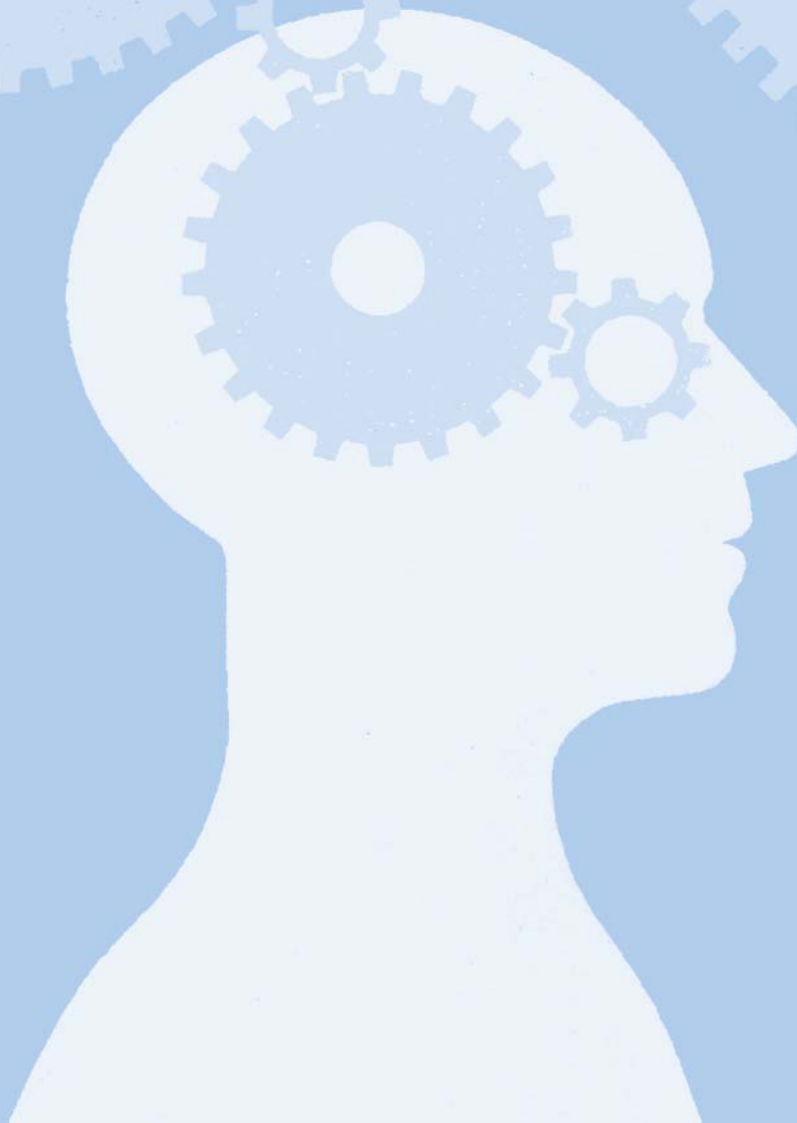


Potential competition problems in voice-over-broadband services

Report prepared for OPTA

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1 Introduction and main conclusions

1.1 Objective

In OPTA's draft decisions on the markets for fixed telephony (July 2005), the regulator considered voice over broadband (VoB) services to be in the same relevant markets as fixed telephony for both access and calls. It also concluded that KPN's position of significant market power (SMP) could lead to competition problems such as excessively low pricing.¹ OPTA has therefore proposed to impose an ex ante remedy in the form of a price floor under KPN's VoB offering for the duration of the regulatory period (the next three years).

KPN is disputing this remedy, arguing that the market for VoB is dynamic and competitive (and separate from fixed telephony), and that KPN does not have the incentive or ability to engage in successful predatory pricing. KPN has submitted two reports by economists (Lexecon and RBB) in support of its position.²

In order to respond to the issues raised by KPN, Lexecon and RBB, OPTA has asked Oxera for an independent assessment of the potential competition problems in the provision of VoB. This report contains Oxera's assessment.

1.2 Main conclusions

An important policy principle of relevance here is that regulators and competition authorities should be cautious when it comes to regulating new markets or services. Over-regulation of such services may hinder their development in the first place, in particular if the service requires a critical mass of new users to be successful.³ A recent policy report published by OPTA supports this principle.⁴

However, another important policy principle is that competition in the early stages of a new service is likely to deliver better results for consumers if such competition is undistorted by the firms' starting positions or links to related markets.⁵ As discussed in this report, there are indeed important links between VoB and related services (independently of how the market is delineated)—in particular, wholesale and retail fixed telephony, and wholesale and retail broadband. Oxera concludes that KPN may have both the incentives and the ability to use its position in these related markets to affect competition in VoB through its pricing policy. It is therefore not unreasonable for OPTA to have concerns about possible anti-competitive pricing by KPN.

The remedy proposed by OPTA is, on the scale of all possible ex ante remedies, relatively light-touch, and is therefore consistent with each of the two policy principles described above. It is Oxera's understanding that the price floor will require KPN to demonstrate that its VoB offering is profitable over a certain minimum time period. Importantly, the price floor

¹ The various decisions are summarised in OPTA (2005), 'Management samenvatting ontwerpbesluiten vaste telefonie', OPTA/IBT/201912, July 1st.

² Lexecon (2005), 'Is There a Need to Regulate KPN's Supply of VoB Services?', report prepared for KPN, April 18th (including the technical annex dated May 2nd); and RBB (2005), 'VoB en de OPTA Marktanalyses', report prepared for KPN, August 31st.

³ See, for example, Posner, R.A. (2000), 'Antitrust in the New Economy', Olin working paper No. 106, University of Chicago; Evans, D. and Schmalensee, R. (2001), 'Some Economic Aspects of Antitrust Analysis in Dynamically Competitive Industries', NBER working paper No. 8268; and Niels, G. and ten Kate, A. (2003), 'Below-cost Pricing in the Presence of Network Externalities', in Swedish Competition Authority, *The Pros and Cons of Low Prices*.

