Investigation into access and interoperability standards for the promotion of the internal market for electronic communications

EXECUTIVE SUMMARY

A study prepared for the European Commission
DG Communications Networks, Content & Technology by:

wik CONSULT

TNO innovation for life

Digital Agenda for Europe

This study was carried out for the European Commission by

Authors: Ilsa Godlovitch, WIK-Consult   Pieter Nooren, TNO
Thomas Plueckebaum, WIK-Consult   Bas Gerrits, TNO

Contributors:
Peter Kroon, Wolfgang Kiesewetter, Stefano Lucidi,
Sylvie Dijkstra-Soudarissanane, Jennifer Silió Mantilla

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Abstract

This study investigates the supply and demand conditions for active wholesale access products across the EU in order to understand (i) whether there is a case for standardised wholesale products across the EU, and if so (ii) what would be the best mechanisms to achieve this. Evidence was gathered through various means including an online survey, benchmarking and theoretical models.

Key conclusions are that common specifications for wholesale products (amongst other factors) could support the transition from legacy to modern high-speed broadband services by reducing the 'time to market'. They could also improve provisioning conditions, quality and consistency for multi-national business customers.

In the short term, attention should be given to ensuring a common understanding concerning the specification of VULA and Ethernet bitstream and addressing concerns over service levels for Ethernet leased lines, potentially through a Commission Recommendation. In the longer term, one option could be to provide for a streamlined set of standardised wholesale products and minimum service standards under the EU telecom framework. The Commission could also engage with standards bodies to encourage commercial standards that are likely to aid interoperability for current and potential future wholesale products and promote the usage of such standards in Reference Offers.

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Executive summary

I.I   The aims of the study

Completing the internal market for electronic communications by fostering cross-border entry and pan-European services is one of the core objectives of the EU Framework for electronic communications[1]. However, previous studies[2] suggest that Europe is not yet taking full advantage of this opportunity, with a patchwork of coverage and product standards.

In this study we investigate the supply and demand conditions for active wholesale access products across the EU in order to understand (1) whether common specifications for these or future products could play a role in breaking down national barriers and boosting high speed broadband for consumers and businesses, and (2) if so – what might be appropriate mechanisms to achieve this.

I.II   The scope of our investigation

The main focus of this study is on whether there should be more harmonisation and/or standardisation in the provision of 'next generation' *active* wholesale products which include Ethernet bitstream (including VULA), IP bitstream[3] and Ethernet Leased Lines (as defined in section 2.5). The study also draws on these current cases to reach wider conclusions about how interoperability of future wholesale access products may best be fostered in Europe's internal market for the future.

The study covers both regulated and commercially available wholesale products, with specific attention to the technical, procedural and service level characteristics of these products, but not pricing. The research focuses on active wholesale access products, because these are relevant for cross-border business communications and for NGA, in cases where physical unbundling is not economically or technically viable. Because active products are more complex than physical access, they are also susceptible to significantly greater variations in definition and capabilities, which can affect coherence across the single market. The analysis of the effects of harmonisation could however also apply in principle to other products including any passive products that are or might become core to achieving competition and interoperability in broadband services.

Harmonisation and standardisation are related, but are not the same. Standards normally consist of common specifications developed by industry bodies, but are not of

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1 Article 8(2) Directive 2002/21/EC as amended by Directive 2009/140/EC
2 These studies include EC (2013) Steps towards a truly internal market, EC (2013) Future electronic communications markets subject to ex ante regulation
3 Although IP Bitstream was investigated in the context of the study, the majority of access-seekers responding to the online survey and through interviews indicated that when using active access, Ethernet was preferred

themselves mandatory, unless made so by regulatory bodies or embedded in contracts. Harmonisation refers to initiatives by public authorities to encourage or mandate common specifications.

Figure 1:   The relationship between harmonisation and standardisation
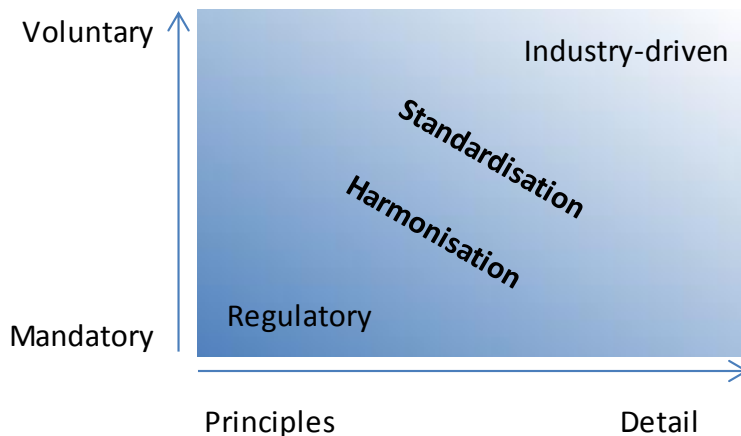
Most often (although not always), harmonisation deals with principles and outcomes, while drawing on the considerable expertise within the industry. Standards may cover specifications and methods in considerable detail, but also leave choices open between variants and parameters.

I.III   Methodology

Our approach to analysing the key questions for the study has been based on a four step approach:

1. **State of play (sections 5 and 6):** we analysed the current status of wholesale supply of the researched active wholesale products by conducting a benchmark based on an analysis of Reference Offers in 10 EU-countries supplemented by the results of a questionnaire to NRAs. We also compiled data concerning the take-up of legacy and 'next generation' business and residential services to assess the speed of transition towards higher bandwidth technologies.

2. **Supply and demand forecasts (section 7)**: using a theoretical model drawing on real world observations, we forecast take-up of retail NGA services under the status quo and under alternative scenarios in which alternative operators using wholesale access converted customers from standard broadband to NGA at the same rate as incumbents. We cross-checked these findings against evidence of the effects of a harmonised approach to LLU on take-up in the early deployment phase of broadband. We also assessed how greater conversion to

Ethernet from traditional leased lines (to match existing best practice in the EU) would affect the broadband speeds experienced by business end-users.

