Wholesale access markets in the Netherlands

Final version

Client: VodafoneZiggo

Rotterdam, 29 November 2017

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1 Introduction

VodafoneZiggo requested Ecorys to conduct an independent assessment of the possibility of defining one single market for wholesale access to broadband networks. The reason for this request is to provide inputs for ACM's upcoming market analysis and decision. Below we briefly elaborate on ACM's working hypothesis for the definition of relevant markets in the upcoming market analysis decision in the Netherlands, followed by a summary of the main questions we aim to answer in this document.

ACM's working hypothesis on the relevant wholesale market(s)

On 4 July 2017, the Dutch regulator ACM informed stakeholders in the Dutch telecom market on its working hypotheses for the upcoming market analysis and decision. Amongst others, ACM explained that it is working towards defining one single market for wholesale access to telecom infrastructures comprising of both local and central level access products; an approach contrary to the European Commission's recommendation to define separate successive wholesale markets for local and central access (markets 3a and 3b respectively), and contrary to all of ACM's previous market analysis decisions.

The current view of ACM is different from its view expressed in the market analyses decision of December 2015[1]. In 2015, ACM followed the Commission's recommendation by defining a market for local access comprising of SLU, LLU, ODF and VULA (market 3a)[2], not including wholesale products for central access such as bitstream[3]. ACM did not analyse the market for wholesale central access (market 3b) in 2015 as this market was already found to be competitive in 2012. The core argument in 2012 for deregulating the market for bitstream access was that if the ULL-market is regulated, alternative operators with presence at the MDF location can (and do) use ULL access as a building block for offering wholesale bitstream services to third parties.

The structure and objectives of this report

In chapter 2, we analyse under which conditions successive wholesale markets may or may not be considered part of the same relevant market. Subsequently, chapter 3 analyses the conditions in the Dutch context and concludes on the implications for the definition of Dutch wholesale market(s). Chapter 4 analyses to what extent the developments in wholesale access products may impact on the choice made/strategies followed by new entrants. Chapter 4 also examines to what extent the developments in wholesale access products may impact on ACM's previously made conclusions on the relation between the regulation of the WLA market and competition in the WCA market.

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1 https://www.acm.nl/nl/publicaties/publicatie/15087/Marktanalysebesluit-ontbundelde-toegang-2016--2019.

2 ACM (2015) para. 100 "*ACM concludeert dat andere vormen van toegang dan fysieke ontbundelde toegang een substituut zijn voor fysieke ontbundelde toegang indien zij voldoen aan de drie in dit verband door de Commissie geformuleerde cumulatieve criteria. Dergelijke virtuele ontbundelde toegang behoort daarmee tot de relevante markt voor ontbundelde toegang (MDF-, SDF- en ODF FttH-access).*"

3 ACM (2015) para. 1447 *"De door Stratix genoemde toegangsvormen wederverkoop, smartcard en bitstream-toegang behoren evident niet tot deze markt, met name omdat er bij deze toegangsvormen minder mogelijkheden voor differentiatie zijn en hiermee niet tot nauwelijks (afhankelijk van de specifieke toegangsvorm) concurrentiedruk op gevestigde aanbieders kan worden uitgeoefend."*

2 Methodology for defining relevant markets

2.1 The hypothetical monopoly test

Prior to analysing competition in markets, it is practice in competition law cases, as well as in regulation of telecom markets, to first define which markets we are talking about in terms of products and of geographic scope. Such definition is typically based on an analysis of demand and supply substitution. Demand side substitutability means that products are considered close substitutes in the eyes of (end)-users. Supply side substitutability means that a supplier of service B could easily reallocate its production capacity to producing service A in response to price increase of service A. When two products are substitutable, this implies that its producers are competitors and that the products (and geographical scope) belong to the same relevant market. Substitutability is a relative term as some products are considered closer substitutes than others. The threshold value for substitutability in competition law cases is usually determined by the Hypothetical Monopoly test (HM-test). The HM-test analyses whether a hypothetical monopolist of service A would experience less competitive constraints if it were to merge with a hypothetical monopolist of service B. If so, service A and B are considered part of the same relevant market.

2.1.1 The SSNIP-test applied to substitutes and complements

The common analysis applied is to assess whether a hypothetical monopolist of service A could profitably increase its price with a Small but Significant Non-transitory Increase in Price (SSNIP) of 5% to 10%. Service A and B are considered part of the same relevant market if such increase would make users switch to service B, or make suppliers of service B switch to offering service A, such that the SSNIP would be unprofitable. Next, the test is repeated for a hypothetical monopolist providing both service A and B to examine whether service C should be included as well.

In the context of bundling in telecom markets, there is a repeating discussion on whether complementary products can be considered part of the same relevant market. The consensus is that complementary products as part of a bundle are not part of the same market if the individual building blocks of the bundle can be purchased separately, and stand-alone offerings exert a competitive constraint on a hypothetical monopolist supplier of bundles such that it cannot raise the price of bundles with a SSNIP. As long as this is the case, bundling should be treated as a marketing strategy and not as a market.

2.1.2 The SSNIP test applied to wholesale building blocks

The working hypothesis intended to be used by ACM is that there is one single wholesale market for access to telecom networks. This raises the question as to what extent successive wholesale markets can be considered part of the same relevant market. The issue has some resemblance with the discussion on a market for bundles at retail level.

Wholesale building blocks are perfect complements because a wholesale client of unbundled local access will have to complement this service with additional backhaul services to create a bitstream to produce a functional retail service. Following the analogy with retail bundles, one may conclude a single market for bundled wholesale building blocks (i.e. a single market for wholesale access) when the wholesale client can only (for technical and/or economical reasons) purchase backhaul services from the incumbent that also offers the unbundled local access service. In that case, the markets for

stand-alone wholesale building blocks are non-existing[4]. However, when the wholesale client can arrange for backhaul services itself or purchase these from a third party, one cannot consider a single market for wholesale access. In such a case, there is a market for unbundled local access (offered by a monopolist) and a successive market for central access services; where central access services are in fact a bundle of local access and backhaul services. The latter market is characterised by multiple suppliers (including self-supply).

One may be tempted to argue that bitstream central access and unbundled local access are substitutes when a SSNIP test of bitstream central access causes the wholesale client to purchase unbundled local access. In that case, however, the wholesale client is not substituting bitstream central access for local unbundled access because the latter was already included in the former. The wholesale client is still using the incumbent's local access; only now as a stand-alone service complemented with self-supplied backhaul services. As such, the wholesale client has not substituted bitstream central access for local unbundled access, but it has substituted the incumbent's backhaul services for self-supplied backhaul services. Similarly, if the price of local unbundled access increases with 10%, this would not affect the alternative operator's make-or-buy decision with regards to backhaul services because the wholesale client will have to bear the SSNIP anyway, independent of whether the backhaul service is self-supplied or provided by the incumbent. The reason is that the wholesale price of local access is embedded in the price for central access bitstream.

In essence, the substitution analysis boils down to a make-or-buy decision which we can formally derive from the following formulas:

1. $TC_e = (P_{ula} + wp_e)V$
2. $TC_s = (P_{ula} + c_s)V + I$
3. $M_i = \frac{TR - TC_i}{TC_i},\ i \in [e, s]$

Where:

- TC_e represents the total costs of the bitstream for the access seeker when wholesale services are fully supplied by the incumbent, i.e., externally. TC_e is a function of the wholesale price for local access P_{ula}, plus the additional wholesale price for backhaul services supplied by the incumbent wp_e, multiplied by the number of subscribers V;
- TC_s represents the total costs of the bitstream when only local access is supplied by the incumbent and backhaul services are self-supplied. TC_s is a function of the wholesale price for local access P_{ula} plus the additional (marginal) costs of self-supplied backhaul services c_e, multiplied by the number of subscribers V, plus the annual costs of the investment in own backhaul infrastructure I;
- M represents the net margin, which is a function of total revenues TR and total costs of the bitstream TC_i.

The wholesale client decides to invest in its own backhaul services when $M_e < M_s$. From equations 1 to 3 it follows that this condition holds when:

4. $I < (wp_e - c_s)V$

[4] One could argue that this is the case in a greenfield situation, absent from any regulatory intervention, because in such case the incumbent may choose not to offer stand-alone wholesale building blocks. However, by the same reasoning one could argue that there is no wholesale market at all because the incumbent may choose not to offer any form of wholesale access. This kind of reasoning ignores however that there is demand for wholesale access and that the incumbent's decision not to supply this service is not necessarily related to its inability, but could be related to dominance which is precisely what the regulatory framework aims to address.

It follows from Equation 4 that the decision between local access and central access is independent of a change in the price for unbundled local access P_{ula}. The make-or-buy decision is based on the difference between the price of externally supplied backhaul services and the marginal cost for self-supplied backhaul services (multiplied by the number of subscribers), relative to the investments in own backhaul infrastructure[5].

Equation 4 makes clear that there are economies of scale, such that the alternative operator is required to have a certain minimum number of subscribers before it pays off to invest in its own backhaul infrastructure. When required investments I are relatively low, or when the alternative operator's market share grows, the regulation of local access prices would lead to (potential) competition for the incumbent's backhaul services and thereby constrain the incumbent's price for wholesale central access $(P_{ula} + wp_e)$. Because of this constraint, the price for wholesale central access likely approaches $(P_{ula} + c_s)$ when investments I approach zero. Only when investments I are extremely high, will the wholesale client's make-or-buy decision lead to a buy-decision for any level of V, and one may conclude that there is no demand (and thus no market) for stand-alone wholesale building blocks.

