BEREC
Body of European Regulators for Electronic Communications

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BEREC Report on the outcome of the public consultation regarding the draft BEREC Guidelines on Very High Capacity Networks

5 October 2023

Contents

1 Executive Summary

BEREC published the draft BEREC Guidelines on Very High Capacity Networks ('the draft Guidelines') on 15 March 2023. At the same time, a public consultation was opened, running until 28 April 2023. BEREC received responses to the public consultation from the following six stakeholders:

- One network operator
  - Liberty Global
- Four associations
  - DSA (Dynamic Spectrum Alliance)
  - Ecta (European Competitive Telecommunications Association)
  - ETNO (European Telecommunications Network Operators' Association) together with GSMA (GSM Association)[1]
  - FTTH Council Europe
- One equipment vendor
  - Huawei

This report provides an overview of the responses BEREC received during the public consultation and the BEREC response to each topic addressed by stakeholders in particular with regard to the need to adapt the draft Guidelines.

In addition, BEREC published all stakeholder responses received.[2]

2 Stakeholder comments and BEREC response

Supporting statements from Ecta, FTTH Council and Huawei

Ecta overall agrees with BEREC's proposals for the revised performance thresholds, focused entirely on 5G, and modifying the thresholds of criterion 4. Ecta also agrees that the 1 October 2023 would be a suitable date for the Guidelines to take effect.

Huawei is pleased that the new parameters indicated in criterion 4 are better aligned with the existing network performance of 5G networks. The deployment of such wireless networks can be important in terms of reaching full Gigabit Connectivity and will serve to push fibre deeper into existing networks and closer to the end-user.

The FTTH Council acknowledges the necessity to update the criterion 4 for mobile networks in light of the development of the 5G technology. The FTTH Council supports the proposed modifications to the criterion 4 performance thresholds and, in particular, the need to increase the downlink data rate. The FTTH Council is pleased that the new parameters indicated in

[1] ETNO and GSMA sent a joint contribution to BEREC
[2] See https://www.berec.europa.eu/en/public-consultations/closed-public-consultations-and-calls-for-inputs/public-consultation-on-the-draft-berec-guidelines-on-very-high-capacity-networks

criterion 4 are better aligned with the existing network performance of 5G networks. The FTTH Council appreciates that in its Guidelines BEREC establishes performance criteria for mobile networks and indeed, different criteria for fixed and mobile networks, which serve different end-users needs and should be seen as complementary in most instances.

BEREC response

BEREC welcomes the supporting statements from Ecta, FTTH Council and Huawei.

BEREC needs to be forward looking and the threshold of the downlink data rate may or should be reduced

Ecta, the FTTH Council and Huawei express the view that BEREC needs to be forward looking and network performance should not be measured in a static context as the existing technology solutions will evolve over time. It is not today's performance that is relevant but to what extent a medium is likely to be capable of delivering on the parameters that will be needed in 2025 and beyond. What those parameters are, or will be, will change significantly over time.

Ecta, Huawei and the FTTH Council consider that from a forward looking perspective the proposed update of criterion 4 in terms of 350 Mbps downlink data speed may (Ecta) or should (Huawei) be reduced, or may be difficult to achieve in the short term (FTTH Council) in light of spectrum allocation issues' (e.g. C-Band, mmWaves) impact on wireless networks downlink performance. Ecta and Huawei invite BEREC to elaborate on the timeline to achieve the downlink performance targets in a dynamic and forward looking perspective. Ecta also suggests that BEREC should, in the final text of the Guidelines, put forward concrete proposals on the intermediate steps for reaching those targets and the respective timelines.

Regarding the forward looking perspective, the FTTH Council points out that BEREC should take into account the different pace of technological development between fixed and mobile networks, and indeed the different constraints the two mediums face from a technical perspective. Indeed, the latter may require a more frequent update of the criteria. The FTTH Council also invites BEREC to consider the opportunity to publish two different guidelines respectively for fixed and mobile networks in view of the upcoming revision in 2025.