⁴ OPTA (2005), 'Regulating Emerging Markets', Economic Policy Note No. 5, prepared by Ovum and Indepen, April.

⁵ See, for example, OFT (2002), 'Innovation and Competition Policy', Economic Discussion Paper 3, prepared by Charles River Associates, March.

does not interfere with KPN's pricing structure—for example, KPN will be free to set a flat-fee charge and/or to offer certain calls (eg, on-net calls) for free, just like some other VoB providers currently do.

The proposed remedy can therefore be seen as a form of regulatory 'safety valve'. If, on the one hand, the potential competition problem does indeed materialise and KPN undertakes to set excessively low charges—and in this report it is shown that this possibility cannot be disregarded—then the price floor will kick in and prevent such problems. If, on the other hand, KPN does not engage in excessively low pricing over the next three years—and KPN's economic advisers argue that KPN will have no incentives to do so—then the price floor will simply not bite, and hence is unlikely to have any significant impact on the development of competition.

1.3 Structure of the report

The remainder of this report is structured as follows:

- section 2 discusses market definition, and its relevance, over which there is disagreement between OPTA and KPN;
- section 3 assesses the competition problems that might arise in the provision of VoB.

2 Market definition

2.1 Relevance of market definition

OPTA considers that VoB forms part of the same relevant market as fixed telephony, in terms of both access and calls. While the take-up of VoB is currently still limited, analysis by OPTA suggests that VoB will account for between 10% and 30% of all access lines in the Netherlands by 2008. According to OPTA, this places significant competitive pressure on the provision of traditional fixed telephony services, and hence VoB should be included in the market.

KPN has raised the point that this conclusion on market definition may well differ if the assessment took VoB, rather than fixed telephony, as the starting point for the delineation. This takes into account the possibility that relevant markets may be defined asymmetrically—ie, even if VoB constrains fixed telephony, fixed telephony may not necessarily constrain VoB.⁶

Notwithstanding this disagreement, Oxera would note that, from an economics perspective, the precise delineation of the relevant market does not significantly alter the assessment of the potential competition problems in this case. The relevant factor in this analysis is that there are important links between VoB, on the one hand, and fixed telephony and broadband services, on the other. It is these links that provide the theoretical basis for the concern that market power in fixed telephony and/or broadband access will be leveraged into the emerging provision of a new service—VoB. This concern exists whether or not VoB is defined as being in the same relevant market as the existing fixed telephony service. These links are further described in section 3 below.

2.2 Does VoB constitute a separate market?

While the exact market definition is not crucial to the assessment of competition problems (as noted above), some comments can be made on this issue.

Both the RBB and Lexecon reports point out that a market delineation starting from VoB is difficult without empirical evidence. At this early stage of development of the new service, not much evidence exists, for example, on consumers' sensitivity to VoB charges, either their absolute level or their level relative to PSTN services.

Nevertheless, some inferences can be drawn on the factors that would be relevant for such an analysis, and the possible outcomes. In this respect, the RBB report (section 2.2) states that fixed telephony is *unlikely* to constitute a competitive constraint on VoB, for the following reasons.

- VoB costs are much lower than for fixed telephony, as are user charges—RBB estimates that monthly rental charges for VoB are about 45%⁷ lower than for fixed telephony (call charges are similar to those of carrier pre-select providers).
- Some features of VoB are not available for fixed telephony (for example, nomadicity⁸).

⁶ KPN also challenges OPTA's conclusion that VoB constrains fixed telephony.

⁷ OPTA estimates this price differential to be somewhat lower—ie, up to 30% for most VoB providers.

⁸ The possibility of taking the assigned telephone number to different fixed locations as long as a broadband connection is present.

- It is unlikely that consumers who have already selected VoB would subsequently switch back to fixed telephony, thus leading to asymmetric substitution.
- RBB notes that OPTA also defined asymmetric markets in its analysis of broadband access (substitution with narrowband).

These reasons identified by RBB may not hold. Despite VoB being cheaper and offering additional features, it is as yet uncertain whether consumer take-up will become significant (and when), and whether consumers will ever fully migrate from fixed telephony to VoB (or other VoIP variants). What is certain is that, at this stage, and possibly in years to come, providers of VoB face the challenge of persuading fixed-telephony users to switch to VoB. In other words, at this stage VoB providers compete not only (or even mainly) to win customers from each other, but also to attract fixed-telephony users. In this sense, fixed telephony does impose a competitive constraint on VoB now and possibly in years to come.

RBB's comparison with the broadband market is not entirely accurate. Broadband Internet access is now a widely accepted service, and OPTA considers that broadband users are now unlikely to switch back to narrowband—broadband is seen as a separate market. However, when broadband access was launched several years ago, narrowband was still the predominant form of Internet access, and for years broadband providers were mainly competing to attract narrowband users, rather than with each other.⁹ In other words, broadband may not always have been a separate relevant market from narrowband. The same may hold for VoB services at present. In economic terms, this means that VoB at present (and possibly in the next few years) may not yet be 'a market worth monopolising'—ie, it may not be a separate relevant market.

⁹ In 1999, annual expenditure on broadband access (xDSL + cable) was 20% of total Internet access expenditure—the remainder being dial-up access. Broadband expenditure only overtook dial-up during 2003. Source: OPTA (2003), 'Annual Report 2002'.

3 Potential competition problems

3.1 Overview

This section explores the competition problems that might arise in the provision of VoB, and addresses some of the arguments made by KPN and its advisers. The starting point for this analysis is as follows.

VoB is a service provided over telecoms infrastructure—DSL over local loop infrastructure shared with PSTN (and other broadband services, such as Internet access), and cable broadband infrastructure shared with other cable services (eg, cable TV). One objective of regulation is to ensure that:

- the development of the provision of this new service (ie, VoB) is not distorted; and
- the *outcome* of this competitive process is that those suppliers who can supply the VoB *service* cheaper, at a higher quality or offering better value for money are relatively successful (and profitable), while those who are less good at meeting consumers' needs are less successful (and less profitable).

