis "*based on the data submission from 4 operators at one point in time seems to be unlikely to lead to a robust result by established econometric standards*". Vodafone also stated that "*Although ComReg's Consultant published an R2 value that usually indicates the linear fit of the relationship, no p-value is given to validate the underlying analysis*."[103]

6.13 Vodafone highlighted what it considered to be "*deficiencies in ComReg's approach to on-net/off-net modelling*" by noting the following: "*[i]f the model assumes a stable 25% market share for the Hypothetically Efficient Operator ('HEO') then there must also be some assumption about the market shares in the rest of the market. The most straightforward assumption is that all operators have equal and stable market shares with a pool of customers who have average calling profiles*".[104]

6.14 As noted, the scope of the Supplementary MTR Consultation was to consider material modifications to the Draft MTR Model. Consequently, the volumes of off-net and on-net minutes were re-assessed and ComReg's revised preliminary views were set out in the Supplementary MTR Consultation – this is further detailed in paragraphs 6.37-6.38.

6.1.2 Submissions to the Supplementary MTR Consultation

6.15 While not within the scope of the Supplementary MTR Consultation, Vodafone repeated its concerns in its response to the Supplementary MTR Consultation concerning ComReg's proposed methodology for sizing the market. Vodafone reiterated its concerns with "*the simple linear regression"* in its submission due to the "*limited number of 2013 data points considered"*. It further stated that "*the change in market structure calls for a reassessment of the relationship with updated market data"*.[105]

6.1.3 ComReg's Position

6.16 Further to Telefónica's view, as detailed in paragraph 6.11, MVNO traffic is modelled and included as part of the overall traffic in the model. During the data collection process, MSPs informed ComReg that MVNO traffic could not be separately identified and therefore MNO volumes were taken in aggregate to capture traffic volumes in the Irish market.

[103] Vodafone Response to the Original MTR Consultation. Page 10 http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[104] ibid.
[105] Vodafone Response to the Supplementary MTR Consultation. Page 12

6.17 With respect to Vodafone's submission (see paragraph 6.12) regarding the degree of significance (p-value) that was provided in section 4.1.2 of the Draft Deloitte MTR Specification Document which accompanied the Original MTR Consultation[106] ComReg acknowledges that the dataset used to establish this relationship was limited. However, the associated inputs provided by operators was also limited and that the fitted value derived from this range falls within the on-net/off-net ratios provided by operators.

6.18 With respect to Vodafone's submission regarding the linear regression, it is important to note that the ratio of on-net to off-net traffic volumes is assumed to be dependent on the market share of the operator and that a strong correlation between market share and on-net versus off-net traffic ratio is observed in ComReg's Quarterly Reports. This implies the presence of network effects i.e., an operator with a high market share is more likely to experience its subscribers calling subscribers on its own network and vice versa. ComReg therefore views the results of the current methodology as being reasonable and in line with a priori expectations.

6.19 Regarding the points raised by Vodafone as set out in paragraphs 6.12 and 6.15, ComReg has updated the coefficient of the fitted line to include a larger dataset based on an expanded range of data from ComReg's Quarterly Reports. The dataset has now been updated to incorporate data from Q3 2012 – Q4 2014. This implies an increased number of observations from 4 to 32 and the coefficient has been adjusted from 6.2238 to 6.1658. The implied ratio (for on-net to off-net calls) is 1.54 for a 25% market share.

6.1.4 ComReg's Final Position

6.20 The regression that estimates the ratio of on-net to off-net minutes is based on a larger dataset in the Final MTR Model compared to what was presented in the Original MTR Consultation.

6.21 In the Final MTR Model, the total volume of off-net minutes originated to other operators is equal to the total volume of off-net minutes terminated from other operators.

6.22 The Final MTR Model continues to model MNO traffic to account for overall traffic in the market.

[106] ComReg Document 14/29a

6.2 Per Subscriber Usage and Operator Market Share

6.23 ComReg assessed total historical and forecast traffic demands in terms of voice, message and data (SMS and MMS) traffic to generate an estimate of the size of the Irish mobile market for each of the years modelled.[107]

6.24 As set out in the Original MTR Consultation, overall market demands were restated in terms of average per subscriber usage for the hypothetical efficient operator. This was considered in the context of the number of mobile subscribers for each year; population estimates; and trends in the mobile penetration rate. Overall market demands were then assessed in order to obtain an estimate of per subscriber usage over time for each of the modelled services.[108]

6.25 By combining per subscriber usage over time with the modelled market share (see section 5.3), it is possible to estimate the required network load for each of the traffic services that the modelled hypothetical efficient mobile operator provides. As the assumed market share of the modelled hypothetical efficient mobile operator differs from the respective market shares of the existing Irish MSPs, the modelled traffic profile (in terms of off-net and on-net calls etc.) will also differ.[109]

6.26 The Draft MTR Model used the results of a linear regression to jointly assess per subscriber usage with the modelled market share. The resulting coefficient can be applied to any given market share for a hypothetical efficient mobile operator to generate the corresponding ratio of mobile on-net minutes and off-net minutes.

6.27 In the Original MTR Consultation, ComReg was of the preliminary view that 3G networks would account for the vast majority of data usage per subscriber on the modelled hypothetical efficient mobile operator's network. While LTE data usage was included in the services set it was not used to dimension any network elements. Therefore, given that the modelled network elements comprised 2G and 3G technologies, any non-LTE data traffic not carried on 3G networks was modelled on 2G networks.

[107] See paragraph 6.6.
[108] This methodology leads to M2M and international roaming, for example, being assigned to domestic subscribers for modelling purposes.
[109] An MSP with a higher market share likely to experience a higher proportion of traffic originating and terminating on its own network compared to an MSP with a lower market share.

6.28 In addition to analysing the modelled operator's service demands by technology (i.e., 2G, 3G and LTE), demand was also analysed from a geographic perspective, and more specifically, in the context of urban, suburban and rural geotypes. This was primarily informed by information that ComReg received from Irish MSPs in response to the First Information Request and the Second Information Request. The migration profiles observed in other NRA models were also considered.[110]

6.29 The Draft MTR Model assumed that 2G and 3G services were launched at the outset of the model (i.e., 2003) and that LTE data services launched in 2014 — as MSPs did not report the use of LTE traffic when responding to the First Information Request. The modelled data profiles for 2G and 3G services are therefore dependent on assumed LTE roll-out and take-up.[111]

6.30 The Draft MTR Model assumed positive slow growth in voice traffic and more significant growth in mobile data usage. It also assumed no further growth in SMS beyond current per subscriber levels.

6.2.1 Submissions to the Original MTR Consultation

6.31 Eircom's submission to the Original MTR Consultation expressed the view that while it "*appreciate[d] that ComReg has now confirmed that one data submission did forecast increasing SMS volumes [it does not] believe that this justifies an assumption that SMS volumes will not decline, given that ComReg's own quarter market data reports are already testifying to a decline in SMS traffic*".[112]

[110] As detailed in Section 4.1.3 (Traffic profile across network technologies) of the Final Deloitte MTR Specification Document published as ComReg Document No 16/09a ComReg Document No. 16/09a https://www.comreg.ie/_fileupload/publications/ComReg1609a.pdf.
[111] See also paragraphs 7.70 and 7.72.
[112] Eircom's Response to the Original MTR Consultation, Page 8 and 9 http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

6.32 Eircom stated "*growth in outgoing minutes that is significantly greater than the growth in incoming minutes. With declining fixed line minutes we assume that this relies on an underlying assumption in the model that on-net traffic is driving the growth in outgoing minutes (assuming on-net traffic qualifies as outgoing minutes while not being considered an element of incoming minutes associated with MTR). This may be true for a limited time while lower priced on-net offers continue to prevail across mobile price plans, however with declining MTRs, we would expect such offers to become less relevant as the lower input cost will likely result in an increasing prevalence of offers that allow for any-network calls at discounted rates. This is an example of the difficulty that is faced in forecasting market trends…*"[113]

6.33 Regarding the forecast voice traffic demands in the Draft MTR Model, Telefónica stated its concern that "*ComReg assumes outgoing and incoming minutes per subscriber is flat [and that] this is not reflective of reality*", particularly in the context of the expanding '*all you can eat packages*'.[114]

6.34 Tesco disagreed with ComReg's assumption of outgoing and incoming minutes per subscriber being flat, in its view, "*the advent and increased popularity of all-you-can-eat packages [which] would appear to undermine ComReg's assumption*".[115]

6.35 With respect to historical and forecast traffic demands in the Draft MTR Model, Vodafone expressed its concern that "*the derived model inputs relied on by ComReg deviate significantly from the information ComReg publishes on a quarterly basis*".[116]

6.36 Vodafone also stated that "*[i]n terms of off-net mobile to mobile calls the Irish market is a closed system*" and stated that "*…one would then expect that for the modelled network the volume of off-net to mobile originated minutes would be the same as the volume of minutes terminated from mobile for an average customer [but that] [t]his is not what the demand or the forecast portions of the model are saying…[n]o commentary has been provided to explain this*".[117]

[113] ibid.
[114] Telefónica's Response to the Original MTR Consultation, Page 3 http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[115] Tesco Mobile Ireland's Response to the Original MTR Consultation, Page 3 http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[116] Vodafone's Response to the Original MTR Consultation, Page 11 http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[117] Vodafone's Response to the Original MTR Consultation, Page 10 http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

6.2.2 Supplementary MTR Consultation

6.37 Having considered Eircom's response to the Original MTR Consultation (see paragraph 6.32), ComReg amended the Draft MTR Model to ensure that the total volume of off-net minutes originated to other operators is equal to the total volume of off-net minutes terminated from other operators. In other words, the total volume off-net minutes originated to another Irish network equals the total volume of minutes terminated by Irish networks from another Irish mobile network. The off-net outgoing and incoming traffic has been set to equal in the updated model.

6.38 This change affects off-net minutes to mobile (incoming/outgoing); international to mobile minutes (incoming); and inbound roaming minutes (incoming) per subscriber.

6.39 The ratio of mobile-to-fixed minutes to fixed-to-mobile minutes is approximately 2:1 in Q4 2013 according to ComReg's quarterly reports. ComReg has in conjunction with Deloitte reviewed the model inputs and revised the inputs before the supplementary consultation stage, following Vodafone's response to the Original MTR Consultation. The inputs are informed by the available ComReg's Quarterly Reports as of Q2 2014. This resulted in a revised ratio in 2013 aligned with the ComReg's Quarterly Reports. Adjusting the ratio to 2:1 for 2013 and similarly adjusting the ratio in other years as per Quarterly Reports does not have a major impact on the pure LRIC MTR.

6.40 Further to Eircom's view detailed in paragraph 6.31, ComReg, in the Supplementary MTR Consultation, revised the projections for SMS per subscriber traffic to decline from 2014 (compared to the Original MTR Consultation in which growth was held constant).

6.41 Having considered submissions to the Original MTR Consultation, and in particular Vodafone's comments detailed in paragraph 6.35, ComReg was of the preliminary view in the Supplementary MTR Consultation that per subscriber traffic should be revised in line with ComReg Key Quarterly Data. Historic per subscriber voice traffic was also aligned with ComReg's Quarterly Key Data Reports as opposed to being solely based on operator data submitted to ComReg.

6.42 Similarly, having regard for Vodafone's point detailed in paragraph 6.36, ComReg adjusted the market for off-net calls, such that the Updated MTR Model treated it as a closed system in the Supplementary MTR Consultation. This ensured that the total volume of off-net minutes originating from another Irish network was modelled to equal the total volume of minutes terminated by Irish networks from another Irish mobile network.

6.43 In the Supplementary MTR Consultation ComReg presented two scenarios of future growth in mobile data traffic. The base-case scenario (Scenario A) was informed by MSP submissions to ComReg. The second scenario (Scenario B) was informed by international expert analysis[118].

6.44 The base-case (Scenario A) excludes a significant level of dongle data traffic that is not deemed to be representative of the data traffic that would likely be carried by a hypothetical efficient Irish mobile operator with 25% market share. ComReg stated that if outliers of dongle traffic were not removed, that the data load of the modelled hypothetical efficient mobile operator would not be representative of a typical Irish MNO. Equally, if such dongle traffic was not removed, estimating the mobile data traffic on the basis of a 1/N approach would result in a derived average subscriber data load for the hypothetical efficient mobile operator that is not representative of a hypothetical efficient mobile operator with 25% market share[119].

6.2.3 Submissions to the Supplementary MTR Consultation

6.45 Eircom's response to the Supplementary MTR Consultation indicated that, in general, it "*considered the adjustments to the [Draft MTR] model to be appropriate*". It further "*consider[ed] the alignment with the data supplied by operators to the Quarterly Market report to be the correct approach*".[120]

6.46 Eircom's response indicated its preference for Scenario B (i.e., forecasted mobile data usage based on international expert analysis and which included all mobile broadband/dongle traffic).[121] While favouring Scenario B, Eircom stated that it did not consider "*dedicated mobile broadband subscriptions (dongles) to be the key driver of the growth in data usage on mobile networks*".[122]

6.47 Vodafone expressed the view that "*operator-led forecasts are best placed to reflect Irish market realities (Scenario A)*"[123]. It also stated that:

- "*As networks fill with voice and smartphone traffic it will not be economically feasible to add additional capacity to support a further increase in the number of high-traffic dongles on these networks*", and

[118] For a more detailed description on the Scenarios proposed in the Supplementary MTR Consultation, please refer to page 13 of ComReg Document 15/19 http://www.comreg.ie/_fileupload/publications/ComReg1519.pdf
[119] ibid.
[120] Eircom's Response to the Supplementary MTR Consultation, Page 4
[121] Eircom incorrectly referred to this scenario as being "*ComReg's preference*".
[122] ibid.
[123] Vodafone's Response to the Supplementary MTR Consultation, Page 18

- "*[C]onsidering the current model set-up, scenario B would thus vastly overstate the relevance of overall data traffic*".[124]

6.2.4 ComReg's Position

6.48 Having considered the respective points raised by Telefónica and Tesco (see paragraphs 6.34 and 6.35), ComReg considers that while the Draft MTR Model forecasts growing per subscriber incoming and outgoing voice volumes until 2020 (after which per subscriber traffic remains constant), this growth in per subscriber voice minutes is primarily driven by on-net and off-net mobile to mobile traffic and therefore does not result in declining traffic to and from fixed.

6.49 Furthermore, the Draft MTR Model was developed to move to a steady state for service volumes. Due to changing technologies and consumer behaviour, it is difficult to forecast the likely profile of service volumes beyond 2020. It is also the case that voice traffic may rise as post-paid contracts may offer more bundled minutes but that other factors such as substitution to OTT services may counteract this. As the later years of the model are intended to allow for profiling of economic depreciation costs, and the cost impact in current years is comparatively insensitive to changes towards the end of the modelling time horizon, it appears appropriate to maintain flat per subscriber traffic after 2020 given uncertainty about these estimates.[125]

6.50 Having considered the submissions to the Original MTR and Supplementary MTR Consultations, ComReg remains of the view that the original approach (informed by MSP submissions to ComReg) with respect to forecasting mobile data usage and dongle traffic remains appropriate for the Final MTR Model (i.e., Scenario A / the base-case). Projections for mobile data traffic in the MTR Model are therefore based on Irish MSP led forecasts of mobile data traffic and in the context of this specific MTR Model as it does not explicitly model LTE.

[124] Vodafone's Response to the Supplementary MTR Consultation, Page 18
[125] This relative insensitivity (of cost impact in current years to changes in inputs towards the end of the modelling time horizon) is due to the discounting of future network investment.

6.51 Scenario A assumes lower levels of data traffic due to dongles than is evident from the ComReg Quarterly Key Data Reports. This is consistent with what Vodafone has stated in its response to the Supplementary MTR Consultation "*[w]hen operators first built 3G networks large capacity was available – particularly for new operators. It was feasible in the short term to offer dongle traffic at very low prices, essentially filling empty networks. As networks fill with voice and smartphone traffic it will not be economically feasible to add additional capacity to support a further increase in the number of high-traffic dongles on these networks. Alternative strategies will be followed instead*".[126] However, as ComReg has modelled a hypothetical efficient existing operator with 25% market share, ComReg considers that it is unlikely that such a mobile operator would have the same levels of spare capacity as a new entrant and so promoting dongle traffic would be less attractive commercially.

6.52 This position is also consistent with Eircom's view which is that it "*expects smartphones to play a significant role in the growth of data usage during the period addressed by this review (up to 2019)*".[127] Eircom also recognised that "*it is difficult to predict the degree to which data will grow*" due to "*fixed data volume growth with fibre rollout and the National Broadband Scheme which will compete for what is ultimately a finite demand for data*".[128]

6.53 ComReg considers that MNOs are also capable of responding to the growth in demand for data services by expanding 4G coverage or, as Vodafone has stated, adopting alternative strategies such as "*handover of data traffic to Wi-Fi or other small networks or the limiting of high-volume data users using class-of-service algorithms.*"[129] This suggests that, should MNOs seek to control the overall network costs of service delivery using such strategies, potential growth in data services could be managed in ways that would not materially impact on the costs of mobile call termination services.

6.54 Therefore, given the high uncertainty around future demand for data traffic on mobile devices and the possibility that a proportion of that data traffic could, for example, be offloaded to Wi-Fi to be carried on other networks, ComReg is of the view that Scenario A is the most appropriate scenario in the context of determining the network cost of wholesale call termination services for the Price Control Period.

[126] Vodafone Response to the Supplementary MTR Consultation, Page 18.
[127] Eircom's Response to the Supplementary MTR Consultation, Page 5
[128] ibid
[129] Vodafone's Response to the Supplementary MTR Consultation, Page 18

6.55 ComReg has also finalised the MTR model on the basis of a revised mobile penetration rate of 124.6% in Q3 2014 to 125.3% as of Q4 2015. While respondents to the Original and Supplementary MTR Consultations did not raise any issue with the penetration rate in the Draft MTR model, the updated mobile penetration rate has been implemented as a result of a revision to ComReg's Quarterly Data, which in turn feeds through to the Final MTR Model.

6.2.5 ComReg's Final Position

6.56 ComReg has developed the Final MTR Model on the basis of mobile voice and data projections submitted to us by Irish MSPs following the both the First Information Request and Second Information Request.

6.57 The Final MTR Model contains projections for SMS per subscriber traffic to decline from 2014.

6.58 While reconciling historic data usage with ComReg's Quarterly Key Data, the Final MTR Model does not incorporate dongle traffic deemed to be an outlier in the market — as it would not be representative of the data traffic carried by a hypothetical efficient mobile operator with 25% market share.

6.59 The Final MTR Model also assumes a mobile penetration rate of 125.3% which is consistent with ComReg's Quarterly Key Data as of Q4 2015.

6.3 Busy Hour Service Demand

6.60 The modelled service demand was calculated on an annual basis. For network dimensioning purposes the busy hour load for each service was also modelled as it is necessary to design a network capable of meeting the peak levels of demand. The modelled busy hours were derived in the Draft MTR Model from information submitted to ComReg by the four MNOs following the First Information Request.

6.61 The information requested by ComReg specified a requirement for traffic profile data by technology; service group; and geotype. This allowed operators to provide up to 21 separate busy hours applying to various subsets of services (e.g., the 24 hour traffic profile for 3G data usage in urban areas).

6.62 The number of calls in a busy hour was also calculated. For each service this was derived by dividing the busy hour minutes by the average duration of a call (in minutes). This calculation also incorporated an assumed additional average ring time per call of 10 seconds. When considering the number of busy hour call attempts ("**BHCA**") in network element dimensioning, a further uplift factor of 30% was applied to this value to reflect unsuccessful calls.

6.3.1 Submissions to the Original MTR Consultation

6.63 Vodafone expressed the view that "*[t]he calculation of busy hour traffic was not producing traffic figures consistent with actual network traffic*".[130] It provided a comparison of the 2G busy hour traffic derived in the model for 2011 with the equivalent Vodafone figure to support its view.

6.64 Vodafone considered that there is an unexplained variation between the modelled busy hour traffic and the busy hour traffic measured on an actual operator's network, even when the level of busy hour traffic is adjusted to account for the difference in the market share of the hypothetical efficient operator. Vodafone stated that "*[w]hile we understand that there will be variation between the HEO and actual traffic experienced by an operator this variation appears outside reasonable variation*".[131]

6.65 Vodafone also stated that "*Although the model seems to reflect this dynamic in general terms by adopting a percentage of traffic in a busy hour based on averaged data may lead to a misleading result in terms of actually observed busy hour dynamics. Two factors should therefore be considered in the model:*

- *Firstly, demand on a cell-by-cell basis will be less peaky, i.e., the percentage of traffic in the busy hour will be higher for an individual cell than the national average, as a consequence of different cells experiencing peaks at different times of day. It is therefore appropriate to reflect this in the network dimensioning within the model.*
- *Secondly, the busy profile observed in the Irish market shows that data busy hour profiles are less peaky than voice. This effect should also be taken into account in the current model*."[132]

6.66 While not within the scope of the Supplementary MTR Consultation, Vodafone repeated its concerns in its response to the Supplementary MTR Consultation surrounding ComReg's treatment of the modelled busy hour traffic. It asserted that "*[t]he previous model produced a 2G traffic in BH of 10,618 in 2011 [and that] Vodafone's 2G BH traffic at this time was more than ✂. Taking this as the traffic for a 40% market share we would expect the HEO with 25% market share to have a 2G busy hour traffic of approximately ✂*."

[130] Vodafone's Response to the Original MTR Consultation, Page 11
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[131] Vodafone's Response to the Original MTR Consultation, Page 11 and Page 12
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[132] Vodafone's Response to the Original MTR Consultation, Page 11 and Page 12
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

6.3.2 ComReg's Position

6.67 With respect to Vodafone's concerns detailed in paragraphs 6.63-6.66, and in particular the modelled Busy Hour Erlang in 2011, ComReg notes that for correct comparison Vodafone should have referred to the route-factored volumes which stood at ✂ Busy Hour Erlang for 2G traffic in 2011 (as opposed to ✂ to which it refers) in the Draft MTR Model that accompanied the Supplementary MTR Consultation. See also paragraphs 6.68-6.70.

6.68 The figure of ✂ Busy Hour Erlang is lower than the ✂ expected by Vodafone. The reason for this discrepancy is because the Draft MTR Model calculated 2G data traffic based on the share of propensity to use 2G data traffic, which is an input informed by MNO responses to The First Information Request, whereas the figure derived in the Draft MTR Model (41MB per subscriber in 2011) does not reconcile with Vodafone's stated 2G data traffic in its submission ✂.

6.69 If we adjusted the input on the propensity to use 2G data traffic upwards to achieve ✂ per subscriber in 2011 this would then result in approximately ✂ Busy Hour Erlang 2G volumes in 2011 as suggested by Vodafone. However, this approach would contradict the figures reported by Vodafone on data traffic usage per technology (i.e., data usage propensities per technology in the Load module: d1.Demand and d2.Forecast) and affect other modelled outputs. Consequently, ComReg does not agree with this approach.

6.70 Furthermore, the assumption of 41MB per subscriber in 2011 as used in the Draft MTR Model is consistent with historic 2G data traffic volumes informed by the responses of other Irish MSPs to The First Information Request.

6.3.3 ComReg's Final Position

6.71 The Final MTR Model has not revised the modelled inputs on 2G Traffic that was presented in the Original and Supplementary MTR Consultations. The busy hour has been modelled in line with the methodology proposed in the Original MTR Consultation. However, while the methodology remains consistent, there was a slight change to the modelled outputs resulting from revised traffic volumes in the Supplementary MTR Consultation.

6.4 Services Set – Definition of Increment

6.72 As it is necessary to define the increment for the wholesale MVCT service, in the Original MTR Consultation, ComReg was of the preliminary view that this should include the following services:

- 2G off-net minute to mobile (incoming)
- 2G fixed to mobile (incoming)

- 2G international to mobile (incoming)
- 2G inbound roaming
- 3G off-net minute to mobile (incoming)
- 3G fixed to mobile (incoming)
- 3G international to mobile (incoming)
- 3G inbound roaming

6.73 Further details on the basis for determining the service volumes that the modelled operator is expected to carry, both on an annual basis and at peak times, were presented in Section 3.6 of the Original MTR Consultation and in section 2.7 (page 12) of the accompanying Draft Deloitte MTR Model Specification Document (as set out in Annex 1 of the Original MTR Consultation).

6.4.1 Submissions to the Original MTR Consultation

6.74 Respondents did not raise any issues with the defined services set that was proposed to define the increment for the Wholesale MVCT service.

6.75 Telefónica did however comment on the nature by which certain services within this defined services set were calculated. It stated that our modelling approach "*highlighted a number of assumptions which are not consistent with reality. For example, ComReg assume an efficient operator would only invest in LTE not 3G whereas operators are investing [in] 3G to enhance service in rural areas before considering 4G.*"[133]

[133] Telefónica's Response to the Original MTR Consultation, Page 2 http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

6.4.2 ComReg's Position

6.76 As stated by Telefónica, the Draft MTR Model did not forecast further roll-out of 3G coverage post 2020 in all geo-types and the model allows for investment and re-investment for 3G assets in the model (as detailed in paragraph 6.75).[134] However, we believe that this approach which is adopted in the model to be reasonable and is consistent with other MTR models internationally (whereby coverage is typically only forecasted for a limited number of years and not throughout the complete modelled time horizon[135] [136]). 3G coverage does expand beyond "base year", which is driven by the assumed 3G service demand. With regards to minimum equipment requirement, please refer to the Final Deloitte MTR Model Specification Document (section 5.1.2)[137]. The minimum element requirement is constant throughout the modelled time period, and this aligns with the 2009 Termination Rate Recommendation definition of a coverage network, namely that "*coverage can be best described as the capability or option to make a single call from any point in the network at a point in time.*

6.77 Subsequent to this submission by Telefónica, as set out in the Supplementary MTR Consultation, the Updated MTR Model was updated to incorporate UMTS900 technology — which is typically undertaken to provide improved 3G coverage in rural areas – see paragraph 7.37. Consequently, ComReg is of the view that Telefónica's concern has been addressed by ComReg's dimensioning of UMTS900.

6.4.3 ComReg's Final Position

6.78 The defined increment for wholesale MVCT in the Final MTR Model includes the following services:

- 2G off-net minute to mobile (incoming)
- 2G fixed to mobile (incoming)
- 2G international to mobile (incoming)

[134] No further 3G population coverage is assumed post 2020 but there is growth in coverage until that year. There is also growth in the number of 3G elements post 2020, driven by the assumed population growth post 2020.
[135] For instance, see ANACOM or PTS models
[136] Coverage in this context refers to the minimum equipment required to handle a single call anywhere on the network (see section 3.7.3 in original consultation). However, Telefónica's point appears to be considering coverage in the context of providing sufficient capacity to meet expected traffic levels in a given area. The model does assume such further rollout of 3G until 2020, beyond which no further rollout is forecasted. Such rollout forecast is consistent with e.g. ANACOM's model, where 3G population coverage growth remains constant post 2020.

[137] ComReg Document No. 16/09a, available here: https://www.comreg.ie/_fileupload/publications/ComReg1609a.pdf

- 2G inbound roaming
- 3G off-net minute to mobile (incoming)
- 3G fixed to mobile (incoming)
- 3G international to mobile (incoming)
- 3G inbound roaming

6.79 The Final MTR Model does not expand coverage beyond the base year of the model (i.e., 2013) and this approach is consistent with international MTR models.

Chapter 7

7 Technology-related parameters

Overview

7.2 ComReg's conclusion in the 2012 Price Control Decision was that a pure LRIC approach to cost-orientation best reflects the efficient cost of wholesale MVCT services and minimises the scope for competitive distortions in the marketplace.[138] The defined increment is the wholesale MVCT service and this methodology excludes a mark-up for any common costs which would not be avoided if the wholesale MVCT service was no longer supplied.

7.3 In developing the Draft MTR Model, ComReg considered the following key cost drivers for network dimensioning purposes:

- the level of coverage required (defined by geographic coverage);
- total traffic (service demand determined on a per-subscriber basis);
- the traffic load at the busy hour;
- quality of service.

7.4 Service demands from all modelled traffic services were combined to form aggregated cost drivers and this enabled us to capture the relative usage of each network element by each unit of service demand.

7.5 Network dimensioning rules were then applied to service demand data in order to calculate the required deployment of appropriate network elements necessary to meet the demands for capacity and coverage.

7.1 Geotypes

7.6 As set out in the Original MTR Consultation, the Draft MTR Model defined three different geotypes (urban, suburban and rural) based on the geographical composition and population density of Ireland. This approach is consistent with geotype definitions used in MTR models built by other NRAs.

[138] ComReg Document No. 12/125, Paragraph 2.18, Page 15. https://www.comreg.ie/_fileupload/publications/ComReg12125.pdf

7.1.1 Submissions to the Original MTR Consultation

7.7 Respondents did not raise any issue with our proposal to model geotypes. However, a number of respondents raised concerns with respect to the associated attributes of the Draft MTR Model and in particular the percentages attached to the co-location of sites by geotype.

7.8 Eircom stated that "*[t]he percentages applicable to collocation at Urban, Suburban and Rural sites appear to be counterintuitive and the reverse of reality. eircom acknowledges that the percentages are calculated against total sites excluding 3G, however regardless of whether 3G sites feature in the percentage calculation, eircom would expect the percentage of sites with collocation to reduce when looking form urban to suburban to rural sites*."[139]

7.9 Vodafone disagreed with "[*t]he 2G/3G proportion of traffic in rural areas [being] the same as in urban and suburban areas*" and it expressed the view that this was "*…not a reasonable assumption as propagation at 2100MHz, the frequency used by 3G, is limited in rural areas*".[140]

7.1.2 Supplementary MTR Consultation

7.10 In respect to Eircom's and Vodafone's response regarding the 2G/3G proportion of traffic in rural areas, ComReg agrees that the proportion of traffic carried by 2G and 3G should vary in rural areas when compared to denser areas. Consequently, as the Updated MTR Model in the Supplementary MTR Consultation assumed further roll-out of 3G infrastructure, particularly in rural areas, the relative technology mix has been updated accordingly. This revision implies that less traffic is carried using 3G in rural areas in the earlier years of the model but that the differential declines over time as additional 3G infrastructure is deployed.

[139] Eircom's Response to the Original MTR Consultation, page 9. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[140] Vodafone's Response to the Original MTR Consultation, page 14. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

7.11 The methodology for generating 1800MHz co-location parameters by geo-type was revised having obtained information submitted in response to the Second Information Request[141]. This leads to an alternative calculation which generates a profile in line with anticipated results from operators. The adjustment incorporates 2G/3G co-located sites as well as sites with 1800 and 3G collocation. The revision to the 900/1800 2G co-location and the adjusted parameters demonstrate the reversed relationship suggested by Eircom in paragraph 7.8. Co-location of 2G cells and 2G/3G cells is impacted by the additional of further 3G sites to rural locations, which increases the proportion of sites which are furnished with both technologies.

7.12 In the Supplementary MTR Consultation, the land area classification used in the Updated MTR Model was based on the CSO's land area classification. However, the corresponding geotype land areas (km^2) were no longer informed by or based on operator submissions. ComReg developed the model on the basis of the latest figures received from the CSO in January 2015. This revised approach replaced that set out in the Original MTR Consultation in which the land area classification was informed by a combination of Eurostat data and Irish MSP data received following the First Information Request. This had the effect of increasing the land area classified as being rural (from 90.2% to 97.6%) in the Updated MTR Model while the land area classified as Urban reduced from 1.6% to 1.2% and the land area classified as Suburban reduced from 8.2% to 1.2%.

7.1.3 Submissions to the Supplementary MTR Consultation

7.13 Vodafone stated that "*linked to [this revision] is a significant shift in traffic patterns that seem questionable*".[142] It further stated that "*[t]he land usage classification used in the earlier model aligns more closely with the actual density of housing used in operators' planning tools - reflecting the actual cell radii experienced in practise. CSO data generally reflects historical town borders, which have not been changed to reflect the growth in suburban housing*."[143]

7.14 Vodafone also stated that "*[t]he explanation of co-location logic in the Deloitte document is not adequate, for example formula (13) in the Deloitte document appears to be incorrect*".[144]

[141] The First Information Request had a September 2013 deadline and the Second Information Request, as above had a September 2014 deadline for receipt of information.
[142] Vodafone's Response to the Supplementary MTR Consultation, Page 13
[143] Vodafone's Response to the Supplementary MTR Consultation, Page 14
[144] Vodafone's Response to the Supplementary MTR Consultation, Page 15

7.1.4 ComReg's Position

7.15 Having considered Vodafone's submission that "*CSO data generally reflects historical town borders, which have not been changed to reflect the growth in suburban housing*", ComReg has revised its approach. ComReg agrees that CSO informed land area classifications may not adequately align with geographic considerations such as density of housing and the commuting spread around urban centre. Given that these geographical considerations influence MNOs' planning decisions, ComReg has therefore reverted to the land area classification that was informed by Eurostat data and information received from Irish MSPs via the First Information Request, as originally proposed in the Original MTR Consultation.

7.16 ComReg is also cognisant that CSO data does not include inland water areas which may be otherwise covered by Irish MSPs.

7.17 Having substantiated the analysis with a calibration exercise (outlined in paragraph 4.23), ComReg considers that the 2G/3G proportions of traffic by geotype used in the Final MTR Model are appropriate.

7.18 Having considered Vodafone's submission, as detailed in 7.14, ComReg confirms that the collocation of sites has been revised to reflect Irish MSP responses to the Second Information Request. This information was also used to determine the collocation of UMTS900 and UMTS2100 sites. ComReg considers the revised collocation inputs appropriate as they reflect the information that was made available by Irish operators.

7.1.5 ComReg's Final Position

7.19 The land area breakdown in the Final MTR Model is based on Eurostat data and Irish MSP data.

7.2 Nodal Layout Methodology

7.20 In the Original MTR Consultation, ComReg was of the preliminary view that a modified scorched node approach was appropriate as this recognises that network roll-out can be constrained by the availability of suitable sites and topological issues.

7.21 In this context, the modified scorched node approach aligned the modelled network for the hypothetical efficient operator to the network design parameters provided by the Irish MSPs. This ensured that the modelled operator's network design is modern and efficient.

7.2.1 Submissions to the Original MTR Consultation

7.22 Vodafone stated that "*the principles underlying ComReg's proposed use of a scorched node approach accords with its view that the competitive conditions in the Irish market mean that the modelling of a hypothetical efficient existing operator should yield results which align strongly with the actual deployments of MNOs normalised for market share*".[145]

7.23 However, Vodafone stated that "*[s]ignificant deviations between the modelled and actual results therefore call into question the accuracy of the model*" and that a "*…comparison of this type is therefore a key validation of whether the model is fit for purpose*."[146]

7.2.2 ComReg's Position

7.24 In response to Vodafone's concerns expressed in paragraphs 7.22 and 7.23 that "*the modelling of a hypothetical efficient existing operator should yield results which align strongly with the actual deployments of MNOs normalised for market share"*, ComReg does not agree. Such an outcome, as suggested by Vodafone, would only arise if Irish MSPs followed the assumptions being applied to the modelled hypothetical efficient operator and for MSPs to have adopted the modern equivalent asset (MEA) principles. MSPs would also have had to achieved the same efficiency that is assumed for the modelled hypothetical efficient operator, that forward planning never significantly deviates from the customer demand, that inertia and backward capability has not hampered the operator's network roll-out and that investments have always been made on time to meet demand. See also paragraph 7.25.

7.25 ComReg has stated that the Draft MTR Model is based on a modified scorched node methodology, which aligns the hypothetical existing operator to the network design parameters provided by Irish MSPs. This approach also ensures that the hypothetical efficient operator's network design is modern and efficient. Consequently, the deployments of actual Irish MSPs will not equate to the deployments of the hypothetical efficient operator.

[145] Vodafone's Response to the Supplementary MTR Consultation, Page 15.
[146] Vodafone Response to the Original MTR Consultation, Page 13
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

7.26 In ComReg Decision D12/12 ComReg stated that if the regulation of termination charges was based on the actual costs of the Service Provider, this would not provide the right incentives for Service Providers to innovate and increase efficiency.[147] Notwithstanding this, various parameters in the Final MTR Model are set to match real world conditions (e.g. to ensure that the modelled operator is not unrealistically efficient). In this regard, a calibration has been carried out with respect to the dimensioning of the hypothetical efficient operator's network and this did not result in a reconciliation of modelled outputs. In general, ComReg is of the view that the outputs of the Final MTR Model reasonably align to the reported figures by the actual operators while controlling for market shares. ComReg confirms that calibration exercises have been satisfactorily performed, as detailed in paragraph 4.23 (and 6.1 of the Final Deloitte MTR Model Specification Document published on ComReg's website as ComReg Document No. 16/09a[148]).

7.2.3 ComReg's Final Position

7.27 The Final MTR Model implements a modified scorched node approach in modelling the hypothetical efficient operator's network.

7.3 Coverage Network

7.28 In the Original MTR Consultation, ComReg was of the preliminary view that the hypothetical efficient operator would have achieved a designated percentage of geographic coverage that matched the average coverage actually achieved by Irish MSPs.

7.29 This was determined by using a weighted network coverage percentage (controlling for market share) which was based on input data received from Irish MSPs.

7.30 The cost of this coverage network was calculated on the basis of a minimum specified network which would be capable of carrying a minimum volume of traffic.

7.31 The coverage of the hypothetical operator was specified with regard to:

- The coverage percentage;
- The technology used for coverage; and
- The spectrum used for technology.

[147] https://www.comreg.ie/_fileupload/publications/ComReg12125.pdf Page 138
[148] https://www.comreg.ie/_fileupload/publications/ComReg1609a.pdf

7.32 The coverage percentages used in the Draft MTR Model were assumed to reserve 2x9MHz of 900MHz spectrum to provide a basic "one-call" 2G network. ComReg was of the preliminary view that deploying a 2G network using the lower spectrum frequency for the required coverage only network was a reasonable approach. This approach enabled the modelled operator to fulfil the coverage requirement with fewer sites by exploiting a larger cell radius.

7.3.1 Submissions to the Original MTR Consultation

7.33 Telefónica stated that "*…it is a mistake not to include UMTS 900 in the modelling as all operators utilise this Technology layer"* and that *"*[i]*t is reasonable to assume 2G & 3G Rollout from a timeline of 2003 however it is not logical to assume any Operator in 2014 would deploy only 4G (LTE) to support Voice & Data services*".[149]

7.34 Vodafone stated that "*…the amount of 900MHz spectrum available to each of the GSM operators from 2003 to 2013 was 7200kHz. This should be reflected in the model… This actual market condition must be reflected in the model.*" [150]

7.35 Vodafone also stated that "*…from 2014 onwards Vodafone will have implemented UMTS900. This is necessary to meet the customer demand for improved 3G coverage."*[151]

7.3.2 Supplementary MTR Consultation

7.36 Having considered the responses received, ComReg issued the Second Information Request which sought detailed information on the use of UMTS900 spectrum.

7.37 Based on the information received from the Second Information Request, ComReg revised its approach in the Supplementary MTR Consultation to include the use of the UMTS900 spectrum band by the hypothetical efficient operator. Specifically, ComReg re-assigned 5MHz of paired 900MHz spectrum from 2G (GSM) to 3G (UMTS) from 2013 and applied this until the end of the model (i.e., to 2032).

[149] Telefónica's Response to the Original MTR Consultation, page 3. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[150] Vodafone's Response to the Original MTR Consultation, page 13. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf.
[151] ibid

7.3.3 Submissions to the Supplementary MTR Consultation

7.38 Vodafone stated that "*[t]he spectrum allocated to the hypothetical operator both for historical as well as future time periods does not align with what could be reasonably expected in the Irish market context. Prior to the 2012 Auction the three GSM operators in Ireland had 7.2MHz of spectrum in the 900MHz band. Additional spectrum was reserved by ComReg for another potential GSM operator. The draft model, however, uses a figure of 8.6MHz which is incorrect.*" It stated that "*it is entirely reasonable therefore to assign 10MHz to the hypothetical operator post 2015, 5MHz for GSM 900 and 5MHz for UMTS900*".[152]

7.39 Vodafone also stated that "*ComReg should have consulted on appropriate allocations on the basis of both a historical and forward looking assessment to ensure adequate representation of a hypothetical efficient operator in Ireland*."[153]

7.3.4 ComReg's Position

7.40 Having considered Vodafone's submission (see paragraph 7.38), ComReg agrees that historical spectrum holdings should be revised. As such, ComReg has revised its approach by taking into account in the "Multi-band Spectrum Release: Release of the 800 MHz, 900 MHz and 1800 MHz Radio Spectrum Bands".[154] As detailed in ComReg Document 12/25, three spectrum assignments of 2x7.2 MHz were held by Vodafone, Telefónica and Meteor prior to 2012. As H3GI did not hold any 900MHz spectrum during this period, using the 1/N methodology[155] means that 7.2 MHz per operator reflects the spectrum assigned to the three operators utilising 900MHz spectrum (i.e., our approach now takes into account that a block spectrum was held fallow). This is considered to be an appropriate spectrum assignment for the hypothetical operator modelled.

7.41 As future spectrum availability in Ireland and the potential associated future holdings of that spectrum is not known at this stage, ComReg considers its forecast assumptions to be appropriate. The latest information used in deriving future spectrum assignments for the hypothetical efficient operator is consistent with the 1/N methodology.

[152] Vodafone's Response to the Supplementary MTR Consultation, page 10.
[153] Vodafone's Response to the Supplementary MTR Consultation, page 10.
[154] ComReg Document 12/25 http://www.comreg.ie/_fileupload/publications/ComReg1225.pdf
[155] See paragraph 5.3.

