



## Assessment of Fixed Voice Call Origination to Non- Geographic numbers in Ireland

### ***Specifications and results***

Ref: 2018-34-PD-ComReg-FVCO

Redacted version

**TERA** Consultants

39, rue d'Aboukir

75002 PARIS

Tél. + 33 (0) 1 55 04 87 10

Fax. +33 (0) 1 53 40 85 15

[www.teraconsultants.fr](http://www.teraconsultants.fr)

S.A.S. au capital de 200 000 €

RCS Paris B 394 948 731

October 2019

## Summary

---

1	Context.....	3
1.1	Scope of the modelling .....	3
1.2	Implementation of the principles paper conclusions .....	4
1.2.1	Price Control .....	4
1.2.2	Model structure .....	4
1.2.3	Costing approach .....	4
2	FVCOs modelling .....	5
2.1	Presentation of the NGN core model .....	5
2.2	Reference files for further changes to the NGN core model required to calculate FVCOs .....	6
2.3	Main changes to the existing FTR model .....	7
2.4	Structure of the FVCO add-on.....	7
2.4.1	Voice platform costs calculation .....	7
2.4.1.1	IMS .....	7
2.4.1.2	SBC and MGC/MGW .....	8
2.4.1.3	Next generation intelligent network ('NGIN').....	8
2.4.2	Retail costs calculation.....	8
2.4.3	Transmission costs calculation.....	9
3	Annex: TERA's Answers to Operators comments to the Consultation Document No. 19/46.....	10
3.1	Context .....	10
3.2	Answers to questions raised by operators.....	10
	<b>Question 6-8, 11 and 13</b> .....	10
	<b>Question 7:</b> Do you agree with the costing principles proposed for modelling the costs to inform the wholesale charges for call origination to Freephone NGNs, as outlined in the DotEcon Report and summarised in Section 4.10 of this Consultation? .....	11
	<b>Question 10:</b> Do you agree with the approach taken to quantify the reasonable retail costs that are relevant to calls originating to Freephone numbers hosted on another operator's network?.....	12

## 1 Context

### 1.1 Scope of the modelling

In 2017, ComReg has launched a review of non-geographic numbers (NGNs) in Ireland. ComReg Document 17/70a<sup>1</sup> provides an overview of NGNs markets, products and business models, which identifies several issues related to the provision of call services to NGNs, and proposes some regulatory remedies to cope with those issues, at both retail and wholesale levels.

Five NGNs classes are considered<sup>2</sup>:

- **'1800', Freephone** – the total charge for these calls is borne by the called party;
- **'1850', Shared Cost (per call charge)** – the caller is charged a fixed rate for only part of the cost of the call, with the called party being charged for the remainder.
- **'1890', Shared Cost (per minute charge)** – the caller is charged a per minute rate for only part of the cost of the call, with the called party being charged for the remainder.
- **'0818', Universal Access** – originally introduced to allow a called party to receive calls at a single or several different locations depending on the time the call is made and the location of the caller. The caller pays for the call and there should be no contribution from the called party.
- **'076', Nomadic** – originally intended to provide VoIP operators a greater choice of types of numbers as well as much more freedom in respect of rights of use than other types of number. It has recently been adopted for other uses including corporate numbers. The caller pays for the call and there should be no contribution from the called party.

Those service classes are characterized by their underlying business model, which can be a Calling Party Pays (CPP) model, a Receiving Party Pays (RPP) model, or a mix of both. Those different business models have led to distinct interconnection settlements, in the case where a call originates and terminates on a different network. The “settlement rate” is the sum per minute or per call that is passed between originating operator (OO) and terminating operator (TO). In all cases, this settlement rate depends on the origination cost borne by the OO, called the “retention rate”.

This retention rate therefore directly impacts the retail cost of NGNs services (for consumers or for service providers), with a direct impact on the services usage.

---

<sup>1</sup> Strategic Review of Non Geographic Numbers in Ireland, a Dotecon Report for ComReg, 16 August 2017

<sup>2</sup> Premium rates and directory enquiries are excluded from the scope of the study

## 1.2 Implementation of the principles paper conclusions

Prior to the cost modelling workflow, ComReg engaged DotEcon to develop a principles paper on the most suitable approach to assess Fixed and Mobile Voice Call Origination rates in the Irish context. This report sets out the main principles to be considered when implementing cost orientation for voice calls to non-geographic numbers.