The above analysis is not new to ACM. Since 2012, ACM has considered the wholesale market for bitstream services competitive (or at least contestable) such that regulation of wholesale central access is no longer required. In other words, ACM has concluded that V and I are such that Equation 4 structurally holds in the case of the Netherlands, and that regulation of P_{ula} will drive down wp_e. In 2015, ACM (implicitly) confirmed this conclusion by concluding that potential competition problems at retail level would be resolved by regulating unbundled local access. As a consequence of the analysis, ACM took the decision to regulate unbundled local access and leave the market for WCA services unregulated. In terms of technology and market evolution no structural changes have occurred between 2015 and 2017 that would suggest another outcome of the same analysis.

2.1.3 *A note on inter-platform competition*

The previous analysis concerns wholesale access on a single network where each wholesale product is a building block for the next. The analysis does not apply one-to-one to wholesale access on different (competing) networks, because local access to the copper network[6] is not a building block for central access to cable networks[7]. In theory, local access to copper networks can be a substitute for central access to cable networks, depending on the costs for self-supplied backhaul services and the relative price of local copper access and central cable access.

All else being equal, local copper access and central cable access are substitutes if the following conditions hold:

5. $P_{ula} < P_{ca} - C_s$

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[5] One may not conclude from Equation 4 that the make-or-buy decision is completely independent of the local access price, because for a given retail price, a high P_{ula} can lead to an artificial price squeeze of $(wp_e - c_s)$. In such case, however, we are dealing with a situation like the so-called 'cellophane fallacy' where the damage of dominance has already been done. It follows from competition law practice as well as from The Commission guidelines (2002/C 165/03, para 42) that the analysis of relevant markets should assume prices to be cost-based. "*[T]he working assumption will be that current prevailing prices are set at competitive levels. If, however, a service or product is offered at a regulated, cost-based price, then such price is presumed, in the absence of indications to the contrary, to be set at what would otherwise be a competitive level and should therefore be taken as the starting point for applying the 'hypothetical monopolist test'*".

[6] The term copper network is used to denote the access network based on twisted pair copper wires of the former Public Switched Telephone Network (PSTN).

[7] The term cable network is used to denote the access network based on coax cables of the former (radio and tv (RTV) distribution network.

and

6. $1.1 \times P_{ula} > P_{ca} - C_s$

Where $C_s = (c_s + I/V)$ and $C_s \leq wp_e$, and where P_{ca} is the wholesale price for central cable access and C_s is the monthly cost per subscriber for self-supplied backhaul services[8].

2.2 The recommendation on relevant markets 2014

2.2.1 The discussion on the applicability of the HM-test to wholesale building blocks

The previous discussion on whether a single wholesale can be defined is also reflected in a study by Ecorys (2013), which was commissioned by the European Commission and underlying the Recommendation on Relevant Markets of 2014:

> *"The question whether the wholesale markets 4 and 5 may be combined depends inter alia on whether the products delivered on these two markets represent complements or substitutes. One might argue that the two products can at least partly be classified as substitutes, e.g. to a potential entrant considering two strategies for rolling out national coverage – WBA and LLU access may be weighed-off against each other.*
>
> *However, this does not have the usual implications for market definition in terms of the hypothetical monopolist (HM) test. The reason for this is that the two products are vertically related – the LLU product is an explicit or implicit part of the WBA access product. This means that an entrant that decides to roll out to the MDF level will still consume the WBA product, be it internally. For this reason, the products currently distinguished by markets 4 and 5 are in actual fact complementary products that can not belong to the same relevant product market in a strict market definition sense.*
>
> *Since a market definition encompassing both the Market 4 and 5 level would be at odds with general competition law principles, we therefore do not propose introducing an all-encompassing wholesale access market."*
>
> (Ecorys, 2013, p 111.)

Ecorys mentions that, following the same reasoning, one would have to conclude that sub-loop unbundling (SLU) in the street cabinet should be considered a different wholesale market from local loop unbundling (LLU) in the main distribution frame. Ecorys states that, notionally, SLU is an input to LLU. Ecorys does not consider this issue to be of great importance *"because SLU does not generally appear to be a feasible access level for entrants in practice (due to the poor economies of density at the street cabinet level)"*. In terms of equation 4 in section 2.1, Ecorys thus argues that investments I for subloop access are too high such that the wholesale client's make-or-buy decision will lead to a buy-decision for any (realistic) level of V[9].

Furthermore, Ecorys (and later the Commission Recommendation on Relevant Markets) recognised that where copper networks are upgraded from ADSL to VDSL, the importance of unbundled physical

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[8] Note that conditions 5 and 6 only hold if these monthly costs are less than the wholesale price for backhaul services supplied by the incumbent (i.e. $C_s \leq wp_e$). If the latter is not the case, the access seeker would not purchase a stand-alone local copper access in the first place, and the SSNIP-test would have to be inversed.

[9] Moreover, the Commission also recognised that Vectoring technology may make SLU practically impossible *"The implementation of (V)DSL acceleration techniques may, however, have an impact on the availability of wholesale access products. In particular, due to the technical limitations of the current generation of VDSL, vectoring technology falls short of delivering significantly higher bandwidths when copper access is granted in parallel at the street cabinet, which may lead NRAs to withdraw the copper SLU access obligation. Such a withdrawal may be found appropriate, justified and proportionate, in particular where there is little or no demand for SLU products and in light of the increased performance that end users (and access seekers) would benefit from through the deployment of VDSL vectoring."* SWD(2014) 298 p. 39.

access at the MDF location significantly reduces because it is limited in the bandwidth it can offer, while end-user demand is evolving towards higher bandwidths. In some EU Member States, the NRA's responded with imposing an obligation to provide Virtually Unbundled Local Access (VULA). VULA is an Ethernet based virtual wholesale product which hands over a VDSL-bitstream at the local level and grants the alternative operator with a high degree of freedom to determine the qualitative characteristics of the retail products. As such, VULA is functionally equivalent to local loop unbundling[10].

With regards to physical and virtual access at the local level, one can make a comment similar to the one made by Ecorys with regards to SLU and LLU: VULA and physical access should primarily be considered part of different relevant wholesale markets because the latter is a building block of the former. However, at locations where the incumbent has installed FttC and is delivering high speeds to end-users based on VDSL, there is no longer a viable business case for ULL access at the MDF locations because, due to the length of the copper wire, it does not allow the alternative operator to offer the same speeds as offered by the incumbent who has rolled out fibre to the sub-loop[11]. In terms of Equation 4 in section 2.1, V may drop significantly if the access seeker remains using LLU, rendering the business case of the alternative operator unsustainable. In such case, the alternative operator can only maintain the level of V needed to recoup the investments made in the backhaul network by using VULA. As such, where networks have been upgraded to VDSL, demand for physical local access seizes to exist (at least for the purpose of servicing the consumer market).

The inclusion of SLU, LLU and VULA in the same relevant wholesale market is consistent with the methodology for the HM-test set out in section 2.1. The same cannot be said for bitstream access provided at a central (i.e. national) handover point. In terms of Equation 4 in section 2.1, investments I for rolling out to the local handover point are generally *not* too high, and at a certain (realistic) level of V the wholesale client's make-or-buy decision may change from a buy-decision to a make-decision.

2.2.2 *The discussion on functional equivalence and redefining relevant markets*

The Commission considered VULA to be functionally equivalent to SLU/LLU access, and it considered VULA to be functionally different from a traditional (IP-based) bitstream-type access[12]. Local access (physical and virtual) is considered to give the access seekers a greater flexibility and control over the retail broadband service offered to the end-user. However, the Commission recognised that "*boundaries between the physical loop and sub-loop unbundling and the WBA markets are likely to be subject to change [and that] it seems more appropriate to differentiate between those wholesale products functionally replicating the key features of traditional physical and local unbundling access (with such products potentially being delivered as non-physical or virtual products) from other forms of access*"[13].

In the study underlying the Recommendation on Relevant markets, Ecorys (2013) anticipated the development of a (Ethernet based) virtually unbundled central access (or VUCA) product that may be able to meet the Commission's requirement of being functionally equivalent to SLU/LLU. Ecorys did not elaborate further on this, except for making the remark that "*VUCA as an access service would not be useful from the ladder of investment perspective, since it does not incentivize entrants to roll out their own network to a local level (as achieved by VULA).*" We add that future technological

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10 *"Therefore, as long as physical unbundling is not possible or feasible in specific situations, experience under Article 7 shows that NRAs are imposing non-physical or virtual network access functionally equivalent to copper loop unbundling as a substitute for physical wholesale local access. Any such virtual local access must be distinguished from a more traditional bitstreamtype access."* SWD(2014) 298 p. 40.

11 And if the incumbent has removed the copper wire or is applying vectoring technology, physical unbundling is simply not possible anymore.

12 See footnote 10.

13 SWD (2014) 298 p. 41.

and application developments related to content distriibution[14] and edge computing[15] confirm a growing strategic importance of being present at the local level for alternative operators, CDN operators, and providers of advances services in the context of Industry 4.0. These developments imply that a hypothetical VUCA product will not be functionally equivalent to VULA. Furthermore, apart from gaining more freedom to operate, an access seeker would also enjoy economies of scale related investments in own backhaul infrastructure. (See also the formal analysis in section 2.1). Such economies of scale alone form an incentive to climb the ladder of investment and benefit the consumer in terms of lower retail prices.

