Body of European Regulators for Electronic Communications
BEREC

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BEREC Opinion for the evaluation of the application of Regulation (EU) 2015/2120 and the BEREC Net Neutrality Guidelines

6 December, 2018

Contents

Executive summary

In general, BEREC concludes that the application of both the Open Internet Regulation[1] and the BEREC Net Neutrality Guidelines[2] is working well. It is clear that both the Regulation and the Guidelines could be considered as striking a balance between the views of many stakeholders. From their inputs, BEREC observes that some stakeholders (for example ISPs) would like the BEREC NN Guidelines to be less stringent while others (for example consumer organisations) argue that the BEREC NN Guidelines should be more stringent.

Nevertheless, BEREC concludes that the Guidelines could, after their application during the first two years, be clarified in certain instances. This will be done in 2019, with the regular involvement of stakeholders via a written consultation on a draft version of updated Guidelines. This Opinion focuses on the major points eligible for clarification; it does not contain a comprehensive list of subjects on which the Guidelines could be clarified.

In this Opinion BEREC provides several conclusions, and highlights the following three due to their specific relevance:

1. <u>On commercial practices</u>
   No substantive changes are needed to the current text of the Guidelines. However, BEREC considers that some further clarifications could be provided so that consistency in the application of the Regulation by NRAs continues to be ensured in the future.

2. <u>On emerging 5G technologies</u>
   According to BEREC's current understanding and analysis, the Regulation seems to be leaving considerable room for the implementation of 5G technologies, such as network slicing, 5QI and Mobile Edge Computing. To date, BEREC is not aware of any concrete example given by stakeholders where the implementation of 5G technology as such would be impeded by the Regulation. As with all other technologies, the specific use of 5G technologies must be assessed on a case-by-case basis under the Regulation. BEREC invites stakeholders to engage in informal dialogue with NRAs if stakeholders experience uncertainty about whether a specific use of a 5G technology complies with the Regulation. In 2019, BEREC will continue its regulatory assessment of 5G in a report due in Q4. This may include further developing regulatory assessment of 5G technologies in relation to net neutrality beyond this Opinion.

3. <u>On the consistent application of the Regulation</u>
   With the clarification of the Guidelines in 2019, BEREC will continue to strive for consistency in the application of the Regulation. It intends to do so by clarifying the Guidelines where necessary, and by providing a step-by-step assessment methodology for zero-rating cases.

[1] Regulation (EU) 2015/2120 of the European Parliament and of the Council of 25 November 2015
[2] BEREC Guidelines on the Implementation by National Regulators of European Net Neutrality Rules, BoR (16) 127

1. Introduction

Objectives

The objective of this BEREC Opinion is to provide, based on BEREC's experience with the application of the Regulation and the BEREC Net Neutrality Guidelines (NN Guidelines), input to the European Commission for its report to the European Parliament and the Council on the review of Regulation (EU) 2015/2120, due by 30 April 2019.

In the Opinion, BEREC has evaluated the application of the BEREC NN Guidelines with the intention of assessing whether these should be adapted to provide optimum support for the objectives enshrined in the Regulation: protecting end-users' rights and simultaneously guaranteeing the continued functioning of the internet ecosystem as an engine of innovation[3].

Finally, BEREC uses this Opinion to discuss new technologies and their relationship to the Regulation. Considering the technological neutrality of the Regulation[4] and the Guidelines, BEREC considers that this Opinion is the best place for discussing the regulatory treatment of specific technologies – and not the Guidelines.

Public consultation

A public consultation was conducted from 14 March to 25 April 2018, gathering information on how stakeholders have experienced the application of the Regulation, as provided for in the BEREC NN Guidelines. Furthermore, BEREC expressed interest in the experiences of stakeholders concerning impact of the Guidelines on the adoption of new technologies.

BEREC has taken the comments of stakeholders into account while drafting this Opinion. In the consultation report, BEREC responds to the specific comments made by stakeholders.

BEREC notes that, in particular, two general themes arise from the input of stakeholders. The first is that innovation is considered to be of paramount importance, and that innovations should be possible without ex ante permission from NRAs. The very objective of the Regulation is to guarantee the innovation potential of the internet for society as a whole. As expressed in the Guidelines already, BEREC considers that the Regulation does not require an ex ante authorisation in relation to commercial practices, traffic management practices or specialised services[5].