3. **Feasibility of common specifications (section 8)**: Based on feedback from stakeholder engagement and the results of the assessment of the 'state of play', we identified candidate areas for common specifications and assessed the scale of likely benefits (drawing on section 7) as well as the potential costs of pursuing mandatory EU-wide harmonisation. In areas where costs were found to outweigh benefits, we also identified approaches which might mitigate costs, and recalibrated the identified options and cost benefit assessment on this basis.

4. **Recommended processes for harmonisation (section 9):** In this section we identified various options for harmonisation ranging from pure commercial standards through to legislative obligations and discussed the associated roles for regulatory bodies and standards organisations. We concluded with an inception impact assessment in which the effectiveness, efficiency, coherence and EU value add of each of the options was evaluated in light of similar previous experience and stakeholder feedback.

Throughout the process, we drew on the extensive input provided through various stakeholder activities. This included:

- An online survey with 26 respondents (including the 3 major trade associations) conducted during March 2015;

- 14 stakeholder interviews;

- Two private workshops involving (i) business end-user associations and corporate end-users on 21 May and (i) BEREC, NRAs and standards organisations on 10 June; and

- A public workshop held on 8 July 2015 which received 36 registrations

A description of the results of the online survey and feedback given by stakeholders, standards bodies and BEREC is available in chapter 4.

I.IV   The importance of the internal market for consumers and businesses

The internal market for electronic communications has the potential to bring substantial benefits to European businesses and society as a whole.

According to UN agency UNCTAD, half of the world's most significant multi-national corporations are headquartered in Europe. Larger businesses (with >250 employees) which either have or could develop a cross-border dimension also play a significant role in the economy, representing 17% of EU turnover, 21% of value added, and 29% of

employment in 2012[4]. Improvements in ICT which increase the productivity of these businesses, could therefore be expected to have a significant economic impact. Previous surveys[5] as well as feedback from end-users gathered for this study highlight that most large businesses prefer a 'one-stop-shop' for electronic communications which offers cross-border seamless connectivity. However, many have problems in meeting their communications needs within the fragmented European landscape.

Although consumers buy telecom services in national or even local markets, they have also benefited greatly from the single market for electronic communications. For example, EU approaches to foster market entry and broadband competition based on local loop unbundling, alongside infrastructure-based competition from cable, may have contributed to making Europe one of the leading regions in the world for broadband connectivity today[6].

I.V   The threat of refragmentation

It is notable that many of Europe's previous successes in the telecom sector have been associated with common or standardised approaches. Local loop unbundling was mandated through an EU Regulation[7] and supported by ETSI standardisation efforts. Efforts by the GSMA and 3GPP contributed to the economies of scale in mobile networks, services and devices that we are accustomed to today. Meanwhile, decades-old standards developed for traditional leased lines supported the expansion of the Internet and the interconnectivity of businesses worldwide.

Technological developments such as Next Generation Access and Ethernet Leased lines have brought increased speeds and significant benefits to consumers and businesses. However, these technological developments, alongside the emergence of regionalised investments (for example by municipalities or regional investors, sometimes in the context of state aid) have resulted in a *refragmentation* of wholesale product offerings, especially in the network access segment, with potential consequences for competition and for the interoperability of services.

Future technological developments including Software Defined Networks (SDN), Network Function Virtualisation (NFV) and fibre networks based on Wave Division Multiplexing (WDM) present the prospect of further fragmentation in the nature and

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4   Eurostat Structural Business Statistics – main indicators – accessed June 2015
    http://ec.europa.eu/eurostat/web/structural-business-statistics/data/main-tables
5   See for example, ERG Report on the regulation of access products necessary to deliver business connectivity services
    http://berec.europa.eu/doc/publications/2009/erg_09_51_business_services_paper_final.pdf. WIK (2013) Business Communications, Economic Growth and the Competitive Challenge
6   A report by the Broadband Commission, the State of Broadband 2014 – chaper 2.2 notes that 'The top ten countries in the world for fixed broadband penetration are all located in Europe with the exception of the Republic of Korea.' http://www.broadbandcommission.org/documents/reports/bb-annualreport2014.pdf
7   Regulation 2000/2887/EC on unbundled access to the local loop

regulatory treatment of wholesale access products in the years to come if not addressed at EU level at an early stage.

I.VI   The views of stakeholders

In our engagement with stakeholders we found a range of strongly held views concerning the case for greater harmonisation of wholesale access products.

For business end-users and particularly multi-national corporations, the current 'spiders-web' of networks and services presents significant challenges. Amongst other issues, business users cite long and unpredictable provisioning times, patchy availability of high bandwidth (Ethernet) connectivity outside cities, as well as a lack of transparency and consistency in 'quality of service' measures as key issues affecting their ability to support their respective core businesses. A concern is that "too many local operators are protecting their home market"[8].

Amongst telecom operators, there are mixed views.

On the one hand, operators which rely on fixed access for a significant part of their business tend to support the need for 'harmonised best practice' for wholesale product offerings across Europe, and favour some degree of intervention from the European Commission or EU legislators to achieve this. The views amongst this group of operators are not unanimous, but cut across geography and business model[9]. In cases where physical access is not viable[10], access-seekers have a preference for layer 2 (Ethernet) wholesale products, which allow greater scope for flexibility and tailoring in the product offering than alternative active wholesale solutions (such as IP-based bitstream). A flexible specification and rapid availability of VULA and Ethernet bitstream products adapted for business are key concerns. Improved service levels (SLAs), transparency (eg through the publication of Key Performance Indicators (KPIs)) and associated service level guarantees (SLGs) which provide compensation in case service levels are not met, were also considered important especially in relation to business wholesale products. Several operators relying on multiple wholesale suppliers found diverging processes (eg for ordering, provisioning and repair) complex and challenging to manage.