BEREC response

BEREC agrees that existing technology solutions will evolve over time. Therefore, also the achievable end-user QoS and the performance thresholds of criterion 4 will also evolve. However, BEREC does not measure the network performance in a static context as it updates the BEREC Guidelines already now, only three years after BEREC published the first version of the Guidelines. Furthermore, the European Electronic Communications Code (EECC, Art. 82) demands that BEREC shall update the Guidelines regularly. However, BEREC considers

it not advisable to update the Guidelines in a too short interval, as also regulatory predictability needs to be ensured.

BEREC further wants to clarify that it already takes into account the different pace of technological development between fixed and mobile networks, as BEREC updates criterion 4 for wireless networks now while criterion 3 for fixed networks will be updated in 2025 (see Outline BEREC Work Programme 2024).[3]

BEREC wants to stress that the Guidelines focus as much as possible on technologies which will be deployed in networks in the time period when these Guidelines are in force, i.e. from October 2023 (see draft Guidelines, paragraph 33). Therefore, the Guidelines are based on the most advanced 5G technology an operator has deployed in its mobile network, even considering pilot deployments and field trials (see draft Guidelines paragraphs 36, 37.c). Moreover, the update of criterion 4 explicitly takes into account the expected change of the "achievable data rate" in the next two years (see draft Guidelines paragraphs 192-197, 200-203).[4] As mentioned above, BEREC also has to update the Guidelines regularly. For all these reasons, BEREC considers the Guidelines to be forward looking.

BEREC would like to clarify that for the performance thresholds of criteria 4 defined in the updated Guidelines, the mmWave band is not relevant, as the performance thresholds are based on the data of the network operators and only one of them already used the mmWave spectrum at the time of the data collection and the reported data rates were below the median data rate (operator M19, see Table 10 in the draft Guidelines).

BEREC would like to point out that, according to the EECC (Art. 54(1)(a)), Member States shall take all appropriate measures to reorganise and allow the use of sufficiently large blocks of the 3.4-3.8 GHz band already by 31 December 2020. Indeed, licences for the 3.5 GHz band have already been awarded in nearly all EU countries and in these countries on average approximately 90% of the 3.5 GHz spectrum has already been allocated, according to data from Cullen International. Furthermore, the performance thresholds of criterion 4 are based on the median of the data provided by the mobile network operators and do not focus on operators which used already a particularly high amount of 5G spectrum. Therefore, BEREC does not share the view that spectrum allocation issues' (C-Band, mmWaves) would change the conclusions with regard to criterion 4.

5G rollout at the time of data collection was not mature enough to justify an update of Criterion 4

The GSMA and ETNO agree that 5G deployment and penetration have increased since BEREC developed its 2020 version of the Guidelines. However, GSMA and ETNO consider

[3] BoR (23) 02, section 3.1, p. 8 https://www.berec.europa.eu/en/document-categories/berec/berec-strategies-and-work-programmes/outline-berec-work-programme-2024

[4] From the point of data collection in June 2022

that more work is needed before BEREC adopt its Guidelines. Indeed, at point 109 BEREC itself highlights that "*at the time of data collection (May to June 2022, see paragraph 59) the mobile network operators were still rolling out 5G, their new 5G networks may not yet have been fully used.*" Therefore, the representativeness of the statistical champion is very limited, as it only includes 19 operators across the whole Union with less than half of the EU countries represented. The number of operators considered for parameters other than data rates is in some cases also lower than 10. It is therefore questionable that BEREC provides for an update of criterion 4 now, considering that in 2025 it is going to review the overall guidelines pursuant to Art. 82 EECC. At that time 5G will have reached a significant level of maturity and the criteria will better represent 5G performances.

Liberty Global is of the view that 5G rollout at the time of data collection was not mature enough to justify an update of Criterion 4. Liberty Global questions BEREC's decision to adopt the statistical median in a situation where only a few data points were available. Liberty Global wonder whether the data collected only from a restricted number of mobile operators was enough to set thresholds that should be met by all mobile operators across the EU to qualify as a very high capacity network, or rather BEREC should have sought more information from mobile operators, even on a rolling basis, and undertaken a more detailed analysis. This would have probably yielded a more sound, realistic and justifiable outcome, allowing stakeholders to provide more information, while progressing with the rollout of 5G networks, and BEREC to rely on a broader and updated data set. The reporting by mobile operators on such parameters in May 2022 could prove to be statistically premature given the early stage of 5G network rollout in certain Member States at the time. BEREC could also consider collecting data on a rolling basis or establish multiple touch points over the year to connect with operators and ensure that the dataset used in the Guidelines is appropriate and reliable.

