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Common Position on Layer 2 Wholesale Access Products

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Executive Summary

In recent years, several incumbent operators rolled out NGA networks in order to provide higher bandwidths to end users. This leads to situations in which access to physical infrastructure was not considered sufficient to ensure effective competition at the retail level. Therefore, several NRAs have imposed access to (active) Layer 2 (Ethernet) wholesale access products (hereinafter L2 WAP) as a remedy on the wholesale local access market (market 4) and/or the wholesale broadband access market (market 5). In some cases L2 WAP on the wholesale broadband access market were already imposed before the NGA rollout started.

In order to get a deeper insight into these products and to foster the exchange of experiences and contribute to the harmonisation of regulatory instruments used in the European Union, BEREC has already analysed L2 WAP in the past years and published the BEREC Report "Common characteristics of L2 WAP in the EU".

In this document BEREC goes one step further and defines Common Positions for L2 WAP imposed on the wholesale local access market (market 3a) and L2 WAP imposed on the wholesale central access market (market 3b). Common Positions are defined for the conditions for the imposition of L2 WAP, prices and technical characteristics, contributing to the regulatory objective of enabling ANOs to provide a variety of competitive services for residential and business customers (incl. voice, internet, IPTV, data).

The following Common Positions are defined:

CP1:   Conditions for the imposition of L2 WAP on market 3a
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Common Positions on technical characteristics of L2 WAP imposed on markets 3a or 3b

CP3:   Technology
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The technical characteristics of L2 WAP in the Common Positions can be viewed as minimum requirements. Depending on national circumstances it may be necessary that L2 WAP fulfil further requirements (including other technical characteristics).

1   Introduction and objective

In recent years, several incumbent operators[1] rolled out next generation access (NGA) networks in order to provide higher bandwidths to end users. This leads to situations in which access to physical infrastructure was not considered sufficient to ensure effective competition at the retail level. Therefore, several NRAs have imposed access to (active) Layer 2 (Ethernet) wholesale access products (hereinafter L2 WAP) as a remedy on the wholesale local access market (market 4/2007) and/or the wholesale broadband access market (market 5/2007).[2] In some cases L2 WAP on the wholesale broadband access market were already imposed before the NGA rollout started.

In order to get a deeper insight into these products and to foster the exchange of experiences and contribute to the harmonisation of regulatory instruments used in the European Union, BEREC has already analysed L2 WAP in the past years and published the BEREC Report "Common characteristics of L2 WAP in the EU" after public consultation in October 2015.[3]

In this document BEREC goes one step further and defines Common Positions on L2 WAP imposed on the wholesale local access market (market 3a) and L2 WAP imposed on the wholesale central access market (market 3b).[4] Common Positions are defined for the conditions for the imposition of L2 WAP (section 2), prices (section 3) and technical characteristics (section 4).

It is recommended to read this document in conjunction with the BEREC (2015) which contains technical descriptions and detailed data of L2 WAP in several countries. This Common Position is based on BEREC (2015), which analyses L2 WAP imposed on markets 4/2007 and 5/2007, but not on market M6/2007. Therefore, L2 WAP on market 4/2014 (high quality access) – which usually have not been imposed in the context of NGA rollout – are beyond the scope of this document.

This Common Position does not alter, and is without prejudice to, the powers conferred, and obligations imposed, on the NRAs under the Framework Directive and the Specific Directives. It is therefore not a substitute for the responsibilities on the NRAs to show (among other things) that SMP remedies are based on the nature of the problem identified, proportionate and justified in light of the policy objectives laid down in Article 8 of the Framework Directive.[5]

2   Conditions for the imposition of L2 WAP

This section defines a Common Position with regard to the conditions under which it is appropriate to impose L2 WAP on market 3a or market 3b.

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[1]   Since typically the operator holding significant market power (SMP) on market 3a or 3b is the incumbent operator (the former monopolist), hereafter the term incumbent operator is used to refer to the operator with SMP.

[2]   Markets of the European Commission's Recommendation on relevant markets of 2007 (see European Commission, 2007) are referred to as market x/2007 in the document.

[3]   BEREC (2015).

[4]   Markets of the European Commission's Recommendation on relevant markets of 2014 (see European Commission, 2014).

[5]   Article 8(4) of the Access Directive

2.1 L2 WAP on market 3a

The primary reason to impose access to L2 WAP on market 3a (with local point of handover (PoH)) relates to the NGA-rollout of the incumbent operator.[6] This NGA-rollout may include e.g. fibre to the cabinet (FTTC), fibre to the building (FTTB) and/or fibre to the home (FTTH). FTTH can be realised as point-to-point (P2P) or as point-to-multipoint (P2MP, e.g. GPON). The primary goal of the NGA-rollout is to be able to offer higher bandwidths to the customers.