This section aims at summarizing the key identified principles, that are relevant in the context of the FVCO modelling and how they have been implemented in practice.

### 1.2.1 Price Control

The principles paper reaches the conclusion that a LRAIC+ costing should be adopted for non-geographic numbers FVCO services, considering voice origination for non-geo numbers traffic as the last increment of the stack.

### 1.2.2 Model structure

The principles paper reaches the conclusion to price FVCO (Fixed Voice Call Origination) based on a Bottom-up LRAIC+ approach.

The model developed by ComReg to determine the current FTRs was built as an add-on to ComReg's "NGN core cost model" used in current decision (D11/18)<sup>3</sup>. This model is now used as starting point for the FVCO modelling. An FVCO add-on enables specific calculation of voice-specific costs by a more detailed calculation of voice switching platform (SBC, IMS, NGIN) costs and related licence costs and specific opex for Wholesale FVCO is added.

During the development of the NGN core model, a top-down validation has been performed by comparing the inventories (number of assets) modelled with the real number of assets in Eir's network. A comparison has been performed between eir's data and output from the NGN Core Model of the total number of exchanges, aggregation nodes, edge nodes and core nodes between and the number of DSLAMs/Chassis used.

The FVCOs are assessed for the 2019-2024 period.

### 1.2.3 Costing approach

The principles paper reaches the following conclusions:

- The modelled operator should:
  - Be a hypothetical efficient operator;
  - Be assumed to have productively-efficient scale.

---

<sup>3</sup> ComReg D11/18.

- Economic depreciation should be the starting point for cost recovery over time.

The DotEcon Report also notes that a practical approach to addressing scale effects in the modelled networks would be to use the average of the actual number of large operators with national coverage and, as eircom is the only fixed operator that has a national presence, the report considers that the fixed model could be based on eir's scale. This is consistent with the scale that is modelled in the Core NGN Model and in the related FTR Model and FVCO Model.

Regarding the depreciation approach that should apply, TERA agree that Economic Depreciation is appropriate when both network demand and asset costs are fluctuating over time but also consider that tilted annuities can be a good proxy for economic depreciation if the modelled network is experiencing a relatively stable evolution in network demand and costs.

## 2 FVCOs modelling

### 2.1 Presentation of the NGN core model

For costing of leased lines and wholesale central access products, ComReg had developed a new version of the NGN model<sup>4</sup>, that models the costs of a core network for a Hypothetical Efficient Operator with the scale of eir. The NGN Core Model also used a tilted annuity approach to annualise costs as the core network is considered to have reached a stage of maturity that should not give rise to significant fluctuations in the rate of change in asset costs either due to changes in technology or service demand. Consequently, TERA are of the view that the using a model based on the NGN Core Model to determine charges for FVCO to Freefone numbers is consistent with the recommendations in the DotEcon Report on efficient scale and depreciation approach.

All core services are considered in the modelling process and core network costs are modelled for the 2009-2024 period, at a regional level:

- Active equipment required at nodes, which depends on:
  - The number of subscribers connected at each node;
  - The traffic passing through the network;
  - The architecture of the network;
- Routing factors for each service;
- Civil engineering assets;
- Top-down opex from eir regulatory accounts, adjusted for efficiencies.

Specification of this NGN model is further detailed in ComReg's draft decision for the WCA/WLA market.<sup>5</sup>

---

<sup>4</sup> ComReg D11/18.

<sup>5</sup> ComReg D17/26: "Pricing of wholesale services in the Wholesale Local Access (WLA) market and in the Wholesale Central Access (WCA) markets: Further specification of price control obligations in Market 3a (WLA) and Market 3b (WCA)" dated from 07 April 2017

The NGN model (in the version that has been updated for FTRs assessment) is used as the starting point for the FVCO modelling as:

- The NGN model represents an appropriate efficient network topology.
- The NGN model has as input the likely demand for services.
- The NGN model calculates the efficient network and operating costs.
- The NGN model uses an appropriate allocation of costs to services

As voice specific elements were not originally dimensioned in the NGN core model, the FVCO add-on includes specific calculation of switching platform costs with the associated licences. The main elements dimensioned are:

- The Session boarder controllers (SBC) that function as a boundary between the access and core of IMS for signalling and media.
- The internet Media System (IMS) that is used for conveyance of packetized call minutes.
- The Next Generation Intelligent Network platform
- The MGC/MGW media gateways that are only used in the TDM configuration

FVCO rates can then be calculated following either LRAIC+ approach using the NGN model, inclusive of transmission and voice platform costs.