The second theme is that stakeholders ask for harmonised, clear and flexible application of the Regulation by NRAs. On the one hand, BEREC seeks to further clarify the application of the Regulation by clarifying the Guidelines on different subjects with which NRAs have gained additional insight in the last two years. On the other hand, ISPs that consider implementing new technologies and new services are welcome to seek an exchange of thoughts with NRAs; the purpose is not to obtain *ex ante* permission, but to learn whether, based on the plans of the ISP, an NRA has certain concerns or not before investments are made.

[3] Recital 1 of the Regulation.
[4] Recital 2 of the Regulation.
[5] Paragraph 21 of the BEREC NN Guidelines.

Overall conclusion

The aim of the Regulation is to protect end-users' rights and internet innovation. BEREC is of the view that the experiences from the application of the Regulation so far indicate that this is working according to its intention. Despite assertions from some stakeholders that the BEREC NN Guidelines are limiting innovation and that BEREC is exceeding its mandate, no concrete examples have been provided that this is the case. This applies also to the emerging 5G technologies where BEREC considers that the Regulation and the Guidelines provide ample room for innovation in the network and at the edge.

In general, BEREC concludes that the application of both the Regulation and the Guidelines is working well. It is clear that both the Regulation and the Guidelines could be considered as striking a balance between the views of many different stakeholders. From their inputs, BEREC concludes that some stakeholders (for example ISPs) would like the BEREC NN Guidelines to be less stringent while others (for example consumer organisations) argue that the BEREC NN Guidelines should be more stringent. There is a consensus among the NRAs of BEREC not to shift the balance and reopen discussions on major topics that were settled in 2016.

Nevertheless, BEREC concludes that the Guidelines could, after their application during the first two years, be clarified in certain instances. This will be done in 2019, with the regular involvement of stakeholders via a written consultation on a draft version of the updated Guidelines. This Opinion focuses on the major points eligible for clarification; other more detailed subjects could also be covered by the clarification of the Guidelines.

Reading guide

In the following sections, BEREC will discuss, per subject, based on the experiences of NRAs and on the stakeholders' input, whether it believes that the Guidelines should be clarified in the future. In chapter 2, BEREC discusses the consistent application of the Regulation. The structure of the rest of the Opinion follows the structure of the Guidelines and the Regulation, so that in chapter 3 commercial practices are discussed, in chapter 4 traffic management, in chapter 5 specialised services and in chapter 6 transparency. In chapter 7, BEREC discusses new technologies and how they relate to the BEREC NN Guidelines as well as developments concerning the internet value chain.

2. Consistent application of the Regulation

BEREC believes the maximum possible consistency in the application of the Regulation and the Guidelines is important for the development of the internal market, for regulatory certainty and correspondingly for a healthy investment climate.

To this end, the NRAs work together within BEREC to exchange facts, practices, ideas and (preliminary) assessments of cases. These exchanges are enabled by, and take place within the legal framework of the Open Internet and BEREC Regulations while at the same time leaving the legal responsibility to decide on specific cases to individual NRAs. While applying the European net neutrality rules, national regulators take decisions to intervene, or not to intervene, in the national legal and economical context. These decisions can be challenged for national courts under national procedural law.

In practice, the NRAs of BEREC meet regularly to discuss the handling of specific national cases and general questions related to the application of the Regulation, with the aim of reaching consensus on the assessment of the relevant aspects to a case.

With the clarification of the Guidelines in 2019, BEREC strives to maintain consistency in the application of the Regulation by NRAs. It will do so by clarifying the Guidelines where possible, and providing a step-by-step assessment methodology for zero-rating cases.

3. Commercial practices, Art. 3(2)

Regulatory assessment of commercial practices

Article 3(2) of the Regulation, in combination with Article 3(1), contains a principles-based norm against which NRAs should assess commercial practices on a case-by-case basis. That is different from the more specific norms in Article 3(3) on traffic management. The 2016 BEREC NN Guidelines describe in some detail which aspects regulators should consider when assessing commercial practices.

During the public consultation, no new substantial arguments were presented from stakeholders as compared to the public consultation on the Guidelines in 2016. Furthermore, comments from different stakeholders pointed in opposite directions, indicating that BEREC might have struck a good balance in the current Guidelines. BEREC notes that some of the stakeholder comments were aimed more at the Regulation, rather than at the Guidelines.

While some stakeholders ask for more regulatory clarity on forbidden practices (typically stakeholders representing consumers), others indicate that ISPs should have more possibilities to present certain offers to the market (typically stakeholders representing ISPs). BEREC has to note that the explicit task given to NRAs is to perform an assessment of concrete cases. In each case, the ultimate test is whether the exercise of end-users' rights is limited.

