BEREC
Body of European Regulators for Electronic Communications

BoR (23) 178

Draft

BEREC Report on Member States' best practices to support the defining of adequate broadband internet access service

5 October 2023

Contents

Executive Summary

The availability of an adequate and reliable broadband internet access service is today a crucial enabler for participation in the digital economy and society. With the adoption of the Directive 2018/1972 establishing the European Electronic Communications Code (EECC), it became part of the universal service as a measure to ensure digital and social inclusion.

The EECC includes the provision of an adequate broadband internet access service, including the underlying connection at a fixed location, within the scope of the universal service. In accordance with Article 84 of the EECC, each Member State is required to define what constitutes an adequate broadband internet access service for its jurisdiction, in light of national conditions and the minimum bandwidth enjoyed by the majority of consumers, with a view to ensuring the bandwidth necessary for social and economic participation in society. BEREC has been allocated with the task "*to contribute towards a consistent application of this Article, after consulting stakeholders and in close cooperation with the Commission, taking into account available Commission (Eurostat) data, draw up a report on Member States' best practices to support the defining of adequate broadband internet access service […]*."[1] The adequate broadband internet access service shall be capable of delivering the bandwidth necessary for supporting at least the minimum set of services set out in Annex V of the EECC. It should also be noted that Article 86 of the EECC on the availability of universal service refers to the adequate broadband internet access service, as defined in accordance with Article 84(3) of the EECC.

In 2020, BEREC published the first report on Member States' best practices to support the defining of adequate broadband internet access service (document reference BoR (20) 99). Article 84(3) of the EECC states that the report shall be updated regularly to reflect technological advances and changes in consumer usage patterns. The minimum set of services which the adequate broadband internet access service must be at least capable of supporting are outlined in Annex V of the EECC.

The report covers the following:

- The policy principle - Article 84 of the Directive (EU) 2018/1972;
- Relevant experience that BEREC can focus on;
- State of play of the definition of adequate broadband in the context of universal service (definition, methodology used in defining the adequate broadband internet access service, obligations, funding, monitoring, and compliance);
- Challenges indicated by MSs;
- Conclusions.

The report has been drafted in close cooperation with the European Commission, in particular, with regard to the data sources referenced in the report. While the previous report (BoR (20) 99) offered insight into the practices of nine MS that had introduced broadband under a USO prior to the transposition of the EECC, this report now provides the observations on the adequate broadband internet access service (as part of universal service) among 29 MS, which responded to a questionnaire issued in May 2023.

Summary of the main findings from the 29 responses received by BEREC:

[1] Article 84(3) of the EECC.

- Regarding the obligations and designation processes, only 9 MSs designated service providers to ensure universal services, including adequate broadband internet access service, at a local or national level. The majority of the MSs stated that they haven't imposed obligations or do not intend to consider the obligations.
- The data speed defined among MSs has evolved significantly, compared to the previous BEREC report (BoR (20) 99). The most common definition of the minimum download speed is 10 Mbps. However, some countries have defined, or are planning to define 30 Mbps as the minimum download speed. Besides Malta, which has already defined 30 Mbps in 2021, Belgium, Luxembourg and Spain are also considering the same data speed.
- Monitoring of universal service is mostly delegated to NRAs (in 20 MSs out of 29 MSs, who responded). However, a few MSs do not carry out monitoring.
- Funding of universal service varies among MSs, although the majority of the respondents were in favour of industry funding.

Recent developments and raised needs by the end-users for adequate broadband internet access service, especially during the Covid-19 pandemic (i.e., challenge for digitalization of healthcare etc.) indicate that the minimum set of services, to be enjoyed by the majority of end-users depicted in the list of services in Annex V of the EECC should be further carefully assessed.

This report is a subject to public consultation in October-November 2023.

This report is a best practices report, and it does not aim to provide formal universal service implementation guidance in respect of the EECC. According to Article 84 of the EECC, it is for the MS, taking into account this BEREC report on best practices, to define adequate broadband internet access in light of national conditions and the minimum bandwidth enjoyed by the majority of consumers within a MS territory to ensure an adequate level of social inclusion and participation in the digital economy and society in the MS territory.

1. Introduction

The Directive 2018/1972, establishing European Electronic Communications Code (EECC) seeks to support end-users' protection by ensuring they have appropriate tools to allow them to make informed decisions[2]. The strategic priority 3 of BEREC *"Empowering end-users"*, with the BEREC Work Programme 2023, outlines that "*Engaging end-users in the fast-changing digital ecosystem is becoming more complex. While digital innovation and competition among digital service providers has improved users' empowerment, there is still an important role for regulators to play in ensuring transparency for consumers, increasing, and maintaining consumer awareness and further improving digital skills*".[3]

Universal Service is a key aspect in ensuring digital inclusion. The European Union focuses on the universal service as a safety net to ensure that a set of at least the minimum services is available to all end-users. In 2020, BEREC published the first Report on Member States' Best Practices to Support the Defining of Adequate Broadband (BoR (20) 99[4]). The legal provisions further provide that the BEREC report must be updated regularly to reflect technological advances and changes in consumer usage patterns.

Pre-existing inequalities of coverage and digital skills are key factors of social exclusion. Recent digital inequalities, especially during the Covid-19 pandemic, have become more evident and the clear realisation of the importance of reducing regional inequalities and improving social cohesion. For this reason, closing digital gaps has become one of the top political priorities in Europe.

Universal service is a safety net to ensure that a set of at least the minimum services is available to all end-users and at an affordable price to consumers, where a risk of social exclusion arising from the lack of such access prevents citizens from full social and economic participation in society.[5] Universal Service provisions serves as a guarantee for the end-users to access the minimum level of electronic communication services, ensuring that obligations to provide universal service are applied if the market does not ensure such provision on a commercial basis.