BEREC response

BEREC does not share the view that 5G rollout at the time of data collection was not mature enough to justify an update of criterion 4. In most countries, the 5G rollout started in 2019 or 2020, i.e. two years before the data collection in 2022. BEREC considers it important that the Guidelines are as up-to-date as possible. BEREC also has the obligation to update the Guidelines regularly, according to Art. 82 of the EECC. The new performance thresholds of criterion 4 show that 5G enables, for example, a significantly higher down link data rate compared to the first version of the Guidelines published in October 2020.[5] Therefore, it would not be appropriate to still use the "old" threshold values of 2020. BEREC considers the data base to be sufficient to determine the performance thresholds of criterion 4. BEREC cannot force the mobile network operators to provide data or e.g. to make measurements in their network in order to be able to complete BEREC's questionnaire. The questionnaire was sent at national level to all mobile network operators (see draft Guidelines, paragraph 59),

[5] BoR (20) 165, paragraph 18 https://www.berec.europa.eu/en/document-categories/berec/regulatory-best-practices/guidelines/berec-guidelines-on-very-high-capacity-networks

therefore, all mobile network operators in the EU had the opportunity to participate in the data collection exercise and to contribute to a broad data base.

BEREC wants to point out that in 2019, when the data was collected for the preparation of the first version of the Guidelines, LTE Advanced (4G) had already a penetration of 99.3% (see BEREC Annual Report 2022),[6] however, the data base for the determination of the performance thresholds of criterion 4 was not broader (see first version of the Guidelines) [7] compared to the data base used in the draft Guidelines for the update of criterion 4. Moreover, the 5G penetration in the EU increased from 14% in 2020 to 66% in 2021 and therefore was already very high at the time of data collection for the update of criterion 4 in 2022.[6]

Finally, BEREC wants to point out that other stakeholders (see Ecta, Huawei and FTTH Council above) explicitly welcome that BEREC is now updating criterion 4.

The national regulatory framework should be factored in when setting criterion 4

Liberty Global has some concerns regarding BEREC's approach to setting the performance thresholds 2 in criterion 4 – especially in relation to the increase of the downlink data rate from 150 Mbps to 350 Mbps. Liberty Global already anticipates that part of Liberty Global's networks will not be able to reach such threshold in the short term. More specifically, in Belgium ca.35% of the footprint will not adhere to the requirement of 350 Mbps, whereas in the Netherlands the whole network is likely to be affected. This is mainly due to national regulatory framework which hinder 5G network deployment and which BEREC has not taken into account enough. Liberty Global argues that in Belgium strict radiation norms have hindered the rollout of 5G in certain areas, also generating a social push-back from the public against 5G technology, considered harmful for a long time. In the Netherlands, spectrum auctions have been long overdue and, as long as the 3.5GHz band is not auctioned, operators will be limited in rolling out high capacity 5G. Already today, such national policies have a huge impact on the achievement of criterion 4 of the BEREC Guidelines in the footprint of Liberty Global and Liberty Global do not anticipate any improvement in the short term. Liberty Global believe that the national regulatory framework should be factored in when setting criterion 4 of the BEREC Guidelines, in the same way as the increase of 5G availability is taken into account, and may justify a reduction of the downlink data rate in performance thresholds 2.

BEREC response

BEREC would like to clarify that the national regulatory framework has been factored in when determining the threshold values of criterion 4. The threshold values of criterion 4 are based on data of mobile network operators of different EU countries and, therefore, national

[6] BoR (23) 109, Figure 3, p. 11 https://www.berec.europa.eu/en/document-categories/berec/annual-reports/berec-annual-report-2022

[7] See BoR (20) 165, Tables 1 and 10 to 14 https://www.berec.europa.eu/en/document-categories/berec/regulatory-best-practices/guidelines/berec-guidelines-on-very-high-capacity-networks

specificities including the national regulatory framework have been taken into account. The determination of the threshold values of criterion 4 is based on the median (see draft Guidelines, paragraph 187) of the data received from the mobile network operators, therefore, the national specificities have been taken into account at an average level. The EECC demands that criterion 4 is based on the "achievable" network performance (see draft Guidelines paragraphs 13, 15, section 4.2) and, therefore, it is not possible to base criterion 4 only on data provided by mobile network operators in EU countries with conditions which may hinder or slow down 5G deployment. If conditions in countries hinder the 5G deployment, BEREC would consider it logical that the coverage of very high capacity networks that fulfil criterion 4 is smaller.