On the other hand, operators which are primarily suppliers of regulated wholesale products[11] as well as cable operators[12], express concerns that introducing EU common

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8   Quotation from INTUG representative at public workshop 8 July
9   There is support for harmonisation initiatives from amongst alternative operators in both business and residential markets, and those operating in purely national as well as in a cross-border context
10 Physical access is preferred by many mass-market alternative operators and business providers focused on installations in business districts
11 These are typically incumbent operators which are subject to SMP obligations by NRAs
12 Cable operators have not typically been subject to wholesale access obligations under the SMP regime. However, cable bitstream access was mandated on Numericable in France as a condition of merger approval, and cable access obligations exist in countries such as Belgium

specifications or minimum standards would raise costs, undermine investment and risk increasing the number of wholesale products they are required to offer, with insufficient guarantees of demand. Some amongst them question the ongoing relevance of wholesale access in an evolving and converging environment. They note that they are already required to offer multiple active wholesale products in parallel, including products for which demand did not materialise as expected[13]. They also observe that many access-seekers demand tailored products or products designed to meet national requirements, which could not be satisfied through standardised offers. These operators consider that intervention to introduce common specifications would be costly, disproportionate and unnecessary. They tend to favour voluntary commercial mechanisms to address any issues with divergence amongst product offerings, where necessary.

BEREC and NRAs take a cautious view as regards common specifications. They note that national solutions are best suited to national markets (including potential standardisation at a national level where appropriate) and cite concerns over high costs and lack of proportionality of harmonised specifications, especially if changes are needed to existing networks or software. They consider that the benefits of harmonisation are unproven and may be unrelated or only related in a minor way to the technical specifications of wholesale products. They cite examples of active wholesale product take-up increasing in several countries. Nonetheless, BEREC has suggested that they could consider the development of a draft 'Best Practice Guideline' in relation to active wholesale products to address any concerns.

International commercial standards organisations such as the Metro Ethernet Forum (MEF) and Broadband Forum (BBF) have worked on several issues relevant to the current study including technical standards for Ethernet Leased Lines, contributions to the specification for VULA and ongoing standardisation efforts to align inter-operator processes and foster the transition to SDN/NFV. They highlight the potential for standards for wholesale products and processes to reduce costs and complexity, and increase efficiency, transparency and interoperability. They conclude that there should be benefits for operators to follow such standards on a voluntary basis. In the course of the public workshop, the MEF and BBF invited European institutions to engage further in their activities. Although it was involved in significant past standardisation efforts and has ongoing workstreams concerning SDN developments, the European standards organisation ETSI has not recently worked on issues relating to wholesale access products.

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13 ATM bitstream has been cited as an example of an access obligation for which there was limited demand

I.VII   Results of benchmarking

In the context of our benchmarking exercise, we found that an increasing number of NRAs have opted to mandate active access - VULA or other forms of Ethernet bitstream - for NGA in circumstances where physical unbundling is not economically or technically feasible. For example table 13 shows that at least 13 NRAs within the EU and accession countries have or are in the process of introducing local access Ethernet bitstream or VULA.

However, there are variations in the wholesale product definitions for VULA and other forms of Ethernet bitstream. The degree of control over access speeds and contention, quality of service options, multicast (which enables IPTV delivery) and VLAN treatment – which is significant for business purposes, are amongst areas in which there are differences. Benchmarks also show that while several countries have specified business-grade Ethernet bitstream products (for example the Netherlands, as described in a case study at Annex 1(iii)), this is not yet widespread.

Consistent with the observations made by business end-users and several users of wholesale access, **there are also significant variations in service level agreements for provisioning and repair times for Ethernet leased lines and the treatment of compensation for missed deadlines** (see Figure 2)**,** as well as differences in the level of automation available in the processes underlying the ordering and provisioning process.

Figure 2:   Ethernet leased lines: on-net provisioning timescales within the SLA
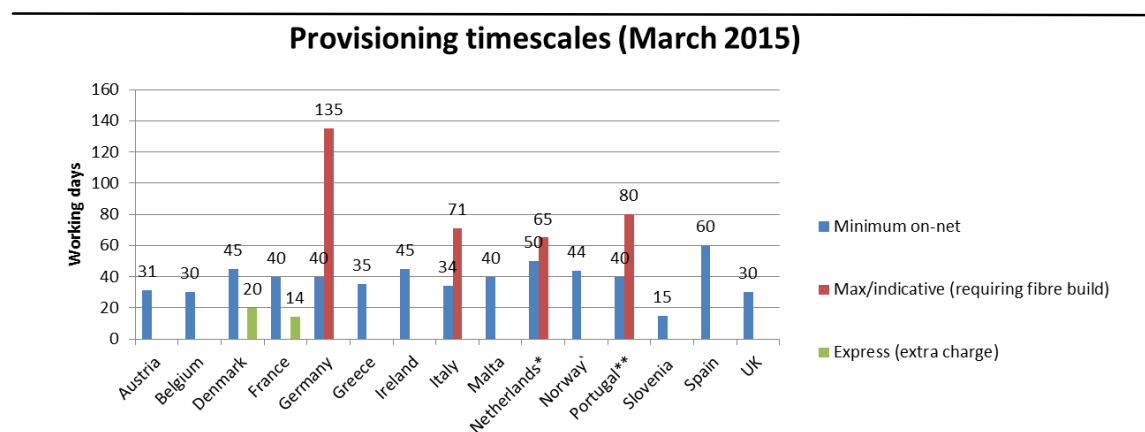
*   65WD is indicative for near-net circuits. ** Portugal targets shown are for 100% delivery in respective dense and less dense areas.

Source: WIK based on data from reference offers and NRAs

Uniform output data (KPIs) is not publicly available in a way that would enable us to check on a pan-EU basis the degree to which targets for provisioning and repair have been met, but it is possible that actual times may be longer than the targeted times. For example, concerns over the failure by BT to meet provisioning targets have led the UK NRA Ofcom to propose to introduce binding minimum standards for provisioning and repair[14].

As regards the means by which wholesale product specifications and processes are developed today, we find that NRAs have played a significant role in supporting the development of wholesale product specifications within their national markets. Some NRAs draw on insights from national industry fora, in which they may play a role, for example as observer, chair and/or arbiter of disputes. In turn, most national specifications draw on European and increasingly global standards such as those defined by the MEF as building blocks towards the national product description. Considerable effort has been made, and results are beginning to be seen in some countries. However, we observe that parallel and lengthy processes have been followed in multiple markets. This raises the question as to whether greater efficiencies could have been achieved through a more common approach in certain areas.