Under the EECC, broadband internet access plays a central role in the scope of universal services, and Member States (MS) shall ensure that all consumers in their territories have access at an affordable price, in light of specific national conditions, to an available adequate broadband internet access service, along with access to voice communications services, including the underlying location, at a fixed location.[6]

Basic (adequate) broadband internet access is widely used for various activities that enhance social and economic participation in modern society. However, the overall take-up rate of

[2] BoR (23) 131b "BEREC's Response to the Exploratory Consultation" BEREC responded to the EU Commission's Exploratory Consultation on the future of the electronic communications sector and its infrastructure which was published on 23 February 2023. https://www.berec.europa.eu/en/document-categories/berec/others/berec-input-to-the-ecs-exploratory-consultation-on-the-future-of-the-electronics-communications-sector-and-its-infrastructure

[3] BoR (22) 193 BEREC Work Programme 2023 https://www.berec.europa.eu/en/document-categories/berec/berec-strategies-and-work-programmes/berec-work-programme-2023

[4] BoR (20) 99 https://www.berec.europa.eu/en/document-categories/berec/reports/berec-report-on-member-states-best-practices-to-support-the-defining-of-adequate-broadband-internet-access-service-ias.

[5] EECC Recital 212.

[6] EECC Article 84(1)

broadband lags behind the availability, and there are still consumers who are disconnected due to reasons related to awareness, cost, skills, or choice.[7]

According to the 2022 Digital Economy and Society Index (DESI 2022) report in the EU, the urban-rural divide in internet usage persists. Households in cities, towns, and suburbs had comparatively higher subscription rates (94% in cities and 92% in towns and suburbs), while those in rural areas were recording slightly lower numbers (89%)[8]. Fixed broadband is available to 98% of EU homes, 90% of which are covered by fast broadband (at least 30 Mbps).

According to the Eurostat data, in 2022, the proportion of household with internet access was 99% in Norway, slightly above the EU MSs highest scores of 98% for Netherlands, Luxembourg, and Finland. Greece (85%), Croatia (86%), and Bulgaria (87%) had the lowest rates of household internet access among the EU MSs. There is still a large difference between urban and rural figures. However, according to the DESI 2022, only 70% of rural households have a fixed broadband subscription compared with 83% of households in cities. The rural-urban gap is the largest in Finland (46% vs 76%), Romania (53% vs 78%) and Bulgaria (48% vs 72%). Looking at broadband speeds, there has been a sharp upward trend in ‚at least 100 Mbps' fixed broadband penetration since 2012. In 2021, 41% of EU households subscribed to such a service, up from 2% nine years ago. Spain, Sweden, Portugal, Luxembourg, and Hungary lead on this indicator with over 60% of households subscribing to at least 100 Mbps. In Greece, Croatia, and Austria, uptake of 100Mbps is very low (less than 20%).

Very high-capacity networks (VHCN) of at least 1000 Mbps are available to 70% of EU homes, with 78% of European homes subscribing to fixed broadband in 2022.[9] However, there are differences between MSs regarding the availability and affordability of fixed broadband internet access service and in coverage levels between urban and rural areas in the same MS.

Population density[10] is also different among the countries. The population density of the EU was 109 inhabitants per km² in 2018.[11] Almost two thirds of the territory was sparsely populated, with a population density of less than one third of the EU average (a population density of less than 30 inhabitants per km²). Less than 10% of the EU's area was home to more than two thirds of its population, the average population density of these areas was over 1,000 inhabitants per km². Uneven population density, and different coverage penetration within territories, means that broadband coverage of rural areas remaining challenging, as 8.5% of households are not covered by any fixed network, and 32.5% are not served by any Next Generation access technology. However, 4G is widely available also in rural areas (99.6%) and it is also worth noting that satellite broadband is technically available with the capability to provide 100% coverage in every MS[12]. On fixed technologies, there was a marked

[7] EECC Recital 213.
[8] Digital Economy and Society Index Report 2022, see p. 22: https://digital-strategy.ec.europa.eu/en/policies/desi
[9] Digital Economy and Society Index Report 2022, see p. 30: https://digital-strategy.ec.europa.eu/en/policies/desi
[10] Population density is the number of inhabitants per square kilometre, see: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Population_density
[11] Regions in Europe — 2022 interactive edition, see https://ec.europa.eu/eurostat/cache/digpub/regions/#total-population
[12] See more the EC's communication: https://www.broadbandforall.eu/

increase in the rural coverage of FTTP (from 26% in 2010 to 34% in 2021)[13]. Ensuring access to affordable and adequate broadband internet access service is a fundamental part of the universal service provisions in the EECC. It ensures the availability of internet access with minimum requirements for all end-users to benefit from social and economic participation in society.

BEREC considers that public intervention should be clearly regarded as a subsidiary instrument in cases where private investments are insufficient to meet end-users' connectivity needs[14]. It is confirmed under the EECC, as outlined in Article 86 (1), "*Where a Member State has established <<…>> that the availability at a fixed location of an adequate broadband internet access service as defined in accordance with Article 84(3) and of voice communications services cannot be ensured under normal commercial circumstances or through other potential public policy tools in its national territory or different parts thereof, it may impose appropriate universal service obligations to meet all reasonable requests by end-users for accessing those services in the relevant parts of its territory*". As such, the commercial telecoms market and public policy are primary drivers of access to broadband internet service in MS, with universal service supporting end-users unable to access an adequate broadband internet access service (IAS) via these measures.

2. Policy Principle and Objective

The policy principle of this report is to contribute to a consistent application of the provisions contained in Article 84, paragraphs 1 and 3, of the EECC[15].Article 84(1) of the EECC states that MSs "*shall ensure that all consumers in their territories have access at an affordable price, in light of specific national conditions, to an available adequate broadband internet access service and to voice communications services at the quality specified in their territories, including the underlying connection, at a fixed location.*"

To contribute towards a consistent application of the provisions of this Article, on 21 June 2020 BEREC, after consulting stakeholders and in close cooperation with the European Commission, taking into account available Commission (Eurostat) data, published a report on Member States' best practices to support the defining of adequate broadband internet access service pursuant to the first subparagraph. That report is to be updated regularly to reflect technological advances and changes in consumer usage patterns (Article 84(3) of the EECC).