ComReg's Final Position

7.42 The Final MTR Model is consistent with historical spectrum usage in the Irish market.

7.43 The Final MTR Model considers the spectrum that was available but not in use prior to 2012 when applying the 1/N methodology to historical spectrum holdings.

7.44 The Final MTR Model also incorporates the use of UMTS900 spectrum by Irish MSPs which was first rolled out in 2013.

7.4 Radio Technology Standards: 2G, 3G and LTE

7.45 In the Original MTR Consultation, ComReg was of the preliminary view that the hypothetical efficient operator would deploy both 2G and 3G technologies in its Radio Access Network ("**RAN**") and have an all IP core.[156] These technology standards complied with the MEA methodology for Irish MSPs and were consistent with international best practice in addition to the 2009 Termination Rate Recommendation.

7.46 ComReg expressed the preliminary view that LTE would almost exclusively be used, during the lifespan of the Price Control Period, to carry data traffic and using Circuit Switched Fall Back (CSFB) for voice and SMS. Given the focus on voice (and in particular on the increment of terminating voice traffic) for the Draft MTR Model, and the uncertainty of any future migration of voice traffic to LTE, the Draft MTR Model did not explicitly include LTE as a radio technology (see also section 7.5 and in particular paragraph 7.70).

7.47 However, LTE was implicitly taken into account in the Draft MTR Model by capping the volume of data carried over 2G and 3G in future years.

7.4.1 Submissions to the Original MTR Consultation

7.48 Eircom stated that "*[w]ith regard to the lifespan of 2G technologies, an assumption is made (apparently based on operator forecasts) that 2G will carry 40% of total voice traffic in 2020 with 2G technologies remaining beyond 2020 to serve Machine to Machine (M2M) demands*" and Eircom questioned "*both assumptions as it is its expectation that 2G is likely to be phased in the early 2020s.*"[157]

[156] An all IP core refers to the transformation of formerly telephone-centric networks toward Next Generation Network ("**NGN**").
[157] Eircom's Response to the Original MTR Consultation, page 9. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

7.49 Eircom also stated that "[*w]ith respect to data traffic, [it] consider[s] the model to prematurely diminish the portion of data traffic carried over 2G networks in the nearer term."* It also advised that it would ✂.

7.50 Respondents did not raise any issue with our proposed treatment of LTE in the Draft MTR Model. Eircom did however "*consider the data volumes attributed to LTE to be understated for 2014*".[158]

7.4.2 Supplementary MTR Consultation

7.51 In respect to Eircom's submission (see paragraph 7.48 and 7.50), our approach to data (and associated forecasts) was revised in the Supplementary MTR Consultation such that historic data was aligned with ComReg's Key Quarterly Data Reports.

7.52 Regarding Eircom's submission (see paragraph 7.49), ComReg does not agree. ComReg considers that it is appropriate that all 2G services remain active throughout Modelled Time Period and we are not aware of any international MTR Models that make this assumption. In addition, no Irish operator has publically announced intentions to discontinue 2G. The 2013 values reflected the weighted average of Irish MSP data in which the number of subscribers (i.e., market share) were used as weightings.

7.53 Having considered the points raised by Eircom, migration of voice traffic from 2G to 3G was revised in the Updated MTR Model. ComReg assumed a constant split of 5% of voice traffic to be carried on 2G in urban and suburban areas and the remaining 95% on 3G from 2020 onwards. This was revised from 40% and 60% respectively for 2G and 3G from 2020 onwards — as set out in the Supplementary MTR Consultation.

7.54 Further to Eircom's submission detailed in paragraph 7.50, the Final MTR Model takes input data from ComReg's Quarterly Reports as of Q3 2014. The data traffic has been revised in line with the data available, which increases the proportion of data carried over LTE. In order for the model to be more representative of the average Irish operator, a proportion of dongle data traffic from the Quarterly Reports has been removed as it reflects data from an outlier operator. This is further discussed in paragraphs 6.50-6.55.

[158] Ibid.

7.4.3 Submissions to the Supplementary MTR Consultation

7.55 Eircom stated that its concerns "*appears to have been addressed in the model in respect of the urban and suburban network assumptions*". However with respect to 40% of rural voice traffic assumed to be carried on the 2G network Eircom considered "*[w]hile it is difficult to accurately project the retirement of 2G and though it is likely that plans for 2G retirement may vary by operator, [the] forecasted portion of voice traffic carried in rural areas should be adjusted downwards towards that of non-rural areas.*"[159]

7.56 Similarly, Vodafone stated that "*[t]he 2G/3G proportion of traffic in rural areas is the same as in urban and suburban areas. This is not a reasonable assumption as propagation at 2100MHz, the frequency used by 3G, is limited in rural areas. The proportion of traffic carried in rural areas is then significantly less than urban and suburban areas."*[160] Vodafone also stated that in its *"…data submission it presented figures showing a lower rural traffic proportion…*".[161]

7.57 Vodafone further stated that "*…there does not appear to be any attempted comparison between the number of sites that the model predicts for a certain aggregated volume of traffic and the actual number of sites deployed by operators for that same volume*."[162] Vodafone stated that "*[t]he 900 MHz effective voice traffic per cell (c1. Ran, row 116, 117, 118) calculated by the model is significantly higher in rural compared to urban areas. This does not seem to calibrate with expected Voice traffic patterns Vodafone's experiences where urban traffic per site is much higher than in rural areas*".[163]

7.4.4 ComReg's Position

7.58 With respect to Eircom's submission (see paragraph 7.55), ComReg notes the difficulty in predicting the actual proportion of voice traffic that will be carried on 2G, given the uncertainty surrounding future voice traffic, 2G technology and the limited availability of projections by Irish MSPs. See paragraph 7.60.

7.59 With respect to Vodafone's submission regarding *"the 2G/3G proportion of traffic in rural areas",* ComReg agrees with Vodafone's submission.

7.60 Further to the points raised in paragraphs 7.58 and 7.59, ComReg has finalised the Final MTR Model as follows:

[159] Eircom's Response to the Supplementary MTR Consultation, page 4.
[160] Vodafone's Response to the Supplementary MTR Consultation, page 28.
[161] Ibid.
[162] Vodafone's response to the Original MTR Consultation, page 9.
[163] Vodafone's response to the Original MTR Consultation, page 18.

7.61 ComReg has assumed that a higher share of voice traffic is carried on 2G in rural areas but that this declines to 40% in rural areas. The equivalent shares assumed in urban and suburban areas is 5% respectively.

7.62 The model assumes further roll-out of 3G infrastructure in denser geotypes and a less intensive use of 3G infrastructure in rural geotypes. ComReg has reviewed the relative technology mix and it appears appropriate that the proportion of traffic carried by 2G and 3G should vary in rural areas compared to more urban geotypes. This revision takes into account the fact that less traffic is expected to be carried using 3G in rural areas but that the differential declines over time as additional 3G infrastructure is deployed. The inputs have also been guided by a calibration exercise, aligning the number of 2G and 3G elements deployed by the hypothetical efficient operator with the actual number of elements deployed by the Irish MNOs. The 2G/3G proportions of traffic by geotype are now considered to be appropriate.

7.63 In summary, the proportion of voice traffic by technology and geotype assumed in the Final MTR Model is as follows:

Original MTR Consultation (2013)

	2G	3G
Urban	67.9%	32.1%
Suburban	67.9%	32.1%
Rural	67.9%	32.1%

Supplementary MTR Consultation (2013)

	2G	3G
Urban	33.8%	66.2%
Suburban	33.8%	66.2%
Rural	53.4%	46.6%

Final MTR Decision (2013)

	2G	3G
Urban	33.8%	66.2%
Suburban	33.8%	66.2%
Rural	65.9%	34.1%

Original MTR Consultation (2025)

	2G	3G
Urban	40.0%	60.0%
Suburban	40.0%	60.0%
Rural	40.0%	60.0%

Supplementary MTR Consultation (2025)

	2G	3G
Urban	5.0%	95.0%
Suburban	5.0%	95.0%
Rural	40.0%	60.0%

Final MTR Decision (2025)

	2G	3G
Urban	5.0%	95.0%
Suburban	5.0%	95.0%
Rural	40.0%	60.0%

7.64 Further to Vodafone's submission detailed in paragraph 7.57, ComReg notes that the reference table had been mislabelled as "effective voice traffic" instead of the revised correct labelling "effective traffic". The data per cell included 2G voice and data traffic in Busy Hour Erlang equivalents and this labelling has been corrected in the Final MTR Model.

7.65 This results in a higher traffic load on 900MHz network due to the assumption that data traffic in rural network is more reliant on the 2G network compared to the more dense geotypes. This assumption is based on the operator provided data on propensities to use 2G and 3G technologies by geotype and the voice migration from 2G to 3G.

7.4.5 ComReg's Final Position

7.66 Historic voice and data traffic information has been aligned in the Final MTR Model with ComReg's Quarterly Reports (as of Q3 2014).

7.67 The Final MTR Model assumes that 2G coverage will remain in place until 2032.

7.68 ComReg has not revised the modelled forecast volume of voice traffic carried in rural areas in the Final MTR Model from what was presented in the Supplementary MTR Consultation.

7.5 Treatment of Spectrum

7.69 In the Original MTR Consultation, ComReg was of the preliminary view that the spectrum holding of the hypothetical efficient operator should be based on an average of Irish operator holdings and aligned with its market share.

7.70 LTE network elements were not explicitly modelled. While re-farming of some spectrum currently used for 2G was accounted for, bands used for LTE were not included in the Draft MTR Model for the reasons set out in paragraphs 7.45 and 7.46.

7.5.1 Submissions to the Original MTR Consultation

7.71 Telefónica stated that "*[t]he modelling approach by ComReg has also highlighted a number of assumptions which are not consistent with reality. For example, ComReg assume an efficient operator would only invest in LTE not 3G whereas operators are investing 3G to enhance service in rural areas before considering 4G.*"[164]

7.72 Vodafone stated that it "*agrees that based on the likely deployment of LTE and the level of its use to carry voice in the time period for the proposed price control it is appropriate not to model LTE*".[165]

7.73 However, Vodafone had a number of concerns with the treatment of spectrum in the Draft MTR Model. It stated that "*…the amount of 900MHz spectrum available to each of the GSM operators from 2003 to 2013 was 7200kHz*" and that "*from 2014 onwards Vodafone will have implemented UMTS900*".[166]

[164] Telefónica's Response to the Original MTR Consultation, page 2. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[165] Vodafone's Response to the Original MTR Consultation, page 13. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[166] Ibid.

7.5.2 Supplementary MTR Consultation

7.74 Having considered the responses (see paragraphs 7.71 and 7.73) to the Original MTR Consultation, the modelled spectrum assignment was amended in the Supplementary MTR Consultation to more explicitly reflect the "1/N" methodology in the Updated MTR Model.

7.75 The Draft MTR Model took into consideration publicly available information on the existing spectrum assignments and future spectrum assignments in the 900MHz, 1800MHz, and 2100MHz spectrum bands. It also took into account information contained in ComReg document No. 12/123.

7.5.3 Submissions to the Supplementary MTR Consultation

7.76 Vodafone stated that "*[t]he spectrum allocated to the hypothetical operator both for historical as well as future time periods does not align with what could be reasonably expected in the Irish context*".[167] Its concern surrounding the amount of historical spectrum modelled relates to three GSM operators in Ireland having 7.2MHz of spectrum in the 900MHz band whereas the draft model at the Supplementary MTR Consultation stage used a figure of 8.6MHz.

7.77 Vodafone's concern with respect to the amount of spectrum modelled in the period post 2015 centres on the redistribution of the available spectrum using the 1/N methodology together with a new market share of 33%. Vodafone expressed the view that "*ComReg should have consulted on appropriate allocations on the basis of both a historical and forward looking assessment to ensure adequate representation of a hypothetical efficient operator in Ireland*".[168]

7.5.4 ComReg's Position

7.78 As detailed in paragraph 6.78, Telefónica correctly stated that the Draft MTR Model did not forecast further roll-out of 3G coverage in rural areas even though the model allows for investment and re-investment for 3G assets in the model (as detailed in paragraph 6.75). However, this approach is considered to be reasonable and is consistent with other MTR models internationally, whereby coverage is typically not expanded beyond the 'base year' of the model.

[167] Vodafone's Response to the Supplementary MTR Consultation, page 10.
[168] Ibid.

7.79 Having also considered the points raised by Vodafone in paragraphs 7.76 and 7.77, ComReg agree that the modelled historical spectrum should be revised accordingly to reflect the amount of historical spectrum modelled relates to three GSM operators in Ireland having 7.2MHz of spectrum in the 900MHz band. See paragraph 7.40.

7.80 With respect to Vodafone's submission regarding market share (see paragraph 7.77), for reasons set out in section 5.1, ComReg has now modelled a hypothetical efficient operator with 25% market share over the period of the model 2003-2032. Consequently, ComReg considers that this addresses Vodafone's submission in that regard.

7.81 ComReg maintains the view that LTE should not be explicitly modelled in the Final MTR Model and this is based on the nature and timing of the First Information Request (i.e., 2013) that was used to develop the Draft MTR Model. The future of LTE in the context of mobile voice traffic remains very uncertain and as such ComReg and its advisors Deloitte LLP have not explicitly model LTE in the base year of the MTR Model. We note that Vodafone's submission to the Original MTR Consultation supported this view, it stated that "*based on the likely deployment of LTE and the level of its use to carry voice in the time period for the proposed price control it is appropriate not to model LTE"* (see paragraph 7.72).

7.5.5 ComReg's Final Position

7.82 ComReg is of the view that the spectrum holding of the hypothetical efficient operator should be aligned with the assumed market share and historically should be based on an average of Irish operator holdings that were in-use as opposed to the spectrum holdings that were available and held fallow. The Final MTR Model implements this approach.

7.83 The Final MTR Model does not have a sudden change in spectrum as market share is held constant at 25% throughout the timeframe of the model.

7.84 Spectrum bands used for LTE have not been explicitly modelled in the Final MTR Model.

7.6 Spectrum Costs

7.85 In the Original MTR Consultation, ComReg was of the preliminary view that, for modelling purposes, ComReg would treat spectrum as a fixed cost and only allow network equipment and infrastructure costs to vary in response to changes in traffic loads.

7.86 This approach is consistent with BU MTR models developed in other jurisdictions[169] on the principle that, for an efficient network operator, there is a trade-off between the opportunity cost of spectrum and additional network roll-out. In other words, mobile network operators are faced with the option of purchasing additional spectrum rights of use or expanding the existing network to accommodate increased demand.

7.6.1 Submissions to the Original MTR Consultation

7.87 Telefónica stated with respect to the "*linear*" decision to purchase additional spectrum rights of use or invest in the network that in its view "*[o]perators are not able to make such linear decisions and are obliged to purchase blocks of spectrum at irregular intervals so operators may have insufficient spectrum and therefore do not have an optimal network design but instead have additional costs*".[170]

7.88 Telefónica further stated "*…a hypothetical allocation of spectrum which could not be purchased or used by an operator in the fashion ComReg assume…[t]his highlights the limitations of cost modelling on hypothetical operators as the component costs could not be replicated by a real world operator*."[171]

7.6.2 ComReg's Position

7.89 In regard to Telefónica's view regarding the purchase of additional spectrum rights of use or network investment, our proposed approach does recognise that operators may acquire the rights to use additional blocks of spectrum at irregular intervals and dimension their network in this context. ComReg is modelling a hypothetical efficient operator and as a consequence of the irregularity of spectrum blocks the model accounts for a lower assignment of spectrum for certain periods — which then results in the deployment of additional network equipment and associated network costs. Similarly, the Final MTR Model allows for excess spectrum at different points in time which results in reduced network costs.

[169] For instance ANACOM's and PTS's MTR models.
[170] Telefónica's Response to the Original MTR Consultation, page 3. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[171] Ibid.

7.90 With respect to Telefónica's submission (see paragraph 7.88), ComReg does not agree with its view. The purpose of linking the modelled quantity of spectrum to the actual spectrum available is to create a representative approach to spectral resources available to a hypothetical efficient operator in Ireland. Our approach is consistent with international precedent whereby a trade-off exists between the level of spectrum payments and quantity of network equipment deployed (e.g., The Netherlands in 2012[172]).

7.6.3 ComReg's Final Position

7.91 The Final MTR Model treats spectrum as a fixed cost and only allows network equipment and infrastructure costs to vary in response to changes in traffic loads.

7.7 Minimum Element Requirements

7.92 In the Original MTR Consultation, ComReg was of the preliminary view that an important consideration in dimensioning the modelled network is the minimum quantity of elements required by the hypothetical efficient operator for the coverage of a one-call network, or in the event that dimensioned load is insufficient to require an adequate quantity of elements that a mobile operator would reasonably be expected to deploy.

7.93 The coverage network scenario that the MTR Model is based upon is consistent with the 2009 Termination Rate Recommendation which specifies that the "*coverage can be best described as the capability or option to make a single call from any point in the network at a point in time".*[173] In other words, the minimum quantity of elements required to be dimensioned by the hypothetical efficient operator is based on the ability to make a single call from any point in the network at any point in time.

7.94 The resulting values for the minimum quantity of elements required for the coverage of a one-call network were informed by the underlying network design; the characteristics of the Irish market; and information submitted to us by Irish MSPs on the minimum number of elements required.

7.7.1 Submissions to the Original MTR Consultation

7.95 Respondents did not raise any issue with our proposed approach regarding the minimum element requirements of a hypothetical efficient operator for the coverage of a one-call network.

[172] A Report for OPTA: Conceptual specification for the update of the fixed and mobile BULRIC models, 15 October 2012.
[173] 2009 Termination Rate Recommendation, page 7.

7.96 However, a number of submissions indicated issues regarding the value of minimum element requirements in the RAN; Core Network; Transmission; and Other Elements Modelled. These are detailed in subsections 7.14–7.17 respectively.

7.7.2 Supplementary MTR Consultation

7.97 In the Supplementary MTR Consultation the approach set out in paragraph 7.94 remained the same. However, arising from a number of material modifications to the Updated MTR Model (see paragraph 7.98), the values for the minimum element requirements were updated as a result of other adjustments to the model that resulted in associated knock-on effects with respect to the modelled minimum element requirements.

7.98 The changes to the minimum element requirements in the Updated MTR Model that resulted from separate changes were as follows:

- The amendment of spectrum holdings in light of the 1/N methodology applied to spectrum;
- The addition of UMTS900 spectrum (5MHz included from 2013);
- The addition of wholesale billing platform element (MER set to 1); and
- Over the period 2003-2006 the minimum element requirements were revised in line with the market share of a hypothetical efficient existing operator as opposed to the hypothetical efficient new entrant that had been modelled in the Original MTR Consultation.

7.7.3 Submissions to the Supplementary MTR Consultation

7.99 Respondents did not raise any issue with the proposed overall approach to modelling minimum element requirements.

7.100 However, Vodafone stated "*that the spectrum assigned to minimum element requirements appears to be overstated*"[174]. Respondents did not raise any issue with the changes to the minimum element requirements identified in paragraph 7.98.

7.7.4 ComReg's Position

7.101 ComReg notes that respondents did not raise any issue with the proposed overall approach to modelling minimum element requirements.

[174] Vodafone Response to the Supplementary MTR Consultation, Page 13.

7.102 The submissions regarding the value of minimum element requirements in the RAN; Core Network; Transmission; and Other Elements Modelled, are discussed in turn in subsections 7.14; 7.15; 7.16; and 7.17 respectively.

7.103 The issue raised by Vodafone in relation to the spectrum assigned to minimum element requirements being overstated (see paragraph 7.100) has been addressed in paragraphs 7.40 and 7.82.

7.7.5 ComReg's Final Position

7.104 The Final MTR Model has been finalised with the specified minimum quantity of elements in the Updated MTR Model that accompanied the Supplementary MTR Consultation.

7.8 Network Dimensioning Using Busy Hour Traffic

7.105 In the Original MTR Consultation, ComReg was of the preliminary view that we should consider the following key cost drivers for network dimensioning purposes in the Draft MTR Model:

- the level of coverage required (defined by geographic coverage);
- total traffic (service demand determined on a per-subscriber basis);
- the traffic load at the busy hour; and
- quality of service.

7.106 Service demand from all traffic services were combined to form aggregated cost drivers in order to capture the relative usage of each network element by each unit of service demand. Network dimensioning rules were then applied to service demand data which enabled us to calculate the required deployment of appropriate network elements in order to meet the demands for capacity and coverage.

7.107 The hypothetical efficient operator was modelled to deploy a network capable of servicing peaks in its annual traffic. The cost modelling analysis in the Draft MTR Model considered this peak-capacity dimensioning in the form of a busy hour load — whereby the network load used to dimension the required network elements was based on traffic levels at the busiest times.

7.108 The peak in traffic was modelled by the average busy hour uplifted by a factor of 10%. This uplift was included to capture variance across daily busy hours and to account for fluctuations in network load (e.g., highly localised cell loads at particular times of the day). This assumption implied that the network is able to deliver services with a 10% higher busy hour than on average. Further uplifts to account for peak-to-mean and cell-specific load factors were also included, alongside the busy hour uplift.

7.8.1 Submissions to the Original MTR Consultation

7.109 Respondents did not raise any issues with the proposed network dimensioning methodology.

7.110 However, a number of submissions indicated issues regarding the subcomponents of this proposed methodology. In particular, submissions were received regarding the most accurate means of modelling total traffic (see section 7.4) and the most appropriate level of coverage (see section 7.3).

7.111 In respect to the proposed busy hour uplift of 10% to recognise geographic and localised busy hour variations (see paragraph 7.108), Vodafone considered that "*[h]istorically the uplift required to deal with these effects was materially higher than 10% e.g. in 2004 Vodafone experienced a factor of ✂%*".[175]

7.8.2 ComReg's Position

7.112 ComReg notes that no issues were raised by respondents with regard to the proposed network dimensioning methodology. In respect of the subcomponents of the proposed methodology (see paragraph 7.110), these are addressed separately in sections 7.3 and 7.4.

7.113 Further to Vodafone's view surrounding the proposed busy hour uplift of 10%, as detailed in paragraph 7.111, the value which Vodafone specified to support its views relate to its network more than 10 years ago. Vodafone has not provided any further data that would justify an increase of the uplift factor assumed by ComReg.

7.114 The peak in traffic was modelled by the average busy hour uplifted by a factor of 10%. This uplift was included to capture variance across daily busy hours. This assumption implies that the network is able to deliver services with a 10% higher busy hour than on average. A further uplift was also applied in the form of a cell-specific load factor. This factor was applied to the network load to ensure that the network is able to handle localised peaks that are above the uplifted average busy hour load (e.g. high localised cell loads at particular times of the day).

7.115 In addition, peak to mean ratios were applied to busy hour traffic to allow for instantaneous peaks in load within the busy hour. This ratio is higher for voice than for data, to take into account the lower latency tolerance that voice has.

[175] Vodafone's Response to the Original MTR Consultation, page 14. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

7.116 Having assessed Irish MSP data in this context, a busy hour uplift of 10% is considered appropriate for a hypothetical efficient operator's network implying that it can deliver services with a 10% higher busy hour than what is experienced on average.

7.8.3 ComReg's Final Position

7.117 The Final MTR Model uses the following key cost drivers for network dimensioning purposes:

- the level of coverage required (defined by geographic coverage);
- total traffic (service demand determined on a per-subscriber basis);
- the traffic load at the busy hour; and
- quality of service

7.118 The Final MTR Model incorporates a busy hour uplift factor of 10%.

7.9 Traffic Conversion

7.119 As set out in the Original MTR Consultation, a common unit of measurement is required in the MTR Model in order to estimate the traffic load on equipment that is responsible for carrying different traffic types. This is required as different services provided by a MSP, such as voice, data, and messages, place different types of demand on its network. Consequently, ComReg was of the preliminary view in the Original MTR Consultation that the Draft MTR Model should use conversion factors to express traffic demand in either Erlangs or MB/s.

7.120 As the vast majority of the hypothetical efficient operator's 2G network is required for voice traffic, ComReg implemented the busy hour loading calculations and dimensioned this network (for 2G elements) in Erlangs.

7.121 In contrast to the modelled 2G network, a significant portion of the hypothetical efficient operator's 3G network is required for data traffic. Therefore, ComReg implemented the busy hour loading calculations and dimensioned this network (for 3G elements) in MB/s.

7.9.1 Submissions to the Original MTR Consultation

7.122 Vodafone stated that "*[b]asic sensitivity tests of the nominal full rate bit rate in the busy hour show that increasing the data rate for voice produces a lower rate… [and that]…this approach is flawed as the conversion factor for voice demand bears no relationship to the network impact of a given data load."* It also stated that "*[t]his is particularly so in the context of 2G where the data load will be low volumes of GPRS traffic*."[176]

7.9.2 Supplementary MTR Consultation

7.123 The traffic conversion factors in the Draft MTR Model were not considered in the Supplementary MTR Consultation. As stated, the scope of the Supplementary MTR Consultation was to consider material modifications to the Draft MTR Model only and there was no such proposed modification to the traffic conversion factors of the Draft MTR Model.

7.9.3 Submissions to the Supplementary MTR Consultation

7.124 Vodafone reiterated its concerns (as set out in paragraph 7.122) with the assumptions surrounding the traffic conversion factors used in the Draft MTR Model. Vodafone stated that "*ComReg has set out that it accepted Vodafone's position that the impact on the network of data carrying real time services such as voice is higher than general data usage and stated that this had been accommodated. However no details have been given on how this is done and it is impossible for respondents to comment on whether this issue has been adequately reflected in the model (see paragraph 3.164 of the consultation document). Given the material deficiencies identified by Vodafone in those model parameters which can be validated and this lack of transparency, the inability to validate ComReg's approach in respect of this matter raises a material procedural concern."*[177]

[176] Vodafone's Response to the Original MTR Consultation, page 15. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[177] Vodafone response to the Supplementary MTR Consultation, page 29.

7.9.4 ComReg's Position

7.125 In the Original MTR Consultation, ComReg set out the network dimensioning methodology, and associated traffic conversion assumptions, that were applied in the Draft MTR Model and this was also detailed in the Draft Deloitte MTR Model Specification Document. Consequently, the check undertaken by Vodafone (as detailed in paragraph 7.122) will not generate the results that Vodafone expected because it inaccurately interpreted ComReg's proposed methodology and the associated assumptions surrounding traffic conversion. Vodafone's submission can be attributed to a labelling issue with respect to the traffic conversion assumptions within the Draft MTR Model and was not due to an error in the Draft MTR Model.

7.126 In order to address this labelling issue, ComReg has renamed the relevant conversion factor in the Final MTR Model to "2G data: Equivalent minutes bit rate".

7.127 As stated in paragraphs 7.119-7.121, the 2G calculations use Busy Hour Erlangs as the unit of measurement[178]. In order to convert the 2G data load (measured in Mbit/s) into equivalent Busy Hour Erlangs the associated bit rate assumption is used. Therefore, changing this bit rate assumption (as described by Vodafone in paragraph 7.122) does not affect the 2G voice Erlang load calculated by the Draft MTR Model, but will change the Erlang equivalent 2G data load.

7.128 While the dimensioning rule has been re-labelled so that it now references the 3G BH voice traffic in units of MB[179], this update does not impact the overall traffic load, but simplifies the calculation process by avoiding an additional step in conversion. This calculation is consistent with the assumption that 3G elements are dimensioned in units of Mb/s.

7.129 With respect to Vodafone's submission that there is in its view a "*lack of transparency*" regarding traffic conversion factor in the model, ComReg has addressed this by re-labelling the relevant conversion factor "2G data: Equivalent minutes bit rate" (see paragraphs 7.125-7.128).

7.130 Further details on the voice to data traffic conversion within the Final MTR Model has been provided in the Section 4.3.2 and Section 5.3.1.4 of the Final Deloitte MTR Model Specification Document[180].

[178] A 2G minute is assumed to be 1/60 of an Erlang.
[179] In the Original MTR Model it had been referenced in Erlang values before being converted into MB.
[180] Published as ComReg Document No. 16/09a: ComReg Document No. 16/09a https://www.comreg.ie/_fileupload/publications/ComReg1609a.pdf

7.9.5 ComReg's Final Position

7.131 The Final MTR Model uses a common unit of measurement to estimate the traffic load on equipment that carries different traffic types (i.e., voice, data and messaging services). In order to do this, the modelled network is dimensioned using traffic conversion assumptions[181].

7.10 Route Factor Volumes

7.132 Route-factored volumes indicate the traffic load for each element in the network having regard to the associated volume of traffic. Routing factors (also known as service usage factors) are used to apportion the cost of network elements to services on the basis of the relative intensity with which a service uses the element. They are also used to calculate the traffic load on each of the elements in the network as well as to attribute the cost of elements to services in the cost module.

7.133 In the Original MTR Consultation, ComReg was of the preliminary view that routing factors should be used in developing the Draft MTR Model in order to capture the relative consumption of resources by each network element and by each unit of service demand.

7.134 As many network elements are sensitive to changes in traffic volumes, the application of route factors in the context of busy hour demands is an important step in determining the quantity of network elements required to support the given level of demand when dimensioning the network.

7.135 Related to routing factors are planned element utilisation factors. In the Draft MTR Model the planned utilisation factors took account of the maximum loading factors that apply for each network component relative to the theoretical design capacity of the element. This is discussed separately in section 7.11.

7.10.1 Submissions to the Original MTR Consultation

7.136 Respondents did not comment on, or raise any issue with, our proposed methodology for applying routing factors in the Draft MTR Model. Similarly, respondents did not raise any issue with the proposed matrix of route factors and the respective values assigned to them.

[181] The conversion factors express traffic demand in either Erlangs or MB/s depending if it is 2G or 3G traffic.

7.10.2 ComReg's Position

7.137 The route factors applied in the Draft MTR Model were informed by information that ComReg received from Irish MSPs in response to The First Information Request. Having considered the responses to the Original MTR Consultation (see paragraph 7.136), ComReg remains of the view that this methodology and the proposed route factors are appropriate.

7.138 As there were no issues raised in respect of our preliminary view, ComReg has developed the model by incorporating the proposed routing factors, as set out in the Original MTR Consultation, and finalised the model accordingly.

7.10.3 ComReg's Final Position

7.139 In order to calculate the long-run costs of the relevant increments, the Final MTR Model takes these route factors and service volumes and combines them with the network element purchasing profile

7.11 Planned Element Utilisation

7.140 In the Original MTR Consultation, ComReg was of the preliminary view that an allowance should be made against each of the specified technical capacities of each network element. These planned element utilisation factors were proposed in order to account for the maximum loading factors that apply to each network element (relative to the theoretical design capacity of the element). This means that network capacity upgrades, which typically occur in advance of the network reaching capacity limits, are accounted for in the Draft MTR Model.

7.141 The proposed planned element utilisation factors were informed by the information that ComReg received from Irish MSPs in response to The First Information Request.

7.142 The planned element utilisation values were assumed to be constant over the time horizon of the Draft MTR Model.

7.11.1 Submissions to the Original MTR Consultation

7.143 Vodafone stated that "*[i]n the process of actual network deployment the applied utilisation factor can vary greatly. In a setting with expected large traffic grow utilisation factors are likely to be a lot lower than the rate assumed in the model.*" It also stated that as "…*the modelled operator in the time period relevant to the review is likely to have experienced large traffic growth, the overall rate should be adjusted to take account of historic utilisation factors between 2003 -2013. As the data request by ComReg only requested current and future utilisation factor estimates, the overall rate should be adjusted on this basis*".[182]

7.144 Vodafone also stated that "*[g]iven the issues that exist with ComReg's assumptions on carrier utilisation then the fact that there have been no checks on 3G uplink constraints is a cause for material concern*".[183]

7.11.2 ComReg's Position

7.145 Having considered the points set out by Vodafone in paragraph 7.143, ComReg has revised its preliminary view that planned element utilisation values were assumed to be constant over the time horizon of the model. In the Final MTR Model, utilisation by element is assumed to be constant over the time horizon of the model, except for 2013 and 2014 when the utilisation of BTS, TRX, and BSC is assumed to be at 90%. Due to the temporary decrease in the hypothetical efficient operator's holdings of the GSM900 spectrum in 2013 and 2014, the 2G RAN network is assumed to be utilised more heavily in these two years.

7.146 With respect to the utilisation factors being held constant, ComReg notes that utilisation factors are typically fixed over time in other MTR models (e.g., ARCEP in France and ANACOM in Portugal). This simplifying assumption that utilisation remains constant throughout the modelled time period is implemented due to the difficulty associated with assessing the appropriate level of historical utilisation in light of interrelated factors on network dimensioning.

[182] Vodafone's Response to the Original MTR Consultation, page 17. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[183] Vodafone's Response to the Original MTR Consultation, page 19. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

7.147 Further, with respect to the point raised by Vodafone in paragraph 7.144 carrier dimensioning has been revised in the Final MTR Model to include utilisation factors. In addition, the calculation of number of carriers per cell has been amended so that it cannot fall below 1 when there is traffic. The 3G uplink calculation follows the same methodology as the 3G downlink dimensioning. Furthermore, checks have been introduced for the downlink calculations, which also implicitly check the uplink calculations.

7.11.3 ComReg's Final Position

7.148 The planned element utilisation values are assumed to be constant over the time horizon of the Final MTR Model, except for 2013 and 2014 when the utilisation of BTS, TRX, and BSC is assumed to be at 90%.

7.12 Sharing of Network Elements between Operators

7.149 Passive network sharing involves MNOs sharing sites and passive elements on sites, such as the physical space and radio masts.

7.150 Active network sharing involves the sharing of elements in the RAN.

7.151 In the Original MTR Consultation, ComReg was of the preliminary view that it was reasonable to assume a market comprised of hypothetical efficient operators that would engage in passive network sharing without any active network sharing.

7.12.1 Submissions to the Original MTR Consultation

7.152 Telefónica stated "*ComReg's assumption that network sharing is purely passive sharing, this is despite network sharing agreements are in place in the market which do share active components*".[184]

7.12.2 ComReg's Position

7.153 Further to Telefónica's submission that active network sharing agreements are in place (see paragraph 7.152), ComReg can confirm that it is aware that active sharing has been present in the Irish market. However, ComReg remains of the view that it is a reasonable assumption that a hypothetical efficient operator would engage in passive network sharing only, particularly given the assumption on the efficient scale of the hypothetical operator (as discussed in paragraph 2.33). See also paragraph 7.154.

[184] Telefónica's Response to the Original MTR Consultation, page 4. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

7.154 Having considered the interplay between the type of site that might be shared in addition to having implicitly considered the volume of sites actually shared and the level of savings that might be achieved, ComReg's approach achieves a combination of site volumes and synergy savings that appear to be within the expected range arising from this interplay.

7.12.3 ComReg's Final Position

7.155 In the Final MTR Model the hypothetical efficient operator is assumed to engage in passive network sharing (i.e., the sharing of sites and the passive elements on sites) but without any active network sharing agreements (i.e., the sharing of network elements in the RAN).

7.13 Logical Structure of Modelled Network

7.156 In the Original MTR Consultation, ComReg set out that the Draft MTR Model should be capable of determining the quantity of network elements that are required to meet the assumed levels of traffic load in each of the respective traffic scenarios. This is an important capability in deriving the pure LRIC MTR.

7.157 ComReg considered the pure LRIC incremental cost of MVCT and the Draft MTR Model therefore included the relevant elements that are used by voice services. Any elements dedicated, for example, to data services are not included on the basis that they do not contribute to the pure LRIC of voice services. This avoids introducing unnecessary calculations in the dimensioning, purchasing profile and cost attribution, for elements which are not related to MVCT and which cannot be considered as contributors to the pure LRIC of this service. Examples of data elements that are not modelled include the Gateway GPRS Support Node (GGSN) which allows the 2G and 3G networks to interface with the internet.

7.158 To be capable of deriving the pure LRIC for wholesale MVCT, the MTR Model needs to be capable of determining the quantity of network elements that are required to meet the assumed levels of traffic load in both the full traffic scenario (including all mobile services) and in the traffic scenario for all mobile services excluding wholesale call termination.

7.159 Consequently, ComReg was of the preliminary view that network elements should be deployed in the RAN, the Core, the Transmission and 'Other Elements' such as spectrum license fees, wholesale billing platform and Voicemail System ("**VMS**").

7.13.1 Submissions to the Original MTR Consultation

7.160 Vodafone stated that "*[t]he Consultation sets out a high level network topology. The functional blocks within this topology are aggregations of specific network implementations."* It also stated that "*[t]he level of aggregation and the lack of granular description of cost allocation mean that it is not possible to properly assess whether the approach and costing adopted by ComReg are reasonable or realistic*."[185]

7.13.2 ComReg's Position

7.161 With respect to Vodafone's submission regarding the level of aggregation and lack of granular description of cost allocation (see paragraph 7.160), ComReg remains of the view that the logical structure of the modelled network presented in the Draft MTR Model was sufficiently detailed and that it is an appropriate basis for modelling a hypothetical efficient operator in the Final MTR Model. See also paragraphs 7.162-7.164.

7.162 The modelled network elements are dedicated to the contribution of MVCT services and exclude introducing unnecessary calculations in the dimensioning, purchasing profile and cost attribution for network elements unrelated to MVCT. Examples of data elements that are not modelled include the Gateway GPRS Support Node (GGSN) which allows the 2G and 3G networks to interface with the internet.

7.163 The logical structure of the modelled network is also consistent with international precedent.

7.164 With respect to Vodafone's concern that it is not possible to properly assess whether the approach adopted by ComReg is reasonable (see paragraph 7.160), in our view we do not think there is any basis to Vodafone's concern as we have set out and addressed the various issues raised by respondents surrounding the RAN, Core, Transmission and 'Other Elements' modelled in subsections 7.14-7.17.

7.13.3 ComReg's Final Position

7.165 The Final MTR Model incorporates network elements that are dedicated to the contribution of MVCT services in the RAN, the Core, the Transmission and 'other elements' such as spectrum license fees, wholesale billing platform and VMS. It avoids introducing unnecessary calculations in the dimensioning, purchasing profile and cost attribution for network elements unrelated to MVCT.

[185] Vodafone's Response to the Original MTR Consultation, page 16. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

7.14 Radio Access Network (RAN)

7.166 In the Original MTR Consultation, ComReg was of the preliminary view that it was appropriate to assume that the hypothetical efficient operator would hold 900MHz and 1800MHz frequency blocks for 2G network provision and 2100MHz frequency blocks for 3G network provision. As set out in paragraphs 7.45, 7.46 and 7.70, LTE network elements were not dimensioned and spectrum holdings for LTE were not included in the modelling analysis.

7.167 Network coverage area by geotype was defined in the Draft MTR Model for 2G and 3G separately and based on coverage areas submitted by Irish MSPs in response to the First Information Request. ComReg assumed that a 2G network remained active throughout the time horizon of the Draft MTR Model.

7.168 ComReg also set out its preliminary view regarding what network elements should be included when modelling the RAN. These included network elements such as sites, BTS/TRX, Node B, 3G Radio, BSC and RNC.

7.169 The key modelling parameters that ComReg proposed and which informed the dimensioning of the RAN in the Draft MTR Model were as follows:

- Land area breakdown: classified by geotype into urban, suburban and rural;
- Network coverage: defined separately for 2G and 3G;
- Cell radii: based on traffic load, available spectrum, re-use factor, cell traffic capacity and grade of service;
- Traffic demand per cell;
- Grade of service: for the 2G network calculated on the basis of Erlang B calculation and the number of available timeslots at a given busy hour grade of service; and
- Equipment capacities.

7.14.1 Submissions to the Original MTR Consultation

7.170 Telefónica stated "*concerns that the sectorisation to 20% of rural area is very high versus [its] experience in the market"* and stated that this *"may be a symptom of Micro cell legacy that has driven the high omni-sectorisation % in rural areas*".[186]

[186] Telefónica's Response to the Original MTR Consultation, page 4. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

7.171 Vodafone referred to the assumed re-use factor in the Draft MTR Model of 10 and stated that "*in order to provide a reasonable quality service to customers a re-use factor of 12 should be used*". It stated that "*[i]n locations where the absence of suitable site has forced operators to use a tighter re-use than 12, this has resulted in degradation of network quality. This reduction in quality should not be part of an efficiently planned network*."[187]

7.172 Vodafone also stated that "*…it is because the uplift factor is required to deal with localised per cell peak traffic demand effects that such network wide averaging is entirely inappropriate and integer numbers of TRXs must be used*."[188]

7.173 Vodafone referred to the assumed timeslots per TRX of 7.5 in the Draft MTR Model and stated that "*this is not a realistic figure*". It stated that "*[t]he reduced spectrum available to GSM 900 because of UMTS900 will reduce the TRX per cell and thus the average traffic timeslots per TRX*".[189]

7.174 Vodafone stated that "*[i]n order to meet a 2% grade of service on each site sufficient TRXs are needed derived from the traffic at the site and the corresponding Erlang table. An average does not meet this requirement. Therefore, the calculation methodology is flawed by leading to an understatement of the required number of TRXs*".[190]

7.14.2 Supplementary MTR Consultation

7.175 Having considered Vodafone's submission that integer numbers of TRXs must be used (see paragraph 7.172), ComReg revised its approach (see paragraph 7.176).

7.176 In the Supplementary MTR Consultation, the Updated MTR Model incorporated an utilisation factor into the calculations of the average number of TRXs and 3G radios per site and by geo-type. This ensured that that the required number of TRXs and 3G radios was set to 1 in any instance (the previous calculation could have resulted in a value of less than 1 for either TRXs or 3G radios).