I.VIII   Outcomes in practice

Outcomes – and in particular the degree to which end-users and wholesale access seekers have migrated from legacy copper to next generation technologies – provide an import measure of the effectiveness of the existing set-up.

In this context, we note that **take-up by retail customers of high speed broadband on available existing NGA networks is still limited in many countries** (see figure 49). There is thus scope to further promote a transition from legacy services to high speed broadband.

There is a strong record of cable operators and other infrastructure-based providers upgrading customers to higher speeds, often at no extra cost, and this is a major driver of NGA uptake. Some incumbents have also engaged in this strategy. However, data suggests that **entrants using wholesale access to offer broadband are not converting customers to high speeds broadband at the same pace as the incumbent or cable operators**. In practical terms, this is because take-up rates of the NGA wholesale product VULA, are lower than might be expected. For example Figure 3 shows that EU-wide incumbents have a higher market share in VDSL (for which VULA is a typical standard remedy) than in DSL, for which LLU is mainly used. Figure 39 further shows that VULA take-up has been slow in several countries.

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14 Ofcom May 2015 consultation on Business Connectivity Market Review http://stakeholders.ofcom.org.uk/consultations/bcmr-2015/

Figure 3:   Incumbent share of broadband lines by platform
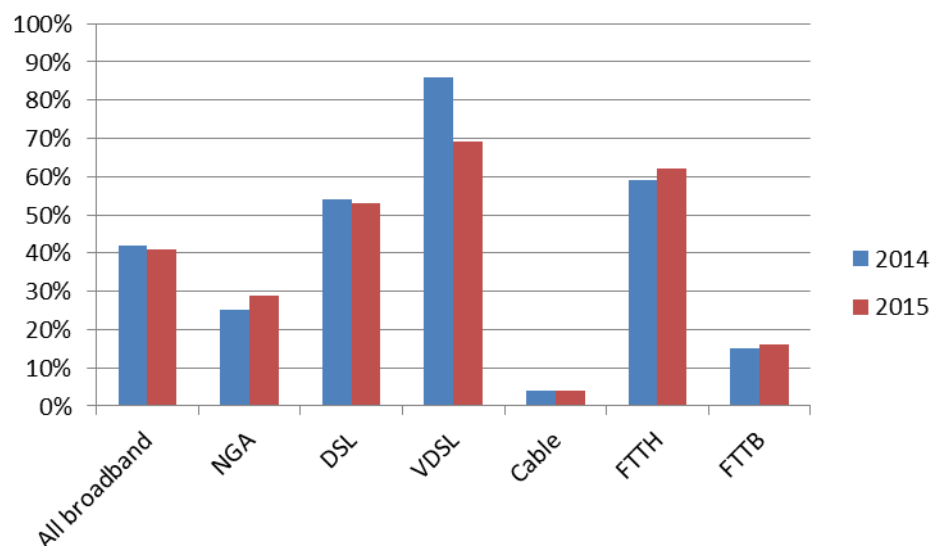
Source: WIK based on Digital Agenda Scoreboard broadband reports 2014, 2015, EC

There could be several reasons behind low or delayed take-up of VULA by alternative operators, including a small coverage area, the date of the obligation, and the economic replicability of products. However, delays in its introduction (perhaps caused by the complexity of developing effective offers), the technical replicability of the product compared with the incumbent's offering and migration processes are factors which could have affected take-up.

Similarly, conversion to fast Ethernet leased lines from legacy leased lines has been relatively slow in many countries (see Figure 4) meaning that many business connections still rely on low speed traditional leased line connections (often of 2Mbit/s and below) rather than benefiting from the cost-effective high speeds (including gigabit connections) afforded by Ethernet technology.

Figure 4:   Retail leased lines – conversion to Ethernet
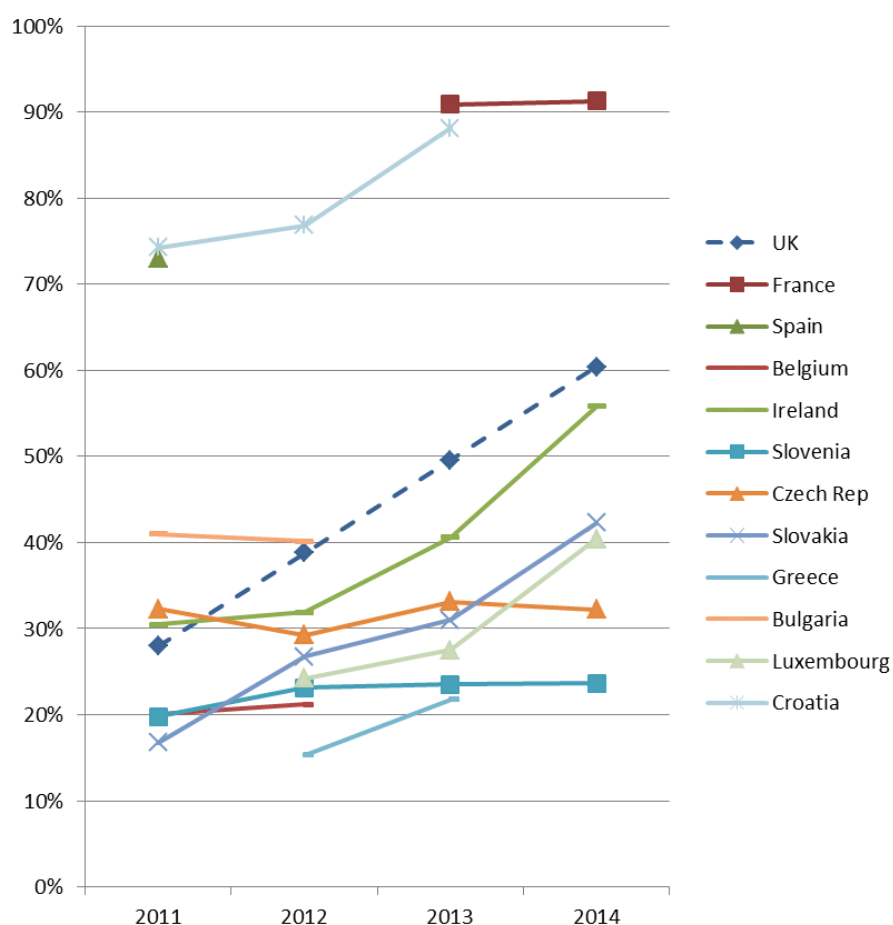
Source: WIK based on NRA data collected March 2015, UK (2012-2013 extrapolation)