The objective of Article 84(3) of the EECC is to support the defining of adequate broadband IAS by each MS for end-users, in light of national conditions. The minimum set of services which adequate broadband IAS must be at least capable of supporting are (Annex V):

1. E-mail
2. Search engines enabling search and finding of all type of information
3. Basic training and education online tools
4. Online newspapers/news

[13] Broadband Connectivity in the Digital Economy and Society Index 2022, see: https://digital-strategy.ec.europa.eu/en/policies/desi-connectivity

[14] BoR (22) 16 BEREC response to the public consultation on the draft revised European Commission Guidelines on State aid for broadband networks, see: https://www.berec.europa.eu/en/document-categories/berec/others/berec-response-to-the-public-consultation-on-the-draft-revised-european-commission-guidelines-on-state-aid-for-broadband-networks

[15] See also Recital 215 of the EECC.

5. Buying/ordering goods or services online
6. Job searching and job searching tools
7. Professional networking
8. Internet banking
9. e-Government service use
10. Social media and instant messaging
11. Calls and video calls (standard quality)

The definition of the bandwidth necessary for supporting at least the minimum set of services set out in Annex V of the EECC should adhere to the principle of technological neutrality.

The BEREC 2023 Work Programme[16] (section 3.2) states that the updated report on MSs' best practices should gather and analyse relevant information, including:

- the continued relevance of the evaluation criteria set out in the previous report;
- relevant experiences to support MSs' in defining adequate broadband IAS;
- at least the minimum set of services that adequate broadband IAS is capable of supporting.

BEREC acknowledges that Article 84(2) of the EECC and specifically "*the criteria that MS might use to deem that an available adequate broadband IAS, not provided at a fixed location, should be made available at an affordable price in order to ensure consumers' full social and economic participation in society"* is outside of the scope of this BEREC report. Accordingly, the matter is not addressed in this report.

This report considers prior work undertaken by European Commission (EC), BEREC, and other authorities to support the defining of adequate broadband IAS in the context of universal service.

The report is based on responses from NRAs of 29 European MSs/participants[17] to the BEREC questionnaire, issued in May 2023. The questionnaire sought to establish:

(I) how MSs[18] have defined adequate broadband IAS and its associated elements;

(II) the methodology, analysis, and assumptions underpinning the definition of adequate broadband IAS;

(III) whether if one or more Universal Service Provider(s) are designated, and the methods use to designate;

(IV) the associated funding mechanisms; and

(V) how compliance with adequate broadband IAS obligations is undertaken.

An early "call for input" from stakeholders was also published in May 2023. Four contributions were received[19]. These responses are now summarised:

[16] "BoR (22) 192 "BEREC Work Programme 2023" page 31.
[17] The questionnaire was sent to all NRAs represented in BEREC and 29 NRAs completed the questionnaire.
[18] In the context of this report, MS is addressed not only EU Member States, but the non-EU MS, who responded to questionnaire.
[19] Contributors claimed confidentiality in respect of their individual submissions. Accordingly, the responses to the BEREC Call for Input are not publicly available.

- All technologies should be considered when evaluating the commercial provision of adequate broadband internet access service.
- Any universal service obligation should be an exceptional measure, to be the least market distortion.
- Realistic quality of service targets should be set to ensure the provision of adequate broadband IAS[20].
- 2 Mbps download speed is sufficient to meet the requirements of the services specified in Annex V[21].

3. Relevant work that BEREC can consider

This section examines relevant work undertaken by the EC, BEREC, and other Authorities.

3.1. Relevant work undertaken by European Commission

Table 1 below summarises work undertaken by the EC which BEREC can draw on for the purposes of this report.

Table 1. Work carried out by the EC

Work undertaken by EC	
EC 2016 Review of the scope of Universal Service (SMART 2014/0011)	The study: Identified the essential online services necessary for consumers to participate in the digital economy and society. Developed a methodology to determine the bandwidth and data requirements for broadband connections must have to enable effective access to online services that enable social inclusion in the digital economy and society.
EC 2011 Report on the outcome of the public consultation and third periodic review of the scope of Universal Service (COM(2011) 795 Final)	• Established what an assessment of a data-rate specified for functional internet access should account for the rate used by majority of subscribers, i.e. the rate used nationally by: – At least 50% of all households – At least 80% of all households with a broadband connection • Established an assessment to identify social and economic objectives and desired outcomes of public intervention
Communications Committee's (COCOM) 2011 report on "Implementation of the revised Universal Service Directive: Internet-related aspects of Article 4"	• Clarified internet-related aspects of Article 4 of the previous USD and aimed to facilitate transposition

[20] One respondent.
[21] Two respondents.

(1) The responses to the most recent EC exploratory consultation on the potential developments of the connectivity sector and its associated infrastructure are summarised as follows.

(2) Article 15 of the Universal Service Directive required the EC to undertake periodic reviews of the scope of universal service, taking into account social, economic and technological developments among other conditions. In 2016, the EC published a "Review of the scope of universal service"[22] which examined the then future of the universal service and specifically looked at the inclusion of broadband in the universal service obligation.

The EC defined a possible methodology to determine bandwidth and data requirements for broadband under universal service. The report developed a methodology involving four 'baskets' of online services, with the primary basket of services[23] addressing social inclusion and services used by the majority of consumers. The primary basket developed by the EC for the purposes of that report is comparable to and closely matches Annex V of the EECC.

The results were presented into key findings; the minimum download bandwidth requirements of the most data-consuming services commonly used in the provision of each service contained in the primary basket (Mbps); the average minimum bandwidth requirement for all services in the primary basket (Mbps); the average monthly data requirements for each service in the primary basket (MB); and a monthly average based on the cumulative data requirements for all services in the primary basket (GB).