## 2.2 Reference files for further changes to the NGN core model required to calculate FVCOs

The following table summarizes the main reference files for further changes to the NGN model required to calculate FVCOs.

The NGN model input sheets: “Routing Factors”, “Voice Traffic” and the new “FVCO plug-in” sheet have been updated accordingly using data from the following files.

**Table 1 - Reference files**

File name	Content
181030_NGNs_ComReg Data Request FRRs-eir version_v02_Core Voice_Response	<ul style="list-style-type: none"> <li>- Updated Routing factors for existing voice services</li> <li>- IMS fixed costs</li> </ul>
201x-traffic to NGN 076_traffic_1611_1711_1811	<ul style="list-style-type: none"> <li>- Non-geographic numbers traffic for the period 2016-2018</li> </ul>
NGN Retail Costs FY1718	<ul style="list-style-type: none"> <li>- FY1718 Non-geographic numbers retail costs</li> </ul>
Review Call Origination Voice Platform Opex costs 201617	<ul style="list-style-type: none"> <li>- FY1617 Wholesale Call Origination specific opex</li> </ul>

*Source: TERA Consultants*

## 2.3 Main changes to the existing FTR model

The main changes to the existing NGN BU-LRAIC model to address the cost of FVCOs include:

- Routing factors for voice services were updated as per eir’s last submission
- Addition of specific interconnection costs:
  - Fixed IMS platform costs
  - Wholesale Call Origination specific opex
  - Additional Retail costs (including billing) for 1800 calls
  - Uplift of the cost base for FVCO to address the under-recovery of fixed and common costs associated with call termination

## 2.4 Structure of the FVCO add-on

“Voice services – Platform costs” and “LRAIC calculation” worksheets included in the add-on to the NGN core model enable to calculate:

- **Transmission costs:** As outputs from the BU-LRAIC NGN model
- **Voice Platforms costs:** Based on Unit costs and engineering submitted by eir or on their regulatory accounts
- **Retail costs (including billing):** Based on data extracted from eir’s accounts, which is adjusted for efficiencies

### 2.4.1 Voice platform costs calculation

To model Voice specific costs, the plug-in follows the framework used the model that served for FTR determination for consistency.

#### 2.4.1.1 IMS

This Network Element is used for conveyance of packetized call minutes.

- Fixed costs are calculated based on fixed investment information provided by eir after annualization over the asset lifetime, using a tilted annuity equation in the worksheet “FVCO-LRAIC analysis”, taking into account the economic asset life and asset price trends.

**Figure 1 – IMS Annual capex calculation**

✂

Source: eir

- Variable costs are mainly related to licences and are calculated in accordance with information provided for FTR assessment.

#### 2.4.1.2 SBC and MGC/MGW

The SBC functions as a boundary between the access and core of IMS for signalling and media.

MGC/MGW provide functionality to break out from IMS for signalling and media and are only considered in a TDM configuration

For these network elements, main cost considered are licence costs that are calculated as per the FTR assessment.

SBC costs are then attributed to the “per call” component of the FVCO.

#### 2.4.1.3 Next generation intelligent network (‘NGIN’)

The costs of the NGIN platform expansion have been provided by eir and are calculated as per the FTR assessment.

NGIN costs are then attributed to the “per call” component of the FVCO.

### 2.4.2 Retail costs calculation

Eir provided a breakdown of the retail costs (linked to the costs of the billing, product management, IT functions and general overheads) for calls to non- geographic numbers, and this was analysed by ComReg /TERA to identify the scale of retail costs that might be relevant to calls originated to Freefone numbers. This involved reducing billing costs on the basis that some retail billing related activities such as bad debt/credit management would not be relevant to Freefone calls although an element of billing system costs were considered relevant as the call data still needs to be collated in order to bill the called party. Market and sales costs were also reduced on the basis that marketing and sales activities relevant to Freefone calls tend to be undertaken by the service provider that receives the call. However, an allowance for general overheads on relevant retail costs is included to be consistent with the LRAIC+ costing approach.

