Report for Ofcom

Study of approaches to fixed call origination and termination charge controls

15 May 2012

Ref: 34541-193

Contents

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1 Introduction

Certain wholesale narrow-band markets in the UK are currently subject to 'network charge controls' (NCC) that were implemented following the last market review in 2009. These controls are due to expire at the end of September 2013.

In anticipation of the expiry of the existing NCC, Ofcom has initiated a review of the UK narrow-band market. While Ofcom was finalising its market review in 2009, the European Commission (EC) issued a recommendation[1] on the treatment of fixed and mobile termination rates (hereafter referred to as the 'Recommendation').

Ofcom has commissioned Analysys Mason to conduct a study to understand the positions taken by other national regulatory authorities (NRAs) with regard to the regulatory treatment of origination and termination of fixed-line calls. The study is limited to major countries where the NRA has taken, or is in the process of taking, account of the Recommendation. Ofcom considers the following aspects of the Recommendation to be central to understanding how closely other NRAs have followed the Recommendation:

- Model recommendations:
  - A bottom-up current cost model is implemented
  - A next-generation network (NGN) is the efficient reference design
  - Termination rates should be set on the basis of a calculation of pure long-run incremental costs (pure LRIC) i.e. costs that do not vary when terminating traffic is removed from the network should not be recovered from termination services.
  - Economic depreciation is implemented, wherever feasible
- Rates between fixed operators are symmetrical
- An appropriate benchmark is used when a cost model in agreement with the Recommendation cannot be developed in time to set rates by 1 January 2013.

The requirement for a bottom-up NGN cost model is new for several NRAs in the EU (and EEA). The need for a pure LRIC calculation is a change for all NRAs who previously often used cost calculations based on the long-run average incremental cost with mark-up (LRAIC+).[2] Both of these costing methodologies estimate the incremental cost to an operator of providing a service. The difference between them is the size of the increment.

1 European Commission C(2009) 3359 final COMMISSION RECOMMENDATION of 7.5.2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU; also EFTA Surveillance Authority Recommendation of 13 April 2011 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EFTA States.

2 Some NRAs refer to LRAIC+ as LRIC+, for the purposes of this document we use the term LRAIC+. A LRAIC+ estimate includes a share of non-traffic sensitive common costs and intra-traffic common costs. A pure LRIC estimate includes only the avoidable costs of the traffic increment in question (i.e. non-traffic sensitive common costs and intra-traffic common costs are excluded).

1.1 Scope

Ofcom has identified the following key issues as areas of focus:

- reasons for adopting (or rejecting) pure LRIC as a costing methodology
- treatment of common costs
- introduction of NGN architecture as current efficient standard
- choice of handover technology (circuit-switched vs. IP-interconnect)
- choice of depreciation methodology
- imposition of symmetry of rates between incumbent and alternative fixed network operators.

1.2 Countries

The countries in the table below have been considered in this study.

Country	Regulatory agency
Austria	RTR
Belgium	BIPT
Denmark	DBA (was NITA)
France	ARCEP
Germany	BNetzA
Netherlands	OPTA
Norway	NPT
Sweden	PTS

Figure 1: Countries examined

For clarity, all monetary values in this report are shown in nominal terms. Weighted average cost of capital (WACC) values may be in real or nominal terms, dependent on the source, but are clearly identified.

The remainder of this document is laid out as follows:

- Section 2 presents a country-by-country analysis of the key issues.
- Section 3 presents a summary of the positions taken by NRAs on the key issues.
- Annex A provides the currency exchange rates used in this report
- Annex B provides a bibliography of references.

2 Country analysis

2.1 Austria

Figure 2: Summary of agreement with the Recommendation [Source: Analysys Mason, 2012]

Recommendation	Agreement
Bottom-up current cost model used or being developed	✓
NGN for efficient operator	✓
Can cost pure LRIC for termination (date expected to be available)	▬ (for 2013)
Economic depreciation [1]	✓ [2]
Pure LRIC prices	▬ (by 2013 [3])
Symmetry of rates	×
If no agreement, use of benchmarking	✓ [4]

Legend: ✓= agreement now, ▬ = expected to be agreement, × = not implemented

Notes:

1: Economic depreciation is not a requirement ("wherever feasible") so an NRA can in principle be in agreement with the Recommendation without an economic depreciation calculation

2: Adjusted (tilted) annuity is used as a proxy for economic depreciation

3: Current regulation may mean the minimum between cost-orientation and retail minus, to avoid margin squeeze

4: The benchmarks used include countries that set rates which are not in agreement with the Recommendation.

2.1.1 Market overview

The Austrian market has experienced significant fixed-to-mobile substitution. The main players in Austria's fixed-line market are A1 Telekom Austria, Tele2 Austria and UPC Austria. In 2010, only UPC Austria managed to increase its subscriber base, while the other two reported losses. On balance, the number of fixed telephony channels fell by 7% to 3.03 million in that year.

Figure 3: Fixed originated telephony traffic in Austria[3] [Source: Analysys Mason, 2012]

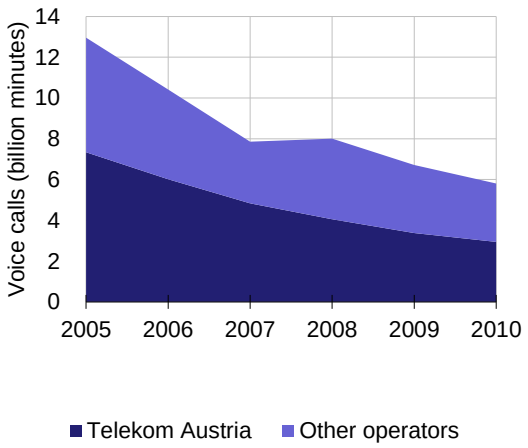
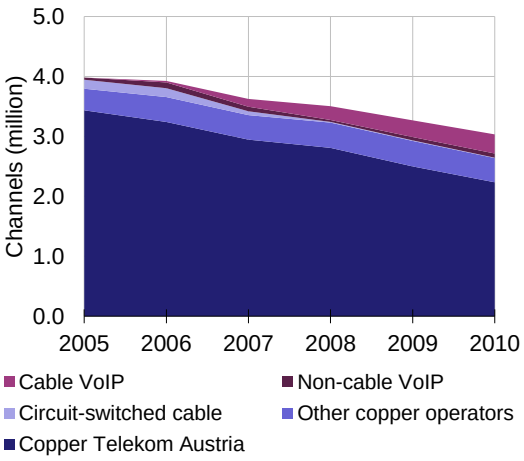


Figure 4: Fixed telephony channels in Austria[3] [Source: Analysys Mason, 2012]



In 2010, the incumbent, Telekom Austria, carried 51% of Austrian fixed-line traffic on 74% of the county's fixed telephony channels.

According to the Regulatory Authority for Broadcasting and Telecommunications (RTR)[4], the next two biggest operators in terms of market share of fixed minutes are Tele2 (< 25%) and UPC (< 10%). The principal access network technologies and business models used by major operators to terminate voice traffic are summarised in the table below.

Operator	Principal access networks
Telekom Austria	Access owner (copper, fibre)
UPC	Access owner (cable)
Tele2	Access leaser (copper)

*Figure **5**: Principal access networks for major operators [Source: Analysys Mason, Telegeography, 2012]*

2.1.2 Identification of SMP

Telecoms regulation in Austria is split between the RTR and the Telekom Control Commission (TKK). The TKK is a state department setting competition regulation, which is implemented by the independent RTR. The RTR in particular focuses on licensing and interconnection. The RTR defines its telecommunications markets in a document titled '*Telekommunikations-*

[3] Note: 1. Charts show total market, which includes both residential and business segments

2. Charts show retail level data, rather than wholesale level data. Therefore part of the "Other operators" may be WLR or CPS operators on the incumbent's network

3. VoIP connections are active users of either paid-for native VoIP services that use a broadband access connection, or VoIP services included in a paid-for bundle with broadband access. The figure excludes peer-to-peer applications. Although some VoIP customers use the service in parallel to their PSTN or ISDN connection, it most commonly replaces a narrowband connection. Especially for cable VoIP connections the argument to give up the PSTN or ISDN connection is strong as this allows the customer to avoid the copper line rental charge.

4. Copper includes both LLU and WLR

[4] [AT01, Page 191]

märkteverordnung' (TKMV). It was updated in 2008 to become TKMV 2008 and has since been revised twice. The latest revision of TKMV 2008 was published on 22 December 2009[5].

Operators with SMP in origination

As part of its third origination market review[6] in 2010, TKK confirmed its conclusion from the first and second origination market review that only Telekom Austria has significant market power (SMP) in call origination based on:

- market share (Telekom Austria held 80%[7] in 2008, whereas no competitor held more than 10%)
- barriers to entry
- lack of countervailing buyer power.

Operators with SMP in termination

In the market of call termination, TKK, designated Telekom Austria and 21 alternative network operators (ANOs) with SMP after considering:

- their 100% shares of the market for termination on their network
- lack of countervailing buyer power.

2.1.3 Rationale for chosen cost standard

Previously, RTR used a forward-looking LRAIC (FL-LRIC) approach in setting price controls. The regulator is of the opinion that as long as traffic levels are rising or flat, this approach sets the correct investment incentives for the incumbent as well as the ANOs, as only efficient investments are compensated.

However, when traffic levels are falling, LRAIC prices are rising. If retail prices do not rise as well, ANOs could be subject to margin squeeze. However, rising retail prices would lead to further fixed-to-mobile substitution, which further reduces fixed traffic and again raises LRAIC. This vicious cycle is deemed by the regulator to set the wrong investment incentives. Therefore RTR has studied alternative approaches including retail-minus, capacity-based charging (CBC) and deregulation. In a 2009 consultation, none of the operators preferred CBC; RTR suggested an approach that takes the lower of the FL-LRAIC and retail-minus rates.

At the same time, RTR is developing an NGN, pure LRIC model for fixed call termination in agreement with the Recommendation as of 2013.[8]

5 [AT02]

6 [AT03]

7 Incumbent share of the origination market (retail + wholesale)

Treatment of common costs

RTR expects pure-LRIC-based fixed call termination rates to be lower than previously applied rates, because common costs are no longer included and because the more efficient NGN infrastructure is taken as its basis. However, RTR does not consider the Recommendation's effect on the costs of origination to be predictable. While the more efficient NGN infrastructure will bring overall costs down, the regulator argues that a higher common cost contribution on origination may result in overall higher origination costs. This higher common cost contribution would result because, according to the RTR, common costs can no longer be attributed to termination, but should instead be recovered from all other relevant services (including origination)[9]. However, at this time RTR hasn't explicitly defined how this could be implemented.

2.1.4 Currently applied rates and proposed glide path

In its 2010 submission to the EC RTR proposed the interconnection rates shown in Figure 6 below.

Figure 6: Currently applied interconnection rates of Telekom Austria [Source: EC response to notification AT/2010/1046-1047 [10]]

Wholesale service	Peak[11] (EUR/ minute)	Off-peak (EUR/ minute)
Regional call origination	0.0128	0.0071
Local call origination	0.0082	0.0048
Call termination	0.0082	0.0048

These rates were suggested to RTR by Telekom Austria in 2009. At that point, the regulator did not consider NGN as the modern equivalent assets (MEA)[12] but agreed to the approach because the rates determined by its hybrid model turned out to be higher than Telekom Austria's suggested rates.

The hybrid model takes a straight average between the top-down termination rates reported by Telekom Austria and the bottom-up LRAIC (BU-LRAIC) termination rates determined by RTR's own model. These two inputs were far from aligned. The top-down local interconnection rate calculated by Telekom Austria was EUR0.0182/min, while the BU-LRAIC cost was EUR0.0056/min[13]. The EC considered this large influence of top-down calculated costs to distort the regulatory aim of setting forward-looking and efficient rates. Consequently, the EC criticised

8 [AT04]

9 [AT03, Page 4]

10 [AT03]

11 Workdays between 8:00 and 18:00 (excluding public holidays)

12 [AT05, Page 3]

13 [AT05]

RTR's approach of averaging the two – especially because RTR itself identified a number of common cost categories as largely responsible for the discrepancy. The involvement of common costs is not in agreement with the Recommendation which suggests only purely incremental costs should be considered. Hence, the EC suggested that after implementing a pure LRIC approach RTR could carry out a reconciliation exercise, which only includes relevant top-down costs and aims to identify and exclude inefficiently incurred costs of the incumbent.

Furthermore, the EC commented that fixed interconnection rates in Austria were high compared to other EU countries. It accepted RTR's argument that fixed-to-mobile substitution is a particularly strong trend in Austria, so that fixed traffic volumes have been falling more rapidly than elsewhere. This could make fixed interconnection relatively more costly in Austria. However, the EC also points out that high fixed interconnection rates cause high fixed retail rates which in turn could be one of the reasons fixed subscribers are migrating to mobile solutions.

In order to take into account the Recommendations, RTR started developing an NGN, pure LRIC model that would allow the regulator to determine interconnection rates that were in agreement with the Recommendation. However, in 2010, RTR notified the EC that this model was not going to be available until 2011. Consequently, it proposed to continue using the old 2009 rates. RTR reasoned that a calculation of 2010 LRAIC would have led to an increase in rates before pure LRIC rates would have led to a decrease in rates. RTR considered this instability in rates to be undesirable.

The EC commented on RTR's proposed plans of 2010 in AT/2010/1046-1047. It does not recognise the use of historical interconnection rates as a valid price control method, especially when these are significantly higher than EU level benchmarks. Therefore, it invites RTR to reconsider the basis of its rates and reminds the NRA that should it decide to use a benchmarking approach, only those countries that already apply rates in agreement with the Recommendation should be included in it.

Symmetry of rates

RTR proposed to set asymmetric termination rates by allowing ANOs to charge the termination rate of a single tandem tariff applied by Telekom Austria for origination (EUR0.0128/min peak and EUR0.0071/min off-peak as shown in Figure 6 above). RTR believes this regulation to be appropriate after considering ANO's termination costs in a national benchmarking exercise.[14]

The EC commented[15] that the proposed rates are well above the EU average for single tandem interconnection and do not reflect the costs to an efficient network operator. Furthermore, ANOs with fewer points of interconnection tend to have lower, rather than higher costs of interconnection thanks to the more efficient NGN infrastructure that they operate. Consequently, RTR should

14 [AT04]

15 [AT03, Page 5]

consider setting termination rates for ANOs either lower than or equal to the rates applied to Telekom Austria.

2.1.5 Model(s) used

The first model available to RTR was built by Telekom Austria. The incumbent had developed a top-down cost allocation model for the determination of interconnection costs. In 2002 RTR started using a complementary BU-LRAIC model in setting interconnection rates, which it calls 'Analytisches (Bottom Up) Kostenrechnungsmodellfür das PSTN Kernnetz der TA' (Analytical bottom-up cost model for the PSTN core network of Telekom Austria). As is captured in the name, this model is not capable of considering NGN infrastructure and focuses solely on the incumbent's PTSN network. The model was developed by WIK and is confidential. However, RTR publishes the model's documentation on its website[16]. This documentation incorporates changes that were made to the model as a result of a public consultation.

In order to follow the Recommendation, RTR has been developing another model that is capable of calculating the pure LRIC of NGN interconnection. This is called the 'Analytisches (Bottom Up) Kostenrechnungsmodellfür das Festnetz - Kernnetz und für Mobilfunknetze' (Analytical bottom-up cost model for the fixed core network and mobile networks). This, too, has been developed by WIK and is confidential. RTR has published the latest version of the model documentation, which incorporates RTR's consideration of comments made during a public consultation, on its website.[17]

In determining the cost of origination the model calculates the LRAIC of origination in terms of capex and opex and then distributes common costs between all services except termination in the proportion of their routing factors.[18]

Figure 7 below summarises the key design parameters of RTR's NGN costing model.

Figure 7: Key design parameters of RTR's NGN costing model [Source: Analysys Mason, 2012]

Dimension	Common options
Operator:	
Type	Hypothetical (efficient) incumbent
Footprint	National
Efficient scale	Immediate scale of incumbent
Assumed access network technology / boundary of access network	Determined in stand-alone access model / Metropolitan point of presence (MPoP) i.e. the point at which the dedicated access line ends – this may vary by access technology e.g. FTTx, FTTH P2P

16 [AT06]

17 [AT07]

18 [AT07, Section 5.3.5]

Service:	
Scope	The below services can be modelled in WIK's model: Narrowband/ voice (retail, wholesale) Broadband (xDSL) Channelised IPTV VOD Business connectivity (Ethernet, transmission (leased line equivalents))
Implementation:	
Modelling period	Multi-year
Depreciation method	Adjusted (tilted) annuity, used as a proxy for economic depreciation Straight line depreciation with return on capital employed
Increment definitions	Individual service LRIC (for wholesale termination) Average increment with mark-ups (LRAIC+) (for other services)
Assumed WACC	To be determined when NGN model is calibrated

Consideration of NGN as efficient operator

WIK accepts that NGN infrastructures have not yet been fully introduced into the Austrian market, although Telekom Austria is in the process of rolling out its NGN[19]. Therefore the modelling of an NGN is currently a partly hypothetical exercise. In particular, the final network control layer structure has not yet been determined, according to WIK. WIK therefore address this issue by incorporating two possible NGN infrastructures – NGN-IMS and NGI – in its model, leaving the choice of which is applied to the model user. NGN-IMS is based on centralised controlling elements whereas NGI relies on decentralised control switches. At the time of its model documentation publication, WIK saw an ambiguity as to which type of infrastructure would establish itself as the standard in the Austrian market place. However, WIK refers to Michalski[20] in observing that most network operators choose NGN-IMS as the basis for their NGNs.

Interconnection on circuit-switched or IP basis

The NGN model is capable of calculating the costs of interconnection both on a TDM and an NGN basis.

For TDM-based interconnection the network requires a soft switch (with integrated SIP-server), a media gateway and a media gateway controller. While the soft switch and media gateway controller can be situated remotely, each POI requires a media gateway on site. Therefore media gateway costs are driven by the number of POI, the traffic volume that is interconnected and the number of ports that need to be available for interconnection.

19 [AT08, Appendix 13a, Page 118] Current plans include modifying interconnect points for access to its next-generation access (NGA) network by the end of 2013

20 [AT9]

For IP-based interconnection the network requires a soft switch (with integrated SIP-server), a label edge router and a session border controller (SBC). The label edge router replaces the media gateway and hands traffic over to the ANO's network in IP traffic. The label edge router costs are driven by the number of ports for interconnection and the number of POIs and are significantly lower. The SBC can also be operated centrally and collects billing information.

Depreciation methodology

The WIK model documentation identifies that a straight-line depreciation (including return on capital employed) and an adjusted annuity approach is implemented in the model. The annuity approach is adjusted, on an individual asset basis, for an average growth trend in use of that asset and an average price trend of that asset. The two trends are defined as being averaged over the economic lifetime of that asset. WIK maintains that this approach captures the characteristics of an economic depreciation calculation, namely[21]:

- The economic depreciation of an asset in any given year must correspond to the loss of value of that asset in the year.
- The loss of value in a year is determined by the fraction of the asset's total expected output that is produced in that year.
- For reasons of non-discrimination, in economic terms the costs of each unit of output should be independent of when this unit of output is produced.

WIK notes that there should be a constant relationship between depreciation charges and interest payments on a period-by-period basis.

The adjusted annuity method is dependent on specific traffic growth profiles.[22] Given the confidential nature of the model, it is not clear exactly what future traffic is assumed.

WIK points out that since this method of depreciation involves forecasts of asset prices as well as forecasts of traffic, it introduces an error bound.[23] However, since these forecasts are to be developed using public consultations, the most accurate forecasts available should in principle be incorporated in the model.

