Body of European Regulators for Electronic Communications

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BEREC Opinion on the Revision of the Broadband Cost Reduction Directive

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1 Introduction

Directive 2014/61/EU on measures to reduce the cost of deploying high-speed[1] electronic communications networks ('the Broadband Cost Reduction Directive', hereafter 'the BCRD' or 'the Directive') aims to facilitate and incentivise the roll-out of high-speed electronic communications networks by lowering the costs of deployment thanks to harmonised measures in four areas: (i) facilitating access to existing physical infrastructure (including across utilities and in-building physical infrastructure), (ii) coordination of civil works, (iii) simplification of administrative procedures for permit granting and (iv) requirements for in-building physical infrastructure for new buildings and major renovations. It also includes provisions to ensure transparency of relevant information through Single Information Points and dispute resolution mechanisms.

In June 2018, the Commission issued a report on the implementation of the Broadband Cost Reduction Directive[2]. The report concluded that the Directive was transposed with significant delays in most Member States and its implementation has been inconsistent across the EU, therefore, hindering the potential to foster a more efficient and fast deployment of electronic communications networks across the EU.

The review of the Directive is included in the Commission's Work Programme 2020 as a REFIT initiative, with the aim to make its provisions more effective and align them with the latest policy and market developments. The review is also part of the actions foreseen in the Commission's Communication 'Shaping Europe's Digital Future'[3] on EU's efforts to make the data-driven industrial revolution a reality and to address the future needs for connectivity.

The Commission has identified digital technologies as a critical enabler for attaining the sustainability goals of 'the European Green Deal'[4] in many different sectors. It has also committed to assess the need for incentives to promote the deployment of more sustainable electronic communication networks as part of the efforts for the ICT sector to undergo its own green transformation.

2 General questions

1) Which are the most important factors that influence the cost and speed of deployment of electronic communications networks ('ECN') (both fixed and mobile)?

From a general perspective, an ECN consists of network nodes and the links between them, as well as the connections between the end-users and the (first) network node (access node).

[1] 'High-speed electronic communications network' means an electronic communication network which is capable of delivering broadband access services at speeds of at least 30 Mbps.
[2] Report from the Commission to the European Parliament and the Council on the implementation of Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks –COM(2018) 492 final
[3] Shaping Europe's Digital Future - COM(2020) 67
[4] A European Green Deal - COM(2019) 640

The network nodes are typically connected with buried cables either in the ground or placed in ducts and in case of mobile networks (backhaul) it is common to use also radio links. The connection between the end-user and the first network node (access node) is based on a cable (e.g. copper, coax, fibre or a combination) in case of fixed networks, and on wireless technology in case of mobile or wireless networks.

The cost of the civil engineering works such as the digging-up of roads to lay the ducts and cables in the ground, account for up to 80% of the cost of deploying high-speed networks.[5] Other costs of deploying electronic communications networks (ECN) are the cost for land and building[6] needed to deploy the network nodes and the electronic equipment of these nodes (e.g. at the transport layer Ethernet switches, routers, WDM equipment and at the service layer IMS, web server, DNS server, video server).[7] In case of mobile networks the cost for the deployment of the access nodes (e.g. base station, NodeB, eNodeB) also includes the cost for physical infrastructure (e.g. masts, poles).

The cost of civil works can be reduced in case existing physical infrastructure can be used for laying the cables since digging-up the ground is not necessary, and in case civil works can be shared with other organisations (e.g. other operators).[8] Both cases enable the ECN operator to deploy its own cable infrastructure and, therefore, possibly also facilitates infrastructure-based competition. For these reasons, access to existing physical infrastructure and coordination of civil works are important to reduce the cost of deploying high-speed ECN. Both are objectives of the Broadband Cost Reduction Directive (BCRD).[9]

The cost of civil works can also be reduced in case the deployment of ECNs can use existing passive optical fibres (dark fibre) of other operators/organisations since digging-up the ground is also not necessary.[10] This also may enable (at least to some extent) infrastructure-based competition. In case physical infrastructure is only available rarely, this may be of particular importance. ECN operators may get access to dark fibre based on provisions of the EECC (SMP regulation, Art. 61(3) EECC) but this is not foreseen in the current BCRD.[11] Whether the latter would be useful is discussed in the answer to question 5.

In case of mobile networks the cost for the physical infrastructure (e.g. masts, poles) for deploying access nodes (e.g. base station, NodeB, eNodeB) can be reduced by sharing this infrastructure between operators.[12] For example, stakeholder information received during BEREC's workshop on mobile infrastructure sharing, held on 16 November 2020, set out that passive sharing enables 10-20% cost savings, large scale radio access network (RAN) sharing could reach 25-30% cost savings and full consolidation could lead to over 40% cost savings.[13] In case of 5G roll-out, sharing of physical infrastructure can play an important role

[5] See https://ec.europa.eu/digital-single-market/en/cost-reduction-measures
[6] For either acquisition and/or leasing
[7] Also ancillary equipment e.g. for power supply and cooling.
[8] Civil engineer works can also be avoided in case cables are deployed on the facades of buildings, however, municipality regulation does not always allow this and this can differ greatly between municipalities.
[9] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks
[10] E.g. based on an indefeasible right of use (IRU)
[11] In the current BCRD, the definition of the term 'physical infrastructure' (Art. 2(2)) does not include dark fibre.
[12] Different types of passive sharing are possible as co-location, site sharing, mast sharing (see BoR (19) 110, sec. 3.1.1, p. 12).
[13] BEREC Document BoR (20) 240, Summary Report on outcomes of mobile infrastructure sharing workshop

with regard to cost-reduction, according to a study from the German WIK.[14] The BCRD aims to reduce these costs since the objective access to physical infrastructure comprises also access to masts, towers, poles, and antenna installations.[15] The European Electronic Communications Code (EECC[16], Art. 57) also foresees rules for access to physical infrastructure with a focus on physical infrastructure controlled by public authorities and which can be used for the deployment of small-area wireless access points.

Access to and use of existing physical infrastructure for laying the cables and installing antennas not only reduce the cost but increase also the speed of deployment of ECN since civil works and construction of masts, which are very time-consuming, are not necessary.

In case an ECN operator deploys its own physical infrastructure, then permits for deploying the physical infrastructure are typically necessary and the approval period has an impact on the speed of the deployment of the ECN.[17] Additional permits may be necessary e.g. in case of civil works in areas designated as a protected area by national legislation. Permits may also be brought before a complaints body which prolongs the deployment of ECN. Therefore, measures to speed up the approval process also contribute to a faster deployment of ECN. With regard to the deployment of mobile ECNs, the granting of permits is often slowed down by worries regarding the electromagnetic radiation. This also impacts the availability of sites for mobile base stations.

In principle, also the cost of active equipment can be reduced by active sharing of infrastructure between operators. For example, operators may use Ethernet leased-lines for connecting network nodes, wholesale access products (e.g. bitstream, VULA[18]) for reaching end-users or radio access network (RAN) sharing.[19] Using services of other operators instead of building own physical infrastructure also increases the speed of the deployment of ECN. However, in case operators use active sharing of infrastructure then operators cannot compete based on own infrastructure. Such forms of cooperation, notably those involving the shared use of scarce resources, may affect amongst others the principle of competitive independence for the network operations depending on the specific case. For this reason, they cannot be permitted as a general rule but will require examination on a case-by-case basis for their implications for competitive independence. In terms of mobile infrastructure sharing, BEREC has set out its views in a Common Position that identifies and describes factors to be considered by NRAs when assessing an infrastructure sharing agreement on a case-by-case basis, where they have competence to do so.[20]

[14] Schäfer, Saskja; Elbanna, Ahmed; Neu, Werner and Plückebaum, Thomas (2020): Cost saving potentials associated with infrastructure sharing in the context of 5G introduction, WIK Discussion Paper No. 472, December 2020 (summary available in English, full version only in German)
[15] See BCRD Art. 2(2)
[16] Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code
[17] Permits are typically also necessary in case cables are deployed on facades.
[18] Virtual unbundled local access
[19] See BoR (19) 110, sec. 3.1.2, p. 12-13
[20] BEREC Document BoR (19) 110, Common Position on mobile infrastructure sharing. See also Document BoR (20) 240, Summary Report on outcomes of mobile infrastructure sharing workshop.

2) What are the most significant problems in coordinating civil works and reusing physical infrastructure deployed by ECN operators for the purpose of deploying ECNs?

ECN operators prefer full control over their network and their activities. Using existing physical infrastructure of other ECN operators and coordinating civil works with other ECN operators substantially reduces the cost of deploying ECN, however, also means to be dependent on other ECN operators.

The dependence on the physical infrastructure of another ECN operator has for example the following negative impact on network operation and network planning. The other ECN operator (access provider) may damage the cable of the ECN operator (access seeker) while performing maintenance work on its physical infrastructure which may result in service interruption. In case of faults, the ECN operator (access seeker) needs access to the physical infrastructure of the other operator (access provider) which may have a negative impact on the repair time. Even though such issues are often subject to negotiations finding actual agreement might often proof to be difficult. Network planning is difficult due to the uncertainties when and under which conditions the ECN operator can access the physical infrastructure of other ECN operators. standard access to physical infrastructure is known in some cases from SMP regulation but uncommon under the BCRD's provisions.[21]

The dependence on the civil works of another ECN operator has for example the following negative impact on network planning. Network planning is difficult since it needs to be coordinated with the time schedule of the other ECN operator. Delays of and changes made by the other ECN operator also affect the ECN operator and it has to adapt its network planning accordingly. The ECN operator can only plan to coordinate civil works with another ECN operator after the latter has informed/published that it plans certain civil works, however, then it may already be too late for the ECN operator to plan and prepare the coordination of civil works.[22]

These dependencies are particularly critical since the other ECN operators are competitors and, therefore, usually do not have any interest to enable the ECN operator to reduce the cost of the deployment of its ECN. The other ECN operators may even strongly oppose against the obligation to provide access to their physical infrastructure and coordinate civil works and, therefore, may use all means in order to prevent this.

However, there are also specific cases where ECN operators might have interest to cooperate with each other with regards to physical infrastructure. Examples are co-investment agreements between operators according Art. 76 of the EECC and network sharing agreements between mobile network operators (see BoR (19) 110).

[21] See BEREC Report on access to physical infrastructure in the context of market analysis (BoR (19) 94)
[22] On the other hand, ECN operators may also misuse this right and invoke the obligation to coordinate civil works in order to delay or disrupt the competitor's planning.

3) What are the most significant problems in coordinating civil works and reusing physical infrastructure deployed by non-ECN operators (operators of energy, transport and water networks) for the purpose of deploying ECNs?

The situation of the ECN operator is similar as in case of question 2. The ECN operator depends on the physical infrastructure and civil works of another operator (see answers to question 2) which in this case is a non-ECN operator and not an ECN operator.

Operators of other sectors e.g. operators of energy, transport and water networks are not necessarily non-ECN operators. They may deploy fibre based on their physical infrastructure and operate an ECN. Then the situation of the access seeker and the access provider is the same as in case of question 2.

Non-ECN operators focus on their primary business and, therefore, have no or (very) limited interest to provide access to their physical infrastructure. Providing access to their physical infrastructure would also have the risk that the ECN operator (access seeker) damages their physical infrastructure which causes service degradation or even service interruption of their primary business which they clearly want to avoid. For non-ECN operators the provision of their own services would always have a higher priority than the provision of access to its physical infrastructure for ECN operators with the consequence that degradations/ interruptions of the ECN operator's services due to e.g. maintenance work on the physical infrastructure does not receive the priority it would need. Non-ECN operators may consider it also not reasonable or even not possible to provide information on their existing physical infrastructure to ECN operators due to the high level of security standard they comply with in order to protect sensitive information on their networks and may consider their physical infrastructure as not suitable of hosting ECN cables.

If non-ECN operators consider access to their physical infrastructure as a business they would offer it voluntarily. The conditions under which non-ECN operator has to provide access to their physical infrastructure and coordinate civil works, in particular the price, also have an important impact on the interest or strength of resistance of the non-ECN operators.

However, e.g. local municipalities may have interest that their citizens are connected with fibre and have access to communications services with high quality of service (e.g. data rate) and then are willing to share their physical infrastructure and also to coordinate civil works.

In addition, one NRA (Traficom) reported the following three problems of coordinating civil works due to different technical requirements in the electronic communications sector and other sectors. (i) It may be necessary that cables of other sectors need to be laid deeper in the ground than the cables of the ECN operator.[23] Then for the ECN operator a separate network deployment is cheaper than the ECN operator's share of the cost of the civil works coordinated with the non-ECN operator. (ii) In certain cases, power supply cables and metallic telecommunications cables need to have a distance of at least 30 cm due to electricity safety regulation and, therefore, cannot be placed in the same narrow trench. This increases the digging costs and for this reason a separate network deployment can be cheaper than coordinating civil works. (iii) Water pipes must be installed at least in 2 meters depth due to freezing ground. Maintenance work demands that the water pipes are excavated, which may

[23] OCECPR also reported this issue.

damage the telecommunications cables installed in the same trench. Therefore, the ECN operator may prefer a separate network deployment.[24]

4) What would be the benefits and drawbacks of changing the scope of the rights and obligations under the BCRD from high-speed electronic communications networks to very high capacity networks? How should existing obligations and/or access agreements be taken into account in case of such change?

A change of the scope of the rights and obligations under the BCRD from high-speed electronic communications networks to very high capacity networks (VHCNs) would face the following methodological problem. A VHCN is an entire network and not only a certain segment of a network (see Art. 2(2) EECC, paragraphs 14 and 47 BoR (20) 165[25]). However, access to physical infrastructure and coordination of civil works may be used for a certain part or segment of a network and not for an entire network. For example, an ECN operator may request access to a physical infrastructure of another operator in order to deploy fibre for a certain part of its backhaul network. It is not possible to determine whether or not this part of the network of the ECN operator qualifies as a VHCN since it is only a segment of a network and not an entire network. Alternatively, it could be considered that the ECN operator only has the right to access the physical infrastructure of another operator or to coordinate civil works with another operator, if its entire ECN qualifies as a VHCN. However, this would be a very strong condition which in practice may only be rarely fulfilled. The reason is that the coverage area of the VHCN may cover certain end-users (e.g. those which are connected based on FTTB and/or FTTH) but not all end-users of the network of the ECN operator (e.g. not end-users based on FTTEx, FTTC). Additionally, the access seeker would have to inform that he plans to deploy a VHCN. In case the access provider questions this, a dispute may have to be resolved before the dispute settlement body (DSB), which could often be the case. Furthermore, it would have to be ensured that the access seeker actually deploys a VHCN. For these reasons, if the scope of the BCRD was changed to VHCNs, then the BCRD may not be applicable due to these methodological problems.[26]

Apart from these methodological issues, a change of the scope of the rights and obligations under the BCRD from high-speed electronic communications networks to VHCNs would have the following benefits. It may foster the deployment of VHCNs to some degree for the following reasons. It might have an impact in case an ECN operator plans a network which does not qualify as a VHCN. The incentive to change its plans and to deploy a VHCN instead of the originally envisaged network depends on the advantages of the BCRD. In case the advantages of the BCRD are significant (in particular the cost savings), the ECN operator may be willing to change its plan and deploy a VHCN, if this is not the case the change of the scope to VHCN would not have an effect. However, it would not have an impact in case an ECN

[24] The situation is similar in Austria and Cyprus. In Austria, (municipal) regulation may prohibit to use one trench for different infrastructures in order to avoid issues in case of fault repair. In Cyprus, maintenance and fault repair operations for water supply systems require specific physical clearance for digging equipment, thus coexistence in the same trench is not feasible.

[25] BEREC Guidelines on VHCNs

[26] These methodological problems do not occur to a comparable extent in case of the current BCRD for the following reasons. The current BCRD refers to 'high-speed ECN' which is defined (Art. 2(3) BCRD) as '*an ECN which is capable of delivering broadband access services at speeds of at least 30 Mbps*'. Unlike in case of VHCN, it is not rarely that an entire (or large parts of an) ECN qualifies as a high-speed ECN.

operator plans to deploy a VHCN since VHCNs are in the scope of the BCRD in both cases, with and without the change of the scope to VHCNs.

In addition to the methodological issues, the drawbacks of the change of the scope of the BCRD to VHCN are as follows. Networks which do not qualify as a VHCN may provide very high data rates and the deployment of such networks may therefore also be in the interest of end-users. However, a change of the scope of the BCRD to VHCNs would make the deployment of non-VHCN which provide high data rates more expensive and, therefore, also more difficult. Such networks, however, may also contribute to the achievement of objectives of common interest. One of the three objectives of common interest of the Commission's Gigabit Society Communication[27] is that all households should have access to internet connectivity of at least 100 Mbps download, upgradable to 1 Gbps by 2025. This objective may also be met by networks which do not qualify as a VHCN and, therefore, it would be important to consider this aspect when deciding on the scope of the revised BCRD.

Finally, another drawback is that changing the scope of the BCRD to VHCN could be a barrier for fibre roll out if it is part of a network that does not (yet) qualify as a VHCN. Clearly, every fibre deployment using existing physical infrastructure may contribute to the roll out of VHCNs, and in a later phase this fibre could be used for VHCNs.

In case the scope of the BCRD will be changed, existing obligations and/or access agreements need to be kept (at least for a reasonable long time). If this was not the case, then ECN operators would not be able to continue to use the physical infrastructure of other operators. This means that the ECN operator is not any longer able to provide services to the concerned end-users and it would cause a permanent service interruption which clearly needs to be avoided. Only if the ECN operator has deployed its own physical infrastructure or is able to use appropriate wholesale services of other ECN operators, it would be able to continue to provide services to the concerned end-users.