In case of a FTTC or FTTB-rollout of the incumbent, physical unbundling of twisted copper pairs may become less attractive for alternative network operators (ANO). ANOs in general have two options: Either, they invest themselves in FTTC/B[7] and are (also) able to offer higher bandwidths to the customers. This may be economically difficult, however, due to the low economies of scale which can be achieved at the street cabinet or building.

The other option is to continue unbundling from the central office (CO). However, this does not allow the offering of higher bandwidths (or at least equally high bandwidths as the incumbent) at the retail level, and if demand for high bandwidths increases, ANOs become less competitive. Further, in case of interferences between DSL-lines operated from the street cabinet with unbundled DSL-lines from the CO (e.g. no use of spectrum shaping) physical unbundling from the CO may be restricted.

Furthermore, ANOs may invest in their own access networks (e.g. FTTH) but also this may be economically difficult due to lower economies of scale compared to the incumbent operator. In such cases, L2 WAP with local handover have been imposed in order to allow alternative operators to remain at the CO *and* to offer higher bandwidths.

Another development of the last years which lead to the imposition of L2 WAP was the use of VDSL vectoring, also mainly by incumbent operators. VDSL vectoring allows significant increases in bandwidth on copper cables, but only if all active lines within a cable binder are part of the same vectoring system. While multi-operator vectoring is technically feasible, its implementation is facing practical challenges.[8] Usually, the vectoring system is therefore operated by only one firm (in practice usually the incumbent operator). A possible solution is to allow one operator to use vectoring and oblige him to offer a L2 WAP.

Finally, access to L2 WAP with local PoH have been imposed in cases where the incumbent operator is rolling out FTTH as GPON[9] and the physical unbundling of individual fibre access lines at the CO (or OLT location) is technically not possible. Due to the lack of suitable equipment, wavelength unbundling at the aggregation point has been considered as not feasible in the past. In the future, however, wavelength unbundling based on a new PON standard might be an alternative (or even superior) option.[10]

Given the above reasons to impose access to a L2 WAP with local PoH, there are, on the other hand, situations in which such access may not be justified. This includes, in particular,

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[6] See BEREC (2015), pp. 4-6.
[7] Possibly using regulated access to ducts and dark fibre between street cabinets and the CO.
[8] Multi-operator vectoring which enables the operators involved to use DSLAMs of different vendors is currently not available because the interface between the DSLAMs is not yet standardized. In case the involved operators use DSLAMs of the same vendor multi-operator vectoring needs a high level of coordination among them (see AGCOM decision n. 747/13/CONS and BEREC (2014), p. 5).
[9] GPON with a splitter between CO and customer premises do not have a single fibre which can be unbundled per household at the CO (except for cases where all splitters are at the CO).
[10] NG-PON2 which enables wavelength unbundling at the FTTH-DSLAM/OLT was standardised in 2014 by ITU-T (ITU-T (2014)). For examples of implementations see Verizon (2015) and PT (2015).

situations where passive remedies are sufficient to ensure effective competition on downstream markets (e.g. if ANOs invest in FTTC/B/H themselves to a sufficiently high degree based on sub-loop unbundling or duct access or if the unbundling of fibre in case of point-to-point FTTH is economically feasible).

There could also be cases where conditions differ within a country and it might be appropriate to impose access to L2 WAP with local PoH only in some areas or for a particular infrastructure.

These considerations lead to the following common position on the imposition of L2 WAP on market 3a:

CP1:   Conditions for the imposition of L2 WAP on market 3a

A L2 WAP should be imposed on market 3a if

(i)   an operator holds a position of significant market power (SMP) on market 3a and an access-remedy is considered to be necessary and proportionate; and

(ii)   access to passive infrastructure (e.g. ducts, copper unbundling, fibre unbundling) or access to wavelength unbundling of an FTTH NG-PON2 as well as wholesale access remedies on market 3b are not sufficient to ensure effective competition at the retail level.

2.2 L2 WAP on market 3b

The imposition of L2 WAP on market 3b (with regional or national PoH) usually aims to provide ANOs with an access product which provides more flexibility regarding technical characteristics and pricing compared to Layer 3 (IP)-based access products ("standard" bitstream).

The imposition of L2 WAP is not necessarily linked to the NGA-rollout of the incumbent operator. Some NRAs have already imposed L2 WAP on the wholesale broadband access market before the NGA-rollout started. There are also cases, however, where a L2 WAP with local *and* regional/national PoH was imposed following the NGA-rollout of the incumbent operator. ANOs can use the L2 WAP with local PoH if they have sufficiently large economies of scale at the local level and the L2 WAP with regional/national PoH otherwise. This allows them to offer the same products on a national basis.