There could be various reasons for low Ethernet conversion, including a limited fibre footprint to businesses, reluctance of end-users to switch, the availability of alternative high bandwidth bitstream offers or limited demand from businesses for services requiring high bandwidths such as cloud computing. However, the effective availability of wholesale Ethernet products and the ease of provisioning and migration from legacy circuits may also be a factor affecting the diffusion of Ethernet leased lines. Although data is limited, there are also indications of a gap between incumbent and entrant conversion to Ethernet leased lines in some countries.

I.IX   The potential benefits of harmonised wholesale products

Best practice harmonisation of core next generation broadband wholesale product specifications could in theory support the diffusion of fast broadband in several ways.

- By fostering **knowledge transfer** and minimising a repetition of similar processes in different countries, thereby reducing costs and time to market;

- By **facilitating cross-border entry and expansion**, for example by new or converged operators seeking to build on existing businesses; and

- By **fostering competition and switching between wholesale offers and interoperability amongst wholesale offers**, which is especially relevant in multi-supplier markets such as business service markets and some national broadband markets

Previous experience from the LLU Regulation (2000) suggests the accelerated diffusion that followed its adoption may have helped to boost European broadband take-up in the early phase (see figure 11). In addition, theoretical models produced for this study which assess the effect on NGA take-up if access-based operators increased conversion from current low rates to the same rate as the incumbent suggest that **NGA uptake in the 10 years to 2020 might have been increased by 20% or more in countries and areas where active wholesale access to NGA networks is relevant**. An illustration of these potential effects can be seen in the diagrams below, and further details are provided in section 7.2.2. Technical replicability at an early stage and effective provisioning and migration processes are a necessary condition of this outcome, although they are not sufficient, as other factors are also relevant.
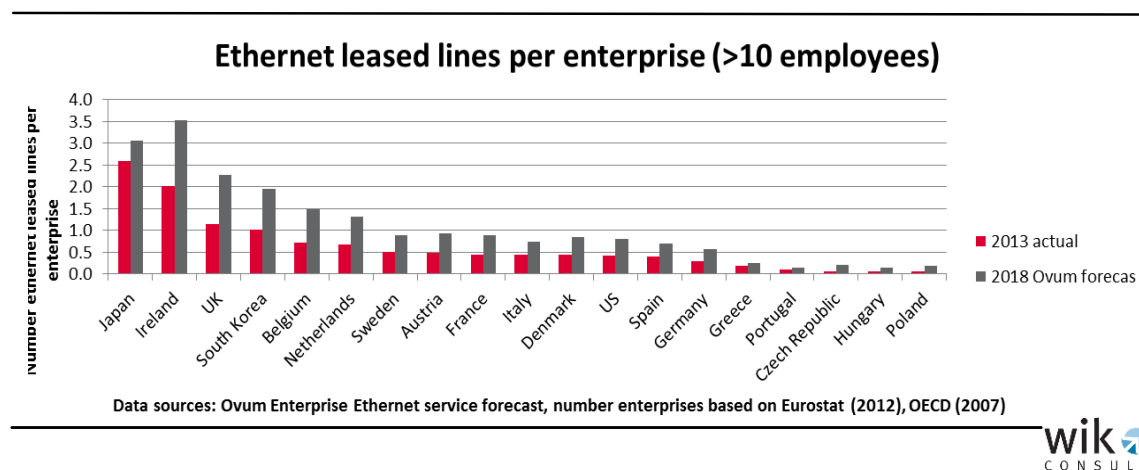
Figure 5:   Case A – NGA retail lines by operator in the status quo and equivalent conversion

Status quo   Equivalence of conversion
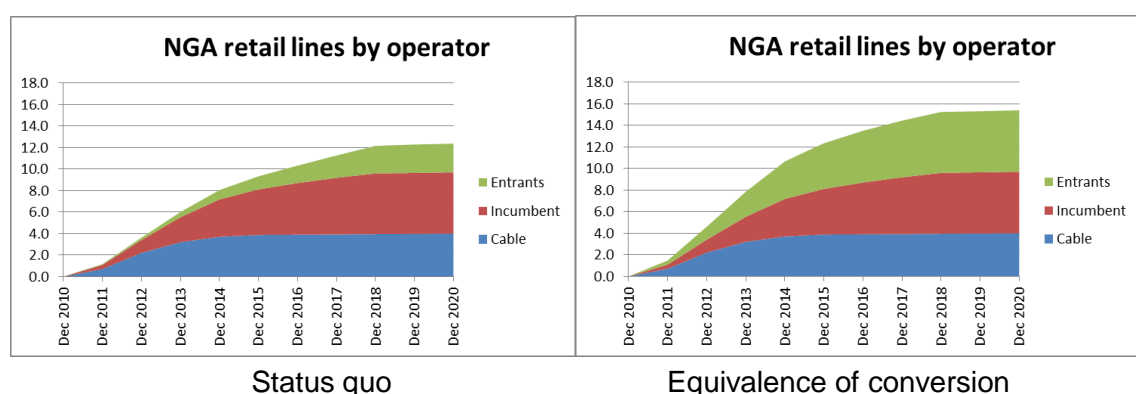
Source: WIK

On the basis of data from Ovum, we also find substantial variations between countries in the number of Ethernet leased lines as a proportion of the businesses with more than 10 employees. **In particular most EU countries appear to be significantly behind countries such as Japan and South Korea in this regard.**

Figure 6:   Current and forecast proportions of Ethernet leased lines in the status quo

Ethernet leased lines per enterprise (>10 employees)

Data sources: Ovum Enterprise Ethernet service forecast, number enterprises based on Eurostat (2012), OECD (2007)

Source: WIK based on data from Ovum, Eurostat, OECD

If action is taken to facilitate a catch-up on take-up of Ethernet leased lines to match better performing countries within the EU, we estimate this could result in a **potential doubling of Gigabit business connectivity by 2020** in a positive scenario compared with the status quo (see table 17). Again, technical, service and procedural issues form only part of the answer. However, they are a necessary condition in achieving this goal. For example, the provision of fibre Ethernet leased lines in many cases requires the extension of the existing fibre network. Provisioning conditions and timeframes for such 'near-net' lines are therefore an important factor in expanding fibre availability and take-up for businesses.