This implies that, from a regulatory perspective, a supplier with SMP in the necessary inputs that VoB service providers require—in this case, including wholesale broadband access and wholesale call terminations—arguably should not be able to gain competitive advantage through any cost advantage it may have in relation to these inputs. In other words, suppliers of VoB services should face the same effective price for those wholesale inputs when those inputs are sourced from a supplier with SMP in those markets.

Below, the following hypotheses are assessed:

- there are links between fixed telephony, broadband and VoB which influence competition (section 3.2);
- KPN has certain cost advantages over VoB rivals due to the links (section 3.3);
- KPN may have the incentive and ability to exploit its cost advantages, thereby affecting competition in VoB (section 3.4).

The model presented by Lexecon is examined in more detail in section 3.5.

Oxera concludes that the possibility of competition problems occurring cannot be disregarded. KPN may have both the incentives and ability to use its position in the broadband and fixed telephony markets to affect competition in VoB through its pricing policy.

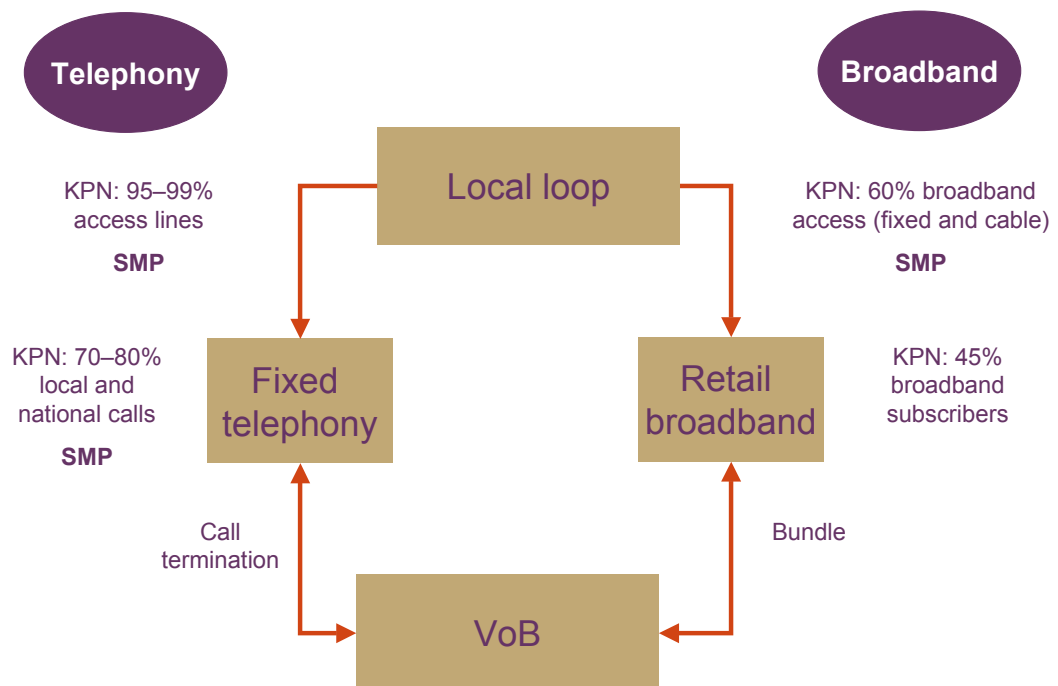
3.2 There are links between fixed telephony, broadband and VoB which influence competition

VoB services are offered over a broadband Internet connection. Currently, most customers take VoB from their existing broadband provider. This being a voice service, VoB calls can be made to the fixed PSTN network, to mobile networks or (increasingly) to other VoB users.

Figure 3.1 illustrates the links between fixed telephony, broadband and VoB. It focuses on the local loop, which is an essential wholesale input for all these three services. KPN has a

significant degree of control over this essential infrastructure, and this lies at the heart of the potential competition problems in VoB (see below).

Figure 3.1 Links between fixed telephony, broadband and VoB



Source: Oxera.

With regard to KPN's position in broadband, in the Netherlands around 60% of broadband subscribers currently use xDSL, with the remainder using cable broadband.¹⁰ At the end of 2003, DSL overtook cable broadband in terms of subscriber numbers, and has grown more rapidly ever since.¹¹ OPTA considers that KPN's access network is the only network available for providers of DSL services who do not have their own network, which gives KPN a position of SMP.¹² OPTA has therefore required KPN to provide unbundled access to its local loops.¹³ At present, around 15% of all broadband subscribers are serviced through an unbundled local loop. Thus, with the exception of cable operators, all VoB providers rely on KPN for access to the local loop.

Due to the presence of this regulation of LLU, OPTA considers that KPN has no SMP in the provision of retail broadband. KPN currently has a market share of around 45% (including the service where KPN accounts for the access and another Internet service provider for the Internet service).¹⁴ Nevertheless, while insufficient to be considered to have SMP, such a high (and growing) market share does give KPN a robust base from which to establish a strong position in the provision of VoB services as well—in particular, because customers typically buy VoB services from their broadband provider.

With regard to KPN's position in fixed telephony, the company still controls more than 95% of all access lines in the Netherlands. It also retains market share of between 70% and 80% of

¹⁰ By January 2005, the number of broadband subscribers in the Netherlands was 3.2m, of which 1.9m were xDSL subscribers (60%) and the others cable broadband users. Based on OPTA (2005), '2004 Annual Report', March.

¹¹ OPTA (2005), 'Ontwerpbesluit wholesale-breedbandtoegang', July 1st, annex 3. Broadband over cable was introduced before xDSL.

¹² OPTA (2005), 'Ontwerpbesluit Ontbundelde toegang', July 1st.