[187] Vodafone's Response to the Original MTR Consultation, page 14. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[188] Vodafone's Response to the Original MTR Consultation, page 14. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[189] Ibid.
[190] Vodafone's Response to the Original MTR Consultation, page 18. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

7.14.3 Submissions to the Supplementary MTR Consultation

7.177 Vodafone stated that "*Deloitte has included some type of rounding [but that] this is still insufficient, as the round-up function is only embedded when the different network elements are aggregated*." It also stated that "*In order to adequately reflect network requirements, the function should be embedded throughout the network module sheets of the model*".[191]

7.178 Vodafone stated that "*the model has been adjusted to round up the required TRX number when the required TRX in a cell is calculated as being between 0 to 1, but not when the TRX needed is another fractional amount, e.g. 1.4*". In its view, "*this is incorrect – the required TRX in each cell should be rounded up an integer number of TRX*".[192]

7.179 Vodafone stated that "*the number of [modelled] TRX deployed seems to be disproportionately low*". It stated that "*[t]he actual number of TRXs deployed in Vodafone's networks stands at 17,552 TRX [and] even allowing for some sort of market share adjustment this would mean that in 2015 the number of TRXs of a "hypothetical operator" would be less than a third of that observed in the Irish market today*." In conclusion it stated that this apparent variation "*calls into question the validity of the model and ability to predict costs in the Irish market context*".[193]

7.180 Vodafone also stated in its response that "*the number of 3G radios deployed seems to increase disproportionately and bears no relation to actual 3G radios that can be reasonably expected to be built*".[194]

7.181 Vodafone also notes that with respect to MPLS and cross connect costs "*…no breakdown of how these mark-ups is derived has been provided and there is no way in which a respondent can validate or assess the adequacy of ComReg's approach*."[195]

7.182 Vodafone's submission stated that it *"…believe[s] that in order to provide a reasonable quality service to customers a re-use factor of 12 should be used. This factor has been widely applied in other European models and used, for instance, by regulators in Portugal, Romania or the UK."*[196]

[191] Vodafone's Response to the Supplementary MTR Consultation, page 14.
[192] Ibid.
[193] Vodafone's Response to the Supplementary MTR Consultation, page 15.
[194] Ibid.
[195] Vodafone's Response to the Original MTR Consultation, page 16. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[196] Vodafone's Response to the Original MTR Consultation, page 28. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

7.14.4 ComReg's Position

7.183 In respect of Telefónica's submission that the sectorisation to 20% of rural area is very high (see paragraph 7.170), ComReg does not agree. ComReg confirms that the data received from other Irish MSPs in response to the First Information Request indicated higher sectorisation than suggested by Telefónica. Consequently, ComReg consider the assumed sectorisation to be appropriate.

7.184 Having considered Vodafone's submission that a re-use factor of 12 should be used (see paragraphs 7.171 and 7.81), ComReg does not agree, having assessed information received from Irish MSPs. As the re-use factor determines whether the spectrum used in a cell can be re-used in nearby cells, a re-use factor that is very high would not make use of the available spectrum efficiently. Conversely, a low re-use factor would lead to an increase in radio interference. Such an increased interference results in degraded performance (such as dropped calls and failed calls), especially for subscribers at the cell edge compared with subscribers near the centre of the cell (which receives a stronger signal from the cell they are using). Consequently, a re-use factor of 10 appears to represent an appropriate balance between efficiency and quality of service in the context of the Irish mobile market[197].

7.185 Having considered Vodafone's submission in relation to network-wide averaging being entirely inappropriate and that integer numbers of TRXs must be used (see paragraph 7.172), ComReg does not agree. ComReg notes that in response to The First Information Request, Irish MSPs provided us with information on: the number of cells; average sectorisation; and average number of TRX per sector. This enabled a comparison between the number of modelled TRXs and the number of TRXs actually deployed by operators.

7.186 Having considered Vodafone's submission that the assumed timeslots per TRX is not a realistic figure (see paragraph 7.173), ComReg believes that its proposed approach for defining the number of traffic timeslots and the approach suggested by Vodafone are both reasonable. The extent of traffic timeslots per TRX is dependent on the configuration of TRXs in the network and in our view, the value of 7.5 timeslots per TRX — which is extensively used in other NRA models (some of which are not public) — appears reasonable and appropriate.

7.187 Furthermore, it is agreed that as the 900MHz GSM spectrum is reduced, the average value of timeslots per TRX may decline. However, it should be recognised that the converse is also true: under high levels of 900MHz GSM traffic in the past, one may argue for a higher average figure. On balance the current figure appears reasonable and appropriate.

[197] See Section 5.1.1.5 in the Final Deloitte MTR Model Specification Document. See also paragraphs A 4.16-A 4.20.

7.188 Having considered Vodafone's submission that the required TRX in each cell should be rounded up an integer number of TRX (see paragraph 7.178) ComReg does not agree. It is important to be cognisant that the MTR Model has been developed on the basis of an average cell configuration in each geotype. ComReg has revised the methodology of rounding up the average number of TRXs or 3G radios to 1 when the calculated value is between 0 and 1 to ensure that all relevant cells have at least 1 TRX or 3G radio as it would be counterintuitive to have an average value between 0 and 1 (this would imply that some cells have no TRXs or 3G radios). As the model is developed on an average cell basis, an average value above 1 does not necessarily need to be an integer, as not all cells are facing equal amounts of traffic. A non-integer value of average number of TRXs or 3G radios reflects the assumption that all cells are not identical. Consequently, ComReg considers its approach to be a realistic reflection of actual network designs. See also paragraph 7.189.

7.189 The following example demonstrates that modelling an MNO by rounding up the number of TRXs per cell may result in investment higher than necessary for the network operator:

- If a hypothetical network operates 200 cells in rural areas, 100 with 3 TRXs and the remaining 100 with 4 TRXs, then an average cell for this operator would thus contain 3.5 TRXs. Rounding up this value would result in an average of 4 TRXs per cell, implying an over-investment for the provision of services demands faced by the hypothetical network operator.

7.190 ComReg does not agree with Vodafone's submission with respect to MPLS and cross connect costs and specifically that "*…no breakdown of how these mark-ups is derived has been provided and there is no way in which a respondent can validate or assess the adequacy of ComReg's approach*". In the Original MTR Consultation, ComReg stated that MPLS and cross connect costs were incorporated in indirect cost mark-ups. This is consistent with other NRA models (e.g., Portugal[198]) and while ComReg has not provided a breakdown of the indirect mark-ups ComReg can confirm that these have been informed by a calibration exercise.[199] This approach is considered to be appropriate due to the limit to the degree of granularity that can be applied, consistent with the need to build and populate the model with data, ComReg is of the view that the current level of granularity is appropriate.

198 http://www.anacom.pt/streaming/ConceptualApproachMobileBU_LRICmodel.pdf?contentId=1079788&field=ATTACHED_FILE

199 In this regard, a calibration has been carried out with respect to the dimensioning of the hypothetical efficient operator's network and this did not result in a reconciliation of modelled outputs.

7.191 Having considered Vodafone's submission detailed in paragraph 7.174 we are of the view that this is a limited case and where the modelled operator has a limited number of sites and traffic, this can be adequately reflected by introducing a floor value constraint consistently across TRXs and 3G radios. Furthermore, ComReg has also tested the impact of adding a further constraint to rounding all averaged TRXs/3G radios to an integer value. The impact of applying either the floor or roundup constraints do not change the Pure LRIC MTR to 4 decimal places of a cent.

7.192 Further to Vodafone's submission detailed in paragraph 7.179, ComReg notes that this information was not previously made available to ComReg or its consultants. Nevertheless, the implied quantity of TRXs can be calculated from the operator reported number of BTSs and the number of TRXs per sector. The implied numbers yield a range of TRXs deployed per operator that is consistent with the dimensioned number of TRXs deployed by the hypothetical existing operator (4,229). Moreover, the difference referenced by Vodafone can be partly explained by the lower 2G traffic volumes in the model, as explained in paragraphs 7.125-7.130.

7.14.5 ComReg's Final Position

7.193 The Final MTR Model uses 100% tri-sectorisation 3G which is consistent with our assessment of Irish MSP responses to First Information Request and Second Information Request. For 2G, urban areas are assumed to be fully tri-sectored in the Final MTR Model, whilst 10% omni-sectorisation in assumed in suburban areas and 20% in rural areas

7.194 A re-use factor of 10 is used in the Final MTR Model. This represents an appropriate balance between efficiency and quality of service.

7.195 The Final MTR Model does not round up the number of TRXs per cell as this may result in investment higher than necessary for the modelled network operator. The Final MTR Model does, however, implement a minimum of one TRX at each cell.

7.15 Core Network

7.196 The core network contains the nodes and equipment necessary to provide services such as call routing to subscribers connected through the RAN. In the Original MTR Consultation, ComReg was of the preliminary view that the core network should be NGN-based and that the hypothetical efficient operator would deploy an all-IP core.

7.197 ComReg was also of the preliminary view that it was appropriate to assume that the hypothetical efficient operator would commence rolling-out 2G and 3G networks simultaneously in 2003. In 2003 the hypothetical efficient operator is also assumed to have deployed core switches and transmission which were fully integrated and capable of switching both voice and data traffic. Consequently, the core network included the following network elements:

Mobile Switching Centre Server ("**MSC-S**");

Gateway Mobile Switching Centre ("**GMSC**");

Media Gateway ("**MGW**");

Authentication Centre ("**AuC**");

Home Location Register ("**HLR**");

Equipment Identity Register ("**EIR**");

Short Message Service Centre ("**SMSC**");

Multimedia Message Service Centre ("**MMSC**");

Network Monitoring Centre ("**NMC**");

Intelligent Network ("**IN**");

Signalling Platform and

Number Portability Platform.

7.198 In the Original MTR Consultation ComReg stated that the network design parameters in the core were insensitive to the changes in traffic volumes when the wholesale termination increment was removed. ComReg also specified the respective dimensioning rules associated with each network element in the core.

7.15.1 Submissions to the Original MTR Consultation

7.199 Eircom stated that it would expect "…*many NMC elements to be subject to far short economic lives with significant variation across elements, therefore we consider a 15 year economic life to be unrealistic and that a 10 year asset life is likely to be at the upper end of a realistic estimate*".[200]

[200] Eircom's Response to the Original MTR Consultation, page 11. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

7.200 Vodafone stated that "*…the model does not take into account any MSC or NMC costs. These costs constitute a very significant contribution to the overall costs of building and operating a network. Management of data parameters for sites and transmission elements constitutes a significant part of these costs. These costs will scale with size of network and thus a portion of the costs should be attributable to the incremental cost of termination*."[201]

7.15.2 Supplementary MTR Consultation

7.201 Having considered Eircom's submission that a 15 year economic life for a NMC is unrealistic (see paragraph 7.199), ComReg updated the Draft MTR Model, ComReg considered that a reduced NMC asset life of 10 years may be more appropriate. As unit capex and opex decreased proportionately this maintained the same unit cost per year of asset life and is consistent with the information submitted by Irish MSPs in response to the First Information Request and the Second Information Request. This modification to the Draft MTR Model did not have a material impact on the pure LRIC MTR.

7.202 In respect of Vodafone's submission that the model does not take into account any MSC or NMC costs (see paragraph 7.200), ComReg did not treat the MSC or NMC as incremental to MVCT traffic. However, ComReg revised in part its approach in the Updated MTR Model to assign an element cost of €1,200 to the GMSC network element[202]. This reflects the cost of interconnection ports – previously it had been zero.

7.15.3 Submissions to the Supplementary MTR Consultation

7.203 Vodafone reiterated (see paragraph 7.200) that "*it appears the model does not take into account any MSC or NMC costs".* Furthermore, Vodafone stated that "*[t]hese costs constitute a very significant contribution to the overall costs of building and operating a network. Management of data parameters for sites and transmission elements constitutes a significant part of these costs. These costs will scale with size of network and thus a portion of the costs should be attributable to the incremental cost of termination".*[203]

[201] Vodafone's Response to the Original MTR Consultation, page 17. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[202] The Gateway Mobile Switching Centre (GMSC) is a type of MSC that is used to route calls outside the mobile network.
[203] Vodafone's Response to the Supplementary MTR Consultation, page 30.

7.15.4 ComReg's Position

7.204 For clarity, during the pre-consultation process Irish MSPs offered to review whether or not input data was available on the cost, dimensioning, utilisation and asset life estimate of the MSC-S and GMSC port. This information was used to inform the dimensioning of the two elements and is further discussed in Section 5.3.2.2 of the Final Deloitte MTR Model Specification Document.

7.205 Having considered Vodafone's submission that the model does not take into account any MSC or NMC costs (see paragraph 7.203), ComReg further considered the issue of the whether the costs of the MSC or NMC network elements should be incremental with regard to wholesale termination traffic. In this regard, ComReg assessed MTR cost models developed in other jurisdictions and reviewed the information provided by Irish MSPs in response to the First Information Request.

MSC

7.206 International precedent suggests that MSC ports can be incremental with respect to termination traffic, whereas the chassis is not. As the MSC ports can have incremental cost contribution to the pure LRIC MTR, but the MSC chassis does not, the GMSC has been revised to include the costs of PoI-facing ports. Therefore, in light of the evidence from other NRA models and the information gathered during the pre-consultation process, the GMSC is treated as being incremental with respect to termination traffic (i.e., a capex cost of €1,200 per unit has been accounted for — as set out in the Supplementary MTR Consultation). However, the MSC-S dimensioning methodology remains unchanged. The impact on the pure LRIC MTR from this amendment is positive, albeit minor.

NMC

7.207 The NMC includes network management/operational systems as well as core testing and monitoring equipment. It is assumed that one NMC is required throughout the modelled time horizon. ComReg is not aware of any NMC being incremental in other NRA models and have finalised the model accordingly.

7.15.5 ComReg's Final Position

7.208 The Final MTR model assumes that the hypothetical efficient operator begins to roll out 2G and 3G networks simultaneously in 2003 with deployed core switches and transmission that are fully integrated and capable of switching both voice and data traffic. In this regard, the core was modelled to include the following network elements: MSC-S, GMSC, MGW, AuC, HLR, EIR, SMSC, NMSC, NMC, IN, Signalling Platform and Number Portability Platform.

7.209 The Final MTR Model treats the GMSC as being incremental to MVCT. The NMC (with an asset life of 10 years) and the MSC are not considered to be incremental to voice traffic.

7.16 Transmission Network

7.210 Transmission in a mobile network can be classified in terms of backhaul and core transmission links. In the Original MTR Consultation, ComReg was of the preliminary view that it was appropriate that data submitted by Irish MSPs in response to the First Information Request should inform the modelling of the backhaul — in particular, the proportion of the sites backhauled using the various media with microwave links and fibre links. The core transmission network was assumed to be operated on a national ring and to be entirely fibre-based.

7.211 The methodology for determining the throughput requirement and capacity of transmission technologies was presented in the Original MTR Consultation. It was stated that this methodology was similar to other NRA models.[204]

7.212 The assumed dimensioning rules result in a sensitivity of transmission costs to any changes in traffic demands. In other words, the sensitivity of these costs depends on the extent that the number of nodes in the different parts of the network and the capacity required to link those nodes is impacted by the changes in traffic demands.

[204] Examples include Portugal (ANACOM) and Romania (ANCOM).

7.16.1 Submissions to the Original MTR Consultation

7.213 Telefónica stated that "*…the modelling does not appear to cover Transmission, i.e. Microwave Radio or Fibre and doesn't appear to cover data centre modelling either as owned or hosted solutions*." It also stated that "*[t]here is no consideration in the modelling for Business Continuity impacts (e.g. Battery Backup, Generator backup to ensure Service Uptime) and the associated network costs."*[205]

7.214 Vodafone stated that in the Draft MTR Model, it appeared "*…that the modelled operator self-supplies all access transmission to its base station sites or uses fibre based access.*" It disagreed with this noting that in its view "*In order to meet roll-out and coverage requirements it is Vodafone's experience that even the most efficient MNO would have used a proportion of copper based leased lines even if these are more expensive in the long term compared to self-supply. This is especially true in the early stages of network deployment and commercial growth*." Vodafone stated it was also of the view that "*this is reflected by the actual activity of operators in the Irish market*".[206]

7.215 Vodafone stated that while "*microwave and fibre transmission are predominantly observed in operator returns there is no analysis of whether this is consistent over the entire period being modelled nor is there any analysis of what proportion of base station access links might be based on leased lines going forward.*"[207] It also stated that, in its view, ComReg has "*… failed to carry out a calibration of the input assumptions both in terms of those verifiable against historical fact and against likely market developments over the period during which the modelled price might apply*."[208]

7.216 There were no proposed material modifications to the modelling of the transmission network and consequently the modelling of the transmission network was not considered in the Supplementary MTR Consultation.

[205] Telefónica's Response to the Original MTR Consultation, page 4. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[206] Vodafone's Response to the Original MTR Consultation, page 16. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[207] Vodafone repeated its concerns surrounding the modelled transmission network in its response to the Supplementary MTR Consultation stating that it "remains oversimplified". In Vodafone's view, "The apportioning of link quantities in order to allocate 2G and 3G sites to 2G and 3G networks as well as the lack of necessary dynamic redundancy requirements inevitably leads to an underestimation of transmission equipment costs".
[208] Vodafone's Response to the Original MTR Consultation, page 16. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

7.16.2 Submissions to the Supplementary MTR Consultation

7.217 In responding to the Supplementary MTR Consultation, Vodafone stated that the treatment of transmission "*remains oversimplified*" in the Draft MTR Model. It also stated that "*the apportioning of link quantities in order to allocate 2G and 3G sites to 2G and 3G networks as well as the lack of necessary dynamic redundancy requirements inevitably leads to an underestimation of transmission equipment costs.*"[209]

7.218 In addition, Vodafone stated that "*within the last three years transmission elements have absorbed more than ✂ of Vodafone's network budget. We do not see that this is reflected in the outputs of the model*."[210]

7.16.3 ComReg's Position

7.219 In response to Telefónica's points raised in paragraph 7.213, ComReg confirms that transmission and business continuity (such as back-up power facilities) have been included in the Final MTR Model and had been included in the Draft MTR Model. The former is dimensioned directly in the model and the latter is taken to be included in indirect mark-ups. Consistent with other NRA models (e.g., Portugal) ComReg has not provided a breakdown of the indirect mark-ups but can confirm that these have been informed by a calibration exercise. Data centre costs associated with services such as hosting, or potentially enterprise cloud services, are not directly included as services in the model.

7.220 In respect to Vodafone's submission regarding the treatment of transmission being "oversimplified" (see paragraph 7.217), ComReg disagrees. The access network in MTR models is often modelled in more detail than the transmission network which is in line with MVCT specific network elements. As the objective of the current model is to support the determination of appropriate maximum wholesale MTRs to be charged by MSPs in Ireland there may be transmission elements (or parts of elements) that are not modelled, as they are not relevant to termination traffic (see paragraph 7.162). However, as Vodafone's total transmission cost (i.e., both opex and capex) is likely to be included in its reported transmission network cost (see paragraph 7.218), it would imply that comparison to the transmission costs in the Draft MTR Model would be inappropriate.

[209] Vodafone's Response to the Supplementary MTR Consultation, page 15.
[210] Vodafone's Response to the Supplementary MTR Consultation, page 29.

7.221 Furthermore, services such as data traffic are modelled but the relevant network elements are modelled in less detail, as set out in paragraph 7.220. An LTE network, for example, is not explicitly dimensioned and additional transmission capacity which might be needed for LTE traffic is not included in the model as a result. It follows that the overall modelled network costs are not intended to replicate the actual total costs incurred by operators.

7.222 Having considered the points raised by Vodafone in paragraphs 7.214-7.215, ComReg can confirm that as historic data on the availability of fibre-to-the-site is limited, the Draft MTR Model was informed by Irish MSP provided data in response to the First Information Request. ComReg implemented a simplifying assumption that a mix of fibre and microwave (MW) is constant per 2G or 3G technology. The 2G sites are based primarily on MW, which is the predominant network technology in early years of the model. 3G only and co-located 2G and 3G sites are slightly more reliant on fibre. Migration of traffic to 3G therefore implies that fibre represents a higher proportion of links in later years of the model.

7.223 Data from Irish MSPs in response to the First Information Request provided information on the proportion of sites backhauled using various transmission media. MW links and fibre links were predominately observed in the data. While self-provided microwave or fibre are capex items compared to leased lines being an ongoing opex item, ComReg does not believe in this context that leased lines are significantly different to this technology. Furthermore, in the long run ComReg would not expect a significant difference in present value costs. Consequently, these assumptions appear appropriate absent the availability of any more accurate data and the Final MTR Model has been finalised on this basis.

7.224 Furthermore, data from Irish MSPs in response to the First Information Request indicated a significant use of MW. ComReg considers that copper-based leased-lines could only have been deployed under Vodafone's suggested scenario (paragraph 7.214) to a limited degree. As ComReg is modelling an established operator with 25% market share in the earlier years of the model it is not considered to be appropriate to use a higher proportion of copper based leased lines given the short time-scale, limited number of potentially impacted sites, and small cost impact.

7.225 A general calibration has been carried out, both in BU and TD terms. The extent of the granularity of calibration has been subject to data availability. Historical and forecasted information was taken into account to guide input assumptions, such as the input costs and capacity assumptions for transmission. Calibration is further explained in paragraphs 5.19-5.21.

7.16.4 ComReg's Final Position

7.226 Transmission and business continuity services such as back-up power facilities are included in the Final MTR Model.

7.227 The Final MTR Model also assumes that a mix of fibre and microwave is held constant for both 2G and 3G technologies. The 2G sites are based primarily on MW, which is the predominant network technology in early years of the model. 3G only and co-located 2G and 3G sites are more reliant on fibre, which implies that fibre represents a higher proportion of links in later years of the model.

7.17 Other Elements Modelled

7.228 In the Original MTR Consultation ComReg was of the preliminary view that spectrum; wholesale billing platform; and VMS should be incorporated into the Draft MTR Model.

7.229 The treatment of spectrum costs and quantities of spectrum defined for the hypothetical efficient operator were assumed to be static across the timeframe of the Draft MTR Model. In other words, ComReg proposed that it was reasonable to hold the quantity of spectrum deployed by the modelled operator constant and instead measure any change in network costs (due to changes in traffic volumes) by altering the size of the network.

7.230 ComReg assumed that it was appropriate to have one wholesale billing platform in place throughout the Draft MTR Model and that it was appropriate for billing costs not to vary in response to changes in traffic.

7.231 ComReg also assumed that VMS, which includes costs associated with maintaining the voicemail system, would not be sensitive to changes in traffic volumes.

7.17.1 Submissions to the Original MTR Consultation

7.232 As set out in paragraph 7.229, treatment of spectrum costs and quantities of spectrum defined for the hypothetical efficient operator were assumed to be static across the timeframe of the Draft MTR Model. Respondents did not raise any issue with including spectrum costs in the model. However, Telefónica did comment on the assumptions used regarding spectrum costs (see paragraph 7.89). Spectrum costs are considered separately in section 7.6.

7.233 Respondents did not raise any issue with respect to our preliminary views surrounding the modelling of 'other elements' i.e., wholesale billing platform and VMS, as set out in paragraphs 7.230 and 7.231.

7.17.2 ComReg's Position

7.234 As there were no issues raised in response to our preliminary view that 'Other Elements' should be modelled (as set out in 7.228), ComReg has developed the model to include spectrum licence fees, wholesale billing platform and VMS.

7.17.3 ComReg's Final Position

7.235 In addition to modelling network elements in the RAN, the Core and Transmission Networks, the Final MTR Model models 'Other Elements' which include spectrum licence fees, wholesale billing platform and VMS.

Chapter 8

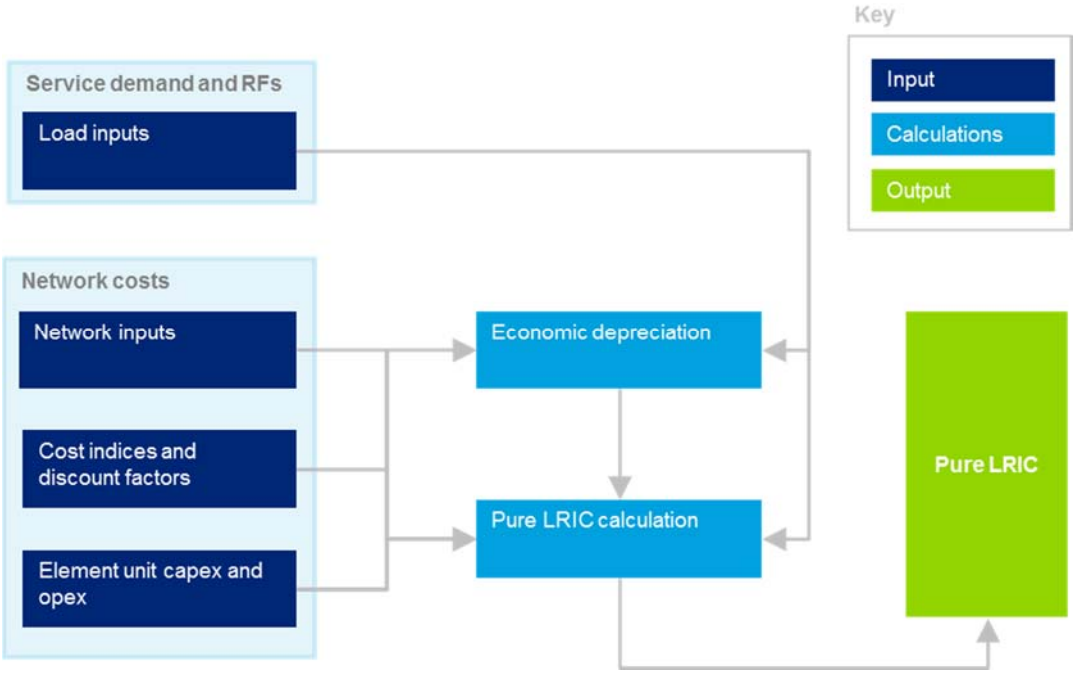
8 Network Costs

8.1 Overview

8.2 The cost module in the MTR Model calculates the long run costs of relevant increments. Outputs from the load and network modules are combined with unit capex and opex prices, indirect mark-ups and price indices to determine the annual expenditure associated with installing, maintaining and operating the network dimensioned to support the specific network load.

8.3 The annual expenditure is then attributed to each year of the model and across the set of services, in line with the economic depreciation algorithm. This calculation is run first under the full traffic scenario and then without MVCT, to generate the relevant outputs of the MTR Model.

8.4 **Figure 3: Cost Module Logical Flow**



8.2 Network Costs – Unit Costs

8.5 As set out in the Original MTR Consultation, in modelling the hypothetical efficient operator for the purpose of calculating wholesale MTRs in Ireland, ComReg presented its preliminary view that network element unit capex and opex costs should be informed by the costs incurred by Irish MSPs. However, as Irish MSPs provided limited information on unit opex costs, a ratio was applied in the Draft MTR Model to estimate unit opex costs i.e., 20% of capex costs for the various network elements.

8.6 Capex was informed by the information submitted to us by Irish MSPs following The First Information Request. As Irish MSPs share sites in practice, the Draft MTR Model allowed for passive sharing and site costs were adjusted to reflect this effective cost sharing.

8.7 Mark-ups were subsequently applied to capture the costs of additional network support functions that are required to install, operate and maintain the equipment. These indirect mark-ups represented costs such as power consumption and device cooling. An aggregate mark up of 40% was applied to capex and 20% applied to opex.

8.2.1 Submissions to the Original MTR Consultation

8.8 In relation to the indirect cost mark-ups Eircom stated that it "…*appreciates that mobile operators were only able to provided limited data in respect of this, however it is not clear how ComReg settled on such a high mark-up*". It continued to query this by noting that "*[w]hen setting the Fixed Termination Rate (FTR), the indirect capex mark-up is far lower, in the region of 10% when the average is taken between the two sets of regulatory approaches that apply in the fixed model (PSTN based and NGN based*)".[211]

8.9 Eircom also expressed the view that ComReg should have considered "*…the matter of an efficiency coefficient which appears not to have been addressed at all in the model. The concept of efficiency coefficient has been applied to the FTR cost model at 12%".*[212]

[211] Eircom's Response to the Original MTR Consultation, page 10. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[212] Ibid.

8.10 Eircom's submission stated that "*…the price level of the Capex items set out in table 25 of ComReg 14/29a appears high relative to the benchmarking of other EU NRAs, particularly with respect to RAN elements which are sensitive with respect to influencing the model outcomes*."[213]

8.11 Vodafone stated that it "*…appears the model does not take into account any MSC or NMC costs. These costs constitute a very significant contribution to the overall costs of building and operating a network. Management of data parameters for sites and transmission elements constitutes a significant part of these costs. These costs will scale with size of network and thus a portion of the costs should be attributable to the incremental cost of termination*".[214]

8.12 Vodafone stated that "*…there should be a top down calibration of the costs produced by the model against real costs experienced by operators. Although the model specification document refers to such a check no factual evidence has been provided for operators to assess the appropriateness of the assumed cost split."*[215]

8.13 Vodafone also stated that "*there is no basis for ComReg to have a confidential version. If a particular data point is a direct use of a specific operator's data then only that operator will recognise this. The other operators will not know if the data point is an average or is related to only one operator. Even if they did know it related to one operator they could not know which one. ComReg's approach in this regard has limited respondents' ability to fully engage with the consultation process*". [216]

8.2.2 ComReg's Position

8.14 In relation to Eircom's submission regarding mark-ups (see paragraph 8.8), ComReg can confirm that these mark-ups have been informed by the level of mark-ups used in other jurisdictions and also have been compared against the limited financial statement data reported by operators. Costs accounted for by the indirect capex include (but are not limited to) a large range of items such as accommodation, power equipment, fire and security, air conditioning, maintenance equipment, office furniture and equipment. Due to the granularity of different cost items, indirect mark-ups are typically used instead.

[213] Eircom's Response to the Original MTR Consultation, page 11. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[214] Vodafone's Response to the Original MTR Consultation, page 17. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[215] Ibid.
[216] Vodafone's response to the Original MTR Consultation, page 22.

8.15 Regarding Eircom's submission in relation to the efficiency coefficient (see paragraph 8.9), it should be noted that the operating expenditure inputted into the FTR model related to Eircom's historic network opex as it applied to its legacy networks. In that context it was considered that an efficiency adjustment was appropriate. The efficiency factor in the FTR model decreases Eircom's actual operating costs to represent the potential efficiencies achievable over three years from implementing more efficient work practices and adopting more efficient technologies. However, an efficiency coefficient adjustment is not considered appropriate for the Final MTR Model, as the level of opex included in the MTR model is not based on actual operator data but is instead derived to be consistent with the network and processes of a hypothetical efficient operator.

8.16 With respect to Eircom's concern that the element unit capex costs presented in the Original MTR Consultation appeared high, it is important to note that the costs are all references to 2013 (i.e., the base year) reported costs information (i.e. the information which Irish MSPs were asked for in the First Information Request). Furthermore, there are in certain instances minor differences in Irish MSPs reported costs that arise due to different element capacities or difference balance of costs between elements in their networks. ComReg can confirm that costs are based on those provided by Irish MSP data, and represent accumulated investment over the 15 year period. ComReg has used unit capex items as provided by MSP data returns and ComReg is therefore not inclined to change direct capex costs for these items.

8.17 Regarding Eircom's views specified in paragraph 8.10, ComReg notes that models developed by other EU NRAs are not directly comparable in terms of elements that they model and may differ in their modelling assumptions. Where possible, costs have been compared and reported in the Final Deloitte MTR Model Specification Document. There does not appear to be a rationale to change direct capex costs for these items.

8.18 Further to Vodafone's submission regarding NMC and MSC (see paragraph 8.11), these costs were included in the Draft MTR Model but due to the nature of the pure LRIC, they were not apportioned to the increment of interest.

8.2.3 Supplementary MTR Consultation

8.19 With respect to Vodafone's view set out in 8.13, the Updated MTR Model at the Supplementary MTR Consultation was shared with the relevant MSP stakeholders and it did not contain any anonymised data. An updated version of what was previously referred to as the 'confidential' version of the Draft MTR Model during the Original MTR Consultation was shared with the respective MSPs at the Supplementary MTR Consultation having received permission from all parties.

8.20 In the Supplementary MTR Consultation the GMSC network element cost was revised to €1,200 to reflect the cost of interconnection ports. This is further discussed in paragraph 2.38 of the Supplementary MTR Consultation. ComReg noted that this does not have any impact on the pure LRIC MTRs as the boundary of the MVCT services does not include the GMSC port (see 7.205-7.207).

8.21 In the Supplementary MTR Consultation ComReg also set out that ComReg reduced the asset life of the NMC from 15 years to 10 years — so that it is more in line with other core network equipment categories and international benchmarks. This is further discussed in paragraph 2.37 of the Supplementary MTR Consultation. In addition, its unit capex and opex have been proportionately decreased, so as to maintain the same unit cost per year of asset life, in line with data returns provided by Irish MSPs.

8.2.4 Submissions to the Supplementary MTR Consultation

8.22 In its response to the Supplementary Consultation Vodafone stated that "*the distribution of costs deviates substantially from historical and future market realities [and that]… at a more fundamental level this calls into question the appropriateness of some of the key inputs and assumptions in relation to the hypothetical operator*."[217]

8.23 Vodafone also stated that "*the changes made to unit CAPEX/OPEX costs seem to be arbitrary. In the absence of a coherent rationale or explanation for individual changes, it is not possible to validate or review the current unit costs*".[218]

8.2.5 ComReg's Position

8.24 With respect to Vodafone's views set out in paragraphs 8.22-8.23, ComReg notes that the changes to unit capex and opex had been randomised to protect confidentiality but also to such an extent that the MTR outputs, as calculated by the Draft MTR Model, did not differ substantially. In summary, the change to capex and opex in the Updated MTR Model is only relevant insofar as the data previously treated as confidential and not shared with Irish MSPs at the Original MTR Consultation[219] was subsequently shared at the Supplementary MTR Consultation. As such, there was no change to the underlying confidential capex and opex in either the Draft MTR Model or the Updated MTR Model.

[217] Vodafone's Response to the Supplementary MTR Consultation, page 10.
[218] Vodafone's Response to the Supplementary MTR Consultation, page 15.
[219] This was identified in Paragraph 1.15 (Page 11) of the Original MTR Consultation Document (14/29) http://www.comreg.ie/_fileupload/publications/ComReg1429.pdf

8.25 The modifications to the Draft MTR Model were adequately detailed in the Supplementary MTR Consultation (in documents ComReg 15/19 and ComReg 15/19a) and have been further substantiated in this document. As the presented outputs of the Draft MTR Model have always been based on the confidential version of the Draft MTR Model, the change in capex and opex from the shared version of the Draft MTR Model had no impact on the calculated MTRs.

8.2.6 ComReg's Final Position

8.26 The Final MTR Model uses the same approach to opex and capex that was presented in the Supplementary MTR Consultation i.e. capex and opex are no longer anonymised for the purpose of sharing a non-confidential version of the model.

8.3 Network Costs – Indices

8.27 The information submitted to us by Irish MSPs following the First Information Request was used to inform the network costs of the hypothetical efficient operator in the base year of the Draft MTR Model (i.e., 2013). As network costs were also required for each of the 30 years within the Modelled Timeframe, ComReg applied capex and opex indices to the 2013 values in order to identify the appropriate unit costs for each.

8.28 These indices were intended to reflect the implied price index for the MEA of each of the modelled network elements. The price trends of the modelled network elements were presented in annual percentage changes (see page 70-72 of the Draft Deloitte MTR Model Specification Document). These were subsequently applied to each categorised group of network elements.

8.3.1 Submissions to the Original MTR Consultation

8.29 No respondent to the Original MTR Consultation raised any issues with the network cost indices that ComReg presented. These indices remained unchanged in the Supplementary MTR Consultation.

8.3.2 ComReg's Position

8.30 The indices for network costs that are contained in the Final MTR Model are the same as what ComReg proposed at the Original MTR Consultation stage. They are primarily based on indices observed in other European NRAs and are applied to each categorised group of network elements.

8.3.3 ComReg's Final Position

8.31 The Final MTR Model uses opex and capex indices, as set out below.

Nominal Price Indices

Element index category	Nominal price indices	
	CAPEX	OPEX
	Annual Change	
Data servers	-4%	-4%
Tx and switches	-3%	-2%
Core	-1%	-1%
Constant	0%	0%
Sites	2%	2%

Source: Tables 30 and 31, page 78, Final Deloitte MTR Model Specification Document

Chapter 9

9 Implementation Related Parameters

9.1 Overview

9.2 As stated in the Original MTR Consultation, the Draft MTR Model was composed of three interlinked calculation modules: the load module; the network module; and the cost module.

9.3 Each module was presented as having a distinct set of inputs and in certain instances the outputs from some of the modules served as inputs to other modules.

9.4 The load module is used to derive the network load for the hypothetical efficient operator. It calculates the demand for both MB/s and Erlangs using a combination of annual traffic, market share, per subscriber traffic usage and the BH profile of traffic.

9.5 The network module determines the number of logical network elements required to cater for the modelled network load (calculated as described in paragraph 9.4) and it also determines the replacement cycle of these elements, which is linked to the asset lives of the modelled network elements.

9.6 In the cost module, outputs from the load and network modules are combined with unit capex prices, indirect mark-ups and price indices to determine the annual expenditure associated with installing and maintaining the network dimensioned to support the specified network load. These costs were profiled over the 30 year timeframe of the Draft MTR Model using an economic depreciation algorithm and apportioning them to the respective services.

9.2 Asset Economic Lifetime

9.7 The underlying assumptions surrounding the modelled assets and associated economic lives were presented in the Draft MTR Model. The asset lives are used as an input into the network purchasing algorithm in the network module. It is an important component in the determination of the quantity of assets required by the modelled operator to satisfy the network load each year and to ensure the network element purchasing profile aligns with major investment cycles. The rationale for asset lives in the Draft MTR Model is also discussed in paragraph 2.40.

9.8 The estimated asset lifetimes presented in the Draft MTR Model were informed by data submitted by Irish MSPs in response to the First Information Request. This information provided details of costs; utilisation; and dimensioning parameters. ComReg also cross referenced the estimated asset lives with those asset lives used by other European NRAs.

9.2.1 Submissions to the Original MTR Consultation

9.9 Eircom stated that "*…an asset life of 15 years is placed on the NMC whereas the highest benchmark that ComReg has presented is Sweden at 10 years with UK as low as 6 years.*" Eircom stated that it would expect "*…many NMC elements to be subject to far short economic lives with significant variation across elements [and therefore considers] a 15 year economic life to be unrealistic and that a 10 year asset life is likely to be at the upper end of a realistic estimate*".[220]

9.2.2 Supplementary MTR Consultation

9.10 In light of Eircom's submission (see paragraph 8.21 and 9.9), ComReg revised the assumed asset life of the NMC to 10 years in the Supplementary MTR Consultation.

9.2.3 Submissions to the Supplementary MTR Consultation

9.11 No respondent submitted any further views on the proposed treatment of asset economic lives.

9.2.4 ComReg's Position

9.12 As there were no further issues raised as part of the Supplementary MTR Consultation, ComReg has modelled the asset lives as set out in that consultation and have finalised the Final MTR Model accordingly.

9.13 The Final MTR Model uses the asset lives which were set out in the Updated MTR Model and which are intended to reflect the economic life of the network assets. While these may differ from the statutory asset lives adopted by MNOs in their financial accounts, the estimated asset lives have been sense checked against data provided by Irish MSPs in addition to those adopted in other BU MTR models in other jurisdictions.

[220] Eircom's Response to the Original MTR Consultation, page 11. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

9.2.5 ComReg's Final Position

9.14 The economic asset lives in the Final MTR Model are based on information that ComReg received from Irish MSPs. They are the same as those that were proposed in the Original MTR Consultation with the exception of the NMC which has an assumed economic asset life of 10 years in the Final MTR Model.

9.3 Capex and Opex Calculation

9.15 In the Original MTR Consultation the capex for each of the modelled network elements was calculated by taking the number of elements purchased in a given year and multiplying it by that year's nominal unit price (excluding inflation – see section 9.9).

9.16 The Draft MTR Model took a similar approach in calculating opex, in which the annual opex was derived by multiplying the required number of network elements in operation each year by the relevant opex nominal unit price for that particular year (excluding inflation – see section 9.9).

9.17 Aggregating capex with opex provided the total costs (in nominal terms) incurred by the modelled operator's network in a given year and this is one of the primary inputs to the economic depreciation calculation which is used to determine the pure LRIC MTRs for each year.

9.3.1 Submissions to the Original MTR Consultation

9.18 Vodafone stated that "…*complex calculations throughout the model are insufficiently documented*"[221].

9.3.2 ComReg's Position

9.19 This methodology remained unchanged in the Updated MTR Model. However, certain calculations resulted in other modifications such as revisions to the GMSC (as discussed in paragraphs 7.202 and 7.209).

9.20 As there were no further issues raised as part of the Supplementary MTR Consultation, the Final MTR Model has been prepared accordingly.

[221] Vodafone's Response to the Original MTR Consultation, page 18. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

9.21 Further to the point raised by Vodafone in paragraph 9.18, ComReg does not agree. ComReg has documented complex calculations in the Draft Deloitte MTR Model Specification Documents (ComReg Documents No. 14/29a and 15/19a), the Draft MTR Consultation Documents (ComReg Documents No. 14/29 and 15/19) in addition to sharing the Draft MTR Models with Irish MSPs and interested parties on two occasions. This is in line with international best practice.

9.3.3 ComReg's Final Position

9.22 The Final MTR Model calculated capex and opex having compared unit costs against data provided by Irish MSPs in addition to data from other publicly available models.