2.1.6 Appeals

We are not aware of any appeals against the termination rates listed in Figure 6 above.

21 [AT06, Section 5.3.1]

22 [AT07, Section 5.3.1]

23 [AT09, Section 5.1.2]

2.2 Belgium

Figure 8: Summary of agreement with the Recommendation [Source: Analysys Mason, 2012]

Recommendation	Agreement
Bottom-up current cost model used or being developed	✓
NGN for efficient operator	✓
Can cost pure LRIC for termination (date expected to be available)	✓[2]
Economic depreciation [1]	✓
Pure LRIC prices	– (during 2013)
Symmetry of rates	✓
If no agreement, use of benchmarking	×

Legend: ✓ = in agreement now, – = expected to be in agreement, × = not implemented

Notes:

1: Economic depreciation is not a requirement ("wherever feasible") so an NRA can in principle be in agreement with the Recommendation without an economic depreciation calculation

2: Modelled, not currently used

2.2.1 Market overview

Figure 9: Fixed originated telephony traffic in Belgium[24] [Source: Analysys Mason, 2012]

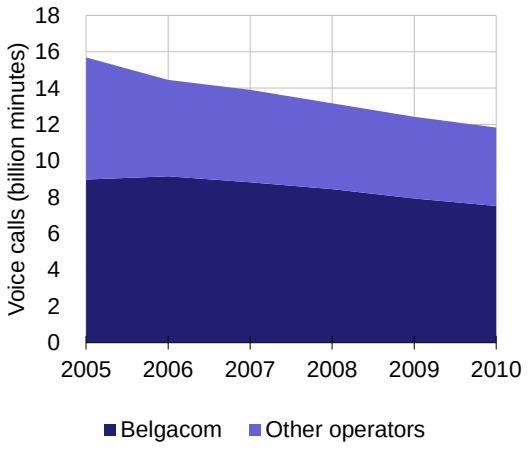
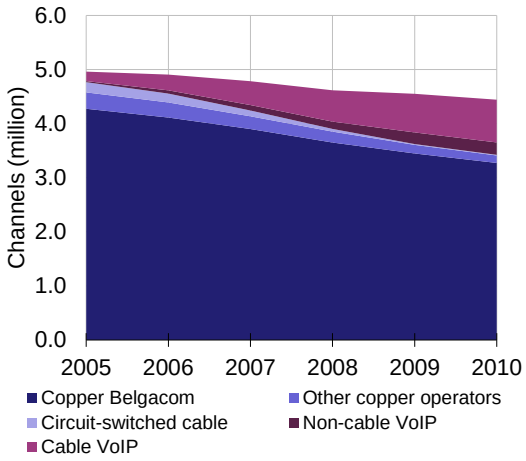


Figure 10: Fixed telephony channels in Belgium[24] [Source: Analysys Mason, 2012]



[24] Note: 1. Charts show total market, which includes both residential and business segments

2. Charts show retail level data, rather than wholesale level data. Therefore part of the "Other operators" may be WLR or CPS operators on the incumbent's network

3. VoIP connections are active users of either paid-for native VoIP services that use a broadband access connection, or VoIP services included in a paid-for bundle with broadband access. The figure excludes peer-to-peer applications. Although some VoIP customers use the service in parallel to their PSTN or ISDN connection, it most commonly replaces a narrowband connection. Especially for cable VoIP connections the argument to give up the PSTN or ISDN connection is strong as this allows the customer to avoid the copper line rental charge.

4. Copper includes both LLU and WLR

In 2010 Belgacom carried 64% of Belgium's fixed telephony traffic on 76% of the country's fixed telephony channels.

The Belgian regulator, BIPT, does not publish operator market shares by fixed voice traffic or fixed-line connections. The three main alternative network operators in Belgium are Telenet, Mobistar and KPN. Principal access networks and business models used by operators to terminate voice traffic are shown in the table below.

Operator	Principal access networks
Belgacom	Access owner (copper)
Telenet	Access owner (cable) Access leaser (cable)[25]
Mobistar	Access leaser (copper)
KPN	Access leaser (copper)

*Figure **11**: Principal access networks for major operators [Source: Analysys Mason, Telegeography 2012]*

2.2.2 Identification of SMP

Operators with SMP in origination

In its first assessment of market power in 2006 in fixed access, origination, termination and transit, BIPT identified only Belgacom as having SMP[26] on the basis of:

- high market share
- sunk costs
- economies of scale and scope
- control over infrastructure that cannot be easily duplicated
- absence of countervailing buying power and vertical integration.

BIPT confirmed this conclusion in 2008.[27]

Operators with SMP in termination

As part of its 2011 market review, BIPT identified 16 operators as having SMP in termination. BIPT reached this conclusion on the basis of:

- the operators' market shares of 100% on their respective network
- barriers to entry
- insufficient countervailing buyer power.

25 Telenet rents access to certain city-owned cable networks

26 [BE01]

27 [BE02]

2.2.3 Rationale for chosen cost standard

BIPT is in the process of developing a model that can calculate pure LRIC of termination in agreement with the Recommendation. The regulator accepts that it would need particular national circumstances to take a decision that would not be in conformity with the Recommendation.[28]It does not consider such circumstances to apply. Consequently, BIPT intends to impose pure LRIC-based fixed termination rates (FTRs) in the course of 2013.[29]

Furthermore, it considers the lower costs associated with the pure LRIC methodology to be adequate given that many operators' retail offers demonstrate that they consider the cost of an additional minute as small or close to zero.[30]

BIPT is of the opinion that multi-service network common costs are higher than with single-service networks, because a greater number of services share the same infrastructure. However, these additional costs are not caused by voice services alone and should therefore be divided between the greater number of services. As a net result, the incremental cost of voice services is lower.[31]

Finally, BIPT identifies that there may be concerns over a 'waterbed' effect. However, the regulator concludes that there is not a clear argument that the waterbed effect is influential. It concludes that any waterbed effect should not prevent the setting of termination rates on incremental costs[32]. This follows the position of the EC in its Explanatory Note of the Recommendation[33].

Treatment of common costs

On our reading, the relevant section of the BIPT decision is in the context of the choice of pure LRIC for two-way markets such as termination. We have not identified other statements which discuss how certain common costs not recovered from termination may be recovered from other services (i.e. CPS being of importance as it may be a one-way market).

BIPT agrees with the Recommendation that these common costs should be recovered in retail markets rather than the termination markets, because retail markets are subject to competition.[34] BIPT argues that the calling party should not necessarily shoulder the entire cost of the call, as the called party also benefits from the exchange. Therefore pure LRIC, which does not allow the

28 [BE03, Paragraph 373]

29 [BE04]

30 [BE03, Paragraph 377]

31 [BE03, Paragraph 378]

32 [BE03, Paragraph 379]

33 [BE05, Pages 28 & 31]

34 [BE03, Paragraphs 375, 376]

terminating party to recover the common costs associated with the service of termination, is an adequate costing methodology.

2.2.4 Currently applied rates and proposed glide path

On 2 March 2012 BIPT adopted its fixed market analysis decision which set the termination rates shown in Figure 12 below.

Figure 12: Termination rates set by BIPT [Source: BE03, Section 6.5.1.3]

Type of call	Call start-up costs (EUR)		Price per minute (EUR)	
	Peak	Off-peak	Peak	Off-peak
Local call termination	0.00314	0.00164	0.00514	0.00270
Call termination within the access zone[35]	0.00443	0.00232	0.00727	0.00381
Call termination outside the access zone[36]	0.00568	0.00298	0.00932	0.00489

These rates are based on a fully distributed cost (FDC) model[37], which includes common costs in the termination rate.

The EC commented[38] that FTRs should be based on cost-efficient levels by the end of 2012. It notes that BIPT is taking the necessary action to implement pure LRIC based rates in the course of 2013. Therefore it reminds BIPT that should its pure LRIC model not be available in time, in order to follow the Recommendation, BIPT needs to set rates that are not higher than the average of the rates set by NRAs which already implement pure LRIC as their costing methodology.

In its final decision, BIPT compares its proposed rates to a European-wide benchmark published by the Body of European Regulators for Electronic Communications (BEREC) and comes to the conclusion that its termination rates are generally below the European average except for its rate for single tandem interconnection, for which BIPT finds its rate to be at the same level as the European average.[39]

There has not been a recent decision on origination. In 2006 BIPT announced that one of the regulatory remedies imposed on Belgacom was a price control.[40]

35 Analogous to single tandem in the UK

36 Analogous to double tandem in the UK

37 Fully distributed cost (FDC) models are also referred to as fully allocated cost (FAC) models

38 [BE04]

39 [BE03, Section 3.2.2.2]

40 [BE06]

Symmetry of rates

Previous to BIPT's March 2012 decision,[41] ANOs could charge FTRs that were up to 15% higher than those assigned to Belgacom, because BIPT had judged that those operators could not benefit from similar economies of scale as Belgacom[41]. However, in its latest submission to the EC, BIPT announced that it would remove this 15% uplift for ANOs so that future rates would be symmetric.[42]

2.2.5 Model(s) used

Previously, BIPT used a FDC model to determine the level of its price control regulation. Analysys Mason is currently building a pure LRIC model for BIPT, which the regulator intends to use to set price controls that agree with the Recommendation during 2013. On 5 March 2012 a consultation on the draft model closed. The comments made are currently being reviewed.

Consideration of NGN as efficient operator

Although Belgacom currently carries TDM voice traffic as well as VoIP traffic on separate platforms, BIPT's model calculates costs as those of a VoIP service on an NGN. The hypothetical efficient NGN modelled is based on the footprint of existing IP network, which already extends into all local exchanges.

Interconnection on circuit-switched or IP basis

The model is capable of modelling both TDM interconnection according to the SS7 standard[43] and IP interconnection according to the SIP standard. In reality, Belgacom has rolled out Ethernet switches into all of its local exchanges, so that IP-interconnection is feasible from an infrastructure perspective. The decision on who bears the cost of IP conversion has not yet been made.

Depreciation methodology

BIPT's model uses economic depreciation in the annualisation of termination costs.

The draft model[44] and its documentation[45] have been made publicly available on BIPT's website. Figure 13 below summarises the key design parameters of BIPT's costing model.

41 [BE03]

42 [BE04]

43 Signalling System 7 defined by ITU as a protocol for circuit-switched interconnection

44 [BE07]

45 [BE08]

Figure 13: Key design parameters of BIPT's model [Source: BE09]

Dimension	Common options
Operator:	
Type	Hypothetical (efficient) operator of incumbent's scale
Footprint	National
Efficient scale	Immediate scale of Belgacom
Assumed access network technology / boundary of access network	Copper, boundary at MDF / cabinet For VDSL-enabled street cabinets at street cabinet (SC) level, for ADSL-enabled street cabinets at MDF level. Draft model assumes access gateways are deployed next to VDSL DSLAMs (either in SC or at MDF)
Service:	
Scope	Narrowband/ voice (retail, wholesale) Broadband (xDSL) Channelised IPTV VOD Business connectivity (Ethernet, VPN)
Implementation:	
Modelling period	Multi-year
Depreciation method	Economic depreciation
Increment definitions	Individual service LRIC (for wholesale termination) Average increment with mark-ups (LRAIC+) (for other services)
Mark-up method for business common costs (if LRAIC+)	Equi-proportional mark-up (EPMU) (for common costs0 Fixed proportion (for IT and overhead costs)
Assumed WACC	Constant nominal pre-tax WACC of 9.61% between 2010 and 2013 based on an asset beta of 0.5 and an equity beta of 0.83[46]

2.2.6 Appeals

To date, there have not been any appeals against the use of the pure LRIC methodology to set fixed termination rates because BIPT has not yet implemented this proposal. A public consultation on the matter ended on 5 March 2012[47]. The comments are currently being evaluated so that BIPT has not yet addressed them publicly.

46 [BE10, Section 14.2]

47 [BE04]

2.3 Denmark

Figure 14: Summary of agreement with the Recommendation [Source: Analysys Mason, 2012]

Recommendation	Agreement
Bottom-up current cost model used or being developed	✓
NGN for efficient operator	✓
Can cost pure LRIC for termination (date expected to be available)	✓[2]
Economic depreciation [1]	×
Pure LRIC prices	– (by 2013)
Symmetry of rates	✓[3]
If no agreement, use of benchmarking	×

Legend: ✓ = in agreement now, – = expected to be in agreement, × = not implemented

Notes:

1: Note that economic depreciation is not a requirement ("wherever feasible") so an NRA can in principle be in agreement with the Recommendation without an economic depreciation calculation

2: Modelled, not currently used

3: EC raised issue

2.3.1 Market overview

Denmark has experienced a particularly steep decline in fixed telephony traffic as is shown in Figure 15 below. The decline has, however, slowed down in 2010 as fixed-line operators expanded their marketing of multi-play offers so as to slow the migration away from PSTN/ISDN lines to (peer-to-peer) VoIP and mobile alternatives. The last six years saw consolidation among alternative network operators. The largest five merged into two, Telia Danmark and Telenor[48].

48 Telia Denmark acquired Debitel in 2007, Telenor has consolidatedTele2, Sonofon and Cybercity.

Figure 15: Fixed telephony traffic in Denmark[49] *[Source: Analysys Mason, 2012]*

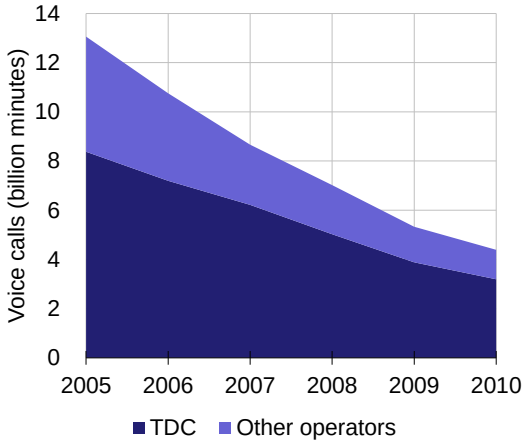
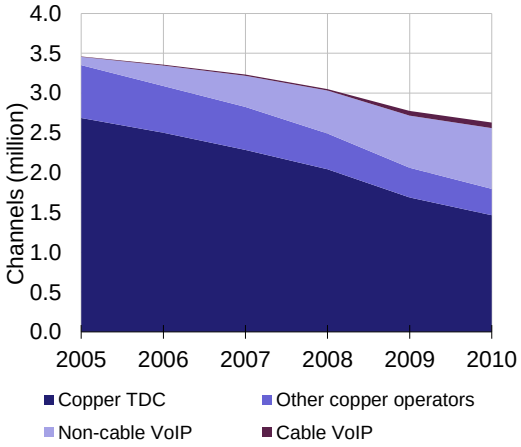


Figure 16: Fixed telephony channels in Denmark [Source: Analysys Mason, 2012]



In 2010, the incumbent operator Tele Danmark Communications (TDC) carried 55% of fixed telephony traffic on 67% of Denmark's fixed telephony channels according to the Danish regulator.

Figure 17: Operator market share of fixed minutes [Source: ITST, 2012]

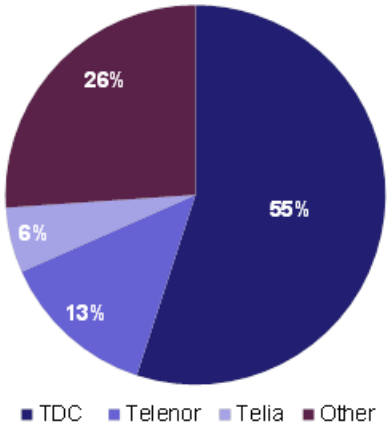
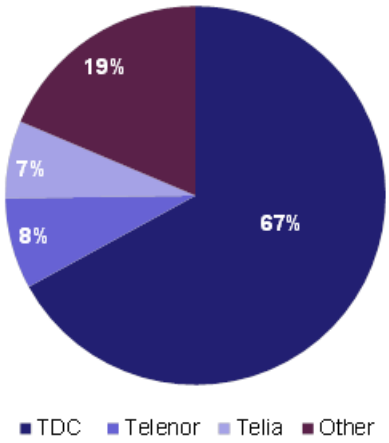


Figure 18: Operator market share of fixed subscriber lines [Source: ITST, 2012]



The main alternative network providers in Denmark are Telenor and Telia, with 8% and 7% of total fixed subscriber lines respectively. Principal access networks and business models used by major operators to terminate voice traffic are shown in the table below.

[49] Note: 1. Charts show total market, which includes both residential and business segments

2. Charts show retail level data, rather than wholesale level data. Therefore part of the "Other operators" may be WLR or CPS operators on the incumbent's network

3. VoIP connections are active users of either paid-for native VoIP services that use a broadband access connection, or VoIP services included in a paid-for bundle with broadband access. The figure excludes peer-to-peer applications. Although some VoIP customers use the service in parallel to their PSTN or ISDN connection, it most commonly replaces a narrowband connection. Especially for cable VoIP connections the argument to give up the PSTN or ISDN connection is strong as this allows the customer to avoid the copper line rental charge.

4. Copper includes both LLU and WLR

Operator	Principal access networks
TDC	Access owner (copper, fibre, cable)
Telenor	Access leaser (copper)
Telia	Access leaser (copper)

*Figure **19**: Principal access networks for major operators [Source: Analysys Mason, Telegeography, 2012]*

2.3.2 Identification of SMP

Operators with SMP in origination

As part of its notification to the EC, NITA has identified only TDC as having SMP in the call origination market passed on PSTN, ISDN and (managed) voice services over broadband (VoB)[50]. It bases this conclusion on:

- market shares (highly concentrated market) – TDC has 85%[51] market share of sales as of 20 January 2011
- dominant position on connected retail markets
- control of bottleneck-resources
- barriers to entry (limited potential competition from new suppliers)
- lack of countervailing buying power
- barriers for customers to shift supplier.

Operators with SMP in termination

As part of its notification[52] to the EC, NITA identified TDC, Telia, Telenor and Colt, as well as 16 smaller ANOs, as having SMP in the call termination market. The considered criteria are:

- market shares (highly concentrated market)
- control of bottleneck-resources
- barriers to entry (limited potential competition from new suppliers)
- lack of countervailing buyer power.

As each of the 20 operators was found to operate in its own market, each was attributed 100% market share. However, only TDC, Telia, Telenor and Colt were assigned a price control.

Other operators are only required to provide access on reasonable request. NITA identified that the smaller ANOs usually enter into a cooperation agreement with one of the four larger companies (TDC, Telenor, Telia or Colt) which are then responsible for conveying all traffic to and from the smaller companies. Therefore NITA did not impose a requirement of rate symmetry on the smaller ANOs as the rates were effectively set by the larger operators. The EC invited NITA to closely

50 [DK01], EC case number DK/2010/1148

51 Incumbent share of the origination market (retail + wholesale) [DK01]

52 [DK02], EC case number DK/2010/1150

monitor the situation and reconsider its position as soon as the ANOs start charging their own termination rates.[53]

2.3.3 Rationale for chosen cost standard

The 2012 interconnection rates are set using a LRAIC+ standard despite the model also supporting a pure LRIC approach. In its consultation note[54] (submitted alongside its draft decision to the EC Article 7 process), NITA summarised its reasoning:

- "The Dutch court's decision of 31 August 2011 relating to fixed and mobile termination where the Dutch telecoms regulator OPTA's use of the pure-LRIC method was remitted".
- "In addition there are several fundamental issues to be addressed, including how the uncovered costs will be allocated". NITA stated that this is an issue on which "very few EU countries have yet taken a position, and therefore there is no established practice".
- A wish to have 'pure LRIC' implemented in both fixed and mobile networks at the same time.