¹³ Local loop unbundling (LLU) regulation has been in place for more than five years now.

¹⁴ OPTA (2005), '2004 Annual Report', March.

local and national calls.¹⁵ OPTA has concluded that KPN has SMP in the wholesale and (most) retail fixed telephony markets. Over the next three years, many VoB calls will still require termination on KPN's PSTN network. KPN's call termination charges will therefore form an important part of the cost base of all VoB providers, including cable operators.¹⁶

3.3 KPN has certain cost advantages over VoB rivals due to the links

The links described above, and KPN's degree of control over telephony and broadband infrastructure, lead to a situation in which the company has certain cost advantages over other VoB providers (both cable operators and other DSL providers). These advantages arise from the following factors.

- Due to its strong position in fixed telephony, KPN has a cost advantage in the termination of VoB calls to the PSTN network. In particular, at the early stages of VoB development (and probably over the next three years), many VoB calls will still have to be terminated on the PSTN network, where KPN controls more than 95% of all access lines.

All other VoB providers must pay KPN the regulated call termination charge, which is essentially based on a measure of KPN's long-run incremental costs (LRIC) plus a mark-up for common costs. In contrast, KPN faces only the short-run marginal cost (SRMC) of terminating calls on its PSTN network. As OPTA also noted in its draft decision (paras 307 and 308), these short-run costs can be quite low, particularly if there is overcapacity on the network.

- A similar logic holds for the regulated LLU charge at which other providers can gain access to KPN's copper lines. There is likely to be some wedge between this regulated charge and the actual marginal costs that KPN faces when using its local loop infrastructure. This gives KPN a cost advantage over the other DSL providers (but not over cable operators).
- KPN is likely to have lower customer acquisition costs (eg, the costs of marketing and promotions) in VoB than other providers, for a number of reasons. KPN has a well-established brand name and reputation as provider of voice services. It has a large established base of broadband customers, at which it can target its VoB offerings. Finally, as also noted in the Lexecon report (section 5.1), KPN has access to a large database of established telephony customers, possibly allowing marketing campaigns to be targeted more effectively than other VoB providers.

The implications of these cost advantages for the potential competition problems are discussed in sub-section 3.4 below.

In addition, it is worth mentioning that incumbent telephony providers may have other advantages over other VoIP offerings in the market that are not modelled in the analysis presented here. For example, incumbents have a competitive advantage in owning an IP network to which customers can be switched seamlessly. This means that they can offer VoIP with guaranteed quality of service and no additional investment. The Canadian Radio-television and Telecommunications Commission (CRTC) referred to this point in its recent decision to regulate VoIP services as traditional fixed-line voice services.¹⁷ Similarly, there are economies of scope for an incumbent that result from providing both VoB and PSTN services. This section (section 3.3) refers to the short-run cost advantage resulting from the

¹⁵ OPTA (2005), 'Management Summary of the Draft Decisions Fixed Telephony', July 1st.

¹⁶ KPN is also the largest mobile operator in the Netherlands, and its mobile call termination charges will also form an important part of the cost base of VoB providers. The remainder of this analysis abstracts from these factors.

¹⁷ See CRTC (2005), 'Regulatory framework for voice communication services using the Internet Protocol', Telecom Decision CRTC 2005-28, May, para. 162.

need to terminate calls in the PSTN. In addition, this could be modelled as scope economies in the joint provision of VoB and PSTN services.

3.4 KPN may have the incentive and ability to exploit its cost advantages, thereby affecting competition in VoB

3.4.1 Profitability to KPN of a VoB customer on its own and on other networks

Why does KPN have incentives to establish a strong position in VoB, and hence to exploit its cost advantages identified above? To answer this, the relevant question to ask is what KPN's profits are from a particular VoB customer, if that customer subscribes:

- through another DSL provider;
- to a cable VoB offering; or
- to KPN's VoB offering.

If the customer goes to another DSL provider, KPN will receive the following profit from that customer:

$$\pi_{\text{dsl}}^{\text{kpn}} = w^{\text{bb}} - mc^{\text{bb}} + t(w^{\text{ft}} - mc^{\text{ft}}) \quad \text{Equation 3.1}$$

where

- w^{bb} is the regulated wholesale broadband charge that KPN receives from other DSL providers (in this case, the LLU charge);¹⁸
- mc^{bb} is KPN's SRMC of providing wholesale access (LLU);
- t is the number of VoB-to-fixed calls made by that customer;
- w^{ft} is the regulated charge that KPN receives for terminating a call on its PSTN network;¹⁹
- mc^{ft} is the SRMC to KPN of terminating calls on its PSTN network.

If the customer goes to a cable provider for VoB, KPN receives:

$$\pi_{\text{cab}}^{\text{kpn}} = t(w^{\text{ft}} - mc^{\text{ft}}) \quad \text{Equation 3.2}$$

The difference with the DSL customer is that KPN does not receive any wholesale broadband revenues since the cable operators use their own networks for offering VoB. The cable VoB customers do generate the same call termination revenues for KPN.

Finally, if the customer subscribes to KPN for VoB, KPN receives the following profit:

$$\pi_{\text{kpn}}^{\text{kpn}} = (p^{\text{VoB}} - mc^{\text{VoB}}) + (p^{\text{bb}} - mc^{\text{bb}}) + m(p^{\text{mt}} - w^{\text{mt}}) + t(p^{\text{ft}} - mc^{\text{ft}}) \quad \text{Equation 3.3}$$

- where p^{VoB} and p^{bb} are the fixed charges that KPN receives from the customer for the VoB and broadband services, respectively;²⁰
- mc^{VoB} is KPN's retail marginal cost of providing the VoB service;²¹

¹⁸ Here Oxera is abstracting from the fact that KPN would also receive this charge if the DSL provider only used the unbundled loop to offer broadband Internet access, without VoB. If that were the case, the profit earned by KPN from other providers' VoB customers would be even lower.