9.4 Economic Depreciation

9.23 The economic depreciation methodology applied by the Draft MTR Model was first presented in the Original MTR Consultation. ComReg proposed to adopt a cost recovery path that was in line with the revenues generated by the hypothetical efficient operator over the timeframe of the model.

9.24 This approach assumes that the present value of the revenue stream from a service (e.g., the provision of mobile termination) equates to the present value of expenses incurred by the hypothetical efficient operator. It enables cost recovery to follow a smooth progression, as traffic volumes and price indices have a smooth progression over time.

9.25 ComReg identified economic depreciation as being the preferred approach in the Draft MTR Model as it is the only method that considers:

(i) the MEA cost today;
(ii) the forecast MEA cost;
(iii) financial asset lifetime;
(iv) economic asset lifetime; and
(v) the output of network over time.

9.26 The economic depreciation approach in the Draft MTR Model needs to ensure that all efficiently incurred costs are recovered in an economically rational way. This facilitates estimation of the total revenues generated across the lifetime of the business in line with the efficiently incurred costs, which includes the cost of capital, all of which can be calculated in present value terms. The economic depreciation calculation is carried out at the network element level for aggregates of asset classes, and in line with this, the asset class specific price trends and element outputs are reflected in the components of total cost.

9.4.1 Submissions to the Original MTR Consultation

9.27 Eircom acknowledged "*…the rationale for this approach though we would like to stress the importance of ensuring a review in the next three years given the challenges that arise in reliability* [sic] *projecting beyond 2017 in such a dynamic market*".[222]

9.28 Vodafone stated that "*it agrees with ComReg's choice of economic depreciation as the appropriate methodology*[223]", but stated that "*the modelling methodology produces results which are simply wrong such as the fact that the economic depreciation approach used by ComReg fails to recover all costs*".[224] Vodafone stated that "*…in theory economic depreciation should yield an equalisation of the present value of cost recovery and the present value of investment both on the OPEX and the CAPEX side. To test this proposition Vodafone has calculated the present value of cost recovery for incremental assets as well as the present value of investment. The results reveal significant under-recovery of costs e.g. on site and TRX OPEX profiles as well as a mixed profile on the CAPEX side*".[225]

[222] Eircom's Response to the Original MTR Consultation, page 8. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[223] Vodafone's Response to the Original MTR Consultation, page 7. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[224] Vodafone's Response to the Original MTR Consultation, page 19. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[225] Ibid.

9.4.2 ComReg's Position

9.29 In respect of Vodafone's submission that the "*economic depreciation should yield an equalisation of the present value of cost recovery and the present value of investment both on the OPEX and the CAPEX side",* ComReg notes that there was a minor error in the calculation of economic depreciation in the Draft MTR Model (excel sheet c1.pure LRIC of the shared 'non-confidential' version) that was originally sent to the six Irish MSPs designated with SMP. The 'non-confidential' Draft MTR Model did not index one of the route-factored volumes against the element prices, which caused the over/under recovery of the elements. However, in the confidential version of the Draft MTR Model this error did not occur. It is this confidential version of the model that the proposed MTRs in the Original MTR Consultation were based on. The element costs of the entire network deployed were correctly recovered: exactly 100% against the network investment in present value terms.

9.30 ComReg confirms that in applying the correction to the economic depreciation algorithm in the non-confidential version of the first Draft MTR Model that the present value (PV) of investment matches the PV of cost recovery for all of the elements modelled.

9.31 However, to be clear, in some years the element investment may be negative due to the element purchasing profile differences between the full traffic scenario and the traffic without termination increment scenario. Economic depreciation ensures that the profile of cost recovery is smooth even in such cases. While the element investment may appear to be negative in some years, the total element investment across the life cycle of the model is never lower in the full traffic scenario compared to the traffic scenario without termination. As explained in paragraphs 9.44-9.47, it is possible for an element to have a negative cost contribution. However, this is not due to an error, rather it is the case that other elements replace a given element's role (as is the case with backhaul links in the model). Model users will notice that the costs under a traffic scenario excluding termination are always lower than or equal to the costs under the full traffic scenario. This is true for aggregate costs of backhaul links, and it is also true for the cross-time-aggregated costs for each of the modelled elements.

9.4.3 ComReg's Final Position

9.32 The Final MTR Model implements economic depreciation which seeks to align the recovery of the cost of an asset with the exhaustion of its economic value over a period of time.

9.33 This method is in contrast to accounting depreciation methodologies, such as straight-line, where these approaches do not attempt to provide this alignment. The economic value of an asset is modelled as the present value of expected income associated with the use of that asset over its useful life and therefore the change in present value of the asset over a year represents the exhaustion of economic value over that period. The economic depreciation algorithm assumes that the present value of expenditures equates to the present value of revenues over the time horizon of the model.

9.34 This means that the algorithm distributes the cost recovery profile in line with the profile of discounted outputs (via the pre-tax nominal WACC) of the asset and the price trend of the underlying asset over its useful life.

9.5 Treatment of inter-temporal effects

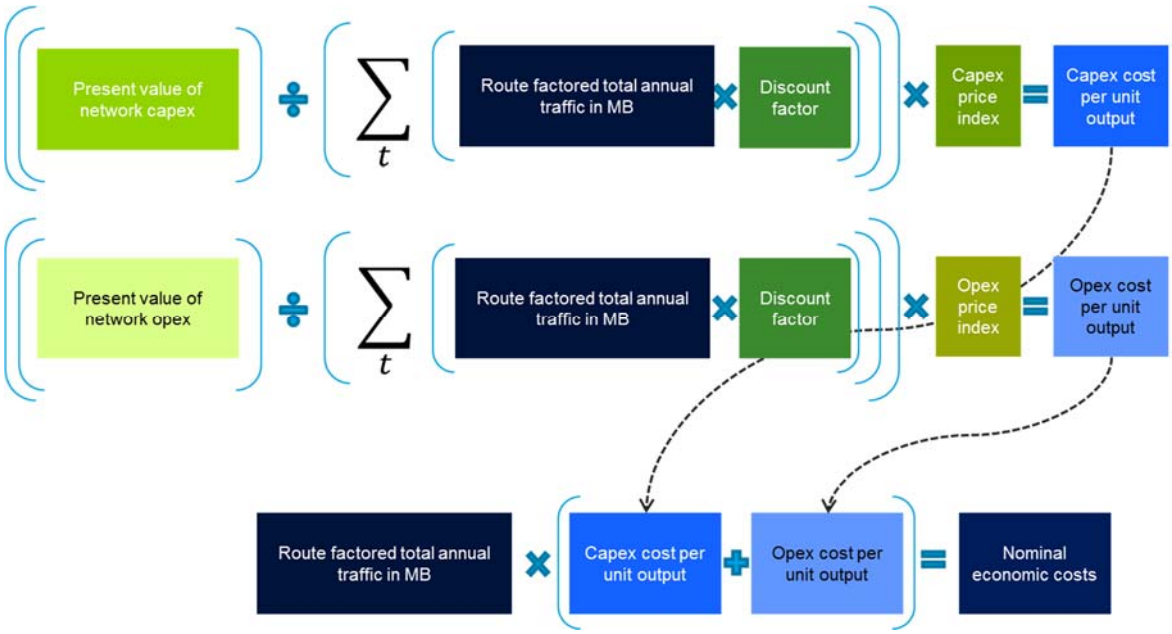
9.35 In line with the economic depreciation methodology, any potential inter-temporal effects would be eliminated. As a result of the economic depreciation methodology, the cost recovery profile is smoothed by calculating the MTR based on the present value difference in network expenditures that arise from the removal of the wholesale termination volume. This process ensures that the incremental costs are fully recovered by a hypothetical efficient operator.

9.36 In the context of the 30 year model it is assumed that the hypothetical efficient operator is operating in perpetuity — with investment decisions made accordingly. It is therefore necessary to recover the costs over the lifetime of the business rather than within a particular timeframe. The present value of the Euro in the final year of the Draft BU pure LRIC 30-year model is considered to be minimal and therefore any perpetuity value beyond 30 years is regarded as immaterial to the calculated MTR.

9.37 In calculating the exhausted value, network costs are depreciated at a greater rate when network elements are used more intensively. Therefore, costs were attributed in line with the profile of the network — which also incorporates future investments in line with expectations of changing network capacity.

9.38 In the Original MTR Consultation the appropriateness of this methodology was illustrated with the following example. In the initial years of network roll out there will be significant expenditure on sites but relatively little traffic carried on those sites as the operator works to build up its market share. Using the example of a site as a specific network element, this is resolved as follows: The effective discount for the site expenditure will be more heavily weighted towards the discounts that apply in the initial years of the Draft MTR Model while the effective discount for site service volumes will be more heavily weighted towards the discounts that apply in the later years.

Figure 4: High-level model logical flow



9.39 Figure 4 presents a stylised representation of the calculation procedure for the economic depreciation in the Draft MTR pure LRIC Model, which makes use of matrix multiplication.[226] Uppercase sigma indicates a sum across the time horizon (i.e. *t* stands for each year of calculation).

9.5.1 Submissions to the Original MTR Consultation

9.40 Eircom acknowledged the rationale "*for applying a 30 year model*" but stressed "*…the importance of ensuring a review in the next three years given the challenges that arise in reliability* [sic] *projecting beyond 2017 in such a dynamic market*".[227]

9.41 Vodafone expressed concern with the "*unexpected under/over-recovery of costs with regards to relevant incremental*". This submission is considered in section 9.4 (paragraphs 9.28-9.29).[228]

[226] It is appropriate to have the discount factor in both the numerator and denominator as the matrix is calculating the discounted value of total expenditure (numerator) and total service volumes (denominator) for each network element across the lifetime of the cost model. Even though the discount applied is the same in each particular year the effective discount in the matrix calculation will be different as the discount applied to the numerator will be weighted by the profile of expenditure against the network element across the lifetime of the model while the effective discount for the denominator will depend on the related profile of network service volumes across the lifetime of the model.
[227] Eircom's Response to the Original MTR Consultation, page 8.
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[228] Vodafone's Response to the Original MTR Consultation, page 19.
http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

9.42 Vodafone also raised an issue with the "*cost recovery profile [indicating] that model starts to recover asset investments before the investments actually occur*". It further states that "*[i]t seems highly questionable that an asset can recover its costs before is actually deployed. ComReg must take account of this and adapt the model accordingly*".[229]

9.5.2 Submissions to the Supplementary MTR Consultation

9.43 While not within the scope of the Supplementary MTR Consultation, Vodafone repeated its concerns in its response to the Supplementary MTR Consultation surrounding the treatment of inter-temporal effects. Vodafone was of the view that "*[t]here seems to be an underlying issue with the model workings in the "Pure LRIC" sheet. This relates to the annual element investment profiles with and without termination as well as the economic depreciation incremental unit outputs*." In particular, "*the IuB (NB_RNC) link output is consistently negative*".[230]

9.5.3 ComReg's Position

9.44 Regarding Vodafone's submission with respect to the cost recovery profile, ComReg does not agree. ComReg considers that the cost recovery profile can begin before the actual element investment occurs for the increment in this context. This is an outcome of economic depreciation calculated from the PV difference of network investment due to the voice termination increment. As discussed in section 9.4, the economic depreciation profiles the cost recovery with the voice termination traffic across the time horizon of the MTR Model. This is also the case in other NRA models that use economic depreciation (e.g., ANACOM's model of the Portuguese market and PTS' model of the Swedish market). The costs are recovered over the lifetime of the service to ensure that the recovery profile is smooth and unaffected by the intervals of element investment due to traffic exceeding the element capacity or due to element lifetime coming to an end.

9.45 With respect to Vodafone's submission that "*the IuB (NB_RNC) link output is consistently negative"*, ComReg considers that while the negative contribution of the "IuB (NB_RNC)" backhaul link network element might appear to be counterintuitive, this is not an error in the model. Rather, this arises due to the way the transmission backhaul links are categorised in the model (see also paragraphs 9.46-9.48).

[229] Vodafone's Response to the Original MTR Consultation, page 20. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[230] Vodafone's Response to the Supplementary MTR Consultation, page 17.

9.46 A backhaul link is categorised as an IuB (NB_RNC) link when it connects two 3G RAN elements, a Node B and RNC. The 2G equivalent to this backhaul link is an Abis (BTS_BSC) link, which connects the 2G elements, a BTS to a BSC. However, in the case of a site where 2G and 3G equipment is co-located, the model optimises the number of links — as only one backhaul link is required to serve each site. As a result, 50% of the backhaul links serving co-located sites are classified as IuB (NB_RNC) links and 50% are classified as Abis (BTS_BSC) links. Consequently, when a 3G only site is required the link is classified as an IuB (NB_RNC) link and when a 2G only site is required the link is classified as an Abis (BTS_BSC) link. However, when the 2G-3G co-located site is required the link can be categorised as either a IuB (NB_RNC) or Abis (BTS_BSC) link.

9.47 The reason for the negative cost contribution of IuB (NB_RNC) is that the 3G-only sites represent a higher share of overall sites under the no-termination traffic scenario as opposed to the full traffic scenario. While the total number of sites is lower under a no-termination scenario, the optimal mix changes such that more 3G only sites are deployed (and fewer 2G only or 2G-3G co-located sites). As a result, more IuB links are dimensioned, while fewer Abis and A links are dimensioned and outweigh the change in IuB (NB_RNC).

9.48 Consequently, while the costs associated with IuB (NB_RNC) links can be negative in the pure calculations, when the IuB (NB_RNC) and Abis (BTS_BSC) links are considered in aggregate the depreciated capital costs for both network elements combined is always positive.

9.5.4 ComReg's Final Position

9.49 The Final MTR Model ensures that any potential inter-temporal effects that would have otherwise arisen are eliminated by smoothing the cost recovery profile via the application of economic depreciation. The pure LRIC MTR is calculated (in each year) from the present value difference in network expenditures that arises from the removal of the wholesale termination volume.

9.6 Timeframe of the Draft MTR Model

9.50 In the Original MTR Consultation ComReg set out its preliminary view that the Draft MTR Model should be based on a 30 year timeframe and more specifically over the period 2003-2032. As the hypothetical efficient operator is modelled in an Irish context, the year 2003 was chosen as a starting point to reflect a pivotal time period in the Irish mobile sector in which MNOs would have commenced network roll-out or initiated major network upgrades.

9.51 As stated in Chapter 5 (see in particular paragraph 5.3), ComReg also considered in the Original MTR Consultation that it would be appropriate to model a hypothetical efficient new entrant from 2003.

9.6.1 Submissions to the Original MTR Consultation

9.52 In its response, Telefónica stated that "*It is reasonable to assume 2G & 3G Rollout from a timeline of 2003…".*[231]

9.6.2 ComReg's Position

9.53 ComReg has used the 30 year timeframe (i.e., the period 2003-2032) as set out in both the Original and Supplementary MTR Consultations and has finalised the Final MTR Model accordingly.

9.6.3 ComReg's Final Position

9.54 The Final MTR Model calculates the MTRs in Ireland having modelled a hypothetical efficient existing operator over the 30-year period 2003-2032.

9.7 Terminal Value

9.55 In the Original MTR Consultation ComReg was of the preliminary view that the Draft MTR Model should not include a terminal value. ComReg also stated that terminal values have a negligible impact on current costs.

9.7.1 Submissions to the Original MTR Consultation

9.56 No submissions were received with respect to ComReg's preliminary views on not including a terminal value.

9.7.2 ComReg's Position

9.57 ComReg maintains the view that that the Final MTR Model should not include a terminal value. The MTRs calculated to date have been on the basis that there is no terminal value.

9.58 Furthermore, ComReg notes that the time period of the Final MTR Model is sufficiently long such that discounting the future years' costs or extending the time horizon beyond 2032 would have a negligible effect on current costs.

[231] Telefónica's Response to the Original MTR Consultation, page 3. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

9.59 By specifying a finite year in the Final MTR Model, ComReg has ensured that costs associated with deploying and running the network within the time period of the model are recovered from revenues generated within the modelled time horizon.

9.7.3 ComReg's Final Position

9.60 The Final MTR Model does not include a terminal value and so incorporates costs that would be associated by a network that is active in perpetuity.

9.8 Cost of Capital

9.61 In the Original MTR Consultation, ComReg was of the preliminary view that it is appropriate to have a mobile-sector-specific cost of capital — as an input parameter to the economic depreciation methodology in the Draft MTR Model. More specifically, it was proposed that a nominal pre-tax WACC would be used.

9.62 The underlying rationale is that this provides mobile operators with a reasonable rate of return on their investment. The cost of capital has been estimated in the form of a WACC using capital asset pricing methodology ("**CAPM**") methodology.

9.63 The mobile telecommunications nominal pre-tax WACC used in the Draft MTR Model was set at 8.66%. However, as a separate public consultation on the cost of capital (Review of Cost of Capital: Document No. 14/28[232]) was being undertaking by ComReg at that time, it was noted that this figure may change following publication of ComReg's decision on the appropriate cost of capital.

9.8.1 Submissions to the Original MTR Consultation

9.64 Eircom stated that it welcomed "*ComReg's intent to allow for a reasonable rate of return on efficiently incurred costs by including the cost of capital in the Draft BU Pure LRIC Model*."[233]

9.65 Telefónica did not raise any issue with the proposed treatment of the WACC in the context of the Draft MTR Model. However, Telefónica referred to its submission to the separate Cost of Capital consultation.[234]

[232] https://www.comreg.ie/_fileupload/publications/ComReg1428.pdf
[233] Eircom's Response to the Original MTR Consultation, page 8. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[234] Telefónica's Response to the Original MTR Consultation, page 3. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf

9.66 Vodafone did not agree with our use of a constant WACC in the Draft MTR Model and stated that "*ComReg has not checked that the historical WACC used as a model input does not reflect its own historical estimation of the WACC for the Irish market, nor that it reflects the WACC that ComReg included in the Mobile Licenses of Operators*".[235] Vodafone stated that "*…to be valid the model must apply the historical WACC that applied in the Irish market from time to time"* and that *"ComReg set out in Vodafone's 3G licence that the appropriate WACC to apply for the period 2003 to 2008 was 18%."*[236] Vodafone was of the view that "*[i]n 2008 ComReg set a fixed WACC of 10.21% [which] implies that the mobile WACC was higher than this*" and that "*…the mobile WACC in this period [2008-2014] would be of the order of 13%- 15%"*.[237]

9.8.2 Supplementary MTR Consultation

9.67 ComReg remained of the preliminary view in the Supplementary MTR Consultation that a constant nominal pre-tax WACC should apply throughout the modelled time horizon. This is further discussed in section 9.8.4.

9.68 The mobile WACC was revised to 8.63% in the updated MTR Model following publication of ComReg's decision in December 2014 on the appropriate cost of capital.[238]

9.8.3 Submissions to the Supplementary MTR Consultation

9.69 Vodafone reiterated its concerns surrounding our treatment of the WACC in the Updated MTR Model noting that "*ComReg assumes that the recently determined WACC rate is an appropriate measure of the weighted average cost of capital over the whole model period. As per Vodafone's previous remarks, this cannot be the case for historical periods, if the model is estimating MTR costs in the Irish market. WACC rates therefore need to be adjusted in accordance with historically relevant data points*."[239]

[235] Vodafone's Response to the Original MTR Consultation, page 3. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[236] Vodafone's Response to the Original MTR Consultation, page 19. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[237] Ibid.
[238] http://www.comreg.ie/_fileupload/publications/ComReg14136.pdf
[239] Vodafone's Response to the Supplementary MTR Consultation, page 16.

9.8.4 ComReg's Position

9.70 ComReg considers that the use of a constant WACC is appropriate. This provides mobile operators with a reasonable rate of return on investment further to Regulation 13(2) of the Access Regulations. This is the first time that cost-oriented MTR prices have been set with reference to a cost model in Ireland.[240] Given the uncertainty surrounding future WACC rates and the lack of information surrounding the returns on MTR services in the past, a time-varying WACC is not considered appropriate and may result in over- or under-recovery of network investment (capex and opex) over the modelled time period and potentially across different price control periods.

9.71 With respect to Vodafone's submission regarding a time-varying WACC, ComReg does not agree. The circumstance that there may have been higher WACCs in the past in the time series of the Draft MTR Model – which, as noted in paragraph 9.70, ComReg does not accept as being proven based on the evidence put forward by Vodafone – does not have any necessary implications for the WACC chosen under the Final MTR Model. The objective of the Final MTR model is not to isolate the cost of capital during a specific period in the past. Rather, its purpose is to inform the cost of capital for the relevant period, which will, overwhelmingly, be a function of the costs of capital today and into the future. The fact that it can be observed *ex post* that WACC may in some specific past period(s) have been different to the WACC used in ComReg's model has no necessary implications for ComReg's calibration of a cost input used in an *ex ante* cost model such as the Final MTR Model. This applies in particular given that "there are important forward looking aspects of the model (such as price trends, outputs, technology shifts, etc.).

9.72 Finally, ComReg is aware that the application of a single and consistent WACC value for the full time horizon of the model is observed in other NRA models, such as the Swedish PTS model, Spanish CNMC model, Romanian ANCOM model and Portuguese ANACOM model.

9.8.5 ComReg's Final Position

9.73 The Final MTR Model incorporates a constant nominal pre-tax WACC of 8.63%[241] throughout the time horizon of the model (2003-2032).

[240] The 18% WACC rate that Vodafone identified (see paragraph 9.66) did not arise from an assessment undertaken by ComReg (or its predecessor). In fact the WACC of 8.63% is the first instance in which a regulated WACC for mobile networks was set by ComReg.
[241] As provided for by ComReg Decision D15/14.

9.9 Nominal Terms

9.74 In the Original MTR Consultation, the Draft MTR Model was developed in nominal terms. This ensures that the MTR price control is more easily understood compared to the alternative of presenting it in real terms.

9.75 ComReg was also of the preliminary view that an inherent inflation assumption was appropriate as it ensures that the MTR price control can be more straightforwardly applied in an *ex ante* manner as it is in nominal terms — thereby avoiding the need for *ex post* inflation adjustments.

9.9.1 Submissions to the Original MTR Consultation

9.76 Respondents did not raise any issue with our approach to developing the Draft MTR Model in nominal terms. Similarly, respondents did not raise any issue with our approach to the actual inflation assumptions used in the Draft MTR Model.

9.9.2 ComReg's Position

9.77 As there were no issues raised in respect of our preliminary view, ComReg maintains the view that it is appropriate for the Final MTR Model to be in nominal terms with an inherent inflation assumption as set out in the Original MTR Consultation.

9.9.3 ComReg's Final Position

9.78 The Final MTR Model is structured in nominal terms and also incorporates assumptions surrounding inflation to ensure that the MTR price control can be applied in a more straightforward manner i.e., in nominal terms and in an *ex ante* manner.

9.10 Views on Maximum MTRs for Proposed Price Control Period

9.79 In the Original MTR Consultation, ComReg was of the preliminary view that the Draft MTR Model should calculate the maximum MTRs for Ireland on an annual basis. However, ComReg also proposed that the average maximum MTR over the course of the specified price control period should apply in each year of the proposed three year price control.

9.80 The average MTR over the proposed price control period (2015-2017) was €0.0057 in the Original MTR Consultation and ComReg expressed the view that it was more suitable to apply this rate in each year instead of setting a slightly higher MTR (€0.0060 as calculated in the Draft MTR Model) at the beginning of the proposed price control period, which subsequently fell (to €0.0053, as calculated by the Draft MTR Model) in the final year of this period.

9.10.1 Submissions to the Original MTR Consultation

9.81 Eircom expressed the view that applying "*…a single average rate up to 2017…is preferable to specific rates for each year, on the basis that it does not consider there to be a material impact in choosing one option over the other, while opting for an average rate avoids the administrative overhead that would arise with annual MTR adjustments*".[242]

9.82 Vodafone stated in its response that "*[t]he annual Pure LRIC price proposed by ComReg shows a decline over the proposed three year price control period*." It continued to note that "*[a]veraging this figure over the three years means that in Year 1 the imposed MTR is in fact lower than the Pure LRIC price i.e. Vodafone would not recover even the marginal cost of providing the service in that year. Unless ComReg has pre-judged the outcome of the 2015 market review or does not intend to carry it out, then the only way in which ComReg can be certain that Vodafone will recover even the marginal cost of providing the MVCT service in 2015 is not to use a three year average*." In addition, Vodafone stated that "*if ComReg wishes to ensure market certainty it should specify the price rather than mandating an upper limit with a maximum MTR*."[243]

9.10.2 Supplementary MTR Consultation

9.83 Having considered the respective points raised by Eircom and Vodafone, in this context, ComReg revised its preliminary view in the Supplementary MTR Consultation such that there was a calculated MTR for each separate year over the price control period.[244]

9.10.3 Submissions to the Supplementary MTR Consultation

9.84 Respondents did not raise any issues with our revised preliminary view that the specific calculated MTRs should be applied in the market for each year of the price control period.

[242] Eircom's Response to the Original MTR Consultation, page 11. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[243] Vodafone's Response to the Original MTR Consultation, page 21. http://www.comreg.ie/_fileupload/publications/ComReg1429s.pdf
[244] MTRs were also provided for 2019.

9.10.4 ComReg's Position

9.85 As there were no further issues raised as part of the Supplementary MTR Consultation, there is a separate MTR for each year over the Price Control Period, and ComReg has finalised the Final MTR Model accordingly.

9.10.5 ComReg's Final Position

9.86 The MTRs that will apply to the Irish market are set on an annual basis in accordance with the Final MTR Model.

Chapter 10

10 Transparency Obligations

10.1 Overview

10.1 In the MVCT Market Analysis Decision, ComReg imposed transparency obligations on the six MSPs designated with SMP.

10.2 The purpose of the transparency obligations specified in the MVCT Market Analysis Decision is to ensure *inter alia* that ComReg is well placed to monitor compliance with the price control obligation. In addition, the pre-notification and publication for changes to MTRs is primarily designed to be of direct benefit to MVCT purchasers – this ensures purchasers have, for example, visibility of wholesale changes which may affect their retail offers (such as prices for calls to subscribers of MSPs) and is, therefore, of indirect benefit to consumers.

10.1.1 Original MTR Consultation

10.3 In the Original MTR Consultation, ComReg proposed further specifying the transparency obligation such that:

- Each SMP MSP shall pre-notify ComReg of its intention to amend its published MTR at least two months in advance of the amendment, unless otherwise agreed by ComReg.

- Each SMP MSP shall furnish to ComReg — at the date of this pre-notification — a statement confirming that it's proposed amended MTR complies with the maximum MTR calculated by reference to the BU Pure LRIC Model.

10.4 In addition, in relation to the initial change to MTRs which may be required to be made, MSPs shall pre-notify Eircom and other relevant undertakings on a particular date to be set out in the final Decision Instrument, such date to be one month after the effective date. For the avoidance of doubt, this notification time period is the same as that imposed by the MVCT Market Analysis Decision and was added to allow for the effective date of the Decision Instrument which is the subject of this Decision Paper.

10.1.2 Submissions to the Original MTR Consultation

10.5 Vodafone's submission stated that "*[t]he wording of the initial implementation requirements in the draft Decision Instrument was not entirely clear i.e. "this date to be the start of the first month which begins one month from the effective date"".* Vodafone suggested the following alternative: "*the MTR as specified in Section 4.2 shall be applied to all traffic from the first day of the calendar month which commences at least 30 days from the effective date. All relevant invoices and credit notes shall reflect this rate*".[245]

10.6 Vodafone's submission also stated that "*ComReg has singled out eircom alone amongst transit operators for the provision of advance notification. If eircom has SMP in the transit market this preferential treatment further entrenches this market dominance. If eircom does not have SMP in the transit market this proposed obligation in the mobile termination market hands it a potential competitive advantage vis a vis its competitors in the transit market."*[246]

10.7 It also stated *"[i]n justifying the imposition of a pure LRIC methodology ComReg took account of cross market effects between the fixed and mobile markets and outlined that its proposed approach would alleviate competitive distortions. It is surprising therefore that in its proposed notification procedures ComReg will in effect introduce a competitive distortion into the "Transit" market by virtue of a remedy imposed in the Mobile Termination markets."*[247]

10.1.3 ComReg's Position

10.8 At Supplementary MTR Consultation stage ComReg took on board Vodafone's concerns about expressly referring to Eircom as noted in paragraph 10.6 above, in the drafting of the revised draft Decision Instrument. In the final Decision Instrument, ComReg has also taken into consideration Vodafone's drafting suggestion as outlined in paragraph 10.5 above.

[245] Vodafone Response to the Original MTR Consultation, page 23.
[246] Ibid.
[247] Ibid.

10.9 The notification obligations set out in Sections 5.1-5.3 of this Decision Instrument shall be applied. ComReg requires MSPs to (i) provide two months advance public notice of any changes to MTRs and (ii) provide 30 days advance written notification of MTR changes to parties with which it has entered into a contract for the supply of MVCT. These notification obligations are also set out in section 11.5 of the Decision Instrument in the MVCT Market Analysis Decision[248].

10.10 As set out in the MVCT Market Analysis Decision, ComReg considers that advance notification of MTR changes should achieve an appropriate balance between the need for MSPs to be able to make changes speedily, while also recognising the requirements for MVCT purchasers to factor such changes into retail and wholesale pricing decisions and any related billing system changes/developments. In particular, ComReg noted that given that many MVCT purchasers do so via indirect interconnection through third party wholesale transit or carriage arrangements[249], the wholesale billing systems of such third parties will require amendment to give effect to MTR changes. This may also involve such third parties providing notification to their wholesale customers.

10.11 ComReg is of the view that the requirements for MSPs designated with SMP to pre-notify ComReg at least two months in advance of any proposed amendment to the MTR and for pre-notification to contain a statement of compliance are justified as they will allow ComReg to monitor compliance with the price control obligation.

10.12 ComReg considers that these notification obligations are unlikely to represent a significant incremental burden on the MSPs designated with SMP and will enable effective monitoring and enforcement, which is necessary given the potential for any non-compliance to impact ultimately on competition in downstream or adjacent markets.

10.1.4 ComReg's Final Position

10.13 Unless otherwise agreed with ComReg, each MSP designated with SMP shall pre-notify ComReg of its intention to amend its published MTR either (i) not less than 2 months in advance of the date on which any such proposed amendment is expected to come into effect; or (ii) one month from the effective date of the decision, whichever date is later.

[248] http://www.comreg.ie/_fileupload/publications/ComReg12124.pdf
[249] For example, Eircom through its SMP obligations to offer CPS, SB-WLR and transit services provides MVCT purchasers with indirect access to MVCT services.

10.14 Each MSP designated with SMP shall furnish to ComReg, at the same time as the pre-notification, a statement confirming that its proposed amended Mobile Termination Rate complies with its obligations.

10.15 Unless otherwise agreed with ComReg, each MSP designated with SMP shall notify in writing every undertaking with which that MSP designated with SMP has entered into a contract in respect of access to MVCT of its intention to amend its MTR(s) either: (i) not less than 30 calendar days in advance of the date on which any amendment to its published MTR is expected to come into effect; or (ii) one month from the effective date; whichever is later.

Chapter 11

11 Final MTR Model

11.1 Overview

11.1 ComReg has set out in paragraph 2.8 that the characteristics of actual Irish MSPs, such as network costs and traffic patterns, have been used to inform what would represent a hypothetical efficient operator in the Final MTR Model.

11.2 ComReg further set out in paragraph 2.13 that the modelling exercise undertaken by ComReg is not specifically intended to reflect the precise, actual costs of one or more Irish MSPs currently active in the market and that ComReg considers that its modelling exercise pays reasonable and proportionate regard to Irish MSPs' costs since the model has been informed in material respects by data provided by the Irish operators.

11.3 It follows that ComReg has developed the MTR Model on the basis of a hypothetical efficient operator while being cognisant of Regulation 13(2) of the Access Regulations.

11.4 Regulation 13(2) of the Access Regulations provides:

"To encourage investments by the operator, including in next generation networks, 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."

Cost of Capital

11.5 The cost of capital in the form of a preliminary nominal pre-tax WACC used in the Final MTR Model is 8.63% as per ComReg Decision D15/14[250]. This provides mobile operators with a reasonable rate of return on investment further to Regulation 13(2) of the Access Regulations (see section 9.8).

[250] http://www.comreg.ie/_fileupload/publications/ComReg14136.pdf

11.2 Final MTR Model Results

11.5 For the reasons set out in this Decision, and in accordance with the Final Deloitte MTR Specification Document, ComReg adopts the Final MTR Model.

11.6 The Final MTR Model calculates the pure LRIC maximum MTR for Ireland on an annual basis (2016 – 2018), as below:

a. 0.84 Euro cent per minute for 2016;

b. 0.82 Euro cent per minute for 2017; and

c. 0.79 Euro cent per minute for 2018.

11.7 Pursuant to Regulation 13 of the Access Regulations and in accordance with Section 12.1 of the Decision Instrument annexed to ComReg Decision D11/12, each MSP designated with SMP is subject to a cost orientation obligation as regards MTRs and prices charged by the MSP designated with SMP to any other Undertaking for Access to or use of those products, services or facilities referred to in Section 8 of that Decision Instrument.

11.8 Pursuant to Regulations 13 and 18 of the Access Regulations, for each year of the Price Control Period, each MSP designated with SMP shall ensure that its MTR is no more than the rate determined for that year in accordance with the Final MTR Model. The rates determined in accordance with the Final MTR Model for the years 2016 to 2018 are as set out above.

Annex: 1 Decision Instrument

1. STATUTORY POWERS GIVING RISE TO THIS DECISION INSTRUMENT

1.1 This Direction and Decision Instrument (hereinafter "Decision Instrument") relates to a further specification of the cost orientation obligation imposed by the Commission for Communications Regulation ("ComReg") under Section 12.1 of the Decision Instrument annexed to ComReg Decision D11/12 at Appendix I.

1.2 This Decision Instrument is made:

i. Pursuant to Regulations 9, 13 and 18 of the Access Regulations;

ii. Pursuant to and having regard to the Significant Market Power (SMP) designations of Three, Meteor, Lycamobile, Telefónica[251], Tesco Mobile and Vodafone in the Relevant Markets as provided for in Section 5.1 of the Decision Instrument annexed to ComReg Decision D11/12;

iii. Pursuant to and having regard to the cost orientation obligation imposed on each of Three, Meteor, Lycamobile, Telefónica[252], Tesco Mobile and Vodafone by Section 12.1 of the Decision Instrument annexed to ComReg Decision D11/12;

iv. Having had regard to the functions and objectives of ComReg as set out in sections 10 and 12 of the Communications Regulation Act 2002, as amended and Regulation 16 of the Framework Regulations and Regulation 6 of the Access Regulations;

v. Having, where applicable, pursuant to section 13 of the Communications Regulation Act 2002, as amended, complied with policy directions made by the Minister for Communications, Marine and Natural Resources;

vi. Having regard to the requirements of Regulation 13 of the Access Regulations;

vii. Having taken the utmost account of the 2009 Termination Rate Recommendation;

[251] ComReg notes that Telefónica has since been acquired by Three and is now owned and/or controlled by Three. For so long as that remains the case, Telefónica shall be deemed to be included within the definition of Three for the purposes of this Decision Instrument.
[252] See footnote 251

viii. Having had regard to the market definition, market analysis and reasoning in the consultation entitled "Market Review – Voice Call Termination on Individual Mobile Networks" (ComReg Document No. 12/46) and in the Response to Consultation and Decision Document entitled "Market Review: Voice Call Termination on Individual Mobile Networks" (ComReg Decision D11/12, Document No. 12/124);

ix. Following a notification to the European Commission of a reasoned proposed extension of two years pursuant to Regulation 27(6) of the Framework Regulations, and the European Commission not having objected, and having regard to the fact that ComReg has received a two year extension to the period for carrying out any further analysis of the Relevant Markets;

x. Having regard to the analysis and reasoning set out in the consultation and draft decisions document entitled "Voice Termination Rates in Ireland: Proposed Price Control for Fixed and Mobile Termination Rates" (ComReg Document No. 12/67);

xi. Having taken account of the submissions received from interested parties in relation to "Voice Termination Rates in Ireland: Proposed Price Control for Fixed and Mobile Termination Rates" (ComReg Document No. 12/67) following a public consultation pursuant to Regulation 12 of the Framework Regulations;

xii. Having regard to the analysis and reasoning set out in ComReg Decision D12/12, and in particular having regard to the choice of Pure LRIC made in that Decision;

xiii. Having regard to the analysis and reasoning set out in the consultation and draft decision entitled "Mobile Termination Rates: Draft Bottom Up Pure Long Run Incremental Cost Model" (ComReg Document No. 14/29);

xiv. Having taken account of the submissions received from interested parties in relation to "Mobile Termination Rates: Draft Bottom Up Pure Long Run Incremental Cost Model" (ComReg Document No. 14/29) following a public consultation pursuant to Regulation 12 of the Framework Regulations;

xv. Having regard to the analysis and reasoning set out in the consultation and draft decision entitled "Mobile Termination Rates: Draft Bottom Up Pure Long Run Incremental Cost Model; Supplementary Consultation" (ComReg Document No. 15/19);

xvi. Having taken account of the submissions received from interested parties in relation to "Mobile Termination Rates: Draft Bottom Up Pure Long Run

Incremental Cost Model; Supplementary Consultation" (ComReg Document No. 15/19) following a public consultation pursuant to Regulation 12 of the Framework Regulations;

xvii. Having regard to the analysis and reasoning set out in the Analysys Mason Final Report;

xviii. Having regard to the analysis and reasoning set out in the Deloitte MTR Model Specification Document for Ireland; and

xix. Having made the draft measure and the reasoning on which the measure is based accessible to the European Commission, BEREC and the national regulatory authorities in other EU Member States and informed each of them of it pursuant to Regulations 13 and 14 of the Framework Regulations and having taken utmost account of any comments made by these parties.

1.3 The provisions of:

a. the Response to Consultation and Final Decision document entitled "Mobile and Fixed Voice Call Termination Rates in Ireland" (ComReg Decision D12/12, Document No. 12/125);

b. the Response to Consultation and Final Decision document entitled "Market Review: Voice Call Termination on Individual Mobile Networks" (ComReg Decision D11/12, ComReg Document No. 12/124);

c. the Consultation and Draft Decision document "Mobile Termination Rates: Draft Bottom Up Pure Long Run Incremental Cost Model" (ComReg Document No. 14/29) ;

d. the Supplementary Consultation and Draft Decision document "Mobile Termination Rates: Draft Bottom Up Pure Long Run Incremental Cost Model; Supplementary Consultation" (ComReg Document No.15/19***)***; and

e. the Response to Consultation and Final Decision Document entitled Mobile Termination Rates: Response to Consultation 14/29 and Supplementary Consultantion15/19 and Final Decision Document (ComReg Decision D02/16, ComReg Document No. 16/09) (**this Decision**)

shall, where appropriate, be construed consistently with this Decision Instrument. For the avoidance of doubt, however, to the extent that there is any conflict between a decision instrument dated prior to the Effective Date and this Decision Instrument, this Decision Instrument shall prevail.