Total non-geographic numbers services FVCO traffic for the year come as forecast calculation in “Voice Traffic” sheet.

The total relevant retail costs are then calculated per year, considering a 2% p.a. price increase, and then divided by the total non-geographic numbers services FVCO traffic.

#### Figure 2 -Screenshot of Retail costs calculation



Source: NGN model – FVCO update, “FVCO-Platform costs”



### 2.4.3 Transmission costs calculation

LRAIC+ transmission costs are calculated in the worksheet “FVCO LRAIC ANALYSIS” as weighted average of the non-geographic number’s services unit costs coming as outputs of the NGN model.

Besides, two scenarios have been implemented in the model for the calculation of Voice Platform specific opex:

- Either following a Bottom-up approach, based on the support costs provided by eir as percentages of variable platform costs.
- Or following a top-down approach, based on specific voice platform opex coming from eir’s regulatory accounts (summarised in the worksheet “Additional NEIMS costs” that can be found in “Opex Annexes” to the model

This transmission costs are later added to the voice platform costs and the retail costs (including billing) to get the a LRAIC+ FVCO cost. An uplift is further added to this cost to reflect the under-recovery of fixed and common costs associated with the pure LRIC calculation of call termination. This uplift is calculated based on the ratio of the total costs in eir’s regulatory accounts and the unrecovered fixed call termination costs.

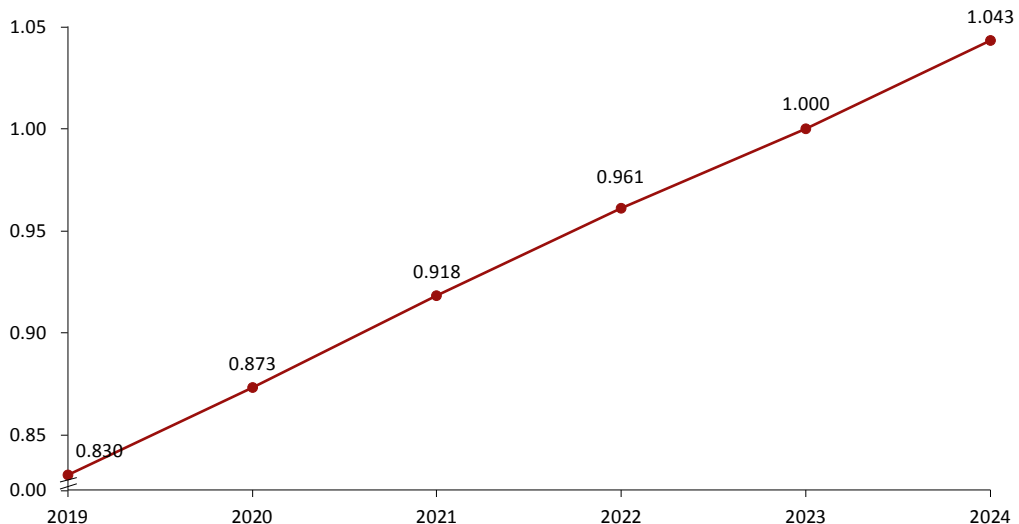
**Figure 3- Screenshot of the model for the LRAIC+ FVCO results display**



*Source: NGN model – FVCO calculation, “FVCO LRAIC ANALYSIS”*

The FVCOs are then calculated for each year of the price control period (from 2019 to 2024) using a macro routine (that is launched using the macro button in the worksheet FVCO – Variable Platform Costs).

**Figure 4 - LRAIC+ FVCOs output for the 2019-2024 price control period**



*Source: NGN model – FVCO calculation, “FVCO LRAIC ANALYSIS”*

### 3 Annex: TERA’s Answers to Operators comments to the Consultation Document No. 19/46

#### 3.1 Context

In the consultation document No. 19/46, ComReg shared with the industry its preliminary views on proposed future Fixed Voice Call Origination to Non-Geographic numbers in Ireland.

FVCO rates are set using the NGN model (the model that served for FTR determination), which is supported by a specific plug-in developed by TERA Consultants specifically to calculate LRAIC+ costs for FVCO to Non-Geographic numbers.

Several Irish Telecommunication providers raised questions about cost standard, the modelling and the FVCO rate assessment approach, this document presents TERA Consultants answers to main modelling issues comments raised in the consultation.