I.X   Relevance for the future

One concern around potential benefits from common specifications for wholesale access may be if efforts are rendered obsolete due to technological change. Expectations from stakeholders as well as analyst forecasts[15] suggest that Ethernet interface wholesale products will remain relevant up to 2020 and beyond. Moreover standards for legacy leased lines proved to be effective and enduring over a long period. This could support a case for a harmonised approach for wholesale access products based on Ethernet.

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15 For example the Ovum data and forecast referenced in this report

However, **in the longer term, other technological developments such as Software Defined Networking (SDN) and Network Function Virtualisation (NFV) technology as well as a potential expansion in point to point FTTH and TWDM PON have the potential to affect the market**. SDN/NFV may facilitate increased customization of wholesale active offers, thereby supporting a trend towards 'virtualisation' while P2P FTTH and WDM PON could renew or expand possibilities for fibre or wavelength unbundling.

We note that these technological developments could affect wholesale product specifications as they reach maturity. However, this would support the case for early engagement by policy-makers in ongoing standardization processes for these technologies. It also suggests that there may be value in generic processes under which new standards for wholesale products could be developed for the future, in order to better manage the transition from past to future generations of services.

I.XI   The costs and feasibility of harmonisation

There are several past examples of the harmonisation of product specifications (for LLU and leased lines), as well as harmonised Quality of Service performance indicators (for designated universal service providers) and harmonised delivery targets (for number portability). In addition, Commission Recommendations have provided recommendations concerning the implementation of Equivalence of Input and leased line delivery times. Past experience therefore suggests that harmonisation of the type of characteristics covered by this study is in principle feasible.

However, as noted by suppliers of wholesale access products as well as BEREC, it seems reasonable to assume that set-up **costs could be significant especially if common specifications and/or other associated requirements are mandatory and require significant changes to existing networks, software or processes.** Ongoing costs could also be affected if requirements necessitate operational changes.

There are also other risks involved with standardisation or harmonisation including a potential weakening of innovation, and the risk of placing bets on the wrong wholesale product, thereby hampering service development and/or competition for years to come.

However, there are various factors which could serve to mitigate costs and reduce risks (although they may also consequently serve to reduce or delay any benefits). These include:

- Avoiding harmonisation of specific parameters, except where strictly necessary or where standards are established and used already in a commercial context; and

- Applying harmonised specifications only to new wholesale products or delaying their introduction; and

- Allowing scope for justified deviation (including experimentation) either by pursuing a 'soft law' approach or otherwise by allowing exceptions. For example, the Recommendation on non-discrimination and cost-methodologies includes a proportionality test in relation to the adoption of 'Equivalence of Input'.

In addition, we note that wholesale access providers expressed significant concerns that harmonised wholesale products could serve to multiply the regulated product-set. A further **cost-minimising strategy could therefore be to foresee the migration from legacy active access wholesale products to modern standardised active wholesale products** rather than encouraging or requiring operators to make other various wholesale services available in parallel. A potential migration path for existing active wholesale products towards Ethernet-based services is shown in the diagram below.

Figure 7:   A potential migration path to next generation services
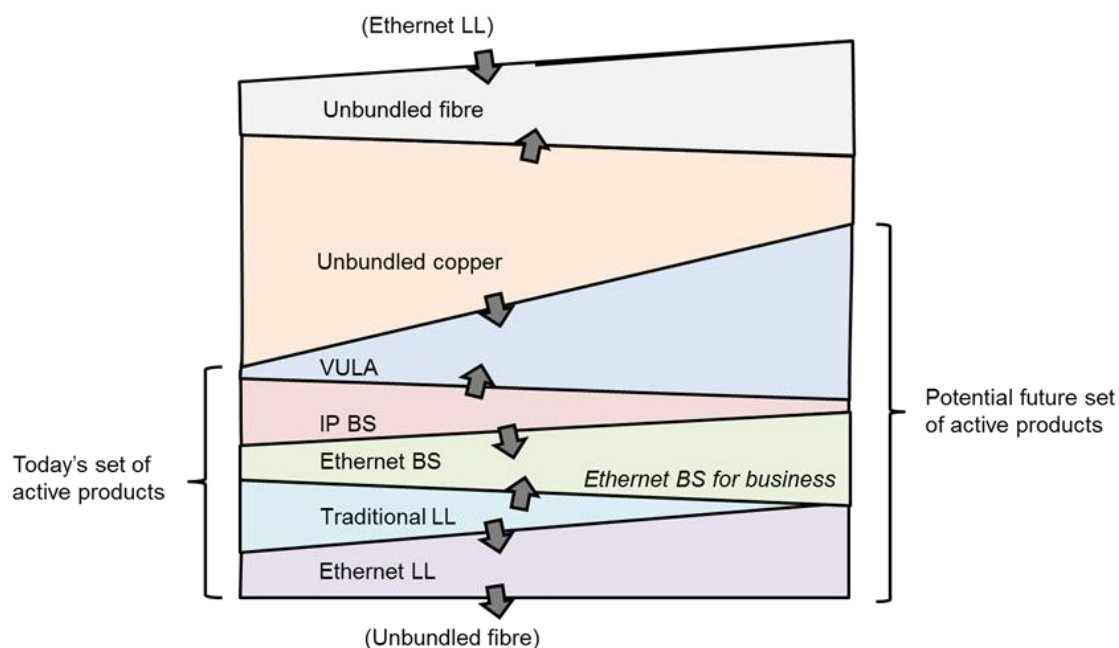
Source: TNO

Under this model, any access obligations could draw on identified harmonised product specifications in the relevant market – with active solutions pursued in cases where physical is not viable. As is the case today, operators would not be prevented from offering other solutions on a voluntary basis.