PART I - GENERAL PROVISIONS (SECTIONS 2 and 3 OF THE DECISION INSTRUMENT)

2. DEFINITIONS

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

"**2009 Termination Rate Recommendation**" means the 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 20.5.2009);

"**Access**" shall have the same meaning as under Regulation 2 of the Access Regulations, as may be amended from time to time; for the purposes of this Decision Instrument, Access shall include access to Mobile Voice Call Termination and Associated Facilities;

"**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;

"**Analysys Mason Final Report"** means the document entitled "Final Report for ComReg following the Supplementary Consultation - Changes in the mobile market in Ireland and the implications for our MTR recommendation to ComReg", dated 22 September 2015 and published as ComReg Document 16/09b;

"Associated Facilities" shall have the same meaning as under Regulation 2 of the Framework Regulations, as may be amended from time to time;

"**Authorisation Regulations**" means the European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2011 (S.I. No. 335 of 2011), as may be amended from time to time;

"**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;

"**Bottom Up Pure Long Run Incremental Costs Model**" or "**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 together and contemporaneously with this Decision Instrument. The operation and details of the BU Pure LRIC Model are more particularly described in the Deloitte MTR Model Specification Document for Ireland published as ComReg Document No. 16/09a**;**

"**Communications Regulation Act 2002, as amended"** means the Communications Regulation Act 2002 (No. 20 of 2002), as amended;

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

"**ComReg Decision D11/12**" means ComReg Document No. 12/124, entitled "Market Review: Voice Call Termination on Individual Mobile Networks", dated 21 November 2012;

"**ComReg Decision D12/12**" means ComReg Document No. 12/125, entitled "Mobile and Fixed Voice Call Termination Rates in Ireland", dated 21 November 2012;

"ComReg Decision D08/15" means ComReg Document No. 15/137, entitled "Numbering Conditions of Use and Application Process - Response to Consultation and Decision" dated 22 December 2015;

"ComReg Document No. 14/29" means ComReg Document No. 14/29, entitled "Mobile Termination Rates: Draft Bottom Up Pure Long Run Incremental Cost Model", dated 11 April 2014;

"ComReg Document No. 15/19" means ComReg Document No. 15/19, entitled "Mobile Termination Rates: Draft Bottom Up Pure Long Run Incremental Cost Model, Supplementary Consultation", dated 26 February 2015;

"ComReg Decision D02/16" means ComReg Document No. 16/09, entitled "Mobile Termination Rates: Response to Consultation 14/29 and Supplementary Consultantion15/19 and Final Decision Document (ComReg Decision D02/16, ComReg Document No. 16/09) (**this Decision**), dated [9] February 2016;

"Deloitte MTR Model Specification Document for Ireland" means the document entitled "MTR Model Specification Document for Ireland: Final Report for ComReg", dated 23 October 2015 and published as ComReg Document No. 16/09a;

"**Effective Date**" means the date set out in Section 8.1 of this Decision Instrument;

"**End-User(s)**" shall have the same meaning as under Regulation 2 of the Framework Regulations, as may be amended from time to time;

"**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;

"**H3GI**" means Hutchinson 3G 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, as may be amended from time to time;

"**Liffey Telecom**" means Liffey Telecom 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;

"**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;

"**Mobile Network**" means a wireless cellular network using radio frequency spectrum in any of the 800 MHz, 900 MHz, 1800 MHz, 2100 MHz Bands and/or other relevant radio frequency spectrum bands as assigned by ComReg to an Undertaking from time to time;

"**Mobile Number(s)**" shall have the same meaning as set out in the National Numbering Conventions, as may be amended from time to time[253];

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

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

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

"**National Numbering Conventions**" means the set of rules under which the Irish national numbering scheme is managed and administered as may be amended by ComReg from time to time and as currently set out in the document entitled National Numbering Conventions, Version 7.0, ComReg Document No. 11/17[254];

[253] From 1 March 2016, the definition of "Mobile Number" in Appendix 9 of ComReg Decision D08/15 shall apply to this Decision

[254] From 1 March 2016 ComReg Decision D08/15 shall replace ComReg Document No. 11/17, National Numbering Conventions, Version 7.0

"**National Regulatory Authority**" or "**NRA**" shall have the same meaning as under Regulation 2 of the Framework Regulations, as may be amended from time to time;

"Numbering Conditions of Use and Application Process" means ComReg Document 15/137, published on 22 December 2015, as may be amended 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;

"**Relevant Markets**" means all of the markets defined in Section 4.2 of the Decision Instrument annexed to ComReg Decision D11/12;

"**Significant Market Power (SMP) Mobile Service Provider**" means a Mobile Service Provider designated with SMP in Section 5 of the Decision Instrument annexed to ComReg Decision D11/12, namely Three, Lycamobile, Meteor, Telefónica, Tesco Mobile and Vodafone;

"**Telefónica**" means Three Ireland Services (Hutchinson) Limited, previously named Telefónica 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, including Liffey Telecom, but excluding, for the purposes of this Decision Instrument, Tesco Mobile;

"**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, but excluding, for the purposes of this Decision Instrument, Telefónica;

"**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, previously named H3GI;

"**Undertaking**" shall have the same meaning as under Regulation 2 of the Framework Regulations, as may be amended from time to time;

"**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;

"800-MHz Band" means the 791 to 821 MHz band of radio frequency spectrum paired with the 832 to 862 MHz band of radio frequency spectrum;

"**900 MHz Band**" means the 880 to 915 MHz band of radio frequency spectrum paired with the 925 to 960 MHz band of radio frequency spectrum;

"**1800 MHz Band**" means the 1710 to 1785 MHz band of radio frequency spectrum paired with the 1805 to 1880 MHz band of radio frequency spectrum; and

"**2100 MHz Band**" means the 1900 to 1920 MHz band of radio frequency spectrum, and the 1920 to 1980 MHz band of radio frequency spectrum paired with the 2110 to 2170 MHz band of radio frequency spectrum.

3. SCOPE AND APPLICATION

3.1 This Decision Instrument applies to and is binding upon those Mobile Service Providers designated with SMP in ComReg Decision D11/12, namely, Three, Lycamobile, Meteor, Telefónica[255], Tesco Mobile and Vodafone, and each such SMP Mobile Service Provider shall comply with it in all respects.

3.2 This Decision Instrument relates to a further specification of the cost orientation obligation imposed by ComReg under Section 12.1 of the Decision Instrument annexed to ComReg Decision D11/12 in relation to the Relevant Markets.

PART II – FURTHER SPECIFICATION OF THE PRICE CONTROL OBLIGATION AND THE TRANSPARENCY OBLIGATION (SECTIONS 4 AND 5 OF THE DECISION INSTRUMENT)

4. FURTHER SPECIFICATION OF THE OBLIGATIONS RELATING TO PRICE CONTROL

4.1. Pursuant to Regulation 13 of the Access Regulations and in accordance with Section 12.1 of the Decision Instrument annexed to ComReg Decision D11/12, 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 that Decision Instrument.

4.2. This period of further specification of the obligations relating to price control will last from 1 September 2016 until 31 December 2018. Pursuant to Regulations 13 and 18 of the Access Regulations, for each year of this 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 are as set out in the table below.

[255] See footnote 251

	BU Pure LRIC MTRs (€ cent per minute)
From 1 September 2016 to 31 December 2016	€0.0084
From 1 January 2017 to 31 December 2017	€0.0082
From 1 January 2018 to 31 December 2018	€0.0079

4.3. The provisions of Section 4.2 shall be applied by each SMP Mobile Service Provider as and from 1 September 2016. All relevant invoices and credit notes shall reflect the applicable MTR rate.

4.4. Without prejudice to section 4.2, ComReg may review and if necessary, amend the maximum MTRs referred to in section 4.2, having regard to circumstances that it considers exceptional.

5. FURTHER SPECIFICATION OF THE OBLIGATIONS RELATING TO TRANSPARENCY

5.1 Notwithstanding and without prejudice to the obligations imposed on each SMP Mobile Service Provider in Section 11.5 of the Decision Instrument annexed to ComReg Decision D11/12, unless otherwise agreed with ComReg, each SMP Mobile Service Provider shall pre-notify ComReg of its intention to amend its published MTR either (i) not less than 2 months in advance of the date on which any such proposed amendment is expected to come into effect; or (ii) on 1 July 2016 ; whichever date is later.

5.2 Each SMP Mobile Service Provider shall furnish to ComReg - at the date of the pre-notification provided for in Section 5.1 - a statement confirming that its proposed amended Mobile Termination Rate complies with Section 4.2 of this Decision Instrument.

5.3 Without prejudice to Section 11.5.2 of the Decision Instrument annexed to ComReg Decision D11/12, and for the avoidance of doubt, unless otherwise agreed with ComReg, each SMP Mobile Service Provider shall notify in writing every Undertaking with which that SMP Mobile Service Provider has entered into a contract in respect of Access to MVCT of its intention to amend its MTR(s) either (i) not less than one month in advance of the date on which any amendment to its published MTR is expected to come into effect; or (ii) on 1 August 2016; whichever date is later.

PART III - OPERATION AND EFFECTIVE DATE (SECTIONS 6 TO 8 OF THE DECISION INSTRUMENT)

6. STATUTORY POWERS NOT AFFECTED

6.1 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).

7. MAINTENANCE OF OBLIGATIONS

7.1 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 continue in force and the SMP Mobile Service Providers shall comply with same.

7.2 If any section(s), clause(s), provision(s), or portion(s) thereof contained in this Decision Instrument is(are) 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(those) section(s), clause(s), provision(s), or portion(s) 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), provision(s), or portion(s) thereof contained in this Decision Instrument, and shall not in any way affect the validity or enforcement of this Decision Instrument or other Decision Instruments.

8. EFFECTIVE DATE

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

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JEREMY GODFREY

CHAIRPERSON

THE COMMISSION FOR COMMUNICATIONS REGULATION

THIS 12 DAY OF FEBRUARY 2016

Annex: 2 Other Issues arising from the Original MTR Consultation and the Supplementary MTR Consultation

A 2.1 As outlined in the paragraph 3.31 the main points made by respondents to the Original MTR Consultation and Supplementary MTR Consultation are addressed in full in the main body of this document. Other points made in the responses are addressed in this Appendix. This Appendix also contains other information relevant to the MTR Consultation process, such as the bilateral meeting ComReg held with Vodafone, at its request, following the Original MTR Consultation.

Bilateral meeting with Vodafone

A 2.2 In the Original MTR Consultation, ComReg set out its preliminary views regarding proposed notification periods and statements of compliance (refer to section 4.4 of the Original MTR Consultation). ComReg also sought views that respondents had in relation to any other issues arising from the Original MTR Consultation. Following a request for a meeting from Vodafone, ComReg agreed to meet with Vodafone on 21 May 2014 in order to respond to Vodafone's list of queries. ComReg's consultants, Deloitte LLP, also participated in the meeting via teleconference.

ComReg's View

A 2.3 In the interests of openness and transparency ComReg published an Information Notice on 30 May 2014 which contained the list of queries raised by Vodafone on ComReg's Draft MTR Model and the responses by ComReg and its advisors to the queries raised by Vodafone on ComReg's Draft MTR Model.[256]

Financial Impact Assessment (FIA)

A 2.4 As part of the Original MTR Consultation ComReg enclosed for each of the six MSPs designated with SMP (on a bilateral and confidential basis) a financial impact assessment ("**FIA**") of moving from the current MTR of 2.6 cent per minute to the 0.57 cent per minute pure LRIC based MTR proposed in the Original MTR Consultation. ComReg subsequently issued an updated FIA at the Supplementary MTR Consultation.

[256] http://www.comreg.ie/_fileupload/publications/ComReg1455.pdf

A 2.5 Having considered Vodafone's submission to the Original MTR Consultation and specifically that "…*standard impact assessments usually include an LRIC+ or LRAIC rate to allow for comparability*…" ComReg incorporated the LRAIC+ (in addition to the pure LRIC) calculated MTRs into the updated FIA at the Supplementary MTR Consultation stage.

ComReg's View

A 2.6 Having finalised the Final MTR Model we have shared this, along with the confidential final FIA, with the respective MSPs designated with SMP (see paragraph 2.50).

LRAIC+

A 2.7 In responding to the Supplementary MTR Consultation Vodafone stated that "*Considering the lack of detailed documentation Vodafone feels it cannot conclusively comment on the "LRAIC+" outputs and requires ComReg to provide a more in depth account on this section of the model*".[257]

ComReg's View

A 2.8 The Updated MTR Model shared with Vodafone (and the other MSPs designated with SMP) at the Supplementary MTR Consultation stage contained the LRAIC+ calculated MTRs and associated workings. For completeness, based on the inputs of the Final MTR Model, as set out in this report and the Final Deloitte MTR Model Specification Document, ComReg has presented the LRAIC+ based MTRs:

a. 1.06 Euro cent per minute for 2016;
b. 0.94 Euro cent per minute for 2017; and
c. 0.83 Euro cent per minute for 2018.

A 2.9 The Supplementary Consultation identified that the Updated MTR Model was producing a pure LRIC MTR that exceeded the LRAIC+ rate under Scenario B in 2019[258]. Footnote 28 on Page 17 noted that "*…due to the difference in the two costing methodologies, there is no mathematical relationship that would require LRAIC+ to be greater than or equal to pure LRIC [and in] certain, less common cases, LRAIC+ may result in lower calculated costs than pure LRIC for the same set of traffic services*"[259].

[257] Vodafone Response to the Supplementary MTR Consultation, Page 17.
[258] This can be explained by the comparison of the cost contribution by network elements. The cost contribution of sites and 3G radios to pure LRIC exceeds their respective contribution to LRAIC+.
[259] http://www.comreg.ie/_fileupload/publications/ComReg1519.pdf

A 2.10 As noted in the Supplementary MTR Consultation, LRAIC+ incorporates an averaging algorithm that proportions the costs per service via route-factor volumes of annual traffic. In some scenarios where the set of services considered represents a very small proportion of total network traffic volumes, pure LRIC may indeed exceed LRAIC+.

A 2.11 While the total network costs for all services are the same for the pure LRIC and LRAIC+ calculations the methodologies for attributing costs to services are inherently different. While LRAIC+ is typically higher due to its inclusion of common costs, there is no mathematical relationship between the two methodologies that would imply that the LRAIC+ for a particular service is always larger than or equal to the pure LRIC for that service. Moreover, the two methodologies are calculated independently in the model. Consequently, there is no constraint that LRAIC+ should always exceed pure LRIC. Instead the two methodologies share a common set of initial calculations which allows them to use a common set of inputs and intermediate calculations and therefore to be included in a single model.

- While the total costs relating to all services is the same for pure LRIC and LRAIC+, the basis for attributing those costs to services differs in important respects between the two approaches.

Pure LRIC

- Pure LRIC is based on the level of traffic that is due to voice termination and network investment costs (opex and capex) due to that traffic and is therefore heavily dependent on the network dimensioning rules in the model.

- Networks are dimensioned to cater for peak demands so annual traffic is converted to peak traffic demands by applying various modelling parameters such as busy-hour peak to mean ratios, payload overhead factors and other load factors. By including such factors in network dimensioning algorithms the model can recognise that, for example, data service can be operated on a best effort basis and as a consequence, imply a lower network load for a given unit of traffic when compared to voice, which is less tolerant of delays in transmission.

- As a result the network dimensioning factors tend to attribute a higher proportion of network resources/costs to voice services than is indicated by voice's share of the total average service volumes.

LRAIC+

- LRAIC+, on the other hand, is not actually based on estimates of the incremental costs of termination services. Rather it is derived by calculating the total cost of each network element for all mobile traffic (including voice, messages and data) and then allocating a proportion of those total network element costs to termination services based on the average network usage of that network element accounted for by termination traffic.

- As the LRAIC+ uses average network usage to attribute costs to services it does not consider the network load weightings that inform the Pure LRIC cost analysis with the result that voice services can receive a lower allocation of the costs of some network elements under the LRAIC+ approach than under the pure LRIC approach. In the context of the Final MTR Model, this has resulted in the overall pure LRIC MTRs being lower than the LRAIC+ MTRs in certain years.

Vodafone's issue with the Draft MTR Model at the Original MTR Consultation

A 2.12 Vodafone was of the view that "…*the model produces results which are incompatible with the market information which ComReg itself publishes such as traffic proportion [and that] the modelling methodology produces results which are simply wrong such as the fact that the economic depreciation approach used by ComReg fails to recover all costs and the fact that in some scenarios the model states that radio sites are required to carry traffic but that no actual radio equipment is needed." It also stated that "…the model produces nonsense results…" and that because "…the model deviates so starkly from reality…means that a serious question arises as to whether the model also has similar deviations in those cases which are more difficult to verify*."[260]

A 2.13 Vodafone stated that "…*complex calculations throughout the model are insufficiently documented. One example is the calculation average effective cell radii in the context of 3G. Upon Vodafone's information request ComReg has given a very abstract explanation of the calculation mechanisms employed. There is still insufficient information to properly review and comment on this aspect of the model.*"[261]

[260] Vodafone's response to the Original MTR Consultation, page 7.
[261] Vodafone's response to the Original MTR Consultation, page 18.

ComReg's View

A 2.14 We have considered the comments in Vodafone's submission to the Original MTR Consultation (see paragraph A 2.12 and A 2.13) and consider them to have been addressed in the Supplementary MTR Consultation and in the main body of this document. The Final MTR Model has been developed and finalised on the basis of a hypothetical efficient mobile operator without the need to align with: "*reality*". Therefore the outputs of the Final MTR Model will not reconcile with either one specific Irish MSP or on average of Irish MSPs.

Analysys Mason Report

A 2.15 Referring to the Analysys Mason report in the context of the merger, Eircom stated that "*the networks are now internalising traffic that was previously subject to MTRs for both former operators*" and consequently in Eircom's view "…*anomalies still remain for off-net traffic to and from '3' and more importantly for other fixed and mobile operators incurring MTR charges",* meaning that "*the need for symmetrical treatment of MTRs relative to FTRs remains undiminished*".[262]

A 2.16 Eircom emphasised the urgency surrounding the need for ComReg to issue a decision as soon as possible when it stated that "*competition, consumer interests and efficient investment incentives continue to be hampered by the fact that MTRs are currently set well above Pure LRIC and indeed LRIC levels*". It stated that a consequence of this is that "*fixed operators and smaller mobile operators continue to incur undue additional cost in delivering any-network bundles*".

A 2.17 Eircom response also clarified that it had not in fact indicated that it would scale back its eMobile business, despite what was quoted on page 15 of the Analysys Mason report.

ComReg's view

A 2.18 Further to Eircom's submission (see paragraph A 2.16), we recognise that the completion of the MTR Model is an important matter and have endeavoured to complete the process in an efficient manner.

[262] Eircom's response to the Supplementary MTR Consultation, page 6.

A 2.19 Having considered the submissions to the Supplementary MTR Consultation, Analysys Mason has updated its report, where appropriate, which has been published as ComReg Document No. 16/09b. As noted in paragraph 3.26, having reassessed market developments in the Irish market over the period 2012-2014, Analysys Mason has concluded that its original conclusion in 2012 to recommend a pure LRIC cost standard for regulated MTRs in Ireland to ComReg still holds. ComReg is informed by this Analysys Mason Final Report in arriving at this Decision which calculates the maximum MTRs for the Irish market using a BU Pure LRIC MTR Model.

Market Analysis

A 2.20 Vodafone also stated that "*[i]*n November 2012 ComReg adopted measures relating to Mobile Voice Call termination on Vodafone's network. Pursuant to ComReg's obligations under the Framework Directive, save in exceptional circumstances, ComReg must complete a review of this market prior to November 2015". [263]

ComReg's View

A 2.21 Further to Regulation 27(6) of the Framework Regulations, ComReg made an official request on 29 July 2015 to the European Commission for a two year extension (until November 2017) to the existing MVCT market analysis. The European Commission did not object[264].

[263] Vodafone's response to the Original MTR Consultation, page 21.
[264] https://circabc.europa.eu/sd/a/19271105-71b4-49ad-8480-ca7bfc320454/MVCT%20Letter%20to%20DG%20Connect%20-%2029%20July%202015%20NON-CONFIDENTIAL.pdf

Three's letter in response to Original MTR Consultation

A 2.22 Three stated that the "*acquisition by Three of O2 could have a significant impact on the information gathered to date by ComReg, and that ComReg's approach to the cost of capital for mobile telecommunications and the MTR cost model and Three's response to ComReg's related consultations. As a result, Three believed that it was premature (and disproportionate) for ComReg to consult in respect of this matter until the merger was completed and Three had an opportunity to provide an informed response to ComReg*."[265]

ComReg's View

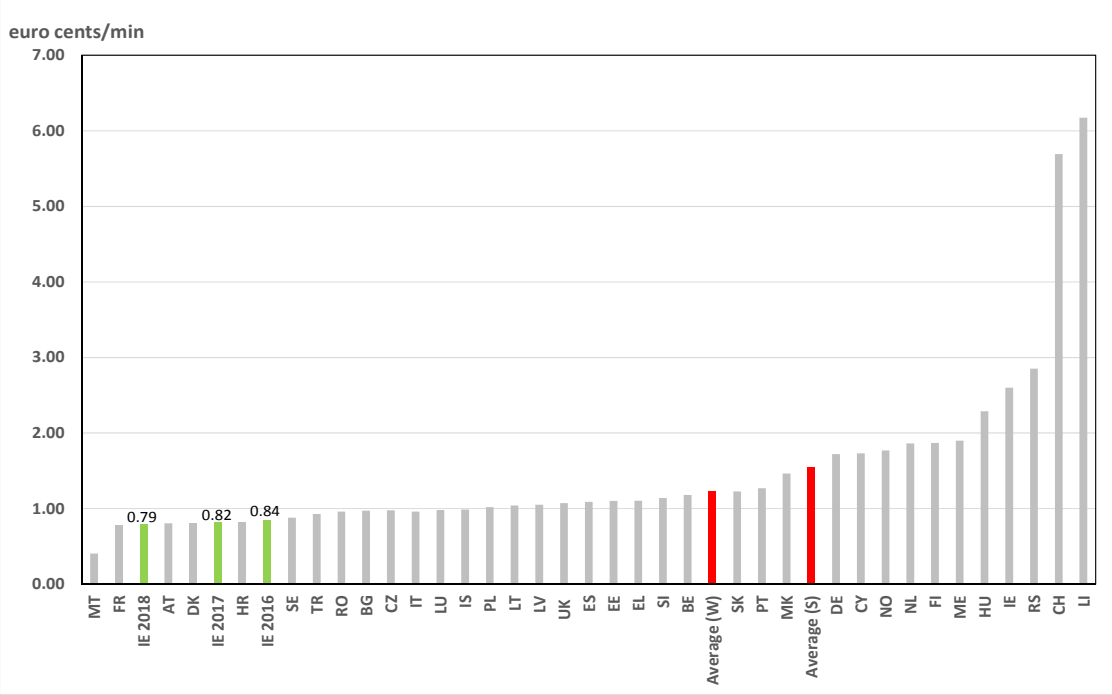
A 2.23 ComReg does not agree that it "was premature (and disproportionate)" to consult upon MTRs. We are of the view that the merger did not impact on the data gathered to date and that we have accounted for this in the manner in which the market and modelled network costs are expected to evolve.

[265] Three's response to the Original MTR Consultation.

Annex: 3 International Comparison of Rates

A 3.1 This Annex sets out an international comparison of MTRs as of January and July 2015 respectively. For illustrative purposes the respective MTRs for 2016-2018 in Ireland imposed by this Decision have been included in the charts[266].

International Comparison of MTRs as of January 2015[267]

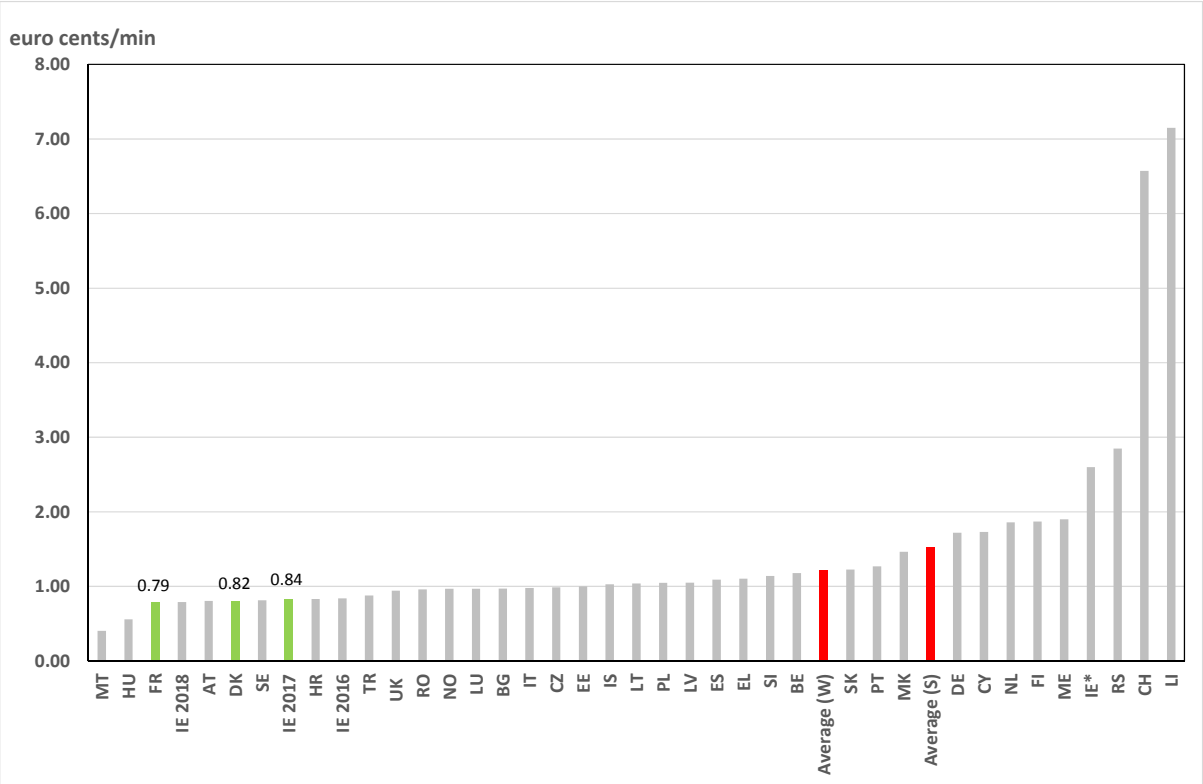


Source: BEREC and ComReg Analysis

[266] For the avoidance of doubt, the rates for 2016, 2017 and 2018 imposed by this Decision have not been included in the Average (S) or Average (W) calculations, as indicated by the red bars within the charts.

[267] http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/5028-fixed-termination-rates-report-as-of-january-2015 (Page 29) – as amended by the inclusion of MTRs in Ireland for the years 2016, 2017 and 2018.

International Comparison of MTRs as of July 2015[268]



Source: BEREC and ComReg Analysis

Country Abbreviations

AT: Austria	LI: Liechtenstein
BE: Belgium	LT: Lithuania
BG: Bulgaria	LV: Latvia
CH: Switzerland	LU: Luxembourg
CY: Cyprus	ME: Montenegro
CZ: Czech Republic	MK: Former Yugoslav Republic of Macedonia
DK: Denmark	MT: Malta
DE: Germany	NL: Netherlands
EE: Estonia	NO: Norway
EL: Greece	PL: Poland
ES: Spain	PT: Portugal
FI: Finland	RO: Romania
FR: France	RS: Serbia
HR: Croatia	SE: Sweden
HU: Hungary	SI: Slovenia
IE: Ireland	SK: Slovakia
IS: Iceland	TR: Turkey
IT: Italy	UK: United: Kingdom

[268] http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/5591-fixed-termination-rates-report-as-of-july-2015 (Page 18) – as amended by the inclusion of MTRs in Ireland for the years 2016, 2017 and 2018.

Annex: 4 Correspondence between Vodafone and ComReg

A 4.1 This Annex sets out points raised by Vodafone in a letter to ComReg on 14 December 2015 and ComReg's response. Specifically the Vodafone letter contained an Annex A and an Annex B. Each of the points raised in Vodafone's letter and ComReg's respective response are set out in this Annex.

[redacted]

Non-confidential version

Donal Leavy
Director Market Operations
ComReg
Abbey Mall
Lr Abbey Street
Dublin 1

14th December 2015

Notification of Mobile Voice call termination price model

Dear Donal,

Vodafone would like to respond to ComReg's notification under Article 7 of the Framework directive of its decision in relation to price control on the wholesale mobile voice termination market and also comment on the revised model shared with Vodafone. We are disappointed that ComReg did not take the opportunity to engage in an industry workshop as suggested by Vodafone on the 28th September. Vodafone needs to reiterate that errors remain in the model and justifications from ComReg as to final positions are not sufficiently explained and in contrast to best practice and models in other European jurisdictions. Vodafone does not seek to delay the conclusions of ComReg's consultation process, however, Vodafone would like to re-iterate ComReg' s obligations to produce a model which fairly reflects the costs of voice call termination and does not risk Vodafone being forced to sell termination services below cost. Based on our analysis of the new model, we come to the conclusion that the unit costs the model calculates are fundamentally flawed and cannot form the basis for regulating the Irish termination.

Vodafone would thank ComReg for hosting the bilateral on the 8th December. As ComReg stated during the meeting and in follow up correspondence the meeting was not a consultation process. As we discussed however the very limited time between our receipt of the Notification and model and the meeting did not allow use to prepare a detailed position on ComReg's latest model.

[redacted]

We do note that the LRIC value calculated by the new model has changed significantly from the value calculated in the previous consultation; as a corollary, the model has changed significantly since Vodafone's last review. This raises concerns for Vodafone considering the changes in the model have been significant and requires time to review.

We need appropriate time to analyse and validate these changes. This requires a detailed review of the different elements of the model (demand, network and cost module), an examination of the overall functionality of the interlinked sheets and model workings and an evaluation of new inputs and a top down calibration of newly generated outputs.

Considering that the effects of even small changes in the modelled value are very significant for Vodafone's business, we believe it is vital that ComReg take the utmost care in arriving at an appropriate rate. As we have stated previously an excessively low MTR would force Vodafone to sell access to our network at a rate below cost..

As we clearly stated at the meeting the model still displays key deficiencies and thus is not fit-for-purpose at this point in time. This evaluation is not only based on a high level assessment of the new model, but links to concerns and issues raised in previous consultation rounds.

Overall, the model workings display significant deficiencies due to the simplistic modelling approach adopted by ComReg's consultants. Vodafone's high level review of the new model clearly illustrates that the 4G data migration utterly distorts the results of the LRIC model. ComReg has modelled a network that shrinks between 2015 and 2020 (the key years for the MTR glide path) and then starts to grow again thereafter. This profile is completely unrealistic and results in total costs in the model being significantly under-stated.

Related to this but of even greater concern to Vodafone is the treatment of site costs. Even though the number of sites declines as traffic migrates from 3G to LTE, the LTE traffic is included in the cost module for the allocation of cost over time. The result is that total costs relating to sites (which are 20% of the cost) are materially under-stated relative to the traffic that is assumed to be carried by the sites. This mismatch between cost and volume unambiguously decreased both the total cost in the model and the unit cost. As a result, the unit costs the model calculates are fundamentally flawed and cannot form the basis for regulating the Irish termination market.

Vodafone remains of the position that ComReg has erred in relation to a number of fundamental inputs (i.e. spectrum re-use, busy hour uplift, TRX dimensioning). While ComReg has some discretion on input values, ComReg cannot ignore that assumptions made in the model manifest in completely unrealistic model outputs, as Vodafone has illustrated in relation to 2G BH traffic.

At our meeting on the 9th December ComReg expressed the view that a differential of approx. 0.3c (the calculated differential between ComReg's published rate and the rate that ComReg could have adopted

[redacted]

if they had taken account of Vodafone's material concerns) would have only a small effect on Vodafone's revenue. ComReg estimated a cumulative effect of [redacted] per annum. ComReg's email from 10th Dec clarified that this was in relation to three specific parameters. Following our engagement, Vodafone has evaluated the net effect on Vodafone of a move from [redacted] Contrary to ComReg's assertion this is not immaterial as the cumulated effect sums up to [redacted] net margin per annum.

Given the materiality of the issue and considering the extensive nature of the model and associated documentation, additional time will be required to examine the model and accompanying documents in order to adequately respond to ComReg's proposed MTR determinations. Vodafone thus reserves the right to raise further queries, issues and specifications in this process.

The comments in the annex of this letter relate to the details of the LRIC model. We maintain our position that documentation on the LRAIC model has not been sufficient to explain the divergence from European best practice and that ComReg have not sufficiently justified the choice of a Pure LRIC methodology in their current determinations.

Based on the evidence available, Vodafone comes to the conclusion that the newly proposed model is not fit for purpose and calculates MTR figure that does not reflect costs in the Irish market. Further, it is concerning for Vodafone that ComReg do not appear to appreciate the significance of their proposal. We urge ComReg to make the necessary changes in the model so that it is fit for purpose before making a final decision.

Sincerely,

Gary Healy
Head of External Affairs & Regulation

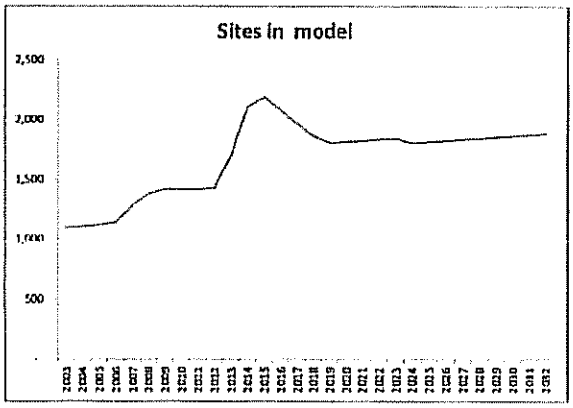
Annex A

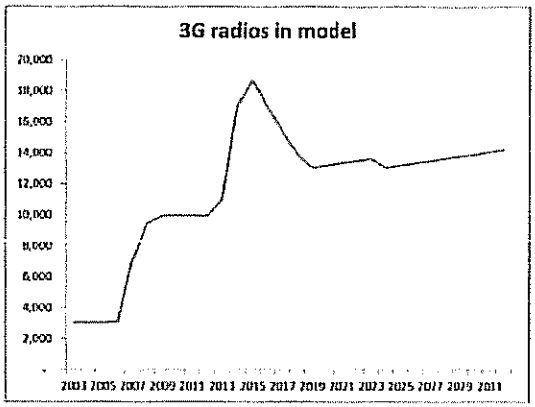
1. Cost recovery / 4G modelling

There seems to be a significant underlying issue with the model workings due to the simplistic approach adopted by ComReg with respect to 4G data migration which distorts the results of the LRIC model.

It is assumed that data traffic migrates from 3G to LTE. However, the LTE traffic is not included in the network dimensioning. The result is that data traffic in the network model declines until the point when the long-term split between 3g and LTE is reached (50:50) and thereafter the traffic in the network model starts to grow again. The result is the anomalous result that the network shrinks between 2015 and 2020 (the key years for the MTR glide path) and then starts to grow again thereafter. This profile is completely unrealistic and results in total costs in the model being significantly under-stated. Of course, total volumes are also under-stated (apart from sites – see below) and therefore the impact on unit cost is ambiguous. **The only thing that can be said with certainty is that the unit costs are wrong.**

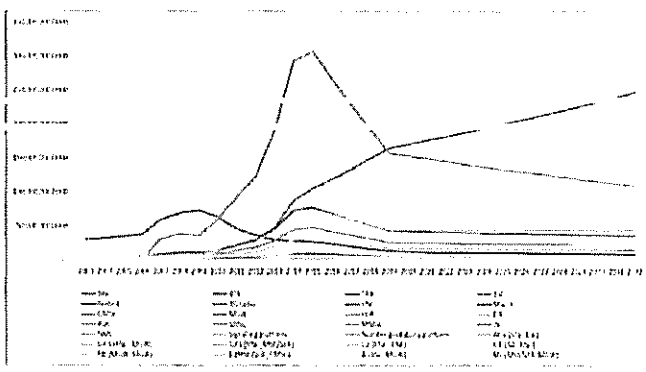
Of more concern is the treatment of site costs. Even though the number of sites declines as traffic migrates from 3G to LTE, the LTE traffic is included in the cost module for the allocation of cost over time. The result is that total costs relating to sites (which are 20% of the cost) are materially under-stated relative to the traffic that is assumed to be carried by the sites. This mismatch between cost and volume unambiguously decreased both the total cost in the model and the unit cost.



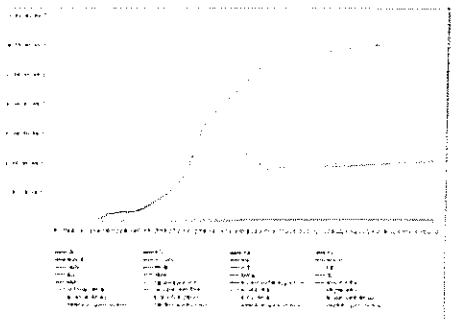


Route factored volumes

Total cost by element and year after economic depreciation



[redacted]



2. Spectrum re-use

Vodafone remains concerned that ComReg have chosen to apply a spectrum re-use factor of 10. This is out of line with other European models and generally applicable network deployment practices. We therefore suggest amending the model and including a spectrum re-use factor of 12.

We believe that in order to provide a reasonable quality service to customers a re-use factor of 12 should be used. This factor has been widely applied in other European models and used, for instance, by regulators in Portugal, Romania and the UK. In Ireland, we have had particular problems in obtaining access to sites to use for base station locations. Because of this we have had to use sub-optimal locations, making frequency planning more difficult and making it more important to avoid interference. This would lead to requirement to use a higher re-use factor.

Various labelling schemes are used to describe frequency re-use schemes. The standard model divides the available frequencies among a cluster of 4 sites, each sectored into 3 cells (i.e. among 12 cells.) This pattern is most commonly referred to as a 4-12 reuse pattern, though sometimes this same scheme is referred to as a 1-4 pattern. In the labelling used in the model this scheme corresponds to a reuse factor of 12. This frequency re-use scheme was the one we referred to in our original data set and later submissions to ComReg. (In our initial data we also referred to a separate re-use scheme for Omni directional site in rural areas – but as a driver for the model this is not relevant given the very small number of Omni-direction sites).

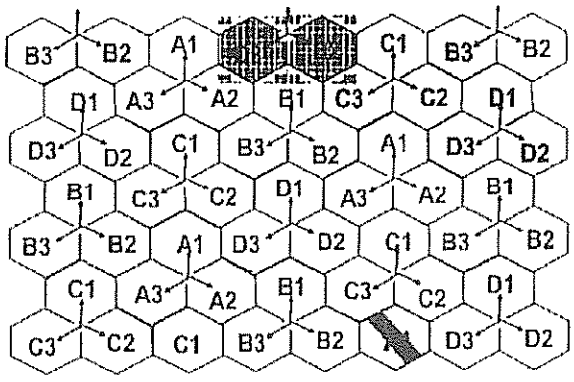


Fig 1 4/12 re-use pattern. Re-use Factor 12.

[redacted]

Higher levels of re-use result in more interference between sites – this interference removes some available capacity from each cell: creating a more complex capacity calculation.

ComReg have shown inconsistency in not following the European norm in choosing this parameter whereas they have justified other parameters such as WACC by quoting these precedents.

Proposed change: Change spectrum re-use factor from 10 to 12	
2016 Pure LRIC value before change	2016 Pure LRIC value after change
€ 0.0084	€ 0.0096

3. Busy Hour uplift

In paragraph 3.156 ComReg sets out that there is a 10% Busy Hour uplift to recognise geographic and localized busy hour variations. Historically the uplift required to deal with these effects was materially higher than 10% e.g. in 2004 Vodafone experienced a factor of [redacted]

4. TRX and 3G radio dimensioning

The model has been adjusted to round up the required TRX number when the required TRX in a cell is calculated as being between 0 to 1, but not when the TRX needed is another fractional amount, e.g. 1.4. This is incorrect – the required TRX in each cell should be rounded up an integer number of TRX.

In a network of cells with varying traffic demands each individual cell need to have adequate capacity for the demand – this inevitably leads to a requirement for more TRX than would be calculated by an averaging process.

In the example 7.189 of the ComReg notification document, an example of 200 cells sites, 100 needing 3 TRX and 100 needing 4 is given. In a real network cells will have a TRX demand that is a real number rather than an integer. In each site the number of TRX must be rounded up in order to provide the required Grade of Service. This site by site rounding up of TRX is an essential part of planning a real network - and a significant driver of cost.

5. TRX Time Slots

Traffic timeslots per carrier. The model assumes Traffic carrying timeslots per TRX of 7.5; this is not a realistic figure. The average figure in the Vodafone Network is 6.8, to allow for our typical signalling allocation of BCCH+2 SDCCH.

[redacted]

6. Alignment of hypothetical efficient operator outputs with costs incurred by actual operators

The cumulative effect of using reuse, uplift, and dimensioning parameters that are unrealistic is to produce a modelled network that is too small and has costs that do not fairly reflect a real network. This would have been clear to ComReg if they had carried out the type of Top-down calibration that is normal in these processes. We understand that a hypothetical model will not produce outputs that align exactly with a real network, but the scale of difference in this case is outside a range that could be driven by higher efficiency,

- **Traffic:** 2G traffic too low. Peaks at 15867 in 2009 (Networks.d1 Load)
- **TRX**: Number of TRXs of a "hypothetical operator" would be less than [redacted] of that observed in the Irish market today 6517 in 2009 (Networks.b1 Load Outputs). This means that the model underestimates costs that a typical operator would accrue.
- **Costs:** Costs should align with real costs in Irish networks. A calibration of the model against these costs should be a normal part of the model building process.

It is also concerning that even within their own notification document ComReg appears to contradict themselves by claiming on the one hand that a TD reconciliation would not be appropriate and on the other that a general calibration both in BU and TD terms has been carried out. This does not raise the confidence in the model portrayed as the 'correct' and 'final' model.

"4.21 With respect to Vodafone's request for a TD reconciliation of the model, ComReg does not consider a TD approach to be appropriate in this context. ....

"7.225 A general calibration has been carried out, both in BU and TD terms. The extent of the granularity of calibration has been subject to data availability. ...

...

[redacted]

Appendix B

Issues raised in previous consultation rounds

In this annex we have not further discussed our position on voice/data conversion, use of WACC, and cost distribution. We remain of the view that these and other issues remain to be fixed in the model. In our appendices we include an update on our analysis of the LRAIC+ model, and a list of the previous issue we submitted which have not been addressed. As already stated this new model has changed significantly from the previous version so more testing will be required before Vodafone can provide an exhaustive list of comments.