Since the introduction of the Guidelines, many zero-rating and similar practices[6] have been introduced by ISPs and, in order to foster a consistent application of the Regulation and the Guidelines, these have been shared within BEREC. Based on the experiences of NRAs in applying the Guidelines with regards to assessing commercial practices, BEREC considers that the Guidelines could be clarified on certain points, as set out below.

BEREC concludes that no substantial changes are needed with regard to the current text of the Guidelines. However, BEREC considers that some further clarifications could be provided to contribute to maintain a consistent assessment of commercial practices by NRAs.

Step-by-step assessment methodology for zero-rating

It may be helpful to clarify further the guidance to NRAs on the different factors to be taken into account in the assessment of zero-rating cases. By providing a step-by-step assessment methodology, BEREC could help NRAs assess cases in a more consistent manner. This methodology should provide a structure to the existing guidance for NRAs' activities when assessing concrete cases.

Such a step-by-step assessment methodology could in particular be based on paragraphs 46 and 48 of the current Guidelines, thereby putting structure on the current approach. These steps could help NRAs to distinguish zero-rating issues from other (net neutrality) issues, help NRAs to assess the relevant factors in a stepwise fashion during the analyses, and provide a methodology regarding how to conclude whether end-users' rights are limited.

To illustrate an example of how the methodology could be built, steps below could be included to:

- Determine whether the commercial practice relates to a publicly available IAS;
- Distinguish traffic management (Article 3(3)) from commercial practices (Article 3(2));
- Define relevant markets and market positions of ISPs and CAPs respectively;
- Evaluate effects from zero-rating on CAPs (entry barriers for CAPs);
- Evaluate effects from zero-rating on end-users (incentives to use certain applications);
- Determine the scale of the practice (percentage of end-users affected by zero-rating).

BEREC will consider clarifying how to apply and weigh the relevant factors for assessing zero-rating practices by providing a step-by-step methodology.

New variants of zero-rating practices

BEREC acknowledges that the Guidelines could contain more examples of commercial practices, in particular those that have been observed in recent years. For example, BEREC believes it could clarify the Guidelines by providing specific guidance on the following practices concerning zero-rating, which are likely to limit end-user rights:

- Participation in a zero-rating scheme that is not free of charge for CAPs ("sponsored data");

[6] Similar practices are, for example, practices that entail access to specific applications or content with a data quota in addition to the basic tariff cap.

- (Exclusive) zero-rating agreements between ISPs and CAPs that have a dominant position on their content market;
- Subscriptions that offer end-users the possibility to choose a zero-rated offer from a specified range of applications within operator-defined categories;
- Zero-rated offers that include applications belonging to the ISP without including alternative similar applications.

A final subject under discussion by BEREC is the general approach to regulatory assessment of zero-rating. The assessment of limitations on end-users exercising their rights should be assessed both as an analysis of the current situation, and also as a forward-looking approach considering possible risks. NRAs should consider the observed actual effects of zero-rating and whether end-users' rights are already harmed. In addition to this, NRAs should emphasise potential future effects of the zero-rating scheme in question and assess whether end-users' rights are likely to be harmed in the future (ref. recital 1 of the Regulation). This aspect also reflects the Regulation's aim enshrined "to guarantee the continued functioning of the internet ecosystem as an engine of innovation" (recital 1).

BEREC will consider addressing new variants of zero-rating and giving further guidance on zero-rating practices that have not been (sufficiently) addressed in the Guidelines.

BEREC will consider adding a clarification about the time horizon for looking at zero-rating practices: NRAs should assess both the current effects of the practice (if the practice is already in the market) and the potential risk of the practice resulting in future harm.

4. Traffic management, Art. 3(3)

Differentiating Quality of Service (QoS) for IAS

The question whether offering different IAS subscriptions with different non-discriminatory QoS classes would be allowed, for example to implement different speeds for different mobile IAS subscriptions, has been raised by multiple stakeholders. BEREC understands this to be both current practice, and compatible with the Regulation as long as the practice does not limit the exercise of the rights of end-users. BEREC considers that this could be clarified in the Guidelines.

Article 3(2) describes that ISPs and end-users can agree on "the characteristics of internet access services such as price, data volumes or speed" as long as such agreements do not limit the exercise of the rights of end-users. It is reasonable to conclude that further QoS parameters, other than data volumes and speeds, such as latency, jitter and packet loss, could be agreed upon. Therefore, it would be permissible for the ISP to provide different QoS classes based on combinations of the above QoS parameters for different IAS subscriptions where the QoS classes are application-agnostic and transparency is ensured – as long as the practice does not limit the exercise of the rights of end-users.