(3) The EC also published a 2011 report on the outcome of the public consultation and third periodic review of the scope in accordance with Article 15 of Directive 2002/22/EC. It set out for the first time the principle that MS could be requested to consider including broadband connections in USO where the data rate in question is used at the national level (i) by at least 50% of all households and (ii) by at least 80% of all households with a broadband connection.

It also established an assessment to identify social and economic objectives and desired outcomes of public intervention, by which intervention would only occur where overall benefits outweigh overall costs.

(4) Other work carried out by the EC in this area includes the Communications Committee's (COCOM) report titled "Implementation of the revised Universal Service Directive: Internet-related aspects of Article 4", in 2011.[24] This document clarified the internet-related aspects of Article 4 of the previous legislative framework and aimed to facilitate the correct transposition of Article 4 and the consistent implementation by MS.

The COCOM report established that an assessment of a data rate for functional internet access should take into account of the data rate used by the majority of subscribers, which is the rate used at the national level by: at least 50% of all households; and at least 80% of all households with a broadband connection.

---

[22] Review of the scope of Universal Service, see https://op.europa.eu/en/publication-detail/-/publication/6eee3cb7-9adf-11e6-868c-01aa75ed71a1.

[23] Primary Basket of Review of the Scope of Universal Service: email, social media, professional networking, telephoning/video calls, search engine, access to information about training and education, health information, online news, information about goods and services, eGovernment services, buying and ordering goods and services, and of internet banking.

[24] European Commission Information Society and Media Directorate General, Communications Committee Working Document "Implementation of the revised Universal Service Directive: internet related aspects of Article 4", COCOM10-31 Final, Brussels, 10 January 2011.

3.2. Work undertaken by BEREC in this area

Table 2 below summarises the work undertaken by BEREC for the purpose of reporting on MSs' best practices in defining adequate broadband IAS.

Table 2. Work carried out by BEREC in this area

Work undertaken by BEREC	
2023 BEREC input to the EC's exploratory consultation on the future of the electronics communications sector and its infrastructure (Section 2 of the overview) BoR (23) 131	BEREC provided a position that US provision or specific public social policies targeted at consumers with low income or with special social needs have proved to be an important measure to avoid or bridge the digital divide and the consequent social and economic exclusion.
2020 Report on Member States' best practices to support the defining of adequate broadband internet access service (BoR (20) 99)	The report: Identified common principles that may contribute to the consistent application of Article 84 of the EECC, based on information provided by nine NRAs with a broadband USO under the previous legislative framework. Made recommendations for future best practices reports.
2017 BEREC views on the Universal Service regime, as in the Commission's proposals and IMCO Opinion	BEREC views on the Universal Service regime, as an input to the EC's proposals (proposal for a Directive establishing the European Electronic Communications Code)
2017 update survey on the implementation and application of the universal service provisions – a synthesis of the results (BoR (17) 41) And older reports dated 2014, 2011, etc.	Provided an update on the 2014 internal report on the implementation and application of the universal service provisions. Synthesised the survey responses of 29 NRAs and covered issues such as the designation of Universal Service Providers, assessment of net costs, compensation mechanisms, assessment of unfair burden, assessment of the impact of the Universal Service provisions upon competitive outcomes, and measures NRAs have implemented on the affordability aspect of universal service obligations.

(1) BEREC provided it's response to the EU Commission's Exploratory Consultation on the future of the electronic communications sector and its infrastructure which was published on 23 February 2023. BEREC's response addressed questions pertaining to matters within its remit. This included an overview document which broadly addresses the topics and themes raised in the EC's questionnaire, and section 2 which focuses on the universal service.

(2) "BEREC Report on Member States' best practices to support the defining of adequate broadband internet access service" in 2020 (BoR(20) 99) examined how MS who had

introduced a broadband USO under the legislative framework of Directive 2002/22/EC (as amended by Directive 2009/136/EC) (the 'previous legislative framework') including "functional internet access" under universal service, determined the broadband USO "taking into account prevailing technologies used by the majority of subscribers and technological feasibility".[25] This report offered insights into the practices of nine MS (Belgium, Croatia, Finland, Latvia, Malta, Slovenia, Spain, Sweden, and the United Kingdom) who had introduced broadband USO, under the previous legislative framework.

In the development of the 2020 report, research was undertaken in respect of the nine MSs which had introduced a broadband USO. BEREC has also used these MSs' experiences and associated updates, to inform the development of the 2023 "Report on Member States' best practices to support the defining of adequate broadband internet access service".

(3) BEREC provided its views on the Universal Service regime when the proposal for EECC was considered by the EU. BEREC stated that the concept of universal service should evolve to reflect advances in technology, market developments and changes in user demand. BEREC also welcomed the focus of the proposed new regulatory framework to include basic broadband at an affordable price in the US scope.

(4) BEREC may also utilise the experience and data provided by the MSs for the End User WG reports in 2017[26] and 2014[27].

The 2017 BEREC survey on the implementation and application of the universal service provisions provided an update to the 2014 internal report. The 2017 report synthesised the survey responses of 29 NRAs and covered issues such as the designation of Universal Service Providers, assessment of net costs, compensation mechanisms, assessment of unfair burden, assessment of the impact of the Universal Service provisions upon competitive outcomes, and measures NRAs have implemented on the affordability aspect of universal service obligations, such as retail price caps. The 2014 BEREC internal report, which synthesised the replies to the EC's questionnaire gathering detailed information on the implementation of the universal service rules in the European Union, was provided to the EC to inform its review of the scope of universal service.