In the following table we review key points made in our submissions of 2014 and 2015

	Key Points from Vodafone Submission 2014	Updated Comments	Dec15 Comments
1	International practice is Model supported by the completion of a LRIC+ or LRAIC model in parallel with a LRIC model.	LRAIC+ supplied – but completely inadequate documentation supplied and values produced not in line with norms of LRIC/LRAIC+.	No change
2	"One of the striking figures is the lack of an in depth sensitivity analysis which is considered good practice in any model of this complexity."	Not addressed - this remains a significant issue	Not addressed
3	ComReg has not checked		
	Historical WACC	Outstanding issue	Not agreed
Choice of Pure LRIC			
Procedural Issues- Failure to use additional market information			
	Form of the modelled operator		
13	On this basis a correctly constructed model based on the hypothetically efficient existing operator and an actual operator at a given market share should be strongly aligned.		Not agreed
16	In line with the text of the Termination Recommendation ComReg should carry out a reconciliation of the results of a bottom-up model with the results of a top-down model in order to produce as robust results as possible. 3.32 There is an associated risk however that some of the assumptions adopted in a BU model may prove to be unrealistic for an actual operator to achieve. For this reason, the 2009	Not addressed	Not agreed

	Termination Rate 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 allocation between a hypothetical and a real operator.*"[57]		
17	The calibration referenced in paragraph 3.34 of the consultation document is limited and is flawed as the maximum and minimum range which is used for comparison includes those operators who use National Roaming and/or are 3G only. Vodafone notes that while ComReg's consultants compare the number of modelled TRXs to the number of TRXs actually deployed by operators this second figure was not directly asked for in the data gathering carried out by ComReg and must have been derived or imputed from some other source.	Not addressed	Not agreed
18	In respect of the assumed or modelled inputs, ComReg has not checked that the historical WACC, used as a model input, reflects its own historical estimation of the WACC for the Irish market, nor that it reflects the WACC that ComReg included in the Mobile Licenses of Operators. .	Not addressed	Not agreed
19	In respect of the outputs, there does not appear to be any attempted comparison between the number of sites that the model predicts for a certain aggregated volume of traffic and the actual number of sites deployed by operators for that same volume. If there was a difference this would require explanation as being related primarily to efficiency issues before the model output could be relied upon.	Not addressed	Not discussed
20	Furthermore given the hypothetical nature of the model produced a financial calibration, it should have been carried out using real financial data obtained from operators. To assist this Vodafone submitted extensive financial data as part of the data gathering exercise. No reference has been made to a suitable financial	Not adequately addressed. The short comparison to Meteor figures is not adequate.	Not agreed

	calibration.		
	Market Share		
Q. 2 Do you agree with ComReg"s preliminary views regarding the appropriateness of the service parameters and their application in the Draft BU Pure LRIC Model? 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			
	2G Busy hour traffic		
	Calculation using working days produces a 2G traffic in BH of 10,618 in 2011. Vodafone's 2G BH traffic at this time was more than 40,000 Erl. Taking this as the traffic for a 40% market share we would expect the HEO with 25% market share to have a busy hour traffic of approximately 25k ERL. While we understand that a there will be variation between the HEO and actual traffic experienced by an operator this variation appears outside reasonable variation.	Not adequately addressed. Although a small change was made model outputs are still far from real network data.	Not agreed
Q. 3 Do you agree with ComReg"s preliminary views regarding the appropriateness of the technological parameters and the network structure (including network design parameters and dimensioning rules) used to model the hypothetical efficient operator's mobile network? 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.			
	Treatment of Spectrum		
	Geographic traffic profile		
25	The 2G/3G proportion of traffic in rural areas is the same as in urban and suburban areas. This is not a reasonable assumption as propagation at 2100MHz, the frequency used by 3G, is limited in rural areas. The proportion of traffic carried in rural areas is then significantly less than urban and suburban areas. In Vodafone's data submission we presented figures showing a lower rural traffic proportion, e.g. 75% of traffic on 2G in 2010.	Significant change has been made to the urban/rural split in the model. This has not addressed the issues raised. Additional work need to be done to fix this issue.	New position – land usage has been changed significantly. Traffic distribution in different Geotypes needs to be analysed..
	Reference: Load > D1 demand		
	Re-use Factor		
26	The model uses a re-use factor of 10. We believe that in order to provide a reasonable quality service to customers a re-use factor of 12 should be used. This factor has been widely applied in other European models and used, for instance, by regulators in	Not addressed	Not Agreed

	Portugal, Romania or the UK. In Ireland, we have had particular problems in obtaining access to sites to use for base station locations. Because of this we have had to use sub-optimal locations, making frequency planning more difficult and making it more important to avoid interference. Hence using larger re-use factors than would be needed in cities where optimum locations are available.		
	Busy Hour		
27	In relation to ComReg's response of 30 June 2014 to the issue of TRX rounding ComReg sets out that the use of such uplift factors is one of the justifications for the use of averaged and non-integer number of TRXs. In fact it is because the uplift factor is required to deal with localised per cell peak traffic demand effects that such network wide averaging is entirely inappropriate and integer numbers of TRXs must be used.	Not addressed. A change has been made in the model to round fractions between 0 and 1 upwards but does not round up the fractional numbers above 1.	Not Agreed
	Conversion factors		
28	As stated in the consultation document as well as the model specification, the conversion in the model is based on Erlang based busy hour calculations. The model, however, constructs conversion in a way that is linked to Mbit/s. Basic sensitivity tests of the nominal full rate bit rate in the busy hour show that increasing the data rate for voice produces a lower rate.	Not addressed.	Not Agreed
	Treatment of voice to data conversion		
30	ComReg has set out that it accepted Vodafone's position that the impact on the network of data carrying real time services such as voice is higher than general data usage and stated that this had been accommodated. However no details have been given on how this is done and it is impossible for respondents to comment on whether this issue has been adequately reflected in the model. (See paragraph 3.164 of the consultation document) Given the material deficiencies identified by Vodafone in those model parameters which can be validated and	Not addressed.	Not Discussed

	this lack of transparency, the inability to validate ComReg's approach in respect of this matter raises a material procedural concern.		
	Logical structure of modelled network		
32	Within the last three years transmission elements have absorbed more than 30% of Vodafone's network budget. We do not see that this is reflected in the outputs of the model. In addition the lack of detail and description provided does not allow Vodafone to assess where the discrepancy has been created.	Not addressed.	Not agreed
	Appropriateness of network element costs: Share of NMC and MSC costs.		
33	It appears the model does not take into account any MSC or NMC costs. These costs constitute a very significant contribution to the overall costs of building and operating a network. Management of data parameters for sites and transmission elements constitutes a significant part of these costs. These costs will scale with size of network and thus a portion of the costs should be attributable to the incremental cost of termination	Not addressed.	MSC ports added. Other MSC costs and NMC costs Not Agreed
	Completeness of costs accounted for in the model		
Q. 5 Do you agree with ComReg's preliminary views regarding the appropriate implementation approach in the Draft BU Pure LRIC Model? Please provide reasons for your response, clearly indicating the relevant paragraph numbers to which your comments refer, along with relevant supporting factual evidence.			
	Consistency and sensitivity checks		
35	Although the consultation document pinpoints that there have been sensitivity and sanity checks the review of the actual model illustrates clear deficiencies.	Not addressed	Not discussed.
37	ComReg uses carrier capability to calculate user throughputs (c.1 Ran calculations). However, that does not reconcile with reality. Whereas ComReg asserts that 3G carriers are capable of 100% of potential user throughput, in reality practical limits of 50% to 70% apply. Once again given	Not addressed	New position – land usage has been changed significantly. Traffic distribution in different Geotypes needs to be analysed. .distribution needs analysis

	the deficiencies identified in those parameters which can be validated, this lack of transparency and inability to review and comment is a significant procedural concern.		
38	Vodafone asserts that the response given by ComReg with regards to collocation is insufficient. ComReg hasn't explained why the percentage of 2G 1800 MHz collocation is so different to the number of 1800 MHz equipped sites. The numbers of sites calculated to have 900 MHz and 1800 MHz do not calibrate against Vodafone's network data.	Not addressed	Not Discussed
39	The 900 MHz effective voice traffic per cell (c1. Ran, row 116, 117, 118) calculated by the model is significantly higher in rural compared to urban areas. This does not seem to calibrate with expected Voice traffic patterns Vodafone's experiences where urban traffic per site is much higher than in rural areas.	Not addressed	New position – land usage has been changed significantly. Traffic distribution in different Geotypes needs to be analysed..
	WACC consideration		
40	The current draft model considers a constant nominal pre-tax WACC of 8.66%. ComReg set out in Vodafone's 3G licence that the appropriate WACC to apply for the period 2003 to 2008 was 18%.	Not addressed	Not Agreed

Model sensitivity analysis on selected items

Proposed model change	Change in model results	
Adjusted spectrum re-use factor to 12	Pure LRIC Nominal value changes from 0.0071 to 0.0085, which equals a 16% change in the overall rate	Not agreed
Adjusted WACC In line with historical values (replacing constant WACC with 18.63% up to 2008).	Pure LRIC Nominal value changes from 0.0071 to 0.0082, which equals a 13% change in the overall rate.	Not agreed
Land area adjustments	Will change overall weight of geographies with different network dimension requirements due to each specific geography this can significantly change the overall results both for the coverage and capacity network.	New position – land usage has been changed significantly. Traffic distribution in different Geotypes needs to be analysed..
Voice-data Conversion factor	Leads to unexpected effects as outlined in the main body of the response. Requires revision of current model.	Not agreed

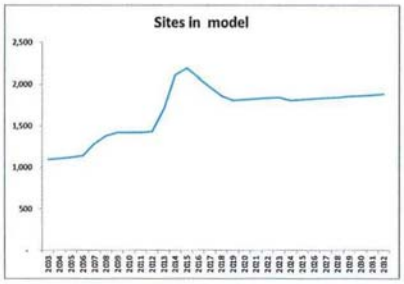
Extract Vodafone Letter 14 December 2015: Annex A, No.1

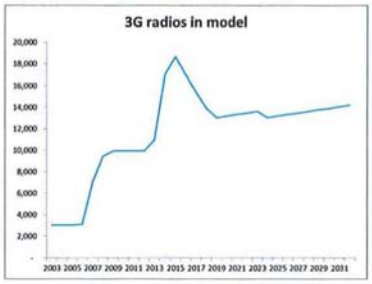
1. Cost recovery / 4G modelling

There seems to be a significant underlying issue with the model workings due to the simplistic approach adopted by ComReg with respect to 4G data migration which distorts the results of the LRIC model.

It is assumed that data traffic migrates from 3G to LTE. However, the LTE traffic is not included in the network dimensioning. The result is that data traffic in the network model declines until the point when the long-term split between 3g and LTE is reached (50:50) and thereafter the traffic in the network model starts to grow again. The result is the anomalous result that the network shrinks between 2015 and 2020 (the key years for the MTR glide path) and then starts to grow again thereafter. This profile is completely unrealistic and results in total costs in the model being significantly under-stated. Of course, total volumes are also under-stated (apart from sites – see below) and therefore the impact on unit cost is ambiguous. **The only thing that can be said with certainty is that the unit costs are wrong.**

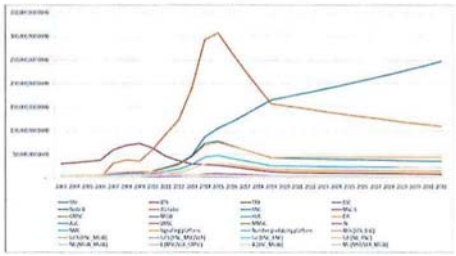
Of more concern is the treatment of site costs. Even though the number of sites declines as traffic migrates from 3G to LTE, the LTE traffic is included in the cost module for the allocation of cost over time. The result is that total costs relating to sites (which are 20% of the cost) are materially under-stated relative to the traffic that is assumed to be carried by the sites. This mismatch between cost and volume unambiguously decreased both the total cost in the model and the unit cost.

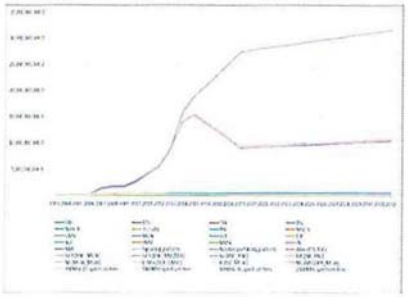




Route factored volumes depreciation

Total cost by element and year after economic





ComReg Response

A 4.2 ComReg does not agree with Vodafone's position that "*the unit costs the model calculates are fundamentally flawed and cannot form the basis for regulating the Irish termination market*" nor that "*The only thing that can be said with certainty is that the unit costs are wrong*". Vodafone's position appears to be based on the treatment of LTE in respect of four related modelling parameters. These LTE related modelling parameters are as follows:

i. the treatment of LTE in the model;
ii. the migration of data traffic from 3G to LTE;
iii. total volumes; and
iv. treatment of site costs.

Each of these is discussed in turn below:

i) The treatment of LTE in the model

A 4.3 Vodafone states that "*The LTE is not included in the network dimensioning*".

A 4.4 ComReg's position on the treatment of LTE in the Final MTR Model is fully reasoned in the Decision Document (in particular in paragraphs 7.69-7.84) and in the Final Deloitte MTR Model Specification Document for Ireland.

A 4.5 Vodafone's submission to the Original MTR Consultation stated that it *"agrees that based on the likely deployment of LTE and the level of its use to carry voice in the time period for the proposed price control it is appropriate not to model LTE"*.[269] ComReg notes that Vodafone's submission to the Supplementary Consultation did not submit any further views on the treatment of LTE in the model.

ii) The migration of data traffic from 3G to LTE

A 4.6 Vodafone states that "*data traffic in the network model declines until the point when the long-term split between 3G and LTE is reached (50:50) and thereafter the traffic in the network model starts to grow again. The result is the anomalous result that the network shrinks...and then starts to grow again*". ComReg does not agree that this "anomalous".

A 4.7 The treatment of LTE in the model is fully reasoned in the Decision Document.

A 4.8 ComReg's position on the migration of traffic from 3G to LTE in the Final MTR Model is fully reasoned in the Decision Document (in particular in paragraph 7.46) and in the Final Deloitte MTR Model Specification Document for Ireland.

[269] Vodafone's response to the Original MTR Consultation, page 13.

iii) Total volumes

A 4.9 Vodafone states that "*…total volumes are also under-stated*". ComReg does not agree with this statement.

A 4.10 ComReg's position on data volumes in the Final MTR Model is fully reasoned in the Decision Document (in particular in paragraphs 6.49-6.60) and in the Final Deloitte MTR Model Specification Document for Ireland.

A 4.11 Furthermore, with respect to the appropriate data volumes to be included in the model, Vodafone's submission to the Supplementary MTR Consultation stated *"… Scenario A, excluding a significant portion of dongle traffic, is the more appropriate way of analysing MTR cost".*

iv) Treatment of site costs

A 4.12 Vodafone states that "*…total costs relating to sites (which are 20% of cost") are materially under-stated relative to the traffic that is assumed to be carried by the sites*". ComReg does not agree with this statement.

A 4.13 As noted, in paragraph 8 of the Decision Document, a *"pure LRIC cost standard means that the relevant increment considered is the wholesale voice call termination service and it excludes a mark-up for any common costs which would not be avoided if then wholesale voice call termination service was no longer supplied".*

A 4.14 In order to determine the pure LRIC of mobile termination the MTR Model is required to include the relevant elements that are used only by voice services and it does not need to include those mobile network elements that are dedicated to mobile data services as they are not relevant to the increment of mobile voice termination. As noted in the Final Deloitte MTR Model Specification Document for Ireland this approach *"avoids introducing unnecessary calculations in the dimensioning, purchasing profile and cost attribution, for elements which are not related to voice termination and which thus cannot be considered as a contributor to the pure LRIC of this service"*[270].

[270]See Section 5.3, page 51 of the Final Deloitte MTR Model Specification Document.

A 4.15 Consequently, the site costs relevant for the calculation of the pure LRIC for mobile termination voice services are determined by the sites associated with 2G and 3G radio technologies. As LTE is not explicitly modelled and is assumed to not carry voice traffic, any site costs associated with LTE will not be incremental to the wholesale voice termination service. Furthermore, as the number of sites is calculated from the outputs of 2G and 3G cell dimensioning, the pattern of declining site numbers in the model (as noted by Vodafone) is entirely consistent with the decline in overall traffic as the model assumes that data traffic migrates to LTE.

Extract Vodafone Letter 14 December 2015: Annex A, No. 2

2. Spectrum re-use

Vodafone remains concerned that ComReg have chosen to apply a spectrum re-use factor of 10. This is out of line with other European models and generally applicable network deployment practices. We therefore suggest amending the model and including a spectrum re-use factor of 12.

We believe that in order to provide a reasonable quality service to customers a re-use factor of 12 should be used. This factor has been widely applied in other European models and used, for instance, by regulators in Portugal, Romania and the UK. In Ireland, we have had particular problems in obtaining access to sites to use for base station locations. Because of this we have had to use sub-optimal locations, making frequency planning more difficult and making it more important to avoid interference. This would lead to requirement to use a higher re-use factor.

Various labelling schemes are used to describe frequency re-use schemes. The standard model divides the available frequencies among a cluster of 4 sites, each sectored into 3 cells (i.e. among 12 cells.) This pattern is most commonly referred to as a 4-12 reuse pattern, though sometimes this same scheme is referred to as a 1-4 pattern. In the labelling used in the model this scheme corresponds to a reuse factor of 12. This frequency re-use scheme was the one we referred to in our original data set and later submissions to ComReg. (In our initial data we also referred to a separate re-use scheme for Omni directional site in rural areas – but as a driver for the model this is not relevant given the very small number of Omni-direction sites).

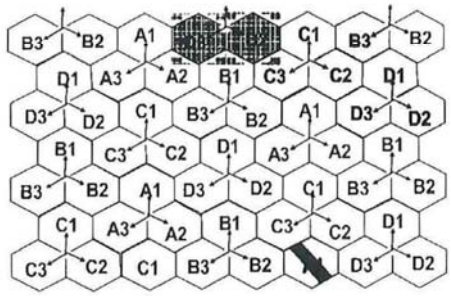


Fig 1 4/12 re-use pattern. Re-use Factor 12.

Higher levels of re-use result in more interference between sites – this interference removes some available capacity from each cell: creating a more complex capacity calculation.

ComReg have shown inconsistency in not following the European norm in choosing this parameter whereas they have justified other parameters such as WACC by quoting these precedents.

Proposed change: Change spectrum re-use factor from 10 to 12	
2016 Pure LRIC value before change	2016 Pure LRIC value after change
€ 0.0084	€ 0.0096

ComReg Response

A 4.16 Vodafone states that "*the spectrum re-use factor of 10…is out of line with other European models and generally applicable network deployment practices*". ComReg does not agree.

A 4.17 ComReg's position on the re-use factor in the Final MTR Model is fully reasoned in the Decision Document (in particular in paragraph 7.184) and the Final Deloitte MTR Model Specification Document for Ireland.

A 4.18 It should be understood that the re-use factor of 10 is an average re-use factor across the whole network. While it is possible that a higher re-use factor may be necessary and appropriate in some parts of the network (for example where there are small radii cells giving the potential for greater inter-cell interference), this is balanced by areas where lower re-use factors can be optimally deployed in order to give greater spectral efficiency. In addition, as GSM has developed, interference limiting technologies (e.g., frequency hopping, dynamic power control, improved shape antennas etc.) have allowed networks to reduce the average re-use factors and therefore increase the spectral efficiency without degrading the quality of service

A 4.19 The model has been built to ensure that the hypothetical efficient operator's network provides a high quality of service to customers. As such the parameters chosen have been conservative as a whole, and it is misleading to focus on the re-use factor in isolation. At various stages in the development of the model, it has been calibrated against known networks in order to examine the predicted number of sites, cells, radios etc. for given traffic loads. Increasing the re-use factor will cause the model to deploy additional cells in order to counter the decrease in available spectrum density for any particular traffic load and will therefore change these calibration points. This may therefore cause other second order effects in the model which would then require further parameter adjustments, resulting in an ambiguous effect on total cost.

A 4.20 In addition, ComReg does not agree with Vodafone's statement that "*ComReg…is not following the European norm*". ComReg notes that the relevant re-use factor used in other NRA MTR models (some of which are not publicly available) varies and, as discussed above, it cannot be viewed in isolation from other parameters in the model.

Extract Vodafone Letter 14 December 2015: Annex A, No. 3

3. Busy Hour uplift

In paragraph 3.156 ComReg sets out that there is a 10% Busy Hour uplift to recognise geographic and localized busy hour variations. Historically the uplift required to deal with these effects was materially higher than 10% e.g. in 2004 Vodafone experienced a factor of [redacted]

ComReg Response

A 4.21 Vodafone states that "*Historically the uplift required to deal with these effects was materially higher than 10% e.g. in 2004 Vodafone experienced a factor of 20%*". ComReg does not agree with this statement.

A 4.22 ComReg's position on the Busy Hour uplift in the Final MTR Model is fully reasoned in the Decision Document (in particular in paragraphs 7.112-7.118) and the Final Deloitte MTR Model Specification Document for Ireland.

Extract Vodafone Letter 14 December 2015: Annex A, No. 4

4. TRX and 3G radio dimensioning

The model has been adjusted to round up the required TRX number when the required TRX in a cell is calculated as being between 0 to 1, but not when the TRX needed is another fractional amount, e.g. 1.4. This is incorrect – the required TRX in each cell should be rounded up an integer number of TRX.

In a network of cells with varying traffic demands each individual cell need to have adequate capacity for the demand – this inevitably leads to a requirement for more TRX than would be calculated by an averaging process.

In the example 7.189 of the ComReg notification document, an example of 200 cells sites, 100 needing 3 TRX and 100 needing 4 is given. In a real network cells will have a TRX demand that is a real number rather than an integer. In each site the number of TRX must be rounded up in order to provide the required Grade of Service. This site by site rounding up of TRX is an essential part of planning a real network - and a significant driver of cost.

ComReg Response

A 4.23 Vodafone states that "*…the required TRX in each cell should be rounded up an integer number of TRX*". ComReg does not agree. ComReg's position on the TRX and 3G radio dimensioning in the Final MTR Model is fully reasoned in the Decision Document (in particular in paragraphs 7.188-7.189) and the Final Deloitte MTR Model Specification Document for Ireland. As set out in paragraph 7.188 of the Decision Document, the MTR Model has been developed on the basis of an average cell configuration in each geotype. Consequently, *"*[a]*s the model is developed on an average cell basis, an average value above 1 does not necessarily need to be an integer, as not all cells are facing equal amounts of traffic. A non-integer value of average number of TRXs or 3G radios reflects the assumption that all cells are not identical. Consequently, ComReg considers its approach to be a realistic reflection of actual network designs."*

A 4.24 With respect to Vodafone's statement that "*in a real network cells will have a TRX demand that is a real number rather than an integer*", ComReg reiterates that the model is developed in this regard on a geotype basis rather than at the site level. Therefore, the required TRX in each cell does not have to be rounded up to an integer number of TRX as this would be incorrect, as set out in paragraphs 7.189-7.192 of the Decision Document .

Extract Vodafone Letter 14 December 2015: Annex A, No. 5

5. TRX Time Slots

Traffic timeslots per carrier. The model assumes Traffic carrying timeslots per TRX of 7.5; this is not a realistic figure. The average figure in the Vodafone Network is 6.8, to allow for our typical signalling allocation of BCCH+2 SDCCH.

ComReg Response

A 4.25 Vodafone states that the assumed timeslots per TRX of 7.5 in the model "*is not a realistic figure*" and that the "*average figure in the Vodafone Network is 6.8, to allow for our typical signalling allocation of BCCH+2 SDCCH*". As set out in paragraph 7.186 of the Decision Document, *"ComReg believes that its proposed approach for defining the number of traffic timeslots and the approach suggested by Vodafone are both reasonable."*

A 4.26 However, as further set out in paragraph 7.186 *"*[t]*he extent of traffic timeslots per TRX is* dependent *on the configuration of TRXs in the network and in our view, the value of 7.5 timeslots per TRX — which is extensively used in other NRA models (some of which are not public) — appears reasonable and appropriate."*

A 4.27 Furthermore, as per paragraph 7.187 of the Decision Document, *"it is agreed that as the* 900MHz *GSM spectrum is reduced, the average value of timeslots per TRX may decline. However, it should be recognised that the converse is also true: under high levels of 900MHz GSM traffic in the past, one may argue for a higher average figure. On balance the current figure* [i.e., 7.5] *appears reasonable and appropriate."*

Extract Vodafone Letter 14 December 2015: Annex A, No. 6

6. Alignment of hypothetical efficient operator outputs with costs incurred by actual operators

The cumulative effect of using reuse, uplift, and dimensioning parameters that are unrealistic is to produce a modelled network that is too small and has costs that do not fairly reflect a real network. This would have been clear to ComReg if they had carried out the type of Top-down calibration that is normal in these processes. We understand that a hypothetical model will not produce outputs that align exactly with a real network, but the scale of difference in this case is outside a range that could be driven by higher efficiency.

- **Traffic:** 2G traffic too low. Peaks at 15867 in 2009 (Networks.d1 Load)
- **TRX**: Number of TRXs of a "hypothetical operator" would be less than [redacted] of that observed in the Irish market today 6517 in 2009 (Networks.b1 Load Outputs). This means that the model underestimates costs that a typical operator would accrue.
- **Costs:** Costs should align with real costs in Irish networks. A calibration of the model against these costs should be a normal part of the model building process.

It is also concerning that even within their own notification document ComReg appears to contradict themselves by claiming on the one hand that a TD reconciliation would not be appropriate and on the other that a general calibration both in BU and TD terms has been carried out. This does not raise the confidence in the model portrayed as the 'correct' and 'final' model.

"4.21 With respect to Vodafone's request for a TD reconciliation of the model, ComReg does not consider a TD approach to be appropriate in this context. ...

"7.225 A general calibration has been carried out, both in BU and TD terms. The extent of the granularity of calibration has been subject to data availability. ...

ComReg Response

A 4.28 This issue is addressed in the decision document. See paragraphs 4.4-4.6; 4.21; 4.23; 5.15; 5.20-5.21; 7.24; 7.26; 7.225, and 8.14. These respective paragraphs have been extracted below for ease of reference.

4.4 In the Original MTR Consultation, ComReg proposed that a BU methodology was the most appropriate means of developing an MTR Model for the purposes of MVCT in the Irish market.

4.5 In the Original MTR Consultation, ComReg stated that a major difficulty in developing TD models for mobile operators is the lack of sufficient detail within operator accounts and the fact that the information available can contain inefficient costs and other legacy issues. In addition, if ComReg were to model the respective individual Irish mobile operator inputs directly this would inevitably create asymmetric costs and therefore asymmetric MTR rates. This could lead to a distortion of competition with regard to how costs are recovered from mobile and fixed operators and would be inconsistent with the 2009 Termination Rate Recommendation.

4.6 As noted in the Original MTR Consultation, the proposed MTR Model is a BU model of a hypothetical efficient mobile operator and, therefore, is not specifically intended to mirror the actual costs of any specific Irish operator(s). The model is not a purely theoretical exercise since it has, in very material respects, been based on data provided by the Irish 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 active in the Irish market…

4.21 With respect to Vodafone's request for a TD reconciliation of the model, ComReg does not consider a TD approach to be appropriate in this context. Following the approved merger of Three and Telefónica, the now merged MNO entity is unlikely to be in a position to provide a combined and meaningful TD model due to its limited history. Therefore, a TD approach would only be more burdensome. Furthermore, there is a risk that a TD approach would be less capable of calculating appropriate symmetric MTRs for a hypothetical efficient existing mobile Irish operator. In particular, due to the recent merger, a reconciliation between TD and BU could only be meaningfully derived for Meteor and Vodafone[271]. Finally, the issue of TD reconciliation must be seen in the context of the fact that, in arriving at a BU MTR model, ComReg has taken into account operator provided data (received from all six MSPs designated with SMP) and having regard for efficiencies and economies of scale, calibrated the model accordingly (see paragraph A 4.37)…

4.23 The Final MTR Model has also been calibrated to the extent data availability allowed for a TD calibration[272]. Specifically:

- *Unit costs (Opex and Capex) have been compared against information submitted to ComReg by Irish mobile operators in response to the First Information Request in addition to data from other publicly available MTR models;[273] [274]*
- *The modelled operator costs in the Final MTR Model have been compared against publicly available segmented financial statements*

[271] It is important to note that while separated accounts by service could guide further calibration these are not available from Vodafone.
[272] In this regard, a calibration has been carried out with respect to the dimensioning of the hypothetical efficient operator's network and this did not result in a reconciliation of modelled outputs.
[273] See 6.1.1 of the Final Deloitte MTR Model Specification Document.
[274] As the model does not include elements related to, for example LTE, as these would have no impact on voice termination, the overall modelled network costs may not as accurately reflect actual total costs incurred by operators.

of Eircom in the financial year ending 2012 for its mobile operator (Meteor);[275] *and*

- *The number of network elements deployed by the modelled operator in 2013 (i.e., the base year) in the Final MTR Model has been compared on an element-by-element basis against information submitted to ComReg by Irish mobile operators in response to the First Information Request…*

5.15 In the Original MTR Consultation, ComReg noted that while the Draft MTR Model is not intended specifically to mirror the actual costs of a specific Irish mobile operator currently active in the market, it should reflect Irish conditions and therefore should be informed by actual or stated cost or other data that Irish operators submitted to ComReg.[276] *In determining the structural implementation of the Draft MTR Model, ComReg proposed that the model should be developed using a modified scorched node methodology. This allows for the modelling of efficient costs and scale while also enabling costs and technology assumptions to be more closely aligned with those actually faced by the MSPs in the Irish market…*

5.20 Similarly, a top-down calibration was carried out based on the limited financial data submitted to ComReg by mobile operators. However, as this information was explicitly marked as confidential it was not appropriate to directly quote the results of this analysis. Furthermore, as the model results were provided to all operators, an absolute or relative comparison against these outputs would have potentially led to operators being able to infer certain MNO cost data.

[275] Ibid.
[276] The operator data received was assessed by ComReg and its external advisers with the view of identifying data which was most representative of a hypothetical efficient mobile operator in an Irish context.

5.21 With respect to Vodafone submission set out in paragraph 5.17 (i), ComReg can confirm that traffic volumes; network parameters; and cost inputs received from Irish mobile operators in response to ComReg's The First Information Request and the Second Information Request were used in developing the Draft MTR Model. The resulting outputs (i.e., network elements and cost outputs) were compared against data provided by Irish mobile operators and data from other publicly available MTR models. See paragraph 4.23. Consequently, ComReg maintains the view that it is appropriate to use operator data provided by each of the six MSPs in order to ensure that the modelled inputs adequately account for the actual cost; network design; and service demand parameters as provided by the operators (i.e., the structural-implementation)…

7.24 In response to Vodafone's concerns expressed in paragraphs 7.22-7.23 that "the modelling of a hypothetical efficient existing operator should yield results which align strongly with the actual deployments of MNOs normalised for market share", ComReg does not agree. Such an outcome, as suggested by Vodafone, would only arise if Irish MSPs followed the assumptions being applied to the modelled hypothetical efficient operator and for MSPs to have adopted the modern equivalent asset (MEA) principles. MSPs would also have had to achieved the same efficiency that is assumed for the modelled hypothetical efficient operator, that forward planning never significantly deviates from the customer demand, that inertia and backward capability has not hampered the operator's network roll-out and that investments have always been made on time to meet demand…

7.26 In ComReg Decision D12/12 ComReg stated that if the regulation of termination charges was based on the actual costs of the Service Provider, this would not provide the right incentives for Service Providers to innovate and increase efficiency.[277] *Notwithstanding this, various parameters in the Final MTR Model are set to match real world conditions (e.g. to ensure that the modelled operator is not unrealistically efficient). In this regard, a calibration has been carried out with respect to the dimensioning of the hypothetical efficient operator's network and this did not result in a reconciliation of modelled outputs. In general, ComReg is of the view that the outputs of the Final MTR Model reasonably align to the reported figures by the actual operators while controlling for market shares. ComReg confirms that calibration exercises have been satisfactorily performed, as detailed in paragraph 4.23 (and 6.1 of the Final Deloitte MTR Model Specification Document* published on ComReg's website as ComReg Document No. 16/09a[278]*).*

7.225 A general calibration has been carried out, both in BU and TD terms. The extent of the granularity of calibration has been subject to data availability. Historical and forecasted information was taken into account to guide input assumptions, such as the input costs and capacity assumptions for transmission. Calibration is further explained in paragraphs 5.19-5.21…

8.14 In relation to Eircom's submission regarding mark-ups (see paragraph 8.8), ComReg can confirm that these mark-ups have been informed by the level of mark-ups used in other jurisdictions and also have been compared against the limited financial statement data reported by operators. Costs accounted for by the indirect capex include (but are not limited to) a large range of items such as accommodation, power equipment, fire and security, air conditioning, maintenance equipment, office furniture and equipment. Due to the granularity of different cost items, indirect mark-ups are typically used instead.

[277] https://www.comreg.ie/_fileupload/publications/ComReg12125.pdf Page 138
[278] https://www.comreg.ie/_fileupload/publications/ComReg1609a.pdf

Extract Vodafone Letter 14 December 2015: Annex B, No. 1

	Key Points from Vodafone Submission 2014	Updated Comments	Dec15 Comments
1	International practice is Model supported by the completion of a LRIC+ or LRAIC model in parallel with a LRIC model.	LRAIC+ supplied – but completely inadequate documentation supplied and values produced not in line with norms of LRIC/LRAIC+.	No change

ComReg Response

A 4.29 This is addressed in paragraphs A 2.8-A 2.11 of Appendix 2 of the Decision Document. These paragraphs have been extracted below for ease of reference.

8. *The Updated MTR Model shared with Vodafone (and the other MSPs designated with SMP) at the Supplementary MTR Consultation stage contained the LRAIC+ calculated MTRs and associated workings. For completeness, based on the inputs of the Final MTR Model, as set out in this report and the Final Deloitte MTR Model Specification Document, ComReg has presented the LRAIC+ based MTRs:*

    d. *1.06 Euro cent per minute for 2016;*

    e. *0.94 Euro cent per minute for 2017; and*

    f. *0.83 Euro cent per minute for 2018.*

9. *The Supplementary Consultation identified that the updated Draft MTR Model was producing a pure LRIC MTR that exceeded the LRAIC+ rate under Scenario B in 2019[279]. Footnote 28 on Page 17 noted that "…due to the difference in the two costing methodologies, there is no mathematical relationship that would require LRAIC+ to be greater than or equal to pure LRIC [and in] certain, less common cases, LRAIC+ may result in lower calculated costs than pure LRIC for the same set of traffic services"[280].*

10. *As noted in the Supplementary MTR Consultation, LRAIC+ incorporates an averaging algorithm that proportions the costs per service via route-factor volumes of annual traffic. In some scenarios where the set of services considered represents a very small proportion of total network traffic volumes, pure LRIC may indeed exceed LRAIC+.*

[279] This can be explained by the comparison of the cost contribution by network elements. The cost contribution of sites and 3G radios to pure LRIC exceeds their respective contribution to LRAIC+.
[280] http://www.comreg.ie/_fileupload/publications/ComReg1519.pdf

11. *While the total network costs for all services are the same for the pure LRIC and LRAIC+ calculations the methodologies for attributing costs to services are inherently different. While LRAIC+ is typically higher due to its inclusion of common costs, there is no mathematical relationship between the two methodologies that would imply that the LRAIC+ for a particular service is always larger than or equal to the pure LRIC for that service. Moreover, the two methodologies are calculated independently in the model. Consequently, there is no constraint that LRAIC+ should always exceed pure LRIC. Instead the two methodologies share a common set of initial calculations which allows them to use a common set of inputs and intermediate calculations and therefore to be included in a single model.*

Extract Vodafone Letter 14 December 2015: Annex B, No. 2

2	"One of the striking figures is the lack of an in depth sensitivity analysis which is considered good practice in any model of this complexity."	Not addressed - this remains a significant issue	Not addressed

ComReg Response

A 4.30 In our response to the European Commission's first Request for Information dated 1 December 2015, we provided reasoning as to why an in depth sensitivity analysis is fraught with difficulty. Specifically, *"[t]he drivers of the change to the pure LRIC MTR are interrelated and so adjusting one of them may affect others. These drivers also may have offsetting effects on the value of pure LRIC. Attributing the exact changes to pure LRIC to each of the drivers (each associated with the respective model modification) is not possible to document due to the interdependence of the drivers. Moreover, their impact on pure LRIC depends on the sequence of the execution of the respective modifications that have been performed. Therefore, it is not possible to attribute one specific value of impact on pure LRIC from each of the modifications undertaken."*

Extract Vodafone Letter 14 December 2015: Annex B, No. 3

3	ComReg has not checked		
	Historical WACC	Outstanding issue	Not agreed

ComReg Response

A 4.31 This issue is addressed in paragraphs 9.70-9.72 of the Decision document. These paragraphs have been extracted below for ease of reference.

9.70 ComReg considers that the use of a constant WACC is appropriate. This provides mobile operators with a reasonable rate of return on investment further to Regulation 13(2) of the Access Regulations. This is the first time that cost-oriented MTR prices have been set with reference to a cost model in Ireland.[281] Given the uncertainty surrounding future WACC rates and the lack of information surrounding the returns on MTR services in the past, a time-varying WACC is not considered appropriate and may result in over- or under-recovery of network investment (capex and opex) over the modelled time period and potentially across different price control periods.

9.71 With respect to Vodafone's submission regarding a time-varying WACC, ComReg does not agree. The circumstance that there may have been higher WACCs in the past in the time series of the Draft MTR Model – which, as noted in paragraph 9.70, ComReg does not accept as being proven based on the evidence put forward by Vodafone – does not have any necessary implications for the WACC chosen under the Final MTR Model. The objective of the Final MTR model is not to isolate the cost of capital during a specific period in the past. Rather, its purpose is to inform the cost of capital for the relevant period, which will, overwhelmingly, be a function of the costs of capital today and into the future. The fact that it can be observed ex post that WACC may in some specific past period(s) have been different to the WACC used in ComReg's model has no necessary implications for ComReg's calibration of a cost input used in an ex ante cost model such as the Final MTR Model. This applies in particular given that "there are important forward looking aspects of the model (such as price trends, outputs, technology shifts, etc.).

[281] The 18% WACC rate that Vodafone identified (see paragraph 9.66) did not arise from an assessment undertaken by ComReg (or its predecessor). In fact the WACC of 8.63% is the first instance in which a regulated WACC for mobile networks was set by ComReg.

9.72 Finally, ComReg is aware that the application of a single and consistent WACC value for the full time horizon of the model is observed in other NRA models, such as the Swedish PTS model, Spanish CNMC model, Romanian ANCOM model and Portuguese ANACOM model.

Extract Vodafone Letter 14 December 2015: Annex B, No. 13[282]

Choice of Pure LRIC			
Procedural Issues- Failure to use additional market information			
	Form of the modelled operator		
13	On this basis a correctly constructed model based on the hypothetically efficient existing operator and an actual operator at a given market share should be strongly aligned.		Not agreed

ComReg Response

A 4.32 This issue is addressed in paragraphs 2.9-2.10 and 5.20 of the Decision document. These paragraphs have been extracted below for ease of reference.

2.9 While the Draft BU Pure LRIC Model is a bottom-up model of a hypothetical efficient mobile operator and, therefore, is not intended to mirror the costs of a specific Irish MSP, it has been based on data provided by the Irish 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 MSPs currently in the Irish market.

2.10 In developing the Draft BU Pure LRIC Model, ComReg has considered operator data from each of the six SMP MSP submissions and ensured that the model inputs actually used have adequately taken account of actual costs provided by operators after being adjusted for efficiencies. In some cases data is lacking entirely; in others it is incomplete or insufficiently granular for the purposes of the Draft BU Pure LRIC Model. Where data is absent, unavailable or incomplete, it has been necessary for ComReg and its advisers to exercise complex judgements as well as an understanding of the relevant inputs and costs associated with them. Where appropriate, such judgement has also been exercised in the light of experience in other jurisdictions…

5.20 With respect to Vodafone submission set out in paragraph 5.17 (i), ComReg can confirm that traffic volumes; network parameters; and cost inputs received from Irish mobile operators in response to ComReg's The First Information Request and the Second Information Request were used

[282] Note that in the Vodafone letter dated 14 December 2015 it does not include any points using a numeral between 4-12.

in developing the Draft MTR Model. The resulting outputs (i.e., network elements and cost outputs) were compared against data provided by Irish mobile operators and data from other publicly available MTR models. See paragraph 4.23. Consequently, ComReg maintains the view that it is appropriate to use operator data provided by each of the six MSPs in order to ensure that the modelled inputs adequately account for the actual cost; network design; and service demand parameters as provided by the operators (i.e., the structural-implementation).

Extract Vodafone Letter 14 December 2015: Annex B, No. 16[283]

16	In line with the text of the Termination Recommendation ComReg should carry out a reconciliation of the results of a bottom-up model with the results of a top-down model in order to produce as robust results as possible. 3.32 There is an associated risk however that some of the assumptions adopted in a BU model may prove to be unrealistic for an actual operator to achieve. For this reason, the 2009	Not addressed	Not agreed
	Termination Rate 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 allocation between a hypothetical and a real operator."*[37]		

ComReg Response to Vodafone Letter 14 December 2015 Annex B No. 16

A 4.33 This is addressed in paragraph A 4.28 i.e., ComReg Response to Vodafone Letter 14 December 2015: Annex A, No. 6.

[283] Note that in the Vodafone letter dated 14 December 2015 it does not include points using a numeral reference between 14-15.

Vodafone Letter 14 December 2015: Annex B No. 17

17	The calibration referenced in paragraph 3.34 of the consultation document is limited and is flawed as the maximum and minimum range which is used for comparison includes those operators who use National Roaming and/or are 3G only. Vodafone notes that while ComReg's consultants compare the number of modelled TRXs to the number of TRXs actually deployed by operators this second figure was not directly asked for in the data gathering carried out by ComReg and must have been derived or imputed from some other source.	Not addressed	Not agreed

ComReg Response to Vodafone Letter 14 December 2015 Annex B No. 17

A 4.34 With respect to Vodafone's view on calibration this is addressed in paragraphs A 4.28 i.e., ComReg Response to Vodafone Letter 14 December 2015: Annex A, No. 6.

A4.24 With respect to Vodafone's view on TRX, this is addressed in paragraphs A 4.23-A 4.24.

Extract Vodafone Letter 14 December 2015: Annex B No. 18

18	In respect of the assumed or modelled inputs, ComReg has not checked that the historical WACC, used as a model input, reflects its own historical estimation of the WACC for the Irish market, nor that it reflects the WACC that ComReg included in the Mobile Licenses of Operators. .	Not addressed	Not agreed

ComReg Response

A 4.35 This is addressed in paragraph A 4.31 i.e., ComReg Response to Vodafone Letter 14 December 2015 Annex B, No. 3.