For example, an ISP is allowed to sell IAS subscriptions with different QoS parameters (e.g. speed, latency, packet loss etc.) in mobile as well as fixed networks using QoS classes to implement these IAS subscription characteristics. This follows from Art. 3(2). Furthermore, the

Regulation does not prevent end-users from buying more than one subscription with different QoS classes, and using them as they want for different applications. None of the aforementioned offers may limit end-users' rights as Article 3(2) refers to Article 3(1) to prescribe this. It should be noted, that such QoS classes must be implemented in an application-agnostic manner.

There is a limitation to the implementation of different QoS classes in the sense that an ISP cannot provide some end-users premium IAS subscriptions to such an extent that it degrades the quality to other IAS subscriptions to a quality below the contract conditions agreed under Article 4(1) or the minimum level of quality that may be defined according to article 5(1) of the Regulation. Therefore, when IAS subscriptions with different QoS classes are provided during temporary network congestion, any reduction of the quality should be proportionate to the agreed quality of the different QoS classes, or less than that ratio for the lower speed IAS subscriptions[7]. Furthermore, it would not be allowed to use priority classes that might result in some classes taking disproportionate capacity from other classes. BEREC emphasises that full transparency of the relevant traffic management measures shall be provided according to Article 4(1) of the Regulation. Finally, BEREC notes that Article 5(1) provides the possibility for NRAs to impose minimum QoS requirements of IAS offered by one or more ISPs if this would be appropriate and necessary.

BEREC will seek to further clarify in the NN Guidelines that providing different QoS classes for different IAS subscriptions can be done in line with the Regulation, taking into account in particular requirements regarding application-agnosticism, quality of service, proportionality and transparency.

Data compression

BEREC finds it in the interest of all stakeholders to clarify the distinction between data compression and "throttling". According to Recital 11, the Regulation does not ban non-discriminatory data compression techniques that reduce the size of a data file without any modification of the content. Lossless compression (i.e. original data can be reconstructed exactly from the compressed data) would therefore be in line with the traffic management rules under the Regulation.

However, BEREC considers that throttling by the ISP of any data stream within the IAS, such as for example video traffic, is not in line with Article 3(3) first sentence, as "restriction or interference" of the traffic on the IAS is not allowed. By analogy, BEREC also considers it not allowable to use such application-specific throttling to force a CAP to supply video content in a lower resolution by the use of adaptive bitrate coding. Such practices would not represent data compression according to Recital 11. BEREC notes that the reduction of the speed or of other QoS parameters of *IAS as a whole*, for example when the general data cap has been reached, could be part of the commercial conditions of Article 3(2).

[7] Consider an example where user A has a 50 Mbit/s IAS subscription and user B has a 100 Mbit/s IAS subscription. In case of congestion where user B experiences a speed reduction to 50 Mbit/s, user A should achieve a speed of at least 25 Mbit/s.

BEREC will consider providing further clarifications in the NN Guidelines regarding data compression and impermissibility of throttling of traffic.

Blocking of content

The question whether blocking of selected content, such as spam, content violating intellectual property rights, or inappropriate content for children, could be allowed, has been raised several times. BEREC suggests that this could be further clarified in the Guidelines under Article 3(3) based on the following two aspects.

Firstly, the scope of the Regulation does not cover software installed at the endpoints, i.e. on terminal equipment such as computers and mobile phones. “End-users shall have the right to … use terminal equipment of their choice”, according to Article 3(1). Therefore, software that is installed on end-users’ terminal equipment connected to the IAS could for example enforce parental controls in line with the Regulation. This aspect is already elaborated in the current version of the Guidelines.

Secondly, the Regulation covers the internet access service (“network layer”), but not content and applications (sometimes referred to as “over-the-top”) that are transmitted over the IAS. Therefore, e.g. filtering of spam might be allowed in the following way. Emails on their way from the sender’s email client to the receiver’s email client pass through one or more email servers. In case an email server is filtering spam, this would not be within the scope of the Regulation, since the application servers (in this example the email servers) are *endpoints* connected to the internet. Therefore this would be permissible.

However, for the avoidance of doubt, filtering web content in the network would not be permissible. This is the case when packets are sent between the web server and the web client, and a middlebox inside the network of an ISP (i.e. a middlebox that is not the intended endpoint of the application) may inspect the packets as they are passing, and may manipulate the payload (e.g. by changing ads). This would not be in line with the Regulation, since the payload is changed during the transmission *between the endpoints* of the application, i.e. in the network.