In the long run, this strategy should reduce costs for wholesale access suppliers by streamlining access obligations, improve interoperability amongst wholesale offers and increase take-up of services based on next generation technologies. However, such a

strategy could also generate costs if it requires wholesale and retail customers to upgrade to more expensive services for which they do not have a need or to invest in new equipment.

I.XII   Conclusions regarding common specifications

Drawing on stakeholder feedback as well as insights from benchmarks and market outcomes, we observe that there are three broad areas in which common specifications might (amongst other factors) contribute to the benefits described. These are:

1. Best practice technical characteristics for VULA and business-grade Ethernet bitstream (which could potentially include a variant of VULA)

2. Consistent inter-operator processes especially as regards business-grade products (but also relevant for residential broadband markets characterised by regional suppliers)

3. Guideline standards for SLAs, SLGs and common reporting arrangements for KPIs – especially in relation to business products such as Ethernet leased lines.

For each of these areas, we considered the potential impact on costs and benefits of three possible levels of harmonisation/standardisation ranging from level 1 (a principles specification) through to level 3 (a specification of specific parameters). This terminology is used by certain standards organisations. We also considered the impact on costs and the resulting cost benefit analysis of pursuing strategies which mitigate costs (noting however that these may also delay benefits).

The conclusions are shown in Figure 8. The areas in which common specifications would be recommended are highlighted in green.

Figure 8:   Conclusions on estimated costs and benefits

Source: TNO/WIK – Dark green represent areas where there may be the highest gains

In our analysis, we distinguish between the appropriate response suited for products targeted towards (national) residential markets (ie mass-market VULA) from products designed for business markets (including bitstream specified for business and Ethernet leased lines).

Because consumer broadband markets are mainly national in character, it seems likely that benefits could still be achieved, with limited cost impact, through harmonisation on the basis of level 1 'principles' basis (equivalence of outcome). More detailed (level 2) specifications could also be presented in order to foster the swift implementation of wholesale products in countries which might introduce the obligation in future. However, these could be restricted to newly introduced wholesale products and/or made subject to proportionality considerations, in order to limit costs.

On the other hand, because business markets are often characterised by multiple suppliers and can involve cross-border provision, we concluded that benefits could be

maximised with a more detailed (level 3) degree of harmonisation. This would be consistent with the high degree of harmonisation applied to business products in the past[16], and with the evidence of commercial demand for standardisation from the ongoing activities in this area by the MEF (for example regarding inter-operator processes).

Harmonisation of wholesale products targeted towards businesses could include more detailed guidance on what is meant by business-grade Ethernet bitstream. This may have particular relevance as this type of wholesale product is one potential successor to traditional leased lines[17], which still make up a high proportion of circuits in many countries. A harmonisation effort could also address minimum targets for SLAs and SLGs for business-focused products, which have been a key concern of business end-users and aim towards common standards on inter-operator processes, drawing on ongoing commercial standardisation work in this area.

In response to the specific transparency and enforcement concerns raised by business users, we note that common definitions might also be helpful for:

- **QoS classes** enabling the easier comparison and categorisation of different wholesale products across countries

- **Key Performance Indicators** and methodologies for provisioning and repair of Ethernet leased lines. This would enable comparison of performance against service levels at EU level. Common KPIs for QoS measurement could also be considered

Finally, in order to ensure that any harmonisation efforts serve to streamline rather than to add to regulation, we would suggest a common EU strategy concerning the migration process from legacy to new wholesale services.

Harmonisation goals today are likely to be constrained by existing fragmentation and the costs this implies. However, a high degree of ambition is needed to reach the target of a harmonised European product space in the longer term.

I.XIII Mechanisms to achieve harmonisation

There are various mechanisms through which common specifications could be achieved. At one end of the spectrum, commercial standards or industry bodies could be encouraged to reach agreement on the identified areas on a voluntary basis . At the other end of the spectrum, harmonisation can be achieved through obligations

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16 For example, in relation to the standardisation of traditional leased line definitions, and the regulatory approach to such in the early liberalisation phase. We also note that attempts were made to set minimum targets for (traditional) leased line provisioning through the 2005 EC Recommendation on this subject

17 We anticipate that legacy leased lines are likely to migrate towards low cost Ethernet bitstream solutions and Ethernet leased lines depending on the requirements of each site

mandated in targeted legislation. European harmonised standards, and soft law in the form of a Commission Recommendation or BEREC guidelines lie between the two extremes.

Figure 9:   Mechanisms for harmonisation
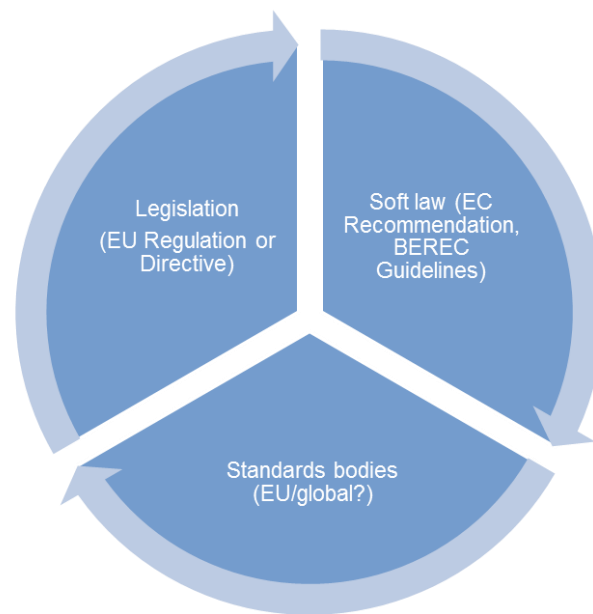
Source: WIK

