Vodafone Group response on the draft BEREC Guidelines on Very High Capacity Networks

30 April 2020

We appreciate the opportunity to comment on this consultation and trust that our comments are helpful to BEREC and National Regulatory Authorities (NRAs) as well as to other stakeholders. We remain at your disposal to discuss our submission to the consultation, or any other aspect relevant in the context of the latter.

To inquire about our response please contact:
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Vodafone Group is a converged communications technology leader, enabling the digital society. We operates across multiple Member States, and we own and operate fixed networks based on fibre all the way to the residential or business end-user or cell site, HFC networks with Coax last mile, as well as strategic partnerships operating active sharing of FTTH, passive FTTH with our own equipment, as well as dark fibre. We take pride in our Gigabit network capabilities and continuous improvements to our fixed and mobile networks on a variety of different technologies.

Promoting access and take-up of very high capacity networks

Promoting access to and take-up of very high capacity networks (VHCN) is one of the main goals of the European Electronic Communications Code (EECC) as per Article 3 and Recital 23 of the EECC.

This principle is at the core of the EU's ambition towards a Gigabit Society.

The COVID19 crisis has confirmed just how essential digital connectivity and networks are for the functioning of economies, for the delivery of and access to critical government functions, for the ability of businesses to adapt, as well as for every aspect of citizens' lives. Looking to the future, investments in modernising digital networks, enhancing capacity and expanding reach of connectivity services should be a key objective as part of ensuring greater "societal resilience".

Prior to the COVID19 crisis, the EECC was a key instrument through which the EU has set out to achieve its policy direction for ensuring that the digital connectivity is treated as a critical infrastructure priority, and to incentivise appropriate investments in modernising digital networks, enhancing capacity and expanding the reach of connectivity services. Such policy objectives have come into sharp focus with the COVID19 crisis, having somewhat tilted to ensuring "must-haves" are prioritised over aspirational "nice-to-haves". The VHCN definition forms a part of this policy direction. It is therefore important to ensure that the manner in which VHCN is defined by BEREC and applied by national regulators works in concert with the wider policy goals to incentivise best socioeconomic outcomes for European connectivity.

While there is a preference in the EECC to focus on optic fibre networks to be as close to the end-user as possible (thus FTTB or fibre to the base station), as the benchmark of what constitutes VHCN (Recital

13 and Art. 2(2))[1], the EECC explicitly and purposely preserves the principle of technology neutrality. The principle of technology neutrality ensures sufficient flexibility in the approach to policy goals and objectives to enable all technologies and networks to be considered within the ultimate goals of better connectivity for the EU. This means that the EECC is drafted in a way that does not restrict the definition to one particular technology leaving scope for different technologies to be included in the VHCN definition.

The essence of how EECC defines VHCN is the capability of any technology deployed to meet the policy objectives of connectivity.

In order to meet the purpose of the VHCN definition and overall goal of the EECC, technology neutrality should be applied in a manner that ensures that new networks being rolled out and existing networks being upgraded can withstand the customers' needs for bandwidth, latency and resilience and have the adequate capabilities to achieve connectivity related policy goals.

Ensuring that the policy settings are well balanced is of paramount importance, especially at these times of health crisis and economic uncertainty. Setting overly restrictive, technology-specific or narrow and ambitious requirements could have serious negative socioeconomic impacts.

Getting the policy settings right will be fundamental in achieving positive socioeconomic goals as we move through the COVID19 crisis and into economic recovery to:

- ensure telecom operators can keep everyone connected and meet growing demands for connectivity, though appropriate investment in fixed and mobile network expansion;
- stimulate the field engineering and construction employment associated with fixed and mobile network investment and deployment;
- by focusing private investment capital directly into our fixed and mobile networks, support increased traffic volumes with improved cost efficiency /economies of scale, resulting in better value for citizens and businesses.

To this end, we encourage BEREC to consider our comments on the draft VHCN Guidelines below and ensure it adopts an approach that will be consistent with the EECC requirements and provide best socioeconomic outcomes in the coming years.

Consistency with the EECC definition and intent - FTTB and fibre to the base station as baseline scenarios

VHCN is defined in the EECC Article 2(2) as (emphasis added):

"an electronic communications network which consists wholly of optical fibre elements at least up to the distribution point at the serving location or an electronic communications network which is capable of delivering, under usual peak-time conditions, ***similar network performance*** in terms of available downlink and uplink bandwidth, resilience, error-related parameters, and latency and its variation"

Recital 13 further clarifies that "serving location" means:

- fixed-line: optical fibre installation up to a multi-dwelling building (FTTB); and
- mobile: optical fibre installation up to the base station.

[1] Also, for instance Recital 62 clearly distinguishes VHCN from older networks or FTTC when discussing geographic mapping "…It should include surveys regarding both deployment of very high capacity networks, as well as significant upgrades or extensions of existing copper or other networks which might not match the performance characteristics of very high capacity networks in all respects, such as roll-out of fibre to the cabinet coupled with active technologies like vectoring."

Recital 13 also notes that in accordance with the principle of technology neutrality technologies other than optical fibre and transmission media should not be excluded from the definition, where they compare with that baseline scenario in terms of their **capabilities**.

In its draft guidelines, BEREC departs from this definition in three significant ways, namely:

1. the requirement for "similar performance" is replaced with "equivalent performance";
2. standards for criteria 3 and 4 are stricter than for criteria 1 and 2 and this departs from a technology neutral approach as it sets the bar higher for non-fibre networks; and
3. the focus on network *capability* is lost in the construction of criteria 3 and 4.