¹⁹ Lexecon labels this term p^{f} . Oxera uses the term w^{ft} to make clear that this is a wholesale charge rather than a price charged to end users.

²⁰ In practice, KPN and any other service provider may charge a single fixed fee for the VoB and broadband bundle. However, splitting the price of the bundle into two allows the VoB service to be treated as purely incremental to broadband. Now, p^{VoB} and p^{bb} can be compared to mc^{VoB} and mc^{bb} , respectively. This makes explicit how the different elements contribute to (or subtract from) overall profits. In Lexecon's analysis, broadband revenues and costs are not included..

- m is the number of calls made by the customer to non-PSTN networks—taken here as a mobile network not owned by KPN;²²
- p^{mt} is the price that KPN charges its customer for calls to mobiles;
- w^{mt} is the call termination charge that KPN pays to the mobile operator;
- p^{ft} is the price KPN charges its customer for VoB-to-fixed calls.²³

From the above equations, it follows that, in most circumstances, a VoB user is more profitable to KPN if that user subscribes to KPN than if that user subscribes to another provider. In other words, KPN would rather gain a VoB customer than see it select another VoB provider because this would generate additional sources of profit that would not be attainable if the customer selected an alternative provider.

The additional sources of profit to KPN, independently of whether the customer comes from (or would have to chosen to go) to a cable or DSL provider, are any profit margin made on:

- the VoB service—equal to the first term in Equation 3.3: $(p^{VoB} - mc^{VoB})$;
- calls to other networks—equal to the third term in Equation 3.3: $m(p^{mt} - w^{mt})$;
- calls to its own fixed network, net of the profit margin it would have made if the customer had gone to an alternative DSL or cable provider—equal to the difference between the last term in Equation 3.1 (or the whole of Equation 3.2) and the last term in Equation 3.3: $t(p^{ft} - w^{ft})$.

In addition to these three profit sources, there are other sources of profit to KPN depending on where the customer comes from (DSL or cable operator):

- if the customer comes from an alternative DSL provider, the additional source of profit is represented by the fixed fee that KPN charges to its customers for the broadband service net of the wholesale price (LLU charge) it charges to the DSL operator $(p^{bb} - w^{bb})$;
- if the customer comes from a cable operator, the additional source of profit is represented by the whole of KPN's profit margin on the broadband fee $(p^{bb} - mc^{bb})$.

Equations 3.1 to 3.3 hold regardless of where the VoB customer originally came from—ie, from PSTN or from another VoB provider.²⁴ If the former then KPN loses the fixed telephony revenues it previously received from that customer.

However, given the current early stage of VoB development, Oxera considers the relevant counterfactual situation to be one in which a PSTN user has decided to switch to VoB and is in the process of selecting a provider. In other words, KPN would lose the PSTN customer in any event. This counterfactual captures better the dynamics of competition for VoB customers. In this counterfactual, the fixed-telephony profits that are lost to KPN should not be incorporated when assessing the options for VoB pricing. At any rate, as an increasing number of users migrate to VoB over time, KPN's incentives to protect its PSTN business can be expected to decrease, and hence its incentives to price aggressively in VoB to increase.

²¹ This is taken to be an incremental cost per subscriber, including VoB call origination costs. To the extent that both KPN and any potential entrant would face call origination costs, not explicitly accounting for them in our analysis does not affect our main conclusions.

²² This is abstracted from the fact that KPN is also the largest player in mobile telephony.

²³ For simplicity, Equation 3.3 also abstracts from any incoming call termination revenues that the VoB customer may generate. It is not clear how call termination to VoB numbers would be charged for. At one extreme, they could be priced equally to call termination on PSTN—in which case the profitability to KPN of a VoB customer would be higher than in Equation 3.3. At the other extreme, they could be offered at a (close to) zero price, reflecting the marginal costs of VoB call termination, which are probably also close to zero.

²⁴ The Lexecon model does make this distinction (see section 3.5 below).

3.4.2 Profitability to KPN of offering free on-net calls

The logic set out above also helps to explain why it can be profitable for KPN to offer free VoB calls to all KPN numbers, including on the PSTN network. From Equation 3.3, it follows that, in this case, p^{ft} would be equal to zero, and the profit would become:

$$\pi_{kpn}^{kpn} = p^{bb} - mc^{bb} + m(p^{mt} - w^{mt}) - t(mc^{ft}) \quad \text{Equation 3.4}$$

This profit can still be positive, provided the margins gained on the fixed charge and on off-net calls exceed the marginal cost to KPN of VoB-to-fixed calls.

Importantly, the profitability of such a pricing strategy would be higher for KPN than for the other VoB providers, precisely because of the cost advantages identified in section 3.3. The other providers face a higher cost of call termination than KPN (ie, w^{ft} versus mc^{ft}) and, in the case of DSL providers, a higher wholesale broadband access cost as well (w^{bb} versus mc^{bb}).

Thus, KPN may be better placed than its competitors to follow an aggressive pricing strategy of free on-net calls, and hence may have the ability to exploit its cost advantage to have an effect on competition in VoB. In most theoretical models of competitive interaction, such a cost advantage would allow a firm to end up with a higher market share (eg, in Cournot oligopoly), or to displace rivals completely (eg, in certain variants of Bertrand oligopoly). From a regulator's perspective, this may be of concern since the cost advantage does not derive from VoB itself but from the related markets.

By the same token, KPN could profitably exploit its cost advantage over other VoB providers by setting its total VoB price above its own total costs (including mc^{ft} and mc^{bb}), but below a level where the regulated wholesale charges, w^{bb} and w^{ft} are covered. The other VoB providers would not be able to match this price—the DSL providers because they do have to recover both w^{bb} and w^{ft} ; the cable providers because they have to recover w^{ft} .