Anticipating further developments of virtual access products and wanting to stimulate access seekers to climb the ladder of investment, the Commission decided to rebrand the "market for physical access" (market 4/2007) to the "market for local access" (market 3a/20014), and the "market for virtual access (market 5/2007) to a "market for central access" (market 3b/2014). The Commission defined several key characteristics distinguishing the wholesale products in both wholesale markets:

- First, the location of the handover point. Local vs. non-local access is an important distinguishing factor. This characteristic recognises the efficiencies due to economies of scale in the backhaul network and the importance of stimulating access seekers to climb the ladder of investment;
- Second, the topology and core transmission features of the wholesale products, in particular regarding network contention. Products in market 3a should provide generic access and agnostic transmission capacity which is uncontended in practice. The technical features of the connection should support LLU-like services (e.g. multicast);
- Third, the degree of flexibility and control for the access seekers to differentiating its retail offers and the quality of service provided.

WIK (2017) has further specified these three characteristics based on communication by the Commission to the German authorities regarding VULA[16], two BEREC reports[17], and WIK's own experience[18].

As such, the new market for local access includes any possible form of physical and virtual wholesale access at the local level, where "*non-physical or virtual network access [is] functionally equivalent to*

[14] CDNs represent infrastructure that bypasses the Internet to deliver content services close to the end-user. Today, CDNs typically terminate at the ISPs national interconnection point. These endpoints typically provide for caching to improve the economics of service delivery, as well as improving the customer experience. With a further increase in traffic volume, lower ICT costs and intensifying competition among content providers, including incumbent telecom operators, CDN operators aim to move the endpoints closer to end-users. The logical next step for CDN operators is to move the endpoints to the level of the Metro POPs. This increases the importance of this interconnection point within the access network. Given the desire to have a high level of control over the customer experience, and the best economics, the use of VULA may be expected. This trend is consistent with the future image of access networks as portrayed by Bell Labs as part of its Future X Network vision. See Weldon, M. K. (2016). *The future X network - A Bell Labs perspective*. Boca Raton, FL: CRC Press, Taylor & Francis Group.

[15] An important element in telecom network evolution is support for the Internet of Things (IoT) as part of Industry 4.0. IoT includes as an important category of low latency applications. Proximity to the end-user is essential to achieve the lowest possible latency. Hence, a trend is emerging towards so-called edge computing whereby processing capacity is placed as low as possible in the access network. This again is consistent with access at the Metro POP and the use of VULA to achieve the highest level of control over the customer experience. See Patel, M., J. Joubert, J. Roldan Ramos, N. Sprecher, S. Abeta & A. Neal (2014). Mobile-edge computing - Introductory technical White Paper. Sophia-Antipolis, France: ETSI.

[16] Case DE/2016/1854, C(2016) 2929 final: https://circabc.europa.eu/sd/a/055249f0-8448-4f3e-844c-c4d12cc001af/DE-2016-1854%20Adopted_EN.pdf.
Case DE/2016/1876, C(2016) 4834 final https://circabc.europa.eu/sd/a/4642d853-cd70-4d7a-9ef3-f11c64e59be3/DE-2016-1876%20ADOPTED_EN%20for%20publication.pdf.
Case DE/2016/1934, C(2016)8366 https://circabc.europa.eu/sd/a/679cca47-d2c0-4895-a9fc-4d5d1c10d922/DE-2016-1934%20Adopted_EN.pdf.

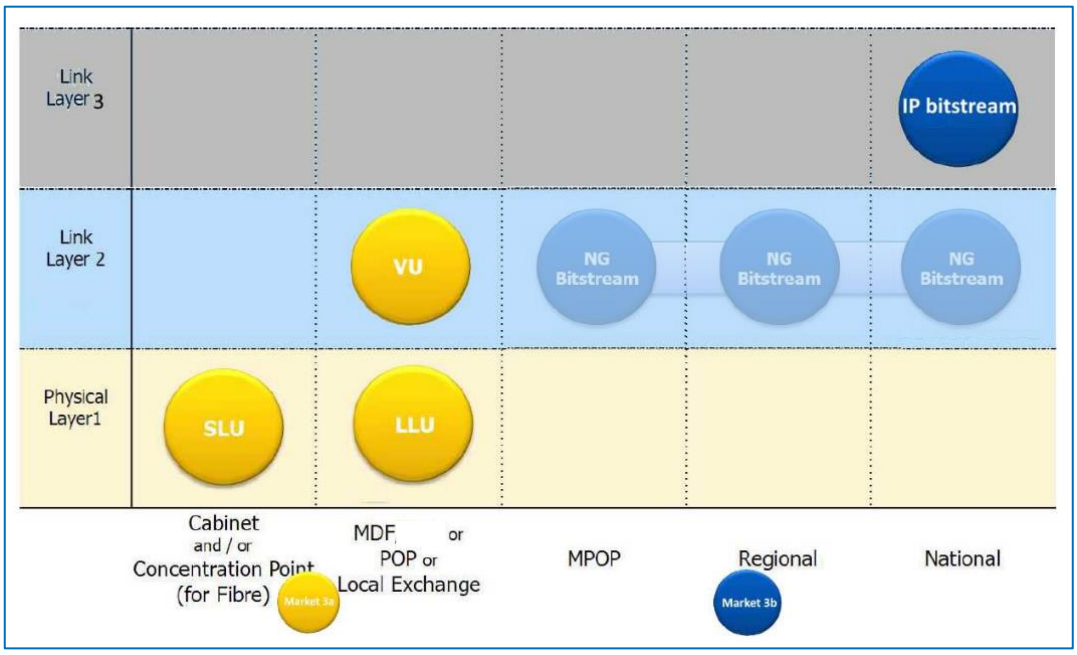
[17] BoR (15) 133 and BoR (16) 162.

[18] See WIK (2017, p. 64).

copper loop unbundling as a substitute to physical wholesale local access"[19] [20]. This implies that the access seeker on the local level should be able to use VULA (similarly as it can use LLU) for providing wholesale central access to third parties for purpose of offering retail internet services complemented with TV and voice services.

The figure below summarises the Commission's view with regards wholesale access markets.

Figure 1 Wholesale access products and markets foreseen by the Recommendation Relevant Markets 2014



Source: adapted from Alcatel Lucent (201x).

2.3 Summary and conclusions

The complementary nature of products implies that using one product, also requires the use of the other product. Complementarity is typical for successive wholesale products where one is the building block for the other. For example, in order to produce a bitstream, one needs to combine local access with backhaul services and a core network. Backhaul services can be purchased externally, or one can build its own backhaul network. When backhaul services are purchased externally, they are typically bundled with local access in the form of a wholesale bitstream service.

One cannot apply a SSNIP-test to examine whether local loop access and bitstream access are part of the same relevant market. The reason is that an entrant that would switch from wholesale local access to wholesale central access in response to a 10% increase of the local access price, would still be purchasing the local access service, only now bundled with backhaul services. For the same reason, one cannot simulate a 10% increase of the local access price by a hypothetical monopolist without assuming that the price for wholesale central access increases as well.

In theory, it is possible that local access products are (de facto) unavailable as a stand-alone product. This may be the case when the required investments in backhaul networks are too high and cannot be recouped, given the market share potential of access seekers. (This may be the case, for example,

[19] SWD(2014) 298 p. 40.

[20] WIK (2017) states that *"Wholesale active access is unlikely to be fully functionally equivalent to physical access, because the choice of the exchange equipment lies with the access provider. Control over the active equipment also implies that the access provider has control over the interfaces used to calibrate the service or detect faults."*

in some areas with low household density). In such cases, the conclusion should be that there is no market for the more upstream wholesale local access product(s).

The provision of certain stand-alone local access may also be prevented for technological reasons. For example, physical access at the sub-loop is unavailable when vectoring technology is applied. In such a case, there may be unfulfilled demand for local access which calls for technological solutions. (For example, NRAs have defined a virtual local access product (VULA) which is functionally equivalent to physical local access).

Innovations in virtual access products may make them more and more functionally equivalent to physical access products. However, a difference will always remain between access products offered at the local level and at the central level because of the economies of scale related to investments in backhaul networks. Moreover, anticipated future technological and application developments point to the Metro POP as focal points for network access by alternative operators.

3 Wholesale access in the Netherlands

3.1 Developments of wholesale access products in the Netherlands

VULA in response to the upgrades to FttC, VDSL and Vectoring

The previous chapter described that, following technological developments from ADSL to VDSL and accompanying rollout of fibre to the street cabinet (FttC), access seekers with a presence at MDF locations were initially faced with a choice between rolling out their own fibre-line to the street cabinet or switching to virtual access forms. The subsequent technological development of "vectoring" rules out the first option and access seekers are forced to switch to virtual access forms. The Commission has imposed a responsibility on NRAs to define a virtual access product (VULA) at the local level which is functionally equivalent to physical access.

All these developments also occurred in the Netherlands and KPN has designed an Ethernet based VULA product for which a reference offer is in place and which is used by access seekers such as Tele2. Compared to traditional bitstream, VULA provides much more degrees of freedom / control to the access seeker. Contrary to local loop access, KPN does not offer VULA at the level of the MDF location, but at metro-POP level (at 161 locations).