#### 3.2 Answers to questions raised by operators

##### Question 6-8, 11 and 13

**Q6.** Do you agree with ComReg’s preliminary conclusions on wholesale charges for calls to 1800 numbers?

**Q7.** Do you agree with the costing principles proposed for modelling the costs to inform the wholesale charges for call origination to Freephone NGNs, as outlined in the DotEcon Report and summarised in Section 4.10 of this Consultation?

**Q8.** Do you agree with ComReg’s preliminary view that the Draft MVCO Model is appropriate for determining a LRAIC+ for Mobile Voice Call Origination to a Freephone NGN?

**Q11.** Do you agree with ComReg’s preliminary view that the Draft FVCO Cost Model is appropriate for determining a LRAIC+ cost for Fixed Voice Call Origination to a Freephone NGN?

**Q13.** Do you agree with the approach taken to quantify the reasonable retail costs that are relevant to calls originating to Freephone numbers hosted on another operator’s network?

In its response to these questions, “**Three**” raised their concerns about the appropriateness of the use of the NGN model, which is the incremental (Pure LRIC) model that served for FTR determination, to assess call origination rates.

“**Three**” stated, in response to the question 6 that: “*It is inappropriate to impose a call origination control based on an incremental cost model.*”

Moreover, in response to the other questions, “**Three**” indicated “*it is incorrect to use this cost model.*”

**TERA answer:**

“**Three**” concerns is related to the consistency between the cost standard identified by DotEcon relevant to determine call origination rates (LRAIC+) and that is used in the NGN model (used for FVCO calculations), pure LRIC.

As described in the principles paper, the FVCO (Fixed Voice Call Origination) cost should be based on a Bottom-up LRAIC+ approach. Practically, this is achieved based on the incremental model (pure LRIC) adjusted to LRAIC+ cost standard, with additional mark-ups.

The LRIC or incremental cost model, which was initially used to determine Fixed Call Termination Rates, is now used as a relevant **starting point** for the FVCO pricing, since fixed call origination modelling do leverage many data from the fixed termination cost model.

However, additional calculations are added in the model (for FVCO pricing) to reach the LRAIC+ cost standard, to which additional mark-ups are added to take into account the recovery of some retail costs associated with call origination and include fixed and common costs unrecovered from FTR tariffs due to the use of a LRIC cost base.

**Question 7:** Do you agree with the costing principles proposed for modelling the costs to inform the wholesale charges for call origination to Freephone NGNs, as outlined in the DotEcon Report and summarised in Section 4.10 of this Consultation?

**BT** gave their view on the costing principles for modelling costs, following the comparison made between dynamics observed in the fixed core network and in the Mobile RANs, explaining that they “*consider this comment incorrect for a number of reasons. Firstly it’s not comparing like with like as core and access networks are different.*”

Moreover, **BT** outlines that “*established fixed operators are also currently experiencing huge change in migrating from TDM switches to VoIP type solutions*” and that “*The fixed world is anything but static.*”

**TERA answer:**

TERA would like to highlight that, from a modelling point of view, the cost model for FVCO assessment is based on modern technology considering a largely IP network technology, but with TDM interconnection.

Then, the cost model used is based on a modern network technology mix, mainly based on IP, which reflects the technological choices that are best practices within many EU telecommunications network.

**Colt**, on the other hand, in its answer to ComReg’s consultation, “*disagrees with DotEcon and ComReg’s proposal to implement a LRAIC+ model instead of a Pure LRIC model.*” suggesting that pure LRIC is a better alternative.

**Colt** also disagrees with ComReg’s view about the inclusion of retail costs and additional mark-up.

**TERA answer:**

TERA’s view is in line with ComReg’s proposal, that LRAIC+ is the appropriate cost standard in FVCO price assessment.

LRAIC+ is the appropriate cost standard that allows operators fully recovering their costs.

Moreover, excluding retail costs would lead to a situation where, for example, FVNO/MVNO would generate any revenue while incurring some retail costs. Thus, they would not fully recover their costs.

**Question 10:** Do you agree with the approach taken to quantify the reasonable retail costs that are relevant to calls originating to Freephone numbers hosted on another operator’s network?

**Eircom** disagrees with ComReg’s proposal concerning the inclusion of retail costs, stating, “*..there are no retail costs that should, on a reasonable basis, be recovered by the Operator originating a call to a Freephone service*”.

**TERA answer:**

See answer above.