If KPN decided to behave in this way, it would distort competition in the provision of VoB services. In light of this, OPTA's requirement for KPN to break even on the provision of VoB, using wholesale prices as its cost inputs, over some minimum time period, can be seen as making KPN behave in the VoB retail market as if it were an independent (non-integrated) service provider. This general approach is one that has been widely adopted by both regulators and competition authorities in order to avoid vertically integrated suppliers distorting competition by combining an upstream no-discrimination rule with a downstream no-cross-subsidy rule.

The above shows that free on-net pricing can be profitable to KPN in *absolute* terms. The Lexecon report emphasises the profitability of this strategy in *relative* terms—ie, compared with the alternative strategy of pricing call termination at least at the regulated call termination charge. This regulated call termination charge represents the opportunity cost to KPN, and Lexecon argues that if this opportunity cost is taken into account, KPN's profit function becomes the same as that of any other VoB provider. Lexecon concludes from this that KPN would never have an incentive to offer free on-net calls. (The Lexecon model is discussed in more detail in section 3.5 below.)

This conclusion does not always hold.

- Even if free on-net pricing results in profits per customer for KPN that are lower than without free on-net pricing, these profits per customer can still be positive (as shown above) and there may be circumstances in which this leads to KPN's *total* profit (ie, across all customers) being higher. This happens if KPN's total number of customers is higher with free on-net pricing, either because market demand is higher at the lower price, or because at the lower price KPN picks up market share from rivals (or both).
- There are dynamic reasons why KPN may have incentives to price aggressively. These are discussed in section 3.4.3 below.

With regard to free on-net calls, the RBB report (section 4.2) contains a numerical example showing that KPN would lose revenues if it sought to gain market share through such a pricing strategy.²⁵ The above exposition makes it clear that that is not a relevant question. The question is not whether KPN would lose any revenues from offering free on-net calls, but rather whether such a pricing strategy might be profitable.

In essence, RBB's numerical example makes the point that if KPN gained market share from another VoB provider, it would no longer receive the call termination revenues that this other provider pays for call termination on KPN's PSTN network. However, the relevant question is whether the profits forgone due to the loss in this revenue outweigh the profits from the gain in VoB revenue.

In the RBB example, a competing VoB provider receives €200 annually from a customer, of which €100 are from the fixed fee (including free on-net calls),²⁶ and €100 are for calls to other networks—50% to KPN's PSTN network; 50% to a mobile network (non-KPN). The VoB provider is assumed to make a profit margin on the off-net calls of 20%, which means that a total of €40 (80% of 50% of €100) is paid by the VoB provider to KPN for call termination.

Next, the example assumes that KPN:

- has the same fixed costs as the other provider;
- offers free on-net calls to all KPN numbers, including on the PSTN network; and thereby
- succeeds in displacing the competitor, as the customer only pays €150 per year, which makes the package attractive (the calls to PSTN, which previously cost €50, are now free).

This means that KPN no longer receives the €40 in termination charges. However, this in itself does not render KPN's pricing strategy unattractive, for the following reasons.

- In terms of Equations 3.1 to 3.3, the €40 is represented by the term $t(w^{ft})$ —ie, the PSTN termination charge KPN received from the other VoB provider. If KPN makes no further margin on this (ie, $w^{ft} = p^{ft}$)²⁷ then the €40 is indeed the revenue forgone by KPN from offering free on-net calls.
- However, according to Equation 3.4, as long as KPN's margins on fixed charge and on off-net calls exceed the marginal cost to KPN of the free VoB-to-fixed calls, KPN still makes a profit.
- Following the numerical example, KPN now receives €150 per year, divided €100 for p^{bb} and €50 for $m(p^{mt})$. €10 is assumed to be the profit KPN makes on off-net calls to the mobile network (20% margin on the €50 off-net call revenue), which is represented by the term $m(p^{mt} - w^{mt})$ in Equation 3.3.
- Moreover, KPN may make some profit on the VoB offering itself—ie, p^{bb} may exceed mc^{bb} . As noted above, the numerical example simply assumes that the €100 represents both revenues and costs per user—ie, no profit margin is made, but this assumption will often not hold.
- For example, if it is assumed that the profit margin of 20%, used in the numerical example, also applies to VoB, the margin on the €100 would be €20. Hence, KPN would make a positive margin of €30 on the fixed VoB charge and off-net calls. This margin

²⁵ A similar point was made previously by Lexecon.

²⁶ The example is unclear here, as it states that this €100 represents the 'fixed costs of the VoB service (including free on-net calls)'. Thus, the assumption seems to be that the fixed annual charge to the customer covers exactly the fixed costs of the VoB providers (ie, no profit margin is made).

²⁷ In effect, the RBB example assumes this to be the case.

must be weighed against KPN's cost of PSTN call termination, for which it no longer receives any revenue.

- If, as OPTA finds, the wedge between the regulated call termination charge (w^{ft}) and KPN's true SRMC of call termination (mc^{ft}) is indeed large then, overall, KPN would still make a profit on its VoB offering, including the free on-net calls. In the above example, if the marginal cost were less than 75% of the wholesale charge, the cost to KPN of the free on-net calls would be less than €30.
- The above shows that free on-net pricing can be profitable to KPN in absolute terms. It can also be profitable in relative terms—ie, if the profit margin made on the €150 is large enough, it could also recover the whole of the €40, which, in terms of the Lexecon model, is the opportunity cost to KPN of this pricing strategy.

3.4.3 Dynamic considerations

The above analysis shows that even in a static sense it may be profitable for KPN to exploit its cost advantages and thereby gain market share from competitor VoB providers.

Perhaps more importantly, this incentive and ability of KPN to have an effect on competition may be even stronger if assessed from a dynamic perspective.