Whether the imposition of a L2 WAP (with regional/national PoH) on market 3b is appropriate and preferable to other forms of access such as a Layer 3 access product highly depends on national circumstances such as the demand of alternative operators, the existence and use of a Layer 3 access product, whether a L2 WAP is imposed on market 3a, etc. BEREC therefore does not define a common position with regard to the conditions for imposition of L2 WAP on market 3b (i.e., no CP for market 3b corresponding to CP1 for market 3a).

3 Pricing of L2 WAP

This section defines a Common Position with regard to the pricing of L2 WAP. L2 WAP imposed on market 3a and 3b usually are NGA wholesale access products, i.e. they allow ANOs to get regulated wholesale access to the incumbent's NGA. Principles for setting the

access price for NGA wholesale access products are included in the NGA Recommendation[11] and the Recommendation on non-discrimination and costing methodologies[12] of the European Commission.

According to the NGA Recommendation, prices for NGA wholesale access products should be cost oriented. In order to take into account the risk associated with NGA investments, a risk premium should be included to reflect any additional and quantifiable investment risk incurred by the SMP operator.

The Recommendation on non-discrimination and costing methodologies includes more details on the costing methodology (in particular the cost model) to be used for pricing the access to NGA networks. Furthermore, it defines (cumulative) conditions under which no cost-orientation for NGA wholesale access products should be imposed. The first condition is that there is a demonstrable retail price constraint on NGA-products either from other infrastructures (such as cable, mobile or alternative FTTH infrastructures), or by the cost oriented access to the legacy copper access network ('copper anchor'), or (on market 3b) based on upstream wholesale inputs (imposed on market 3a). The other conditions which need to be fulfilled are that the following non-discrimination obligations should be in place: (i) Equivalence of inputs (EoI)[13] or obligations relating to technical replicability when EoI is not yet fully implemented and (ii) obligations relating to the economic replicability (economic replicability test). The economic replicability test is similar to a margin squeeze test, however it may differ to the margin squeeze tests which are or have been applied to legacy network infrastructure.

Based on these Recommendations, BEREC defines the following Common Position for Pricing of L2 WAP:

CP2:   Pricing of L2 WAP

Prices of L2 WAP should be cost-oriented (in line with the NGA Recommendation). Under certain conditions (in particular those mentioned in the Recommendation on non-discrimination and costing methodologies), prices should not be cost-oriented but should fulfil an economic replicability test.

Since L2 WAP imposed on market 3a and L2 WAP imposed on market 3b usually are NGA wholesale access products, CP2 applies to both.

4 Technical characteristics of L2 WAP

This section defines Common Positions on the technical characteristics L2 WAP imposed on market 3a or 3b should have.

The definition of technical characteristics of L2 WAP needs to take into account both the demand of retail customers of ANOs and the technical capabilities in the network of the SMP

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[11] European Commission (2010).
[12] European Commission (2013).
[13] EoI, according to the Recommendation on non-discrimination and costing methodologies, "… means the provision of services and information to internal and third-party access seekers on the same terms and conditions, including price and quality of service levels, within the same time scales using the same systems and processes, and with the same degree of reliability and performance. EoI as defined here may apply to the access products and associated and ancillary services necessary for providing the 'wholesale inputs' to internal and third-party access seekers."

operator. Both may vary between countries and therefore also the technical characteristics of L2 WAP can be expected to differ between countries.

However, a recently published BEREC Report[14] shows that L2 WAP of different countries, despite differences in national circumstances, do have several common characteristics. The Common Positions are based on these findings and aims to foster the harmonization of regulatory instruments at the European Union level. For this reason the technical characteristics of L2 WAP in the Common Positions can be viewed as minimum requirements. Depending on national circumstances it may be necessary that the L2 WAP fulfil further requirements (including other technical characteristics).

As explained in section 2.1, L2 WAP should be imposed on market 3a if access to passive infrastructure or wavelength unbundling of an FTTH NG-PON2 alone does not ensure effective competition at the retail level. L2 WAP with local PoH aim to offer ANOs as much as possible the same flexibility to provide different products and to innovate as with physical unbundling. However, the flexibility and the potential to differentiate is restricted compared to physical unbundling since L2 WAP provide a service (not a physical medium) and the technological capabilities of the network of the provider of L2 WAP have to be taken into account. Nonetheless, the regulation usually aims, as much as possible and proportionate, to enable ANOs to provide a variety of services to residential and business customers (incl. voice, internet, IPTV, data) based on L2 WAP with local PoH.

L2 WAP on market 3b give alternative operators more flexibility and a higher degree of freedom regarding product characteristics compared to a Layer 3 product (IP bitstream) (section 2.2). The regulation also usually aims, as much as possible and proportionate, to enable ANOs to provide a variety of services (incl. voice, internet, IPTV, data) depending on the market definition.

The following Common Positions identify technical characteristics of L2 WAP imposed on market 3a or 3b which contribute to these regulatory objectives.