BEREC will seek to further clarify in the NN Guidelines the extent to which blocking of selected content would be allowed in case of endpoint-based mechanisms and application layer mechanisms.

Legitimate security measures

BEREC has noted from its experience, from the input of the stakeholders to the consultation, and from contact with ENISA (European Union Agency for Network and Information Security), that it is desirable to further clarify how NRAs may assess measures concerning the integrity and security of the network, of services provided over the network and of terminal equipment of end-users (Article 3(3)(b)). For this exception to be justifiable, the ISP may resort to measures going beyond reasonable traffic management, such as blocking or restricting traffic.

ENISA is developing guidelines to help NRAs assess possible demands of ISPs to restrict the IAS based on the recognised network security and integrity measures. The BEREC Expert Working Group on Net Neutrality has reviewed a draft version of this document to align it with the Regulation and the Guidelines.

However, the final assessment whether a traffic management measure that treats data traffic unequally is permissible because of legitimate security concerns lies with the NRA and is made on the basis of individual national circumstances.

BEREC will seek to clarify further legitimate security measures, taking the ENISA guidelines into account, and thereby guide NRAs in their assessment of national cases.

Duration of traffic management measures

Regarding the duration of traffic management measures, the Regulation prescribes that they "shall not be maintained longer than necessary". In that regard, the Guidelines now distinguish in para 73 and 85 between 1) a trigger function that can be in place on an ongoing basis and 2) the actual traffic management measure that can only become effective in times of necessity (e.g. when a security threat occurs). Some stakeholders proposed clarifications to paragraph 73, and some of them proposed that reasonable traffic management measures ought to be allowed to be implemented on an ongoing basis.

Traffic management practices such as resource scheduling in cellular access networks, marking the QoS class of the IP packets and differentiated queuing in network elements, are done continuously based on predefined criteria and cannot be turned on and off based on the prevailing congestion situation.

The intention with the current wording in the NN Guidelines was not to prevent such measures. The wording of paragraph 85 was chosen based on how *security measures* could be described, that there is a kind of "monitoring" functionality that detects security threats, plus the active security functionality that blocks the threats. However, the word "trigger" in paragraph 73 does not describe the *queueing functionality* so well. By deleting the word "trigger" here, the description becomes more general, and would be more correct.

The original intention was to distinguish between 1) functionality that *did not* have an effect on the traffic (whether that was a detection function running continuously that *did not* have any blocking effect on the traffic passing, or it was a queueing function running continuously that *did not* have any optimisation effect on the traffic as long as there is no congestion), and 2) functionality that *did have* an effect on the traffic.

BEREC will consider providing further clarifications in the NN Guidelines regarding the duration of traffic management measures.

5. Specialised services, Art. 3(5)

What is a specialised service?

The question regarding what qualifies as a specialised service, and what criteria should be considered to assess this, has become even more relevant due to the public discussion about compatibility between net neutrality and the emerging 5G technologies. Therefore, the description of specialised services in the Guidelines might benefit from further clarification.

First of all, one should realise that in principle there is no difference in regard to the Regulation between 5G and any other existing or emerging network technology. The Regulation applies on a technologically neutral basis. The goal of the Regulation is to safeguard IAS, and at the same time allow objectively and technically necessary specialised services (SpS) to be provided. This applies to any network technology, and 5G is no exception.

Furthermore, BEREC could consider clarifying in the NN Guidlines that services that have higher requirements in only one characteristic of the IAS, but lower requirements in other characteristics, could also be a legitimate reason to provide a SpS (e.g. connected IoT devices that may have low latency requirements but no requirement for high speed).

BEREC will consider providing further clarifications in the NN Guidelines regarding the conditions that have to be met in order for a service to be characterised as a specialised service, subject to a case-by-case assessment.

Relationship between SpS and IAS

BEREC received comments to the consultation regarding connectivity between SpS and the internet. Stakeholders referred to para 110 identifying SpS as services that “do not provide connectivity to the internet” and are “logically separated from the traffic of the IAS”.

Regarding the expression “do not provide connectivity to the internet”, there are two different aspects, whether one is considering general connectivity on the *network layer* or specific connectivity between servers executing at the *application layer*. Regarding the general connectivity at the network layer, the SpS may not be used to replace an IAS by a service that prioritised specific applications while giving access to the internet. As an example explained in recital 17 of the Regulation, VPN services might also give access to the internet, and this should not result in them being considered to be a replacement of the IAS, provided that the VPN service complies with Article 3(1) to (4) of the Regulation.