Based on interviews with a wholesale client in the Netherlands as well as with a major vendor, it was confirmed that it is technically possible for an access seeker using VULA in the Netherlands to offer a WCA product to third parties at national handover points. A conclusion that is confirmed by WIK (2017)[21].

From layer 3 bitstream to layer 2 bitstream

Bitstream access over copper has evolved from a layer 3 (IP) service provided at the national level to a layer 2 (Ethernet) service at the national level. KPN refers to this product as L2NWAP. In the Netherlands, Layer 2 bitstream access can also be purchased at the metro level (L2LWAP), however, this does not provide much more degrees of freedom/control to the access seeker compared to layer 2 bitstream access at the national level. Wholesale prices do not differ very much between L2NWAP and L2LWAP. Moreover, if an access seeker rolls out its backhaul network to the metro-POP, it rather takes VULA than L2LWAP because the first offers more degrees of freedom/control and it is cheaper. In practice, all bitstream access services are purchased at the national level.

The termination of the IP-based bitstream service requires entrants to install their own IP routers at the national hand-over points. As such, the migration from layer 3 to layer 2 bitstream implied a certain level of de-bundling of wholesale access building blocks.

Layer 3 bitstream access to cable networks

ACM (as well as WIK) argues that cable operators could offer a layer 3 bitstream service to third parties. It is, however, not clear whether the cost-base of bitstream cable access allows VZ to charge a price which is competitive to the wholesale prices charged by KPN for L2NWAP (this has not been analysed by ACM or WIK). Moreover, it is questionable whether access seekers are interested in cable bitstream access, considering that access seekers currently active on KPN's network would have to replace all modems installed at consumers premises (CPE), and new entrants choosing for

[21] WIK (2017 p.65) "All these bandwidth profiles in principle can be made available over the VULA products to other wholesale customers also".

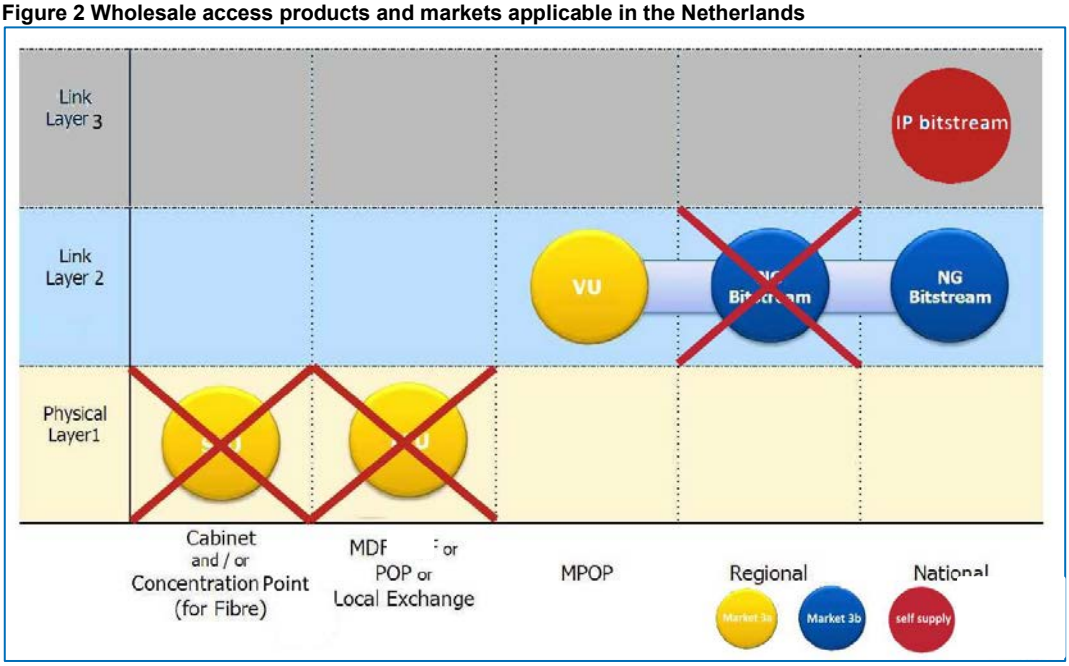
cable access would not have the perspective of advancing to local access (at least not before 2025 according to WIK 2017)[22].

Both the potential high cost-base as well as uncertain demand may make the business case for offering cable bitstream access unrealistic (we elaborate on this section 1).

3.2 Implications for market definitions

The picture that the Commission had in mind during the drafting of the 2014 Recommendation (see Figure 1) does not apply in practice to the Netherlands (nor does it apply to most other EU Member States). In the Netherlands, it looks more like this:

Figure 2 Wholesale access products and markets applicable in the Netherlands



The figure illustrates

- that there is no market for SLU and LLU (at least for delivering mass market consumer products). The primary reason is that there is no demand; either because the necessary investments for alternative operators are too high relative to the revenue/market share potential, or/and because of technological limitations for delivering super high speeds *and* simultaneously offering wholesale access at the same location;
- that there is demand for VULA and that VULA is offered at the level of the metro-POP and not at the local exchange;
- that there is no market for ethernet-based bitstream access at the level of the metro-POP. The primary reason is that the price difference with ethernet-based bitstream at the national handover point is offered for approximately the same price, and because once a party has a presence at the metro-POP location, it will be more economical to use VULA;
- that all parties seeking access at the national handover point, prefer ethernet based bitstream over IP-based bitstream because it offers them more degrees of freedom/control. And, consequently; that
- all IP-based bitstream is self-supplied.

[22] Moreover, according to WIK (2017) it is questionable that such product would support multicast functionality.

4 Entrants' strategies in the B2C market using current wholesale access products

ACM argues that there is one market for wholesale access to networks. In other words, it argues that a notional wholesale offer of IP-based bitstream over cable can be considered a substitute for both KPN's VULA and L2NWAP. We have explained earlier that there are serious methodological limitations to considering KPN's VULA and L2NWAP as part of the same relevant market. We have also explained that these methodological limitations may not necessarily apply to considering IP-based bitstream via cable and KPN's L2NWAP part of the same relevant market. The latter requires a more thorough analysis of the access seeker's business cases for WCA on VZ's network and on KPN's network. This chapter further analyses these business cases.

Due to the earlier reasoning by ACM in 2012 (and later in 2015) underlying the deregulation of the WBA market, a point of attention in our analysis is the functioning of the 'ladder of investments' as well as the ability of access seekers to offer wholesale access in downstream markets based on upstream wholesale access products.

Without prejudice to whether it is technically and economically possible for VZ to offer WCA over cable, we focus our analysis on comparing WIK's business case of an alternative operator pursuing a national strategy using WCA provided by KPN with WIK's business case of an alternative operator pursuing a national strategy using WCA provided by VZ. While discussing the alternative operator's choice between WCA by KPN and WCA by VZ, we also consider the alternative operator's options to further climb the ladder of investment as its market share grows. As such, we also discuss WIK's analysis of the entrant's business case to pursue a national strategy using KPN's VULA[23].

This chapter analyses the business cases using the business case models developed by WIK (2017). We first discuss the assumptions and calculations made by WIK with regard to market demand, potential revenues for the access seeker, costs for the access seeker using WCA, and costs for the access seeker using VULA. Next, we discuss WIK's conclusions in light of the options for access seekers to climb the ladder of investments (and how these conclusions are affected by the assumptions they made, some of which are not in line with reality). Finally, we use WIK's model to analyse the business case of and access seeker providing IP-based bitstream access to third parties, using KPN's VULA as a building block.

4.1 Review of assumptions and calculations by WIK

4.1.1 Customer profiles and retail offerings

Both the costs and the revenues are affected by assumptions made regarding the user profiles on each network. User profiles can be categorised by the dimension of x-play bundles as well as the dimension of download speeds.

In the dimension of x-play bundles, WIK uses single-play (Internet-only), double-play (Internet + voice) and triple-play (Internet + voice + TV) bundles. In the dimension of download speed, WIK uses the following categories: 50Mb/s, 150Mb/s and 300Mb/s. These speeds no longer correspond to the download speeds offered by VZ.

[23] [redacted]

WIK assumes that the distribution of customers across these products is similar for VZ and KPN[24]. We observe that this assumption is flawed. Firstly, VZ offers no subscriptions for internet-only, but always includes a (basic) cable TV (CTV) service. The basic CTV service includes 25 analogue channels, 25 SD channels, 4 HD channels, the Ziggo sports channel, and Ziggo Go for watching these channels online. Secondly, VZ does not offer a double play package of Internet+Voice (as argued by WIK). VZ does offer a double play package of Internet and Interactive TV[25]. Thirdly, compared to KPN, VZ's customers are more likely to purchase 3-play subscriptions of Internet, interactive TV, and Voice.

The Tables below compare consumer profiles (and %-shares) used by WIK for VZ (Table 4-1) with data received from VZ on the actual situation (Table 4-2).