Finally, in case the scope of the BCRD is changed, then it is advisable to include in the revised BCRD rules which make clear whether the new scope of the BCRD does have an effect on existing agreements/contracts between operators in order to avoid disputes with regard to this.

In conclusion, BEREC is of the opinion that caution is necessary when considering to limit the scope of the revised BCRD to VHCN, in particular because of the methodological reasons described above. Ultimately the BCRD already in its current form aims to foster the deployment of fibre roll-out in order to enhance the capabilities and enlarges the footprint of ECN's and BEREC does not see the benefit of limiting the deployment to certain ECN's as the main objective should be promotion of fibre deployment. This will of course also promote the deployment of networks which are capable of meeting the Gigabit Society Communication targets, and in particular VHCNs.

[27] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Connectivity for a Competitive Digital Single Market - Towards a European Gigabit Society, COM(2016) 587 final, Brussels, 14.9.2016

5) Is there a need to review or amend any of the current definitions included in the BCRD, for instance, in light of market developments or to ensure alignment with the European Electronic Communications Code[28] (EECC)?

The EECC includes provisions which might have an impact on the definitions used in the BCRD as e.g. the deployment and operation of small-area wireless access points (Art. 57), symmetric access obligations according Art. 61(3) or the definition of the term 'VHCN' together with the corresponding BEREC Guidelines.[29]

The current BCRD (Art. 3(2)) foresees that network operators of 'all' sectors (according Art. 2(1)) have the obligation to meet all reasonable requests of ECN operators for access to its physical infrastructure under fair and reasonable terms and conditions, including price. Art. 57 (4) of the EECC foresees that operators have the right to access any physical infrastructure controlled by national, regional or local public authorities, which is technically suitable to host small-area wireless access points or which is necessary to connect such access points to a backbone network. Therefore, the current BCRD and the Art. 57 EECC differ with regard to which organisations have to provide access to their physical infrastructure. The BCRD demands this from network operators, Art. 57(4) from public authorities.

The term 'physical infrastructure' is defined in the current BCRD (Art. 2(2)), however, not in the EECC. The BCRD defines this term as 'any element of a network which is intended to host other elements of a network without becoming itself an active element of the network' and lists also examples 'such as pipes, masts, ducts, inspection chambers, manholes, cabinets, buildings or entries to buildings, antenna installations, towers and poles.' These examples are relevant with regard to the physical infrastructure of network operators. Art. 57(4) of the EECC refers to any physical infrastructure and mentions explicitly the examples street furniture, such as light poles, street signs, traffic lights, billboards, bus and tramway stops and metro stations. These examples are relevant with regard to the physical infrastructure of public authorities (but not of ECN operators since they typically do not own such infrastructure).

However, the physical infrastructure of Art. 57(4) is not fully consistent with the definition of the term 'physical infrastructure' in the BCRD for the following three reasons. (i) Art 57(4) includes any physical infrastructure suitable to host small-area wireless access points regardless whether it is part of a network, (ii) street furniture as e.g. light poles, street signs, traffic lights are not an element of a network (unless they would be part of the definition of a transport network) and (iii) are not intended to host other elements of a network. Therefore, the use of the term 'physical infrastructure' in Art. 57(4) is not consistent with the definition of the term 'physical infrastructure' in the current BCRD.

The definition of the term 'physical infrastructure' in the current BCRD is consistent with the scope of the current BCRD that network operators have to provide access to their physical infrastructure. However, if the scope of the BCRD will be changed e.g. that also public authorities have to provide access to their physical infrastructure (see question 19), then BEREC is of the view that the definition of the term 'physical infrastructure' needs to be amended in any case in order to align it with this new scope.

[28] Directive (EU) 2018/1972 of the Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code
[29] BEREC Guidelines on VHCNs, BoR (20) 165.

With regard to the symmetric access provisions according to Art. 61 (3) EECC, it has to be noted that the first subparagraph of this regulation foresees the possibility to impose access obligations on wiring cables and associated facilities inside buildings or up to the first concentrations or distribution point where that point is located outside the building. Associated facilities are defined in Article 2 (10) EECC as associated services[30], physical infrastructures and other facilities or elements associated with an ECN or an electronic communications service which enable or support the provision of services via that network or service, or have the potential to do so, and include buildings or entries to buildings, building wiring, antennae, towers and other supporting constructions, ducts, conduits, masts, manholes and cabinets. As stated above, the term 'physical infrastructure' itself is not defined in the EECC. The aforementioned definition of associated facilities however indicates a broad definition for this term, which in any case also includes facilities and elements that may not be regarded as physical infrastructure but are associated either with ECNs or electronic communication services. This would e.g. also include wirings like copper or fibre lines (which in addition are directly referred to in the provision of Article 61(3) subparagraph 1 as stated above). From this follows that 'associated facilities' is a term defined very broad, which also includes physical infrastructure as defined under the BCRD, but is not restricted to the latter. Therefore, BEREC is of the view that a need to adjust the definition of the term 'physical infrastructure' in the BCRD does not follow from the provisions of Article 61(3) EECC.[31]

According to recital 152 EECC, any obligation imposed by the NRAs under the EECC and decision taken by other competent authorities under the BCRD to ensure access to in-building infrastructure or to physical infrastructure up to the access point should be consistent. Article 61(3) subparagraph 2 EECC enables NRAs to extend (under certain conditions) access obligations up to an access point beyond the first concentration or distribution point. The requirement of consistency in itself does not necessarily lead to the conclusion that the scope of the definitions relevant for the BCRD and the EECC needs to be identical. Art. 61(3) EECC subparagraph 2 serves the purpose to address problems of network replication and underlying competition problems and also foresees the possibility to impose access obligations based on active services (bitstream, VULA) in justified cases. The BCRD on the other hand aims to reduce the deployment costs of ECNs. To achieve consistency it seems more important to maintain the principle that the sector regulation in case of conflict prevails over the BCRD (on the relation of Article 61(3) EECC to the BCRD in general, see answer to question 33).

The access point defined in Article 2 (11) BCRD refers to a physical point, located inside or outside where connection to the high-speed-ready in-building physical infrastructure is made available. The definition of the first concentration or distribution point for Article 61(3) EECC is specified in the BEREC Guidelines on the criteria for a consistent application of Article 61(3) EECC (BoR (20) 225) which have been adopted by BEREC on December 10 2020 pursuant to Article 61(3) subparagraph 5 EECC. The term concentration or distribution point according

[30] Associated services are according to Art. 2 (11) EECC defined as service associated with an electronic communications network or an electronic communications service which enables or supports the provision, self-provision or automated-provision of services via that network or service, or has the potential to do so, and includes number translation or systems offering equivalent functionality, conditional access systems and electronic programme guides (EPGs), as well as other services such as identity, location and presence service.

[31] Similarly, in case of co-location and sharing of network elements and associated facilities for providers of ECN according to Art. 44 EECC, the term 'associated facility' is broader and includes also e.g. building wirings which do not fall in the category 'physical infrastructure' of the BCRD (Art. 2(2))(see also the detailed description in this paragraph). Therefore, a need to adjust the definition of the term 'physical infrastructure' in the BCRD does also not follow from the provisions of Article 44 EECC.

to paragraph 25 of the Article 61(3) Guidelines refers interchangeably to the same access point, where cables viewed in the downstream direction are disaggregated (distributed) and viewed in the upstream direction are aggregated (concentrated). Therefore, the definition of access point for the purpose of Article 61(3) EECC is based on the aggregation/ disaggregation of cables and not based on the access to physical infrastructure as defined in the BCRD. Both access points may or may not coincide. Article 61(3) EECC is not restricted to access to physical infrastructure as defined in the BCRD, but includes also access to wiring and cables and in principle also foresees possibility to impose active access products. Because of the different scope, the definition of the 'access point' differs from the definition in the BCRD. Therefore BEREC is of the opinion that a need to adapt the definition of 'access point' in the BCRD does not follow from Article 61(3) EECC.

Furthermore, if the scope of the BCRD will be changed to VHCNs (see question 4), then the definition of 'high-speed electronic communications networks' would not any longer be needed. BEREC is of the view, that in this case it is important that the revised BCRD refers to the definition of the term 'VHCN' in the EECC (Art. 2(2)) and the BEREC Guidelines on VHCNs (BoR (20) 165) and that it does not define the term 'VHCN' differently in order to be consistent and to avoid confusion. In addition, in this case, it would also be necessary to adapt the term 'high-speed-ready in-building physical infrastructure' and its definition accordingly.

According to signals from some market parties the scope of physical infrastructure definition could be replaced as well. Some access seekers tend to be more interested in dark fibre based products and thus the term 'physical infrastructure' including dark fibre may be discussed. However, even though this approach could be contributive in cost reduction when entering to the market, it in fact partially deviates from the original goal of the BCRD (boost deployment of new ECN). With regard to the implications of the inclusion of access to dark fibre based on the BCRD, the following developments need to be considered.

On the one hand, giving rights to use dark fibre in almost all cases also relates to competition questions between ECN operators. The EECC inter alia aims specifically to address such competitions problems, e.g. with the instruments for SMP regulation and with the symmetric regulation according to Art. 61(3) EECC. A complex assessment of the objectives set out in Art. 1(2), Art. 3(2) and Art. (4) EECC is necessary for the application of these instruments as well as demonstration of the fulfilment of the preconditions for the imposition of access obligations under the specific regulations of the EECC. These conditions, which safeguard competition, should also be taken into account in connection with the discussion on access to dark fibre under the BCRD, while the benefit of a parallel access regime thus has to be carefully assessed. Such access would indeed need an in-depth adaptation of the current definitions of the BCRD (e.g. dark fibre becoming itself an active element of the network when access is given to an access seeker and does thus not fall under the current scope of the BCRD).

Therefore, BEREC is of the opinion that a parallel access regime to dark fibre under BCRD seems not proportionate as the abovementioned regulatory instruments from the EECC are best placed to provide such access for interested ECN operators.

On the other hand, the BCRD's primary target is according to Art. 1(1) BCRD to facilitate and incentivise the roll-out of ECNs. While the effects on competition also have to be considered in the application of the BCRD, ensuring effective competition is in itself not the primary

objective of the BCRD. Nevertheless, network operators may base their assessment of a reasonable character of an access request on criteria such as the availability of viable means of wholesale physical network infrastructure access (e.g. in case of lack of space). Information on dark fibre available via the single information point, however, may be useful in light of national circumstances (e.g. in case access to dark fibre is possible based on SMP regulation, to take them into account when planning civil works (to avoid breaking cables)).

6) What are the challenges that are specific to the deployment of new network technologies, such as fibre or 5G? What new challenges can be expected for the next 5 to 10 years? How can a revised instrument help in addressing these challenges?

New roll-outs of fixed networks concerns primarily fibre, for which anticipated challenges in the near future are expected to be the same as today: Availability of physical infrastructures, permit granting procedure, capability of negotiating coordination of civil works.[32] In particular, the remaining premises to be connected with fibre will be the ones for which such difficulties will be the more prevalent, with higher cost of fibre connection, namely for isolated premises on rural areas, with scarcity of available infrastructure and longer aerial deployment.[33]

BEREC identifies the BCRD and the EECC (SMP regulation, symmetric provisions and incentives to share investment risks) as instruments aiming at addressing these issues.

Increasing challenges faced by deployment of new network technologies (on both fixed and mobile networks) are growing concerns linked to the reduction of environmental impact and climate change of ECN, with the need to deal with concerns of stakeholders, such as environmental interest groups, industrials and consumers (see section 10).

5G and future mobile/wireless technologies may face acceptance problems due to mistrust relative to health[34] and spatial planning concerns. A concern also arises due the availability of the mobile base station sites, and the high number of micro cells, small cells and base stations needed.[35]

Instruments to overcome this issue may be Art. 57 EECC relating to the deployment and operation of small-area wireless access points and the Implementing Regulation specifying their characteristics[36]. Nevertheless, it would be important to identify borderlines between Art. 57 and the possibly adjusted scope of the BCRD (see question 19).

The Commission Recommendation (EU) 2020/1307 aims to foster the deployment of VHCN and 5G by identifying best practices on certain aspects.

[32] One MS (NL), however, reports that deliberately overbuilding the newly deployed networks of a competitor, is becoming an increasingly large issue.
[33] One MS (NL) reports that the scarcity of construction contractor capacity is also an issue.
[34] BEREC and RSPG issued a joint paper on spectrum related EMF issues.
https://berec.europa.eu/eng/news_and_publications/whats_new/7667-berec-and-rspg-adopt-joint-position-paper-on-spectrum-related-emf-issues.
Amongst other things, the joint paper represents a precursor to future work for BEREC, recognising that, together with other competent authorities (health, environmental, radiation protection), it is important to remain open to hearing and understanding such concerns of European citizens. BEREC will, within its competence, continue to address potential barriers to wireless deployments.
[35] One MS (NL) also reports scarcity of real estate for mobile sites.
[36] Commission Implementing Regulation (EU) 2020/1070 of 20 July 2020

According to the BEREC Guidelines on VHCNs (BoR (20) 165) both fibre and 5G fall within the scope of VHCN since the criteria defined in these guidelines are in principle applicable to any network.

The overall challenge is also to meet the Gigabit Society targets[37], in particular in rural areas or areas where such services cannot be offered commercially. BEREC identifies some instruments that could help to overcome this issue such as BCRD, the Guidelines for the application of State aid rules in relation to the rapid deployment of broadband networks, and the co-investment provisions of the EECC (Art. 76, 79).

3 Questions on the functioning of the dispute settlement body/process

7) What is BEREC's overall evaluation of the functioning of the dispute settlement process so far? How could its efficiency be improved in terms of the time required to adopt a decision or reach a settlement?

The principle of the dispute settlement process foreseen in the BCRD is very positive. The instrument is necessary to ensure the enforceability of the obligations set out in the BCRD. Thus, it supports market players to bring their services to customers. Regarding the possibilities of a further improvement, BEREC would like to address the following aspects, however.

The implementation of the dispute settlement process had different effects in the MSs. These differences seem to depend in particular on the pre-existing legal framework and/or market conditions. For instance, the impact of the BCRD could be somewhat limited, where a national legal framework similar to the BCRD was in force before or access to the physical infrastructure of the SMP operator has already been available.[38]

In addition, in some MSs, the DSB has decided several cases (at least one DSB observed a significant rise of case numbers in 2019 resp. 2020), although in other MSs no cases at all have been decided yet.

The mere effect that there is a mandatory dispute settlement process can apparently solve problems, even without a formal decision of DSB. MSs experienced – even if their DSB decided only a few cases so far –, that arguing parties often reached a bilateral agreement in the mandatory conciliation process (beforehand the dispute settlement process of the DSB). Moreover, MSs report several cases, where parties reached an agreement within dispute settlement proceedings before the DSB, while others had no success in trying to lead the parties to a peaceful settlement (mainly because the parties have already fallen out with each other prior to the DSB process). Beyond this, other parties may settle their disputes in cases similar to those where the DSB already issued a decision. In these constellations, the binding decision of the DSB provides guidance to market participants beyond the specific case (better

[37] Connectivity for a Competitive Digital Single Market - Towards a European Gigabit Society, Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions, COM(2016) 587 final, Brussels, 14.9.2016

[38] One MS (NL) reports that ECN operators informed that the speed of ECN deployment/civil works differ too much from non-ECN operators and that the NRA did not yet receive any requests for dispute settlement since the introduction of the BCRD in national law.

defined as ‘regulation by litigation’) by setting references for fair and reasonable terms and conditions (e.g., on prices and on the technical suitability of the physical infrastructure to which access has been requested). Therefore, under the assumption that the cases being brought to a DSB are the rather difficult and complex ones, a decision of the DSB can create a kind of guardrails and hereby help to facilitate a high number of future successful negotiations.

Improve efficiency

The cost of deploying ECN can be reduced by using existing physical infrastructure (see answers to question 1). ECN operators (access seekers) need the information where existing physical infrastructure is available and under which condition they can use it. The operators which have to provide access to their physical infrastructure typically have no (or very) limited interest or may even strongly reject this obligation (see answers to questions 2 and 3). Therefore, a request to access existing physical infrastructure may frequently result in a dispute to be resolved by the DSB/NRA. The outcome of this dispute settlement process is unclear, whether and under which conditions the ECN operator gets actually access to the existing physical infrastructure. This makes it difficult for the ECN operator to plan its network roll-out.

Therefore, measures which make the outcome of dispute settlement procedures more foreseeable for the ECN operator (access seeker) would make it (significant) easier for ECN operators to plan the use of existing physical infrastructure. One example for such a measure is as follows. The DSB/NRA publishes standard access conditions and bases the dispute settlement procedure on them. This is similar to the publication of the decisions of disputes the DSB/NRA already took, which also indicate to some extent the outcome of future dispute settlement procedures, but would (significantly) increase this foreseeability. The standard access conditions, however, are not binding since the dispute settlement procedure needs to take into account the actual circumstances of the case and, therefore, may deviate (at least to some extent) from the standard access conditions. Standard access conditions might be more appropriate for non-pricing aspects like e.g. fault clearance time, as many market players may not have experiences in setting access conditions.