NITA has confirmed that it plans to set interconnection rates in agreement with the Recommendation for 2013. Consequently, the EC had no interconnection-related comments to NITA's notification of its 2012 rates.[55]

Treatment of common costs

As noted above, NITA has mentioned to the EC that it considers further investigation into the issue of unrecovered costs to be necessary before implementing pure LRIC-based interconnection rates. Despite raising this uncertainty, NITA stated its plans to conform to the Recommendation by 1 January 2013.

2.3.4 Currently applied rates

Denmark's regulator – formerly NITA, now Erhvervsstyrelsen, Danish Business Authority (DBA) – sets interconnection rates on a yearly basis. As Figure 20 below shows, 2012 rates are slightly higher than the 2011 rates. NITA explained that this is mainly due to the falling number of copper connections and the traffic that is carried on them. Also NITA has in the past set origination rates to be slightly higher than termination rates, a practice which continues. The interconnection rates for 2013 have not yet been determined as the NRA will update its one-year model in the course of 2012.

53 [DK03]

54 [DK04]

55 [DK05]

Figure 20: Denmark's interconnection rates [Source: EC[56]]

	Peak/Off peak	Local currency (DDK / minute)		EUR currency[57] (EUR / minute)	
		2011	2012	2011	2012
Call origination	Peak	0.0164	0.0174	0.0022	0.0024
	Off peak	0.0084	0.0092	0.0011	0.0013
Call termination	Peak	0.0140	0.0149	0.0019	0.0021
	Off peak	0.0074	0.0079	0.0010	0.0011

Symmetry of rates

Historically only TDC's termination rate was price regulated. Previously virtually all operators had entered into symmetric price agreements with TDC, which meant that the other operators' termination rates towards TDC was set as the exact same rate as TDC's regulated prices for local termination. Thus, the price regulation of TDC's termination rate had in practice been applied to TDC's purchase of fixed termination from other operators – the markets were thus characterised by symmetrical rates. Later, it was found that these conditions no longer prevailed and that other operators, Telia, Telenor, Hi3G and Colt[58], had set a termination rate that was above the regulated price for local termination[59]. The markets were characterised by asymmetric rates.

Therefore, in the decisions of 20 January 2010, DBA set symmetric termination rates between TDC, Telia, Telenor and Colt. All decisions except the decision regarding TDC where however remitted by the Telecommunications Complaints Board. In 2011, DBA has published new draft decisions for Telia, Telenor, Hi3G and Colt, where it proposes to set the prices at the same level as TDC's regulated termination rate[60].

As noted above in Section 2.3.2, NITA does not directly impose obligations of symmetry on smaller operators. It believes those operators' termination rates are effectively set by the larger operators who are obliged to terminate at symmetric rates.

2.3.5 Models used

The model used to determine interconnection rates is a single-year LRAIC+ model. It was first used in determining interconnection rates in 2003 and has since been updated on a yearly basis. The 2011 release, which was used to calculate 2012 rates, involves updates of:

56 [DK05]

57 Exchange rates listed in Annex A

58 [DK03]

59 [DK06]

60 [DK06]

- equipment prices
- salary expenses
- productivity trend
- traffic and volume forecasts
- a reduction in nominal pre-tax WACC from 6.90% to 6.45%.

Following a review in 2007, NITA decided that the model should move from a circuit-switched to packet-switched technology.[61] Both networks have been implemented in the model as of 2008. Actual deployment of the NGN core was expected to take a number of years. NITA believed it was reasonable to set prices based on the NGN model as of the beginning of 2010, whilst recognising that consideration may be needed that TDC may not have that position[62].

At the time it identified that a "thorough consideration of parallel circuit-switched and packet-switched infrastructures and their respective operating expenses would be necessary during the transition from circuit-switched to packet-switched networks". This would avoid the calculation of operational costs that are higher than those of an efficient operator. To support this, TDC conducts a top-down analysis of its costs so that the bottom-up and top-down results can be compared in a hybrid model.

In 2011 an extensive update was carried out to the models. As part of this, Analysys Mason built a pure LRIC costing methodology into the single-year model. This version has been released by NITA and will be in agreement with the Recommendation. However it was not used in the pricing decision for 2012. It is best described as bottom-up hybrid LRAIC+ with pure LRIC for termination. The new model is based on the existing single-year model, which has been modified to produce a pure LRIC result (as well as a LRAIC+) based on an annuity depreciation method. The update did build a multi-year calculation for an economic depreciation result, but this is for access networks only.

The model is available to download on NITA's website.[63]

Figure 21 below summarises the key design parameters of NITA's latest model, which may be used in setting prices in 2013.

Figure 21: Key design parameters of NITA's model [Source: Analysys Mason, 2012]

Dimension	Common options
Operator:	
Type	Hypothetical efficient incumbent
Footprint	National for copper Sub-national (not regional, but intermittent coverage) for cable TV and

61 [DK07]

62 [DK08, Pages 7,8]

63 [DK09]

	fibre
Efficient scale	Incumbent scale
Assumed access network technology / boundary of access network	The core network is assumed to take traffic from the following networks: 1. Copper, boundary at MDF / cabinet 2. Cable TV, boundary at CMTS location 3. FTTH, boundary at fibre node
Service:	
Scope	Narrowband/ voice (retail, wholesale, dial-up) Broadband (xDSL, Ethernet over fibre) Channelised IPTV VOD Business connectivity (leased lines, Ethernet, VPN)
Implementation:	
Modelling period	Single-year for core services Multi-year for wholesale fibre access
Depreciation method	Straight-line depreciation and return on capital employed – historical cost accounting (HCA) or current cost accounting (CCA) for all services Annuity – straight or tilted for all services Economic depreciation (simple) for wholesale fibre access
Increment definitions	Individual service LRIC (for wholesale termination) Average increment with mark-ups (LRAIC+) (for other services)
Mark-up method for business common costs (if LRAIC+)	EPMU
Assumed WACC	Constant nominal pre-tax WACC of 6.45% between 6. October 2009 and 25. October 2011 based on an asset beta of 0.5.[64]

Consideration of NGN as efficient operator

As noted above, the cost model has included an NGN core design since 2008. NITA considered that TDC will not be able to move to such an infrastructure by then. Nonetheless NITA is of the opinion that no migration costs should be included in its LRAIC modelling. This is because, in order to be consistent with its principle of forward-looking regulation, it should assume that the efficient network is already rolled out, rather than accounting for the costs associated with reaching this outcome.[65]

By 2009, TDC had IP-DSLAMs installed at 1900 points of presence.[66]

64 [DK10, Page 5]

65 [DK07 Section 2.4 page 15-16]

66 [DK11, Page 51]

Interconnection on NGN or TDM basis

In its 2009 Report on the LRAIC Model and User Guide[67], NITA recognises that IP-based interconnection is typically cheaper than TDM-based interconnection. However, as long as alternative network operators operate circuit-switched voice networks, it will generally be necessary to operate media gateways to deliver TDM-based interconnection.

NITA has now been reorganised and the NRA is now part of the DBA. DBA released for public consultation a draft decision on the wholesale market for fixed call termination (Market 3)[68] . The draft decision intends to demand IP-based interconnection from some operators as of September 2012. This is intended to give all interested communications providers the chance to comment on the proposed approach to termination rate regulation before a final decision is made. The consultation ended on 11 April 2012 and no responses to the consultation have yet been made public.

In the consultation documents, DBA includes a draft of the regulatory remedies that it intends to impose on four operators. These are Colt, Hi3G, Telenor and Telia. Colt, Telenor and Telia had faced regulatory remedies before so that the consultation revises previous measures. Hi3G on the other hand, had not previously faced regulatory measures. The draft decisions highlights that the main changes from its previous approach are a requirement to terminate voice calls on regulated and non-discriminatory conditions (including prices), to terminate voice calls via 'Managed VoB', to exchange traffic via IP interconnection, a requirement to adopt a cost accounting system and a requirement of transparency[69].

According to DBA, operators need to be able to interconnect on an IP basis because of the increasing amount of VoB. DBA notes that if a pure VoB operator with IP-based traffic wants to interconnect with an operator that offers PSTN voice services, the conversion from IP to PSTN can be carried out either before the handover by the originating VoB operator or after the handover by the PSTN operator. VoB operators would be interested in handing traffic over in IP so as to avoid having to invest in a PSTN gateway that could convert the traffic to PSTN.[70] Therefore DBA considers interconnection on an IP basis to be necessary. However, it accepts that operators do not currently have a fully functional IP interconnection solution in place and therefore plans to require this remedy from 1 September 2012. Until then the only regulated standard of interconnection is TDM, so that IP operators bear the cost of conversion from TDM to IP (and vice versa).

The requirement for a cost accounting system is necessary so that upon request the operators can supply DBA with relevant cost data. This will allow DBA to assess whether the operators use

67 [DK12, Page 80]

68 [DK06]

69 [DK13 Section 1.9]

70 [DK13 Section 1.3.2]

legitimate, objective and transparent criteria for allocating costs in their own models and allow the regulator to reconcile against its own future modelling exercises.[71]

This draft decision and the associated regulatory remedies only apply to Colt, Hi3G, Telenor and Telia, because these four operators have been identified by DBA as typically able to set termination rates that are higher than the regulated prices that nationwide operators such as TDC are charging.[72]

TDC already offers IP interconnect. The price control set by the NRA for TDM-based termination also applies for TDC's IP interconnect service.

Depreciation methodology

The depreciation method used the Danish models for price setting has thus far been tilted-annuity depreciation.[73] Economic depreciation was only recently introduced for the specific case of wholesale fibre products.

2.3.6 Appeals

Neither NITA nor its successor have yet implemented rates on the basis of pure LRIC methodology. Therefore operators have not yet appealed against such an approach.

71 [DK13, Section 1.6.3]

72 [DK13, Section 1.3.3]

73 [DK12]

2.4 France

Figure 22: Summary of agreement with the Recommendation [Source: Analysys Mason, 2012]

Recommendation	Agreement
Bottom-up current cost model used or being developed	✓
NGN for efficient operator	✓
Can cost pure LRIC for termination (date expected to be available)	✓
Economic depreciation [1]	×
Pure LRIC prices	✓
Symmetry of rates	✓
If no agreement, use of benchmarking	n/a

Legend: ✓ = in agreement now, ▬ = expected to be in agreement, × = not implemented

Notes:

1: Economic depreciation is not a requirement ("wherever feasible") so an NRA can in principle be in agreement with the Recommendation without an economic depreciation calculation

2.4.1 Market overview

While the overall electronic communications sector in France achieved revenue growth of 0.5% in 2010, fixed telephony declined. During 2010, revenues from PSTN subscriptions fell by 7.7% to EUR4.4 billion[74]. The volume of voice traffic originating on fixed networks has levelled out as shown in Figure 23 below. However, a growing share of this traffic is carried as VoIP (as evidenced by the growing number of VoIP channels shown in Figure 26).

74 [FR01, Page 142]

Figure 23: Fixed originated telephony traffic in France[75] [Source: Analysys Mason, 2012]

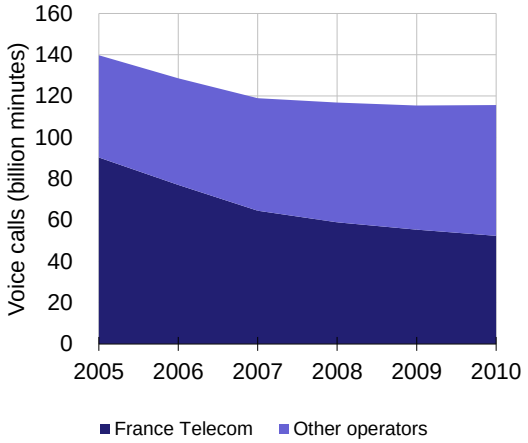
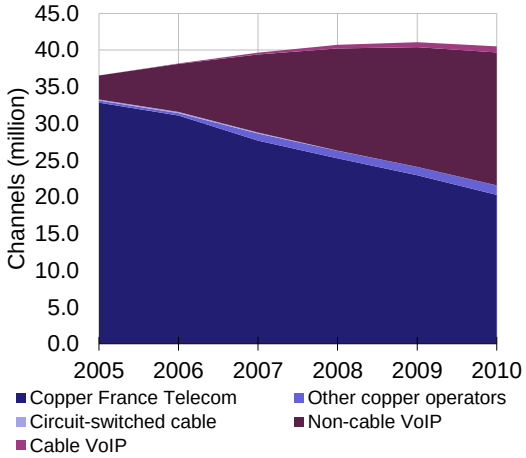


Figure 24 Fixed telephony channels in France[75] [Source: Analysys Mason, 2012]



In 2010, France Télécom carried 45% of France's fixed telephony traffic on 45% of the country's fixed telephony channels.

We understand that ARCEP stopped reporting market shares in 2006. The three main alternative network operators are SFR, Numericable-Completel and Iliad. The principal network access technologies and business models used by major operators to terminate voice traffic are shown in the table below.

Operator	Principal access networks
France Télécom	Access owner (copper, fibre)
SFR	Access owner (fibre) Access leaser (copper)
Numericable-Completel	Access owner (cable, fibre)
Iliad	Access owner (fibre) Access leaser (copper)

Figure Principal access networks for major operators [Source: Analysys Mason, Telegeography, 2012]

[75] Note: 1. Charts show total market, which includes both residential and business segments

2. Charts show retail level data, rather than wholesale level data. Therefore part of the "Other operators" may be WLR or CPS operators on the incumbent's network

3. VoIP connections are active users of either paid-for native VoIP services that use a broadband access connection, or VoIP services included in a paid-for bundle with broadband access. The figure excludes peer-to-peer applications. Although some VoIP customers use the service in parallel to their PSTN or ISDN connection, it most commonly replaces a narrowband connection. Especially for cable VoIP connections the argument to give up the PSTN or ISDN connection is strong as this allows the customer to avoid the copper line rental charge.

4. Copper includes both LLU and WLR

2.4.2 Identification of SMP

Operators with SMP in origination

As part of its third cycle review of the interconnection markets, ARCEP finds only France Télécom as having SMP in origination. It bases this observation on:

- France Télécom's market share of 89%[76] in 2009
- control of infrastructure that is not easily duplicated
- the existence of significant economies of scale and scope
- lack of countervailing buying power of ANOs
- limited prospects for the evolution of the market[77].

Operators with SMP in termination

As part of the same third cycle review, ARCEP finds that all public telephone network operators have SMP in termination as:

- each operator has 100% market share on its network
- there is low countervailing buyer power.

2.4.3 Rationale for chosen cost standard

ARCEP uses pure LRIC in determining FTRs. According to the regulator, this costing standard provides the correct economic signal to market players to stimulate optimal market developments to the benefit of end users. In particular, it avoids market distortions between fixed and mobile operators. Such distortions could, for example, arise from the network effect by which operators with the largest subscriber base benefits from the fact that each of its individual subscribers can make (on-net) calls to a greater number of people on its network than it could on other operators' networks. If termination is priced at a higher level than pure LRIC, the network effect applies, because operators could offer on-net calls *at a lower price* than off-net calls.

In the two-sided interaction of a telephone call, the pure LRIC approach also brings appropriate benefits to both the calling and called party. According to the ARCEP, LRAIC does not represent the value of the call for the called network as the entirety of the cost is borne by the calling network.

Rather than use the model's output directly, ARCEP applies slightly higher rates. The regulator reports the output of its model as shown in Figure 26 below.

[76] Incumbent share of the origination market (retail + wholesale)

[77] [FR02, Section II.2.2.]

Figure 26: Model output [Source: FR03, Sections IV.4.2.4.1 and IV.4.2.4.2]

EUR / minute	2011	2013
Pure LRIC	0.00069	0.00065
LRAIC	0.00131	0.00107

Using the pure LRIC model output in Figure 26 and considering some specific commercial costs of terminating calls on the wholesale market assessed on a technical/economical basis, ARCEP concludes that EUR0.0008/min is a reasonable target level for the FTR. ARCEP did not discuss these specific commercial costs in detail in its publication.

ARCEP notes that this approach is fully in line with the Recommendation.

Treatment of common costs

ARCEP initially explained that common costs no longer recovered through the termination fee could eventually be recouped through other (wholesale) products such as call origination. In order to ensure regulatory predictability, ARCEP revealed that it intended to apply its chosen (common) cost allocation equally to on-net origination and off-net origination, so that costs will be recovered equally from wholesale and internal origination.[78]

The EC expressed its concerns "that shifting costs from the wholesale call termination market to another regulated wholesale market may create additional barriers to enter the retail telephony market, thus hindering competition."[79] It reminded ARCEP that the two-sided nature of termination services may make it appropriate for the terminating party to shoulder part of the common costs and highlights the availability of services other than origination for the recovery of the common-cost component of termination.

However, the regulator did not specify call origination rates. Instead ARCEP launched a new regulatory project in close collaboration with the EC on the treatment of costs no longer recovered on the fixed call termination market. This project aimed in particular at addressing the EC comments on:

- justification on the recovery of costs previously recovered through termination services to other services
- services susceptible to recover this cost
- demonstration of the non-discriminatory nature of this approach
- specific treatment of TDM traffic.

This project was scheduled for completion before the end of 2011. It is our understanding from conversations with ARCEP that this project has been concluded. Since the beginning of 2012,

78 [FR02, Section II.2.3.]

79 [FR02, Section III.]

through the regulatory framework in place, ARCEP has allowed France Télécom to apply a mark-up on wholesale line rental (WLR) which allows the recovery of some common costs that were previously recovered from fixed call termination.

2.4.4 Currently applied rates and proposed glide path

As a result of its third cycle market review, in July 2011 ARCEP published its decision on the regulation of SMP in fixed telephony[80]. In this decision ARCEP sets the following pure LRIC termination rates:

Figure 27: Proposed glide path of termination rates in France [Source: ARCEP]

	from 01 October 2011	01 July 2012 to 01 January 2013	as of 01 January 2013
Termination rate (EUR/min)	0.0030	0.0015	0.0008

ARCEP assigns different origination rates to carrier pre-select (CPS) operators and VAS operators[81] [82]. Although it is still debating on what grounds origination for CPS operators should be determined, the regulator has released its conclusion on origination rates for VAS operators. Because France Télécom is losing market share in this sector – the operator controlled less than 50% of revenues in 2009 – ARCEP considers that it no longer requires cost-based regulation. Instead the regulator proposed the application of non-excessive pricing caps, as shown in Figure 28 below. Therefore all origination rates in France are currently set according to fully allocated costs, until the outcome of ARCEP's regulatory project on origination is determined.

Figure 28: ARCEP's non-excessive pricing caps on VAS operator origination [Source: Analysys Mason, 2012]

	01 January 2012 to 31 December 2013	01 January 2014 to 31 December 2014	as of 01 January 2014
VAS providers' non-excessive pricing caps (EUR/min)	0.00430	0.00415	0.00400

Symmetry of rates

The proposed termination rate price control is symmetric. The price control applies to France Télécom as well as ANOs.[83]

80 [FR03, Section IV.4.3.2.3]

81 [FR03, Section III.4.6]

82 VAS operators are similar to premium rate service providers, based on Ofcom's definition http://stakeholders.ofcom.org.uk/telecoms/policy/premium-rate-services/

83 [FR02, Page 5]

2.4.5 Model(s) used

The model that ARCEP uses is capable of calculating LRAIC as well as pure-LRIC-based interconnection rates and was built by Analysys Mason.