Table 4-1 Customer profiles on cable according to WIK (2017)

	50Mbps	150Mbps	300Mbps
Single Play (Internet)	4.4%	5.5%	1.1%
Double Play (Internet+voice)	8.8%	11%	2.2%
Triple Play (Internet+voice+TV)	26.8%	33.5%	6.7%

Source: WIK (2017)

Table 4-2 Customer profiles on cable according to VZ

[redacted]

Source: company data

Note that VZ's 3-play subscriptions include a few low-end bundles with basic Cable TV, but most 3-play bundles contain more advanced Interactive TV packages. Nearly all double play bundles include Interactive TV. Moreover, as speeds go up (moving from 'Start' to 'Complete' to 'Max'), the Interactive TV packages are enlarged with additional content (movies and series) and functionalities (recording, pausing, catch-up TV, etc.). Using the actual user profiles has the effect of (slightly) raising the calculated blended ARPU of VZ compared to the calculations by WIK. The change has little impact on the wholesale costs of the access seeker compared to the calculations by WIK. However, compared to WIK, the access seeker has higher costs for TV-content.

4.1.2 Revenues for VZ

With regard to retail prices, WIK says it has retrieved information about the prices from the VZ website. However, considering that VZ's actual bundles are dissimilar to the bundles used by WIK, it is not possible for WIK to retrieve prices from the VZ website for the categories they use (these prices simply do not exist). As such it is unclear how WIK has compiled the following table.

Table 4-3 VZ's retail prices (ex VAT) according to WIK (2017)

	50Mbps	150Mbps	300Mbps
Single Play (Internet)	€39.50	€48.00	€56.00
Double Play (Internet+voice)	€53.00	€57.00	€65.00
Triple Play (Internet+voice+TV)	€44.00	€57.00	€72.50

[24] *"Assume same % single/double/triple play as in KPN network"*, see: wca-vula-vfziggo-coax-model.xlsx cell 'Input parameters'!L35

[25] Which includes 77 channels (of which 36 are available in HD) or, for the '*Max*' subscription, 129 channels (of which 50 in HD). The subscriptions also include additional functionalities such as on-demand TV, catch-up TV, etc.

Source: WIK (2017)

WIK states in its report that it corrected retail prices for *"services not considered at the cost side of the calculations like […] content related services […] by the estimated value of that service"*. In other words, WIK states that it has corrected for the additional content and functionalities of the 'complete' and 'max' subscriptions. If we take the retail prices as advertised on VZ's website (not considering temporary discounts) and we apply the same correction for content related services and functionalities, we arrive at the following retail prices for VZ's product categories (see Table 4-4 below).

Table 4-4 VZ's retail prices (ex VAT) according to the VZ website

	40Mbps (start)	200Mbps (complete)	400Mbps (max)
Internet + CTV[26]	€35.95	€42.56	€49.96
Internet + Interactive TV[27]	€38.43	€45.08[28]	€57.48[29]
Internet + Interactive TV+Voice[30] (+Volop bellen)[31]	€48.31	€54.96[28]	€67.36[29]

Source: Ecorys calculations based on information from the VZ website.

The prices in Table 4-4 are all considerably lower than the prices used by WIK (in Table 4-3). Using the actual retail prices has the effect of lowering the calculated blended ARPU of VZ compared to the calculations by WIK.

The section below calculates the net effect of correcting for user profiles (Table 4-2) and retail prices (Table 4-4).

Blended ARPUs

WIK calculates a blended ARPU as follows: *"The ARPU is derived from the prices of the targeted retail market services, the most important product bundles and assumptions about the share of customers of the incumbent that order these products."*

For KPN, WIK calculates a blended ARPU of 48.22 euros/month. Based on the consumer profile shares in Table 4-1 and the retail prices in Table 4-3, WIK arrives at a blended ARPU for VZ of 53.10 euros. When we redo WIK's calculations based on the corrected consumer profile shares in Table

26 https://www.ziggo.nl/internet/vergelijken/.

27 https://www.ziggo.nl/tv-internet/.

28 to correct for the additional content delivered in the 'complete' package we deducted the amount which VZ charges for this when added to the 'Start' subscription (6.95 euros/month including VAT).

29 To correct for the additional content delivered in the 'Max' package we deducted the amount which VZ charges for this when added to the 'Start' subscription (11.95 euros/month including VAT)

30 https://www.ziggo.nl/alles-in-1/

31 For the inclusion of the voice service we have included the price of VZ's additional package 'Volop Bellen' (of around 10.95 euros including VAT) as to account for voice related retail revenues.

4-2 and the corrected retail prices in Table 4-4, we arrive at a blended ARPU for VZ of 50.69 euros/month[32].

The approach followed by WIK (multiplying consumer profile shares by the currently advertised retail prices) ignores the fact that that VZ gives discounts to new customers as well as the fact that most legacy clients have had a contract for many years and consequently pay a (much) lower subscription fee than new clients, while benefitting from capacity improvements over the years. Based on internal company data of VZ, we have been able to establish the true ARPU per product category reflecting the above and arrive at a blended ARPU of [redacted] euros/month (see Table 4-5). In other words, VZ's customer base pays on average [redacted] than VZ's currently advertised retail prices.

Table 4-5 VZ's blended ARPU based on actual figures

[redacted]

Source: company data
Note: the blended ARPU in table 5 is line with the ARPU of Ziggo in the Annual Report 2016, as published by Liberty Global.

We expect that a similar legacy effect is leading to an overestimation by WIK of KPN's blended ARPU. However, we cannot verify this due to a lack of access to KPN's internal company data.

The overestimation of VZ's blended ARPU (and possibly KPN's blended ARPU) may have an impact on the estimation by WIK of the access seeker's revenue potential, as WIK assumes that the access seeker determines its price on the basis of the blended ARPU of the network provider of the wholesale access service.

4.1.3 Revenues for the access seeker

Retail prices of alternative operators

WIK assumes that the alternative operator can realise a blended ARPU that is 10% below the blended ARPU of the respective vertically integrated operator. WIK assumes that this price discount properly reflects the entrant's strategy to gain customers and is based *"on observations in the current pricing of alternative operators of services with comparable packages and line speed"*. WIK does not further elaborate on these observations with examples or underpinning data.

When we compare retail prices on the price comparison website of the Dutch Consumer Association (Consumentenbond), we find the following data on monthly prices and annual costs for different DSL providers.

[32] VZ was not able to split double play subscriptions into Internet+CTV and Internet+Interactive TV. Our calculations assume that all double play subscriptions are Internet+Interactive TV. Consequently, our assessment of the blended ARPU is an overestimation of the actual figure.

Table 4-6 Discounts of alternative DSL operators relative to KPN prices

	Monthly charges						Monthly discounts					
	50 mbps			100 mbps			50 mbps			100 mbps		
	I	I+V	I+V+T	I	I+V	I+V+T	I	I+V	I+V+T	I	I+V	I+V+T
KPN	**€ 39,00**	**€ 40,00**	**€ 50,00**	**€ 44,00**	**€ 45,00**	**€ 55,00**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
Online	€ 30,00	€ 32,50	€ 45,00	€ 32,00	€ 34,50	€ 43,00	-23%	-19%	-10%	-27%	-23%	-22%
T-mobile	€ 27,50	€ 30,00	€ 39,00				-29%	-25%	-22%			
Tele2	€ 28,00	€ 33,00	€ 41,00	€ 30,00	€ 35,00	€ 43,00	-28%	-18%	-18%	-32%	-22%	-22%

	Annual costs						Annual discounts					
	50 mbps			100 mbps			50 mbps			100 mbps		
	I	I+V	I+V+T	I	I+V	I+V+T	I	I+V	I+V+T	I	I+V	I+V+T
KPN	**€ 444,00**	**€ 456,00**	**€ 540,00**	**€ 504,00**	**€ 516,00**	**€ 600,00**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
Online	€ 360,00	€ 360,00	€ 400,00	€ 384,00	€ 384,00	€ 486,00	-19%	-21%	-26%	-24%	-26%	-19%
T-mobile	€ 360,00	€ 390,00	€ 438,00				-19%	-14%	-19%			
Tele2	€ 361,00	€ 421,00	€ 493,00	€ 385,00	€ 445,00	€ 517,00	-19%	-8%	-9%	-24%	-14%	-14%

Source: https://www.consumentenbond.nl/alles-in-1/vergelijker
Note: the difference between monthly charges and annual costs is that the latter includes (temporal) discounts and promos

From this data we conclude that, on average, alternative operators offer a discount of 23% relative to KPN's monthly charges and a discount of 18% relative to the annual costs for an end-user of a KPN subscription. It follows that, based "*on observations in the current pricing of alternative operators of services with comparable packages and line speed"*, WIK should have used **a discount of around 20%** rather than a discount of 10% relative to the advertised prices. This seems logical considering that the analysis above shows that [redacted] (The same may apply to KPN). W[redacted]. If the alternative operator aims to gain market share, it would have to offer a higher discount on the currently advertised prices to be able to compete effectively at the actual retail price level.

Taking VZ's blended ARPU based on advertised prices (50,69 euros) as a benchmark, the blended ARPU for the access seeker on VZ's network would be 20% lower at 40.55 euros per month per subscriber (rather than 47.80 euros as calculated by WIK). Similarly, taking KPN's blended ARPU based on advertised prices as a benchmark (48.21 euros), the blended ARPU for the access seeker on KPN's network would be 20% lower at 38.57 euros per month per subscriber (rather than 43.40 euros as calculated by WIK).

We conclude that WIK has overestimated the revenue potential of the access seeker. This conclusion applies to WIK's assessment of the access seeker's business case when using WCA over VZ's network, as well as to WIK's assessment of the access seeker's business case when using WCA over KPN's network.