There is a range of different other measures that may improve the efficiency of the dispute settlement process or the DSB itself. These could include

- the publication of application forms, which would help parties to stay focused on relevant facts when lodging a complaint;
- the publication of practices and guidelines of the DSB (FAQs, see also answer to question 10), e.g.
    - detailed guidance to telecommunications operators on how negotiations regarding access and transparency should be conducted,
    - guidelines on terms and conditions for access to the physical infrastructure and the coordination of civil works,
    - guidelines regarding the dispute resolution process (i.e. technical specifications) or
    - regulations for design, deployment and dismantling of electronic communications networks;
- the publication of decisions of the DSB on its website.

For example for the DSB proceedings, an improvement in terms of the time required to adopt a decision could be reached, if the communication between DSB and the parties to the dispute is mainly led by electronic means. This should be the fastest way of communication, which leads to a quick resolution of the dispute. The proceeding may also be accelerated by an early information request of the DSB to the parties demanding the basic information (e.g. copy of the access agreements, public contracts with the public administrations involved, cartographic information of the physical infrastructure, information regarding the negotiations held between the parties before submitting the dispute to the NRA, etc.). This helps to gather all basic information early in the process and, thus, expedite the process. Another proposal is the introduction of a mediation process as part of the dispute resolution process, which could - on the one hand - bring more flexibility and less formality in communication with parties compared to the usual administrative procedure rules. On the other hand, a failed mediation process would prolong the usual DSB proceeding.

Beyond the DSB proceedings, it seems favourable to hold workshops for stakeholders to educate them on the provisions of the BCRD and the prerequisites for the proceedings. DSBs may also give guidance to the market by periodical responses to informal consultations and requests for information from telecommunications operators on issues related to the BCRD. Another option could be a legal obligation of network operators and/or their contractual partners to transmit concluded contracts on the use of existing infrastructure to the DSB. This would allow the DSB to gain an overview over the existing market conditions, which may be helpful for its reasoning and decision making.

In two MSs (BG, GR) the NRA prepared a list of experts for dispute resolution on transparent and non-discriminatory manner, which is updated on a yearly basis. The NRA may use an expert of this list to resolve a dispute (experts e.g. for civil engineering, electrical engineering, mechanical engineering).

For the effectiveness of the dispute resolution the importance of an effective sanction regime has to be pointed out as is foreseen in Art. 11 of the current BCRD. For example, in case the network operator has to provide access to its physical infrastructure according to the decision of the DSB and does not comply with this obligation.

In one MS (DE) it is part of the proceedings of the dispute settlement that a public hearing takes place where other parties not directly involved can participate.

In conclusions, BEREC is of the view that a range of different measures may improve the efficiency of the dispute settlement process or the DSB itself. DSBs/NRAs could select those measures which contribute most to this improvement based on the national circumstances.

Problems / Challenges:

One challenge is – although the BCRD entered into force six years ago – in some MSs a lack of awareness of network operators of the access and transparency obligations they must comply with.

Some DSBs observed another challenge of enforcing the BCRD due to deficient preparations of the proceedings by the parties, e.g. applications with insufficient information. This influences the length of proceedings because the cases are conducted within the administrative

procedure (that means the DSB is obliged to establish the facts and has to gather and introduce evidence). Thus, high formal burdens and / or deficient information or documents submitted to the DSB make it even harder to meet the current, very tight deadlines.

Both challenges might be overcome, at least partly, by workshops for stakeholders and (even more) transparency measures by the DSB (see above).

Some DSBs also noted that access providers often do not have any interest to share their physical infrastructure and, therefore, use as many counterarguments as disposable. DSBs may have to examine all of them, which results in a long duration of procedures. This challenge is an issue difficult to resolve.

8) Which competent bodies are best placed to perform the functions of the national dispute settlement body?

The function of the national dispute settlement body (DSB) should be assigned to an institution, which has experiences with dispute settlement. In most MSs this is the NRA in charge of electronic communications.[39] Regulating telecommunication markets for two decades, NRAs have gained broad and profound knowledge of the complex technical and economic conditions in these markets. This ensures, they are able to intervene quickly and effectively in all matters within their remit where a dispute arises between operators.

Another point is the experience of NRAs with complex but time-limited proceedings out of their knowledge with SMP-regulation. Furthermore, the interactions of the BCRD, SMP-regulation and the forthcoming symmetric regulation of Article 61(3) EECC lead to the conclusion that the DSB is best placed as being mandated to the NRA.[40] NRAs have a pronounced understanding of the current and the forthcoming European legal framework, especially when SMP-regulation is concerned. Therefore, they can assess interactions between this instrument and the BCRD best. Moreover, NRAs will be the competent bodies to deal with the forthcoming symmetric regulation. Thus, NRAs as DSB can ensure consistent procedural practice and price setting for the different access regimes.

Another important aspect is the institutional independence of NRAs, which is enshrined in Art. 6-8 EECC (see also question 9).

Beyond this, some NRAs do not solely regulate telecommunication markets, but also other network industries, e.g. the energy or railways sector. In this case, the NRAs have already experiences, when it comes to the use of existing infrastructure in these sectors or a corresponding coordination of civil works. This could be very helpful, e.g. when a network operator claims technical or security reasons for the refusal of an access request. Even if NRAs does not regulate other network industries themselves, they have a close contact network with other NRAs in other sectors, which they can use in the event of a dispute regarding non-ECN infrastructure.

[39] See BoR (17) 245, p. 7-9

[40] There might be MSs where the NRA is currently not the DSB and where it might be sufficient that the NRA is consulted by or part of the dispute settlement board.

Moreover, many NRAs have at least certain tasks when it comes to the oversight of access conditions linked in State Aid regulations in the context of broadband network deployment.[41]

For the above-mentioned reasons, BEREC is of the view that the NRAs in charge of electronic communications are best suited to fulfil the role of DSB.

9) Is there a need for specific provisions ensuring the institutional independence of Dispute Settlement Bodies (DSBs), in the meaning of Articles 6 to 8 of the EECC which are applicable to National Regulatory Authorities? In particular, is there a need for provisions requiring DSBs not to seek or take instructions from any other body in relation to the exercise of their tasks and ensuring adequate means (technical, financial, human resources) to perform their duties?

Institutional independence is essential to guarantee fair, efficient, and successful dispute settlement. DSB political independence has been even more relevant where national legislation includes access to the public administration physical infrastructure. This is the case, for instance, in Spain where over 60% of the disputes solved by the DSB involved public administrations. Should the revised BCRD broaden its scope to include such infrastructures, the requisite of political independence should be further ensured.

In case the DSB operates in the area of competence of the NRA, which currently is the case in 23[42] MSs, institutional independence is ensured by Art. 6-8 EECC and the respective DSBs did not report any problems concerning exertion of influence to BEREC so far. Therefore, if the revised BCRD foresees NRAs as DSBs, BEREC sees no need for further provisions. Beside institutional independence, it is, however, also important that binding decisions of the DSB remain contestable in competent administrative courts and that it is ensured that the DSB is provided with adequate means (technical, financial, human resources) to perform their duties.

10) In a number of countries, authorities have issued guidelines or rules to be followed by the DSBs in the performance of their functions. In which areas (access and transparency on physical infrastructure, transparency and coordination of civil works, access to in-building physical infrastructure) have such guidelines or rules contributed the most to the efficient and effective functioning of the dispute resolution process? Should they better be provided at national or EU-level and by which authority?

It is worth mentioning the Report '*Implementation of the Broadband Cost Reduction Directive*', BoR (17) 245, where the rules which the DSB has to apply (binding or non-binding, depending on the case) are discussed at national level.

More specifically, the Report mentions that legal authorities have issued rules which NRAs have to (or could) follow, when they carry out the tasks of the DSB, in nine (56%) of the 16 countries analysed. The table below provides an overview on the rules of these countries.

[41] See BoR (17) 246
[42] According to BoR (17) 245 in 21 MSs and after its publication in two further MSs (BG, NL)

Overview on the rules which the DSB has to or could apply

Information on the rules	Number of countries	Country
Which kind of rules?		
• General / procedural rules	8	DE, GR, IT, LT, RO, SE, SI, UK
• Specific to in-building infrastructure	1	PL
Binding or non-binding rules?		
• Binding	7	DE, GR, IT, LT, RO, SE, SI
• Non-binding	2	PL, UK
Which authority issued the rules?		
• NRA	5	IT, LT, PL, RO, UK
• Government	2	GR, SE
• National parliament	2	DE, SI

Source: Information based on BoR (17) 245, Tab. 5, p. 12

In eight of the nine countries, general or procedural rules (e.g. the process the DSB is likely to follow in resolving disputes) and in one country specific rules with regard to in-building infrastructure have been issued. In seven countries, the rules are binding, and in the two others not. In five countries, the rules were issued by the NRA, in two countries by the government and in two further countries by the national parliament (*cfr.* Table 5, BoR (17) 245).

In addition to this information of the Report, some other countries adopted guidelines (DK[43], HU[44], IE[45]), or plan to introduce guidelines (BG, ES[46]) or already consulted them (PT, guidelines on access pricing methodology). In another case (IT), guidelines on pricing of access to existing physical infrastructure has been *de facto* defined in settling the first relevant cases of dispute solved by the DSB, as in the following disputes, the DSB applied the same principles of such relevant cases.

Most frequently, the rules have been adopted, in practice, to facilitate the DSB in setting the dispute, assessing the procedure to be followed by all the involved parties. In some cases, guidelines also provided more specific information to be considered in solving the disputes, for example with reference to pricing of access to physical infrastructure (Art. 3 BCRD) and to in-building infrastructure (Art. 9 BCRD).

Specifically on the task of pricing, another BEREC Report on '*Pricing for access to infrastructure and civil works according to the BCRD*' (BoR (19) 23) outlines that in 13 MSs[47] the law transposing BCRD at national level includes further guidance on pricing or foresees publication of rules regarding pricing methodologies, for access to existing infrastructures (Art. 3 BCRD), whereas in other 10 MSs this is not the case. Similarly, for coordination of civil works (Art. 5 BCRD), some rules on cost sharing are provided in the BCRD transposition law in five MSs,[48] whereas in other 12 MSs no specific provisions are included.

[43] Guidelines concerning case processing to be followed in the performance of DSB function
[44] The NRA issued binding rules specific to in-building infrastructure
[45] Guide as to the procedures through which disputes under the BCRD would be resolved
[46] Guidelines concerning physical infrastructure disputes including criteria identified by the DSB in the context of previous disputes regarding information, transparency and access obligations and principles applicable to prices.
[47] AT, BG, CY, DE, DK, FI, HU, IT, PL, PT, RO, SI, SE
[48] AT, FI, HU, PT, SI

In the same Report, it is underlined that regardless whether the BCRD has been implemented with or without specific guidance for pricing, almost all the countries already have some elements of a specific methodology in place to approach pricing decisions in the framework of dispute settlement. Such a methodology is explicitly foreseen in four MSs,[49] contained in explanatory documents of the legislation or guidelines written by the NRAs, or rather consist of past experience with dispute resolution, representing *de facto* a sort of guidelines (as in the case of IT, mentioned above).

In general, experiences coming from NRAs (acting as DSB) showed that the availability of some guidelines has improved effectiveness of access to physical infrastructure, transparency in the procedure, as well as access to in-building physical infrastructure. The guidelines have likely limited in many cases the need to solve the dispute itself, helping the parties to reach an agreement without the final intervention of the DSB (and the consequent binding decision).

From a different point of view, in cases where the existing legal system, while resolving the disputes under BCRD, provides already some general rules (e.g. of administrative procedure) and contains sufficiently concrete rules of dispute settlement process (CZ), it may be not necessary to issue additional guidelines or rules concerning the resolution of disputes.

Having said that, at general level, BEREC is of the view that the adoption of specific guidelines or rules by national authorities to assist the DSB in applying the BCRD contributes to the efficient and effective functioning of the dispute resolution process. Such guidance already proved to be useful in several MSs in improving effectiveness in the application of the Directive and enhancing transparency and predictability, also in case they are intended as non-binding. Guidelines may also help in setting consistent prices and to avoid distortive impact on the market.

However, BEREC is of the opinion that the guidance should be provided only at national level by relevant authorities and in common understanding with industry, if needed, as this would also facilitate industry's commitment to follow given guidance (see also answers to questions 21 and 25). How to apply BCRD at national level should remain in the discretion of the MSs, in order to take into account specific situations. Moreover, procedures adopted by DSBs should be consistent with the existing administrative procedures at national level, which may differ significantly among MSs. Guidelines on access pricing may also need to be flexible, because in most of MSs the general approach in pricing services in settling disputes is 'case-by-case' by nature, with a general reference to cost recovery or cost orientation in interpreting fair and reasonable prices under BCRD (*cfr.* BoR (19) 23).

For all such reasons, BEREC believes that guidelines may support the practical application of BCRD, but at the same time suggest to leave each MSs the freedom to adopt such guidelines, also non-binding, at national level, also because the general objective of BCRD is to reduce cost and speed-up the deployment of new networks in each single MSs.

[49] BG, CZ, PT, RO

11) Is there a need for closer cooperation between the DSBs and regulatory authorities (as well as DSBs, where applicable) of other network industries (e.g. energy, water and transport)? If yes, what would be the best way to ensure such cooperation?

Some NRAs reported that they have already mandatory cooperation between the DSBs and other sectors regulatory authorities. Some NRAs argued that mandatory cooperation makes the DSBs operation more complicated and it should not be forced. In order to safeguard the operation of DSB, it should be empowered to decide on itself only.

BEREC sees that mandatory coordination with NRAs and other sectors regulatory authorities could increase the complexity of the decision making process of DSB and be time consuming. BEREC finds it more useful to increase informal cooperation between relevant bodies. An informal regular exchange of non-confidential information, common understanding, best practices and views is welcomed and operational in some NRAs. BEREC sees that informal cooperation and information exchange can be recommended.

One way to increase common understanding, share information and utilize best practices is to publish DSB's decisions or form a data bank of decisions. BEREC find that recommendation to the DSB to publish information of DSB's decisions and best practices improves the visibility of decisions and encourages the exchange of common practices at all sectors involved.

4 Questions on the functioning of the Single Information Point and on transparency concerning existing physical infrastructure

12) What is BEREC's overall evaluation of the functioning of the Single Information Point(s) (SIP) so far, looking at different implementations across Member States? How could the gathering or provision of information be better organised so that the SIP is able to offer information regarding existing physical infrastructure and planned civil works, which is comprehensive (including all sources of information, public and private) and updated?

BEREC's overall evaluation of the functioning of the SIP is positive. In general, the idea behind the SIP is good as it improves coordination of civil works (Art. 6 BCRD) and physical infrastructure sharing (Art. 4 BCRD). It should be noted that only 11 NRAs[50] perform the function of SIP. In other countries the SIP has been implemented by another body or a combination of bodies, and is less easy to evaluate by BEREC members.

The evaluation of the functioning of the SIP depends on the way it is implemented. Some NRAs report that the SIP works very well and is heavily used, other NRAs report that adaptations are being planned to make the SIP more effective. Information gathering is however reported as being challenging and demanding resources from the organisation that runs the SIP.

[50] AT, CY, CZ, DE, FI, IE, LT, PL, PT, SE according to BoR (17) 245 (p. 7-8). In the meanwhile also the Slovakian NRA is SIP. In three further MSs (LU, RO, SI), the tasks of the SIP were appointed to the NRA and to another organisation.

Where the SIP is implemented according to the minimum requirements of the BCRD, the following shortcomings are mentioned:

- Due to the fact that the use of the SIP is not mandatory for requests regarding physical infrastructure (Articles 4(1) and 4(4) of the BCRD) the SIP does not possess complete and comprehensive minimal information concerning physical infrastructure.
- Due to the optional nature of Article 4(2) public bodies which are not obliged to supply this minimum information will not provide data and updates to the SIP. Sometimes information is distributed among different public bodies which is a burden for the data gathering process and causes delays.
- The current provisions in the BCRD do not oblige a database with a register of planned civil works by network operators that are fully or partially financed by public means. Therefore, it may be difficult for a network operator to discover civil works that can be of interest and that are suitable for coordination.

BEREC is of the opinion that the gathering of information is hindered by the way this process is currently foreseen in the BCRD, i.e. on a request basis and mostly optional via the SIP. If the data in the SIP would have to be comprehensive, it might be necessary to define a mandatory legal basis for data submission and/or extending this obligation to public and private stakeholders (see also answers to questions 16 and 17). This kind of legal obligation is already foreseen or will be implemented in some MSs, and leads to SIPs that are more extensively used. E.g., in Poland the use of the SIP has significantly increased since the data transfer of information already available in electronic format became obligatory (2020). In Czech Republic, part of the action plan on non-subsidy measures for deploying electronic communication networks is to create a database containing planned civil works.

BEREC notes that linking the SIP with other data or processes may be an important incentive for use by operators. For instance, in Austria, the SIP is heavily used because applicants for state aid for broadband rollouts are obliged to prove whether there is any physical infrastructure suitable for sharing in the area of application. The use of the SIP can in addition also be promoted and assisted by preparing instructional videos, as was done in Poland by UKE. Some ECN operators also might be willing to transfer data to the SIP to avoid providing the same data on request to other ECN-operators, which might be more costly.

In on MS (GR) it is planned to implement the SIP as a one-stop-shop which coordinates also the whole permit granting procedure, including electronic submission and management of applications on a centralised basis. Another practice, as is the case in Poland, is adding other layers of information to the SIP, such as map information layers made publicly available by registers and map portals, and taking into account the needs of telecommunications undertakings (e.g. information needed to commence the investment process, data on telecommunications infrastructure).

