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Draft BEREC Guidelines on very high capacity networks

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https://bereg.europa.eu/eng/news_consultations/ongoing_public_consultations/6821-public-consultation-on-draft-bereg-guidelines-on-very-high-capacity-networks

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Introduction

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Introduction (1)

- According to Art 82 EECC*), *'By 21 December 2020, BEREC shall [...] issue guidelines on the criteria that a network is to fulfil in order to be considered a very high capacity network (VHCN), in particular in terms of down- and uplink bandwidth, resilience, error-related parameters, and latency and its variation.[...]*'
- NRAs shall take these Guidelines into utmost account
- The Guidelines shall contribute to the harmonization of the definition of the term 'VHCN' in the EU
- VHCN is a new and important concept of the EECC*)
- One of the general objectives of the EECC (Art. 3(2a)) is *'promot[ing] connectivity and access to, and take-up of, VHCNs'*
- The concept of VHCN is used also in other initiatives taken by the EU institutions

*) European Electronic Communications Code

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Introduction (2)

- The term ‘VHCN’ is relevant for several provisions in the EECC, e.g. for the following
- The conditions under which NRAs shall not impose certain obligations on wholesale-only undertakings depend on access to a VHCN (Art. 61(3)) in connection with Art. 80)
- The geographical surveys of network deployments may include a forecast of the reach of VHCNs (Art. 22(1))
- NRAs may invite undertakings and public authorities to declare their intention to deploy VHCNs in designated areas (Art. 22(3))
- The regulatory treatment of new VHCN elements foresees lighter regulation for VHCNs under certain conditions related to co-investment (Art. 76)
 - This provision (Art. 76), however, only applies to certain types of VHCN
 - The performance thresholds defined in the BEREC Guidelines on VHCNs are not relevant for this provision (Art. 76.)



Definition of the term 'VHCN' in the EECC



Definition of the term 'VHCN' in the EECC (1)

- The term 'VHCN' means (Art. 2(2))
 - Either a network with a fibre roll out up to a certain point
 - Or a network which is capable of delivering, under usual peak-time conditions, a similar network performance
 - in terms of downlink and uplink bandwidth, resilience, error-related parameters, latency and its variation
- Rec. (13) further clarifies to which point fibre needs to be rolled out
- In conclusion, VHCNs according to Art. 2(2) are:
 - Any network providing a **fixed-line** connection with fibre roll out at least up to the **multi-dwelling building**;
 - Any network providing a **wireless** connection with fibre roll out up to the **base station**;
 - Any network providing a **fixed-line** connection and which is capable of delivering under usual peak-time conditions a certain network performance (**performance thresholds 1**); and
 - Any network providing a **wireless** connection and which is capable of delivering under usual peak-time conditions a certain network performance (**performance thresholds 2**)



Definition of the term 'VHCN' in the EECC (2)

- The performance thresholds 1 and 2 need to be determined as follows:
 - **Performance thresholds 1:** The end-user QoS which is achievable under usual peak-time conditions by a network providing a fixed-line connection with a fibre roll out up to the multi-dwelling building.
 - **Performance thresholds 2:** The end-user QoS which is achievable under usual peak-time conditions by a network providing a wireless connection with a fibre roll out up to the base station.
- The equivalent performance is considered with regards to the achievable end-user QoS of VHCNs for the following reasons:
 - The EECC (Art. 3(2)a) promotes the rollout of VHCNs to benefit end-users and VHCNs are capable of providing end-user services with a particularly high QoS
 - The term 'VHCN' is defined (Art. 2(2)) as a certain type of network (not a limited part of a network) and, therefore, the performance up to the end-user where the public network ends needs to be considered



Criteria for the definition of 'VHCNs'



Criteria for the definition of VHCNs (1)

- In accordance with the EECC and based on data collected from network operators, the Guidelines lay down the following
- Any network which fulfils **one** (or more) of the following 4 criteria is a VHCN
- **Criterion 1:** Any network providing a **fixed-line** connection with a fibre roll out at least up to the **multi-dwelling building**
- **Criterion 2:** Any network providing a **wireless** connection with a fibre roll out up to the **base station**



Criteria for the definition of VHCNs (2)

- **Criterion 3:** Any network providing a **fixed-line** connection which is capable of delivering, under usual peak-time conditions, services to end-users with the following quality of service (**performance thresholds 1**):
 - Downlink data rate ≥ 1000 Mbps^{*)}
 - Uplink data rate ≥ 200 Mbps^{*)}
 - IP packet error ratio (Y.1540) $\leq 0.05\%$
 - IP packet loss ratio (Y.1540) $\leq 0.0025\%$
 - Round-trip IP packet delay (RFC 2681) ≤ 10 ms
 - IP packet delay variation (RFC 3393) ≤ 2 ms
 - IP service availability (Y.1540) $\geq 99.9\%$ per year

*) IP packet payload data rate



Criteria for the definition of VHCNs (3)