4.1.4 Costs for the access seeker using WCA products

The costs for the access seeker presented in WIK's public report are slightly different from the costs calculated in the accompanying public Excel model. The outcomes of the public Excel model differ because the values of some input parameters have been changed for confidentiality reasons. The changes are minor and we can still use the public Excel model to evaluate WIK's work.

Comparing the results from WIK's report and its (public) Excel model

With regard to the total monthly cost per subscription, we conclude from the public report that WIK has calculated the following values:

- [redacted]euros / month using KPN WCA[33]
- [redacted]euros / month using VZ WCA[34]

The costs resulting from WIK's public Excel model are approximately [redacted]euros higher[35].

Total costs consist of wholesale costs and other costs incurred by the access seeker (such as retail costs and investments in CPE). These cost categories can be further sub-divided. We assume that the relative shares of each of these cost categories is the same in the public and the confidential version of the Excel model.

With regard to wholesale costs for WCA, WIK assumes that:

- VZ applies a tariff structure that is similar to KPN's tariff structure;
- on aggregate, the tariff structure entails:
  - costs for colocation, line rental, and traffic costs,
  - one-off costs for connection, disconnection, etc.;
- VZ would charge (approximately) similar prices for each element in the tariff structure;
- VZ would not offer a 15% volume discount as does KPN for its national WCA product;
- total wholesale costs form about 60% of total costs[36].

With regard to the other costs for the access seeker, WIK makes several assumptions that result in slight differences between cable and copper access, however these differences partly cancel each other out[37]. In sum, monthly costs other than wholesale costs are about [redacted] euros (per access line) higher on cable compared to copper[38].

Table 4-7 and Table 4-8 below summarise the results from WIK's public model for VZ and KPN respectively, and present the results from WIK's confidential version, derived on the basis of %-shares.

Table 4-7 Cost structure of the alternative operator with 2% market share using VZ's network

	Public Excel model		Confidential Excel model (values derived based of %-shares)
	monthly costs	% of total costs	monthly costs
Average monthly costs/subscription	**42.04**	**100%**	[redacted]
Total wholesale costs	*25.48*	*60.6%*	
Colocation	0.51	1.2%	
Line rental	24.97	59.4%	
One-off	0.79	1.9%	
Access line	19.13	45.5%	
Transport	5.05	12.0%	
Total non-wholesale costs	*16.55*	*39.38%*	
Total own network and equipment costs	5.07	12.1%	
Total voice termination costs	1.22	2.9%	

33 [redacted]

34 [redacted]

35 In the public version of the Excel model the corresponding values are 37.40 euros/month for KPN WCA and 42.03 euros/month for VZ WCA.

36 In WIK's public Excel model, total wholesale costs form 58% of total costs on copper and 60.6% of total costs on coax.

37 At least, this is the case in the public version of WIK's Excel model.

38 [redacted] €/m compared to 15.70 €/m in WIK's public Excel model

Total retail costs	6.02	14.3%	[redacted]
Total other costs	3.45	8.2%	
Total common costs	0.79	1.9%	

Table 4-8 Cost structure of the alternative operator with 2% market share using KPN's network

	Public Excel model		Confidential Excel model (values derived)
	monthly costs	% of total costs	monthly costs
Average monthly costs/subscription	**37.40**	**100%**	[redacted]
Total wholesale costs	*21.70*	*58%*	
Colocation	0.51	1.4%	
Line rental	21.19	56.7%	
One-off	0.80	2.1%	
Access line	15.90	42.5%	
Transport	4.50	12.0%	
Total non-wholesale costs	*15.70*	*41.97%*	
Total own network and equipment costs	5.36	14.3%	
Total voice termination costs	1.76	4.7%	
Total retail costs	5.47	14.6%	
Total other costs	2.36	6.3%	
Total common costs	0.75	2.0%	

Calculating the cost for corrected user profiles and retail prices

The above comparison of costs depends on the assumption that VZ's customer profiles are the same as KPN's. Using the actual data on user profiles slightly lowers the wholesale costs with [redacted] euros/month and slightly raises the access seeker's own costs (for TV servers, TV content, and common costs) with [redacted] euros/month per access line. The net effect on the access seeker's total costs of correcting the user profiles in WIK's public (non-confidential) model is an increase of [redacted] euros/month per access line.

In WIK's model, the access seeker's retail costs are a function of its revenues. Using the corrected data on retail prices and using the corrected factor of 20% by which the access seeker undercuts VZ's advertised retail prices (the discount factor), lowers the access seeker's retail costs by [redacted] euros/month per access line. Moreover, the change in the access seeker's retail prices lowers 'common costs' by [redacted] euros/month per access line. The net effect on the access seeker's total costs of correcting the access seeker's retail prices in WIK's public (non-confidential) model is a decrease of [redacted] euros/month per access line. Similarly, for the access seeker using KPN's network, retail and common costs go down because its revenue potential on KPN's network is lower. Retail and common costs go down with [redacted] euros/month per access line when using WCA over copper.

In sum, adjusting user profiles, correcting advertised retail prices, and correcting the discount factor, results in a decrease of the access seeker's total costs on VZ's network by [redacted] euros/month per access line[39], and by [redacted] euros/month per access line on KPN's network. We assume that the impact of using alternative user-profiles is the same in the public and confidential models. It follows that total monthly costs per subscription for the alternative operator using WCA on VZ's network **decrease to [redacted] euros / month** (from [redacted] euros / month). Its total monthly costs per subscription using WCA on KPN's network **decrease to [redacted] euros / month** (from [redacted] euros / month.

We conclude that WIK (slightly) overestimates the costs for the access seeker.

[39] Some rounding differences

4.1.5 *Costs for the access seeker using KPN's VULA*

WIK concludes that the monthly wholesale costs for VULA are only slightly lower than the monthly wholesale costs for WCA. This is a wrong conclusion based on a misinterpretation of KPN's tariff schemes for VULA.

In the public version of the model, WIK calculates that the monthly wholesale costs incurred by the access seeker when using VULA by KPN are 19.38 euros. However, WIK overestimates the costs of transport by misinterpreting KPN's wholesale tariffs for transport. KPN's wholesale tariffs for transport are 7500 euros/month *per 10Gbps steps measured cumulatively on all LWAP's*. WIK wrongly multiplies the transport charges by the number of metro-POPs to which the entrant has rolled out (with a maximum of 161), rather than the cumulative capacity on all metro-POPs.

From WIK's public Excel model it follows that an access seeker with 2% market share has around 170.000 subscribers requiring a joint traffic capacity of approximately 41 Gbps. As such, the monthly transport charges are 5 x 7500 euros (KPN's wholesale tariff is charged per 10Gbps, so this is required 5 times to meet the joint traffic capacity of 41Gbps). In the public version of WIK's Excel model, WIK calculates transport charges by multiplying 7500 euros by 161 metro locations. This results in overestimating the costs for transport by a factor of 32.

Correcting for this mistake results in total monthly wholesale charges when using VULA on KPN's network of **12.51 euros/month** rather than 19.38 euros/month. Table 4-9 below compares the results of WIK's original calculations with the results of the model after correcting the calculations for transport costs.

Table 4-9 Wholesale costs for VULA, comparing original model with model corrected for transport costs

	Original model	Corrected model
	monthly costs	monthly costs
Total wholesale costs	*19.34*	[redacted]
Colocation	0.75	
Line rental	18.59	
One-off	2.04	
Access line	9.50	
Transport	**7.04**	

We conclude that WIK's assessment of the access seeker's business case when using VULA over KPN's network (considerably) overestimates the costs for the access seeker. The reason is that WIK has made a calculation error in its model regarding the costs for transport.

4.2 Review of the conclusions drawn by WIK

The section below analyses how the previous review of WIK's assumptions and calculations impacts on the access seeker's options to climb the ladder of investment. An entrant would have to choose between wholesale central access by VZ and KPN. This choice is based on a) the net margin for the access seeker using WCA by VZ relative to the net margin for the access seeker using WCA by KPN; and b) on the net margin for the access seeker using VULA by KPN once it has surpassed a certain market share threshold. We analyse a) and b) separately in sections 4.2.1 and 4.2.2. Because

choices a) and b) are interrelated they jointly determine the degree of substitutability between WCA via cable (based on IP) and WCA via copper (based on Ethernet).

4.2.1 *Entry at national level: choosing between cable and copper*

At the national hand-over points, KPN no longer offers IP-based bitstream but only offers Ethernet based bitstream (WBA NWAP). Entrants must install their own equipment to link to the IP network layer. VZ does not offer bitstream access to other parties. WIK concludes that it is technically possible for VZ to offer an IP-based bitstream service to other parties at national hand-over points. Entrants would depend on VZ to install equipment for linking to the IP layer. WIK has not examined whether there is also an economically viable business case for VZ to offer wholesale bitstream access.

VZ's hypothetical IP-bitstream product could be considered an alternative for the IP-bitstream that DSL competitors supply themselves, using KPN's Ethernet bitstream as a wholesale input. However, it is not the case that L2-bitstream via copper is a building block for L3-bitstream via cable. As such, a hypothetical monopoly test concerning copper and cable bitstream access is not necessarily at odds with competition law. It follows that when there is a business case for VZ to offer bitstream to an external party, it is possible that the different wholesale products of KPN and VZ exert direct competitive pressures on each other, such that they may be considered as part of the same relevant market.