The gathering or provisioning of information could be improved by automating the information supply and by using electronic interfaces. For instance, the automatic conversion from different data formats and coordination systems into a unified format in the SIP database accelerates the processing of the data. Moreover, the process of data collection for the providing network operator is simplified if a wide range of data formats is accepted. Automating the information supply also facilitates the updating of the information, as this would be less labour intensive.

The accessibility and ease-of-use of the SIP is also deemed important and the SIP should be implemented by taking into account the feedback from users. The comprehensiveness of the SIP is facilitated if it is a portal that is open for all network operators and that gives all parties the possibility to submit their data.

The quality of the information is also determined by the level of detail, such as a clear distinction between different types of infrastructure.

13) Which competent bodies are best placed to perform the functions of the single information point? What would be the technical, financial and human resources necessary to perform these functions?

The competent bodies which, on the one hand, have experiences with performing the functions of the SIP or similar functions and, on the other hand, are well known to ECN operators which use the SIP are best placed to perform the functions of the SIP. Experiences are necessary e.g. at the implementation level, e.g. the implementation of the IT-infrastructure, database, front end and evaluation tools and at the level of data collection and validation of the data received. According to BoR (17) 245, the tasks of the SIP were assigned in 11 MSs[51] fully and in three other MSs[52] partly to the NRA. Therefore, in these 14 MSs the NRA is the competent body which has experiences with performing the functions of the SIP and which is also well known to the ECN operators.

The technical, financial and human resources necessary to perform the functions of the SIP depend, on the one hand, on the functions of the SIP, whether and to what extent the functions of the SIP go beyond the minimum requirements defined in the BCRD and, on the other hand, from the size of the country since in large countries more physical infrastructure exists and, therefore, needs to be made available via the SIP compared to smaller countries. Assets required would also depend on whether an internal solution or a tender will be chosen and the presence of an IT infrastructure that is expensive is also essential. The technical resources depend on the architecture which may include the following components:

- database,
- GeoServer data and spatial services server,
- http API[53] to ensure communication between the user interface and database and GeoServer,
- front-end application of the administration panel,
- front-end application of the map application, and
- identity management.

Examples for the technical, financial and human resources necessary to perform the functions of the SIP are as follows. In Austria, after a rough estimate, the capex was 250 000 euros and the opex was 50 000 euros per year plus 2 employees full time equivalent. Poland spent about 1 million euros to create and implement SIP and spends 10% annually on maintenance. The system has been created with participation of 5 members of steering committee, 12 team members and team of external advisors. In Portugal 12 human resources from NRA with different skills were involved at the tender stage. At the implementation stage there were 8

[51] AT, CY, CZ, DE, FI, IE, LT, PL, PT, SE and after BoR (17) 245 was published also in SK
[52] LU, RO, SI
[53] Application Programming Interface

human resources from the supplier, project manager, a coordinating director and an external consultant from NRA.

14) What information, in addition to the minimum information required by Art. 4(1) of the BCRD, has proven useful for the deployment of ECN? How useful does BEREC consider the addition of the following types of information: a) geo-referencing (exact coordinates); b) total and spare capacity to host network elements; and c) digital modelling (digital representation of the physical infrastructure)?

The function of the SIP is not performed by all NRAs (see answers to question 12). Many of the NRAs that do carry out the function of SIP have only the minimum information required by Art. 4(1) of the BCRD included in their SIP implementations. Some NRAs plan or already collect the geo-referenced location of the physical infrastructures, or other additional information like the sector to which a private operator belongs to, for the SIP. Some NRAs have also developed a portal to share the information at SIP.

BEREC is of the opinion that a very useful additional information is geo-referencing, as already foreseen in some MS (e.g. AT, DE, PL, PT). The inclusion of geo-referenced information in the SIP implementations is considered to be essential. However, it needs to be pointed out that this does not necessarily mean the provision of an accurate location, since the accuracy depends on the accuracy (decimal places) of the geographic (latitude, longitude) coordinates. Many different coordination systems (several hundreds) are available, therefore, conversion in the geo data system of the SIP is necessary. Automating the information supply and an automatic conversion from different data formats and coordination systems into a unified format in the SIP database facilitates significantly the data collection (see answers to question 12).

BEREC considers total and spare capacity to host network elements also as an important information for ECN operators in order to help them to assess whether they could use existing physical infrastructure. However, the concept of the spare capacity is very dynamic (i.e., may change on a daily or on an hourly basis) and is very hard to define (especially regarding some physical infrastructures – e.g. poles). Furthermore, spare capacity is not always equal to available capacity, since such capacity might be needed for the future use by the network operator itself or be incompatible to host ECN elements due to technical or other reasons. Therefore, BEREC considers it appropriate that SIP implementations may in the future foresee an additional capacity field associated with each physical infrastructure record (e.g. duct capacity/area), which could be optionally filled by the network operators.

BEREC suggests also that the additional information (compared to the minimum information according Art. 4(1)) should not be limited to public bodies only. All telecom operators, utility companies and other owners of physical infrastructure should provide the information to SIP (cf. questions 16 and 17).

BEREC is of the opinion that digital modelling might also be a helpful information for ECN operators. However, network operators may have only some (or even no) information with regard to this available. Data collection also might be rather complex and if this data changes frequently than it also would be necessary to update this information regularly. Some NRAs pointed out the heavy burden on the owners of physical infrastructure to digitally map their

infrastructure. Therefore, BEREC considers that the extra information for digital modelling should not be obligatory.

The digital representation of the physical infrastructures (e.g. vectorial, satellite) might also be a challenge regarding network security. The public access to nationwide view to existing physical infrastructure can be harmful to both network safety and security, and national security. In any case, BCRD already foresees that the access to the minimum information is limited only if necessary in view of the security of the networks and their integrity, national security, public health or safety, confidentiality or operating and business secrets. This problem can e.g. be resolved with limiting the access to the SIP's information to ECN operators only, however. It has to be noted that if geo-referenced data is submitted to the SIP it is not necessarily fully disclosed to ECN operators or other users requesting information.

15) What would be the benefits and challenges of mapping physical infrastructure suitable for the deployment of ECN? What are the possible synergies of such exercise with the mapping of ECN under Article 22 of the EECC?

BEREC's opinion on the inclusion of geo-referenced information (exact coordinates) and the physical infrastructure of which organisations would be useful to make available via the SIP is discussed in the answers to questions 14, 16, and 17.

Synergies with the mapping of ECN under Article 22 of the EECC may be possible at the implementation level, e.g. the implementation of the IT-infrastructure, database, front end and evaluation tools and at the level of data collection and validation of the data received.

However, BEREC is of the view that such synergies are hardly possible at the level of the content because of the following reasons. According to the current BCRD, the information available via the SIP is information on some existing physical infrastructure of network operators (not including the cables, e.g. fibre). The revised BCRD may foresee that at the SIP information on more existing physical infrastructure is available (see answers to questions 16 and 17) and also more than the minimum information according Art. 4(1) current BCRD (see answers to question 14). The geographical surveys according to Article 22 of the EECC make information available on the geographic reach of broadband networks and the information collected shall be at an appropriate level of local detail and shall include sufficient information on the quality of service (QoS) and parameters thereof. Therefore, the information provided by the SIP and the information of the geographical survey differ. The SIP makes information on existing physical infrastructure (excluding cables) available and the geographical survey information on the QoS. However, a link between both is difficult since it is not possible to conclude from physical infrastructure (not including cables) to a certain QoS.[54]

Information available at the SIP, however, may be relevant for State aid for the following reasons. State aid considers 'white areas' in which there is no broadband infrastructure and it is unlikely to be developed in the near future (paragraph 66 EU State Aid Guidelines).[55] Physical infrastructure which already exists in white areas can potentially reduce the cost of the roll-out of ECN depending on the extent to which it is actually suitable and possible to be used for the ECN roll-out. This is recognised in paragraph 78 (g) EU State Aid Guidelines,

[54] See also BEREC Guidelines on geographical surveys of network deployments, BoR (20) 42 paragraph 13, p. 6
[55] EU Guidelines for the application of State aid rules in relation to the rapid deployment of broadband networks (2013/C 25/01)

which foresees that MSs shall encourage the use of existing infrastructure to reduce deployment costs and further recommends that MSs shall setup a national database on the availability of existing infrastructure. For example, in one MS (Austria), the network operators (ECN and non-ECN) have the obligation to make information on their physical infrastructure available via the SIP and a pre-requisite for State aid is that the applicant has to check whether physical infrastructure already exists in the respective area based on the information available via the SIP.

16) To what extent would it be useful for the deployment of ECN to impose an obligation (currently at the discretion of Member States) for public sector bodies to make available via the SIP the information they hold on existing physical infrastructure?

The implementation of the SIP has varied significantly to date. To be successful in its aim to contribute to the transparency of information, an obligation to make available information on existing physical infrastructure can be an effective tool to foster a more efficient roll-out of broadband networks. The experiences of several NRAs support this observation.

In six MSs (CY, FI, LT, PL, PT, RO), which appointed the tasks of the SIP to the NRA, public sector bodies have the obligation to make available via the SIP the information they hold on existing physical infrastructure of network operators as foreseen as an option in Art. 4(2) of the BCRD (see BoR (17) 245, p. 18-19[56]). In one of them (FI), all public sector bodies do have this obligation. In Sweden, public sector bodies also have to make this information available via the SIP, however, they have also the possibility to make this information available not via the SIP but instead by other electronic means (e.g. own webpage).

In Finland, the national law already requires public sector bodies to make available via the SIP the information they hold on existing physical infrastructure. This includes both the infrastructure that is in their own property and the information that they hold from other organizations in their information systems. In Slovenia, the interested public (e.g. ECN operators) can find information on the entire public infrastructure in one place, all free of charge, which has been very useful.

In Germany, public sector bodies have to provide the same information as network operators according to Art. 4.1 of the BCRD, if they own or operate a network listed in Art. 2(1) of the BCRD. In addition, any network operator is required to make existing digitized and geo-referenced information about physical infrastructures as well as dark fibre and radio links available to the SIP.

In Austria, public sector bodies also had the obligation to make available via the SIP the information they hold on existing physical infrastructure of network operators as foreseen optionally in Art. 4(2) of the BCRD. However, this obligation was removed for the following reasons. In Austria, network operators also have the obligation to make information on their physical infrastructure available via the SIP (see answer to question 17). Therefore, the information of the physical infrastructure of the network operators is already available via the SIP and it is not necessary to collect the information on this infrastructure also from public sector bodies which do have such information. Furthermore, network operators do know best their physical infrastructure, therefore, information from network operators on their physical

[56] Meanwhile this is also the case in two further MSs (CY, RO).

infrastructure can be more accurate and comprehensive compared to information on their physical infrastructure held by public sector bodies.

In conclusion, ECN operators need information on existing physical infrastructure of network operators in order to be able to use them. Therefore, BEREC considers it appropriate that public sector bodies make available via the SIP information on existing physical infrastructure of network operators. However, this is not necessary if e.g. this information is made available via the SIP by other means (e.g. if this information is provided directly by the network operators to the SIP) or if this information is made available by other electronic means (e.g. at the webpage of the public sector body). A centralized platform for this information, as the SIP, has the advantage that operators planning to roll-out an ECN does not need to know beforehand whose physical infrastructure is relevant in the area of interest.

17) To what extent would it be useful for the deployment of ECN to impose an obligation for non-public sector organisations (network operators and/or other owners of infrastructure) to make available via the SIP the information they hold on their own physical infrastructure?

In order to create effective transparency about (available) physical infrastructures, an obligation for non-public sector organisations to make available their respective information is equally useful as a mandate for public sector bodies (see question 16).

In six MSs (AT, CY, DE, FI, PL, PT), which appointed the tasks of the SIP to the NRA, organisations other than public sector bodies have the obligation to make information on existing physical infrastructure available via the SIP (see BoR (17) 245, p.19[57]). This obligation is imposed in four MSs (AT, CY, PL, PT) on network operators as defined in the BCRD (Art. 2.1) which include also operators of other sectors than the electronic communications sector (e.g. gas, electricity, water) and in two other MSs (DE, FI) on network operators which own or operate infrastructure that can be used for telecommunication purposes (DE, FI[58]). In another MS (Sweden), all network operators and network owners have the obligation to make information on existing physical infrastructure available via the SIP, however, they have also the possibility to make this information available not via the SIP but instead by other electronic means (e.g. own webpage). In a further MS (RO), all network operators also have the obligation to make information on existing physical infrastructure available via the SIP.

In conclusion, ECN operators need information on existing physical infrastructure of network operators in order to be able to use it. Therefore, BEREC considers it appropriate that also other organisations than public sector bodies (e.g. network operators) make information on existing physical infrastructure available via the SIP.

[57] Meanwhile this is also the case in one further MS (CY).
[58] Excluding network operators which activities are targeted at a low number of users, are locally restricted and economically de minimis.

5 Questions on access to existing physical infrastructure

18) What would be the benefits and drawbacks from expanding the obligation to provide access to existing physical infrastructure to organisations other than network operators? What has been the experience so far in this regard?[59]

In several MSs national legislation has already widened the application of access obligation (Art. 3 BCRD) to organisations other than network operators; this has been outlined in the BEREC document on the 'Implementation of the Broadband Cost Reduction Directive', BoR (17) 245, where it is mentioned that in 12[60] countries (AT, CY, DE, ES, FR, GR, HR, IT, LT, PT, RO, SI), organisations other than network operators have to provide access to their existing physical infrastructures. Depending on the specific countries, this includes in general all the organisations which have infrastructure useable for communication lines (AT, FR, IT, RO, SI), whereas in some cases it is specifically reported that public administrations are included (ES, PT). In one specific case (HR), it is reported that '*any legal or natural person who owns electronic communications infrastructure is obliged to provide access to it*'.

For example, ARCEP imposes, within the framework of the BCRD transposition, an access obligation to both private and public owners and/or managers of physical infrastructures. NRA considers this extension as beneficial for the roll-out of networks, as it allows for instance ECN operators to gain access to 3 to 4 million electrical poles operated by Enedis.

In addition to what was reported in the BEREC Report, also other MSs have extended the application of Art. 3 BCRD to other entities[61], for example in Finland, Poland, Slovenia, and Denmark.

It can be observed that in the BCRD (Art. 2.1) the term 'Network operator' includes undertakings but not public bodies or institutions (for example, municipalities); on the basis of the above, it may be argued that the extension of the access obligations also to public bodies is somewhat already in place in the majority of the MSs. On the same level, also extensions to privately controlled physical infrastructures for the deployment of ECN has been considered.

That being said, BEREC considers relevant the benefit coming from the availability of existing infrastructures owned by entities other than network operators as defined in BCRD, simply because an extended usage of existing assets would lower the cost of deployment significantly and have a beneficial impact on ultra-broadband and VHCN roll-outs, especially in countries where there is lack of re-usable assets owned by undertakings. So, broadening the Network Operator definition to include also other organisations or, equivalently, expanding the access obligation also to assets owned by organisation other than Network Operator, may have a beneficial impact on BCRD effectiveness.

[59] According to the BEREC report on the Implementation of the Broadband Cost Reduction Directive (BoR (17) 245) 'Other organisations than network operators which have to provide access to their physical infrastructure and to coordinate their civil works are e.g. all organisations which have infrastructure useable for communication lines (AT, FR, IT, RO, SI) and (certain) public administrations (ES, PT).'

[60] Meanwhile this is also the case in a further MS (CY)

[61] For example, in Finland obligation to provide access falls on all entities both public and private that have infrastructure suitable for host network elements. Entities that own road side infrastructure, canals at road areas or in bridges or municipalities and their facilities in public areas are good examples of non-network operators that have obligation to provide access and information to SIP.

Such extension would be also very relevant for 5 G deployment. On this point, this would be also consistent with EECC, which in recital 140 states that '*MSs should ensure that public buildings and other public infrastructure are made available on reasonable conditions for the deployment of small-cells with a view to complementing Directive 2014/61/EU*', and also Art. 57 (3) states that '*MSs shall, by applying, where relevant, the procedures adopted in accordance with Directive 2014/61/EU, ensure that operators have the right to access any physical infrastructure controlled by national, regional or local public authorities, which is technically suitable to host small-area wireless access points or which is necessary to connect such access points to a backbone network*'.

However, the availability of infrastructures of other organisations, suited to install communication network elements, may differ significantly among MSs and the concrete effect of such expansion would depend on specific circumstances.

On the other side, the drawback of expanding the obligation is that a higher workload on DSB is likely to emerge, because the enlargement of the entities which would be involved by the obligation itself will potentially increase the number of disputes. The same issues arising in disputes among network operators (e.g. on refuse of access and/or cost compensation and access pricing) will arise also with other organisations, with potentially different peculiarities due to the different nature of such organisations.

In this regard, for example in the Spain experience, between 2017 and 2020 almost 62% of the disputes settled by the DSB (CNMC) concerning the deployment of high-speed electronic communications networks, were related to public administrations' obligation to provide access to their physical infrastructures.

Moreover, expanding the obligation to provide access to privately controlled physical infrastructures for the deployment of ECN could generate new disputes in which the competent body/authority may be in some cases unclear (NRA-DSB, civil courts).

Another consideration is that not all types of infrastructures owned by different entities are exploitable at a same level for ECN deployment; extending to other entities and types of assets the access obligation may determine further complexity for the DSB, as this should be treated in sector specific manner so as to provide for a higher level of predictability and certainty for both network providers and access seekers.