Regarding connectivity between servers at the application layer, voice communication is an example of a service that could provide connectivity between a SpS (e.g. VoLTE) and an internet application (e.g. Skype), i.e. one could call between mobile telephony subscribers and Skype users. There would in such a case not be any general connectivity directly between the end-user and the internet, i.e. the service would not be usable or offered as a replacement for an IAS. Therefore, such functionality would be in line with the Regulation.

Stakeholders also commented on the expression “logically separated from the traffic of the IAS”. When SpS and IAS are transmitted over a common infrastructure, a provider would typically use a method to separate traffic between the two service categories. Such separation

is referred to as “logically separated”. The current wording of the Guidelines clearly explains that this is *an example*; therefore, there is no requirement that ISPs must implement SpS this way. Furthermore, “logically separated” does not necessarily require strict reservation of capacity for IAS vs. SpS. However, the Regulation requires that SpS are not provided to the detriment of the general quality of IAS for end-users.

BEREC will seek to further clarify in the Guidelines the relationship between specialised services and internet access services.

Impact of SpS on the general quality of IAS

BEREC and NRAs have received comments from stakeholders regarding assessment of the impact of SpS on the general quality of IAS. BEREC has a good opportunity to further develop the issue of measurement methodology when the NN Measurement tool[8] is developed. A first step was taken in the “Net Neutrality Regulatory Assessment Methodology” adopted by BEREC in 2017. The Regulation also contains some concrete metrics regarding this in recital 17, which could be further expanded on by BEREC.

BEREC also received comments regarding capacity expansion of networks. ISPs would not be obliged to expand the network capacity if current QoS requirements are fulfilled, but NRAs are obliged to promote the continued availability of IAS at levels of quality that reflect advances in technology. For those purposes, NRAs may impose requirements concerning technical characteristics, minimum QoS requirements and other appropriate and necessary measures on one or more ISPs, ref. Article 5(1) of the Regulation.

BEREC will, as a mid-term goal, seek to leverage the NN Measurement tool to further develop the measurement methodology regarding measuring of the general quality of internet access services.

6. Transparency, Art. 4

Scope of transparency requirements

BEREC notes that NRAs occasionally encounter ISPs that hold the view that the transparency requirements in the Regulation only apply to IAS provided to consumers. This limitation to the scope of the Regulation does not follow from the text of the Regulation, since Article 4 stipulates that “[p]roviders of internet access services shall ensure that *any* contract which includes internet access services […]” (emphasis by BEREC).

BEREC will consider providing further clarification regarding the scope of transparency in the NN Guidelines.

[8] https://berec.europa.eu/eng/news_and_publications/whats_new/5045-net-neutrality-measurement-tool-result-of-the-tender

Mobile IAS speeds

The general requirement on ISPs to inform their customers about "the speed which they are able realistically to deliver" (recital 18) is applicable also for mobile networks. For fixed IAS, the requirement to inform about "normally available speed" and minimum speed in Article 4(1) provides specific information to end-users in that regard. However, for mobile IAS, there is no requirement to inform about these specific speed parameters.

According to para 156: "The advertised speed for a mobile IAS offer should reflect the speed which the ISP is realistically able to deliver to end-users. Although the transparency requirements regarding IAS speed are less detailed for mobile IAS than for fixed IAS, the advertised speed should enable end-users to make informed choices, for example, so they are able to evaluate the value of the advertised speed *vis-à-vis* the actual performance of the IAS. Significant factors that limit the speeds achieved by end-users should be specified."

According to para 157: "NRAs could set requirements in accordance with Article 5(1) on how speeds defined in the contract relate to advertised speeds, for example that the advertised speed for an IAS as specified in a contract should not exceed the estimated maximum speed as defined in the same contract."

BEREC will consider providing further clarification regarding mobile speed information requirements in the NN Guidelines.

Hybrid IAS

Hybrid IAS is defined as an IAS that consists of a combination of fixed and mobile technologies. An example is a wireline DSL modem, which also contains a SIM card and a communication interface for LTE. When the utilisation of the fixed access exceeds a certain percentage, LTE is activated and traffic is also sent via the mobile interface. This may raise the question of which transparency rules apply to this IAS service.