- As OPTA has pointed out, there may be advantages to being the first provider to gain significant market share in VoB services. Customers who are yet to make the switch from PSTN to VoB may be uncertain about the quality and other benefits of the new service, and hence may select a provider with an established track record in VoB. This may become a self-reinforcing process.
- Another first-mover advantage may exist if there are differences in switching costs between the stage of switching from PSTN to VoB, on the one hand, and switching between VoB providers, on the other. A VoB provider who can secure a customer's first choice of VoB may have an advantage if subsequent switching between VoB providers requires the acquiring supplier to offer a significant improvement in the service offering.
- An attractive VoB offering may also be a way to protect market share in retail broadband access. VoB and broadband access are, for the moment, typically provided by the same company. Customers who take up VoB from their existing broadband provider may become less likely to switch to another broadband provider.
- Finally, moving into VoB is likely to be a rational defensive strategy for all incumbent telephony providers, whose fixed telephony revenues will be under a clear threat from VoB in years to come.²⁸ As noted in section 3.4.1, over time, as an increasing number of users migrate to VoB, KPN's incentives to protect its PSTN business can be expected to decrease, and hence its incentives to price aggressively in VoB to increase.²⁹

3.5 Comments on the Lexecon model

Lexecon has produced a report on behalf of KPN in which it is argued that OPTA should have no competition concerns about KPN's VoB offering because:

²⁸ See, for example, *The Economist* (2005), 'The meaning of free speech', September 17th.

²⁹ Should KPN succeed in becoming the dominant VoB provider, another competition concern might arise—if KPN controlled both PSTN and VoB, it would be able to increase prices for both services and hence to some extent control switching from PSTN to VoB (similar to the way in which a hypothetical monopolist who controls two substitute products can set higher prices than if they controlled just one).

- wholesale regulation at cost-based prices guarantees competition at the retail level and renders above-cost price squeezes impossible;
- VoB is a competitive market with low entry barriers due to cost-based regulated access to the ‘bottleneck’ facility and the existence of cable companies currently offering VoB services. Hence, it would be irrational for KPN to price VoB services below cost in order to squeeze its rivals’ prices because it would not be possible to recoup these short-term losses.

Section 3.3 above explained that, even with a cost-based regulated wholesale price, KPN may have the ability and the incentives to offer free on-net calls to the PSTN by exploiting its cost advantages over VoB rivals. This may occur because the SRMC of providing access to the local loop and terminating calls on the PSTN is lower than the regulated LRIC plus mark-up prices. Whether KPN has incentives to exploit this short-run divergence will depend on whether the strategy is profitable (see section 3.4 above).

Lexecon has also produced a technical annex that aims at assessing whether KPN would have the incentives to charge lower prices for its VoB service than an independent operator.³⁰ To that purpose, a comparison is made between the marginal values of attracting a VoB subscriber for KPN and for a VoB entrant. The analysis concludes that the marginal value to KPN of an additional VoB subscriber is entirely driven by the direct VoB margins earned on that subscriber. As such, KPN would not face stronger incentives to charge lower prices for its VoB services than an independent operator. This would effectively eliminate the link between VoB and fixed telephony.

A concern with Lexecon’s approach is that it does not clearly show that KPN has no incentive to offer excessively low prices (eg, free on-net calls, or low pricing of a broadband–VoB bundle). The main justification appears to rely on the notion that KPN will face an opportunity cost in terms of forgone call termination revenues (if the VoB customer comes from an entrant), or forgone PSTN margin (if the customer comes from the PSTN network). Hence, KPN would have pricing incentives similar to those of any other VoB entrant.

However, as mentioned above, in order to assess whether KPN could engage in excessively low pricing, it is necessary to determine whether such a strategy is profitable taken either in static terms—ie, the VoB flat fee covers overall costs, including opportunity costs (see section 3.4.2 above)—or dynamic terms—ie, relative to securing broadband revenues and avoiding further losses of voice revenues (see section 3.4.3 above).

The remainder of this section provides some additional comments on Lexecon’s technical annex, and addresses some concerns with the approach and methodological steps of that analysis.

3.5.1 Lexecon’s approach does not show that KPN has no incentives to engage in low pricing

Using Lexecon’s notation, a VoB entrant’s profit function is defined as:

$$\pi^e = F^e n^e - t n^e (p^f + c^{eb}) \quad \text{Equation 3.5}$$

where

- F^e is the fixed-fee VoB price;
- n^e is the number of VoB customers the entrant is able to attract;
- t is the per customer number of VoB-fixed calls,³¹

³⁰ Lexecon (2005), ‘Technical Annex: answers to OPTA’s additional questions’, May 2nd.

³¹ In this simplified case it is assumed that VoB subscribers only make VoB fixed calls and do not receive any calls.

- p^f is the termination fee the entrant must pay to KPN;³²
- c^{eb} is the variable cost of originating a call from the entrant's VoB network.³³

Hence, the marginal value of a new VoB subscriber for an entrant is:

$$MV^e = F^e - t(p^f + c^{eb}) \quad \text{Equation 3.6}$$

For KPN, the profit function is defined as:

$$\pi^k = F^k n^k - \underbrace{t n^k (p^f + c^{kb})}_{\text{Cost of VoB-fixed calls}} + \underbrace{t(n^e + n^k)(p^f - c^f)}_{\text{Profit from call termination}} + \underbrace{F^f n^f - t n^f (2c^f)}_{\text{Profit from PSTN calls}} - K \quad \text{Equation 3.7}$$

where:

- F^k is the fixed-fee VoB price;³⁴
- n^k is the number of VoB customers KPN is able to attract;
- t is the per customer number of VoB-fixed calls;
- p^f is the fixed network termination fee;
- c^{kb} is the variable cost of originating a call from KPN's VoB network;
- c^f is the variable cost of terminating a call in the fixed network;³⁵
- F^f is the fixed-telephony retail price;
- K is fixed cost of the PSTN network.