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Extract Vodafone Letter 14 December 2015: Annex B, No. 19

19	In respect of the outputs, there does not appear to be any attempted comparison between the number of sites that the model predicts for a certain aggregated volume of traffic and the actual number of sites deployed by operators for that same volume. If there was a difference this would require explanation as being related primarily to efficiency issues before the model output could be relied upon.	Not addressed	Not discussed

ComReg Response

A 4.36 This issue is addressed in paragraphs 7.61-7.65 of the Decision document. These paragraphs have been extracted below for ease of reference.

7.61 ComReg has assumed that a higher share of voice traffic is carried on 2G in rural areas but that this declines to 40% in rural areas. The equivalent shares assumed in urban and suburban areas is 5% respectively.

7.62 The model assumes further roll-out of 3G infrastructure in denser geotypes and a less intensive use of 3G infrastructure in rural geotypes. ComReg has reviewed the relative technology mix and it appears appropriate that the proportion of traffic carried by 2G and 3G should vary in rural areas compared to more urban geotypes. This revision takes into account the fact that less traffic is expected to be carried using 3G in rural areas but that the differential declines over time as additional 3G infrastructure is deployed. The inputs have also been guided by a calibration exercise, aligning the number of 2G and 3G elements deployed by the hypothetical efficient operator with the actual number of elements deployed by the Irish MNOs. The 2G/3G proportions of traffic by geotype are now considered to be appropriate.

7.63 In summary, the proportion of voice traffic by technology and geotype assumed in the Final MTR Model is as follows:

Original MTR Consultation (2013)

	2G	3G
Urban	67.9%	32.1%
Suburban	67.9%	32.1%
Rural	67.9%	32.1%

Supplementary MTR Consultation (2013)

	2G	3G
Urban	33.8%	66.2%
Suburban	33.8%	66.2%
Rural	53.4%	46.6%

Final MTR Decision (2013)

	2G	3G
Urban	33.8%	66.2%
Suburban	33.8%	66.2%
Rural	65.9%	34.1%

Original MTR Consultation (2025)

	2G	3G
Urban	40.0%	60.0%
Suburban	40.0%	60.0%
Rural	40.0%	60.0%

Supplementary MTR Consultation (2025)

	2G	3G
Urban	5.0%	95.0%
Suburban	5.0%	95.0%
Rural	40.0%	60.0%

Final MTR Decision (2025)

	2G	3G
Urban	5.0%	95.0%
Suburban	5.0%	95.0%
Rural	40.0%	60.0%

7.64 Further to Vodafone's submission detailed in paragraph 7.57, ComReg notes that the reference table had been mislabelled as "effective voice traffic" instead of the revised correct labelling "effective traffic". The data per cell included 2G voice and data traffic in Busy Hour Erlang equivalents and this labelling has been corrected in the Final MTR Model.

7.65 This results in a higher traffic load on 900MHz network due to the assumption that data traffic in rural network is more reliant on the 2G network compared to the more dense geotypes. This assumption is based on the operator provided data on propensities to use 2G and 3G technologies by geotype and the voice migration from 2G to 3G.

Extract Vodafone Letter 14 December 2015: Annex B, No. 20

20	Furthermore given the hypothetical nature of the model produced a financial calibration, it should have been carried out using real financial data obtained from operators. To assist this Vodafone submitted extensive financial data as part of the data gathering exercise. No reference has been made to a suitable financial	Not adequately addressed. The short comparison to Meteor figures is not adequate.	Not agreed
	calibration.		

ComReg Response

A 4.37 With respect to Vodafone's view on calibration this is addressed this is addressed in paragraphs A 4.28 i.e., ComReg Response to Vodafone Letter 14 December 2015: Annex A, No. 6.

Extract Vodafone Letter 14 December 2015: Annex B No. [2G Busy hour traffic]

Q. 2 Do you agree with ComReg"s preliminary views regarding the appropriateness of the service parameters and their application in the Draft BU Pure LRIC Model? 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			
	2G Busy hour traffic		
	Calculation using working days produces a 2G traffic in BH of 10,618 in 2011. Vodafone's 2G BH traffic at this time was more than 40,000 Erl. Taking this as the traffic for a 40% market share we would expect the HEO with 25% market share to have a busy hour traffic of approximately 25k ERL. While we understand that a there will be variation between the HEO and actual traffic experienced by an operator this variation appears outside reasonable variation.	Not adequately addressed. Although a small change was made model outputs are still far from real network data.	Not agreed

ComReg Response

A 4.38 This is addressed in paragraphs 6.68-6.71. These paragraphs have been extracted below for ease of reference.

> *6.68 With respect to Vodafone's concerns detailed in paragraphs6.64-6.67 and in particular the modelled Busy Hour Erlang in 2011, ComReg notes that for correct comparison Vodafone should have referred to the route-factored volumes which stood at ✂ Busy Hour Erlang for 2G traffic in 2011 (as opposed to ✂ to which it refers) in the Draft MTR Model that accompanied the Supplementary MTR Consultation. See also paragraphs 6.69-6.71.*

6.69 The figure of ✂ Busy Hour Erlang is lower than the ✂ expected by Vodafone. The reason for this discrepancy is because the Draft MTR Model calculated 2G data traffic based on the share of propensity to use 2G data traffic, which is an input informed by MNO responses to The First Information Request, whereas the figure derived in the Draft MTR Model (41MB per subscriber in 2011) does not reconcile with Vodafone's stated 2G data traffic in its submission ✂.

6.70 If we adjusted the input on the propensity to use 2G data traffic upwards to achieve ✂ per subscriber in 2011 this would then result in approximately ✂ Busy Hour Erlang 2G volumes in 2011 as suggested by Vodafone. However, this approach would contradict the figures reported by Vodafone on data traffic usage per technology (i.e., data usage propensities per technology in the Load module: d1.Demand and d2.Forecast) and affect other modelled outputs. Consequently, ComReg does not agree with this approach.

6.71 Furthermore, the assumption of 41MB per subscriber in 2011 as used in the Draft MTR Model is consistent with historic 2G data traffic volumes informed by the responses of other Irish MSPs to The First Information Request.

Extract Vodafone Letter 14 December 2015: Annex B, No. 25[284]

Q. 3 Do you agree with ComReg"s preliminary views regarding the appropriateness of the technological parameters and the network structure (including network design parameters and dimensioning rules) used to model the hypothetical efficient operator's mobile network? 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.			
	Treatment of Spectrum		
	Geographic traffic profile		
25	The 2G/3G proportion of traffic in rural areas is the same as in urban and suburban areas. This is not a reasonable assumption as propagation at 2100MHz, the frequency used by 3G, is limited in rural areas. The proportion of traffic carried in rural areas is then significantly less than urban and suburban areas. In Vodafone's data submission we presented figures showing a lower rural traffic proportion, e.g. 75% of traffic on 2G in 2010.	Significant change has been made to the urban/rural split in the model. This has not addressed the issues raised. Additional work need to be done to fix this issue.	New position – land usage has been changed significantly. Traffic distribution in different Geotypes needs to be analysed..
	Reference: Load > D1 demand		

[284] Note that in the Vodafone letter dated 14 December 2015 it does not include points using a numeral reference between 21-24.

ComReg Response

A 4.39 This is addressed in the paragraphs identified in A 4.36.

A 4.40 With respect to Vodafone's view that *"Traffic distribution in different Geotypes needs to be analysed"*, see paragraph 7.15 of the Decision document (which is extracted below for ease of reader).

> *7.15 Having considered Vodafone's submission that "CSO data generally reflects historical town borders, which have not been changed to reflect the growth in suburban housing", ComReg has revised its approach. ComReg agrees that CSO informed land area classifications may not adequately align with geographic considerations such as density of housing and the commuting spread around urban centre. Given that these geographical considerations influence MNOs' planning decisions, ComReg has therefore reverted to the land area classification that was informed by Eurostat data and information received from Irish MSPs via the First Information Request, as originally proposed in the Original MTR Consultation.*

Extract Vodafone Letter 14 December 2015: Annex B, No. 26

	Re-use Factor		
26	The model uses a re-use factor of 10. We believe that in order to provide a reasonable quality service to customers a re-use factor of 12 should be used. This factor has been widely applied in other European models and used, for instance, by regulators in	Not addressed	Not Agreed
	Portugal, Romania or the UK. In Ireland, we have had particular problems in obtaining access to sites to use for base station locations. Because of this we have had to use sub-optimal locations, making frequency planning more difficult and making it more important to avoid interference. Hence using larger re-use factors than would be needed in cities where optimum locations are available.		

ComReg Response

A 4.41 This issue is addressed in paragraphs A 4.16-A 4.20 i.e., ComReg Response to Vodafone Letter 14 December 2015: Annex A No. 2.

Extract Vodafone Letter 14 December 2015: Annex B, No. 27

	Busy Hour		
27	In relation to ComReg's response of 30 June 2014 to the issue of TRX rounding ComReg sets out that the use of such uplift factors is one of the justifications for the use of averaged and non-integer number of TRXs. In fact it is because the uplift factor is required to deal with localised per cell peak traffic demand effects that such network wide averaging is entirely inappropriate and integer numbers of TRXs must be used.	Not addressed. A change has been made in the model to round fractions between 0 and 1 upwards but does not round up the fractional numbers above 1.	Not Agreed

ComReg Response

A 4.42 This issue is addressed in paragraph A 4.21-A 4.22 i.e., ComReg Response to Vodafone Letter 14 December 2015: Annex A No. 3.

Extract Vodafone Letter 14 December 2015: Annex B, No. 28

	Conversion factors		
28	As stated in the consultation document as well as the model specification, the conversion in the model is based on Erlang based busy hour calculations. The model, however, constructs conversion in a way that is linked to Mbit/s. Basic sensitivity tests of the nominal full rate bit rate in the busy hour show that increasing the data rate for voice produces a lower rate.	Not addressed.	Not Agreed

ComReg Response

A 4.43 This is addressed in paragraphs 7.125-7.130. These paragraphs have been extracted below for ease of reference.

7.125 In the Original MTR Consultation, ComReg set out the network dimensioning methodology, and associated traffic conversion assumptions, that have been applied in the Final MTR Model and this was also detailed in the Draft Deloitte MTR Model Specification Document. Consequently, the check undertaken by Vodafone (as detailed in paragraph 7.122) will not generate the results that Vodafone expected because it inaccurately interpreted ComReg's proposed methodology and the associated assumptions surrounding traffic conversion. Vodafone's submission can be attributed to a labelling issue with respect to the traffic conversion assumptions within the Draft MTR Model and is not due to an error in the Draft MTR Model.

7.126 In order to address this labelling issue, ComReg has renamed the relevant conversion factor in the Final MTR Model to "2G data: Equivalent minutes bit rate".

7.127 As stated in paragraphs 7.119-7.121 the 2G calculations use Busy Hour Erlangs as the unit of measurement[285]. In order to convert the 2G data load (measured in Mbit/s) into equivalent Busy Hour Erlangs the associated bit rate assumption is used. Therefore, changing this bit rate assumption (as described by Vodafone in paragraph 7.122) does not affect the 2G voice Erlang load calculated by the Draft MTR Model, but will change the Erlang equivalent 2G data load.

[285] A 2G minute is assumed to be 1/60 of an Erlang.

7.128 While the dimensioning rule has been re-labelled so that it now references the 3G BH voice traffic in units of MB[286], this update does not impact the overall traffic load, but simplifies the calculation process by avoiding an additional step in conversion. This calculation is consistent with the assumption that 3G elements are dimensioned in units of Mb/s.

7.129 With respect to Vodafone's submission that there is in its view a "lack of transparency" regarding traffic conversion factor in the model, ComReg has addressed this by re-labelling the relevant conversion factor "2G data: Equivalent minutes bit rate" (see paragraphs 7.125-7.128).

7.130 Further details on the voice to data traffic conversion within the Final MTR Model has been provided in the Section 4.3.2 and Section 5.3.1.4 of the Final Deloitte MTR Model Specification Document[287].

Extract Vodafone Letter 14 December 2015: Annex B, No. 30[288]

	Treatment of voice to data conversion		
30	ComReg has set out that it accepted Vodafone's position that the impact on the network of data carrying real time services such as voice is higher than general data usage and stated that this had been accommodated. However no details have been given on how this is done and it is impossible for respondents to comment on whether this issue has been adequately reflected in the model. (See paragraph 3.164 of the consultation document) Given the material deficiencies identified by Vodafone in those model parameters which can be validated and	Not addressed.	Not Discussed
	this lack of transparency, the inability to validate ComReg's approach in respect of this matter raises a material procedural concern.		

ComReg Response

A 4.44 This is addressed in paragraphs A 4.43.

[286] In the Original MTR Model it had been referenced in Erlang values before being converted into MB.
[287] Please refer to ComReg Document No. 16/09a: https://www.comreg.ie/_fileupload/publications/ComReg1609a.pdf
[288] Note that in the Vodafone letter dated 14 December 2015, does not include any points using a numeral 29.

Extract Vodafone Letter 14 December 2015: Annex B, No. 32[289]

	Logical structure of modelled network		
32	Within the last three years transmission elements have absorbed more than 30% of Vodafone's network budget. We do not see that this is reflected in the outputs of the model. In addition the lack of detail and description provided does not allow Vodafone to assess where the discrepancy has been created.	Not addressed.	Not agreed

ComReg Response

A 4.45 This issue is addressed in paragraphs 7.220-7.225. These paragraphs have been extracted below for ease of reference.

7.220 In respect to Vodafone's submission regarding the treatment of transmission being "oversimplified" (see paragraph 7.217), ComReg disagrees. The access network in MTR models is often modelled in more detail than the transmission network which is in line with MVCT specific network elements. As the objective of the current model is to support the determination of appropriate maximum wholesale MTRs to be charged by MSPs in Ireland there may be transmission elements (or parts of elements) that are not modelled, as they are not relevant to termination traffic (see paragraph 7.162). However, as Vodafone's total transmission cost (i.e., both opex and capex) is likely to be included in its reported transmission network cost (see paragraph 7.218), it would imply that comparison to the transmission costs in the Draft MTR Model would be inappropriate.

7.221 Furthermore, services such as data traffic are modelled but the relevant network elements are modelled in less detail, as set out in paragraph 7.220. An LTE network, for example, is not explicitly dimensioned and additional transmission capacity which might be needed for LTE traffic is not included in the model as a result. It follows that the overall modelled network costs are not intended to replicate the actual total costs incurred by operators.

[289] Note that in the Vodafone letter dated 14 December 2015 it does not include any point using a numeral reference 31.

7.222 Having considered the points raised by Vodafone in paragraphs 7.214-7.215 ComReg can confirm that as historic data on the availability of fibre-to-the-site is limited, the Draft MTR Model has been informed by Irish MSP provided data in response to the First Information Request. ComReg implemented a simplifying assumption that a mix of fibre and microwave (MW) is constant per 2G or 3G technology. The 2G sites are based primarily on MW, which is the predominant network technology in early years of the model. 3G only and co-located 2G and 3G sites are slightly more reliant on fibre. Migration of traffic to 3G therefore implies that fibre represents a higher proportion of links in later years of the model.

7.223 Data from Irish MSPs in response to the First Information Request provided information on the proportion of sites backhauled using various transmission media. MW links and fibre links were predominately observed in the data. While self-provided microwave or fibre are capex items compared to leased lines being an ongoing opex item, ComReg does not believe in this context that leased lines are significantly different to this technology. Furthermore, in the long run ComReg would not expect a significant difference in present value costs. Consequently, these assumptions appear appropriate absent the availability of any more accurate data and the Final MTR Model has been finalised on this basis.

7.224 Furthermore, data from Irish MSPs in response to the First Information Request indicated a significant use of MW. ComReg considers that copper-based leased-lines could only have been deployed under Vodafone's suggested scenario (paragraph 7.214) to a limited degree. As ComReg is modelling an established operator with 25% market share in the earlier years of the model it is not considered to be appropriate to use a higher proportion of copper based leased lines given the short time-scale, limited number of potentially impacted sites, and small cost impact.

7.225 A general calibration has been carried out, both in BU and TD terms. The extent of the granularity of calibration has been subject to data availability. Historical and forecasted information was taken into account to guide input assumptions, such as the input costs and capacity assumptions for transmission. Calibration is further explained in paragraphs 5.19-5.21.

Extract Vodafone Letter 14 December 2015: Annex B, No. 33

	Appropriateness of network element costs: Share of NMC and MSC costs.		
33	It appears the model does not take into account any MSC or NMC costs. These costs constitute a very significant contribution to the overall costs of building and operating a network. Management of data parameters for sites and transmission elements constitutes a significant part of these costs. These costs will scale with size of network and thus a portion of the costs should be attributable to the incremental cost of termination	Not addressed.	MSC ports added. Other MSC costs and NMC costs Not Agreed
	Completeness of costs accounted for in the model		

ComReg Response

A 4.46 This issue is addressed in paragraphs 7.202 and 7.204-7.207 of the Decision document. These paragraphs have been extracted below for ease of reference.

7.202 In respect of Vodafone's submission that the model does not take into account any MSC or NMC costs (see paragraph 7.199), ComReg did not treat the MSC or NMC as incremental to MVCT traffic. However, ComReg revised in part its approach in the Updated MTR Model to assign an element cost of €1,200 to the GMSC network element[290]. This reflects the cost of interconnection ports – previously it had been zero.

7.204 For clarity, during the pre-consultation process Irish MSPs offered to review whether or not input data was available on the cost, dimensioning, utilisation and asset life estimate of the MSC-S and GMSC port. This information was used to inform the dimensioning of the two elements and is further discussed in Section 5.3.2.2 of the Final Deloitte MTR Model Specification Document.

[290] The Gateway Mobile Switching Centre (GMSC) is a type of MSC that is used to route calls outside the mobile network.

7.205 Having considered Vodafone's submission that the model does not take into account any MSC or NMC costs (see paragraph 7.203), ComReg further considered the issue of the whether the costs of the MSC or NMC network elements should be incremental with regard to wholesale termination traffic. In this regard, ComReg assessed MTR cost models developed in other jurisdictions and reviewed the information provided by Irish MSPs in response to the First Information Request.

MSC

7.206 International precedent suggests that MSC ports can be incremental with respect to termination traffic, whereas the chassis is not. As the MSC ports can have incremental cost contribution to the pure LRIC MTR, but the MSC chassis does not, the GMSC has been revised to include the costs of PoI-facing ports. Therefore, in light of the evidence from other NRA models and the information gathered during the pre-consultation process, the GMSC is treated as being incremental with respect to termination traffic (i.e., a capex cost of €1,200 per unit has been accounted for — as set out in the Supplementary MTR Consultation). However, the MSC-S dimensioning methodology remains unchanged. The impact on the pure LRIC MTR from this amendment is positive, albeit minor.

NMC

7.207 The NMC includes network management/operational systems as well as core testing and monitoring equipment. It is assumed that one NMC is required throughout the modelled time horizon. ComReg is not aware of any NMC being incremental in other NRA models and have finalised the model accordingly (i.e., a cost has not been accounted for in the Final MTR Model).

Extract Vodafone Letter 14 December 2015: Annex B, No. 35[291]

Q. 5 Do you agree with ComReg's preliminary views regarding the appropriate implementation approach in the Draft BU Pure LRIC Model? Please provide reasons for your response, clearly indicating the relevant paragraph numbers to which your comments refer, along with relevant supporting factual evidence.			
	Consistency and sensitivity checks		
35	Although the consultation document pinpoints that there have been sensitivity and sanity checks the review of the actual model illustrates clear deficiencies.	Not addressed	Not discussed.

ComReg Response

A 4.47 This is addressed in paragraph 5.20. This paragraph has been extracted below for ease of reference.

> *5.20 With respect to Vodafone submission set out in paragraph 5.17 (i), ComReg can confirm that traffic volumes; network parameters; and cost inputs received from Irish mobile operators in response to ComReg's The First Information Request and the Second Information Request were used in developing the Draft MTR Model. The resulting outputs (i.e., network elements and cost outputs) were compared against data provided by Irish mobile operators and data from other publicly available MTR models. See paragraph 4.23. Consequently, ComReg maintains the view that it is appropriate to use operator data provided by each of the six MSPs in order to ensure that the modelled inputs adequately account for the actual cost; network design; and service demand parameters as provided by the operators (i.e., the structural-implementation).*

[291] Note that in the Vodafone letter dated 14 December 2015, does not include any points using a numeric 34.

Extract Vodafone Letter 14 December 2015: Annex B, No. 37[292]

37	ComReg uses carrier capability to calculate user throughputs (c.1 Ran calculations). However, that does not reconcile with reality. Whereas ComReg asserts that 3G carriers are capable of 100% of potential user throughput, in reality practical limits of 50% to 70% apply. Once again given	Not addressed	New position – land usage has been changed significantly. Traffic distribution in different Geotypes needs to be analysed. .distribution needs analysis
	the deficiencies identified in those parameters which can be validated, this lack of transparency and inability to review and comment is a significant procedural concern.		

ComReg Response

A 4.48 This is addressed in paragraph 7.147. This paragraph has been extracted below for ease of reference.

> *7.147 Further, with respect to the point raised by Vodafone in paragraph 7.144 carrier dimensioning has been revised in the Final MTR Model to include utilisation factors. In addition, the calculation of number of carriers per cell has been amended so that it cannot fall below 1 when there is traffic. The 3G uplink calculation follows the same methodology as the 3G downlink dimensioning. Furthermore, checks have been introduced for the downlink calculations, which also implicitly check the uplink calculations.*

A 4.49 With respect to Vodafone's view that *"land usage has changed significantly"*, please refer to paragraph 7.15:

> *7.15 Having considered Vodafone's submission that "CSO data generally reflects historical town borders, which have not been changed to reflect the growth in suburban housing", ComReg has revised its approach. ComReg agrees that CSO informed land area classifications may not adequately align with geographic considerations such as density of housing and the commuting spread around urban centre. Given that these geographical considerations influence MNOs' planning decisions, ComReg has therefore reverted to the land area classification that was informed by Eurostat data and information received from Irish MSPs via the First Information Request, as originally proposed in the Original MTR Consultation.*

[292] Note that in the Vodafone letter dated 14 December 2015, does not include any points using a numeral 36.

Extract Vodafone Letter 14 December 2015: Annex B, No. 38

38	Vodafone asserts that the response given by ComReg with regards to collocation is insufficient. ComReg hasn't explained why the percentage of 2G 1800 MHz collocation is so different to the number of 1800 MHz equipped sites. The numbers of sites calculated to have 900 MHz and 1800 MHz do not calibrate against Vodafone's network data.	Not addressed	Not Discussed

ComReg Response

A 4.50 This issue is addressed in paragraph 7.11. This paragraph has been extracted below for ease of reference.

> *7.11 The methodology for generating 1800MHz co-location parameters by geo-type was revised having obtained information submitted in response to the Second Information Request[293]. This leads to an alternative calculation which generates a profile in line with anticipated results from operators. The adjustment incorporates 2G/3G co-located sites as well as sites with 1800 and 3G collocation. The revision to the 900/1800 2G co-location and the adjusted parameters demonstrate the reversed relationship suggested by Eircom in paragraph 7.8. Co-location of 2G cells and 2G/3G cells is impacted by the additional of further 3G sites to rural locations, which increases the proportion of sites which are furnished with both technologies.*

A 4.51 Please also refer to paragraph A 4.28.

[293] The First Information Request had a September 2013 deadline and the Second Information Request, as above had a September 2014 deadline for receipt of information.

Extract Vodafone Letter 14 December 2015: Annex B, No. 39

39	The 900 MHz effective voice traffic per cell (c1. Ran, row 116, 117, 118) calculated by the model is significantly higher in rural compared to urban areas. This does not seem to calibrate with expected Voice traffic patterns Vodafone's experiences where urban traffic per site is much higher than in rural areas.	Not addressed	New position – land usage has been changed significantly. Traffic distribution in different Geotypes needs to be analysed. .

ComReg Response

A 4.52 This is addressed with respect to paragraph A 4.36.

Extract Vodafone Letter 14 December 2015: Annex B, No. 40

	WACC consideration		
40	The current draft model considers a constant nominal pre-tax WACC of 8.66%. ComReg set out in Vodafone's 3G licence that the appropriate WACC to apply for the period 2003 to 2008 was 18%.	Not addressed	Not Agreed

ComReg Response

A 4.53 This is addressed with respect to paragraph A 4.31.

Extract Vodafone Letter 14 December 2015 Annex B: Model sensitivity analysis on selected items

Model sensitivity analysis on selected items

Proposed model change	Change in model results	
Adjusted spectrum re-use factor to 12	Pure LRIC Nominal value changes from 0.0071 to 0.0085, which equals a 16% change in the overall rate	Not agreed
Adjusted WACC In line with historical values (replacing constant WACC with 18.63% up to 2008).	Pure LRIC Nominal value changes from 0.0071 to 0.0082, which equals a 13% change in the overall rate.	Not agreed
Land area adjustments	Will change overall weight of geographies with different network dimension requirements due to each specific geography this can significantly change the overall results both for the coverage and capacity network.	New position – land usage has been changed significantly. Traffic distribution in different Geotypes needs to be analysed. .
Voice-data Conversion factor	Leads to unexpected effects as outlined in the main body of the response. Requires revision of current model.	Not agreed

Re-Use factor to 12

A 4.54 This is a repeat Vodafone's Annex A, No., 2. and No. 26 in Vodafone's Annex B. Please refer to paragraphs A 4.16-A 4.20 and paragraph A 4.41 respectively.

Adjusted WACC

A 4.55 This is a repeat of No. 3 in Vodafone's Annex B and No. 40 in Vodafone's Annex B. Please refer to paragraph A 4.31.

Land Area Adjustments

A 4.56 Please refer to paragraph A 4.36and A 4.39-A 4.40

Voice Data Conversion Factor

A 4.57 Please refer to paragraph A 4.43.

Annex: 5 Correspondence between European Commission and ComReg

A 5.1 This Annex details correspondence that ComReg had with the European Commission. It contains the Requests for Information that were received from the European Commission in addition to ComReg's respective responses. The subsequent "No Comments" letter from the European Commission is also contained in this annex.

EUROPEAN COMMISSION

Brussels, 15.12.2015
C(2015) 9591 final

Commission for Communications (COMREG) Block DEF - Abbey Court - Irish Life Centre, Lower Abbey St.
Dublin 1, Ireland

For the attention of Mr. Kevin O'Brien
Chairperson

Fax: +353 1 878 81 93

Dear Mr O'Brien,

Subject: **Commission Decision concerning Case IE/2015/1812: Wholesale voice call termination on individual mobile networks – Remedies**

Article 7(3) of Directive 2002/21/EC: No comments

1. PROCEDURE

On 17 November 2015, the Commission registered a notification from the Irish national regulatory authority, Commission for Communications (ComReg)[1], concerning further specification of the price control and transparency obligations previously imposed in the markets for wholesale voice call termination on individual mobile networks in Ireland[2].

The national consultation[3] ran from 11 April 2014 to 20 June 2014. A supplementary consultation ran from 26 February 2015 to 7 May 2015.

[1] Under Article 7 of 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 (Framework Directive), OJ L 108, 24.4.2002, p. 33, as amended by Directive 2009/140/EC, OJ L 337, 18.12.2009, p. 37, and Regulation (EC) No 544/2009, OJ L 167, 29.6.2009, p. 12.

[2] Corresponding to market 2 in Commission Recommendation 2014/710/EU 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 (Recommendation on Relevant Markets), OJ L 295, 11.10.2014, p. 79.

[3] In accordance with Article 6 of the Framework Directive.

On 26 November 2015, a request for information[4] (RFI) was sent to ComReg, and a response was received on 1 December 2015. An additional RFI was sent on the same date and the response was received on 3 December 2015.

2. DESCRIPTION OF THE DRAFT MEASURE

2.1. Background

The second round review of the market for mobile voice call termination was notified to and assessed by the Commission under case IE/2012/1371[5]. ComReg designated six mobile service providers as having significant market power (SMP)[6] and imposed the following obligations on all of them: access, non-discrimination, transparency, and price control. Moreover, ComReg chose (in case IE/2012/1373[7]) a pure bottom-up long-run incremental cost (BU-LRIC) methodology as the most appropriate price control remedy for setting fixed and mobile termination rates (MTRs) in Ireland. For the period from 1 July 2013 until the adoption of a pure BU-LRIC model (expected at the time by 1 July 2014 at the latest), ComReg had proposed to set MTRs in Ireland on the basis of a benchmarking method based on those countries that have notified pure BU-LRIC models under Article 7 of the Framework Directive. The resulting pure BU-LRIC benchmark to be achieved as of 1 July 2013 was 1.02 €cents/min.[8] The European Commission (i) called upon ComReg to implement the target benchmarked MTR already by 31 December 2012, and (ii) commented that the benchmark should be based on the rates that are set by the NRAs by way of final decisions in the respective Member States, instead of notified rates as proposed by ComReg.

Both decisions (cases IE/2012/1371 and IE/2012/1373) were appealed to the High Court on 18 December 2012. Following the High Court's judgment of July 2013, a Court's Order[9] was issued in October 2013 imposing an interim maximum MTR of 2.60 €cents/min applicable as of 1 July 2013. This rate corresponds to the MTR in place at the time of the Order.

In July 2015 ComReg notified the Commission of a proposed two years extension of the period for conducting a new analysis of the markets for voice call termination

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4 In accordance with Article 5(2) of the Framework Directive.

5 C(2012) 8381.

6 Hutchison 3G Ireland Limited (H3G), Lycamobile Ireland Limited (Lycamobile), Meteor Mobile Communications Limited (Meteor), Tesco Mobile Ireland Limited (TMI), Vodafone Ireland Limited (Vodafone) and Telefónica Ireland Limited (O2).

7 C(2012) 8381.

8 The intermediate rates proposed for the periods July 2012-January 2013 and January 2013-July 2013 were, respectively of 4.15 €cents /min and 2.58 €cents /min.

9 In its judgment of 14 August 2013 the High Court ruled in part against ComReg, namely in relation to the benchmarking. However, it deferred its ruling on Vodafone's challenge to the legality of ComReg's choice of pure LRIC as the relevant cost standard pending the adoption of the model. The court's order was made on 11 October 2013 (and perfected on 17 October 2013) and a further statement of reasons for the Judgment was provided by the High Court on 21 November 2013.

on individual mobile networks in Ireland, pursuant to Article 16(6)(a) of the Framework Directive. The Commission did not object to the requested extension. According to ComReg's response to the RFI, the new analysis of the mobile termination markets is planned to start in 2016 and is expected to be completed by 21 November 2017.

2.2. Notified draft measure

The proposed draft measure specifies the price control and the transparency obligations previously imposed on the operators identified with SMP[10] in case IE/2012/1371, and based on the results of the newly developed pure BU-LRIC model.

The price control period covers three years, i.e. 2016-2018. The symmetrically applicable MTR caps are as follows:

- 0.84 €cents/min for 2016;
- 0.82 €cents/min for 2017; and
- 0.79 €cents/min for 2018.

ComReg models a hypothetical efficient operator[11], assumed to have fully deployed its network in 2003, and to have acquired its hypothetical 25% market share in the same year. This market share is obtained through the 1/N approach where N is the number of operators active on the Irish mobile market in 2013, i.e. the base year in the modelling exercise which covers a period of 30 years (2003-2032)[12]. ComReg follows a BU modelling approach based on a modified scorched node[13] methodology. The model is also calibrated with operators' data to reflect the costs of a hypothetical efficient operator facing the market conditions and network realities in Ireland.

The modelled efficient operator runs a NGN core network designed to carry 2G and 3G traffic. ComReg explains in the notification and in the response to the RFI that LTE-deployment has only recently started in Ireland and that operators intend to use 4G to carry only data traffic, for the foreseeable future.

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10 ComReg explains that given that H3G has acquired Telefónica since the 2012 market analysis, Telefónica shall be deemed to be included within the definition of Three for the purpose of the notified draft measure.

11 This approach is considered to allow the modelling of efficient costs and scale, whilst at the same time allowing assumptions relating to costs and technology to be aligned closely with those actually faced by the operators currently in the Irish market.

12 The year 2003 was chosen as a starting point to reflect a pivotal time period in which mobile network operators would have commenced network roll-out or initiated major network upgrades. The 30 year period has been set *inter alia* to allow for two spectrum renewal periods. Moreover, the year 2013 is used as a base year since it was the latest full year when the original MTR consultation was published in April 2014; thus most of the SMP operators' information was gathered over that period.

13 ComReg's consultancy Deloitte specifies that this approach allows the assumed network to be changed to reflect reasonable improvements in efficiency, and to respond dynamically to the scenarios on traffic load and market share, within the constraints of network parameters and input data provided by operators.

With regard to the transparency obligation, ComReg proposes that each SMP operator has to (i) pre-notify ComReg of its intention to amend its published MTR and (ii) notify in writing every undertaking (with which that SMP operator has entered into a contract in respect of access to the mobile termination service) of its intention to amend its MTRs. These notifications should be done by the SMP operators either (i) not less than 30 calendar days in advance of the date on which any amendment to its published MTR is expected to come into effect; or (ii) one month from the effective date of the decision, whichever date is later.

3. NO COMMENTS

The Commission has examined the notification and the additional information provided by ComReg and has no comments.[14]

Pursuant to Article 7(7) of the Framework Directive, ComReg may adopt the draft measure and, where it does so, shall communicate it to the Commission.

The Commission's position on this particular notification is without prejudice to any position it may take *vis-à-vis* other notified draft measures.

Pursuant to Point 15 of Recommendation 2008/850/EC[15] the Commission will publish this document on its website. The Commission does not consider the information contained herein to be confidential. You are invited to inform the Commission[16] within three working days following receipt whether you consider that, in accordance with EU and national rules on business confidentiality, this document contains confidential information which you wish to have deleted prior to such publication.[17] You should give reasons for any such request.

Yours sincerely,

CERTIFIED COPY
For the Secretary-General,

Jordi AYET PUIGARNAU
Director of the Registry
EUROPEAN COMMISSION

For the Commission,
Roberto Viola
Director-General

14 In accordance with Article 7(3) of the Framework Directive.

15 Commission Recommendation 2008/850/EC of 15 October 2008 on notifications, time limits and consultations provided for in Article 7 of 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 301, 12.11.2008, p. 23.

16 Your request should be sent either by email: CNECT-ARTICLE7@ec.europa.eu or by fax: +32 2 298 87 82.

17 The Commission may inform the public of the result of its assessment before the end of this three-day period.

Appendix 1

ComReg Response to European Commission's 26 November RFI

Concerning Case IE/2015/1812 ('RFI Response')

Wholesale voice call termination on individual mobile networks – Remedies

- The following sets out the Commission for Communications Regulation's ("ComReg") response to the questions set out in the European Commission's Request for Information ("RFI") of 26 November 2015 regarding case IE/2015/1812 (the "26 November RFI").

- It should be noted that certain information within this RFI Response has, for reasons of confidentiality and commercial sensitivity, been identified with the symbol □□and has been highlighted in grey. **This information should not be placed in the public domain**.

Scope of the Proposed Measures / Regulated markets

Response to Question 1

Please confirm our understanding that the draft decision is addressed to both Three and Telefonica because of the reasons specified in footnote 16, i.e. *"Telefónica, although designated with SMP in D12/12 has since been acquired by Three. Whilst that remains the case Telefónica shall be deemed to be included within the definition of Three for the purposes of this Decision. This Decision is nonetheless addressed to both Three and Telefónica as, for the time being at least, both entities continue in being."*

1. We confirm that your understanding is correct and that the draft decision is addressed to both Three and Telefónica.

2. There is a typographical error in footnote 16 of the draft decision and footnote 4 reference of the Article 7 notification. Both references should refer to ComReg Decision D11/12 ComReg Document No. 12/124 entitled "Market Review: Voice Call Termination on Individual Mobile Networks" dated 21 November 2012 ("Decision D11/12") which was the document which imposed SMP on the six mobile service providers. This was the draft measure notified to the European Commission under reference IE/2012/1371. This was also incorrectly referenced in paragraph 2 of the Article 7 notification as IE/2012/1372. The reference for the SMP decision should be IE/2012/1371 and D11/12. We trust this clarifies the matter.

3. For a further explanation see 'Annex 1: Draft Decision Instrument'[294] and in particular Paragraph 1.2 (ii) in which footnote 2 states *"ComReg notes that Telefónica has since been acquired by Three and is now owned and/or controlled by Three. For so long as that remains the case, Telefónica shall be deemed to be included within the definition of Three for the purposes of this Decision Instrument."*

Response to Question 2

Please confirm our understanding that the draft measure proposes the specification of the price control and of the transparency obligation imposed on the SMP operators on the basis of the market analysis previously notified to the Commission under Article 7 in 2012, i.e. case IE/2012/1371. If not please explain the link between the present draft measure and ComReg Decision D12/11.

1. Your understanding is correct the draft measure proposes the specification of the price control and of the transparency obligation imposed on the SMP operators on the basis of the market analysis previously notified to the Commission under Article 7 in 2012, i.e. case IE/2012/1371. However, the relevant decision document is ComReg D11/12[295].

Response to Question 3

Please also clarify whether the need for this specification (and the development of the LRIC model in particular) results from the Court judgment you refer to or stems from ComReg's attempts (started in 2012) to introduce pure LRIC MTRs in line with the Termination Rates Recommendation.

1. The primary reason for the notification comes from the ComReg Decision to introduce pure LRIC MTRs in 2012 which is in line with the Termination Rates Recommendation.
2. The only link between the development of the model and the Court Judgement is that the Court held over its decision on the lawfulness of ComReg's choice of pure LRIC as the relevant cost standard until such time as a specific model is completed by ComReg. See paragraphs 3.11 – 3.17 of Draft Decision Document.

[294] Of Appendix A to the Article 7 notification, "Mobile Termination Rates: Response to Consultation 14/29 and Supplementary Consultation15/19 and Final Decision Document hereafter, referred to as the "Draft Decision Document"
[295] https://www.comreg.ie/_fileupload/publications/ComReg12124.pdf

Response to Question 4

Please explain when the currently applicable measure (stemming from ComReg Decision D12/11) expires, or is it applicable until a new ComReg market analysis decision? When do you envisage starting the review of the mobile termination markets? In case the current measure expires soon, why does ComReg consider it legally robust to base the newly specified remedy on the price control remedy imposed in D12/11?

1. The reference in question 4 is in fact to ComReg Decision D11/12[296] the measure notified as IE/2012/1371 rather than "ComReg Decision D12/11". As can be seen from Section 16.1 of the Decision Instrument annexed to that document (ComReg Document No. 12/124, Decision D11/12) at Annex I, that Decision is due to "remain in force until further notice by ComReg". Therefore, that is the current market analysis decision applicable to the markets for mobile voice call termination in Ireland until ComReg carries out a new market analysis of that (those) market(s) and notifies a new decision.
2. On 29 July 2015, ComReg wrote to the Commission (Mr Reinald Krueger, Head of Unit B-3, Directorate General for Communications Networks, Content and Technology) to notify the Commission of a reasoned proposed extension of two years (to 21 November 2017) of the period for conducting a new analysis of the markets for voice call termination in individual mobile networks in Ireland, pursuant to Article 16(6)(a) of the Framework Directive. This notification was acknowledged by the Commission on the same date (e-mail from Mr Stefan Kramer of 16:54 on 29 July 2015). The Commission did not object to this proposed extension and therefore ComReg is now required to have conducted a new market analysis of the markets for voice call termination in individual mobile networks in Ireland by 21 November 2017. ComReg will begin this market analysis in 2016 and expects to have it completed by 21 November 2017.
3. For the above reasons, but in any event (given the limited changes to the market since ComReg Decision D11/12 – as to which see page 4 of ComReg's notification to the Commission of a reasoned proposed extension of two years of the period for conducting a new analysis of the Irish MVCT markets, reproduced below for convenience), ComReg is confident in the robustness of Decision D12/12 as a foundation for the now proposed remedies decision.

   Extract from ComReg's 29 July Notification to the European Commission:

   "*ComReg notes in this regard that termination markets, by their very nature, are typically characterised by an intrinsic bottleneck*[297] *and conditions of competition are not typically dynamic. ComReg is not aware of any material changes in the conditions of competition within the existing regulated MVCT markets. In this respect, ComReg notes that, amongst other things, it is likely that individual SMP operators' market shares remain at 100%, barriers to entry are high and non-transitory and, despite having some pricing freedom, MTRs have remained at 2.6 cent per minute.*"

[296] https://www.comreg.ie/_fileupload/publications/ComReg12124.pdf
[297] As noted in the Explanatory Note to the 2014 Commission Recommendation on Relevant Markets.

Response to Question 5

Does the present draft measure, if adopted, annul ComReg price control decision D12/12? Please further explain the link between the newly proposed draft measure and decision D12/12.

1. The draft measure does not annul ComReg D12/12. However, the price control and transparency obligations set out in the notified draft measure IE/2015/1812 will supersede those set out in D12/12 as notified to the European Commission under IE/2012/1373. It should be noted that the choice of pure LRIC was made in D12/12.
2. The present draft measure, if adopted, will be a further specification of the price control and transparency obligations contained in ComReg D11/12 the SMP Decision as notified to the European Commission under IE/2012/1371.

Response to Question 6

Could you please indicate the MTRs applied in years 2012-2015 and how they have been set? Please confirm our understanding that the MTRs currently applicable in Ireland were set by the Court at 2.60 eurocents/min since 1 July 2013. If not please explain.