In judging the effect of these different approaches, we benefit from a wealth of past experience. This includes:

- For targeted legislation: the harmonisation and standardisation of LLU and historic approaches to traditional leased lines as well as the imposition of 1 day number portability and QoS and KPI metrics for universal service providers

- For soft law: the effect of EC Recommendations on various subjects including NGA, termination and leased lines, as well as BEREC best practice guidelines

- For harmonised standards: the efforts of ETSI in the field of spectral management for LLU, number portability and other issues; and

- For commercial standards: the efforts of global bodies such as the MEF and BBF in the development of common specifications and processes

- For industry bodies, the 2011 CEO Roundtable established by Commissioner Kroes as well as national industry fora, which often involve the NRA as facilitator

Our conclusion is that in a harmonisation effort, different mechanisms and different bodies may be suited to different tasks, and the most effective and efficient outcomes may be achieved through a collaborative effort.

In particular, we find that harmonisation which affects (mainly) regulated wholesale products such as VULA may require intervention from policy-makers and regulators, because industry and standards bodies are unlikely to reach consensus on contentious points. On the other hand, industry and standards bodies are well-suited towards delivering detailed specifications in cases where there is a common interest amongst the industry or where they are assigned very specific tasks associated with the implementation of existing regulatory obligations.

Global standards bodies are likely to play an increasingly important role in an increasingly globalised business environment. However, commercial global standards do not have a formal role in European standardisation processes with the possible exception of public procurement processes[18]. European standards bodies can be given specific instructions by the Commission and the results of their work may be adopted as harmonised standards. However, their experience and scope may not always be as relevant as that of global bodies, and there are no guarantees (especially for contentious issues) that they will accept a standardisation request or deliver outcomes that meet policy-makers' needs.

In cases where the market will not work to deliver standardisation, the use of targeted legislation to achieve common specifications is likely to be most effective over the long term, but is time-consuming and complex to establish. This is also the least flexible mechanism. Recommendations and guidelines are relatively faster to implement, but require detailed monitoring and enforcement to ensure adherence, and may therefore be less efficient over time.

Lastly, it is worth noting that it is possible to take more than one approach. Adopting short term measures to address current issues for example through soft law is consistent with a longer term strategy of adapting the EU Framework to address problems in a more systematic way.

I.XIV Recommendations for the short term

Drawing on our analysis of the respective merits of different approaches to solving the current fragmentation of wholesale offers across the EU, we recommend the following approaches to address problems under the existing framework in the short term:

1. The Commission could initiate a dialogue with the most significant global standards bodies to inform them of the EU Framework requirements concerning

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18 Article 13 and 14 of the EU Standardisation Regulation 2012

wholesale products and explore whether these requirements could be reflected in future workplans

2. NRAs should be encouraged to draw on any existing relevant widely accepted global standards for wholesale product definitions as well as inter-operator processes, and to embed these within regulated Reference Offers. In this way global *commercial* approaches could be replicated in *regulated* wholesale offers, ensuring effective interoperability between them

3. The European Commission, drawing on input from BEREC, could consider issuing a Recommendation concerning *common specifications and service characteristics for regulated wholesale access products* covering markets 3 and 4 of the Relevant Market Recommendation. Such a Recommendation could cover:

   a. A principles-level (output focused) description of the main characteristics of the active wholesale products which should normally be supplied by operators having SMP in the relevant markets in cases where physical access is not economically or technically feasible or would not be sufficient to achieve effective competition. This could describe the main differences between residential and business variants of the products and in an annex cover expectations around which features would normally be expected to be mandatory in regulated products and which might be optional depending on the circumstance. It could focus on providing principles-level guidance on issues which have proved to be contentious amongst access providers and access-seekers (and therefore not susceptible to agreement within industry bodies).

   b. Recommended minimum service levels for on-net Ethernet leased lines, which could include target on-net provisioning times (including timeframes for migration) and repair times, and recommended common approaches regarding SLAs for near-net and off-net provisioning, which forms a major portion of fibre leased line provisioning in many countries.

   c. Recommended transparency obligations associated with minimum leased line service levels and QoS including common KPIs to be published at wholesale and retail level.

   d. A recommended approach towards making the transition from legacy active wholesale products to modern Ethernet interfaces for bitstream and leased lines including the circumstances in which legacy services could be phased out in order to focus on a streamlined wholesale product set

4. BEREC could play an important role in providing guidance to the Commission concerning layer 2 wholesale product specifications and could provide input and experience on practical matters concerning SLAs, SLGs the collection and

reporting of associated KPIs, and migration processes to support the move from legacy to modern technologies. Following or during the implementation of a Recommendation, BEREC could also collect KPI data and monitor progress against potential targets.

5. The Commission could consider giving ETSI a mandate to work on specific issues to support implementation of a Recommendation. These could include for example common EU definitions/classifications of QoS ranges, and potentially more detailed methods for the common measurement of QoS. If global standards for inter-operator processes are reached, consideration could also be made to adopting a European standard based on such international processes.

I.XV   Considerations for the Review of the EU Electronic Communications Framework

In relation to the wider review of the framework for electronic communications, consideration could be given for the longer term to:

1. Embedding within the Framework a standardised wholesale product set (subject to amendment) or the means to propose such a product set (eg through Recommendation on remedies) and providing the scope for the Commission (subject to appropriate checks and balances) to approve or modify a high level Reference Offer for harmonised wholesale products at EU level.

2. Providing for the establishment of an EU industry forum to assist with the development of EU high level reference offers and the application of any other EU-level regulatory obligations. This forum could, in addition to taking a 'statement of requirements' and timescales from the Commission, permit the involvement of the Commission in arbitration in cases where agreement could not be reached.

Setting within the Framework or enabling the creation of requirements relating to EU minimum standards eg for provisioning and associated reporting obligations for high speed on-net connectivity to businesses (and potentially residential customers) (common minimum KPIs)

European Commission

Investigation into interoperability standards for the promotion of the internal market for electronic communications – Executive Summary
Luxembourg, Publications Office of the European Union

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