BEREC considers hybrid access as fixed access with regard to the part of the service which relies on fixed technology, primarily because the access is at a fixed location, the consumer perceives this as a fixed service and the technology used for this part of the service is fixed technology. Consequently, ISPs should provide the minimum, normally available, maximum speeds in the contracts with end-users (Article 4(1)(d)), although the speeds might refer to different interfaces (fixed/mobile), or to the sum of the speeds of both interfaces in the case of the maximum speed. In addition, the ISP should inform the end-user that speed exceeding the speed delivered over the fixed technology, since this speed information is subject to the transparency rules that apply to mobile technology.

BEREC will consider providing further clarification regarding hybrid internet access services in the NN Guidelines.

The process of certification

As addressed in Article 4(4), paragraphs 161 and 162 of the BEREC NN Guidelines establish the possibility for an NRA to certify one or more monitoring mechanisms, possibly operated by a third party. Nevertheless, it is noted that these provisions do not provide an obligation for certification by NRAs.

In case an NRA or a Member State has established, or has the intention to establish, a national certification process, the recommendations in chapter 7 of the "Net Neutrality regulatory assessment methodology report" are considered relevant. Additionally to these recommendations, NRAs or Member States may also provide complementary requirements, covering for example the characterisation of the end-user environment.

BEREC will seek to include the recommendations regarding the process of certification as included in the NN Regulatory Assessment Methodology Report in the NN Guidelines.

7. New technologies

Technological developments

Questions about the relationship between net neutrality and new technologies frequently come up in the daily work of NRAs, in public debate and in responses to the public consultation. During the public consultation, stakeholders provided valuable comments regarding 5G. Some stakeholders expressed concerns about their flexibility to adopt new technologies such as 5G under the Regulation and the Guidelines, while others stated that there is no evidence for any impediment concerning concrete 5G technologies to come.

BEREC notes that the principle of technological neutrality is stated as a prerequisite in the second recital of the Regulation. BEREC adheres therefore to the principle also reflected in the contributions to the consultation: there is no *a priori* ban on any technology. In general, most communication technologies can be used in a way that is in line with the Regulation, and in a way that is not in line with it. Any *specific use* of a communication technology must comply with the Regulation. BEREC considers that addressing specific technologies in the Guidelines is not appropriate. Therefore, BEREC will address certain regulatory aspects of new technologies in this Opinion. The regulatory questions that may come up with regard to new technologies are often related to the subject of SpS or to "categories of traffic" under reasonable traffic management.

However, it should be kept in mind that similar technologies have already been available for many years, but their deployment in public networks is limited.

With regard to categories of traffic BEREC recalls that it has previously pointed out that "[w]hile mechanisms for introducing differentiated QoS traffic classes have been available for more than a decade, … these have not been implemented across networks on the internet (as opposed to the provision of specialised services within operators' own networks, e.g. in relation to IPTV)."[9]

[9] BEREC's comments on the ETNO proposal for ITU/WCIT, BoR (12) 120.

Emerging 5G technologies

The Regulation and Guidelines are technologically neutral, and therefore do not constitute a ban on the implementation of any 5G technology itself. The specific use of 5G technologies, as for any other network technology, has to be assessed on a case-by-case basis by NRAs. Characteristic technologies that are often related to 5G such as network slicing, use of 5QI[10] and Mobile Edge Computing are briefly discussed in this section.

Prior to looking into these 5G-specific technologies, it is valuable to recall that the relevant characteristics of many of the 5G technologies were also present in LTE or other network technologies, even though the deployment of these technologies in practice has been limited.

In 2019, BEREC will continue its assessment of 5G in a report due in Q4. This may include further developing regulatory assessment of 5G technologies in relation to net neutrality beyond this Opinion.

Network slicing

Network slicing is a concept within the 5G technology. With network slicing a 5G network might be virtually split up into several sub-networks, called slices. Slices can be tailored to the specific quality requirements of applications or services using the connections enabled by the network. It is possible that several slices provide different services in parallel within a single 5G network.

Based on the comments to the draft NN Guidelines in 2016, BEREC found it relevant to include footnote 26 in the NN Guidelines: “Network slicing in 5G networks may be used to deliver specialised services”. At the time the Guidelines were the available medium for BEREC to provide the requested clarity, despite the objective of keeping the Guidelines technologically neutral. Now that BEREC has addressed the relation between network slicing and the net neutrality rules in more detail in this report, the footnote can be taken out of the Guidelines. This is an editoral change, and does not change the position of BEREC on the relation between network slicing and specialised services.

Network slicing could be used as a method for ISPs to provide specialised services and IAS, and at the same time contribute to the prevention of detriment to the general quality of IAS by reason of the provision of specialised services (ref. recital 19 of the Regulation). Still, NRAs must assess on a case-by-case service whether a given specialised service meets the requirements of Art. 3(5) of the Regulation.