The threshold of the latency parameter remains to be further assessed

GSMA and ETNO believe that the threshold values of criterion 4 are achievable in 5G at busy hour under good radio coverage except the threshold value for the latency parameter ("Round-trip IP packet delay (RTD)". For the latency parameter, the stated threshold remains to be further assessed. Latency from the point of view of the end-user varies depending on several parameters such as terminal, technology used, whole cell, loaded or not, good radio condition or not and location of the internet server that measures it. In the view of GSMA and ETNO, it seems difficult to obtain a single threshold to qualify a very high capacity network, as it depends on whether the user is on a 4G, 5G non-standalone or 5G standalone network in a given radio configuration.

Without the precise definition of the measurement protocol and the nature of the measurements (field measurements, sensors), GSMA and ETNO believe that it is not possible to build a common reference between mobile operators to evaluate the relevant threshold. In the view of GSMA and ETNO, the 18 ms threshold is very low and such a requirement requires knowledge of the calculation method. GSMA and ETNO consider it therefore premature to establish such a value.

BEREC response

BEREC would like to clarify that the draft Guidelines (see paragraphs 21.c, 54, 55) and also the first version of the Guidelines clearly state that the performance thresholds of criterion 4 (and also of criterion 3) "*refer to the path from the end-user to the first point in the network where the traffic of the end-user services is handed over to other public networks (e.g. nearest peering point) and in case of round-trip parameters back to the end-user*". Footnote 8 to this sentence further clarifies "*Without taking into account limitations caused by the customer premises equipment respectively mobile equipment*." Therefore, the path and the location of the server which is used for measurements is fully clear, as well as, that limitations of the mobile equipment should not be taken into account.

BEREC would also like to clarify that the definition of criterion 4 (see draft Guidelines, paragraph 19) clearly states that the performance threshold needs to be met "*under usual peak-time condition*". Therefore, also the network load that needs to be considered is clear.

BEREC would like to clarify further that the performance thresholds of criterion 4 "*refer to outdoor locations only and to the average value within the coverage area considered*." (see draft Guidelines paragraphs 21.g, 77 and 78). Therefore, also the radio conditions are clearly defined.

Finally, BEREC would like to stress that criterion 4 is defined as "*Any network providing a wireless connection which is capable of ….*" (see draft Guidelines paragraph 19) and, therefore, this definition is completely technological neutral. Consequently, if in an area considered the performance thresholds are met the area is covered by a very high capacity network completely independent on which technology the network is based on.

Amendment of the layer at which the data rate performance applies is not justified

GSMA and ETNO note that BEREC modifies the layer at which the data rate performance applies (from IP packet payload to transport layer protocol payload), leaving unchanged the layer for fixed very high capacity networks, with an evident inconsistency between fixed and mobile performance parameters. GSMA and ETNO deem that this last amendment is not justified and should be assessed in the overall review of the guidelines in 2025.

BEREC response

BEREC wants to point out that the data rate of the updated criterion 4 needs to be based on the transport layer protocol payload and not on the IP packet payload, in order to ensure that the BEREC Guidelines on very high capacity networks are consistent with the BEREC Guidelines on the Implementation of the Open Internet Regulation (BoR (22) 81, paragraphs 140 and 166). The latter Guidelines only allow the data rate to be based on the transport layer protocol payload and not on the IP packet payload. The previous version of these Guidelines, the BEREC Guidelines on the Implementation by National Regulators of European Net Neutrality Rules (BoR (16) 127, see paragraphs 140 and 166), which were in force in 2019 when the data for the first version of the BEREC Guidelines on very high capacity networks were collected, allowed the data rate to be based on either the transport layer protocol payload or the IP packet payload. However, these Guidelines were superseded by the new version of these Guidelines (BoR (22) 81) and, therefore, the data rate of the updated criterion 4 has to be based on the transport layer protocol payload. In 2025, also criterion 3 will be updated (see Outline BEREC Work Programme 2024)[3] and then the data rate of criterion 3 will also be based on the new version of these Guidelines (BoR (22) 81). This is also explained in detail in the draft Guidelines (see paragraph 21.d, footnote 9. and paragraph 47).