- **Criterion 4:** Any network providing a **wireless** connection which is capable of delivering, under usual peak-time conditions, services to end-users with the following quality of service (**performance thresholds 2**)
 - Downlink data rate ≥ 150 Mbps^{*)}
 - Uplink data rate ≥ 50 Mbps^{*)}
 - IP packet error ratio (Y.1540) $\leq 0.01\%$
 - IP packet loss ratio (Y.1540) $\leq 0.005\%$
 - Round-trip IP packet delay (RFC 2681) ≤ 25 ms
 - IP packet delay variation (RFC 3393) ≤ 6 ms
 - IP service availability (Y.1540) $\geq 99.81\%$ per year
- The performance thresholds of criterion 4 refer to **outdoor** locations only and to the **average** value within the coverage area considered

^{*)} IP packet payload data rate



Criteria for the definition of VHCNs (4)

- The performance thresholds 1 and 2 refer to the following path
 - From the end-user to the first hand-over point in the network where traffic of the end-user services is handed over to other public networks^{*)}
- In case of particularly long distances (e.g. several hundred kilometres) the threshold round-trip IP packet delay increases for every 100km by 1 ms
- VHCN does not represent a unified concept
 - ‘Fixed VHCNs’ meet criterion 1 or criterion 3 (or both)
 - ‘Wireless VHCNs’ meet criterion 2 or criterion 4 (or both)
- A ‘Wireless VHCN’ may also meet the QoS thresholds of criterion 3 (e.g. in case of FWA) and then it may be considered equivalent to a ‘Fixed VHCN’

^{*)} In case of round-trip parameters back to the end-user



Criteria for the definition of VHCNs (5)

- Since for a network it is sufficient to meet one criterion to qualify as VHCN
 - A network which qualifies as a VHCN according to criterion 1 does not necessarily fulfil criterion 3
 - A network which qualifies as a VHCN according to criterion 2 does not necessarily fulfil criterion 4
- The Guidelines provide criteria for the consideration of a network as a VHCN, where this is relevant for the application of the EECC
- They should not be interpreted as a view on the appropriateness of such consideration as a criterion for any other policy instrument, including public funding



Application of the criteria

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Application of the criteria (1)

Criterion 1

- Any network providing a **fixed-line** connection qualifies as VHCN if fibre is rolled out at least up to the **multi-dwelling building** (criterion 1)
- It does not need to fulfil further criteria
- Criterion 1 is fulfilled in case of FTTB and FTTH
- Criterion 1 is not fulfilled e.g. in case of a fibre roll out up to a node to which multiple single-family houses are connected even only a few
- BEREC is of the view, that in case fibre is rolled out up to the **multi-dwelling building** it is desirable that technologies which are deployed inside the building correspond to the performance potential of FTTB



Application of the criteria (2)

Criterion 2

- Any network providing a **wireless** connection qualifies as VHCN if fibre is rolled out at least up to the **base station** (criterion 2)
- It does not need to fulfil further criteria
- Criterion 2 is fulfilled e.g. in case of
 - Mobile networks with a fibre roll out up to the base station
 - Public WLAN (WiFi) networks with a fibre roll out up to the access point
- BEREC is of the view, that in case fibre is rolled out up to the **base station** it is desirable that wireless access technologies which are deployed correspond to the performance potential of fibre to the base station



Application of the criteria (3)

Criterion 3 / 4

- The network needs to be capable of meeting during peak-time the performance thresholds of criterion 3 / 4
- It is not necessary that
 - The network actually offers a service which meet the performance thresholds
 - All services provided by the network have to meet the performance thresholds
- The area covered by the network needs to be divided in appropriate sub-areas
- For each sub-area, it needs to be determined whether the performance thresholds are met
- If this is the case, then the part of the network that covers this sub-area qualifies as a VHCN



Application of the criteria (4)

Criterion 3 / 4 (contd.)

- A sub-area meets the performance thresholds if, under usual peak-time conditions, the end-users in this sub-area will **typically** / on **average** at **outdoor** locations experience at least the QoS of the performance thresholds
- For example:
 - In case of criterion 3, measurements made with an internet speed test^{*)} in the sub-area during peak-time typically measure at least 1,000 / 200 Mbps
 - In case of criterion 4, measurements made with a drive test^{*)} in the sub-area during peak-time measure on average at least 150 / 50 Mbps
- **Criteria 3 and 4 refer to ‘any network which provides a fixed-line / wireless connection’ and therefore apply technologically neutral to all networks**

^{*)} Without tariff and CPE limitations



Determination of the performance thresholds



Determination of the performance thresholds (1)

- The performance thresholds of criterion 3 and criterion 4 have been determined based on data collected from network operators
 - In total, operators filled in 204 questionnaires, data of 106 questionnaires have been taken into account
- The performance thresholds of **criterion 3** are based on the achievable end-user QoS in fixed networks with **fibre roll out up to the multi-dwelling building** and the **best technology** on the in-building infrastructure
 - G.fast (212 MHz) on the in-building copper twisted pair
 - DOCSIS 3.1 on the in-building coax network



Determination of the performance thresholds (2)

- The performance thresholds of **criterion 4** are based on the achievable end-user QoS in mobile networks with **fibre roll out up to the base station** and the **best LTE Advanced (4G) technology** in terms of aggregated spectrum, MIMO order, modulation etc.
 - In order to take 5G into account as much as possible, the data rate thresholds have been determined based on the **90% percentile** (not median)
 - The Guidelines foresee that BEREC intends to update criterion 4 as soon as 5G has reached mature deployment and significant penetration and not later than 2023



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