Consideration of NGN as efficient operator

The model only considers NGN technology and does not model TDM infrastructure. This is because some alternative operators in France have rolled out modern NGNs. The incumbent operator continues to own and operate both architectures (to provide TDM and VoB services), but ARCEP considers the TDM architecture to be sub-optimal and that any additional cost associated with the TDM architecture should be recovered by operators through other services.[84]

The EC comments that these other services should not include any regulated services and asks the regulator to carefully consider its approach.[85]

Interconnection on circuit-switched or IP basis

In the cost model, all traffic is considered to be interconnected in TDM. Within the (NGN) model, a conversion is included between VoIP and TDM at the interconnection point. This cost is included in the model so that all NGN-based traffic-dependent costs are taken into account in the pure LRIC output. This approach has been chosen as most operators commented that IP interconnection standards were not mature enough.

ARCEP required France Télécom to offer interconnection at fewer points within 18 months of its decision; France Télécom was allowed to choose whether to offer this on a TDM basis or an IP basis. This approach to interconnection would require fewer than 24 POIs, rather than the 400 France Télécom uses for existing PSTN-based interconnection.[86] France Télécom chose to provide this interconnect service, with reduced number of points on an IP basis. The EC has welcomed this approach.[87]

Depreciation methodology

Different depreciation methodologies have been incorporated into the model. However, these do not include economic depreciation, because the ARCEP board had previously decided to disregard it. This is because the regulator does not favour its dependence on long-term traffic forecasts. The methodology that has been used to build the model's base case is based on a (constant) tilted

84 [FR02, Section II.2.3.]

85 [FR02, Section III.]

86 [FR02, Section II.2.3.]

87 [FR02, Section III.]

annuity depreciation. This depreciation method is also implemented in France Télécom's regulatory accounts.

The model has been made publically available on ARCEP's website.[88]

Figure 29 below summarises the key design parameters of ARCEP's NGN costing model.

Figure 29: Key design parameters of ARCEP's model [Source: Analysys Mason, 2012]

Dimension	Common options
Operator:	
Type	Hypothetical (efficient) new entrant
Footprint	National
Efficient scale	Immediate scale (=1/N) (but N is different on different geotypes)
Assumed access network technology / boundary of access network	Copper, boundary at MDF / cabinet
Service:	
Scope	Narrowband/ voice (retail, wholesale, dial-up) Broadband (xDSL) Channelised IPTV VOD
Implementation:	
Modelling period	Multi-year
Depreciation method	Tilted annuity (used in price setting) Linear depreciation and CCA also implemented
Increment definitions	Individual service LRIC (for wholesale termination) Average increment with mark-ups (LRAIC+) (for other services)
Mark-up method for business common costs (if LRAIC+)	LRAIC+ not modelled
Assumed WACC	Constant nominal pre-tax WACC of 10.4% based on an equity beta of 1[89]

2.4.6 Appeals

There were no appeals against the termination rates shown in Figure 27 above.

88 [FR04]

89 [FR05, Page 6]

2.5 Germany

Figure 30: Summary of agreement with the Recommendation [Source: Analysys Mason, 2012]

Recommendation	Agreement
Bottom-up current cost model used or being developed	✓
NGN for efficient operator	✓
Can cost pure LRIC for termination (date expected to be available)	▬ (unknown)
Economic depreciation [1]	×
Pure LRIC prices	×[2]
Symmetry of rates	✓[3]
If no agreement, use of benchmarking	×

Legend: ✓ = in agreement now, ▬ = expected to be in agreement, × = not implemented

Notes:

1: Note that economic depreciation is not a requirement ("wherever feasible") so an NRA can in principle be in agreement with the Recommendation without an economic depreciation calculation

2: Rejected in the draft decisions which are currently being consulted on

3: EC raised issue

2.5.1 Market overview

Germany's fixed telephony market was liberalised in 1998. Since then around 130 ANOs have entered the market either using the local loop owned and operated by the incumbent (Telekom Deutschland) or offering their own fixed infrastructure on copper, cable or fibre. Cable has been especially successful in Germany. In 2010, Telekom Deutschland held 63% of telephone channels and carried 54% of Germany's voice traffic, according to Analysys Mason Research.

Figure 31: Fixed originated telephony traffic in Germany[90] [Source: Analysys Mason, 2012]

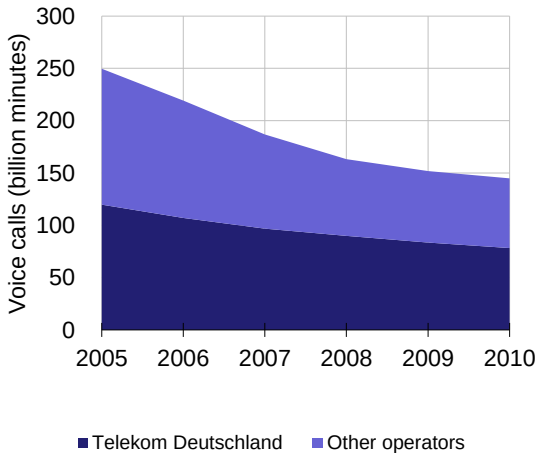
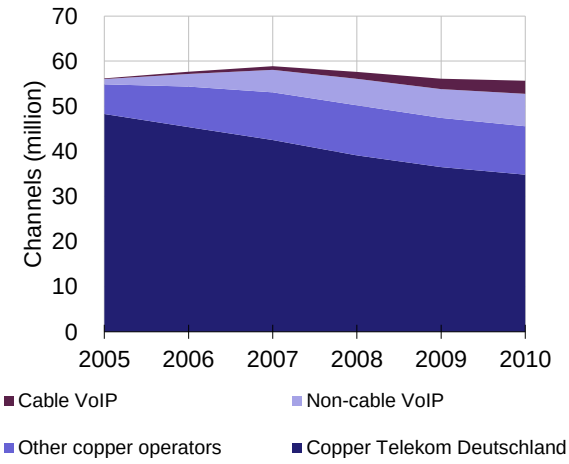


Figure 32: Fixed telephony channels in Germany [Source: Analysys Mason, 2012]



The German regulator BNetzA does not report fixed voice channels or minutes at an operator level. Three of the largest alternative network providers in Germany are Telefonica Deutschland, Tele2 Deutschland and Kabel Deutschland. The principal access networks and business models used by major operators to terminate voice traffic are shown in the table below.[91]

Operator	Principal access networks
Telekom Deutschland	Access owner (copper, fibre)
Telefonica Deutschland	Access leaser (copper) Access owner (fibre)*
Tele2	Access leaser (copper) Access independent (carrier pre-selection)
Kabel Deutschland (KDG)	Access owner (cable)

*Small scale/trial

*Figure **33**: Principal access networks used by major operators [Source: Analysys Mason, Telegeography 2012]*

[90] Note: 1. Charts show total market, which includes both residential and business segments

2. Charts show retail level data, rather than wholesale level data. Therefore part of the "Other operators" may be WLR or CPS operators on the incumbent's network

3. VoIP connections are active users of either paid-for native VoIP services that use a broadband access connection, or VoIP services included in a paid-for bundle with broadband access. The figure excludes peer-to-peer applications. Although some VoIP customers use the service in parallel to their PSTN or ISDN connection, it most commonly replaces a narrowband connection. Especially for cable VoIP connections the argument to give up the PSTN or ISDN connection is strong as this allows the customer to avoid the copper line rental charge.

4. Copper includes both LLU and WLR

[91] KDG provides VoIP services over cable. Other VoIP providers are Vodafone (ULL-based business model), United Internet (reseller) and Telefonica (ULL based business model).

2.5.2 Identification of SMP

Operators with SMP in origination

In its 2008 market review[92], BNetzA identified only Telekom Deutschland as possessing SMP in Market 2 (fixed origination).

Operators with SMP in termination

As part of the same 2008 review, BNetzA identified Telekom Deutschland and 57 ANOs as having SMP in Market 3 (fixed termination), because each is considered to operate in its own market in which it holds 100% market share[93]. Two of the 57 ANOs have since merged so that 56 ANOs with SMP remain[94].

2.5.3 Rationale for chosen cost standard

The 2004 German Telekommunikationsgesetz ('Telecommunications Law') defines efficient costs as LRAIC with an adequate mark-up for common costs.[95] This definition of efficient costs has been used as the basis for setting termination and origination rates in the past. In its current form it appears to contradict the Recommendation in that it prescribes a mark-up for common costs to be included in determining the costs of termination. There has been an amendment to the Telecommunications Law that entered into force on 10 May 2012[96]. The Law will now allow for the option to follow the Recommendation[97]. However, BNetzA, who has started the national consultation on the fixed call termination market and mobile termination rates (MTR)[98], does not plan to make use of this option and follow the Recommendation on the treatment of fixed termination rates.

Treatment of common costs

The currently prevailing FTR is based on an extended EU comparison. Therefore, BNetzA has not yet revealed how it intends to treat common costs in future. However, BNetzA mentioned that in order to implement the Recommendation, the equal [common] cost distribution between termination and origination charges will probably no longer be possible.[99] New draft decisions (from 2012) on access obligations for both Telekom Deutschland and the alternative operators

92 [DE01]

93 [DE01]

94 [DE02]

95 [DE03, § 31, Paragraph 2]

96 [DE04]

97 [DE04, Paragraph 99]

98 [DE05], [DE06]

99 [DE07]

state that common costs will still be taken into account when setting termination rates in the future.[100]

2.5.4 Currently applied rates

BNetzA has historically set origination and termination rates at the same level and refers to them jointly as interconnection rates. The fixed interconnection rates listed in Figure 34 below currently apply for the incumbent operator, Telekom Deutschland.

Figure 34: Interconnection rates applying from 01.07.2011until 30.11.2012 [Source: BNetzA[101]]

Tariff zone (Interconnect level)	*Peak tariff Mon-Fri 09:00–18:00* ***(EUR/min)***	Off-peak tariff Mon-Fri 18:00–09:00; as well as 0:00–24:00 on Sat, Sun and nationwide holidays (EUR/min)
I (Local)	0.0045	0.0032
II (Single tandem)	0.0069	0.0046
III (Double tandem)	0.0104	0.0068

Note: the three tariff zones (which depend on the interconnect level reached) are shown in Figure 35 below.

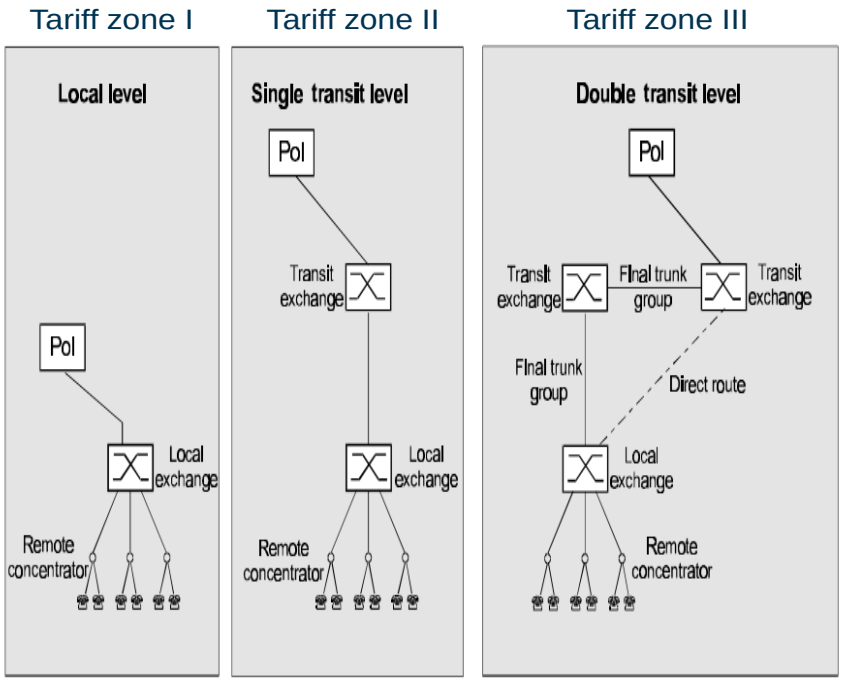


Figure 35: Different tariff zones of FTRs [Source: WIK[102]]
Note: transit is analogous to tandem in the UK

The review that led to these rates was triggered by an application from the incumbent for an average increase of interconnection rates of approximately 10%[103].

100 [DE05, Section 3.6.5.2.1.2]

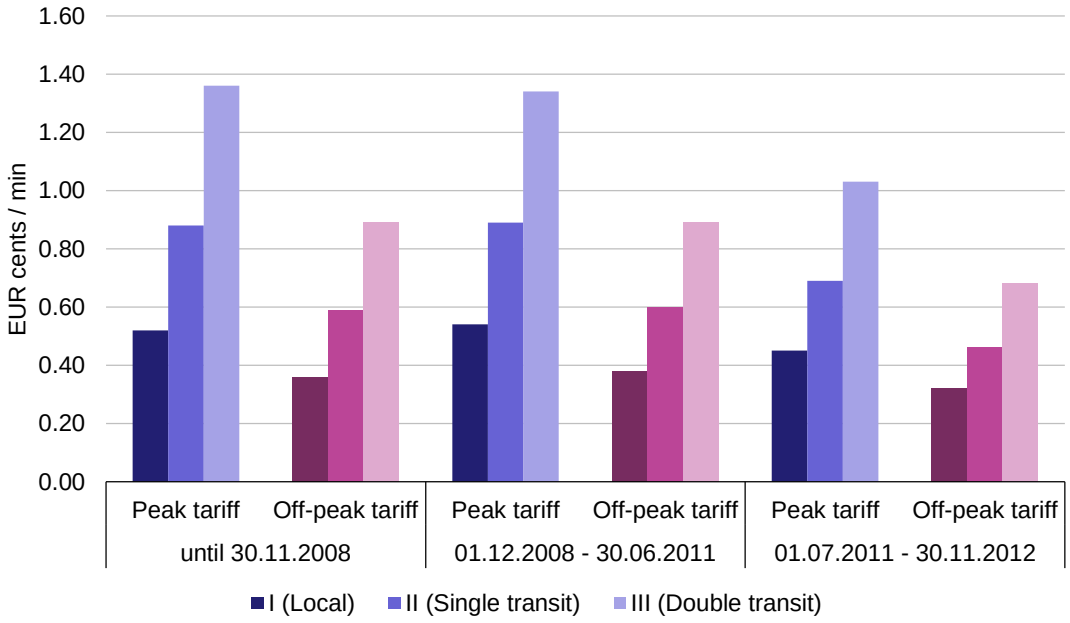
101 [DE08]

102 [DE09]

103 [DE07]

Telekom Deutschland justified its application by highlighting the falling traffic levels on its network due to fixed-to-mobile substitution, migration of customers to ANOs and cable companies as well as migration of traffic from narrowband to VoB. However, contrary to the incumbent's suggestion the regulator lowered rather than raised rates, as is shown in Figure 36 below.

Figure 36: Historical interconnection rates in Germany [Source: BNetzA]



According to German telecommunications law[104], BNetzA can choose from three methods in deciding the adequate level of interconnection rates:

1. cost accounts reported by operators
2. costing models
3. an international review.

Rejection of cost accounts approach

Leading up to its decision to base the new FTRs on an international review, BNetzA considered using the costs reported by the incumbent. However, it concluded that these could not be used as they were based solely on TDM infrastructure whereas a currently efficient operator would have started a migration to NGN infrastructure. Consequently, Telekom Deutschland's reported costs did not form an adequate basis for the setting of FTRs.

104 [DE03, § 35 Paragraph 1, Sentence 1]

Rejection of existing cost models

BNetzA had developed an integrated multi-service NGN model that has the capability to model the cost of VoIP, which could have been used to inform the regulator on the costs of an efficient NGN operator. However, in the last interconnect decision in 2011 the model was found not to be ready to deliver accurate results. This was due to uncertainty on a number of input parameters and the model's inability to calculate NGN-specific opex and common costs. Although opex and common costs are available to BNetzA for PSTN-based infrastructure, it chose not to use these because it expects PSTN and NGN to generate widely differing opex and common costs.

Acceptance of benchmarking approach

Having ruled out reported operator costs, and in the absence of an appropriate NGN model, an international review was the only means of setting satisfactory FTRs.

Application of price control

The rates resulting from the international review only apply to the incumbent. BNetzA currently sees no need to apply price controls to ANOs as it expects commercial agreements between the ANOs and Telekom Deutschland to result in ANOs charging the incumbent's rate. Although there is no access obligation placed on ANOs, BNetzA argues that they have an incentive to interconnect with Telekom Deutschland as the only operator with nationwide coverage. In the corresponding interconnection contracts, BNetzA argues that Telekom Deutschland would not be prepared to pay termination rates that exceed its own rates. Consequently, ANOs would be paid termination rates no higher than those set for Telekom Deutschland, which are based on the costs of a hypothetical efficient operator. Furthermore, the non-discrimination obligation imposed on the ANOs would then ensure that they do not demand from each other FTRs that exceed the level of an efficient operator. In cases where, in spite of commercial incentives to reach the above outcome, ANOs end up charging higher termination rates, BNetzA reserves the right to intervene through ex-post regulation[105].

The EC commented on BNetzA's proposal in the EC response to notification DE/2009/0948[106]. It does not consider the commercial agreements between ANOs and Telekom Deutschland to be sufficiently reliable to ensure that FTRs are based on the costs of an efficient operator. This is because the commercial agreements could be temporarily suspended in disputes over the rates so as to push rates higher or foreclose entry. The EC considers this to be a realistic risk although BNetzA sees little reason for disputes given that the handover between networks is standardised. Ex-ante regulation and an access obligation would be required to guarantee stable FTRs based on the costs of an efficient operator.

105 [DE02]

106 [DE02]

Furthermore, the EC points out that the non-discrimination obligation only applies under equivalent conditions. These may, however, not apply to the deviating ANO.

The EC is concerned that possible deviations from Telekom Deutschland rates can only be addressed through ex-post price control measures. It considers this kind of intervention to come too late as customers would already have suffered a loss through higher termination rates.

Therefore the EC invited BNetzA impose a single cost-oriented, symmetric termination rate on all SMP operators, thereby applying the Recommendation, but BNetzA did not implement this recommendation.

2.5.5 Symmetry of rates

The FTRs are only applied to Telekom Deutschland. However, in practice, BNetzA expects that the 56 ANOs' commercial agreements with Telekom Deutschland will result in them charging the same rate. Draft decisions currently under national consultation will explicitly state symmetric rates.[107]

2.5.6 Model(s) used

BNetzA uses two models to help it form its opinion on the setting of adequate FTRs.

1. a TDM-based model called AnalytischesKostenmodell – NationalesVerbindungsnetz ('analytical cost model – core network'), currently version 2.0
2. an NGN-based model called AnalytischesKostenmodellfür das Breitbandnetz ('analytical cost model for the broadband network'), currently version 2.1.[108]

Both models are referred to as total-element long-run incremental cost (TE-LRIC) models. In this report, we refer to this type of model as a BU-LRAIC model.

Neither the TDM-based nor the NGN-based model is publicly available, but BNetzA has published German language documentation of the NGN-based model[109] as well as version 2.0 of the TDM-based model[110].

TDM model history

The TDM-based model was originally developed in 1997/1998 to model Telekom Deutschland's existing copper network. Originally, its scope covered the core network as well as the access

107 [DE05, Section 3.6.5.2.1.6]

108 An amended version 2.1 of the analytical cost model for the broadband network was published in December 2011, replacing the 2010 version

109 [DE10]

110 [DE09]

network. In 2000 it was upgraded to version 2.0, largely in order to incorporate public consultation responses. Since its update, the modelling of the access network and that of the core network have been separated due to their different cost drivers. In the access network the demand for connections drives costs while in the core network traffic volumes drive costs.

The model does not take into consideration any migration to NGN, which is why a separate NGN model is being developed.

NGN model

The TDM model is complemented by an integrated NGN broadband model that is capable of modelling all services, which may one day run over NGN. This includes the assignment of different service quality levels through packet prioritisation. One of the services modelled with this in mind is VoIP.