IP packet error ratio and IP packet loss ratio to be merged

In terms of customer experience, GSMA and ETNO consider the technical parameters IP packet error ratio and IP packet loss ratio to be equivalent. As soon as there is an error in the transmission of a packet (IP packet error ratio), it is dropped and lost at application level and this amounts to estimating the packet loss rate (IP packet loss ratio). GSMA and ETNO therefor suggest that these two parameters be merged into one parameter.

BEREC response

BEREC wants to clarify that the EECC (Art. 2(2) and 82) explicitly demands that the BEREC Guidelines on very high capacity networks have to define “error-related parameters”, therefore, more than one error-related parameter needs to be defined. Before BEREC collected data, BEREC asked the stakeholders whether in their view other error-related parameters than the IP packet error ratio and IP packet loss ratio are more appropriate. However, the stakeholders did not provide a clear indication that other error-related parameters are more appropriate (see draft Guidelines, paragraphs 49-51). Therefore, the performance thresholds of criterion 4 include thresholds for both, the IP packet error ratio (Y.1540) and the IP packet loss ratio (Y.1540). Furthermore, BEREC would like to clarify that these error-related parameters are not the same or equivalent and differ as follows. According to ITU.T Rec. Y.1540 (sections 6.3 and 6.4), the IP packet error ratio refers to the IP packets that arrived at the other side of the communication and is the ratio of the IP packets that arrived with an error to the total IP packets that arrived (either successfully or with an error). Whereas the IP packet loss ratio refers to the transmission path and is the ratio of total lost IP packets to total transmitted IP packets. The IP packet error ratio is therefore (at least from a formal point of view) completely independent from the IP packet loss ratio, as it only considers IP packets that arrived and not IP packets lost during transmission.

Need to fully consider the entire communications network

DSA fully supports BEREC’s interpretation that the very high capacity network definition is not limited to a certain part of the network hierarchy but instead encompasses the entire network, and the QoS parameters of performance thresholds 1 and 2 apply to the entire network. However, the fact that the Guidelines exclude limitations caused by the customer premises equipment (CPE) in the case of fixed networks is a matter of concern, whereas for wireless networks excluding mobile equipment (ME) makes sense. Given that Wi-Fi is the primary way end-users connect to their fixed networks, the performance of the Wi-Fi segment should be part of the assessment to determine whether a fixed network does have very high capacity network capabilities (i.e., whether it meets performance thresholds 1). In DSA’s opinion, a different approach would be flawed as it would mean ignoring the performance of the last-meter network segment. BEREC should consider the connectivity as experienced by the end user, i.e. the experience up to the end-user device - as opposed to the network termination point. This means that the BEREC Guidelines should consider Wi-Fi equipment as part of the

fixed access network rather than of the end-user equipment. The DSA strongly recommends BEREC to amend footnote 8 in paragraph 21.c accordingly.

BEREC response

BEREC would like to clarify that the draft Guidelines and also the first version of the Guidelines consider the entire communications network (see draft Guidelines paragraphs 46, 54, 55). BEREC would like to stress that whether or not a public communications network qualifies as a very high capacity network depends only on characteristics of the public communications network and not on characteristics of elements (e.g. network elements, equipment, devices) outside the public communications network. Furthermore, according to the definition of the network termination point (see EECC Art 2(9), Rec. 19), the public communications network ends at the network termination point. Therefore, it is not possible to include the end-user device in the definition of the performance thresholds of criteria 3 or 4, as suggested by DSA. To the contrary, BEREC considers it important that the draft Guidelines in paragraph 21.c footnote 8 explicitly make clear that limitations caused by the customer premises equipment respectively mobile equipment shall not be taken into account.