5G QoS Class Identifier (5QI)

Within the 5G network, a Quality of Service (QoS) Class Identifier (QCI) mechanism, called 5QI, can be used. 5QI is a mechanism in which packets are classified in different QoS classes. In this way, the QoS can be tailored to specific requirements. Each QoS class has its own assigned QoS characteristics (such as packet delay and packet loss). As a result, some packets can get better QoS than other packets.

Considering an architecture where IAS is provided through network slices in parallel to specialised services in other slices, 5QI could be used as a traffic management measure to offer IAS complying with the rules on reasonable traffic management for the provision of

[10] 5G QoS Identifiers, comparable to QCI in 4G.

different “categories of traffic”. This is already covered by the Guidelines in paras 57-75, and there seems to be no need to update these.

Furthermore, traffic management based on 5QI may also be used to provide different IAS subscriptions with different QoS classes, ref. “Differentiating QoS for IAS” in chapter 4.

Mobile Edge Computing (MEC)

Mobile Edge Computing (MEC) refers to a network architecture where storage and computing capacities are located close to a base station. MEC is expected to be a technology that supports the provision of lower end-to-end latency through a 5G network.

NRAs may take into account the MEC policies and practices of ISPs insofar as they have the effect of limiting the exercise of end-user rights under Article 3(1). In case MEC is used in conjunction with the provision of internet access services, then the traffic management measures must comply with the conditions of Article 3(3) of the Regulation. In case MEC is used in conjunction with provision of specialised services, this must comply with the conditions of Article 3(5) of the Regulation.

BEREC considers that the Regulation leaves considerable room for the implementation of 5G technologies, such as network slicing, 5QI and Mobile Edge Computing. To date, BEREC has no knowledge of any concrete example given by stakeholders where the implementation of 5G technology would be impeded by the Regulation. As with all other technologies, the specific use of 5G technologies must be assessed on a case-by-case basis under the Regulation.

BEREC welcomes stakeholders to engage in a dialogue with NRAs if stakeholders experience uncertainty whether a specific use of a 5G technology complies with the Regulation.

Developments concerning the internet value chain

During the public consultation preceding this report, an ISP suggested that the scope of ‘net neutrality’ should be expanded to encompass the whole internet value chain and to thereby guarantee the continued functioning of the internet ecosystem as an engine of innovation.

BEREC has performed analyses on the topic of the internet value chain. In March 2018, BEREC published its first thoughts on this topic in its BoR (18) 35 Report on the impact of premium content on ECS markets and the effect of devices on the open use of the internet[11]. The report stated that “…in this context, app stores act as gate-keepers regarding applications, and subsequently regarding much of the content to which end-users can have access on the Internet. As of today however, the potential threats that are identified in this report remain rather hypothetical.”

In addition, some NRAs have demonstrated an interest in analysing the impact of technical intermediaries on the openness of internet (ACM[12], ANACOM[13] and ARCEP[14]). These studies

[11] https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/8013-berec-report-on-the-impact-of-premium-content-on-ecs-markets-and-the-effect-of-devices-on-the-open-use-of-the-internet
[12] https://www.acm.nl/en/publications/acm-launches-market-study-mobile-app-stores
[13] https://www.anacom.pt/render.jsp?contentId=1380573
[14] https://www.arcep.fr/uploads/tx_gspublication/rapport-terminaux-fev2018-ENG.pdf

are looking into limitations to the right of end-users to access and distribute information, content or applications of their choice.

It is noted that the European Electronic Communications Code (the EECC)[15] intends to extend the monitoring powers of NRAs with regard to "other relevant undertakings active in the electronic communications or closely related sectors" (Article 20). This power may for example enable NRAs to collect data from device manufacturers and operating system providers concerning their commercial and technical practices.

It is also noted that the current proposal 2018/0112 for a Regulation[16] seeks to promote "fairness and transparency for business users of online intermediation services". These could include, for example app stores. This proposal is, however, currently under deliberation of the European (co-)legislator.

BEREC notes that the open access to, and provision of, services and applications that the Regulation seeks to maintain could potentially be affected in practice by developments further up or along the internet value chain to which the Regulation does not apply. One theoretical example would be foreclosure of certain apps and services in app stores for mobile phones.

BEREC therefore concludes that this subject should be kept under scrutiny at European level for further consideration in ongoing and future regulatory developments.

[15] http://europa.eu/rapid/press-release_IP-18-4070_en.htm
[16] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018PC0238&from=en