The technology-specific outcomes of applying this proposed definition could result in unintended exclusions of networks, which *do* deliver performance similar to the fibre baseline scenario and *do* have the network capability to do so, for instance metropolitan LTE networks, 4G and certain types of DOCSIS networks. Equally, an FTTH operator qualifying under criterion 1 could limit upstream speeds to less than the 200M of criterion 3, and hence offer worse performance than required under criterion 3.

We therefore propose that BEREC ensure its guidelines are within scope of the EECC definition by correcting the above three issues. Such corrections to the definition should avoid distortions in the application of the definition, specifically:

1. The requirement should be for "similar" not "equivalent" performance. This will allow for some flexibility within different networks and also for relevant flexibility required for ongoing network upgrades over the coming years, rather than locking the definition in to specific parameters measured by specific providers in 2019;
2. Standards for criteria 3 and 4 cannot be stricter than for the baseline scenario. The technology neutrality approach must be respected by ensuring that criteria 3 and 4 allow for *similar performance and capability* as the baseline scenario and are therefore comparable, not held to a different or more aspirational standard; and
3. Criteria 3 and 4 are not taking into account network capability as required by the EECC, which will lead to further distortions. This should be corrected.

VF comments on performance thresholds 1 and 3 (fixed networks)

To demonstrate the distortions in the current definitions as mentioned above, all DOCSIS 3 technologies perform equally well when used for short-range in-house applications or metropolitan area networks spanning distances of up to 160 km, irrespective of whether the transport medium is fibre or coaxial cable. Therefore, DOCSIS 3 technologies should be considered as a reference when the medium is fibre.

We would recommend BEREC consider adopting the following amendments to the current fixed criteria to avoid the issues highlighted above.

Test measurement

1G IP performance should be 1G at Ethernet level – and hence IP rate of 960 Mbps. As BEREC note in their Annex 5, IP data rate will necessarily be lower than the transmission rate, as the packet payloads require preamble and other Frame overheads. Footnotes 47 and 48 suggest that the typical rate be taken at 960 Mbps. This will avoid the need for non-standard CPE and test equipment for verification purposes.

NRAs already specify test set-ups to qualify operators for league-table comparisons, and may wish to retain their own approaches that meet the spirit of the testing.

Y.1540 testing requires test capability deployment at both ends of the test. For the network end, specialist test head equipment within the operator's domain is the norm, located as close to the peering handover of traffic with other operators, to be realistic on measuring the performance of elements under their control. For the CPE, usually a dedicated test set is used in place of customer equipment, or a specific test software module on the CPE. Y.1540 is itself under continued review, including contributions by BEREC, with the latest version from 2019 (updated Feb 2020) providing a new annex on testing results.

There are also other standard bodies, such as the Broadband Forum, working on testing approaches that better measure user experience, such as Quality of Experience Delivered (Broadband QED[2]) and Application Layer Testing.

BEREC should therefore permit the testing methodology to be agreed with the NRA in each country and reviewed with operators over time.

Upstream calculations

For upstream calculations, BEREC have mixed the technology types and chosen the G.fast lab-theoretical value reported on the questionnaires. We recommend resetting the upstream value to the realistic value achievable on extant fibre only DOCSIS 3.1 network when full spectrum is available, namely 160Mbps peak, though note also that NRAs have mandated conditions which may restrict this lower to 100Mbps for instance. This is because existing users who do not wish to upgrade still must have their service maintained, or may have their own modems. This may be an area BEREC might wish to review by December 2025, when evaluating actual deployment of 5G and G.fast.

IP Service Availability target

Uptime is usually stated with planned works removed from the calculation, but also with contractual removal of effects caused by third-party failures such as the local power grid. We ask that this exclusion is made explicit, as well as the existing note that the measurement period is over 12 months.

Criterion 3 revised in accordance with these proposals would therefore be amended to read (amendments highlighted):

> Criterion 3: Any network providing a fixed-line connection that is capable of delivering, under usual peak-time conditions, services to end-users with the following quality of service (performance thresholds 1):
>
> a. Downlink data rate ≥ 1000 Mbps **(960Mbps IP rate if Downlink is delivered as Gigabit Ethernet)**
>
> b. Uplink data rate **≥ 160 Mbps** (note as above, subject to NRA conditions)
>
> c. IP packet error ratio (Y.1540) ≤ 0.05%
>
> d. IP packet loss ratio (Y.1540) ≤ 0.0025%
>
> e. Round-trip IP packet delay (RFC 2681) ≤ 10 ms
>
> f. IP packet delay variation (RFC 3393) ≤ **10**[3] ms
>
> g. IP service availability (Y.1540) ≥ 99.9% per year**, with planned works and impact of third-party works excluded**

[2] https://www.broadband-forum.org/2019-09-03-broadband-forum-leaps-forward-in-the-pursuit-of-better-broadband-quality-of-experience

[3] Based on IPDV should not be less than the Packet Delay selected.

VF comments on performance thresholds 2 and 4 (wireless networks)

We agree with the GSMA submission regarding concerns with thresholds 2 and 4.

In addition, we make the following observations:

- Typically high capacity base stations are connected directly with fibre; however, that does not necessarily equate QoS for end users across different end-to-end networks.
- Regarding criterion 4, QoS parameters (e.g. DL data rate, UL data rate etc.) chosen for setting performance threshold are achievable, however, these are not necessarily guaranteed or part of customer SLAs.
- Currently, except for cities, 4G and 5G performance would be similar. Most of the latency improvement also come from MEC which is applicable for both 4G and 5G. While 5G expects to improve data rates, in a radio network data rate experience will be highly variable depending on received signal quality and interference from neighbouring cells. In the uplink we will be limited by UE transmit power, which is typically similar in 5G compared to 4G. Mean values round-trip IP packet delay and delay variation seem achievable in mobile network with MEC and 4G/5G.