CP3: Technology

Ethernet is the dominant Layer 2 protocol and the most commonly used interface in both packet based transport networks of service providers and local area networks (LAN) of end users. Therefore, L2 WAP should be based on Ethernet.

CP4: CPE/Modem

The use of their own CPE/modems/ONT enables ANOs to further differentiate their services and to innovate. Therefore, if a L2 WAP is imposed, the ANOs should also have the possibility to use and configure their own CPE/modem/ONT. However, the CPE/modems/ONT of ANOs have to fulfil certain requirements e.g. in order to ensure a proper interworking with the network of the provider of the L2 WAP.

CP5: Bandwidth

ANOs need to be able to differentiate the down- and upload speed of their services from those of other operators. Therefore, L2 WAP should enable ANOs to control the speed of their

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[14] BEREC (2015)

services within the limit(s) of the bandwidth profile(s) of the subscriber access line. Depending on the form of price regulation, different bandwidths might be available at different prices.

CP6: Quality of service

ANOs need to be able to choose the quality of their services and to provide services with higher quality of service (QoS) requirements. Therefore, L2 WAP should provide (ostensibly[15]) uncontended bandwidth or a bandwidth with a sufficiently high QoS. The QoS should be at least as high as the incumbent operator is providing to his own retail arm internally.

The QoS requirements of L2 WAP imposed on market 3b may be lower compared to the QoS of L2 WAP imposed on market 3a since the definition of market 3b and the retail products which ANOs should be able to provide based on L2 WAP on market 3b may not require the same QoS as on market 3a. Also, L2 WAP on market 3b include (additional) backhaul components which may decrease the achievable QoS compared to that on market 3a.

CP7: Traffic prioritisation

Traffic prioritisation increases the flexibility of ANOs in the design of their products and enables ANOs to use the bandwidth of L2 WAP more efficiently (e.g. by prioritising voice traffic over internet traffic). Therefore, L2 WAP should also offer ANOs the possibility to prioritise the traffic (e.g. based on the p-bits of the Ethernet protocol). Several priorities should be available for ANOs.

CP8: Multicast

L2 WAP with multicast frame replication functionality enable ANOs the provision of services generating multicast traffic (e.g. IPTV) with an efficient use of the bandwidth of L2 WAP. On the other hand, the multicast frame replication functionality increases the complexity and costs of a L2 WAP. Therefore L2 WAP should have a multicast frame replication functionality if it is necessary and proportionate to ensure technical and economical replicability of competing retail (bundled) offers.

CP9: Number of VLANs

The availability of several VLANs per end user facilitates the provisioning of several services per end user and traffic forwarding. Therefore, L2 WAP on market 3a should enable ANOs to use (at least) several VLANs per end user unless the ability of the ANO to provide several services is ensured by complementary wholesale products. On market 3b the need for several VLANs may depend on market situation, e.g. which retail products ANOs should be able to provide based on the L2 WAP according to the regulatory objectives.

CP10: Customer identification

Customer identification enables ANOs to provide individual services to their subscribers and to authorise for each customer individually which network resources (services) the customer can use (e.g. limiting the internet access speed based on what the subscriber has signed up for). Therefore, L2 WAP should enable ANOs to identify their end users.

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[15] For the term „ostensibly uncontended bandwidth" see BEREC (2015), pp. 10-11

CP11: Security

With security measures network operators can preserve the integrity and availability of their networks and services. Therefore, L2 WAP should enable ANOs to apply security measures. ANOs should have the possibility to apply any security measure they would like to use at Layer 3 and higher layers.

CP12: Fault management

If, in case of a fault, actual information on parameters of the concerned subscriber access line is available to ANOs, this supports their fault management and facilitates to locate and repair the failure. Therefore, L2 WAP should enable ANOs to receive a report on actual values of parameters of the subscriber access line on request which facilitate their fault management.[16]

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[16] These parameters may include e.g. configuration, test, status and/or performance parameters of the DSL system.

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Abbreviations

ANO	Alternative Network Operator
CO	Central Office
CPE	Customer Premises Equipment
DHCP	Dynamic Host Configuration Protocol
DSLAM	Digital Subscriber Line Access Multiplexer
FTTB	Fibre To The Building
FTTC	Fibre To The Cabinet
FTTH	Fibre To The Home
GPON	Gigabit Passive Optical Network
IP	Internet Protocol
IPTV	Internet Protocol Television
ITU-T	International Telecommunication Union – Telecommunication Standardisation Sector
LAN	Local Area Network
L2	Layer 2
NGA	Next Generation Access
NG-PON	Next Generation Passive Optical Network
NRA	National Regulatory Authority

ONT   Optical Network Termination

PoH   Point of Hand-over

QoS   Quality of Service

VDSL   Very High Speed Digital Subscriber Line

VLAN   Virtual Local Area Network

WAP   Wholesale Access Product