In conclusion, BEREC highlights the advantages in expanding the access obligation in terms of effectiveness of BCRD, but at the same time would pose the attention on the increased effort for the DSB as consequence of such expansion.

All the above considerations also apply, in general, to provisions regarding coordination of civil works (Art. 5 of BCRD).

19) What would be the benefits and drawbacks from expanding the obligation to provide access to existing physical infrastructure to other types of publicly controlled physical infrastructure which are not already covered by the Directive and are suitable for hosting (fixed

and mobile/wireless) ECN elements[62], such as public buildings and urban furniture (e.g. light poles, street signs, traffic lights, billboards, bus and tramway stops and metro stations)?

The current BCRD (Art. 3(2)) foresees that all network operators of 'all' sectors (according Art. 2(1)) have the obligation to meet all reasonable requests of ECN operators for access to its physical infrastructure under fair and reasonable terms and conditions, including price. The current BCRD, however, does not foresee that the public sector has to provide access to its existing publicly controlled physical infrastructure suitable for hosting (fixed and mobile/wireless) ECN elements to ECN operators. But this is foreseen in the EECC (Art. 57(4)) with regards to publicly controlled physical infrastructure technically suitable to host small-area wireless access points or which is necessary to connect such access points to a backbone network.

Therefore, the expansion question 19 asks for is primarily to expand the already existing obligation of public authorities (Art. 57(4) EECC) to provide access to publicly controlled physical infrastructure suitable for hosting small-area wireless access points to publicly controlled physical infrastructure suitable for hosting 'all' (fixed and mobile/wireless) ECN elements (including small-area access points).

BEREC is of the view that such an expansion should be considered carefully. It increases the items to which public authorities have to provide access to. This expansion may have an impact on planning activities for both, the owners of such infrastructure and the access seekers. The capacity and accessibility of any facilities would require an assessment the latest during the planning stage for the ECN deployment. For example, in particular with regards to the technical capability to host a certain ECN element which typically depends on weight, size, shape and other parameters.

In conclusion, BEREC is of the view that the BCRD's scope should be defined consistent, taking into account the provision of Art. 57 paragraph 4 EECC. When facilities are considered beyond the scope of Article 57 EECC, proportionality should be considered. For instance access to rooftops of buildings owned by public bodies, which might be suitable to deploy facilities capable of hosting equipment for wireless networks, which do not qualify as small-area wireless access points, might be considered to be proportionate. On the other hand, it might be questionable whether street furniture is suitable to support the deployment of mobile/wireless ECN-elements other than small-area wireless access points, because of e.g. lack of technical suitability and/or a too high radiation level. BEREC does not see how access to publicly controlled infrastructure as e.g. street furniture can help ECN operators to deploy fibre in order to roll-out fixed ECNs.

20) What would be the benefits and drawbacks from expanding the obligation to provide access to existing physical infrastructure to other types of privately controlled physical infrastructure suitable for hosting (fixed and wireless) ECN elements, such as private buildings used for non-residential purposes (offices, shopping malls, factories, etc. subject to necessary exemptions) and to the extent those are not already covered by the Directive?

Article 9 BCRD already foresees access to privately controlled physical infrastructure in case of in-building physical infrastructure. The benefit of widening the BCRD's scope to other types

[62] Including also elements that are covered by Art. 57 of the EECC and the relevant Implementing Act.

of privately controlled physical infrastructure suitable for hosting (fixed and wireless) ECN elements, such as private buildings used for non-residential purposes, could further increase the availability of infrastructure suitable to place network elements. In consequence, amongst other things [63], the coverage and/or capacity of ECN might be improved easier. If the market could be enlarged, positive impacts on competition and market prices might also develop. Some types of facilities might be either owned by public bodies or by private undertakings (for instance rooftop of the building, urban furniture). In such cases effectively the same type of facilities might be concerned where the extension is widened from public to private owners. Where the obligation to grant access to a certain type of infrastructure is already considered as proportionate for public bodies, this might sometimes also be true for private entities owning the same type of infrastructure.

On the other hand, information requirements and administrative effort as well as radiation concerns might question the proportionality of an extension at least to some of the infrastructures that could be considered. In addition, it has to be considered that such obligations might be regarded as particularly intrusive as privately controlled infrastructure is concerned.

For instance, in Denmark, a legislative bill which expands Article 57 paragraph 4 EECC to apply to entities others than public authorities controlling urban furniture was recently adopted by the Parliament. This extension encompasses access to urban furniture, but access to buildings has been excluded due to the consideration of private property rights. It is considered that access to private buildings is more intrusive compared to access to urban furniture. Access to private buildings could potentially involve expropriation.

In Croatia HAKOM already had interference in disputes concerning operators to install, network elements (mostly for wireless communications) inside and outside shopping malls. It was observed that the main subject of concerns always was the price and the disputes have been settled. From this experience follows, it would be beneficial to expand the obligations on privately controlled physical infrastructure, but it is not clear regarding legal rights, how to impose such an obligation on private owners.

One MS would find it disproportionate to extend the directive to this type of infrastructure. Neither fixed nor mobile operators are asking for such an extension in this MS. Moreover, mobile operators do not yet know whether or how many small cells they will deploy, considering the associated costs.

The regulation in this MS stipulates obligations in terms of passive infrastructure sharing for mobile network. Thus, mobile operators must respond to reasonable requests from other operators to share their sites or masts.

In conclusion, BEREC considers that – safe for possible, well defined and justified exceptions – the provision of access to non-network private facilities should normally be left to commercial agreements.

[63] In relation to small cells for example, a report for BEREC in 2018, by consultants Dotecon/Axon set out a number of consequences that may have some relevance here, such as on the role of pivotal site owners with bargaining power and the supply of locations for small cells. See BEREC Document BoR(18) 23, at page 101 therein.

21) According to the BEREC report on the implementation of the BCRD[64] as well as the BEREC report on pricing for access to infrastructure and civil works according to the BCRD[65], one of the biggest challenges in dispute settlement for access to existing physical infrastructure is the 'selection of the most appropriate costing methodology for the specific case'. Does BEREC see the need for more specific rules on the costing methodology? In particular, does BEREC consider that specific cases (type of physical infrastructure or type of access provider) would justify cost-oriented pricing?

Dispute settlement often includes the challenge to decide about 'fair and reasonable terms and conditions, including prices' (see Recital 18 and Article 3(2) BCRD). So far, the BCRD has not specified any costing methodology to determine those prices, such that no pricing standard can be concluded from the precept 'fair and reasonable'. Not dissimilar, the European Commission addressed the question whether BEREC sees more need for guidance on pricing aspects under the notion of 'fair and reasonable' in its targeted consultation on the review of the access recommendations from 16 June 2020 (questions 18). In its response (BoR (20) 169), BEREC pointed out that 'fair and reasonable' can be seen as a holistic concept, which may include pricing aspects, but is not limited to the latter.

In general, it depends on each individual case whether pricing aspects are concerned at all and, if so, the impact of the requested access on the business case has to be taken into account (Article 3(5) subparagraph 2 BCRD). In this context, BEREC conducted a report on the transposition and application of the BCRD with a focus on pricing issues in 2019 ('BEREC report on pricing for access to infrastructure and civil works according to the BCRD' from 07 March 2019 (BoR (19) 23)), providing an overview on how the notion 'fair and reasonable' relates to pricing methodologies. According to that report, some MSs already included further guidance on pricing methodologies in their national implementation of the BCRD; some even explicitly refer to cost orientation. In 10 MSs no indication beyond the BCRD's 'fair and reasonable pricing' is given in the law while in 14 MSs the law includes further guidance on pricing or foresees publication of rules regarding pricing methodologies. Reference to recovery of cost leads some DSB to explicitly interpret 'fair and reasonable' as 'cost orientation', both in general (5 MSs) or within the framework of a case-specific approach (2 MSs). Other MSs, however, did not include any indication yet or follow a more general approach. The latter in particular allows to flexibly considering any impact on the business plan of the access provider. This problem typically arises in cases where the infrastructure operator is an ECN operator, too. Especially those cases can become very complex, because the decision by the DSB shall ensure that the access provider has a fair opportunity to recover its costs and shall take into account the impact of the requested access on the business plan of the access provider. Reference is made to the impact of pricing on the business model and investments and/or to the opportunity cost of providing access in 5 MSs. Some NRAs also place the focus on existing market prices, mainly regulated prices, as a relevant element to be considered (4 MSs) in order to avoid introducing distortions on the market

Concerning cost-oriented pricing methods, BEREC would like to emphasize that the fundamental objective must always be a context-dependent application. It is important to note that the notion of 'fair and reasonable' is not generally linked to a specific pricing mechanism under the BCRD, but as broad concept rather allows the DSB to set prices in a manner that

[64] BoR (17) 245
[65] BoR (18) 163

will not distort market outcomes and also allows to take into account the requirement of consistency to pricing obligations linked to other regulations, in particular SMP-regulation. Cost-oriented methods therefore were often used where these were regarded as suitable. BEREC, however, does neither see the need nor the possibility to restrict the analysis to those methodologies. Moreover, any obligation to use cost-orientated pricing methodologies on a binding basis bears the risk that DSBs would need to apply methods using sufficient (past) data, which they might not have due to too few cases so far. In such cases different methodologies like e.g. benchmarks or reference to SMP-prices (e.g. based on the NDCM Recommendation) might be more appropriate, depending on the observed circumstances.

As DSB's proceed a rising number of cases over the time, some DSB's already issued Guidelines on pricing aspects based on experiences gained in the past or intend to do so (see also question 7). Guidelines issued by DSB will often not be able to address all possible cases which may arise in the future, but will for many market situations provide a valuable guidance to the involved market parties and, in addition, publicised decisions are able to enhance clarity on access conditions, including prices, which might be regarded as being acceptable under the notion of 'fair and reasonable.'

Guidelines or cost sharing/pricing principles issued by DSBs based on the experiences of national authorities in charge would risk to be overruled if the Commission would consider to issue further guidance within the BCRD. The same is also true for individual decision which have been publicized and from which principles agreeable for market parties maybe derived. Therefore, it could even be harmful to the market development, if principles already known to market parties would suddenly be invalid. In particular, known pricing principles will often already reflect in private, commercial agreements. Consequently, BEREC sees no further need for more guidance in the revised BCRD and would not regard such guidance as advisable.

22) According to the BEREC report on the implementation of the BCRD, another big challenge in dispute settlement for access to existing physical infrastructure is the 'refusal to access to physical infrastructure'. Does BEREC see the need for more specific rules on the grounds that justify refusal to access, such as lack of space or technical suitability, or for additional grounds for refusal?

First, BEREC likes to note, that the reasons for an access refusal are already well developed. Given, that legislation in general and especially a directive defines rather general principles, the BCRD established reasons for a refusal, DSBs are able to build on.

Naturally, every single DSB proceeding leads to new questions, how to interpret the provisions. The questions are even more challenging, when the DSB starts to implement a decision-taking practice for the first time. But a common approach between NRAs or between a NRA and national experts may lead to a more detailed common understanding of different organizations what kind of passive infrastructure can be shared and when a refusal of access is justified. Furthermore, such an approach is more open and flexible to new technical and economic developments.

Considering these aspects, BEREC concludes, that from today's point there is no need for more specific rules on the grounds that justify refusal to access in the BCRD. Moreover, BEREC doubts, that rules in a directive may be detailed enough to answer specific questions

occurring in a DSB proceeding. BEREC thinks, the ground for a refusal of access is a challenge the BCRD cannot take off from NRAs. BEREC wonders, if the revised BCRD may, however, encourage the MSs / NRAs to define such rules at a national level.

23) Does BEREC have any other suggestions about how to make the access related provisions of the BCRD more effective and efficient? Are there any lessons learnt from the obligations (both SMP and 'symmetric') to provide access to physical infrastructure imposed under the regulatory framework, which could be applied to the respective obligations in the Directive?

The differences between the instruments of the BCRD on the one hand and regulatory instruments on the other hand (SMP and symmetric regulation on the basis of Art. 61(3) subpara 2 EECC) is as follows. For the first, the main reason for intervention is the reduction of costs and the speeding up of network deployment (independent of competition problems). For the other regulatory instruments, resolving competition problems is the main reason for intervention. BEREC would like to refer also to BEREC's response to question 26 of the Commission's targeted consultation on the review of the access recommendations (BoR (20) 169).

When considering experience and lessons learnt, firstly we must not forget that we are faced with two differentiated types of market regulations (SMP and symmetric). Therefore, although the acquired experience in both fields is important, it is not totally transferable between them.

In this sense, regarding SMP regulation in some MS such as Spain, the SMP operator must grant access to its physical infrastructure at cost-oriented prices and under non-discriminatory and transparent conditions, including a base of online data of infrastructures. As a consequence, there are around 32,000 km of pipelines of the incumbent operator that are used by alternative network operators and during all these years the CNMC has had to resolve numerous disputes. In this sense, the experience gained is an important tool, both when analyzing infrastructures and when determining prices.

On the other hand, symmetrical measures were imposed in Spain aided to promote and facilitate sharing of fibre deployments within and near buildings, valid for buildings without Common Telecommunications Infrastructures (those built before 1998) at reasonable prices and in transparent conditions, but in this cases the sharing point corresponds to the localization of the optical termination boxes of the first operators to deploy optical fibre, therefore, as it has been said before, although the acquired experience is important, it is not totally transferable.

Despite the regulatory differences, CNMC affirms the importance of the existence of an infrastructure database for SMP regulation, as one of the main tools to promote infrastructure sharing (such is the case in Spain).

During the gained experience, problems have also been found when infrastructures are built in such a way that they do not technically allow third party access. Therefore, a possible suggestion would be that in-building physical infrastructure must not only be accessible but also has to be built so that access is possible, making newly constructed buildings 'broadband ready' (as is the case of Croatia and also of Spain since 1998).

SMP regulation on access to physical infrastructure was put in place in France in 2008, with the respect of three principles of non-discrimination between Orange and others ECN operators, transparency (with publication of a reference offers and KPIs), and a regulated cost-oriented access price.

ARCEP identifies such obligations relevant due to the essential and non-replicable characteristics of the physical infrastructures owned and managed by Orange, historically used for copper network, which constitute a predominant part of available physical infrastructure in France, with more than 560,000 km of ducts and 13 million poles.

Orange's significant influence on access to physical infrastructure enables ARCEP to carry out an ex-ante regulation, with the definition of modalities of access intended to guarantee others operators the largest possible autonomy vis-a-vis Orange.

Despite the additional tools brought by the BCRD, it is relevant to point out that the BCRD provisions do not have any impact on the existing SMP regulation[66]. SMP and BCRD regulations coexist, with the SMP framework considered to be stricter than the BCRD: ex-ante regulation opposed to dispute settlement on a case-by-case basis, set out SMP prices which are often cost-oriented, while the BCRD foresees fair and reasonable prices. The notion 'fair and reasonable' is not directly linked to a specific pricing methodology, but also encompasses cost-oriented prices where these are regarded to being fair and reasonable (BoR (19) 23).

Therefore, the BCRD constitutes an additional tool for physical infrastructure access, but it sets a threshold of obligation that is less stringent than the SMP regulation. In particular, the effort needed to bring an access request under the BCRD provisions to the point of a dispute resolution before the DSB is high and the outcome harder to predict. It is worth noting that while dispute resolution has some advantages (a decision lasting the lifetime of the network), ex ante regulation may be more relevant but is constrained by the lifetime of a market review and the identification of SMP.[67]

Regarding the symmetric obligations on access to physical infrastructure, an example comes from another NRA (HAKOM), with ordinance on manner and conditions of access and shared use of electronic communications infrastructure and other associated facilities. Problem with access related provision lays in historical infrastructure when incumbent was one and only national operator and it built its physical infrastructure in such a way that it does not technically allow this access. This MS also has imposed that newly constructed buildings must be 'broadband ready' with in-building infrastructure that can be used by multiple operators.

One NRA (ARCEP) would finally like to highlight that symmetric obligations on fibre operators, and the definition of a framework supporting the passive mutualization of fibre optic networks, is beneficial to a rational use of physical infrastructures: It allows all the interested access seekers to passively access the mutualised parts of the FTTH networks while limiting the risk

[66] 2014/61/EU (17): *'At the same time in the case of physical infrastructure access obligations imposed pursuant to the Union regulatory framework for electronic communications, such as those on undertakings having significant market power, this would be already covered by specific regulatory obligations that should not be affected by this Directive'*. This is without prejudice that where obligations imposed pursuant to the BCRD, these should be taken into account when applying the regulations provided in the EECC to the extent relevant.

[67] One NRA (ANCOM), however, reports that ex-ante access regulation was withdrawn and symmetric regulation being the only way to impose access obligation to physical infrastructure.

of saturation of physical infrastructure, which would have prevented that all operators can roll out their own network.

Therefore, the question if specific obligations/remedies are reasonable and proportionate in specific cases might be very different. For some obligations it might be reasonable and proportionate to transfer them from regulatory instruments (SMP and symmetric regulation) to the provisions of the BCRD (e.g. non-discrimination), for others it might not be (e.g. reference offer of duct access). BEREC is of the opinion that transferring the full set of SMP obligations possible based on the EECC to infrastructure owners obliged to grant access based on the BCRD would obviously not be proportionate. It also has to be taken into account the dispute settlement under the BCRD is applied ex-post and the sector regulation under the EECC is applied ex-ante.