As part of the 'total-element' approach, the demand for each asset can be determined in terms of required bandwidth and packet rate.

It does not model the NGA network and instead focuses on the distribution and core networks. The exclusion of NGA networks in this model was intended to allow flexibility for different roll-out strategies, which can be captured by a stand-alone NGA model.

The model uses a scorched-node approach in the roll-out of infrastructure by an efficient hypothetical operator of the incumbent's scale. This means that the existing nodes in Telekom Deutschland's network are maintained as an input while the model's network roll-out algorithm determines the equipment required at each node and the capacity required between them in order to carry the IP-traffic of all services.

The model calculates a detailed network infrastructure requirement which can be turned into an annualised capex using a straight annuity approach[111]. It is not intended to derive bottom-up opex, but can account for opex through mark-ups.

With the resulting total network costs, the model can then calculate LRAIC as well as other costing methodologies.

The NGN model has been developed by the WirtschaftlichesInstitutfürInfrastruktur und Kommunikationsdienste (WIK) and is confidential. However, BNetzA has published associated model documentation on its website[112], which notes that a pure LRIC cost could be calculated using the model.

Figure 37 below summarises the key design parameters of the NGN costing model.

111 [DE10, Section 7.5.1]

112 [DE10]

Figure 37: Key design parameters of BNetzA's NGN costing model [Source: BNetzA]

Dimension	Common options
Operator:	
Type	Hypothetical (efficient) incumbent
Footprint	National
Efficient scale	Immediate scale of incumbent
Assumed access network technology / boundary of access network	MPoP (Metropolitan Point of Presence), model documentation[113] explains this as the point at which the dedicated access line ends – this may vary by access technology (e.g. FTTx, FTTH P2P) and it is the point where Ethernet aggregation is always present
Service:	
Scope	The below services can be modelled in WIK's model: Narrowband/voice (retail, wholesale) Broadband (xDSL) Channelised IPTV VOD Business connectivity (Ethernet, VPN)
Implementation:	
Modelling period	Multi-year
Depreciation method	Straight annuity
Increment definitions	Individual service LRIC (for wholesale termination) Average increment with mark-ups (LRAIC+) (for other services)
Assumed WACC	To be determined when NGN model is calibrated

Consideration of NGN as efficient operator

BNetzA held a public consultation on IP-based interconnection in 2008 and summarised its high-level conclusions in a number of key points or '*Eckpunkte*'[114].

In these *Eckpunkte*, BNetzA highlights that interconnection rates have historically been set for each individual service (e.g. voice termination), which is a distinction that is no longer adequate for packet-based services such as VoIP. However, within voice termination, there should not be parallel termination rates for traditional voice and VoIP services, as only the most efficient technology provides the adequate cost basis. IP-based services are likely to be significantly less costly and the disruption of a rapid transition to correspondingly lower interconnection rates is likely to be 'too disruptive' to the market. Nonetheless, it is desirable to do so as it furthermore sets the right incentive to accelerate the transition to the more efficient technology. A glide path based on the relative proportions of circuit-switched and packet-switched traffic may be the correct solution.

113 [DE10, Section 2.4.3]

114 [DE11]

The consultation also found that, while a 'bill-and-keep' system is not a feasible means of regulating interconnection in the short-term, it would be sensible to introduce this at least in the core network in the long term. The advantages of such a system include the avoidance of termination monopolies and the associated regulatory requirement as well as the efficient utilisation of networks. A large disadvantage would be the introduction of a 'hot-potato' problem according to which operators would want to hand over traffic as soon as possible at lower network levels to reduce their costs of interconnection. However, this would largely be mitigated through the lower number of POIs of an NGN. There are likely to be 12 POIs, which are likely to all be situated in the core network, so that the possibility of lower level handover is avoided.

Further to the consultation on IP-based interconnection, BNetzA is currently developing an NGN model which in future can be used together with the existing TDM-based LRAIC model to set a glide path from current termination rates to termination rates based on a full NGN infrastructure.

BNetzA argues that setting FTRs on either a PSTN or an NGN basis would not be representative of reality, as there will in practice be a gradual migration from circuit-switched traffic to packet-switched traffic. The risk of distorting competition between established ANOs can be minimised by determining the costs of a hypothetical efficient operator using PSTN and the equivalent costs for NGN in parallel, and subsequently blending the results. An adequate migration path should act to avoid any disruptive change in rates that would distress industry.[115]

BNetzA does not consider such FTRs to affect incentives for investment in the most efficient operator. This is because the FTRs are the same for both technologies.

Interconnection on NGN or TDM basis

As mentioned above, the consultation on IP-based interconnection resulted in a view that as few as 12 POI will be required in an NGN infrastructure. However, media gateway costs will be driven by the number of POI as well as traffic volumes.

BNetzA has recently issued draft decisions on access obligations which mandate access via IP interconnection for both Telekom Deutschland and alternative operators.[116] BNetzA proposes to regulate IP-interconnect at the same rate as PSTN-interconnection, because higher rates could hinder the adoption of this more efficient technology.[117]

Depreciation methodology

The only depreciation methodology implemented in WIK's NGN model is a tilted annuity. WIK argues that its tilted annuity approach is capable of capturing the underlying principles of

115 [DE07]

116 [DE05, Page 5]

117 [DE05, Section 3.6.5.2.1.5]

economic depreciation. However, without full disclosure of the model's depreciation algorithm it is currently not possible to verify whether this kind of depreciation behaves in the same way as conventional economic depreciation.

2.5.7 Appeals

The regulator has not published a final decision on termination rates, so no appeals have been made yet.

2.6 The Netherlands

Figure 38: Summary of agreement with the Recommendation [Source: Analysys Mason, 2012]

Recommendation	Agreement
Bottom-up current cost model used or being developed	✓
NGN for efficient operator	✓
Can cost pure LRIC for termination (date expected to be available)	✓ [2]
Economic depreciation [1]	✓
Pure LRIC prices	×
Symmetry of rates	✓
If no agreement, use of benchmarking	×

Legend: ✓ = in agreement now, ▬ = expected to be in agreement, × = not implemented

Notes:

1: Economic depreciation is not a requirement ("wherever feasible") so an NRA can in principle be in agreement with the Recommendation without an economic depreciation calculation

2: Modelled, not currently used

2.6.1 Market overview

In the Netherlands VoIP has been growing at a particularly fast rate. It increased from 4% to 42% of channels between 2005 and 2010. With 1.3 million VoIP subscribers in Q1 2010, the incumbent (KPN) is not only the largest player in the ISDN/PSTN market, but in the VoIP market as well.

Figure 39: Fixed originated telephony traffic in the Netherlands[118] [Source: Analysys Mason, 2012]

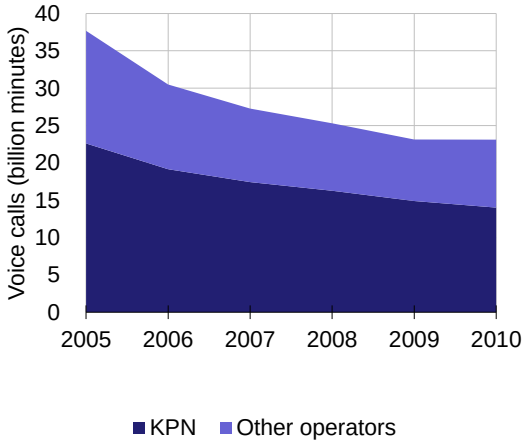
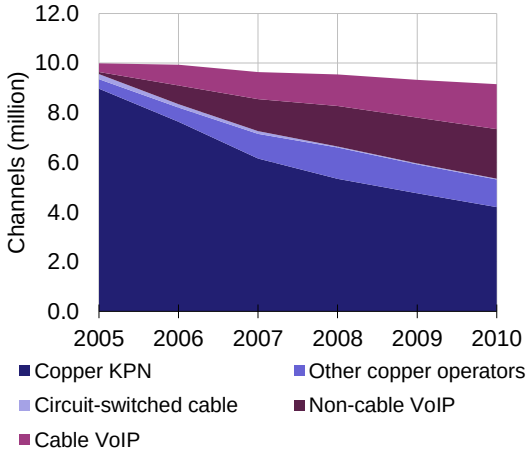


Figure 40: Fixed telephony channels in the Netherlands[118] [Source: Analysys Mason, 2012]



KPN carried 61% of the Netherlands' fixed telephony minutes on 61% of the country's fixed channels, according to Analysys Mason Research.

OPTA does not report number of channels by operator, and only report market shares in terms of retail traffic in 5% increments. For 2010, these market shares have remained broadly stable across the top 4 operators, with the incumbent KPN holding 55–60% market share, and Ziggo, UPC and Tele2, 10–15%, 5–10% and 5–10% respectively.

The principal access networks and business models used by major operators to terminate voice traffic are shown in the table below.

Operator	Principal access networks
KPN	Access owner (copper, fibre)
Ziggo	Access owner (cable)
UPC	Access owner (cable)
Tele2	Access leaser (fibre)

*Figure **41**: Principal access networks for major operators [Source: Analysys Mason, Telegeography 2012]*

[118] Note: 1. Charts show total market, which includes both residential and business segments

2. Charts show retail level data, rather than wholesale level data. Therefore part of the "Other operators" may be WLR or CPS operators on the incumbent's network

3. VoIP connections are active users of either paid-for native VoIP services that use a broadband access connection, or VoIP services included in a paid-for bundle with broadband access. The figure excludes peer-to-peer applications. Although some VoIP customers use the service in parallel to their PSTN or ISDN connection, it most commonly replaces a narrowband connection. Especially for cable VoIP connections the argument to give up the PSTN or ISDN connection is strong as this allows the customer to avoid the copper line rental charge.

4. Copper includes both LLU and WLR

2.6.2 Identification of SMP

Operators with SMP in origination

As part of its 2008 notification to the EC[119], OPTA identified only KPN as having SMP. The criteria that OPTA considered in reaching this conclusion include:

- market share
- vertical integration and network coverage
- product and service diversification
- economies of scale and scope
- control of infrastructure difficult to replicate
- countervailing buying power
- barriers to entry.

KPN is not required to supply WLR on its VoB connections.[120]

Operators with SMP in termination

OPTA found all operators of fixed public telephone networks, of which there are 35, to have SMP[121] based on:

- 100% shares of the market for termination on their network
- lack of countervailing buyer power
- absolute barriers to entry to each individual operator's network
- lack of potential competition.

2.6.3 Rationale for chosen cost standard

Before the EC published its Recommendation on termination rates, OPTA determined its interconnection rates using top-down models. In 2008 the regulator proposed to set the FTR as of January 2009 at EUR0.0065/min based on top-down embedded direct costs (EDC). It found this top-down approach to be adequate because it had previously carried out a comparative efficiency analysis (CEA) in 2004, which found that KPN's efficiency was among the 10% most efficient operators', when benchmarked against operators in the USA. OPTA saw no need to update the exercise as KPN was unlikely to have become less efficient since 2004 – especially because a large part of its wholesale services are bought by its own retail arm so that efficiency gains would, to a large extent, benefit KPN itself. Furthermore, although KPN has an incentive to attribute a

119 [NL01]

120 [NL02, Page 56]

121 [NL03]

larger share of its costs to termination than would be proportionate, it is bound by the applied accounting standard.

The EC, in commenting[122] on OPTA's EDC approach, noted that a coherent European-wide regulatory regime was necessary. Contrary to this coherent approach, EDC did not support the approach of basing rates on the costs of an efficient operator using modern efficient technology. Therefore, the EC invited OPTA to change its costing basis to the pure LRIC of an efficient operator.

Thereafter, OPTA made the proposals discussed in Section 2.6.4 below.

Treatment of common costs

In its response to OPTA's 2010 submission, the EC[123] highlighted OPTA's proposal that the origination price control applied on CPS operators should take into consideration the change in termination rate price controls from LRAIC+[124] to pure LRIC. This is because CPS operators benefit from the lower termination rate of pure LRIC-based prices without offering a similar reduction to other operators. In order to address this one-sided effect on CPS operators, OPTA intended to allow KPN to charge CPS operators a higher fee for origination. The higher rate was to make up for the impact that the introduction of pure LRIC prices had on call termination. The previous EDC-based termination rate was EUR0.007/min while the pure LRIC-based termination rate target, reached at the end of the glide path, was EUR0.0045/min. The difference, EUR0.0025/min, was to be added to the fixed call origination rate that CPS operators would pay to KPN as of 01/09/2012.

The EC commented on this proposal in NL/2010/1079-1080. It asked OPTA not to disregard the standard procedure by changing its policy on call origination pricing before its next call origination market review. By setting rates in advance of this review the EC considered OPTA to be prejudging the review's findings, which is in breach of the Framework Directive. The Directive suggests the nature of the problem needs to be identified before remedies are taken. OPTA followed this comment and removed the proposal about the mark-up on the originating rate from the termination market analysis decision.

2.6.4 Currently applied rates and proposed glide path

Since 2010, legal appeals have caused the regulator to move from the proposed pure LRIC rates to LRAIC+ based rates. The notification to set FTRs at LRAIC+ is currently held up by the EC as it has opened a Phase II proceeding against OPTA by issuing a serious doubts letter on 13 February

122 [NL03]

123 [NL04]

124 OPTA refer to this as BU-LRIC+, which in the terminology of this report is LRAIC+

2012[125]. Under Article 7a(1) of the Framework Directive, this has the effect of preventing the adoption of the notified draft measures for a three month period from the date of the serious doubts letter (the standstill period).

Originally proposed pure LRIC rates

In 2010, OPTA proposed to set the below interconnection rates, which are based on pure LRIC modelling. It submitted these plans to the EC as part of its 2010 notification[126].

Figure 42: Originally proposed FTRs in the Netherlands [Source: NL04]

FTR (EUR/ minute)	2nd half 2010	1st half 2011	2nd half 2011	01/01/2012-01/09/2012	01/09/2012 onwards
At local level	0.0050	0.0052	0.0053	0.0059	0.0045
At regional level	0.0071	0.0071	0.0072	0.0059	0.0045

These rates are based on the below model output. Figure 43 below shows that the LRAIC+ model results were at this point nearly 50% higher than the pure LRIC results.

Figure 43: Model output for LRAIC+ and pure LRIC interconnection [Source: NL06]

FTR (EUR / minute)	2009	2010	2011	2012	2013
Nominal regional LRAIC+	0.0064	0.0065	0.0065	0.0066	0.0067
Nominal pure LRIC	0.0042	0.0042	0.0043	0.0044	0.0045

As part of this original proposal, the termination rates for local-level interconnection and regional-level interconnection were to become identical by 2012. This is because OPTA recognises NGN as the underlying efficient technology and argues that with this technology the network level at which interconnection takes place no longer has a significant impact on costs.

In considering the EC's new methodology of purely incremental costing, OPTA is concerned that operators may adapt their cost structure to define more of their costs as incremental rather than fixed. This would raise the long-run incremental costs. Since termination rates are to be set based on these incremental costs, the rates would consequently rise as well. In particular, OPTA considers that the largest cost component in a VoIP environment is the licence cost for VoIP software at approximately EUR0.004/min. Operators can have two types of contract for such a licence with their vendors. The licence fee can either be independent of the amount of traffic processed by the licence – in which case it is not incremental – or it can scale with the amount of traffic processed – in which case it is incremental. Consequently, operators that are currently on a non-incremental contract can agree with their vendors to make the licence traffic-dependent, which would push up pure LRIC. OPTA has taken a forward-looking approach in which the regulator

125 [NL05]

126 EC case number NL/2010/1079-1080

expects this to happen. In its modelling, it therefore considers the full EUR0.004/min to be incremental. Correspondingly, after including non-VoIP software related costs, the rate that resulted from OPTA's modelling was relatively high at EUR0.0045/min in the long run.

In its comments to OPTA's notification NL/2010/1079-1080, the EC disagreed with the approach of basing a regulatory decision on the nature of commercial agreements between operators and their vendors because these can change in the future. In addition, the EC pointed out that the licence fee costs also contribute to the delivery of call origination. For these reasons, the EC advised OPTA to conduct further analysis on the extent to which this cost is incremental.

Moreover, the EC pointed out that a rise in termination rates at local level was taking place between 2010 and 2011 (see Figure 42 above) and asked OPTA to avoid this temporary increase by instead lowering the local level rate for the first nine months of 2011 to lie between EUR0.0053/min and EUR0.0045/min.

Revised pure LRIC rates of OPTA's 7 July 2010 decision

After taking into account the comments of the EC, OPTA published its interconnection rates decision on 7 July 2010. This contained the adjusted pure LRIC rates shown (in bold) in Figure 44 below.

Figure 44: Proposed FTRs of 7 July 2010 OPTA decision [Source: NL07]

FTR (EUR/ minute)	2nd half 2010	1st half 2011	2nd half 2011	01/01/2012-01/09/2012	01/09/2012 onwards
At local level	0.0050	0.0052	0.0053	**0.0045**	**0.0036**
At regional level	0.0071	0.0071	0.0072	**0.0054**	**0.0036**

However, the 7 July 2010 decision was overturned by the Trade and Industry Appeal Tribunal on 31 August 2011, which instructed OPTA to set interconnection rates according to LRAIC+ methodology. In the meantime a price cap of EUR0.0053/min at local level and EUR0.0072/min at regional level was to apply.

LRAIC+ rates in agreement with the Dutch Trade and Industry Appeal Tribunal

After taking into account the Tribunal's views and as part of its EC submission NL/2012/1284-1285, OPTA notified the EC of its intention to implement the below LRAIC+ rates.

Figure 45: Adopted FTRs [Source: NL07]

FTR (EUR/ minute)	Until 01/01/2012	01/01/2012 - 01/09/2012	01/09/2012 onwards
At local level	0.0053	0.0045	**0.0037**
At regional level	0.0072	0.0054	**0.0037**

Typically, LRAIC+ results are higher than pure LRIC. However, the rates shown in Figure 45 above are based on OPTA's revised VoIP cost modelling. After OPTA's decision was overturned by the Trade and Industry Appeal Tribunal, the regulator undertook further analysis into VoIP software costs.

Its LRAIC+ model broke VoIP costs down as follows:

- EUR0.0013/min for transport networks
- EUR0.0010/min for VoIP hardware
- EUR0.0014/min for VoIP software (revised down by EUR0.0020/min from EUR0.0034/min).

Consequently, long-run termination rates were lowered to EUR0.0037/min, which is similar to the pure LRIC result shown in Figure 44 above.

After OPTA submitted its plans to set termination rates based on LRAIC+ modelling rather than pure LRIC modelling, the EC published its comments on OPTA's plans:

- It reminded OPTA that under the Framework Directive, NRAs are to collaborate with the EC and BEREC in reaching a consistent regulatory practise that will strengthen the European Union's internal market.

- The EC reminded OPTA that according to the Recommendation, termination rates should only cover the costs that could be avoided if termination was no longer offered, i.e. purely incremental costs. In addition, this costing standard in combination with symmetric rates should result in benefits associated with choice, price and quality for users.

- The EC pointed out that OPTA's LRAIC+ results are at least twice as large as its pure LRIC results, based on the two examples shown in Figure 46 below. Furthermore, it criticises that OPTA did not provide any economic arguments to demonstrate that the Recommendation's goals could also be met by using LRAIC+ based rates. It is concerned that instead competitive distortions could result between fixed and mobile operators and operators with asymmetric market shares and traffic levels.

Figure 46: Comparison of LRAIC+ and pure LRIC termination rates [Source: NL07]

FTR (EUR/ minute)	FTR to apply as of 01/05/2012	MTR to apply as of 01/09/2012
LRAIC +	0.0037	0.024
Pure LRIC	0.0016	0.012

Finally the EC argues that, should one country in the European Union deviate from the consistent regulatory Recommendation and allow higher termination rates to be charged, then consumers in other countries calling the deviating country end up paying higher rates. The Framework Directive aims to avoid this outcome by ensuring there is a level playing field between operators in the

European Union. Consequently, the EC considers OPTA's proposed regulation to create barriers to the internal market.