The 2017 report found that:

- At least one US provider has been designated in each one of the respondent countries, with the exception of Germany, Estonia, Luxembourg, Poland, Romania, and Sweden;
- Eight MSs (Croatia, Cyprus, Czech Republic, France, Greece, Hungary, Netherlands, and Portugal) used competitive designation mechanisms to designate the US provider either for all or for part of the services encompassed within the scope of USO;
- The most common method of funding USO was via sectoral funding. Of the 19 cases in which operators contributed to the compensation fund only some operators are

[25] Article 4(2) of Directive 2009/136/EC and Directive 2002/22/EC.

[26] BEREC update survey on the implementation and application of the universal service provisions – a synthesis of the results; 2017 BoR (17) 41, see https://www.berec.europa.eu/en/document-categories/berec/others/berec-update-survey-on-the-implementation-and-application-of-the-universal-service-provisions-a-synthesis-of-the-results

[27] EC questionnaire on the implementation and application of the universal service provisions – a synthesis of the results; 2014; BoR (14) 95, see https://www.berec.europa.eu/en/document-categories/berec/reports/ec-questionnaire-on-the-implementation-and-application-of-the-universal-service-provisions-a-synthesis-of-the-results

required to contribute, through a minimum income/revenue/turnover threshold and in only two MSs all operators are obliged to contribute.).).

- Relatively few MSs included a broadband connection within the scope of the USO, however a significant number of MSs were taking measures, at national level, to provide end-users with a functional or high-quality broadband connection.

3.3. Work undertaken by BEREC in other areas

Other BEREC documents include relevant and helpful information in the context of universal service.

In November 2022, a joint virtual workshop on the application of the end-users' rights provisions of the EECC was organised by BEREC and BEUC. The discussions focused on end-user` issues such as operator switching, contract termination etc. A discussion on people with disabilities also took place. A number of issues were raised in respect of the difficulties that this user group experience with electronic communication services. Valuable suggestions were also made in respect of access and affordability for people with disabilities. These results may be useful considerations for the implementation of Article 85 of the EECC. Information on this workshop is set out in the BEREC document BoR (23) 25 "Summary Report on the BEREC – BEUC Joint Workshop on the application of rights of end-users in the EECC"[28].

BEREC document BoR (22) 172[29] "Report on measures for ensuring equivalence of access and choice for disabled end-users" also contains information on the accessibility for persons with disabilities. Amongst other things, it focuses on (i) Article 85 and the universal service provisions for people with disabilities and (ii) Article 111 of the EECC on equivalence of access. It also states that while the Universal Service Directive focused primarily on obligations placed on the Universal Service Providers (USPs), the EECC has a broader scope, setting out general obligations. In this report, it is recognised that the EECC, together with The European Accessibility Act, shifts the focus from specific Universal Service provisions to a set of general and overarching accessibility provisions, including some with strict implementation timelines. Accordingly, it is imperative that MSs actively engage with this change of focus. "BEREC Report on the outcomes of public consultation on the draft BEREC Report on measures for ensuring equivalence of access and choice for disabled end-users" (BoR (22) 171[30]) includes the views of market players on the issues set out in the report.

BEREC's report BoR (22) 169 "Report on satellite connectivity for universal service"[31] addresses the topic of satellite connectivity for the provision of universal services. This report is based on a BEREC survey among MSs and participant states, in respect of the state of satellite services, relevant regulatory issues, the suitability of these services for the provision of internet etc.

---

[28] https://www.berec.europa.eu/en/document-categories/berec/reports/summary-report-on-the-berec-beuc-joint-workshop-on-the-application-of-rights-of-end-users-in-the-eecc

[29] https://www.berec.europa.eu/en/document-categories/berec/reports/report-on-measures-for-ensuring-equivalence-of-access-and-choice-for-disabled-end-users

[30] https://www.berec.europa.eu/en/document-categories/berec/reports/berec-report-on-the-outcomes-of-public-consultation-on-the-draft-berec-report-on-measures-for-ensuring-equivalence-of-access-and-choice-for-disabled-end-users

[31] https://www.berec.europa.eu/en/document-categories/berec/reports/report-on-satellite-connectivity-for-universal-service

On 8 June 2022, a digital divide workshop was held by BEREC where NRAs' Heads exchanged views. This workshop was organised following the "Study on post Covid measures to close the digital divide" (BoR (21) 138[32]), published in October 2021, and on the lessons learned during the Covid-19 pandemic (2020- 2021) in respect of the digital resilience of networks and digital inclusiveness. The main conclusions of the workshop are set out in the BEREC report BoR (22) 129 "Summary Report on the BEREC Workshop on Digital Divide"[33]. This report, amongst other things, includes information on affordability and accessibility issues, set out in Article 85 of the EECC.

BEREC report BoR (23) 87 "BEREC Report on Competition amongst multiple operators of NGA-networks in the same geographical region" set out information on the NGA network deployment in MSs (competition, market analysis results, remedies etc.)[34]. Information on the existing network infrastructure and its deployment set out therein may be useful in examining the availability issues of universal service.

BEREC organised a workshop on secure and reliable connectivity in Europe from low earth orbit satellite fleets. Interesting issues regarding end-user connectivity and future developments were presented and discussed. The output of this workshop may be of interest in respect of universal service availability issues.

The following reports include information that may be useful and relevant to the availability of adequate broadband service within the framework of the universal service as well: BoR (20) 168[35] "Draft BEREC Guidelines on Geographical surveys of network deployments", BoR (21) 83[36] and BoR (21) 31[37] BEREC Reports on the outcome of the public consultation on the draft BEREC Guidelines on Geographical surveys of network deployments.

3.4. Relevant work undertaken by other organisations

This section sets out relevant work carried out by other organisations, other than the EC and BEREC.