6 Questions on the coordination of civil works and transparency concerning planned civil works

24) To what extent would an increase of coordination of civil works between network operators reduce the cost and time of ECN deployments? What are the main reasons that such coordination remains limited? Which measures could foster a higher degree of coordination? Please distinguish between ECN/ECN and ECN/non-ECN coordination cases, if appropriate.

Since civil works contribute to a high degree to the costs of ECN deployment there is, in principle, high potential for cost savings. The exact amount of cost savings, however, is difficult to quantify because it will depend on several determinants as, for instance, on the number of involved undertakings and technical parameters (e.g., topology, trench depth, and trench profile in case of underground deployment). Nevertheless, Akos for instance estimates for Slovenia that about 30% of the ECN deployment costs could be saved if coordination is successful.

Despite the high potential, coordination of civil works does not occur as frequently as expected. Main reasons are a certain kind of reluctance to start coordination due to a lack of common understanding, missing awareness of the opportunities and advantages, and the uncertainty about how to negotiate the coordination successfully (see also answers to questions 2 and 3). Moreover, the practical framework of civil works often is quite strict, such that the planning undertaking struggles with complex permit granting procedures and, consequently, has only little flexibility to coordinate in terms of time. As a general prerequisite, the need to construct must coincide concerning time and place and the respective undertakings should have access to the relevant pieces of information in due time.

To overcome those impediments, BEREC wants to emphasize the importance of good data availability on planned construction works and suggests fostering it further (cf. BoR (17) 245, sec. 3.2.3). Regarding this, some MSs report very positive experience.

Another instrument to help accelerating negotiations for undertakings that are generally willing to coordinate is that the DSB provides guidance on how it would allocate costs in case of a dispute settlement. The provision of those mechanisms, therefore, would not just improve transparency and planning security for the parties involved in the proceedings, but also encourage undertakings to reach an agreement without the DSB. In line with that, the

impediment of complexity could be reduced if the regulatory structure of the coordination of civil works could be aligned to the structure of the provisions for the use of existing physical infrastructure. More precisely, this structure could ensure there could always be the claim to coordinate civil works unless there is a proven reason to refuse.

To conclude, BEREC agrees that there is potential to leverage coordination of civil works and understands the availability of information and planning security for undertakings concerning cost allocation mechanisms to be the most promising instruments for that.

25) According to the BEREC report on the implementation of the BCRD, one of the biggest challenges in dispute settlement for coordination of civil works is setting the price in consideration of cost sharing. Does BEREC see the need for more specific rules on the pricing methodology to be used in different cases of civil works coordination? If yes, what could be the principles of such rules?

First, BEREC remarks the general principle of fair and reasonable terms and conditions is appropriate. This principle is open to take into account other regulatory measures and therefore helps to ensure a consistent legal framework for telecom operators in the MSs (see also answer to question 21 with respect to access to existing physical infrastructure).

Any more specific guidance in the revised BCRD going beyond the concept of 'fair and reasonable' might restrict DSBs in their flexibility to address the needs of a complex case-by-case analysis. The preferable option to increase clarity may be seen in the publication of guidelines by DSBs/NRAs (see also answer to question 7). Hereby, the case-by-case experiences NRAs have (and that are necessary for developing Guidelines) can be used in order to set out appropriate conditions. Furthermore, national market conditions need to be taken into account. In Germany for instance BNetzA recently adopted Guidelines on the pricing for civil works coordination which are binding for the DSB. Likewise, Traficom is currently in the process of preparing guidelines for Finland. OCECPR published a binding legal rule on sharing costs of civil works between ECN operators in the past.

In Belgium, network operators are required to notify their civil works so that other operators can opt to join and coordination takes place. Cost sharing principles were agreed on e.g. for the Brussels Capital Region by network operators and are publicly available. A disadvantage for ECN operators is that they cannot lead larger projects together with utilities providers as they do not have the proper certification.[68] Therefore this kind of coordination does not always lead to a significant cost reduction compared to the situation where they would deploy alone and are in full responsibility of the project and its timing (also signalled as a disadvantage of this kind of coordinated works by telecom operators).

Guidelines or cost sharing/pricing principles issued by DSBs based on the experiences of national authorities in charge would risk to be overruled if the Commission would consider to issue further guidance within the BCRD. The same is also true for individual decisions which have been publicized and from which principles agreeable for market parties maybe derived. Therefore, it could even be harmful to the market development, if principles already known to market parties would suddenly be invalid. In particular, known pricing principles will often

[68] Specific technical certification could be needed for coordinated civil works with non-ECN operators, e.g. for the installation of gas pipes or electricity cables. This kind of expertise is often not present with (sub)contractors that are responsible for the deployment of ECN.

already reflect in private, commercial agreements. Given this aspect and in addition the complexity of pricing aspects for the coordination of civil works and the requirement for a consistent application in relation to other regulatory measures, BEREC in conclusion is of the view that further guidance in the revised BCRD on pricing for the coordination of civil works is neither necessary nor advisable.

26) What would be the benefits and drawbacks of extending the obligation for meeting reasonable requests for coordination of civil works to all network operators, irrespective of whether they are financed by public means?

An extension of the obligation to all network operators, irrespective of whether they are financed by public means, would increase the possibilities to share costs of civil engineering and may therefore be seen to be beneficial. Furthermore, such an extension could potentially accelerate the dispute settlement proceedings as the – aside from state aid – rather complex question, if civil works are financed by public means, would be obsolete.

On the other hand, the extension could probably not remedy the main limitation for the impact of coordinated civil works – a lack of willingness to coordinate (see answers to questions 2 and 3). A possibility to raise willingness is to make sure the operator who is leading the project gets a remuneration for this. But, although this seems fair, this may sometimes be a disadvantage to telecom operators, as far as they cannot lead larger projects together with utilities providers (e.g. if the telecom operators do lack the proper certification for this). This may lead to a situation, where the coordinated civil works would not always lead to a significant cost reduction compared to the situation where the telecom operators would deploy alone and are in full responsibility of the project and its timing. Thus, the possibility of a remuneration would have to be profoundly assessed and considered very carefully.

Beyond this, such an extension may require the implementation of more precise criteria on a refusal of coordination. Maybe even an enhanced list with further criteria could be necessary to make sure the extended legal provision is proportionate.

Presumed, the obligation would not be extended, BEREC likes to remark that a clarification in the recitals which cases fulfil the requirement of publicly financed civil works and/or which constellations do not would be helpful to speed up proceedings.

27) The BCRD requires network operators to provide information (and make it available via the SIP) regarding their planned civil works, only following ad hoc requests. What would be the benefits and drawbacks of requiring all network operators to make available via the SIP the relevant information on planned civil works, irrespective of whether a request has been made?

Some NRAs reported, that the national legislation already requires that all network operators make the information on planned civil works available via the SIP. In some MS, there is no requirement of a prior request from ECN operator. Some SIPs have been developed so that interested investors also announce their interest of joint construction on the portal.

With such an obligation to all network operators, the opportunities to coordination of civil works increase. This can be expected to increase coordination in total and decrease investment costs.

It can also make it easier for investors in ECN to get information on planned civil works earlier or in time to make a successful agreement on civil works coordination. The successful joint construction project starts often already with coordinated planning, so information changing even from the future needs is important. Coordination and information exchange as early as possible and as widely as possible is beneficial.

On the other hand, the requirement would widen the scope of BCRD.

7 Questions on permit granting procedures

28) What are the main reasons for delays in the permit granting procedures for the deployment of ECN? Which measures would be most effective in speeding up the process and reaching timely decisions?

BEREC cannot contribute to the answer of this question since NRAs typically do not have the legal competence to grant permits.

However, one NRA (OCECPR) coordinates the whole procedure for permit granting for ECN (for fixed wired network infrastructures only) and considers the following measures as effective in speeding up the process and reaching timely decisions: (i) tacit approvals, (ii) streamlined and uniform procedures (timeframes, application forms) across the whole country and (iii) electronic applications.

29) Which types of ECN deployments could be subject to a lighter permit granting regime or be exempted from a prior permit request on the grounds that their impact on aspects of public interest can be presumed to be minimal? What could be other grounds for a lighter permit granting regime or for a permit exemption?

BEREC cannot contribute to the answer of this question since NRAs typically do not have the legal competence to grant permits.

30) Are permit fees a potential disincentive for the deployment of new ECN, notably taking into account the multiplicity of permits often required and their predominantly local character? What would be an appropriate principle for setting these permit fees (e.g. not higher than the level of administrative cost), which also takes account of the specific context mentioned before?

The Commission's Communication 'Shaping Europe's digital future' stressed that, for digital infrastructure and networks alone, the EU has an investment gap of EUR 65 billion per year. Adequate investments at EU, national and regional levels are necessary to achieve the EU 2025 connectivity objectives set in the Commission's Gigabit Society Communication. The EECC improves regulatory conditions which will contribute to the achievement of these connectivity objectives. Despite the mobilised national and EU funding resources, it is crucial to further reduce the cost of network deployment, including for fibre and 5G networks.[69]

For these reasons, BEREC is of the view that it is appropriate that the permit fees do not exceed the administrative costs.[70] It may even be considered to exempt ECN operators from

[69] See https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=PI_COM:Ares(2020)3207717&rid=1
[70] Only the costs of the administration of the permit granting (not of other requirements an ECN operator may have).

the obligation to pay permit fees, at least for a certain period, as the deployment of broadband infrastructure is in public interest.

However, from a legal perspective, BEREC is of the opinion that it is questionable whether the legislation of the electronic communications sector (e.g. the BCRD) is the right place for provisions which stipulate permit fees of other legislative matters as e.g. constructions sector, nature conservation.

Economically it might also be questionable, whether permit fees significantly drive the costs of broadband network deployment and can be considered as decisive factor for ECN operators when deciding on investments. Compared to the actual investment necessary in network elements and civil engineering works, permit fees might often only amount to a comparatively low amount of expenses. This also depends on the calculation of such fees across the different MSs.

Permit exemptions (see question 29) not only can contribute to speed up the deployment of new ECN but also fully eliminate the permit fees and the administrative burden associated with permits.

31) What would be the benefits and drawbacks of establishing the Single Information Point as a single point of entry ('one-stop-shop') for the application for all permits required for an ECN deployment project and as a point of coordination with all relevant authorities involved in the permit granting procedures and communication with the applicant via electronic means? What would be the main challenges for such implementation?

The proposed approach may make it easier for ECN operators to apply for a permit and to communicate with the relevant authorities. ECN operators would have the possibility to apply for permits at a single point, the SIP, and therefore, do not need to know the (local) authority for granting the permit. After the application for a permit, however, ECN operators may prefer to receive a confirmation of the application and all further communication directly from the competent granting authority and also to respond directly to this authority.

The deployment of ECN may require many different types of permits e.g. building permits, permits for civil works, specific permits in case of conservation areas. Typically not only ECN operators but also operators of other sectors and other organisations need such permits. In general, these permits are not granted by the SIP, at least in case the tasks of the SIP were assigned to the NRA, but instead by other authorities, often local authorities.

From the perspective of the permit granting authority, it may be considered not to be appropriate to foresee for one type of applicant, the ECN operator, specific and different means to apply and communicate with the granting authority and not also for the operators of other sectors and other organisations. However, to foresee that all operators of all sectors would have the possibility to apply for permits and to communicate with the granting authority via the SIP would not be appropriate since the SIP is an entity specific for the electronic communications sector but not for other sectors.

The SIP could only be established as single point of entry ('one-stop-shop') for the application for permits if legislation foresees this (either optional or mandatory). BEREC is of the opinion that it is questionable whether the legislation of the electronic communications sector (e.g. the

BCRD) is the right place for provisions on application and related communication for permits of other legislative matters (e.g. constructions sector, nature conservation).

The SIP could only forward the information from the applicant to the granting authority or information between authorities or information from an authority to the applicant, however, it cannot process this information since then it would be part of the permit granting process and, therefore, would act as (part of a) permit granting authority.[71]

Therefore, the main issues would be (i) the IT implementation, (ii) the logic of the information flow between applicants and the relevant authorities (the complexity is expected to be high), (iii) how to ensure that this logic is always up-to-date, (iv) liability issues in case the SIP does not forward the information correctly and without delay and (v) that the MS assigns sufficient resources to the SIP. It would also be necessary to clarify with all relevant authorities whether it would be even possible to establish the logic of the information transfer, their willingness to cooperate and how they best could be involved in the process to update the logic of the information transfer.[72]

BEREC is of the view that it would not be appropriate to establish the SIP as a centralised permit granting authority for several reasons. Shifting the functions of permit granting from local authorities to (centralised) SIP would have the consequence that knowledge of local facts get lost and in many MSs (e.g. federal states) it may even legally not be possible to foresee this. The establishment of a centralised permit granting authority (for operators of all sectors and all other organisations) is clearly subject of other legislative matters and not of the electronic communications sector. A centralised permit granting authority would need a very large amount of resources (the resources of the current permit granting authorities which are often many local authorities). NRAs are (typically) not permit granting authorities and, in case the tasks of the SIP were assigned to the NRA, this would change the tasks of NRAs completely.

8 Questions on availability and access to in-building physical infrastructure

32) To what extent have the current provisions on availability and access to in-building physical infrastructure facilitated the deployment of ECN?

The BEREC report on the implementation of the BCRD (BoR (17) 245, p. 14) shows that in one MS (Poland) the number of disputes with regard to access to in-building physical infrastructure according Art. 9 BCRD is particularly high.

Since 2012 in Poland the mandatory installation of high speed ready in-building physical infrastructures for new and major renovated buildings is stipulated in law – ordinance regards technical conditions of the building. According to this act, every apartment must be equipped

[71] One NRA (OCECPR) reported that it coordinates the whole procedure for permit granting for ECN operator (for fixed wired network infrastructures only) but does not grant permits. ECN operators apply for permits provided by public authorities or other competent organisations through OCECPR. To facilitate this procedure an electronic system was recently developed and it is gradually extended to cover all municipalities/districts. When feasible and according to the location of the ECN project, the existing procedures and systems propose all the authorities where permits are required from and generate the final confirmation when all permits are obtained.
[72] In addition, it is also necessary to keep an updated registry of relevant authorities and users of the system.

with telecommunication box connected with fibre, coax and cooper cable to point of distribution usually located in the basement. As this act typically affects the telecom industry but not the building and construction sector, these provisions are not well known by the obligated owners and planners of such buildings.

In case of older buildings and those new ones which were not equipped with the proper telecommunication network, ECN operators have the legal right for access to the building to deploy high speed network. That cause a lot of disputes between ECN operator and building owner (not ECN operator). In 2019 and 2020 (till end of November), the NRA (UKE) issued 282 decisions which grant access to the buildings. Since 2010 UKE grant access to over 3,500 buildings in Poland. To limit those disputes UKE issued non-binding guidelines regarding access to building.

Access to in-house infrastructure is free of charge if the owner is not ECN operator. For the infrastructures owned by ECN operators, fees covers the costs of the infrastructure (including the risk of investments). UKE issued seven decisions for the seven largest ECN operators which set framework conditions for access to the in-house telecommunication infrastructure.

Similarly, in Austria the provisions of the BCRD are also not well known to the building and construction sector. The mandatory installation of high speed ready in-building physical infrastructures for new and major renovated buildings is stipulated in Art. 13c of the Telecommunications Act. As this act typically affects the telecom industry but not the building and construction sector, these provisions are not well known by the obligated owners and planners of such buildings. Additionally, laws for the building and construction sector fall within the competence of the federal provinces (regional level) and not of the federal government (national level), as e.g. the Telecommunications Act.

One NRA (AKOS) considers that one of the main shortcomings is that an ECN has the right to access the physical infrastructure of another ECN/non-ECN, but this infrastructure is usually built in such a way that it does not technically allow access. The question is whether the owner can be forced into such construction, which will allow access to others. However, it would be worth trying this at least for in-building physical infrastructure. The NRA suggests that the in-building physical infrastructure must not only be accessible but also has to be built so that access is possible for at least two additional operators. The NRA believes such a measure is justified by the fact that it is very difficult to obtain consents in buildings and that this is for the benefit of end users (these rules would apply to larger buildings only, say with 10+ apartments or business premises).

One NRA (AGCOM) judges the provisions on availability and access to in-building physical infrastructure of the current BCRD positively, although no dispute arose so far, for the following reasons. AGCOM received requests of clarifications regarding the access to in-building physical infrastructure and, since no dispute arose so far, the involved parties could find a solution themselves. This may be the consequence of the fact that ‘mediation rule’ – providing clarifications on the application of the BCRD – has been effective in solving the litigation between the parties, which reached voluntary agreements. In such sense, BCRD provision on this topic is sufficiently clear. However, in order to improve transparency, AGCOM is drafting some guidelines on access to in-building infrastructures.

Another NRA (ANACOM) also made positive experiences with the current provisions on availability and access to in-building physical infrastructure. They allow that operators provide their services in adequate time, with less obstacles and therefore contributing for greater deployment of ECN.

33) Does BEREC see any potential overlaps between Art. 9 BCRD and Art. 61(3) EECC? If yes, how can the consistent application of these provisions be ensured? Is there a need to adjust the provisions in the Directive to avoid such overlap and if so, how?

Article 9 paragraph 2 BCRD foresees that MSs shall ensure that, subject to the first subparagraph of paragraph 3, every public communications network provider has the right to access any existing in-building physical infrastructure with a view to deploying a high-speed electronic communications network if duplication is technically impossible or economically inefficient. Further, pursuant to Article 9 paragraph 3 BCRD MSs shall ensure that any holder of a right to use the access point and the in-building physical infrastructure meets all reasonable requests for access from public communications network providers under fair and non-discriminatory terms and conditions, including price, where appropriate.