According to WIK, an entrant with a 2% market share and pursuing a national strategy realises a 2.4%-points higher net margin using KPN's WCA services (16.8%) compared to using VZ's WCA services (14.4%); see figure below.

Table 4-10 Overview of WIK's tested business case scenarios and their respective possible margins

Scenarios	Margin (for base case of 2% market share)
1) National coverage with WCA KPN Copper & Fibre network	16.8%
2) National coverage with VULA KPN copper network	12.8%
3) Regional coverage with VULA KPN copper network	17.4% With 10 largest access points connected
4) Complete network coverage with Fibre LLU KPN fibre network	-55.6%
5) Partial network coverage with Fibre LLU KPN network	-25.8% With 10 largest access points connected
6) National coverage with WCA for VodafoneZiggo coax network	14.4%
7) National coverage with VULA for VodafoneZiggo coax network	-11.9%
8) Regional coverage with VULA for VodafoneZiggo coax network	18.1% With 10 largest access points connected

The colours indicate the level of margin possible; dark green for stark positive to dark red for stark negative.

Source: WIK (2017)

WIK argues that this conclusion is based on its assumption that VZ does not offer a 15% volume discount, such as offered by KPN[40]. Without this discount, the business case of the access seeker on KPN's network would result in a lower net margin compared to cable[41].

[40] WIK (2017, p. 2) "The lower margin for the coax business case is explained by the significant volume discount (15%) on KPN's WCA service, which is applicable for KPN's copper network only."

[41] [redacted]

However, as pointed out above, WIK has made some assumptions that are wrong, and which affect the conclusions on the net margins:

1. WIK assumes that consumer profiles on cable are like those on copper. As discussed above, this assumption does not hold in practice.
2. WIK used wrong data on VZ's advertised retail prices.
3. [redacted].
4. WIK assumes that alternative operators undercut the price benchmark (i.e. the advertised retail prices of the respective vertically integrated operator from whom they purchase the WCA service) by 10%. We have shown that this percentage is in reality closer to 20% (see section 4.1.3).
5. From 3. and 4. it follows that the blended ARPU for an alternative operator on VZ's network should be [redacted]euros/month (rather than [redacted] euros/month), and on KPN's network it should be [redacted] euros/month (rather than [redacted] euros/month).
6. After correcting for the differences in user profiles on cable, using the correct data on retail prices, and applying the correct discount factors by access seekers, the alternative operator's costs of WCA over cable decrease with [redacted]% (or [redacted] euros / month per line, from [redacted] to [redacted] euros/month per line – see section 4.1.4). The alternative operator's cost of WCA over KPN's network go down with [redacted]% (or [redacted] euros/month per line, from [redacted] euros/month to [redacted] euros/month – see section 4.1.4).

From 5. and 6. it follows that the net margins for the alternative operator are as follows

- [redacted]% when using KPN WCA[42]
- [redacted]% when using VZ WCA[43]

We note that the positive business case for alternative operators when using WCA provided by KPN heavily relies on the 15% discount offered by KPN[44]. The question is then whether VZ would be able to offer a similar discount[45]. WIK assumes that this is not the case[46]. We find this assumption appropriate as VZ would need to make changes to the network and the organisation involving a considerable increase of CAPEX and OPEX[47]. Without a discount, we conclude that the business case for an access seeker to offer a retail product on the basis of WCA over cable is negative and that demand for WCA over cable is likely non-existent.

4.2.2 *Advancing to metro level for VULA*

From the previous analysis it follows that, depending on whether VZ is able to offer a 15% volume discount, the natural entry point for an entrant is either KPN's L2NWAP or VZ's IP-bitstream. However, the latter option does not allow for the entrant to climb the ladder any further. Using KPN's L2NWAP allows for rolling out to the KPN's metro-pops and delivering a broadband service using KPNs L2LWAP or VULA. The business case for L2LWAP is non-existing because it will always be

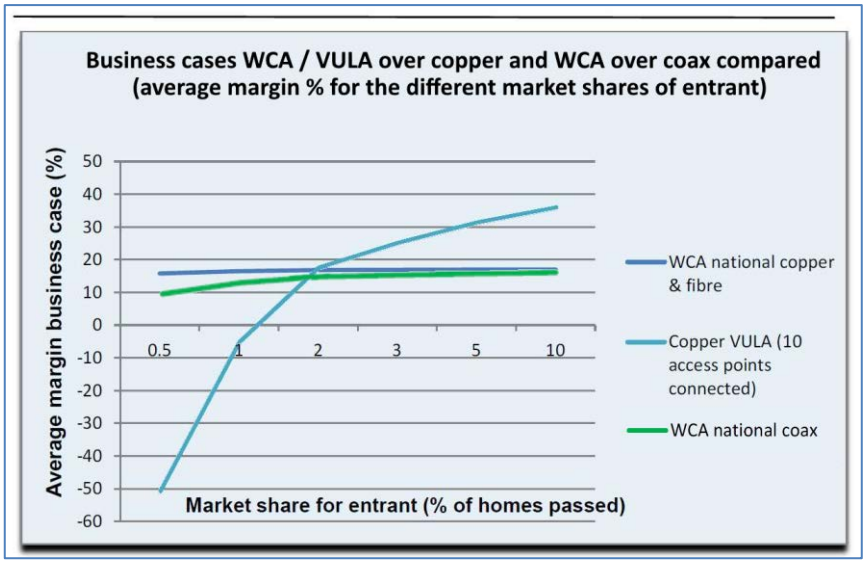
42 ([redacted]
43 [redacted]
44 [redacted]
45 [redacted].
46 WIK (2017, p. 2) "*The lower margin for the coax business case is explained by the significant volume discount (15%) on KPN's WCA service, which is applicable for KPN's copper network only.*"
47 In chapter 3 we assess the size of these incremental CAPEX and OPEX related to the provision of WCA over cable.

more economical to purchase a VULA product at the local level and it provides more degrees of freedom/control for the alternative operator.

Rolling out to the local level for the purpose of VULA, increases the entrant's own network costs as the entrant needs to invest in fibre lines to the metro-locations and to install its own equipment at the metro locations. In return, the entrant benefits from lower wholesale costs and increased functionalities. This gives rise to scale economies such that the investments are only profitable if the entrant has reached a certain scale.

WIK concludes that for an entrant with a market share of above 2%, it is profitable to invest in rolling out its network to the metro locations of KPN, as it can realise a higher net margin using KPN's VULA services compared to using KPN's WCA services as well as compared to VZ's WCA services. (See Figure 4-1 below).

Figure 4-1 WIK's comparison of the entrant's business cases for WCA and VULA using KPN's and VZ's network



Source: WIK (2017)

The above conclusion on the threshold market share of 2% is affected by the overestimation of transport costs (see section 4.1.5 above), the underestimation of the discount offered by alternative operators relative to the incumbent's retail price, as well as by the assumptions made on user profiles on cable networks. Correcting for these mistakes, WIK's Excel model shows that the business case for VULA access becomes positive at much lower market shares. Based on the results from the public

Excel model[48], we conservatively estimate that WIK's conclusions would have to be adjusted as in the Figure 4-2 below[49].

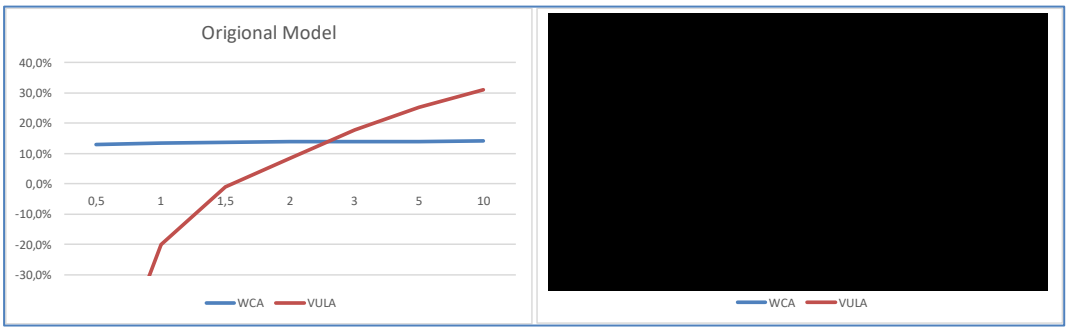
Figure 4-2 Adjusted comparison of the entrant's business cases for WCA and VULA using KPN's and VZ's network

Source: adjusted from WIK (2017)

It follows that a new entrant aiming for a future market share of 2% will always choose for WCA over copper rather than for WCA over cable. This conclusion is reached not only from the observation that the net margin for WCA over cable is very low for all market shares, but also from the fact that choosing WCA over copper allows the entrant to migrate to VULA and realise a much higher net margin once it has passed the 1% market share threshold[50].

[48] In WIK's public Excel model (using some alternative values for certain input parameters), the business case for a national VULA roll-out becomes positive at a market share of more than 2,5% (see left panel in figure below). After correcting the mistake related to transport pricing, the VULA business case for a national VULA roll-out already becomes positive at a market share of 1%. (see right panels in the figure below).