In proposing the use of the LRAIC+ costing methodology, OPTA is not currently following the Recommendation, which requires pure LRIC price caps to be implemented as of January 2013.

Resolution

Currently, there is a conflict between the Dutch Trade and Industry Appeal Tribunal's instructions to set termination rates using LRAIC+ modelling and the EC's Recommendation to use pure LRIC modelling. In order to resolve this conflict, we understand that the EC is currently working with BEREC and OPTA to find a resolution.[127] The EUR0.0037/min rates shown in Figure 45 shall not be enforced until after the end of the Article 7 Phase II proceedings [128].

BEREC Opinion

BEREC has since published its opinion on the Netherland's proposed use of LRAIC+ modelling in a document titled 'BEREC opinion art 7a phase II Cases NL/2012/1284-128'[129]. It concludes that the EC's serious doubts are justified and agrees with the view that LRAIC+ based prices may create a barrier to the EU's single market. However, it recognises that the Dutch Trade and Industry Appeal Tribunal's ruling is legally binding under Dutch law. Consequently, it does not currently consider it appropriate to form specific proposals on how to align OPTA's regulation with the Recommendation.

Symmetry of rates

Before 2008 OPTA implemented asymmetric termination rates based on the concept of delayed reciprocity. According to this concept, the ANOs' rates are set equal to the level of the incumbent's rates a given number of years previously. In 2008 OPTA moved away from its practise of setting asymmetric rates as it saw no exogenous cost differences between the two types of operator that might justify these and considered enough competition to have developed to make further entry assistance through asymmetric rates unnecessary.[130]

In 2008 OPTA mentioned that it considers voluntary bill-and-keep agreements to be beneficial for competition although they are not possible under existing non-discrimination agreements.[131] Consequently, OPTA proposed not to apply non-discrimination obligations on SMP operators in future. Therefore, while interconnection rates set an upper bound for the amount operators can

127 [NL07]

128 [NL08]

129 [NL09]

130 [NL03]

131 [NL03]

charge each other for interconnection, OPTA does not object to lower rates being used. In particular, an operator could charge one of its interconnection partners one rate and another of its interconnection partners a lower rate or none at all.

2.6.5 Model(s) used

The model used by OPTA in determining the costs of interconnection is capable of calculating both LRAIC+ and pure LRIC prices. Between 2009 and 2010, Analysys Mason developed OPTA's first bottom-up fixed model, which modelled a hypothetical existing operator. The long-run market share of the operator was defined as 50% of the fixed market, with residential customers being migrated on to the NGN over five years and business customers over 11 years. In the model, customers are migrated off the modelled NGN platform onto the subsequent generation of fixed network that will follow NGN, to capture the effects of a subsequent generation of network between 2014 and 2019.

Prior to the use of this model, cost-orientation of fixed services had been informed by KPN's top-down model.

Figure 47 below summarises the key design parameters of OPTA's model.

Figure 47: Key design parameters of OPTA's model [Source: Analysys Mason, 2012]

Dimension	Common options
Operator:	
Type	Hypothetical existing operator
Footprint	National
Efficient scale	Market share of 1/*n* where *n* =2 for fixed operator; Assumes a hypothetical migration of customers onto the NGN core
Assumed access network technology / boundary of access network	Copper, boundary at MDF / cabinet
Service:	
Scope	Narrowband/ voice (retail, wholesale) Broadband (xDSL, Ethernet over fibre) Business connectivity (leased lines, Ethernet, VPN)
Implementation:	
Modelling period	Multi-year
Depreciation method	Economic depreciation
Increment definitions	Individual service LRIC (for wholesale termination) Average increment with mark-ups (LRAIC+) (for other services)
Mark-up method for business common costs (if LRAIC+)	EPMU
Assumed WACC	Constant real, pre-tax WACC of 7.38%[132]

[132] [NL10, page 98]

Consideration of NGN as efficient operator

In order to follow the Recommendation, OPTA has used NGN core networks as the modern equivalent asset in its modelling.[133]

Interconnection on circuit-switched or IP basis

As part of its market analysis[134] OPTA discussed NGN interconnection with operators. The conclusions drawn from this discussion are that IP-based interconnection is likely to play a bigger role in future and that KPN considers more than five points of IP-based interconnection to be inefficient in future. Therefore the regulator sets a maximum of five POIs for IP-based interconnection. For the interconnection of PSTN terminated traffic the same 20 POIs are required that have been used for the interconnection of originated traffic. If an operator interconnects on both PSTN and IP basis, the minimum number of POIs is not additive (i.e. 25), but is capped at 20. OPTA considers this rule to be necessary in ensuring ANOs are not made to interconnect at too many sites. However, if a supplier and a consumer of interconnection are in agreement that a higher (or lower) number of POIs would be beneficial – for example because with additional IP POIs the incumbent offers lower rates of IP interconnection – they may agree to interconnect at more (or fewer) locations. In other words, the supplier and consumer of interconnection can negotiate any number of locations, but the supplier cannot force the consumer to connect to more than 5 (or 20) location if the consumer does not want this. The regulator does not set price controls on IP-based interconnection at this point.[135] Consequently, where traffic is interconnected on a TDM basis by an IP operator, the IP operator bears the cost of conversion from TDM to IP.

Depreciation methodology

The depreciation methodology applied in OPTA's model for the setting of interconnection rates is economic depreciation.

2.6.6 Appeals

As discussed extensively above, OPTA's 7 July 2010 decision to set price controls according to pure LRIC modelled costs was appealed in front of the Dutch Trade and Industry Appeals Tribunal by T-Mobile Netherland B.V., Vodafone Libertel B.V., Koninklijke KPN N.B., KPN B.V., Telfort B.V., and Lycamobile Netherlands B.V.[136] This appeal resulted in the Tribunal's judgement instructing OPTA to set interconnection rates on the basis of LRAIC+.

133 [NL11, Paragraph 38]

134 [NL11, Paragraphs 585-588]

135 [NL11, Paragraphs 585-588]

136 [NL09]

2.7 Norway

Figure 48: Summary of agreement with the Recommendation [Source: Analysys Mason, 2012]

Recommendation	Agreement
Bottom-up current cost model used or being developed	✓
NGN for efficient operator	✓ [2]
Can cost pure LRIC for termination (date expected to be available)	✓ [3]
Economic depreciation [1]	✓
pure LRIC prices	×
Symmetry of rates	✓
If no agreement, use of benchmarking	×

Legend: ✓ = in agreement now, ▬ = expected to be in agreement, × = not implemented

Notes:

1: Economic depreciation is not a requirement ("wherever feasible") so an NRA can in principle be in agreement with the Recommendation without an economic depreciation calculation

2: Part way though a glide path from TDM to NGN costs

3: Modelled, not currently used

2.7.1 Market overview

Norway has seen an especially acute decline in fixed telephony as customers continue to substitute from fixed to mobile calls and VoIP operators gain market share. The latter experienced rapid growth in 2008, though in 2010 they reported a minor decline in market size. As Figure 49 below shows, by 2010 total fixed traffic has fallen to 37% of its 2005 level. Fixed telephony subscriptions have also fallen, by 7% in 2010 down to 1.65 million subscriptions[137] according to NPT.

137 Note that this is the number of subscriptions rather than channels. Subscriptions can have more than once channel, for example ISDN basic access has two channels.

Figure 49: Fixed telephony traffic in Norway[138]
[Source: Analysys Mason, 2012]

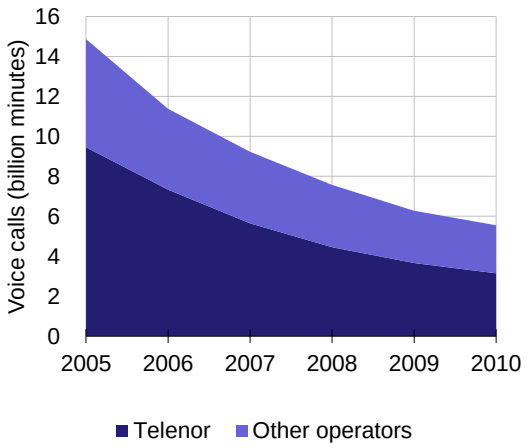
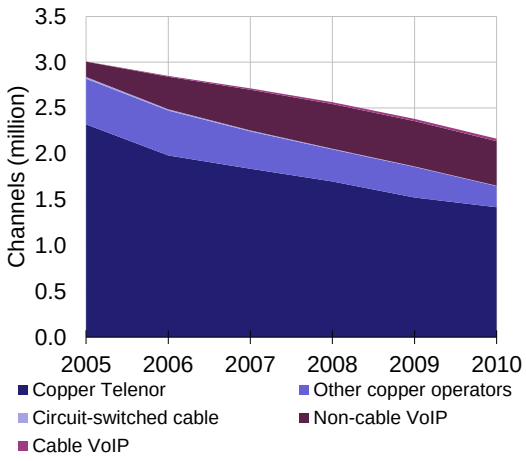


Figure 50: Fixed telephony channels in Norway[138]
[Source: Analysys Mason, 2012]



In 2010, Telenor held 65% of telephony channels and 59% of fixed voice traffic on its network.

Figure 51: Market share of total fixed minutes
[Source: NPT, 2012]

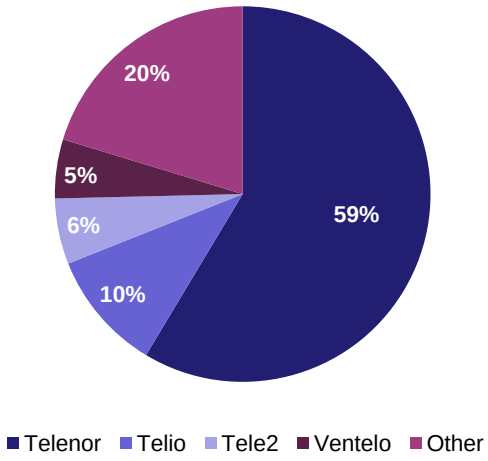
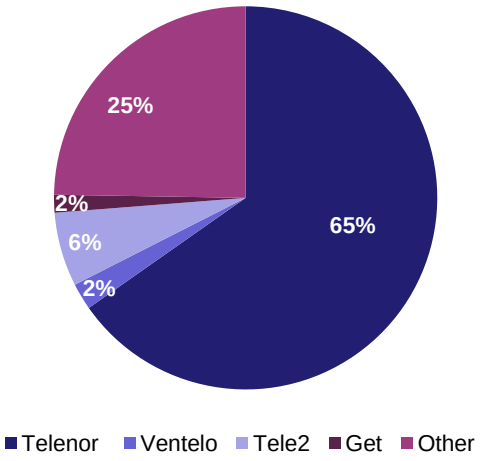


Figure 52: Market share of telephony lines [Source: Telegeography, 2012]



In terms of total fixed minutes, the three largest alternative network providers are Telio (10%), Tele2 (6%) and Ventelo (5%). In terms of lines, the three largest alternative network operators are Tele2 (6%), Ventelo (2%) and Get (2%). Telio has a 0% market share in lines as it provides VoIP services but does not supply the broadband service required to carry the traffic. The principal

[138] Note: 1. Charts show total market, which includes both residential and business segments

2. Charts show retail level data, rather than wholesale level data. Therefore part of the "Other operators" may be WLR or CPS operators on the incumbent's network

3. VoIP connections are active users of either paid-for native VoIP services that use a broadband access connection, or VoIP services included in a paid-for bundle with broadband access. The figure excludes peer-to-peer applications. Although some VoIP customers use the service in parallel to their PSTN or ISDN connection, it most commonly replaces a narrowband connection. Especially for cable VoIP connections the argument to give up the PSTN or ISDN connection is strong as this allows the customer to avoid the copper line rental charge.

4. Copper includes both LLU and WLR

access networks and business models used by major operators to terminate voice traffic are shown in the table below.

Operator	Principal access networks
Telenor	Access owner (copper, fibre, cable)
Tele2	Access leaser (copper)
Telio	Access independent (VOB)
Ventelo	Access owner (fibre) Access leaser (copper)
Get	Access owner (cable)

*Figure **53**: Principal access networks for major operators [Source: Analysys Mason, Telegeography, 2012]*

2.7.2 Identification of SMP

Operators with SMP in origination

In its 2011 market review[139] NPT concluded that Telenor is the only operator with SMP. It based this observation on:

- Telenor's very high market share, estimated at 75%-80%[140] in 2010
- high barriers to entry due to the legacy network
- the lack of countervailing buying power based on the fact that Telenor is the only operator to offer external origination.

This confirmed the regulator's 2006 view that only the incumbent has SMP in origination.

Operators with SMP in termination

In its 2010 market review[141] NPT identified Telenor as well as 12 ANOs as possessing SMP in termination to their respective networks. They were deemed to hold SMP due to:

- their 100% shares of the market for termination on their network
- absolute barriers to entry to each individual operator's network
- their incentive to set high termination rates
- insufficient countervailing buying power to depart from the SMP presumptions.

This again is consistent with the regulator's 2006 view on SMP in the market for termination.[142]

139 [NO01, Page 36]

140 Incumbent share of the origination market (retail + wholesale)

141 [NO01, Paragraph 267]

142 [NO02]

2.7.3 Rationale for chosen cost standard

Norway is not in the European Union and therefore is not overseen by the EC. However, as part of the European Free Trade Association (EFTA), it is overseen by the EFTA Surveillance Authority (ESA). This is in large part aligned with the Recommendation and has published its own Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EFTA States[143] modelled on the EC's Recommendation.

NPT published its draft decision on regulatory measures on origination and termination on 7 June 2011[144]. In this draft decision the regulator described its intention to allow the common cost associated with fixed termination traffic to CPS operators to be recovered in the CPS fixed call origination market (described in detail in the section on the 'Treatment of common costs' below).

On 7 July 2011 the ESA commented on NPT's proposal. In particular, it asked NPT to explain in greater detail why its proposed measure is the most suitable remedy under the Recommendation. Furthermore, the ESA invited NPT to consider other reallocation possibilities that it could implement as a remedy instead. While the ESA welcomes NPT's development of a pure LRIC model, it urged the regulator to implement this model's output sooner than January 2014, as the recommended approach suggests that FTRs should be based on pure LRIC by the end of 2012.

On 1 August 2011, NPT published its final decision.[145] NPT explained that in this final decision it addressed ESA's comments in Section 6.2.4, which were already part of the draft decision (summarised below under 'Treatment of common costs' below), and Section 7.2.5.2, which was extended to capture the arguments presented.

The principal rationale behind NPT's choice of LRAIC for fixed termination was to be consistent with its mobile termination costing methodology. NPT expects that any inconsistency between the costing methodologies applied to fixed and mobile markets will result in undesirable distortions of competition between operators in these two markets. Such distortions would be particularly detrimental because NPT considers there to be strong competition and a high level of substitutability between the two markets. Therefore it chose to apply technology-neutral regulation in which termination is priced according to the same methodology for both types of network.

The LRAIC-based MTRs were set in NPT's decision of 27 September 2010 and are intended to apply until the end of 2013. NPT highlights that following its submission to the ESA concerning these rates, the ESA had no comments. Similarly, the ESA did not comment on the use of LRAIC in its letter of 14 June 2011, in which it accepted NPT's plans to set Lyca's rates based on LRAIC. During 2013 the NPT intends to consider whether pure LRIC has become the more appropriate costing standard for mobile termination as of 2014. At the same time it will consider introducing a

143 [NO03]

144 [NO04]

145 [NO05]

coordinated new approach for the regulation of fixed and mobile termination so that the new approach is applied to both markets at the same time.[146]

NPT sees another problem with the use of pure LRIC beyond inconsistency with its mobile termination costing methodology. The regulator points out that pure LRIC is very sensitive to whether 'voice server software' and 'voice server processors' are considered to be incremental or not and notes that it does not see a consensus across Europe on the matter.[147] The Dutch regulator OPTA mentions a similar concern, which is discussed in Section 2.6.4.

Treatment of common costs

NPT agrees that pure LRIC can result in the right incentives for efficiency. This is because the approach requires the common cost component of the regulated market (e.g. termination) to be recovered in competitive markets (e.g. retail calls). This incentivises the operator to be efficient because in competitive markets operators need to lower their costs as far as they can so as to remain price competitive.[148]

However, NPT does not consider it appropriate to exclude origination from this consideration. While ESA's Recommendation focuses on termination rates and does not consider origination, NPT is of the view that the two are linked as they use the same network elements. The model it uses is capable of calculating the costs that are common to origination and termination. NPT argues that these should be divided between the two services using an EPMU on their LRAIC costs (to get a LRAIC+ result). If, however, pure LRIC is used to price termination, then the mark-up that would have applied on termination needs to be applied to the LRAIC of origination instead.

In setting the termination rate, as NPT's draft decision emphasises, "termination markets are two-sided in the sense that both the party initiating a call and the recipient of the call benefit from the call. It is thus not a given that all the costs associated with termination of a call should be covered through the termination charge charged to the provider who originates the call (the CPP principle). On the contrary, it may be argued that the subscriber receiving a call should help cover a portion of the costs of termination."[149] This goes to argue that a common-cost mark-up on termination should be avoided. With this argument in mind, NPT has decided not to use a common-cost mark-up in setting termination rates and use LRAIC (with for the avoidance of doubt no common-cost mark-ups to account for business overheads[150]) for termination.

Origination markets on the other hand are not two-sided in the same way, because the incumbent does not usually purchase origination from ANOs in the way that it purchases termination from

146 [NO05,Paragraphs 241-243]

147 [NO05, Paragraph 237]

148 [NO05, Paragraph 236]

149 [NO04, Paragraph 128]

150 Here a large average increment has been defined. There are costs within the large average increment that would be considered 'common' if defining small service increments.

ANOs. Consequently, customers of the incumbent do not benefit from the origination services it sells. Therefore, the common cost component of origination should be passed on to the ANO that purchases origination via a corresponding mark-up. NPT chose LRAIC+ for the setting of origination, as the cost standard that allows for such a mark-up.

However, besides this mark-up, NPT considers a further mark-up on origination to be required. This is due to a distortion of competition that results from the existence of CPS customers on Telenor's network. The traffic that is terminated to these CPS customers has a common cost component that is borne by Telenor although the benefit of receiving this traffic goes to the CPS operator. Furthermore, Telenor is unable to recover this common cost component from other services, such as retail traffic, as the affected customer by definition uses a different carrier.

In order to avoid such a distortion of competition and allow Telenor to recover these costs, NPT has introduced a further mark-up on the pricing of origination. This mark-up is scaled according to the fraction of termination traffic that goes to CPS customers on Telenor's network. The unrecovered common costs resulting from traffic that is terminated at Telenor's own subscribers can be recovered by Telenor in other markets (such as retail calls).

Previously, the price controls on origination and termination were set at the same rate. NPT recognises that higher origination than termination rates give rise to an arbitrage opportunity, for example through call-back requests. However, it expects the resulting distortion to be minimal given that the difference in rates is not large. We note that the size of this difference is currently small due to the use of LRAIC and may be larger if pure LRIC is adopted.

2.7.4 Currently applied rates

In July 2011, NPT notified the ESA of its proposed change in origination and termination rates. The resulting glide path until 2014 is shown in Figure 54 below.