Article 61(3) subparagraph 1 EECC sets out that NRAs may impose obligations, upon reasonable request, to grant access to wiring and cables and associated facilities inside buildings or up to the first concentration or distribution point as determined by the NRA, where that point is located outside the building. Where it is justified on the grounds that replication of such network elements would be economically inefficient or physically impracticable, such obligations may be imposed on providers of electronic communications networks or on the owners of such wiring and cables and associated facilities, where those owners are not providers of electronic communications networks. Not dissimilar, according to Article 12(3) of the Framework Directive[73] MSs shall ensure that national authorities have the power to impose obligations in relation to the sharing of wiring inside buildings or up to the first concentration or distribution point where this is located outside the building where this is justified on the grounds that duplication of such infrastructure would be economically inefficient or physically impracticable.

In consequence, a certain overlap between Article 9 BCRD and Article 61(3) EECC and its predecessor Article 12(3) Framework Directive is evident with respect to access to in-building physical infrastructure. The transposition of the EECC into national law is foreseen by 21 December 2020. In consequence, actual experiences in its application are not present. Nonetheless, NRAs have experiences with the regulation of Article 12(3) Framework Directive. No issues related to this overlap are known to BEREC based on experiences in the application of Article 12(3) Framework Directive. BEREC currently also does not see any emerging issue in the application of Article 61(3) EECC in the future.

It has to be noted, however, that according to Article 1 paragraph 4 BCRD in case of conflicts provisions of the Framework Directive (inter alia) shall prevail over the relevant provision of the BCRD. This principle should be kept and updated with a reference to the EECC. This is of particular importance as well, as the overlap between both provisions might further increase, as access to existing physical infrastructure is not excluded from Article 61 (3) EECC for both,

[73] Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002, amended with Directive 2009/140/EC of the European Parliament and of the Council of 25 November 2009.

access up to the first concentration or distribution point and access to the point beyond the first concentration or distribution point. In particular, where a problem of network replication and underlying competition problem needs to be addressed market parties and NRAs will need to rely on Article 61(3) subparagraph 2 EECC. On the other hand, access based on the BCRD is possible also in cases where the NRA decided access to existing physical infrastructure based on Art. 61(3) is not justified given the different requirements. This should be clarified in the revised BCRD. The current definition of 'access point' in the BCRD only refers to access to physical infrastructure, whereas the guidance provided on the determination of the first concentration or distribution point in the BEREC Guidelines on a consistent application of Article 61(3) EECC (BoR (20) 225) takes into account that access based on Art. 61(3) EECC maybe (and often will be) granted to cables and wiring (see answer to question 5). An access point to physical infrastructure may or may not coincide with an access point determined to be the first concentration or distribution point under Art. 61(3). In BEREC's view this reflects the different scope of both regulations and does not lead to the requirement to adjust the definition of 'access point' in the BCRD if its scope were to remain unchanged.

9 Questions on expanding the physical infrastructure that can be used for hosting very high capacity networks

34) What would be the benefits and challenges in deploying physical infrastructure suitable for hosting very high capacity network elements (e.g. fibre or mobile base stations) along new or majorly renovated communication routes (e.g. roads, railways), transport hubs and public supply networks? Would it be appropriate or necessary to mandate the deployment of such physical infrastructure in general or in specific cases?

BEREC understands that the question is directed at situations, where communication routes, transport hubs and public supply networks either are deployed/constructed entirely new or see a significant renovation.

Under such circumstances, the requirement to deploy physical infrastructure suitable to host VHCN elements could contribute to achieving the Gigabit Society Communication targets.[74]

In the case of fixed VHCN, fibre deployment is either required to reach at least to the multi-dwelling building in order to fulfil criterion 1 of paragraph 18 of the BEREC Guidelines on VHCNs (BoR (20) 165) (VHCN Guidelines) or to fulfil the performance thresholds defined for criterion 3 of paragraph 18 of the VHCN Guidelines. The latter will typically require a fibre deployment rather close to the end user's location as well. Backhaul capacities would in the latter case also require upgrades in order to avoid the backhaul network becoming the bottleneck and preventing the fulfilment of the performance thresholds. Likewise, to enable VHCN networks according to criterion 1 to offer end-user services of a high quality (e.g. Gigabit download speeds), the backhaul capacities normally need to be enhanced to keep pace with the fibre deployment in the access segment. Therefore, the deployment of fixed

[74] BEREC would like to raise awareness, that neither the type of speed to be considered nor the interpretation of the term 'upgradable' are well defined with respect to the Gigabit Society Communication's objectives, see also BoR (20) 226 (response on the targeted public consultation on the revision of the state aid rules for the deployment of broadband networks, answers to questions 14, 17 and 27).

VHCN could generally benefit from an increased availability of physical infrastructure suitable for fibre deployment.

Similarly, a wireless VHCN is according to criterion 2 of paragraph 18 VHCN Guidelines a wireless network with fibre rollout up to the base station or a wireless network that fulfils the performance thresholds defined in paragraph 18 for criterion 4 of the VHCN Guidelines. Again, for the fulfilment of these performance thresholds the backhaul (and core) networks should be designed in conditions compatible with the access network QoS. With the rollout of 5G, the capacity requirements for backhaul networks connecting a wireless access networks, will further increase.

In consequence, the deployment of fibre for backhaul and access networks, both fixed and mobile, can benefit if suitable facilities for fibre deployment, in particular ducts and manholes are available, as additional civil engineering works might be significantly reduced. In addition, the deployment of wireless networks can benefit from facilities suitable to host mobile base stations or access nodes.

On the other hand, it has to be recognised that the requirement to deploy suitable, physical infrastructure could be regarded as intrusive if imposed as an obligation in general. Depending on which type of physical infrastructure is deployed and which type of construction or renovation works fall under such an obligation, the additional costs might not always justify the benefits.

It has to be considered, that in principle demand will often be uncertain and will sometimes not develop at all. Reasons for this might be the lack of willingness of ECN-operators to depend as an access seeker on infrastructure of third parties (see answers to questions 2 and 3). Even where this is not the case, different means to deploy VHCNs might sometimes be more attractive, in particular, where viable alternatives are present. There is no obligation for ECN operators to make use of such physical infrastructure and sometimes it might not be necessary at all. Additionally, the area or transport path concerned might in some cases be already covered with VHCN. Conversely, the concerned area might sometimes not really have any customers to supply at all (e.g. transport ways covering distance through remote areas, like e.g. forest roads). In these cases, the additional costs for the infrastructure deployment might never be covered. Even if demand turns up, this might sometimes only happen with time delay. In addition it has to be borne in mind that stakeholders that have no previous experience with planning and deploying ECN infrastructure might not build passive infrastructure efficiently or according to the potential demand at hand. This might especially be relevant, if access parts of a network would be deployed in such an infrastructure. In consequence, such requirements will more likely be justified, where the additional costs of the physical infrastructure are minor compared to the investment carried out or where the use of the infrastructure is likely or even ensured.

In Slovenia for instance the electronic communications act foresees the obligation that investors in public infrastructure, where theses receive public funding, have to build appropriate physical infrastructure suitable for hosting ECN elements where such an infrastructure is not yet available and where the investor does not find any complementing investor in ECN to coordinate the civil works for ECN with. Certain problems still arise where new infrastructure is being built in areas where there is no need for ECN (e.g. construction of

a new forest road). In addition, it also has to be considered that road safety requirements may limit the use of physical infrastructure in road areas to a degree.[75]

For masts and poles, a construction 'for stock' without any degree of coordination with future customers, might not be advisable at all. Mobile network operators need to place base stations and antennas at locations suitable for their mobile networks, taking into account the configuration of the network (e.g. cell size) and pre-existing infrastructure. Instead, offering a certain base structure (i.e. ducts as well as connections to the power lines), which MNOs can use later to improve their network, might be more useful. This might prove difficult if it is not clear who is responsible for this. Poles for aerial cable deployment will also only be acceptable for e.g. residents, if they will see any use.

It has to be considered that MNOs often have to commit to the fulfilment of certain coverage requirements as part of the coverage obligations linked to frequency spectrum licenses. Such coverage requirements often include the coverage of e.g. main roads and railways. Likewise, the Gigabit Society Communication's strategic objective foresees uninterrupted 5G coverage for all major terrestrial transport paths (alongside all urban areas). Requiring entities constructing such major transport paths might greatly contribute to the timely and cost efficient deployment of mobile networks, including 5G. However, as mentioned above, coordination with the MNOs might be necessary to enable such investments to come into fruition.

In conclusion, BEREC is of the view that such a requirement might be very helpful to facilitate VHCN deployment, but should be confined to specific cases. In particular, major transport paths, for instance such falling under the TEN-T regulation (Trans-European transport Network), could enhance the deployment of backhaul for fixed VHCN, but even more importantly for wireless VHCN. Similarly, availability of physical infrastructure in urban areas might significantly reduce the costs of deployment and might help e.g. city carriers to upgrade backhaul capacities and bring fibre closer to end-user as well as contributing to the backhaul capacities required for Wi-Fi and for mobile networks.

35) In cases of new deployments of fixed and/or wireless/mobile networks, what would be the benefits and challenges in deploying (where technically possible) physical infrastructure (e.g. ducts, poles, towers, etc.) sufficiently dimensioned to host also network elements of other operators? Would it be appropriate or necessary to mandate the deployment of such physical infrastructure in general or in specific cases?

It has to be considered that State aid regulations foresee already the deployment of sufficiently dimensioned capacities for civil engineering infrastructure (Article 52 (5) General Block Exemption Regulation[76] (GBER) and paragraph 78(g) (footnote 107) Broadband State Aid Guidelines[77] (BBSA GL)). As the situation differs considerably where the gap for private investment is not filled with public money, BEREC focusses on the latter situation for the response to the answer.

[75] Similarly, in Romania infrastructure law foresees in case of road construction, repair, modernization, renovation, or extension works that the coordinating authority shall take into account the need to install ECN.
[76] Commission Regulation (EU) No 651/2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty, 17 June 2014.
[77] EU Guidelines for the application of State Aid rules in relation to the rapid deployment of broadband networks, 2013/C 25/01, 26.01.2013.

In principle, the obligation to deploy excess capacities has certain advantages and disadvantages, which differ to a degree depending on which type of infrastructure (ducts and poles for fibre deployment or masts for mobile network equipment) and what part of the network (backhaul or access segment) is concerned. The following aspects should be considered.

First, the average costs for providing retail services to end-users may largely be decreased, where several network operators share the same physical infrastructure. Thus, an optimal capacity utilisation might be achieved only where physical infrastructure can be used jointly.

The presence of multiple network operators is in principle beneficial as more infrastructure based competition (e.g. competing fibre networks) will likely lead to more innovation for end-user services, a higher quality of products and lower prices for end-users.

Second, the investment for subsequent market entries can be decreased substantially. Where suitable physical infrastructure in particular for fibre deployment is available, entry barriers might be reduced significantly. A second ECN provider deploying a fibre network might have an even more difficult business case as the first mover and the present legacy infrastructure might make it difficult to achieve the end-user customer base required for a profitable business case.

Third, also positive effect on administrative aspects of network deployment can be expected, as permit granting for construction might be necessary only once for the bulk of physical infrastructure.

Fourth, the environmental impact might in general be lesser, as digging and building can be reduced significantly. This aspect also has an effect on the costs of mobile network deployment as mobile base stations have to be connected to both fibre and power.

On the other hands, such a requirement also has significant drawbacks. Similar to the situation described in questions 34, the actual demand (with regard to locations as well as the amount of masts required for mobile networks and the capacity and local availability of ducts) will be unknown beforehand. Where the costs for deploying excess capacities are significant, the questions arises how these costs can be covered and by whom.

In the worst case, this requirement may prevent fibre deployment, in particular in the access segment in economically less favourable areas. In less densely populated areas, a positive business case for the deployment of only one network might already be difficult to obtain. The investment in excess capacities might put such business cases already at stake only looking on the supply side conditions. This factor however might only be very significant, where excess capacities provide to be a cost driver.

In addition, the expectation of market entry for competitors may in itself further challenge the expectations of the first mover in affecting the demand side. Where positive business cases are already difficult to obtain without a competitor entering the market, they will likely turn negative. This factor in itself should however not be seen as decisive. Where market conditions are in principle unfavourable to support competition, the question might rather arise, whether such areas could be subject to state aid.

The reasoning applies in principle also where the construction of masts for mobile networks is concerned, even though some differences need to be considered.

The challenge with regard to mobile networks is that not every location (i.e. for a mast) is suitable for every MNO as their networks are planned individually. MNOs often have to comply with coverage criteria when being licensed with new spectrum. Additionally, new spots have to fit into the already existing networks. This also has an effect on the possibility for infrastructure sharing. While ideally one spot could be used by all MNOs, this is in reality often not possible due to the network restrictions. Also, cooperation between MNOs (i.e. active or passive sharing) may be subject to ruling of the respective NRA, and/or the relevant competition authority.[78]

Furthermore, MNOs often face opposition from concerned citizens about radiation when they plan to build new masts. While a joint use of masts might reduce the negative perception, building a mast preemptive might meet with even harsher emotions and opposition from concerned citizens. The environmental impact might also be important to consider, as lesser number of masts might be required to achieve the same coverage by competing MNOs. This could also enhance the acceptance of mobile network deployments with residents.

In Denmark for instance, municipalities may, in connection with an application for a permit for the construction of new masts or for the extension or conversion of existing masts, lay down conditions regarding the overall dimensioning of the mast in order to make subsequent joint use possible.

10 Questions on measures to reduce the environmental impact of electronic communications networks

*36) In which environmental impact categories (e.g. climate change, depletion of materials or other resources, pollution, waste) might **the deployment** of ECN have a significant impact? What are the factors which determine such impact (deployment techniques, equipment manufacturing techniques and materials, etc.)? Please distinguish between fixed and wireless/mobile networks, if appropriate.*

The environmental impact of ECN deployment itself (as separate from operation phase) is difficult to measure, assess and categorize as there is no common methodology and data collection standards to do so. For the time being, BEREC does not have sufficient insight and expertise to give an unequivocal answer to this question. However, some initial elements can be put forward**.**

From what BEREC knows, CO2 emission is a significant factor of the lifecycle of network equipment. Different reports give different estimates for these emissions. This might be due to the fact that carbon intensity of a kilowatt-hour differs in each country, which in turn affects the carbon distribution between deployment and usage. Estimates also differ due to differences in calculation models that have been used, i.e. what is included in them.

It is also likely that deployment of networks has environmental impacts other than energy consumption and CO2 emissions e.g.: material consumption, soil artificialization, etc. Therefore, the whole product lifecycle of network equipment should be assessed, as a significant impact of the deployment of ECN might derive from the materials which are used

[78] See also BEREC Document BoR (19) 110, Common Position on mobile infrastructure sharing and BoR (20) 240, Summary report on workshop on mobile infrastructure sharing.

in the construction of infrastructure and the waste associated with replacement and upgrade of equipment. These impacts can be reduced with eco-construction, repair policies, recycling, reuse, etc.

As far as BEREC understands, there has not been specific research on the environmental impacts of deployment of ECN. It would be advisable to measure impacts of deployment of ECN in a coordinated manner. Several initiatives from different MSs can be pointed out. For instance, Traficom has discussed measuring environmental impacts of ECNs with operators and performed a preliminary data collection. ARCEP, in its last report[79] calls for coordinated work on measurement methodologies.

BEREC recalls that the fast and smooth deployment of the infrastructure is of utmost importance, while keeping the own environmental impact of the deployment as low as possible. The consequent application of the coordination of civil works according to the BCRD may in itself contribute to the objective to reduce the environmental impact of ECN deployment. The coordination of civil works, the use of synergies between different network operators and the joint use of existing physical infrastructure[80] might not only help to save investments, but might also reduce the environmental load by reducing the need for additional civil engineering works.[81]

Further measures could be considered in this regard. For instance in Germany it is considered that in the future, ECN-operators have to take into account environmental aspects when exercising the way of rights.[82] It is considered that the NRA can obligate the joint deployment or use of network elements and the joint use of land when disputes arise. BEREC notes, however, that the requirement of full environmental impact assessment – if taken too far - may be contrary to the objective of deployment of broadband infrastructure with a view to providing access to quality connectivity for all.

It also has to be noted that national authorities responsible for awarding spectrum usage rights to mobile operators for the deployment of mobile electronic communications networks currently do not carry out an environmental assessment under Directive 2001/42/EC (Strategic Environmental Assessment – SEA), Directive 2011/92/EU (Environmental Impact Assessment – EIA) and/or Directive 92/43/EEC (Habitats Directive). BEREC kindly invites the European Commission to take into account the responses of NRAs responsible for the management of the radio spectrum represented in the Radio Spectrum Policy Group to a questionnaire circulated by the European Commission.