(1) International Telecommunications Union (ITU) focuses on the digital divide, organising various events worldwide as well as providing reports and analysis on the issue. The most recent ITU report „Telecommunications/ICTs for rural and remote areas"[38] concludes that the principle of universal access has proven to be an essential development tool, and that the proper use of universal service/access funds offers a good opportunity for economic growth and poverty alleviation in developing countries. However, there is no, one-size-fits-all' model for financing rural connectivity and engaging all stakeholders. However, creating public-private

[32] https://www.berec.europa.eu/en/document-categories/berec/reports/study-on-post-covid-measures-to-close-the-digital-divide

[33] https://www.berec.europa.eu/en/document-categories/berec/reports/summary-report-on-the-berec-workshop-on-digital-divide-8-june-2022

[34] https://www.berec.europa.eu/en/document-categories/berec/reports/berec-report-on-competition-amongst-multiple-operators-of-nga-networks-in-the-same-geographical-region

[35] https://www.berec.europa.eu/en/document-categories/berec/regulatory-best-practices/guidelines/draft-berec-guidelines-on-geographical-surveys-of-network-deployments

[36] https://www.berec.europa.eu/en/document-categories/berec/reports/berec-report-on-the-outcome-of-the-public-consultation-on-the-draft-berec-guidelines-on-geographical-surveys-of-network-deployments-verification-of-information

[37] https://www.berec.europa.eu/en/document-categories/berec/reports/berec-report-on-the-outcome-of-the-public-consultation-on-the-draft-berec-guidelines-on-geographical-surveys-of-network-deployments-art-22-2-223-and-224-of-the-eecc

[38] https://www.itu.int/hub/publication/d-stg-sg01-05-1-2021/

partnerships (PPP) provides a workable solution. This report sets out that the Recommendations ITU-T L.163 (2018), ITU-T L.110 (2017) and ITU- L.1700 (2016) are three of the most popular and useful recommendations to address the question on rural connectivity.

(2) Worldbank (digital development analytical insights). In a study of January 2021, titled "Minimum Data Consumption: How Much is Needed to Support Online Activities, and Is It Affordable?"[39], the data consumption to support social media and other online entertainment activities is estimated at 178 MB daily, equivalent to slightly more than 5 GB per month. Adding this amount (5.2 GB) to the foundational[40] amount (660 MB) would result in a minimum monthly data consumption estimate of almost 6 GB per month.

(3) Alliance for Affordable Internet (A4AI)[41] released a new "meaningful connectivity" target that calls for a broadband connection at home, or place of work or study with unlimited data access. However, this is a challenging goal, especially in low and middle-income countries, as the amount of data required is not affordable for many. A4AI focuses on meaningful connectivity. This approach looks beyond the traditional binary metric of connectivity (whether people are online or offline) and evaluates the quality of their access.

(4) The Federal Communications Commission (FCC – Regulator of the United States of America), has a significant focus on the principle of universal service, stating that „"all Americans should have access to communications services". The FCC has category of FCC programs and policies to implement this principle including a universal service fund. The current definition, set by FCC in 2015, refers to a minimum broadband internet service, where it delivers download speeds of at least 25 megabits per second (or Mbps) and upload speeds of at least 3 Mbps.

The FCC publishes and updates regularly 2 types of information: (i), the Broadband Speed Guide (Annex 2), intended to inform about typical online activities with the minimum Mbps needed for adequate performance for each application and (ii), the Household Broadband Guide (Annex 2), is to compare minimum download speed (Mbps) needs for light, moderate and high household use with one, two, three or four devices at a time (such as a laptop, tablet or game console). Federal legislation requires the FCC to determine annually whether broadband is being deployed to all Americans on a reasonable and timely basis. It does so by collecting data on whether broadband service that meets the speed benchmark is available to users in a geographic area. More information is provided in the Annex 2 of this document.

(5) The importance of broadband, universal access and digital inclusion is also recognised in other parts of the world. Being connected is not an optional requirement, but a prerequisite for countries to improve the situation of their inhabitants and to be competitive in a globalized and digital environment (CITEL Report: OEA/Ser.L/XVII.4.1.37).

There are several initiatives for the expansion of Telecommunications/ICTs in rural, unserved or underserved areas for the CITEL administrations who wish to develop projects to consider, observing the regulatory provisions applicable in each country such as: (i) promoting the use of universal service funds or (ii) assistance funds for connectivity projects aimed at remote or (iii) underserved rural areas and ensuring they have the facilities that would make it possible for them to gain access to all kinds of operators or adapting minimum standards of service

[39] https://thedocs.worldbank.org/en/doc/742001611762098567-0090022021/original/AnalyticalInsightsSeriesJan2021.pdf
[40] In this context understood as fundamental or basic.
[41] https://a4ai.org/meaningful-connectivity/

quality, speed, and continuity of service in rural communities. According to the report, only 4 of every 10 homes (in Latin American and Caribbean countries) have a fixed broadband connection while 50% of the population require a broadband connection. Countries in Latin America and Caribbean are therefore focused on solutions to ensure social inclusion and addressing important asymmetries in the coverage of accessibility to digital services. Most universal services are funded by operators through payments, incomes, rates, fines, fees, payment for spectrum; Other options are donations, financial yields and general public expenditure budget of the countries. In the Dominican Republic, the vast majority of the Fund‘s financing comes from collecting a 2% tax on telecommunications bills (the operator is the collector but the one who finances the provision of the service is the citizen through a tax).

There are several issues addressed by these other organisations which may be useful considerations for this report. The minimum standards for broadband internet access service are analysed from different perspectives (A4AI's meaningful connectivity) and defined as10 Mbps of download (FCC‘s 25 Mbps). The main conclusions from CITEL‘s best practices report on the compilation of better practices are (i) to improve the coverage and universalise the services and (ii) to identify the development of models that allow to reduce the digital divide. This is a necessity to guarantee the existence of a differentiated regulation focused on rural areas. It encourages any interested actor - regardless of size - to participate in the challenge to close the connectivity gap in remote areas. ITU also focuses on this, stating that no one-size-fits-all model for (i) financing rural connectivity and (ii) engaging all stakeholders.