Net margins WCA/VULA over copper compared for different % market shares



WIK (2017) Ecorys using a corrected version of WIK's model

[49] Conservative in the sense that the analysis using WIK's public Excel file indicates that correcting the mistake leads to a 1.5%-point decline of the threshold market share while Figure 4-2 assumes that the effect is only 1%-point.

[50] Even if VZ could offer a 15% volume discount, the entrants business case for WCA over copper remains superior despite the lower net margin, because it can migrate to VULA and once the entrant has surpassed a market share of ~1%.

4.3 Provision of wholesale access products to third parties

For a party with a presence at the metro-POP, it is technically possible to use KPN's VULA product for offering third parties an IP-based WBA product for internet access at national level. This follows from the observation that similar strategies using ULL-access as a building block have been observed in the past (e.g. by BBNed and Tele2) and formed the basis for OPTA's decision in 2012 to deregulate the WBA market (5/2007). VULA, being functionally equivalent to ULL, can in principle be a similar building block. This has been confirmed during interviews with a wholesale client in the Netherlands as well as with a major vendor. Also, WIK (2017) indicates that VULA can be a building block for offering WBA to third parties[51].

We analyse below whether this is also economically feasible, using WIK's model for WCA and VULA on KPN's copper network:

- Firstly, we make the necessary correction in the model concerning the transport component in the VULA module (see section 4.1.5) and we make the correction with respect to the percentage with which an entrant undercuts the blended ARPU of KPN (see section 4.1.3);
- Secondly, we set the market share of alternative operator A with a presence at the metro-POP at 5%[52]. This provides information on the retail revenues of the alternative operator and the costs for its retail services;
- Thirdly, we assume that alternative operator A decides to offer WCA to third parties for a price which is 10% below the price charged by KPN for WCA. KPN's wholesale price is 20.90 euros/month (see Table 4-8 in section 4.1.4). Hence A charges a wholesale price of 18.85 euros/month. Consequently, total costs for the third party decrease from [redacted] euros/month (see section 4.1.4) to [redacted] euros/month.
- Fourthly, we set the market share of the alternative operator A in WIK's VULA module to 7% and 9% to estimate the increase in wholesale and own costs that A would have to incur for offering WCA to third parties with a joint market share of 2% and 4% respectively. We exclude the increase in CPE equipment, as these costs will have to be borne by the third party[53];
- Finally, we assume that, in order to facilitate this strategy, the alternative operator needs to prepare its operations and network for third party access, including the OSS/BSS systems and setting up a wholesale department. We assume that this requires an investment of 20 million euros[54] which the alternative operator aims to earn back over a period of 5 years, assuming a discount rate equal to the costs of capital[55]. This requires an additional monthly revenue stream of ~315 thousand euros, which needs to be recovered from A's wholesale revenues[56].

The table below presents the results of the analysis.

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51 WIK (2017 p.65) "All these bandwidth profiles in principle can be made available over the VULA products to other wholesale customers also".

52 This is the lower bound of the estimated market share of Tele2 in the Netherlands (see ACM's telecom monitor).

53 Likely we should exclude more costs, like (parts of) Core network costs, Costs for voice specific network equipment, IPTV & VCAS server costs, and IP transit costs. By not excluding (parts of) these costs, our estimate likely overstates the own network costs that A has to incur for offering WCA to third parties.

54 This figure is based on interviews with operators in other Member States which have (relatively) recently been mandated to provide wholesale access to other parties.

55 Using a WACC of 4.5%, which is a conservative estimate based on what ACM uses for KPN's copper network. ACM uses a higher WACC of 6.5% for KPN's fibre network and VZ uses an even higher WACC for internal accounting purposes.

56 This value may be overestimated for parties like Tele2 who already have OSS/BSS systems in place for providing wholesale access to third parties in the B2B market. B2B solutions are more customised to clients' needs which makes that the OSS/BSS system is equipped to deal with a great variety of wholesale solutions. The costs of integrating a mass market bitstream product into these systems may be substantially lower than the 20 million we use in the calculations.

Table 4-11 economic feasibility of reselling wholesale access to third parties

	No wholesale		Wholesale clients with 2% joint market share		Wholesale clients with 4% joint market share	
Retail lines		426.056		426.056		426.056
Wholesale lines				172.235		344.471
Retail revenues	15.777.737	37,03	15.777.737	37,03	15.777.737	37,03
Wholesale revenues			3.246.638	18,85	6.493.277	18,85
Wholesale costs for retail	5.007.965	11,75	5.007.965	11,75	5.007.965	11,75
Wholesale costs for wholesale[1]			1.916.884	11,13	3.833.768	11,13
Own costs retail	6.859.041	16,10	6.859.041	16,10	6.859.041	16,10
Own costs wholesale[2]			341.085	1,98	681.453	1,98
Set up costs[3]			315.510	1,83	315.510	0,92
Retail profits	3.910.732		3.910.732		3.910.732	
Wholesale profits	-		673.159		1.662.546	
Total profits	3.910.732		4.583.891		5.573.278	
Retail margin	24,8%		24,8%		24,8%	
Wholesale margin			20,7%		25,6%	
Total margin	24,8%		24,1%		25,0%	

1 Total wholesale costs for VULA with 7% (respectively 9%) market share – total wholesale costs for VULA with 5% market share

2 Total own costs for VULA with 7% (respectively 9%) market share, excluding costs for CPE – total own costs for VULA with 5% market share, exclusing costs for CPE

3 Required monthly stream of income over 5 years which adds up to a net presesnt value of 20 million euros

It appears to be an economically viable option for alternative operator A to enter the WCA market and offer third parties a discount of 10% relative to KPN's wholesale price. The net margin on A's wholesale operations exceeds 20% when the joint retail market share of operator A's wholesale clients is 2%. The net margin on A's wholesale operations increases as the joint retail market share of its wholesale clients grows.

For smaller third parties, it is interesting to make use of the offer by alternative operator A, for the net margin of an access seeker with 2% market share improves from 8% to 13.5%[57].

The threat of alternative operator A entering the market for WCA services based on VULA, imposes a competitive constraint on KPN's WCA prices. In practice, this may result in KPN offering higher rebates (than the 15% currently offered) during negotiations with individual wholesale clients who seek access at the national handover point. If there were a risk for dominance in the WBA market, the potential entry by operator A would remove that risk (provided VULA prices are regulated).

57 Retail prices for the third-party access seeker are 38.57 euros/month (20% below KPN's retail prices) and its costs are 33.38 euros/month per line. The net margin is therefore (38.57– 33.38) / 38.57 = 13.5%

5 Summary and conclusions

Chapter 2 analyses the conditions under which successive wholesale markets may be considered part of the same relevant market. The methodology set out in chapter 2 boils down to two basic rules:

- **Rule 1**: Wholesale products that are each other's building blocks cannot belong to the same relevant market because an entrant that uses one product, also uses the other product.

  For example: WBA = LLU + backhaul services. This means that an entrant using LLU access must produce the backhaul service itself; and the entrant purchasing WBA access products purchases bundles of LLU and backhaul services. A SSNIP-test between LLU and WBA is therefore not possible, because the access seeker cannot evade the SSNIP by switching from LLU to WBA.

- **Rule 2**: for practical reasons one can make an exception to rule 1 when the market (i.e. demand and/or supply) for stand-alone upstream wholesale products no longer exists because the wholesale client cannot (for technical and/or economic reasons) produce its own downstream services and can only purchase downstream services from the incumbent that also offers the upstream service.

  For example, following the upgrade of (parts of) the copper network to an FttC architecture, demand for LLU access may disappear (at those locations) because access seekers can no longer effectively compete on the basis of LLU access. Demand for SLU access may be absent due to the poor economies of density at the street cabinet and, following the introduction of vectoring technology, also supply of SLU access may be absent. At location A, where the copper network has been upgraded to an FttC architecture, there may thus no longer be a market for LLU and SLU access. Instead, demand and supply for wholesale local access at location A are focussed on VULA. At location B, where the copper network has not been upgraded to an FttC architecture, demand for LLU access remains[58]. In this situation it would be unpractical to define a separate market for LLU at location B and a separate market for VULA at location A.

The inclusion of SLU, LLU and VULA in the same relevant wholesale market is consistent with the above rules. The same cannot be said for bitstream access provided at a central (i.e. national) handover point.

Innovations in WCA products (such as a possible development of VUCA) may make WCA products more functionally equivalent to WLA products. However, differences will always remain between access products offered at the local level and at the central level. First, because of the economies of scale in backhaul networks. The analysis in chapter 4 of the business cases of access seekers confirms that, all else being equal, an access seeker enters the market on the basis of WCA and climbs the ladder of investment to VULA as it gains market share. Secondly, WLA products can be used by access seekers for offering WCA services to third parties. Chapter 4 confirms that KPN's wholesale prices for WCA services is constrained by potential entry in the WCA market by access seekers with presence at the metro-POPs. Thirdly, anticipated technological and application developments point to the Metro POP as focal points for network access by alternative operators, CDN operators, and providers of advances services in the context of Industry 4.0.

[58] And at location that are connected to an FttH network, demand for local access is focussing on ODF access.

All in all, we conclude that access technologies have evolved, but not to such extent that the market for WLA and WCA services have merged into a single market for wholesale access. VULA and L2NWAP remain successive wholesale building blocks for which separate market exists. ACM's previous conclusion that the regulation of WLA makes the WCA market effectively competitive (or at least contestable) remains valid.

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