Lastly, the deployment of wireless ECNs might raise concerns about visual impact. The deployment of masts, antennas, small cell base stations and street cabinets as well as the façade cabling should be compatible with the surrounding environment in order to preserve

[79] https://www.arcep.fr/uploads/tx_gspublication/rapport-pour-un-numerique-soutenable_dec2020.pdf
[80] By physical infrastructure we do not mean network infrastructure for which mutualization and joint use are based on different logic and issues.
[81] The joint use of existing physical infrastructure is of particular relevance in areas where investments in ducts in an economically efficient manner is difficult because the underground is already completely filled with infrastructure or restrictions of municipalities. The coordination of civil works might not only reduce environmental load but also inconveniences for citizens and economic activities due to the frequent and extensive realization of soil and subsoil works, with consequent disturbances at traffic and territory planning level.
[82] In Portugal due to heavily wood fires, measures were adapted in order to foster the migration of aerial cables from the wooden poles (which are fuels for the fire) to the technical road channels which also contributes to the reduction of the environmental impact of ECNs.

nature, historical sites and buildings in cities. This requires, coordination with other competent authorities and conversations with the public.

*37) In which environmental impact categories (e.g. climate change, materials use) might **the operation** of ECN have a significant impact? What are the factors that determine such impact (energy sources used for the generation of supplied electricity, energy efficiency of the equipment, medium or technology of the network, etc.)? Please distinguish between fixed and wireless/mobile networks, if appropriate.*

As indicated above, there is no common method for measuring, assessing and categorizing ECNs environmental impact. A number of reports conducted by private actors and non-governmental organizations (NGOs) have contributed to raise awareness on the subject.[83] Nevertheless, those documents tend to present different results depending on the hypotheses chosen highlighting the need to build common standards and methodologies. These studies remain useful for understanding trends and magnitude orders, although a particular lack seems to emerge in the analysis of environmental impact categories outside GHG emissions.

Therefore, BEREC strongly welcomes the Commission and European Parliament's[84] ongoing initiatives on this issue. Additionally, several NRAs and governments are currently working to build common methodologies and indicators to assess the sector environmental impact and to collect robust and relevant set of data. Traficom was involved in the preparation of an environmental strategy for ICTs lead by the Finnish Ministry of Transport and Communications. This work resulted in a final report published in November 2020 which included multiple measures to be taken by a wide variety of actors, including Traficom itself. It includes also measures to be taken in connection to ECNs and their environmental footprint.[85] As stated above, in France, ARCEP published a report on digital technology's environmental impact in December 2020.[86] Besides this, the French authority is working with the Agency for Ecological Transition (ADEME) to produce methodologies and indicators in order to measure ICTs environmental footprint as part of a governmental mission. Both ARCEP and Traficom launched data collection procedures to operators with an environmental section. In Germany, the Federal Environment Agency has commissioned a report on green cloud technologies from the Fraunhofer IZM research institute. Preliminary results of this report have been published in September 2020.[87]

In the light of these current works and discussions carried out within BEREC, several preliminary conclusions can be formulated.

BEREC considers that ECN can and must be part of the European ecological transition. BEREC purpose is not to deliver a blanket condemnation of technology, nor to rein in or restrict

[83] Notably '*For a digital sobriety*',The Shift Project, Lean ICT, October 2018; '*Digital global environmental footprint*', GreenIT, September 2019 ; '*Reducing our digital environmental foortprint*' French General Council for Economy, December 2019

[84] See European Parliament resolution of 25 November 2020 Towards a more sustainable single market for business and consumers (2020/2021(INI)) https://www.europarl.europa.eu/doceo/document/TA-9-2020-0318_EN.html

[85] Interim report '*The ICT sector, climate and the environment*' Finnish Ministry of Transport and Communications, 2020 http://urn.fi/URN:ISBN:978-952-243-586-6

[86] https://www.arcep.fr/uploads/tx_gspublication/rapport-pour-un-numerique-soutenable_dec2020.pdf

[87] Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Press release No. 144/20 | Digitalisation (Joint release by the German Federal Environment Ministry BMU and the German Environment Agency UBA), 10.09.2020, website: https://www.bmu.de/en/pressrelease/video-streaming-data-transmission-technology-crucial-for-climate-footprint/.

its use out of hand: certain applications in fact contribute directly to reducing greenhouse gas emissions. But nor should ECN be seen as a sector exempt from doing its part to comply with the Green Deal and with the Paris Climate Agreement.

Regarding the category of ECN environmental impacts, different reports indicate that carbon emissions are a significant analytical framework, but this type of impact deserve to be completed with other indicators. The direct GHG emissions of telecom operators are mainly due to the electricity consumption of their networks alone, which can be broken down differently depending on the segments considered: access networks, aggregation networks and core networks. As mentioned, networks lead to other environmental impacts, such as water consumption linked to electricity consumption and cooling circuits, the artificialization of soils through the mining of rare earths including fossil fuels and the consumption of abiotic resources to build network components and devices that use networks.

The access segment consumes between 70 and 80 % of the total energy consumption of a network. The rest is shared between the aggregation segment and the operators' core network for 20 % and their data centers for 10 % approximately.[88] Regarding aggregation networks and core networks, a study[89] indicates much lower average consumption than for the access network. Nevertheless, the increase in traffic (greater bandwidth) could lead to an increase in consumption on the core networks, proportional to the volume of data to be processed (although it is also dependent on the energy efficiency progress of the latter).

Finally, fixed networks seem to consume less energy overall than mobile networks. For example, the initial findings of the German Federal Environment Agency study indicate that the lowest HD-quality of video streaming produces different levels of GHG emissions depending on the transmission technology. CO2 emissions are produced when HD video is streamed at home over a fiber optic connection, with only 2 grams of CO2 per hour of video streaming coming from the data center and data transmission. A copper cable (VDSL) generates 4 grams per hour. UMTS data transmission (3G), however, produces 90 grams of CO2 per hour. If the transmission technology used to transmit data is 5G instead, only about 5 grams of CO2 are emitted per hour. The electricity used by the end device is not factored into this calculation.[90] These results are probably partly linked to the fact that the energy consumption of UMTS depends very little on the amount of traffic which circulates, unlike 5G.[91] However, these evaluations of energy performance by technology present limits. They do not take into account the history of the deployment, specific cases of use associated and rebound effect, degrees of substitutability between technologies etc. Conclusions should not be drawn hastily and more in-depth studies are needed.

The factors to be considered in determining the environmental impact of the operation of ECN could be:

- The design of the ECN equipment, including base stations and gateways. This induces criteria of energy efficiency, the quantity of recycled and recyclable materials, the presence or absence of toxic substances for the environment.

[88] ARCEP, *ICT environmental footprint*, October 2019.
[89] IEEE, « *Power Consumption in Telecommunication Networks: Overview and Reduction Strategies* », Communications Magazine, July 2011.
[90] See footnote 83.
[91] See footnote 84.

- Energy consumption associated with the operation of networks. (For example, the possibility of putting equipment that is not in use on standby mode can have significant impact.)
- Indirect consequences of operation of ECN: consumption of ICTs devices and variations of digital services usage.
- Management of network's lifecycle (including devices).
- Waste collection and treatment.

BEREC would like to outline the need to complete reflections on ECN environmental impact with data collection, measurement methodologies and by a larger approach tackling all the links composing EC value chain. The impact of the operation of telecommunications networks is closely related to the efficiency of data centers as well as devices' uses and lifecycle. It should also be noted that the telecommunications sector delivers the digitalization that enables other sectors to be more energy efficient as well as more sustainable.

38) What could be appropriate criteria to qualify electronic communications networks as environmentally sustainable (e.g. techniques used in deployment, materials and energy efficiency of the equipment, transmission medium, degree and type of sharing, etc.)?

Defining an ECN as environmentally sustainable is probably very challenging. Work could be done on the matter but should involve all stakeholders and particularly ECN operators.

Meanwhile, several initiatives to monitor the environmental footprint of ECN are needed to

i) identify the big sources of footprint of ECN (and therefore identify where stakeholders should focus)
ii) assess the effectiveness of initiatives and efforts made by stakeholders to decrease their environmental footprint.

For the moment BEREC acknowledges that the impact of ECN on the environment could be reduced, for example, by using more energy efficient equipment and renewable energy sources, using sleep mode when equipment is not (or not fully) used, repair, re-use and recycling of material, avoid toxic components and materials with particularly negative environmental impact as much as possible.

The impact of networks should be assessed in two dimensions with different set of indicators and criteria for each. Firstly, the carbon footprint should be estimated and secondly, the environmental impact as a whole, including life cycle issues, should be assessed. For instance, in France, ARCEP[92] proposes a first list of indicators that could be used but need to be discussed with the stakeholders. Indicators which focus on CO2 emissions can divide them to emissions by operator, emissions by network equipment, and average CO2 emission per subscriber.

When it comes to the CO2 emission of an operator it could be useful to look at the breakdown of emissions according to the 3 scopes defined in the ISO 14064-1.[93] This would allow a precise approach according to a common reference system.

[92] See footnote 54
[93] ISO 14064-1:2006 Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals, https://www.iso.org/standard/38381.html

Other indicators could point out the use of renewable energy, energy efficiency of the equipment, and the equipment's possibility to use 'sleep mode' or to adapt its energy consumption depending on the traffic. Criteria for environmentally sustainable ECN could then be determined based on these indicators.

Second, circular economy approach should be in focus for ECN to be environmentally sustainable. The entire lifecycle of the ECN should be taken into account starting from the design phase of networks, throughout its deployment and operation until the re-use and re-cycling of the network components. Eco-design principle should be applied for ECN, so that the equipment and devices should be designed to be energy efficient, recyclable and repairable, with a view to deploy only the necessary quantity of network elements and equipment.

With this approach, both raw material and power consumption can be reduced. Energy consumption has been a major concern for many operators, as energy related costs make up a 20-40 % share of their operational expenditures.[94] Using renewable energy sources can both reduce the environmental footprint and the operational costs.[95]

It is also important to point out that networks should be designed to be more resilient and to be able to adapt to climate and environmental change.

Network load optimization can contribute to reducing the environmental footprint by reducing the energy consumption in the network.

BEREC notes that improving data collection and common EU data standards on ECN's and the whole sector's environmental footprint is key for the sector to achieve climate neutrality by 2030, as set in the 'Shaping Europe's digital future' strategy.[96]

Moreover, it should be noted that networks are not the only ones responsible for the environmental footprint of the digital sector. In fact, devices and data centers are the main sources of environmental impact. Therefore, other players in the digital value chain must be involved in the process.

BEREC recalls that measurement tools and methodologies should be coordinated at the European or international level to ensure a coherent approach and avoid duplicating works on this issue.

39) What could be appropriate administrative/regulatory incentives for encouraging the deployment of environmentally sustainable networks (e.g. prioritized permit processing, reduction or abolishment of permit fees, reduction of abolishment of fees for access to publicly controlled physical infrastructure, etc.)?

First of all, BEREC is ready to share its expertise in electronic communications matters to build relevant and efficient policies to tackle the environmental impact of the sector.

BEREC is actively addressing these problematics as part of the work to be carried out by the 'Sustainability' ad-hoc working group. An internal workshop gathered NRAs heads in

[94] https://www.gsma.com/wp-content/uploads/2019/04/The-5G-Guide_GSMA_2019_04_29_compressed.pdf
[95] https://www.gsma.com/wp-content/uploads/2019/04/The-5G-Guide_GSMA_2019_04_29_compressed.pdf
[96] https://ec.europa.eu/info/sites/info/files/communication-shaping-europes-digital-future-feb2020_en_4.pdf

December 2020 so as to draw the first tracks necessary for the development of a BEREC's strategy regarding environmental matters. A few NRAs[97] have already started working on this subject and in general the participants of the workshop agreed on the fact that environmental aspects should be taken into account by regulators with the objective to gain greater understanding of ECNs' environmental footprint and enable the sector to support EU's climate agenda. Evaluation for next-steps in this issue, including potential administrative or regulatory incentives for sustainable networks deployment, cannot be done without common indicators and methodologies to assess the environmental impact of digital technologies. At the workshop, data collection and information gathering was identified as critical instruments for NRAs to gain a greater understanding of ICTs environmental footprint. It should also be noted, that data-driven regulation could be an effective way to create positive incentives for operators so as to reconcile sustainability and connectivity. Common and comparable indicators through data-driven regulation could also provide precious and reliable information for end-users allowing enlightened choices so as to steer the market in the right direction. Furthermore, end-users should be empowered to be able to take environmental aspects into account when making ICT related decisions. However, given the complexity of this topic, telecom regulators should cooperate with relevant stakeholders, while a coordination on EU and international level is of utmost importance.

To create regulatory and administrative incentives, it will be essential to set clear and common targets. This means developing consensual metrics and having reliable environmental data. For that purpose, BEREC follows the standardization efforts initiated by the Commission and other organizations, such as ITU[98], ETSI[99] and CENELEC [100].

Sharing best practices already deployed by national authorities or operators is fundamental and represents one of the tools mobilized by BEREC. This practice is a mean of strengthening regulators' actions coordination and capitalizing on each others' experiences. This can also be a window to promote and value operators' voluntary initiatives aiming to reduce their environmental impact.

Regarding the modulation of permits' fees and attribution depending on environmental criteria, this policy tool might have to be investigated further. The implementation of prioritized permits only for ECNs could create a distortion against networks of other sectors (e.g. gas, electricity, water). Regarding the reduction of permit fees, the following needs to be considered. Permits for the deployment of physical infrastructure (e.g. ducts, towers) may only consider the physical infrastructure and not how it will be used (e.g. which wireless technology is deployed on the tower, which routers/switches are connected with the fibre deployed in the ducts). Similarly, permits for civil works may only consider the civil works not the network nodes the fibre laid in the earth connects. Therefore, permits might only be able to consider the environmental impact and the sustainability of the deployment of physical infrastructure or of the civil works and not of the other elements of the new-build ECN which may be much more relevant with regard to the environmental impact and sustainability of the ECN. For these reasons, the reduction of permit fees may not be very relevant. Alternatively, the permit

[97] Traficom, ARCEP, ComReg
[98] https://www.itu.int/en/ITU-T/about/groups/Pages/sg05.aspx
[99] https://www.etsi.org/technologies/environmental-aspects
[100]https://www.cenelec.eu/dyn/www/f?p=104:110:285155798497401::::FSP_ORG_ID,FSP_LANG_ID,FSP_PROJECT:1258637,25,63870

granting authority could ask for information on the other parts of the new-build ECN in order to assess the environmental impact and sustainability of the new-build ECN. However, from a legal perspective, it is questionable whether it would have the right to ask for data not directly linked with the subject of the permit, the deployment of physical infrastructure or civil works, and whether this would be proportionate. In addition, collecting additional comprehensive data would delay the permit granting process and, therefore, might be a significant barrier to speed up the deployment of ECN. Furthermore, the permits fees reduction may not be relevant since the fees associated with the permit are very low compared to the cost of deploying the infrastructure.

Another measure for discussion could be to promote joint construction of ECNs with smart grids/meters and smart water management systems. Hence, electricity and water companies could get immediate benefits from the construction of ECN and joint construction and the household that gets the connection would get economic benefits as well from decreased electricity and water bills.

11 Open question

40) Are there any additional points that BEREC would like to make on the revision of the Directive?

Overall, BEREC would like to highlight the following points of the answers to the questionnaire.

BEREC agrees that the objectives of the current BCRD, access to existing physical infrastructure and coordination of civil works are important for reducing the cost of deploying ECN (see answers to question 1). BEREC is of the opinion that the main problem is that the operators (ECN and non-ECN) typically do not have any interest or even strongly reject to make their existing physical infrastructure available to ECN operators or to coordinate civil works with them (see answers to question 2 and 3).

BEREC considers the principle of the dispute settlement process very positive (see answers to question 7). However, BEREC is of the opinion that measures are important which make the outcome of dispute settlement procedures more foreseeable for ECN operators (access seeker) which significantly facilitates the use of existing physical infrastructure. BEREC is of the view that in particular relevant measures could be the publication of non-binding standard access conditions by the DSB/NRA and to base the dispute settlement procedures on them as well as guidelines for the DSB/NRA, both at national level (see answers to questions 7 and 10). BEREC also considers NRAs in charge of electronic communications best placed to perform the functions of the national DSB (see answers to question 8).

BEREC's overall evaluation of the functioning of the SIP is also positive (see answers to question 12). BEREC considers it appropriate that public sector bodies and also other organisations than public sector bodies (e.g. network operators) make available via the SIP information on existing physical infrastructure of network operators since ECN operators need this information in order to be able to use the existing physical infrastructure of network operators (see answers to question 16 and 17). BEREC considers NRAs in charge of electronic communications also best placed to perform the functions of the national SIP, at least the NRAs which already perform the function of the SIP (see answers to question 13).

Finally, BEREC also want to address the following additional point on the revision of the BCRD. Any clauses in the current BCRD which treat security interests are maintained or augmented as necessary to be in line with the current and near future developments in this area.

12 Abbreviations

ADSL	Asymmetric Digital Subscriber Line
API	Application Programming Interface
BBSA GL	Broadband State Aid Guidelines
BCRD	Broadband Cost Reduction Directive
DSB	Dispute Settlement Body
ECN	Electronic Communications Network
EECC	European Electronic Communications Code
EMF	Electromagnetic fields
FFTB	Fibre To The Building
FTTC	Fibre To The Cabinet
FTTEx	Fibrte To The Exchange
FTTH	Fibre To The Home
GB	Giga Byte
GBER	General Block Exemption Regulation
GHG	Green House Gas
HD	High Definition
ICT	Information and Communications Technology
MNO	Mobile Network Operator
MS	Member State
NGO	Non-Governmental Organization
NRA	National Regulatory Authority
SIP	Single Information Point
SMP	Significant Market Power
TEN-T	Trans-European Transport Network

VHCN	Very High Capacity Network
VULA	Virtual Unbundled Local Access