4. Current state of play - definition of adequate broadband IAS in context of universal service

This section sets out the current MS definitions of adequate broadband internet access service, based on MS responses to the BEREC questionnaire issued to MSs in May 2023.

4.1. Definition of adequate broadband internet access service

The term adequate broadband internet access service was first introduced in the EECC[42] in 2018. At the MS level, adequate broadband IAS is defined, taking into account the bandwidth necessary for supporting at least the minimum set of services set out in Annex V of the EECC.

Article 86 of the EECC (“Availability of universal service”) refers to the adequate broadband IAS, as defined in accordance with Article 84(3) of the EECC. Accordingly, consideration of availability under Article 86 of the EECC takes into account the adequate broadband IAS set out in Article 84 of the EECC. Similarly, Article 85 of the EECC on the “Provision of affordable universal service” refers to “services referred to in Article 84(1),” which refers to adequate broadband internet access service (and voice communications).

Bandwidth is a critical element in the definition of adequate broadband IAS. Bandwidth refers to the data rate supported by the underlying network connection or the number devices that connect to the network. The data volume and latency indicate the amount of data that can be transmitted between two points within a set period of time. The lower the bandwidth (data rate), the less data can be sent at one time. The significance of bandwidth on network performance depends upon the number of active devices connected to the network. The more

[42] Article 84(3) of the EECC.

devices that are connected and actively using the internet, the more bandwidth is required to be accessible at any given point in time.

How the particular service is defined and its associated characteristics in regulations or laws may significantly impact both end-users and providers and any associated financing measures to ensure that these minimum features are available and affordable. In defining an adequate broadband IAS, many MSs used a combination of (i) the 2011 COCOM report'[43], (ii) the assessement on nationwide coverage of high-speed fixed broadband internet access networks and the various technologies used, (iii) the prevailing bandwidth used by the majority of end-users, and (iv) the various fixed wired and wireless broadband technology packages available from the different service providers in the relevant market.

As consumers take up faster broadband, more data is being consumed through the downloading of streamed music, films, computer software, video games, and e-books. This is driving data usage allowances. The service characteristics of broadband such as upload speeds, unlimited data usage and latency (the performance of live applications, such as video calling and conferencing) have become increasingly important. Households are using multiple internet devices at the same time. Cisco Annual Internet Report, 2018–2023 states that, globally, devices and subscriptions are growing faster (10% annual growth rate) than both the population (1% annual growth rate) and the number of Internet users (6% annual growth rate). This trend is accelerating with the increase in the average number of devices and connections per household and per capita.

The previous BEREC report (BoR (20) 99) highlighted that a broadband USO had been introduced in nine MS between 2010 and 2018, either by the relevant Ministry or the NRA. There was some degree of variability in the definition which was implemented across the nine countries. Three MSs had set a minimum download speed of 1 Mbps, one MS set 2 Mbps, two MS set 4 Mbps and two MS set 10 Mbps. Latvia was the only one of the nine MS that had not introduced a minimum bandwidth broadband USO and it had limited the scope of the broadband USO and associated affordability measures only to disabled end-users. Some MS had set a minimum upload speed (Slovenia, United Kingdom) but the majority of MSs had not.

There are significant changes since the data was collected for the first BEREC report (BoR (20) 99). The majority of MS have now transposed the EECC and defined adequate broadband IAS, in the context of universal service. At the time of the survey, there are currently 18 countries[44] which have defined adequate broadband IAS while 2 countries[45] informed that they have not and 9 countries[46] have stated that they have not yet.

[43] See Ref 23.
[44] Austria, Croatia, Cyprus, Czech Republic, Denmark, Finland, Germany, Greece, Hungary, Latvia, Lithuania, Malta, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden.
[45] Estonia and the Netherlands.
[46] Belgium, Bulgaria, France, Iceland, Ireland, Italy, Luxembourg, Norway and Poland.

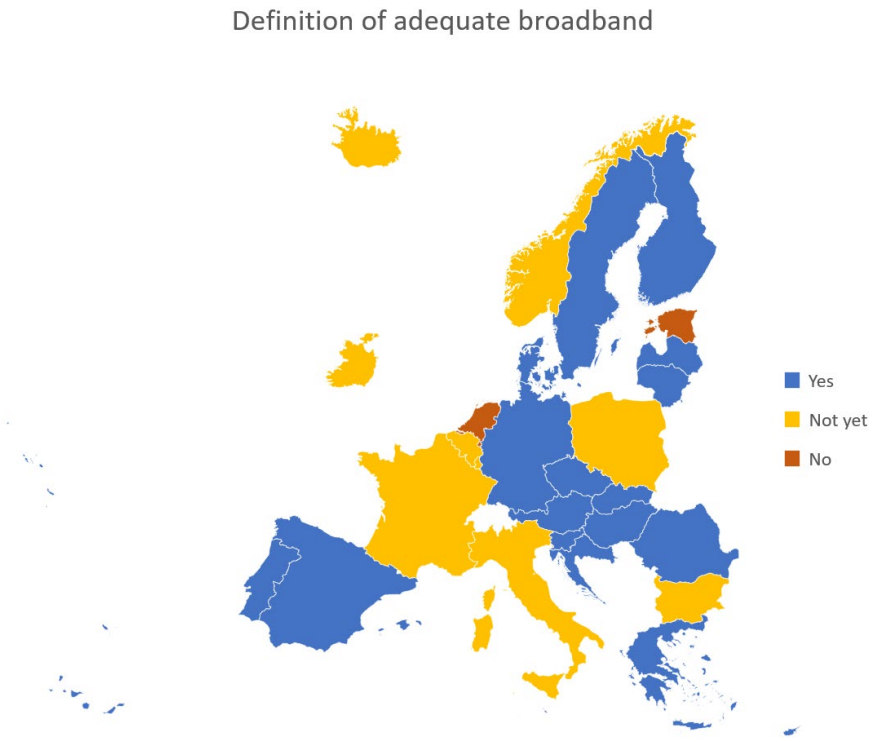

Figure 1. Has adequate broadband internet access service (as specified by the EECC) been defined in your country?