1. The MTRs currently applied in Ireland are 2.60 eurocents/min. This rate was set by ComReg under Decision 12/12 to take effect from 1 January 2013. The rate was due to change to a benchmarked pure LRIC MTR under Decision 12/12 on 1 July 2013 but this rate change did not take effect due to the Judgment of the Irish High Court.
2. The Court's Order (the Order) was made on 11 October 2013 (perfected on 17 October 2013) and it included an order imposing on Vodafone an interim maximum MTR of 2.60 cent per minute[298]. In the interests of symmetry, ComReg interpreted the effect of this Order as meaning that a maximum MTR of 2.60 cent per minute should be applied by each of the SMP Mobile Service Providers, pending ComReg's decision in respect of a model.
3. Accordingly, the MTR of 2.60 cent has been in place since 1 January 2013.
4. Prior to 1 January the MTRs of mobile operators were not symmetrical see pages 25-26 of

   http://www.openeir.ie/WorkArea/DownloadAsset.aspx?id=2895

[298] ComReg Document No 13/97: Information Notice: High Court Order following its Judgment of 14 August 2013 on Mobile Termination Rates; published on 21 October 2013. Please refer to the following link: http://www.comreg.ie/_fileupload/publications/ComReg1397.pdf

Response to Question 7

Is the 2.60 eurocents/min price cap based on the second step of the glide-path notified under Article 7 in 2012, i.e. 2.58 eurocents/min as of January 2013?

(a) If this is the case and given that the Court has ruled that benchmarking is not compatible with a cost-orientation obligation, why do you think that the Court has accepted ComReg's glide-path proposed in 2012? In this respect, please explain how ComReg defined the 2.58 eurocents/min price cap applicable as of 1 January 2013?

(b) If not, could you please clarify the methodology withheld by the Court to set the 2.60 eurocents/min price cap.

1. Prior to the adoption of ComReg Decision D12/12, MTRs in Ireland were based on a voluntary glide-path arrangement whereby the MTRs of SMP MSPs were set in line with the expected European average using the BEREC six-monthly snapshots and other publicly available information.
2. Pursuant to ComReg Decision D12/12, prior to the proposed introduction of Pure LRIC based MTRs from 1 July 2013, pursuant to Section 5.1 of the Decision Instrument annexed to ComReg D12/12, an interim maximum MTR of 2.60 eurocents/min was imposed for the period 1 January 2013 to 30 June 2013 (see paras 2.42, 7.65 and 7.91-7.95 of ComReg Decision D12/12 for the precise methodology used for setting this 2.60 eurocents/minute rate).
3. The Court set the rate of 2.6 eurocents/minute in the Order of the High Court of 11 October 2013 (attached in email). The Court's reasoning is set out in Judgement of the High Court of 14 August 2013 (see email) and the Supplementary Reasoning Ruling of the High Court of 21 November 2013 (attached in email).

Response to Question 8

Please confirm that the 2.60 eurocents/min price-cap is applicable to all six SMP operators.

1. The Court mandated a price-cap of 2.60 eurocent /min as the maximum rate to be charged by Vodafone.
2. Mobile Service Providers designated with Significant Market Power are also applying the price cap of 2.60 eurocent/ min – please see response to Question 6 above.

Response to Question 9

The proposed MTRs price caps are slightly decreasing from one year to the other. Could you please explain what model (or other) factors explain this decrease?

1. The primary factor that influences the observed year-on-year decrease in the proposed MTR price caps is the application of the economic depreciation algorithms in the model.
2. The Economic depreciation algorithm is outlined in Section 6.2 of the Deloitte specification document.[299]
3. In the model the economic depreciation calculations are performed at the network element level and the price indices applied to each network element will determine whether the unit cost for that network element will increase or decrease year-on-year.
4. Essentially the capex and opex price indices reflect the annual change in the Modern Equivalent Asset (MEA) prices for each network element. Tables 29 and 30 in the specification document list the capex and opex nominal price indices that are applied to each of the five categories of network element in the model while table 31 identifies the index codes assigned to each network element.
5. Therefore, the main reason for the year-on-year decrease in the MTRs price caps is that the majority of the incremental costs that are recovered against MTRs each year in the model relate to network elements such as BTS and 3G radio that have declining price indices.

[299] Annex 4 of the Draft Decision Document.

Response to Question 10

You refer to operators' data gathered for the purpose of calibrating the LRIC model, i.e. characteristics of actual Irish mobile service providers have been used to model the hypothetical operator (section 2.8). Could you please explain whether you consider your modelling approach as being bottom-up (BU), top-down (TD), or reconciled BU/TD? Please explain.

1. As noted in Section 4.1.3 of the Draft Decision Document, the LRIC model uses a BU approach to set MTRs.
2. In implementing the model ComReg was mindful of the fact that *"while the Draft MTR Model is not intended specifically to mirror the actual costs of a specific Irish mobile operator currently active in the market, it should reflect Irish conditions and therefore should be informed by actual or stated cost or other data that Irish operators submitted to ComReg"*[300]. As paragraph 4.6 of the Draft Decision Document states *"The model is not a purely theoretical exercise since it has, in very material respects, been based on data provided by the Irish 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 active in the Irish market"*.
3. For this reason ComReg and its external advisers sourced data from Irish operators to inform the model so that *"traffic volumes; network parameters; and cost inputs received from Irish mobile operators … were used in developing the Draft MTR Model"*.
4. Therefore, the final model is a BU model that uses operator provided data, where appropriate and justified, to ensure that it reflects the costs of a hypothetical efficient operator facing the market conditions and network realities pertaining in Ireland. ComReg's own estimates have been used where Irish operator data was not available

[300] Draft Decision Document, Paragraph 5.15.

Response to Question 11

Please clarify how you have chosen: (a) the base year of the MTR model (i.e. 2013) as well as (b) the period you are modelling in terms of both its length (i.e. 30 years), and its starting date (2003).

(a) The base year of the MTR Model

1. The rationale for choosing 2013 as the appropriate base year is that it reflects a period from which the majority of information was obtained from Irish MSPs designated with SMP (see paragraph 3.20 of the Draft Decision Document). Furthermore, 2013 was the latest full year that was available when the Original MTR Consultation was published in April 2014[301].

(b) The period you are modelling in terms of both its length (i.e. 30 years), and its starting date (2003).

2. The modelled timeframe is over the 30 year period 2003-2032 (see paragraph 2.10 of the Draft Decision Document). The rationale for choosing 2003 as an appropriate starting point is due to the fact that we have modelled a hypothetical efficient mobile telecommunications operator in an Irish context and, as noted in paragraph 9.50 (of the Draft Decision Document) *"the year 2003 was chosen as a starting point to reflect a pivotal time period in the Irish mobile sector in which MNOs would have commenced network roll-out or initiated major network upgrades."* The 2003 commencement date is also aligned to submissions received from Irish MSPs.
3. With regard to the timeframe of the model, consideration was given for the BU Model to extend over a time-frame that is at least as long as the network element with the longest asset life. As noted in the Deloitte specification document a 30 year time period for the model from 2003 until 2032 allows for two spectrum renewal periods which has an assumed asset life of 15 years.
4. The 30 year time period of the BU model also has the benefit of addressing the issue of terminal values as it is *"sufficiently long that by discounting the future years' costs and traffic, extending the time horizon further would have a negligible effect on current costs"*[302].

[301] http://www.comreg.ie/_fileupload/publications/ComReg1429.pdf
[302] Annex 4 of the Draft Decision Document, Section 2.4.

Response to Question 12

According to the Termination Rates Recommendation (and in particular the annex to it), spectrum costs should be taken into account on the basis of forward-looking opportunity costs to the extent that additional spectrum is acquired to increase capacity (above the minimum to provide retail services to subscribers) for the purpose of carrying additional traffic resulting from the provision of a wholesale voice call termination service. Please confirm our understanding that your finally proposed approach ensures (in particular in point 7.91) that only those spectrum costs which are traffic related are included in the MTR calculation.

1. Your understanding is correct.
2. As noted in paragraph 7.91 in the Draft Decision Document on Spectrum costs, ComReg is of the view that the spectrum costs should be treated as a fixed cost and only allow network equipment and infrastructure costs to vary in response to changes in traffic loads.
3. As noted in paragraph 7.86, this approach is consistent with *"BU MTR models developed in other jurisdictions*[303] *on the principle that, for an efficient network operator, there is a trade-off between the opportunity cost of spectrum and additional network rollout. In other words, mobile network operators are faced with the option of purchasing additional spectrum rights of use or expanding the existing network to accommodate increased demand"*.

[303] For instance ANACOM's and PTS's MTR models.

Response to Question 13

Your model assumes a constant 25% market share. As mentioned in points 5.36 and 5.37 of your notification, NRAs have to demonstrate why they deviate from the 20% minimum market share set in the Termination Rates Recommendation.

(a) Could you please point to the market conditions in Ireland which imply a deviation from the recommended approach?

(b) Could you please provide (if available) the MTRs which would result from applying the 20% market share?

(c) In relation to your explanations on applying the 33% or 25% market share, please also provide the MTR level if you were to apply the 33% market share.

a) Could you please point to the market conditions in Ireland which imply a deviation from the recommended approach?

1. See paragraphs 5.37-5.42 of the Draft Decision Document
2. The 20% market share set out in the Recommendation is a minimum.
3. There have never been more than four network operators in Ireland.
4. In ComReg's view, the assumed 25% market share does not deviate from the recommended approach in the EC's Termination Rates Recommendation. The EC Recommendation refers to the *minimum* efficient scale only, thus recommending that the *minimum* market share deemed to be efficient is 20%. That is, an operator with a market share above 20% can be deemed to have reached efficient scale because it exceeds the minimum efficient scale requirement of 20% market share.
5. Since the EC recommendation refers only to the minimum efficient scale, the current model input of 25% market share complies with this recommendation.
6. As is customary in most BU-LRIC models developed in other jurisdictions, a "1/N" approach has been used, where N is the number of operators actually operating in the market.
7. Based on the conditions of the Irish market prior to the recent Hutchison 3G Ireland's (H3GI)'s acquisition of O_2 Ireland, this approach implies a 25% market share.
8. ComReg has consulted on adjusting the model to reflect the reduction in the number of mobile operators from 4 to 3, which would have implied an increase in market share to 33% after 2015. However, this approach would have caused the model to assume significant network investment by the hypothetical operator in 2015. Such network investment is not considered a realistic representation of an actual operator's investments.
9. In addition, while the merged entity (H3GI and O2) has led to the number of existing MNOs active in the Irish market reducing from four to three, it will take time to merge the two existing networks of H3GI and O2 such that the number of actual mobile networks will remain greater than three for a period of time.

10. Another factor that has been considered is the possibility that a new MVNO in the Irish market may evolve into a MNO in the coming years. It may therefore be premature for modelling purposes to assume that only three MNOs would be active over the Modelled Timeframe.
11. As such, ComReg has deemed it to be prudent, at this time, to allow for a constant market share of 25% to persist throughout the modelled timeframe. ComReg will continue to monitor the level of network competition in the Irish mobile market and determine if the 25% market share should be increased for future price control periods (if appropriate).

b) Could you please provide (if available) the MTRs which would result from applying the 20% market share?

1. This is not available.
2. Although previous versions of the model have been tested using different market share assumptions to understand their impact, such sensitivity has not been carried out in the final version of the model.

c) In relation to your explanations on applying the 33% or 25% market share, please also provide the MTR level if you were to apply the 33% market share.

1. Although previous versions of the model have been tested using different market share assumptions to understand their impact, such sensitivity has not been carried out in the final version of the model.
2. A reliable response to this question would entail a significant amount of re-modelling and is not possible within the EU Commission's timelines..

Response to Question 14

Your notification reads: "spectrum bands used for LTE have not been explicitly modelled in the final model" (point 7.84), and "However, LTE is implicitly taken into account in the draft model by capping the volume of data carried over 2G and 3G in future years." (point 7.47)

(a) Please confirm our understanding that LTE is not modelled in the final version of the model. If this case, please clarify the capping mechanism you refer to in point 7.47 quoted above.

(b) If this is not the case, please explain and specify (i) the years for which 4G is considered in the model, and (ii) the 2G/3G/4G distribution.

(c) We understand that you face some uncertainties around the LTE roll-out (also mentioned in section 2.3.1 in Deloitte's report). Please indicate if possible whether you expect that the MNOs in Ireland will deploy 4G technology during the relevant three years period (2016-2018). If so please explain why you assume, in the network design for your BU-LRIC model, that a hypothetical efficient operator would use 4G, in addition to 2G and 3G technologies.

(d) Could you please also indicate the effect which in your view the inclusion of 4G technology in the model for the hypothetical efficient operator would have on the overall level of the mobile rate?

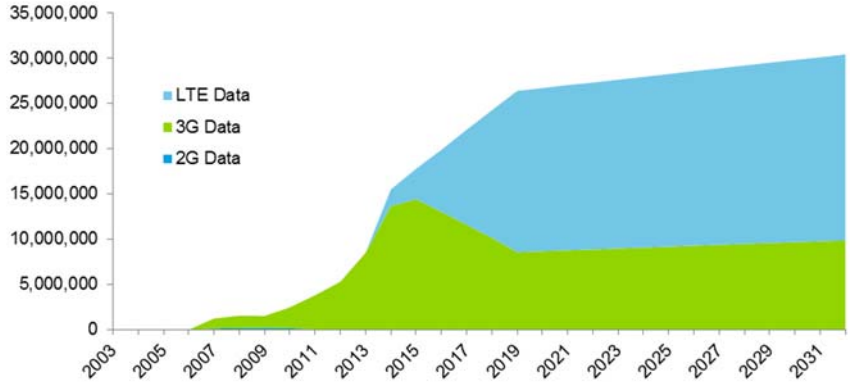
a) Please confirm our understanding that LTE is not modelled in the final version of the model. If this case, please clarify the capping mechanism you refer to in point 7.47 quoted above.

1. Your understanding is correct.
2. Mobile operators in Ireland have only recently started to introduce 4G technology. During the model development phase, deployment plans and speed of roll-out were still uncertain. In any case, operators informed ComReg that their intention was to use any 4G network to carry only data traffic, for the foreseeable future.
3. For these reasons, 4G technology has not explicitly been modelled in the model, given its focus on mobile voice termination.
4. However, since operators expect to carry data traffic over LTE, an assumption is made in the model that some of the total forecast data traffic in Ireland will be carried over LTE rather than over the modelled 2G and 3G network[304]. The volume of data carried over 2G and 3G is thus “capped” in future years. The proportion of total data traffic that is assumed to be carried over 4G (and thus not over the modelled 2G and 3G networks) is determined by factors including per-subscriber data usage on different technologies (estimated from

[304] Further discussion on the data traffic profile across network technologies can be found in in Section 4.1.3 of the Deloitte Specification document

operators' data) and the profile of data traffic usage, by network technology and geo-type. This results in the following data profile[305]:

Figure 1: Total network data traffic by technology (in GB per year)



Source: *Deloitte analysis and QKD as of December 2014 excluding a significant element of dongle data traffic.*

b) If this is not the case, please explain and specify (i) the years for which 4G is considered in the model, and (ii) the 2G/3G/4G distribution.

1. n/a

c) We understand that you face some uncertainties around the LTE roll-out (also mentioned in section 2.3.1 in Deloitte's report). Please indicate if possible whether you expect that the MNOs in Ireland will deploy 4G technology during the relevant three years period (2016-2018). If so please explain why you assume, in the network design for your BU-LRIC model, that a hypothetical efficient operator would use 4G, in addition to 2G and 3G technologies.

1. Please see answers 3-4 to Question 14 (a) above.

d) Could you please also indicate the effect which in your view the inclusion of 4G technology in the model for the hypothetical efficient operator would have on the overall level of the mobile rate?

1. ComReg does not feel it is possible to comment on the potential impact of the inclusion of LTE voice technology in the model. This has not been considered given the current state of the Irish mobile market and operator's own forecasts.

[305] From Figure 12 in Section 4.1.3 of the Deloitte specification document.

Response to Question 15

Please explain your approach to the treatment of wholesale commercial costs for the purpose of calculating the mobile termination rates.

1. Wholesale billing platforms have been considered, and are included as a cost component in the model.
2. However, in the final version of the model, these are not considered to be incremental to termination traffic, and therefore are not included in the final LRIC MTR.

Response to Question 16

With respect to the WACC, could you please: (a) Specify whether it is a general WACC (referring to all the activities) or a specific one (applicable to wholesale mobile termination only). Please also indicate how often the WACC is updated. (b) Provide the figures for the risk free rate and the equity risk premium and specify the methodology used for their calculation.

a) WACC

1. We confirm that the WACC rate of 8.63% used in the MTR Model is a WACC specific to the mobile telecommunications sector notified to Irish MSPs in December 2014[306] and not a specific one applicable to wholesale mobile termination only (See Case IE/2014/1649)[307].
2. ComReg outlined its final position regarding the costs of capital for the mobile telecommunications sector "*over the next 3-5 years*" in paragraph 3.9 of ComReg Decision D15/14[308].

b) Risk-free rate and equity risk premium

1. The nominal risk free rate used as an input into the WACC calculation was in the range 3.63%. ComReg calculated the nominal risk free rate using the Fisher Equation which involves separate estimations of the real risk-free rate and inflation (reference paragraph 5.3 in D15/14).
2. The Equity Risk Premium ('ERP') used as an input in the WACC calculation was 5.00%. This was based on a Europe Economics Technical Report, which "*estimated the ERP based on ERP estimates provided by DMS* [Dimson, Marsh, and Staunton] *and review of ERP values applied in previous*

[306] Please refer to paragraph 9.73 of the Draft Decision Document.
[307] See page 56 of the ComReg D15/14 which identifies the changes to the nominal pre-tax WACC from 8.66% to 8.63%. This decision was uploaded as a final measure to CIRCABC on 6 January 2015 .
[308] http://www.comreg.ie/_fileupload/publications/ComReg14136.pdf

regulatory WACC estimations in Ireland. The DMS estimate of ERP arithmetic mean for Ireland was 4.6%, with the Irish specific rate similar to the estimated European wide ERP of 4.8%. Regulatory precedent suggests an ERP range of 5% to 6% with the most recent decisions in the lower part of this range. ComReg analysed Europe Economics approach to estimating the ERP and agreed with its proposal of a range of 4.60% to 5.25% and a point estimate of 5.00% for ERP to apply to each of the costs of capital estimated. (including those of other Irish regulators)" (reference paragraph 5.4 in D15/14).

Response to Question 17

We understood that you envisage introducing new transparency obligations concerning the notice of MTRs' changes. Could you please explain which rules are currently applicable in such cases?

1. The transparency obligations currently applicable to SMP MSPs in the MVCT markets in Ireland are those set out in section 11 of ComReg Decision D11/12 (Case IE/2012/1371).
2. ComReg had further specified those obligations in Sections 4.5 and 4.6 of the Decision Instrument annexed at Annex 2 to ComReg Decision D12/12 (Case IE/2012/1373).
3. Pursuant to the Order of the Irish High Court made on 11 October 2013 (perfected on 17 October 2013) section 4 of the Decision Instrument Annexed to ComReg Decision D12/12 was quashed.
4. In any event, pursuant to the Order imposing an interim maximum MTR of 2.60 cent per minute on Vodafone, and the decision of the other SMP MSPs in the MVCT markets in Ireland to adopt symmetric MTRs, no MTR changes are anticipated until adoption of a model based MTR decision by ComReg and/or further order of the Irish High Court.
5. Section 5 of the Decision Instrument annexed to the notified draft measure IE/2015/1812 contains the proposed further specification of the transparency obligation set out in section 11 of the Decision Instrument annexed to ComReg Decision D11/12.

ComReg Response to European Commission's 1 December RFI

Concerning Case IE/2015/1812 ('RFI Response')

Wholesale voice call termination on individual mobile networks – Remedies

- The following sets out the Commission for Communications Regulation's ("ComReg") response to the questions set out in the European Commission's Request for Information ("RFI") of 1 December 2015 regarding case IE/2015/1812 (the "26 November RFI").

- It should be noted that certain information within this RFI Response has, for reasons of confidentiality and commercial sensitivity, been identified with the symbol ✂ and has been highlighted in grey. **This information should not be placed in the public domain**.

Response to Supplemental Question 1

Your confidential draft decision (point 9.80) refers to the 0.53 eurocents/min MTRs level identified for 2015-2017 in the Original MTR consultation.
Could you please:
(i) list the elements of the responses to the public consultation on the basis of which the price cap of 0.53 eurocents/min you refer to has changed to the currently proposed level of 0.84 - 0.82 and 0.79 eurocents/min for 2016 - 2018, and
(ii) quantify the change for each of the listed elements.

b. In this respect, could you please also quantify the trends identified in Annex F?

i) list the elements of the responses to the public consultation on the basis of which the price cap of 0.53 eurocents/min you refer to has changed

1. As indicated in paragraph 9.80 of the Appendix A to the Article 7 notification, "Mobile Termination Rates: Response to Consultation 14/29 and Supplementary Consultation 15/19 and Final Decision Document hereafter, referred to as the "Draft Decision Document", the €0.0057 rate proposed in the Original Consultation[309] was based on the average of the rates that were calculated for the three years of the price control period (2015-2017).
2. The main points made by respondents to the Original MTR Consultation and Supplementary Consultation[310] are addressed in full in the main body of the Draft Decision Document. Other responses are addressed in Appendix 1 of the Draft Decision Document. Due to the varying nature of the responses to both the Original Consultation and Supplementary Consultation, ComReg has not repeated in each instance respondents' views where they did not object to or comment on our proposed approach. However, where respondents specifically

[309] Appendix B to the Article 7 notification, "Original MTR Consultation" hereafter referred to as the "Original Consultation".
[310] Appendix D to the Article 7 notification, "Supplementary MTR Consultation" hereafter referred to as the "Supplementary Consultation".

commented on, expressed a view or raised an issue with respect to any of our preliminary views from the Original and Supplementary MTR Consultations we have set out the main points raised and response to these comments in the Draft Decision Document. As such, the basis of the changes have been fully documented as part of the Article 7 Notification.

3. For ease of reference, in order to address your query, we have set out below the changes from the Original Consultation to the Supplementary Consultation in the first instance and the subsequent changes from the Supplementary Consultation to Draft Decision Document.[311]
4. In the Supplementary Consultation, ComReg made a number of modifications having given due consideration to the submissions made by respondents to the Original Consultation.
5. A comparison of the rates proposed in the Supplementary Consultation with the rates calculated in the original model (see page 16 of the Supplementary Consultation) is repeated here:

Price control period	Annual MTR in updated MTR Model and proposed in the Supplementary Consultation (Mobile Data Traffic Scenario A)	Annual MTR in updated MTR Model and proposed in the Supplementary Consultation (Mobile Data Traffic Scenario B)	Average (2014-2017) MTR proposed in the Original Consultation (April 2014)
From date of Decision to 31 December 2015	€0.0071	€0.0067	€0.0057*
1 January 2016 to 31 December 2016	€0.0068	€0.0064	€0.0057*
1 January 2017 to 31 December 2017	€0.0065	€0.0061	€0.0057*
1 January 2018 to 31 December 2018	€0.0062	€0.0058	
1 January 2019 to 31 December 2019	€0.0059	€0.0055	

** Denotes average rate for (2014-2017).*

[311] Please note that while every attempt has been made in response to this question to document all the changes, the Draft Decision Document is the document which sets out the reasoning and modifications in full (as noted in paragraph 2). As such, due to the short response time available to address your query, in the event of any discrepancy between the RFI and the Draft Decision Document, the Draft Decision Document shall at all times be the definitive version.

6. The modifications from the Original MTR Consultation to the Supplementary Consultation are set out on pages 13-15 of the Supplementary Consultation. For ease of reference we have listed these changes here[312]:

i. ***Market share***[313]**:** An adjustment of the assumed market share to 25% during 2003-2014 and 33% from 2015. This change was to reflect the Three Ireland Hutchison Limited (Three) / Telefónica Ireland Limited (O2) merger.

This is discussed in paragraphs 2.8-2.10 of the Supplementary Consultation.

ii. ***Voice traffic:*** Historic per subscriber voice traffic was aligned with ComReg's Quarterly Key Data (QKD) Reports as opposed to being solely based on operator data submitted pursuant to ComReg's MTR Section 13D Information Request of 6 August 2014. This change affects mobile-to-fixed minutes and fixed-to-mobile minutes per subscriber.

This matter is discussed in paragraphs 2.11-2.15 of the Supplementary Consultation.

iii. ***Data traffic:*** The historic average per subscriber usage of data services was revised to ensure greater alignment with the ComReg QKD reports. In the Supplementary MTR Consultation ComReg presented two scenarios of future growth in mobile data traffic.

A base case scenario (Scenario A) was included in the model provided to interested parties for review. The historic figures were based on the ComReg QKD reports while excluding a significant volume of dongle data traffic not deemed to be representative of the traffic carried by a hypothetical efficient mobile operator with 25% market share until end-2014. The forecasts (based on 33% market share from 2015) used in this scenario continue to be informed by the Irish mobile operator data obtained in response to the MTR Section 13D Information Request.

This matter is discussed in section 4.1.2 of the Supplementary Consultation.

An additional data scenario was also modelled by ComReg (Scenario B) [314]. This was based on an historical average per subscriber usage of data services that includes all dongle traffic (reconciling with ComReg QKD reports) combined with revised forecasts that project a significantly higher level of data growth across the time horizon of the model. The revised forecasts were based on ComReg analysis informed by recent international projections of mobile data growth.

[312] See footnote 3.
[313] The Market Share assumption was updated following the Supplementary Consultation. See paragraphs 5.30-5.43 of the Draft Decision Document.
[314] After consideration of operator responses to the Supplementary Consultation, ComReg adopted Scenario A as the most appropriate basis. See paragraphs 6.46-6.60 of the Draft Decision Document.

This matter is discussed in paragraphs 2.16-2.28 of the Supplementary Consultation.

iv. ***Off-net calls:*** The treatment of Irish market for off-net calls was updated to be a closed system containing N operators with equal market share[315].

Consequently, the total volume of off-net minutes originated to other operators was modelled to equal the total volume of off-net minutes terminated from other operators. This change affects off-net minutes to mobile (incoming/outgoing), international to mobile minutes (incoming) and inbound roaming minutes (incoming) per subscriber.

This matter is discussed in paragraph 2.29 of the Supplementary Consultation.

v. ***Spectrum holdings[316]:*** Addition of UMTS900 Spectrum i.e., the hypothetical operator was now assumed to hold UMTS900 spectrum from 2013.

This matter is discussed in paragraph 2.30 of the Supplementary Consultation.

vi. ***Traffic by technology[317]:*** The proportion of traffic carried across 2G and 3G networks in rural areas was adjusted such that it no longer had the same profile as that observed in denser geo-types.

It was also assumed that all 2G services would remain active throughout the modelled time horizon. The adjustment was made so that the 2013 value resembles the weighted average of the operators' data responses by using the number of subscribers (market share) as weights. In 2020 the migration is capped so that 5% of traffic remains on 2G until the end of the modelled time horizon.

This matter is discussed in paragraph 2.31 of the Supplementary Consultation.

vii. ***Minimum equipment counts per site:*** Minimum value of TRX and 3G radios per site and 3G radio utilisation. The average number of TRX / 3G radios per site, by geo-type was now set to 1 in such instances where the calculated value for these network elements previously fell below 1.

This matter is discussed in paragraph 2.32 of the Supplementary Consultation.

[315] The Market Share assumption was updated following the Supplementary Consultation. See paragraphs 5.30-5.43 of the Draft Decision Document.
[316] After consideration of operator responses to the Supplementary Consultation, ComReg updated this approach to allow for our approach now takes into account that a block spectrum was held fallow).
This is discussed in paragraph 7.40 of the Draft Decision Document.
[317] After consideration of operator responses to the Supplementary Consultation, ComReg revised this approach further. See paragraphs 7.58 – 7.65 of the Draft Decision Document.

viii. ***Cell collocation:*** Adjustment of cell collocation. This adjustment results in a higher proportion of cells collocated within both GSM 1800 and GSM900 sites in addition to the overall number of 2G and 3G cell collocations.

This matter is discussed in paragraph 2.33 of the Supplementary Consultation.

ix. ***Spectrum holdings:*** In line with actual holdings by network operators and the spectrum available in the Irish market, the hypothetical existing operator's assumed spectrum holding was now based on an average of operator holdings and aligned with the assumed market share (1/N approach) of the hypothetical existing operator[318].

This matter is discussed in paragraphs 2.34-2.36 of the Supplementary Consultation.

x. ***NMC:*** Network management centre (NMC) asset life was reduced from 15 years to 10 years. The related capital costs have also been reduced in proportion to the change in asset lives.

This matter is discussed in paragraph 2.37 of the Supplementary Consultation.

xi. ***GMSC[319]:*** The GMSC (gateway mobile switch centre) element unit CAPEX cost has now been set to €1,200 (previously it had been zero).

This matter is discussed in paragraph 2.38 of the Supplementary Consultation.

xii. ***Geotype classification[320]:*** The land area classification used in the model was revised in line with up to date CSO figures. This resulted in a larger proportion of the country being classified as rural.

This matter is discussed in paragraph 2.39 of the Supplementary Consultation.

[318] Note that as the hypothetical existing operator's assumed spectrum holding is aligned with its Market Share assumptions any changes to the Market Share assumptions (see footnote 313) has implications for the assumed level of spectrum held by the hypothetical existing operator.
[319] After consideration of operator responses to the Supplementary Consultation, ComReg revised this approach further. This is discussed in paragraph 7.206 of the Draft Decision and section 5.3.2.2 of the Deloitte Specification Document. It is also discussed in the answer to RFI Question 2 below.
[320] After consideration of operator responses to the Supplementary Consultation ComReg reverted to the land area classification that was informed by Eurostat data and information received from Irish MSPs via the First Information Request, as originally proposed in the Original MTR Consultation (See Section 7.15 of Decision Document)

xiii. ***SMS Forecasts:*** The forecast of SMS per-subscriber traffic was revised to decline from 2014, as opposed to remaining constant. A logarithmic decay is assumed throughout 2014-2032, in which the decrease is steepest in early years and in such a manner that SMS services remain active throughout the modelled time horizon (2003-2032).

xiv. ***WACC:*** The mobile WACC was revised to 8.63% in the Supplementary Consultation following publication of ComReg's decision in December 2014 on the appropriate cost of capital.[321]

This matter is discussed in paragraph 2.3 of the Supplementary Consultation.

xv. ***Annual MTR:*** ComReg proposed in the Supplementary Consultation that the maximum MTR should be set annually rather than as a fixed maximum MTR for the duration of the Price Control Period.

This matter is discussed in paragraph 2.6 of the Supplementary Consultation.

7. As noted in paragraph 2.3 of the Supplementary Consultation, the Deloitte Specification Document (which was published at the same time as the Supplementary Consultation)[322] provides details of every modification that has been implemented in the Supplementary Consultation MTR Model.

[321] http://www.comreg.ie/_fileupload/publications/ComReg14136.pdf. See also ComReg's response to Question 16 to the European Commission's 26 November RFI.
[322] http://www.comreg.ie/_fileupload/publications/ComReg1429a.pdf

9. A number of interested parties responded to the Supplementary Consultation (see paragraph 3.28 of the Draft Decision Document) and ComReg made a number of modifications as a result of having given due consideration to the submissions made by the respondents. As a result the Pure LRIC rates calculated by the MTR Model increased from those consulted on in the Supplementary Consultation.

Price control period	Annual MTR in updated MTR Model and proposed in this Draft Decision Document	Annual MTR proposed in Supplementary Consultation (Mobile Data Traffic Scenario A)
1 January 2016 to 31 December 2016	€0.0084	€0.0068
1 January 2017 to 31 December 2017	€0.0082	€0.0065
1 January 2018 to 31 December 2018	€0.0079	€0.0062

10. For ease of reference, in order to address your query we have set out below the changes from Supplementary Consultation to Draft Decision Document.[323]

i. ***Market share:*** the market share of the modelled operator is revised from that set out in the Supplementary Consultation and is now assumed to remain constant during the modelled time period from 2003 through 2032. A market share of 25% has been set.

This is discussed in paragraphs 5.30 – 5.43 of the Draft Decision Document and section 2.2 and section 4.1.1.3 of the Deloitte Specification Document (Annex: 4 Final Deloitte MTR Model Specification Document for Ireland)[324].

ii. ***On-net and off-net per subscriber traffic:*** As a result of the market share adjustment discussed above the associated on-net and off-net per subscriber traffic is updated accordingly.

This is discussed in section 6.2 and paragraph 5.39 of the Draft Decision Document and section 4.1.2 of the Deloitte Specification Document.

[323] See footnote 3.
[324] Of Appendix A to the Draft Decision Document.

iii. ***On-net / off-net calls:*** this ratio is informed by the relationship observed in ComReg's QKD on operator market shares and the proportion of their mobile minutes that are on-net. The ratio has been revised to be informed by a larger QKD dataset (to that considered in the Supplementary Consultation) covering Q2 2012 through Q3 2014.

This is discussed in paragraphs 6.16 – 6.23 of the Draft Decision Document and section 4.1.2 of the Deloitte Specification Document.

iv. ***Spectrum assignments:*** As a result of the market share adjustment discussed above the associated spectrum assignments is updated accordingly.

This is discussed in paragraphs 7.76-7.83 of the Draft Decision Document and section 2.3.2 of the Deloitte Specification Document.

v. ***Spectrum holdings:*** ComReg has revised its approach by taking into account in the "Multi-band Spectrum Release: Release of the 800 MHz, 900 MHz and 1800 MHz Radio Spectrum Bands".[325] As detailed in ComReg Document 12/25, three spectrum assignments of 2x7.2 MHz were held by Vodafone, Telefónica and Meteor prior to 2012. As H3GI did not hold any 900MHz spectrum during this period, using the 1/N methodology means that 7.2 MHz per operator reflects the spectrum assigned to the three operators utilising 900MHz spectrum (i.e., our approach now takes into account that a block spectrum was held fallow).

This is discussed in paragraphs 7.38-7.40 of the Draft Decision Document and section 2.3.2 and section 5.1.1.7 of the Deloitte Specification Document.

vi. ***GMSC incrementality:*** the GMSC incrementality assumption has been revised so that the PoI facing ports are assumed to contribute to pure LRIC.

This is discussed in paragraph 7.206 of the Draft Decision and section 5.3.2.2 of the Deloitte Specification Document. It is also discussed in the answer to RFI Question 2 below.

[325] ComReg Document 12/25 http://www.comreg.ie/_fileupload/publications/ComReg1225.pdf

vii. ***Geotype classification:*** The breakdown of land-area by geo-type has been reverted to the value inputs presented during the Original Consultation process. This input reflects Ireland's land area, including inland water as per Eurostat. The geotype classification of urban, sub-urban, and rural areas is based on operator data. This classification relates to a more recent Irish demographic distribution than that reported by the CSO.

This is discussed in paragraphs 7.13 – 7.19 of the Draft Decision and section 5.1.1.2 of the Deloitte Specification Document.

This impacts on the calculation of weighted cost of site backhaul, which results in modifications to unit capex and unit opex of 2G links (Abis) and 3G links (Iub).

viii. ***Penetration rate:*** The penetration rate for 2014 has been revised to 125.3%, reflecting the information from ComReg's Q4 2014 QKD. The subsequent penetration rate figures from 2015-2032 have been revised in light of this information also.

This is discussed in paragraph 6.56 of the Draft Decision Document and section 4.1.1.2 of the Deloitte Specification Document.

ix. ***Traffic by technology:*** the profile of voice and SMS traffic migration from 2G to 3G network has been slightly revised between 2012 and 2015 in rural areas. The profile has been amended to assume a smoother migration in those years in order to be consistent with the smooth profiles assumed for urban and suburban areas.

The proportion of voice traffic by technology and geotype assumed is updated as follows in the Draft Decision Document:

Supplementary Consultation MTR Model (2013)

	2G	3G
Urban	33.8%	66.2%
Suburban	33.8%	66.2%
Rural	53.4%	46.6%

Draft Decision Document MTR Model (2013)

	2G	3G
Urban	33.8%	66.2%
Suburban	33.8%	66.2%
Rural	65.9%	34.1%

Supplementary Consultation MTR Model (2025)

	2G	3G
Urban	5.0%	95.0%
Suburban	5.0%	95.0%
Rural	40.0%	60.0%

Draft Decision Document MTR Model (2025)

	2G	3G
Urban	5.0%	95.0%
Suburban	5.0%	95.0%
Rural	40.0%	60.0%

This is discussed in paragraphs 7.58 – 7.68 of the Draft Decision Document and section 4.1.3 of the Deloitte Specification Document.

x. ***Planned element utilisation:*** ComReg revised its preliminary view that planned element utilisation values were assumed to be constant over the time horizon of the model. In the Draft Decision Document, utilisation by element is assumed to be constant over the time horizon of the model, except for 2013 and 2014 when the utilisation of BTS, TRX, and BSC is assumed to be at 90%. Due to the temporary decrease in the hypothetical efficient operator's holdings of the GSM900 spectrum in 2013 and 2014, the 2G RAN network is assumed to be utilised more heavily in these two years.

This is discussed in paragraphs 7.143 – 7.146 of the Draft Decision Document and section 5.1.3 of the Deloitte Specification Document.

(ii) quantify the change for each of the listed elements.

1. The drivers of the change to the pure LRIC MTR are interrelated and so adjusting one of them may affect others. These drivers also may have offsetting effects on the value of pure LRIC. Attributing the exact changes to pure LRIC to each of the drivers (each associated with the respective model modification) is not possible to document due to the interdependence of the drivers. Moreover, their impact on pure LRIC depends on the sequence of the execution of the respective modifications that have been performed. Therefore, it is not possible to attribute one specific value of impact on pure LRIC from each of the modifications undertaken.

b. In this respect, could you please also quantify the trends identified in Annex F?

1. As noted in response to Question 1 (ii) above, it is not possible to attribute one specific value of impact on pure LRIC from each of the modifications undertaken.
2. Consequently, in Annex F of the Deloitte Specification Document, the impact of each of the modifications are described in general orders of magnitude and directional effects only.

Q2. In para 7.198 you refer to the fact that the Original MTR Consultation stated that the network design parameters in the core were insensitive to the changes in traffic volumes when the wholesale termination increment was removed. Para 8.20 states "In the Supplementary MTR Consultation the GMSC network element cost was revised to €1,200 to reflect the cost of interconnection ports. ComReg noted that this does not have any impact on the pure LRIC MTRs as the boundary of the MVCT services does not include the GMSC port (see 7.205- 7.207)".

Finally, Deloitte's report states that on the basis of comments received: "….the assumption on GMSC incrementality has been amended." The draft decision concludes in this respect (Para 7.209): "The Final MTR Model treats the GMSC as being incremental to MVCT". Against this background, could you please explain what are the arguments which have made ComReg change its mind on GMSC incrementality.

1. See paragraphs 7.203-7.2.07 of the Draft Decision Document.
2. As paragraph 8.20 of the Draft Decision states: *"In the Supplementary MTR Consultation the GMSC network element cost was revised to €1,200 to reflect the cost of interconnection ports. This is further discussed in paragraph 2.38 of the Supplementary MTR Consultation. ComReg noted that this does not have any impact on the pure LRIC MTRs as the boundary of the MVCT services does not include the GMSC port…".*[326]
3. In its response to the Supplementary Consultation, Vodafone re-iterated its argument (see paragraph 7.203 of the Draft Decision Document) that "*"[t]hese costs constitute a very significant contribution to the overall costs of building and operating a network. Management of data parameters for sites and transmission elements constitutes a significant part of these costs. These costs will scale with size of network and thus a portion of the costs should be attributable to the incremental cost of termination".*
4. Having considered Vodafone's submission that the model does not take into account any MSC or NMC costs (see paragraph 7.203 of the Draft Decision), ComReg further considered the issue of the whether the costs of the MSC or NMC network elements should be incremental with regard to wholesale termination traffic. In this regard, ComReg assessed MTR cost models developed in other jurisdictions and reviewed the information provided by Irish MSPs in response to the First Information Request.
5. Consequently, as set out in paragraph 7.206, ComReg revised its position noting that "International precedent suggests that MSC ports can be incremental with respect to termination traffic, whereas the chassis is not. As the MSC ports can have incremental cost contribution to the pure LRIC MTR,

[326] Note that there is a drafting error in the last sentence in paragraph 7.202. This sentence states that "This modification to the Updated MTR Model did not have a material impact on the pure LRIC MTR". This sentence needs to be deleted in its entirety as it does not reflect the position at the Supplementary Consultation stage. As noted in the Supplementary Consultation (see paragraph 2.38 of the Supplementary Consultation) and summarised correctly in paragraph 8.20 of the Draft Decision Document "*this does not have any impact on the pure LRIC MTRs as the boundary of the MVCT services does not include the GMSC port …".*

but the MSC chassis does not, the GMSC has been revised to include the costs of PoI-facing ports. Therefore, in light of the evidence from other NRA models and the information gathered during the pre-consultation process, the GMSC is treated as being incremental with respect to termination traffic. However, the MSC-S dimensioning methodology remains unchanged. The impact on the pure LRIC MTR from this amendment is positive, albeit minor."

Q3. On page 4 of the notification, you point out, that the High Court ordered that the maximum MTR of 2.6 cent per minute should be in effect "until such time as the proceedings have been determined or until further ordered", but that the High Court decision would be "pending any future decision adopted by ComReg once its model for MTRs has been completed". In the letter dating from 29. July 2015 you point out that this rate (2.6) "will remain in the market until ComReg is in a position to adopt its (BU-)LRIC model in respect of MTRs and applies to the court to vary its order and accordingly the rate in the market."

Please clarify if once adopted the present draft measure has any immediate effect, i.e. takes over the court ordered maximum MTR of 2.6 cent per minute, or if any change of the rate will require prior court approval.

✂

✂ END