From KPN's perspective, a new VoB customer could come either from a VoB entrant³⁶ or from the PSTN network. Hence, Lexecon assigns probabilities to each scenario (σ^e and σ^f , respectively, where $\sigma^e + \sigma^f = 1$). The marginal value of a VoB customer to KPN is therefore:

$$\pi^k = F^k - t(p^f + c^{kb}) + t(p^f - c^f) - \sigma^e t(p^f - c^f) - \sigma^f (F^f - 2tc^f) - K \quad \text{Equation 3.8}$$

Lexecon notes that, if $\sigma^e = 1$, the marginal value collapses to the same expression as for an entrant (see Equation 3.5), the only difference being c^{kb} , the VoB-specific variable cost. For Lexecon, this is evidence that KPN does not have stronger incentives to reduce the prices of its VoB services below those of its rivals. However, as noted above, this result only shows that KPN has an opportunity cost in offering a VoB service; it does not say anything about whether offering free on-net calls (including calls to the PSTN) is a profitable strategy.

3.5.2 The fixed-cost recovery condition

Furthermore, Lexecon seeks to show that, independently of the values that σ^e and σ^f take, Equation 3.7 will always collapse to an equation similar to that of Equation 3.5. To do so, it relies on the fixed-cost recovery condition on the PSTN, or, in other words, a zero-profit condition for the PSTN division of KPN. Hence, for all values of n^f , this implies that

$$(n^e + n^k)t(p^f - c^f) - n^f (F^f - 2tc^f) = K \quad \text{Equation 3.9}$$

Lexecon begins by assuming that VoB attracts no subscribers (ie, $n^e + n^k = 0$, $n^f = 1$).³⁷ The fixed-cost recovery condition implies that:

³² w^t in Oxera's notation (see section 3.4 above).

³³ Call origination costs are not explicitly accounted for in the Oxera framework. However, as already mentioned, this does not affect the main conclusions of the analysis (see section 3.4.1 above).

³⁴ In Oxera's notation, F^k would be equivalent to p^{Vob} . Note, however, that Lexecon does not include the broadband margin in the profit function ($p^{bb} - mc^{bb}$ in Oxera's notation).

³⁵ mc^t in Oxera's notation (see section 3.4 above).

³⁶ Equivalently, an entrant's VoB offer could have been chosen ahead of KPN's.

$$F^f - 2tc^f = K \quad \text{Equation 3.10}$$

In other words, according to Equation 3.10, a PSTN subscriber must cover fixed costs K. This is a specific case in which there are no VoB subscribers, a condition that may no longer hold once some VoB subscribers have joined KPN. However, Lexecon uses Equation 3.10 in the more generic case where a non-zero number of VoB subscribers have been attracted (ie, when $n^e + n^k = 1 - n^f$). In this case, Equation 3.9 becomes:

$$(1 - n^f)t(p^f - c^f) - n^f(F^f - 2tc^f) = K \quad \text{Equation 3.11}$$

If Equation 3.10 is substituted in Equation 3.11, as Lexecon does, the following is obtained:

$$t(p^f - c^f) = K \quad \text{Equation 3.12}$$

The last step of Lexecon's analysis is to use Equations 3.10 and 3.12 in Equation 3.7, to obtain the result that KPN's marginal valuation of a new VoB customer is analogous to an entrant's marginal valuation. However, the result is driven by a methodological inaccuracy in the analysis of the fixed-cost recovery condition. A correct application of this condition would re-establish the link between VoB and KPN's PSTN business, and would show that KPN's marginal valuation of a new VoB customer would not be analogous to an entrant's marginal valuation.

This would require an assumption that the other situation holds where $\sigma^f = 1$ (ie, the new VoB customer comes from the PSTN). In this case, the expression for KPN's marginal valuation of a new VoB customer would be:

$$MV^k = F^k - t(c^f + c^{kb}) - (F^f - 2tc^f) \quad \text{Equation 3.13}$$

Equation 3.13 shows that the marginal value of a new VoB customer that comes from the PSTN is equal to that customer's VoB margin net of the forgone PSTN margin. However, reaching this conclusion does not show that KPN has no incentives to offer free on-net calls to its VoB customers.

3.5.3 Making and receiving calls

Lexecon also analyses the more generic case where a VoB customer can both make and receive calls. In this case, KPN's profit function (given in Equation 3.7) would include an additional term reflecting the margin on terminating incoming calls in its VoB network: $y^k(p^b - c^b)$, where y^k is the total amount of incoming calls to KPN's VoB network, p^b is the termination charge on the VoB network, and c^b is the cost of terminating calls in the VoB network.

Two further assumptions are made: $tn^k = y^k$ (a balanced calling pattern) and $p^b = p^f$ (reciprocal termination charges). KPN's profit function therefore reduces to an equation very similar to Equation 3.7:

$$\pi^k = F^k n^k - tn^k(2c^{kb}) + t(n^e + n^k)(p^f - c^f) + F^f n^f - tn^f(2c^f) - K \quad \text{Equation 3.14}$$

However, it is unlikely that termination charges between VoB and the PSTN will be reciprocal, for two reasons:

- the LRIC price of call termination in the VoB network is likely to be lower than the equivalent PSTN price because of the VoB's cost advantages relative to the traditional PSTN technology;

³⁷ The total number of users is normalised to 1 so that $n^e + n^k + n^f = 1$.

- VoB calls are data packets that can be routed in many different ways through the public Internet and do not require a dedicated channel, unlike PSTN calls. For this reason, per-minute call termination is unlikely to be the prevalent price structure of VoB call termination in the long term (even if it still is today).

Without reciprocal termination charges, KPN's profit function would include an additional term reflecting the price differential between VoB and PSTN call termination:

$$\pi^k = F^k n^k - t n^k (2c^{kb}) + t(n^e + n^k)(p^f - c^f) - \underbrace{t n^k (p^f - p^b)}_{\text{call termination price differential}} + F^f n^f - t n^f (2c^f) - K$$

Equation 3.15

With this profit function, KPN's marginal valuation of a new VoB customer would no longer depend exclusively on VoB-specific efficiencies, as Lexecon claims, but must also take into account the price differential between VoB and PSTN call termination. The same would hold for an entrant.

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