Figure 54: Glide path of FTRs set by NPT [Source: NPT[151]]

	1 January 2012 - 31 December 2012	1 January 2013 – 31 December 2013	From 1 January 2014
Maximum price for origination per minute (NOK)	0.049	0.041	0.033
Maximum price for termination per minute (NOK)	0.039	0.032	0.026
Maximum price for origination per minute (EUR)[152]	0.00666	0.00558	0.00445
Maximum price for termination per minute (EUR)[152]	0.00530	0.00435	0.00351

151 [NO04, Page 5]

152 Exchange rates in Annex A

In determining these rates NPT drew on modelled LRAIC+ for call origination as the costing standard, and LRAIC for call termination. These rates were confirmed in NPTs final decision.

Symmetry of rates

The FTR price controls applied to Telenor and the 12 ANOs are symmetric.

2.7.5 Model(s) used

In determining adequate interconnection price caps NPT uses a model developed by Analysys Mason, which is capable of determining the following costing methods:

1. LRAIC
2. LRAIC+
3. Pure LRIC
4. LRAIC^ for origination (may be applicable where termination is set using pure LRIC)
5. 'LRAIC+ with mark-up' (may be applicable where termination is set using LRAIC)

LRAIC^ was developed to understand possible effects on origination rates, given pure LRIC on termination rates. NPT argues that when termination is priced at pure LRIC, the associated unrecovered network common costs may need to be recovered via a subset of other services including transmission, on-net voice traffic and voice origination. This approach is captured by the LRAIC^ costing method. 'LRAIC+ with mark-up' was introduced to assess what mark-up may be reasonable to origination when termination is set at LRAIC (with no common-cost recovery). This analysis was added after national consultation. Section 2.7.3 discusses it in greater detail.

The model contains two network designs: current networks and NGNs. In the current network design, separate PSTN and IP platforms are modelled. All voice traffic is carried over PSTN infrastructure and all broadband, Ethernet and IP business connectivity services share the IP platform. In the NGN design, all services (including voice calls) are carried via an IP network. All services share the converged transmission resources. Multiple service access nodes (MSANs) replace DSLAMs and provide TDM to VoIP conversion within the exchange.

In its default network setting, the model reflects Telenor's current fixed network and assumes a full NGN migration by the end of 2015. The model can also examine the costs of a 'pure VoIP' player, a 'pure local loop unbundling' operator and a 'pure own access' player. However, NPT used the default setting reflecting Telenor's network as the basis for its interconnection rate modelling[153].

[153] Three different versions of the model are publicly available:

1. Draft v1.2. [NO06]
2. Draft decision v1.4. [NO07]
3. Final decision v1.6. [NO08]

A top-down calculation was also developed for the purposes of reconciliation. As part of this exercise asset counts, annualised capex by category[154] and opex per category[155] were reconciled. This calculation was not made publically available, but some documentation was published[156].

Figure 55 below summarises the key design parameters of NPT's model.

Figure 55: Key design parameters of NPT's model [Source: Analysys Mason, 2012]

Dimension	Common options
Operator:	
Type	Incumbent (Telenor size) Pure VoIP player Pure LLU player Pure own access player
Footprint	National
Efficient scale	Roll-out and growth based on history
Assumed access network technology / boundary of access network	Copper, boundary at MDF / cabinet
Service:	
Scope	Narrowband/ voice (retail, wholesale, dial-up) Broadband (xDSL, Ethernet over fibre) Business connectivity (leased lines, Ethernet, VPN) Channelised IPTV [set to zero in base case] VOD [set to zero in base case]
Implementation:	
Modelling period	Multi-year
Depreciation method	Economic depreciation
Increment definitions	Individual service LRIC (for wholesale termination) Average increment, with optional mark-ups (LRAIC or LRAIC+) (for other services)
Mark-up method for business common costs (if LRAIC+)	EPMU
Assumed WACC	Constant real, pre-tax WACC of 7.52% based on an asset beta of 0.55[157]

Consideration of NGN as efficient operator

For the delivery of voice services NPT considers both a TDM voice platform based on Telenor's existing network and an NGN platform that carries VoIP. In addition to voice, the NG core

154 Categories include: Accommodation power systems, voice platform, broadband platform, data network, active transmission equipment, other core platforms, overheads and transmission trenching, ducting and cabling.

155 Categories include: Accommodation power systems, accommodation civil works, voice platform, non-voice platforms and overheads.

156 [NO09]

157 [NO10]

network model will include broadband, IP-VPN and Ethernet services. It can also model IPTV (linear and VoD) services but these were not included in the model used for estimating termination rates. NPT chose to base its analysis on a migration from full TDM to full NGN over the course of the five years from 2011 to 2015[158]. The migration profile is specified according to the split of call attempts and the number of occupancy minutes between the networks. The result of this migration is a blended figure between the two network technologies that is endogenously determined in the model.

Interconnection on NGN or TDM basis

Interconnection rates were set on the basis of a TDM interconnection model. NPT recognises that IP interconnect, specifically SIP-interconnect, may become more common during the timeframe of this price control[159]. It does not rule out having to assess whether requests for SIP-based interconnect are reasonable during this time frame. Telenor, for example, revealed in its consultation response that it plans to offer SIP interconnection as of 2011/2012. However, until IP interconnection is demanded by the regulator, operators are only required to interconnect on a TDM basis, in which case an operator that wants to carry traffic on an IP basis needs to bear the cost of conversion.

Depreciation methodology

NPT uses economic depreciation in the determination of interconnection rates.

2.7.6 Appeals

Two ANOs – Tele2 and Network Norway – have appealed against NPT's decision on the regulation of Market 2 (Call origination on the fixed telephone network) and Market 3 (Call termination on individual fixed telephone networks). Both based their appeal on four key arguments[160]:

1. They consider the migration profile to NGN to come into play too late. Rather than migrating between 2011 and 2015, they argue for a migration that starts in 2010, as in Denmark, and ends in 2014, as in Sweden. The delayed migration profile is not in line with the Recommendation and over-compensates operators that use NGN technology.
2. They argue that a large number of session border controllers (SBCs) are used in the model in order to enable interactive video and IPTV services. The associated high costs should not be carried by voice services.
3. Compared to other European countries, Norway's termination charges are high. This trend would continue unless points 1 & 2 are addressed.

158 [NO03]

159 [NO05, Paragraph 200]

160 [NO11]

4. Raising the price cap for origination will benefit Telenor. Therefore it is difficult to see how this regulation is going to encourage competition. Furthermore, the NPT has not sufficiently justified its LRAIC+ approach with an additional increment to the ESA.

The NPT has assessed these points and commented the following on the key arguments:

1. NPT uses a faster migration than the Swedish regulator, PTS, which took six years. PTS has however also started setting the correspondingly lower interconnection rates earlier. NPT cannot abruptly lower termination rates without disrupting the predictability of rates for investors, so that a delayed migration profile is appropriate.
2. It is unclear how many SBCs the appealing parties would eliminate. Irrespective of the capacity that the original number of SBCs provides, they are essential in ensuring security, network integrity and greater flexibility in routing. Furthermore, although they provide advanced data services that fall outside Market 3, their functionality is largely related to the setting up of calls. Therefore it is appropriate to include the SBCs in the cost modelling of voice services.
3. It is difficult to compare different countries as they have different market sizes and geographical areas. The model on the other hand captures conditions specific to Norway.
4. It is not clear that the ESA will decide against NPT's approach. NPT considers this approach to be consistent with the principle that companies themselves must provide for payment of administrative expenses for their own customers' calls by attributing them to unregulated products.

2.8 Sweden

Figure 56: Sweden: current agreement with the Recommendation [Source: Analysys Mason, 2012]

Recommendation	Agreement
Bottom-up current cost model used or being developed	✓
NGN for efficient operator	✓ [2]
Can cost pure LRIC for termination (date expected to be available)	– (for 2013)
Economic depreciation [1]	×
Pure LRIC prices	– (by 2014)
Symmetry of rates	✓
If no agreement, use of benchmarking	×

Legend: ✓ = in agreement now, – = expected to be in agreement, × = not implemented

Notes:

1: Economic depreciation is not a requirement ("wherever feasible") so an NRA can in principle be in agreement with the Recommendation without an economic depreciation calculation

2: Part way though a glide path from TDM to NGN costs

2.8.1 Market overview

While other fixed-line markets in Europe are consolidating, in Sweden the competition from new VoIP operators has been a growing. In mid-2010, 30 operators held 98% of the market; one year later 37 operators made up 99% of the market. In the year to June 2011, the number of VoIP subscribers increased from 1.06 million to 1.25 million.

Figure 57: Fixed originated telephony traffic in Sweden[161] [Source: Analysys Mason, 2012]

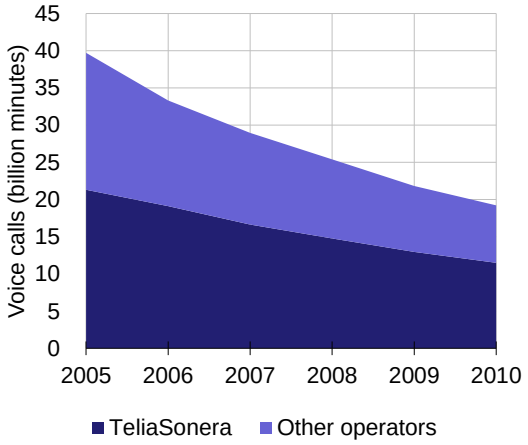
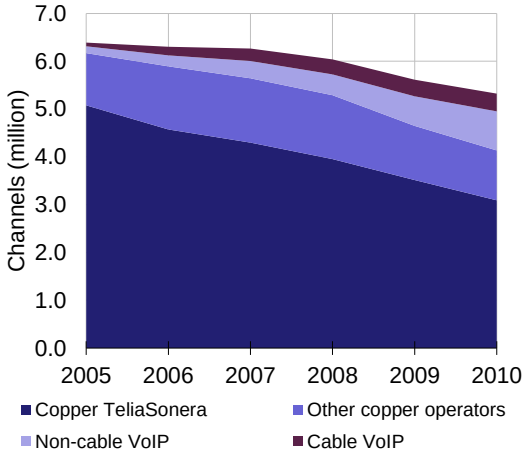


Figure 58: Fixed telephony channels in Sweden[161] [Source: Analysys Mason, 2012]



In 2010 TeliaSonera carried 59% of Sweden's fixed-line traffic on 65% of fixed telephony channels.

Figure 59: Operator market share of fixed traffic [Source: PTS, 2012]

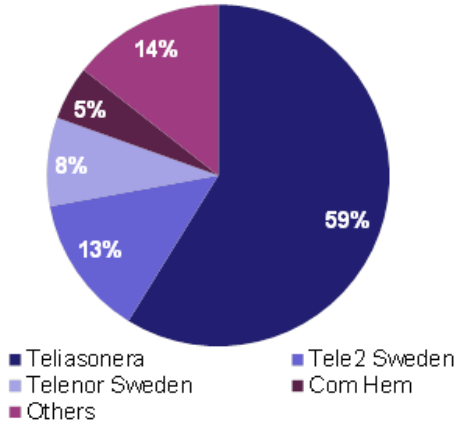
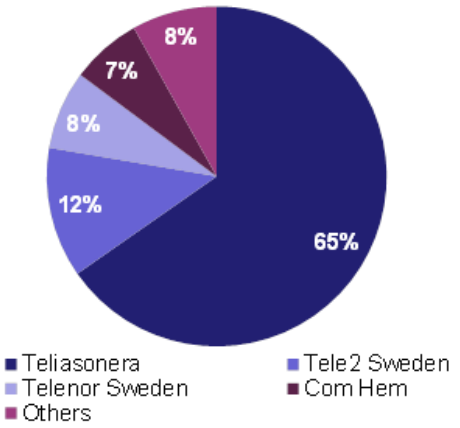


Figure 60: Operator market share of fixed voice connections [Source: PTS, 2012]



The three largest alternative network operators in Sweden are Tele2, Telenor and Com Hem with market shares of fixed lines of 12%, 8% and 7% respectively.

Principal access networks and business models used by major operators to terminate voice traffic are shown in the table below.

[161] Note: 1. Charts show total market, which includes both residential and business segments

2. Charts show retail level data, rather than wholesale level data. Therefore part of the "Other operators" may be WLR or CPS operators on the incumbent's network

3. VoIP connections are active users of either paid-for native VoIP services that use a broadband access connection, or VoIP services included in a paid-for bundle with broadband access. The figure excludes peer-to-peer applications. Although some VoIP customers use the service in parallel to their PSTN or ISDN connection, it most commonly replaces a narrowband connection. Especially for cable VoIP connections the argument to give up the PSTN or ISDN connection is strong as this allows the customer to avoid the copper line rental charge.

4. Copper includes both LLU and WLR

Operator	Principal access networks
TeliaSonera	Access owner (copper, fibre)
Tele2	Access owner (cable, fibre) Access leaser (copper)
Telenor	Access owner (fibre) Access leaser (copper)
Com Hem	Access owner (cable)

*Figure **61**: Principal access networks for major operators [Source: Analysys Mason, Telegeography, 2012]*

2.8.2 Identification of SMP

Operators with SMP in origination

As part of PTS's second origination market review[162], completed in 2009, PTS identified TeliaSonera as having SMP for the following reasons:

- high market share (TeliaSonera held 86%[163] of the origination market in 2008)
- high and persistent barriers to entry
- economies of scale.

Operators with SMP in termination

As a result of its second wholesale call termination market review[164], completed in 2009, PTS identified the incumbent, TeliaSonera, as well as 25 ANOs as operators with SMP based on:

- their 100% shares of the market for termination on their network
- control of infrastructure that is not easily duplicated
- the lack of countervailing buying power[165].

2.8.3 Rationale for chosen cost standard

In communications with the EC, PTS has declared that it will develop a model capable of generating pure LRIC estimates in 2013. It recently delivered a presentation to industry on 22 March 2012[166]. The presentation identified that the implementation of pure LRIC needs to be considered. A timeline shows that a draft model is expected in November 2012 and that the whole project may run until Q2 2013.

In addition, on 5 March 2012, PTS launched a first consultation on its draft decision for regulation of the interconnect market.[167] This consultation covers Market 1 (Access to the fixed telephone

162 [SW01]

163 Incumbent share of the origination market (retail + wholesale)

164 [SW02]

165 [SW02]

166 [SW03]

167 [SW04, Abstract]

network), Market 2 (Call origination on the fixed telephone network), Market 3 (Call termination on individual fixed telephone networks) and Market 7 (Voice call termination on individual mobile networks). In the abstract of the consultation paper, PTS argues strongly that pure LRIC-based termination should be introduced on the basis that it has not observed a linkage between falling mobile interconnect rates and the growth of the mobile sector. It does not directly comment on the impact of pure-LRIC-based fixed termination (in the abstract), but does note that lower rates would reduce payments between fixed and mobile operators, and from small mobile to large mobile operators. PTS concludes that it is a question of when, not if pure LRIC should be introduced.

At the time of writing, comments had been received from stakeholders on this first consultation but no further statements had been made by PTS.

Treatment of common costs

For 2013, PTS will set rates that include some common costs. In a previous notification to the EC[168], PTS proposed to set origination rates equal to termination rates and use models that include common costs to determine the rate until 2012. In 2013 it is expected that an updated pure LRIC version of the model would be given a 6/7 weighting while the remaining 1/7 weight would be calculated using the 2007 TDM model (version 4.1), which includes common costs. The migration is illustrated in Figure 62 below and the models are discussed in Section 2.8.5 below. From 2014 onwards the migration to NGN infrastructure and a pure LRIC model is completed, therefore rates will be set using only this latest pure LRIC version of the model. In its notification SE/2011/1205, the EC did request once more that PTS implement a glide path that is in full agreement with the Recommendation as of January 2013.

Figure 62: Transition from TDM-based modelling to NGN-based modelling in Sweden [Source: Analysys Mason, 2012]

	2008	2009	2010	2011	2012	2013	2014
Hybrid model v4.1 (TDM-based, including common costs)	6/7	5/7	4/7	3/7	2/7	1/7	
Existing hybrid model (NGN-based, including common costs)	1/7	2/7	3/7	4/7	5/7		
Update of hybrid model (NGN-based, excluding common costs, pure LRIC)						6/7	7/7

Note: For the existing hybrid model, v8.06 was used in the PTS draft notification, model v8.1 was used in the final decision. The proposed update (including pure LRIC calculation) has not been released so there is no version number

168 [SW05] EC case number SE/2011/1205

More generally, as part of its recent consultation PTS discusses the issue of whether the origination rate should be adjusted when termination is set using pure LRIC. It discussed that origination prices could remain the same (a LRAIC+ approach) or adjusted to recover costs common with termination. As its draft position, PTS has proposed that no adjustment is made as it would have two negative effects. Firstly, it would (in PTS's view) disproportionately penalise the few operators buying call origination. Secondly, it noted that TeliaSonera has the option to adjust its retail rates. Overall PTS believed the impact of not increasing origination rates is relatively small compared to the impact on competition if rates were raised[169].

PTS also assessed the possible risk of call-back arbitrage which may arise due to a difference in rates between origination and termination. For example, CPS providers could, with some form of technical implementation, set up calls from their subscribers by using two termination legs rather than an origination and a termination leg. It assessed the possible revenue loss through arbitrage and considered the effect less significant than the revenue savings achieved by fixed operators due to lower mobile termination rates. Therefore it did not consider arbitrage to be a significant argument against differentiated origination and termination rates[170].

2.8.4 Currently applied rates and proposed glide path

Since 2008 PTS has set origination and termination rate controls based on a glide path between a TDM-based model and an NGN-based model, both of which were based on a LRAIC+ methodology. In 2007 the regulator had an NGN core model developed, based on its existing TDM core model. This has been updated each year and is now known as version 8.1. However, the TDM-based version 4.1 of the model was also maintained. This version uses 2007 costs as the basis for its calculation. In order to allow for a smooth transition from TDM-based to NGN-based networks, the regulated costs transition linearly from v.4.1 results towards v.8.1 results over the course of four years from 2008 to 2012, as shown in Figure 62 above. For 2013 and 2014, it is expected that a pure LRIC model will replace the v.8.1 model.

Consistent with the approach specified in 2007, the regulator set the 2012 interconnection rates shown in Figure 63 below. These are segmented into four network levels: local, metro, single and double tandem. Although origination and termination rates are calculated separately in the model, they are practically identical.

169 [SW04, page 32-33]

170 [SW04, page 33-34]

Figure 63: 2012 origination and termination rates in Sweden [Source: Analysys Mason, PTS[171]]

Network segment	Hybrid 4.1 (SEK / minute)	Hybrid 8.1 (SEK / minute)	Weighting	2012 (SEK / minute)	2012 (EUR / min)[172]
Origination local segment	0.0443	0.0150	2/7 × 0.0443 + 5/7 × 0.0150 =	0.0233	0.00269
Origination metro segments	0.0478	0.0164	2/7 × 0.0478 + 5/7 × 0.0164 =	0.0254	0.00293
Origination single segment	0.0472	0.0164	2/7 × 0.0472 + 5/7 × 0.0164 =	0.0252	0.00291
Origination double segment	0.0544	0.0180	2/7 × 0.0544 + 5/7 × 0.0180 =	0.0284	0.00328
Termination local ring segments	0.0443	0.0149	2/7 × 0.0443 + 5/7 × 0.0149 =	0.0233	0.00269
Termination metro segments	0.0478	0.0165	2/7 × 0.0478 + 5/7 × 0.0165 =	0.0254	0.00293
Termination single segment	0.0472	0.0165	2/7 × 0.0472 + 5/7 × 0.0165 =	0.0253	0.00292
Termination double segment	0.0544	0.0179	2/7 × 0.0544 + 5/7 × 0.0179 =	0.0284	0.00328

Note: model v8.06 was used in the PTS draft notification, model v8.1 was used in the final decision

PTS noted in its recent consultation[173] that it had examined its existing cost model (model v8.1) and had identified specific costs[174] of SEK0.0018/minute (approximately EUR0.0002/min[175]) as attributable to termination. We would interpret this as a marginal cost within the definition of the model.