Need to reflect the 'Digital Decade Policy Programme 2030' framework

DSA appreciates that the aim of the review of the 2020 BEREC Guidelines is to take 5G developments fully into account. However, DSA considers it odd that the updated BEREC Guidelines did not reflect the ambitions of the Digital Decade Policy Programme 2030 adopted in December 2022, as it constitutes the policy framework for the deployment of very high capacity networks in the next decade. The principles and objectives of the Digital Decade Policy Programme 2030 could be reflected in paragraphs 4 and 11 of the draft BEREC Guidelines, as follows. To include in paragraph 4 "*According to the Digital Decade Policy Programme 2030, by 2030 all end users at a fixed location are covered by a gigabit network up to the network termination point, and all populated areas are covered by next-generation wireless high-speed networks with performance at least equivalent to that of 5G, in accordance with the principle of technological neutrality*" and in paragraph 11 "*The principle of technology neutrality has been also enshrined in the connectivity targets of the Digital Decade Policy Programme 2030*".

BEREC response

BEREC would like to clarify that the BEREC Guidelines define the criteria a network has to fulfil in order to be considered a very high capacity network. However, the Digital Decade Policy Programme 2030 does not refer to very high capacity networks and does not use this term. The intention of paragraph 4 is to inform on EU initiatives which use the concept of very high capacity networks. Therefore, BEREC considers it not appropriate to include the Digital Decade Policy Programme 2030 in this paragraph, as suggested by DSA.

BEREC would like to point out that technology-neutrality is a principle that is widely used, and it is not within the scope of the Guidelines to inform about all initiatives which use this principle. Therefore, it is not possible to include in paragraph 11 the information that also the Digital Decade Policy Programme 2030 uses this principle.

Future revisions should provide information pro-actively

Ecta suggests for future revisions that BEREC and the NRAs provide information pro-actively to all spectrum holders, in order to trigger more responses and more responses containing the relevant information, as Ecta considers the questionnaire responses taken into account by BEREC (corresponding to 19 operators from 13 Member States) to be low even though Ecta understands the reasons why BEREC had no choice but to discard some responses.

BEREC response

BEREC would like to point out that BEREC proactively engaged with stakeholders in the preparation of the Guidelines. BEREC started a call for input and asked the network operators on feedback to the draft questionnaire (see draft Guidelines paragraphs 56-59). BEREC adapted the draft questionnaire based on the input received from the stakeholders. Only then the final version of the questionnaire was sent at national level to the network operators. All mobile network operators in the EU had the opportunity to participate in the data collection exercise and to contribute to a broad data base. However, BEREC has to collect data as required by the EECC and BEREC cannot change these requirements. BEREC also cannot force network operators to provide data or e.g. to make measurements in their network in order to be able to complete BEREC's questionnaire.

All authorities involved should avoid introducing new imbalances between competitors through the design of spectrum assignment proceedings

Ecta is of the view that several late entrant operators suffer from severe spectrum deficits compared to their direct competitors, due to the manner in which NRAs or other competent authorities have organised spectrum award proceedings, both historically and in recent years. Ecta calls on those NRAs that are in charge of radio spectrum awards, and on the public authorities in charge elsewhere, and on the EU institutions, to ensure that, in cases where operators make requests to reduce or remove their spectrum deficit, the necessary procedures are put in place to enable this to occur on fair terms. Going forward, Ecta calls on all authorities involved to avoid introducing new imbalances between competitors through the design of spectrum assignment proceedings.

BEREC response

BEREC would like to clarify that, according to Art. 82 EECC, the Guidelines have to define the criteria a network has to fulfil in order to be considered a very high capacity network. Therefore,

the subject of Ecta's concern, the design of spectrum assignment proceedings, does not fall within the scope of the Guidelines.

3 List of Abbreviations

BEREC	Body of European Regulators for Electronic Communications
DSA	Dynamic Spectrum Alliance
Ecta	European Competitive Telecommunications Association
EECC	European Electronic Communications Code
ETNO	European Telecommunications Network Operators' Association
FTTH	Fibre To The Home
GSMA	GSM Association