Symmetry of rates

The termination rates set are symmetric between operators in that PTS requires that "other operators shall keep a fair and reasonable price, which is defined as being no higher than the level calculated according to the cost model"[176].

171 [SW06]

172 2012 exchange rate used of 0.115 EUR/SEK. Exchange rates given in Annex A

173 [SW04, page 21]

174 These are costs which are explicitly variable with voice termination traffic. Depending on the model design there may be other cost elements which are reasonably avoided when termination is removed as the last service.

175 2012 exchange rate used of 0.115 EUR/SEK. Exchange rates given in Annex A

176 [SW07]

2.8.5 Model(s) used

The model that PTS uses is a single-year bottom-up LRAIC model with calibration to hybridise. It was built by BWCS[177] and is updated each year to reflect the latest available costs for the utilised assets and the previous year's traffic levels.

The 2007 update resulted in model version 4.1, which was based on a TDM core architecture. Although this version still informs the termination rates set today, its asset prices have not been updated since 2007. PTS maintains that this is because 2007 is the most recent year to adequately reflect a purely TDM-based market. At the same point, the model was revised to be capable of modelling an IP-based core network. This NGN model has since been updated on an annual basis and now is version 8.1.

Depreciation methodology

Although the model is capable of implementing a number of depreciation methodologies, a tilted annuity approach is used in reaching pricing decisions.[178] This is consistent with PTS's previous core network modelling. Economic depreciation would have been difficult to implement given PTS uses a single-year model.

Figure 64 below summarises the key design parameters of PTS's existing model.

Figure 64: Key design parameters of PTS's model [Source: Analysys Mason, 2012]

Dimension	Common options
Operator:	
Type	Hypothetical efficient incumbent (bottom-up costs are reconciled against incumbent's top down data)
Footprint	National
Efficient scale	Immediate incumbent scale
Assumed access network technology / boundary of access network	Copper, boundary at MDF / cabinet FTTH, boundary at fibre node
Service:	
Scope	Narrowband/ voice (retail, wholesale, dial-up) Broadband (xDSL, Ethernet over fibre) Channelised IPTV, VOD Business connectivity (leased lines, backhaul)
Traffic volumes	Incumbent volumes of last year
Implementation:	
Modelling period	Single year
Depreciation method	Tilted annuity
Increment definitions	Individual service LRIC (for wholesale termination) Average increment with mark-ups (LRAIC+) (for other services)

177 [SW08]

178 PTS has published the model version 8.1 on its website. [SW09]

Mark-up method for business common costs (if LRAIC+)	EPMU
Assumed WACC	Constant nominal, pre-tax WACC of 8.80%[179]

Until the end of 2012, both the models used have a large 'average increment' definition (so recover 'common network costs' - those common to several types of services) and included an optional mark-up for common business overheads in calculating the cost of termination. For 2013, PTS intends to adjust its NGN model to become capable of determining 'pure LRIC'.). This should change the increment definition and exclude common costs (both network and business) and thus allow PTS to calculate a cost in a way that is in agreement with the Recommendation. However, as noted above, PTS had stated it would blend the 2013 result with the existing 2007 TDM result (v4.1) to remain consistent with its glide-path approach. The EC has noted this would not be in agreement in 2013.

Consideration of NGN as efficient operator

When in 2009 PTS considered switching from a TDM to an NGN structure as the basis of its modelling, the regulator found that the NGN results were 70% lower than the TDM results[180]. Consequently, in order to avoid sudden adjustments that would disrupt the market, the regulator decided to implement the glide path from TDM to NGN based price caps illustrated in Figure 62 above.

Interconnection on circuit-switched or IP basis

Interconnection is modelled on a TDM basis. Consequently, operators with an IP-only core would have to undertake TDM-to-IP (and IP-to-TDM) conversion themselves and bear the associated costs. We are not aware of any plans PTS may have to require IP-based interconnection in the future.

2.8.6 Appeals

Whilst not directly relevant to the Recommendation, NGN-based termination rates have been disputed by the incumbent. TeliaSonera appealed against PTS's decision to implement partially NGN-based termination rates in 2008 and 2009. The incumbent argued that this decision was incompatible with previous decisions that prescribed a circuit-switched core network and that the change in methodology had not been communicated and decided upon properly. TeliaSonera won this appeal on procedural grounds and it was ruled that two of the model iterations of PTS were considered to have been implemented without the correct regulatory grounds. In order to install these, an amendment to the Regulation came into force on 1 March 2010.[181]

179 [SW08, Consolidation model, sheet I-Parameters, cell J568] This is the WACC used in the public version of the model, which may deviate from the WACC used in the final regulatory decision

180 [SW10]

181 [SW11]

3 Summary of countries' agreement with the EC's Termination Rates Recommendation

For each country, we have measured the degree of agreement with specific criteria from the Recommendation identified by Ofcom.

Currently, France is the only country where the regulatory process is completed and follows the Recommendation. Based on NRA statements, we also note that Austria and Denmark expect to be following the Recommendation by 1 January 2013, with Belgium following suit during 2013. As Sweden is expected to retain its glide-path approach, it will not be *fully* following the Recommendation during 2013, but expects to be by 1 Jan 2014. The German NRA is expected to reject pure LRIC prices, based on its recently proposed draft decisions. The Netherlands and Norway are not in agreement with the Recommendation. The Netherlands is unable to follow the Recommendation due to a legally binding judgement by its domestic court. Norway has chosen not to set pure LRIC rates in its current period of price controls.

Figure 65: Summary of current agreement by country [Source: Analysys Mason, 2012]

Criterion	Austria	Belgium	Denmark	France	Germany	Netherlands	Norway	Sweden
Bottom-up current cost model in use or development	✓	✓	✓	✓	✓	✓	✓	✓
NGN for efficient operator	✓	✓	✓	✓	✓	✓	✓[1]	✓[1]
Capable of costing pure LRIC for termination (date expected to be available)	– 2013	✓[2]	✓[2]	✓	– un-known	✓[2]	✓[2]	– 2013
Economic depreciation[3]	✓[4]	✓	×	×	×	✓	✓	×
Pure LRIC prices	2013[5]	2013	2013	✓	×[6]	×	×	2014
Symmetry of rates	×	✓	✓[7]	✓	✓[7]	✓	✓	✓
If no agreement, use of benchmarking	✓[8]	×	×	n/a	×	×	×	×

Legend: ✓= in agreement now,– = expected to be in agreement, ×= not implemented, n/a = not applicable

Notes:

1: Part way though a glide path from TDM to NGN costs
2: Modelled, not currently used
3: Note that economic depreciation is not a requirement ("wherever feasible") so an NRA can in principle be in agreement without an economic depreciation calculation
4: Adjusted (tilted) annuity is used as a proxy for economic depreciation
5: Current regulation may mean the lower of cost-orientation and retail minus, to avoid margin squeeze
6: Rejected in their draft decisions which are currently being consulted on
7: EC raised issue

8: The benchmarks used include countries that set rates which are not in agreement with the Recommendation.

3.1 Adopting or rejecting pure LRIC approach for termination rates

The table below summarises the expected adoption of a pure LRIC approach. Where dates are provided, they indicate the NRA's intended time of adoption of pure LRIC. These plans are, however, subject to regulatory review and should therefore not be considered as guaranteed.

Figure 66: Summary of adoption of pure LRIC by country [Source: Analysys Mason, 2012]

	Austria	Belgium	Denmark	France	Germany [1]	Netherlands	Norway	Sweden
Adoption of pure LRIC	2013	2013	2013	✓	✗	✗	✗	2014

1: Rejected in their draft decisions which are currently being consulted on.

3.1.1 Countries that adopted pure LRIC

Only France has adopted pure LRIC in a price control decision at this time. We note that it has identified non-modelled costs that result in rates being set at around 20% above the rates from the pure LRIC model.

3.1.2 Countries that rejected pure LRIC

At this time, the Netherlands is unable to adopt pure LRIC since its domestic Court overturned its July 2010 decision and asked OPTA to set FTRs based on LRAIC+.

Norway has chosen not to set pure LRIC rates in its next period of price control. Principally, NPT rejected pure LRIC to stay consistent with its mobile decision[182]. It may review its fixed pricing position during its next mobile review. It also noted that model results can be sensitive to whether 'voice server software' and 'voice server processors' are considered to be incremental, following the issue raised in the appeal of OPTA's July 2010 Decision.

Based on the draft decisions which are currently being consulted on, Germany proposes that it will not adopt pure LRIC.

182 LRAIC, (for the avoidance of doubt, with no common cost mark-ups)

3.1.3 Countries that have not reached a final decision

Austria, Belgium and Denmark are expected to introduce pure LRIC-based price controls before the end of 2013.

Sweden has stated it will not set a *fully* pure LRIC based rate for 2013, as a result of retaining a glide-path, but expects to be in full agreement with the Recommendation by 2014.

3.2 Treatment of common costs where pure LRIC was chosen

The table below summarises NRAs' position regarding how common costs not recovered from termination charges may be recovered from mark-ups to other retail or regulated wholesale services if pure LRIC is adopted for termination.

Figure 67: Summary of current statements on common cost treatment by country [Source: Analysys Mason, 2012]

Position	Austria	Belgium[1]	Denmark	France	Netherlands	Sweden[3]
Nothing has been said						
Recovery through other services:						
• Unregulated services (e.g. Retail services)	✓	✓				✓
• Regulated wholesale origination service	✓	?			✓[2]	
• Other regulated wholesale service		?		✓		
To be discussed further			✓			

1: As explained below, we believe that recovery of common costs from wholesale services such as origination is not explicitly discussed (either for or against).

2: Was specified as only applying to CPS operators. Position currently unclear due to court decision

3: Sweden's position is based on a draft decision

In addition, although Norway has not adopted pure LRIC, but has adopted a LRAIC approach for termination (including some costs which – with a small increment approach – would be considered common costs), it has added an additional mark-up to origination.

Germany is not included in the above table as it is not expected to implement pure LRIC for FTR.

3.2.1 Positions of note

In France, ARCEP initially proposed recovering common costs from call origination (internal and wholesale), to which the EC expressed concerns. ARCEP launched a further investigation, which concluded that common costs should be recovered from WLR charges. As of the start of 2012, ARCEP has allowed France Télécom to apply a mark-up on WLR to allow the recovery of some common costs that were previously recovered from fixed call termination.

In the Netherlands, OPTA proposed an adjustment to the origination rate for traffic for CPS operators. The EC questioned this approach and suggested that to change the basis of the origination price it would need to conduct an entire market review of origination. Given that a domestic court rejected the proposal for termination (which OPTA, the EC and BEREC are currently working together on), the ultimate position on origination is also unclear.

In Norway, NPT has extensively discussed the issue of common cost recovery in cases where pure LRIC and LRAIC are used to calculate termination rates. It has chosen to price termination at LRAIC and origination based on LRAIC+, with an additional mark-up for common costs on origination prices for CPS operators.

In Austria, RTR argues that the common costs component of termination needs to be recovered from all other services using the same assets, including origination. Consequently, when pure LRIC is used for termination, the LRAIC+ of origination should be higher than when termination takes part of the common costs. No final decision has been made.

In Denmark, the DBA/NITA mentioned the issue of how the now-unrecovered common costs will be allocated in its consultation note. They plan to conform to the Recommendation by 2013, so will need to define their approach to origination pricing at that point.

Conversely, in Sweden, the PTS discussed this issue but concluded that no additional uplift to the origination price was required.

BIPT has said that the unrecovered common costs of termination should be recovered through unregulated retail markets. However, as we read it, this text was in the context of the choice of pure LRIC for termination and there has been no clear statement in relation to origination in particular (e.g. CPS being a one-sided market). No final pricing decision has yet been taken in Belgium.

Further details on this point for each country can be found in the country sections above.

3.3 Introduction of NGN architecture as current efficient standard

The table below summarises NRAs' positions on whether NGN architecture is considered to be the modern efficient standard. In Norway and Sweden an explicit glide-path is being used to migrate from a TDM cost base; for these cases, we note the point at which cost is expected to be based solely on NGN. The actual model may still be in development.

Figure 68: Summary of current statements on NGN architecture by country [Source: Analysys Mason, 2012]

Model	Austria	Belgium	Denmark	France	Germany	Netherlands	Norway	Sweden
NGN only	✓	✓	✓	✓	✓	✓	2015	2014
NGN & some consideration of legacy							✓	✓

3.4 Choice of handover technology: circuit-switched or IP-interconnect

The table below summarises NRAs' positions regarding the question of whether Market 3 (Call termination on individual fixed telephone networks) regulation mandates IP-based interconnect. Many believe it will become important in the next few years (though may not be commercially available now). Only in Denmark and France has a decision been taken under Market 3 regulation requiring IP-based interconnection to be made available by certain operators. As far as we have been able to ascertain, the price control is not different in these IP-interconnect cases.

Figure 69: Summary of current statements on IP interconnect by country [Source: Analysys Mason, 2012]

Position	Austria[1]	Belgium[2]	Denmark	France	Germany	Netherlands	Norway	Sweden
Set separate rates for IP-based interconnect								
Explicitly discussed, not setting different rates			✓	✓	✓	✓	✓	
No information	✓	✓						✓

1: RTR's model will be capable of modelling IP-interconnect. Its position is unclear.

2: BIPT's model will be capable of modelling IP-interconnect. No statement found on IP-interconnect.

3.4.1 Positions of note:

France Télécom, should now provide, on reasonable request, interconnection to its newly built NGN-IP network, which has much fewer points of interconnect compared to the TDM network.

In Denmark, a draft decision has been issued which requires Colt, Hi3G, Telenor and Telia to provide IP-interconnect. The incumbent, TDC, currently offers IP-interconnect and rates are capped by the TDM price control.

In Germany, the draft decisions on access obligations will mandate access via IP interconnection for both Telekom Deutschland and alternative operators. BNetzA proposes to regulate IP-interconnection at the same rate as PSTN-interconnection, because higher rates could hinder the adoption of this more efficient technology.

3.5 Choice of depreciation methodology

The table below identifies the main depreciation method implemented (or planned) in the NRAs' cost model. The actual model may still be in development.

Figure 70: Summary of main depreciation methods in model being developed by country [Source: Analysys Mason, 2012]1

Principal depreciation method	Austria[1]	Belgium	Denmark	France	Germany	Netherlands	Norway	Sweden
Economic depreciation	✓	✓				✓	✓	
Annuity	✓[2]		✓[2]	✓	✓			✓

1: RTR's chosen depreciation method is a tilted annuity, which it considers to be a proxy for economic depreciation

2: Annuity can be adjusted (tilted)

3.6 Imposition of symmetry of rates between incumbent and alternative fixed network operators

The table below summarises where NRAs have now imposed symmetry on termination rates between the incumbent and alternative fixed network operators (ANOs). In the case of Austria and Germany, the EC has previously raised concerns over the implementation, and these may still be valid.

Figure 71: Summary of NRAs' imposition of symmetry between incumbent and ANOs by country [Source: Analysys Mason, 2012]

	Austria	Belgium	Denmark	France	Germany	Netherlands	Norway	Sweden
NRA has imposed symmetry	✗	✓[3]	✓[1]	✓[3]	✓[2]	✓[3]	✓[3]	✓[3]
EC raised issue	✓		✓		✓			

1: Indirectly, as NITA believed termination is supplied through larger operators who have price controls imposed

2: Currently indirectly, via "fair and reasonable prices". The 2012 draft decisions, currently under national consultation, will explicitly state symmetric rates

3: Directly through price control obligations on all ANOs

In Austria, RTR has allowed ANOs to set termination equal to single tandem origination, which is higher than the local termination rates that Telekom Austria can set. The EC has commented[183] that termination rates should be lower than or equal to the rates applied to Telekom Austria.

183 [AT05, Page 6]

In Belgium, BIPT has only recently removed its allowance of 15% uplift to ANO rates.

In Denmark, NITA did not directly impose obligations of symmetry on smaller operators. It believed that those operators' termination rates were effectively set by the larger operators who were obliged to terminate at symmetric rates. This stemmed from commercial agreements signed between the smaller and larger operators which meant a larger operator will provide conveyance services. The EC invited NITA to closely monitor the situation and reconsider its position as soon as the smaller ANOs start charging their own termination rates. More recently the DBA has published new draft decisions for the larger ANOs which will require symmetry with TDC rates.

In Germany, BNetzA has previously expected symmetry to be achieved through explicit requirements for 'fair and reasonable' prices (which it explicitly states are to be no higher than the rates of the incumbent, Telekom Deutschland) in the negotiation with Telekom Deutschland and has not imposed cost orientation obligations on the ANOs. The EC has commented[184] that there is a risk of operators other than Telekom Deutschland setting charges too high and recommended the imposition of a single termination rate on all SMP operators. Its recently issued draft decisions (currently under national consultation) will explicitly state symmetric rates.

184 [DE02, Page 4]

3.7 Currently applied fixed termination rates

The table below provides the current rates imposed for fixed termination, showing the range of rates set by each NRA. Where published, we also include a pure-LRIC-based termination cost.

Figure 72: Summary of termination rate price controls set by NRA, as of 1 May 2012 [Source: Analysys Mason, 2012]

Country	High rate (EUR/ min)	Low rate (EUR/ min)	Rate variation by:		Single rate	Pure LRIC rate (EUR/ min)
			Time of day	Geographic		
Austria [1]	0.0082	0.0048	Y	N		N/A
Belgium [2]	0.0112	0.0032	Y	Y		N/A
Denmark	0.0021	0.0011	Y	N		N/A
France	0.0030	0.0030			Y	0.00065 [3]
Germany	0.0104	0.0032	Y	Y		N/A
Netherlands	0.0054	0.0045	N	Y		0.0054 [4]
Norway	0.0053	0.0053			Y	N/A
Sweden	0.0033	0.0027	N	Y		N/A

Note: NRAs may choose to set rates with a time and a geographic variation. Where possible we present a national, peak rate and a local, off-peak rate to show the range of rates set in each country. For France and Norway, neither variation is used by the NRA.

1: Austria rate includes EUR0.0017/ minute fee for billing

2: Assumed call duration of 3 minutes is used to amortise the call set-up charge

3: 2013 model result. ARCEP have set a price of EUR0.0008, after adjusting for specific commercial costs from 1 January 2013

4: OPTA proposed regional FTR for 2012 (until 1/9/2012) based on pure LRIC model, 7 July 2010. Rate was not implemented.

Annex A Exchange rates

The exchange rates used in this report are given in Figure A.73 below. All currency values presented in this report are in nominal terms.

Figure A.73: Exchange rates used in this report (year averages) [Source: EIU]

Exchange rate	2011	2012	2013	2014
EUR/NOK	0.1282	0.1359	0.1360	0.1348
EUR/SEK	0.1107	0.1154	0.1189	0.1193
EUR/DKK	0.1338	0.1377	0.1395	0.1387
EUR/GBP	1.1512	1.2431	1.2987	1.2852

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SW11	PTS, KR. TeliaSonera AB ./. PTS, ang.föreläggandeomprissättningavsamtrafik i fastanätenligt LEK avseendeåren 2008 och 2009. Mål nr 486-10 och 487-10, 29 July 2011, available at: http://www.pts.se/sv/Dokument/Domar/2011/KR-TeliaSonera-AB--PTS-ang-forelaggande-om-prissattning-av-samtrafik-i-fasta-nat-enligt-LEK-avseende-aren-2008-och-2009-Mal-nr-486-10-och-487-10/ More available at: https://lagen.nu/dom/rk/2011:1