The MSs which have not defined adequate broadband IAS, cite a variety of reasons. In some cases there are no plans to define adequate broadband IAS (Estonia, the Netherlands). In some cases the process of defining adequate broadband IAS is ongoing and consultation processes are underway (Belgium, Italy, Luxembourg). In other MSs (Bulgaria, France, Iceland), pre-consultation works are ongoing. In some cases the EECC has yet to be transposed (Norway, Poland). In the case of Norway, however, although not defined by law or regulation, the parliament has defined a goal for a fixed broadband speed of 100 Mbps for everyone. In Iceland, there is a pre-existing 2020 decision, which states that an adequate broadband IAS should be able to deliver at least 10 Mbps, on average, over a 24-hour period[47]. This is open to periodic review taking into account the trends in other MSs. Some definitions of broadband remain, based on the previous Directive, but the majority of the adequate broadband IAS definitions have been defined in 2021 and 2022.

[47] Decision no. 9/2020 - ECOI designated Neydarlinan ehf. (112 operator in Iceland) as a USO in those circumstances where homes and businesses do not have a decent broadband connection regardless the technology - mobile or fixed.

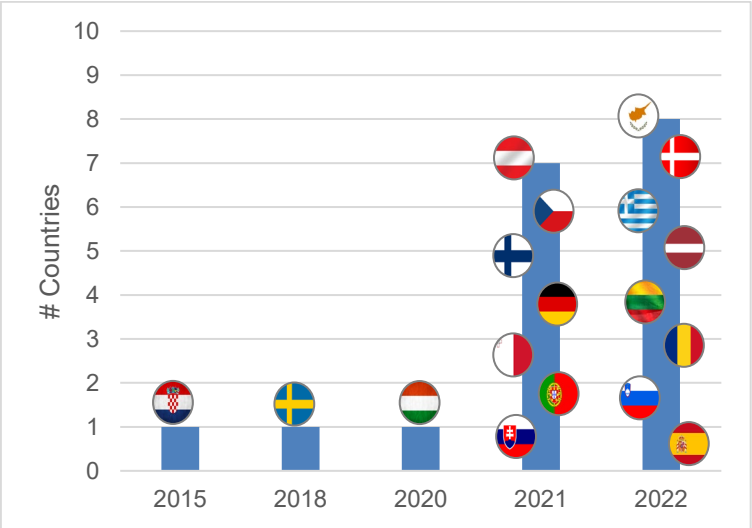

Figure 2. Year of current definition of adequate broadband Internet access service

Generally, the definition of adequate broadband IAS is set by the NRA orby the relevant Ministry, with the assistance of the NRA. There are a few cases where adequate broadband IAS was entirely determined by the Ministry or Government (Czech Republic, Finland, Greece, Romania, Spain, and Sweden).

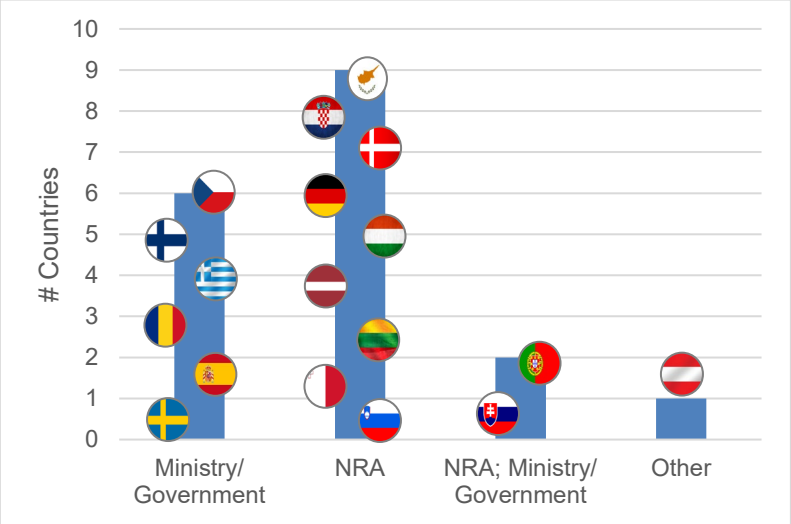

Figure 3. Which institution/authority has defined the current adequate broadband Internet access service?

The countries which have answered other institution/ authority have a slightly different approach. In Austria, the definition comes from Art 107 of the Austrian Telecommunications Act (TKG 2021). In the case of Portugal, the NRA was involved, however, the definition was decided by the government. For this reason, it was included in the third group (it could also be in the first group of countries with an associated annotation).

Most countries have defined minimum requirements for download and upload speed. The download speed is now usually around 10 Mbps with the exception of Malta, where it is set at 30 Mbps. There are countries (Belgium) which are in the process of defining 10 Mbps until 2027, and 30 Mbps as of 2027. There are also a number of cases where a change to 30 Mbps is anticipated, however they are dependent on (i) the definiton by Royal Decree (Spain) or (ii) where a legislation is under public consultation (Luxembourg). In Germany, the

Telecommunications Minimum Supply Ordinance (Verordnung über die Mindestanforderungen für das Recht auf Versorgung mit Telekommunikationsdiensten, TKMV) is to be re-evaluated annually, where the requirements will be adjusted to respond to increasing demands of the services defined in Annex V of the EECC. The Telecommunications Act (TKG) also states that the minimum bandwidths for upload and download, and the one-way latency used by at least 80% of all users throughout Germany, has to be considered to determine the minimal requirements for the adequate broadband IAS. The adequate broadband IAS in universal service regime will dynamically adapt to the growing connectivity needs of all consumers.

The current Norwegian Electronic Communications Act still needs to be transposed into national legislation to give effect to the EECC. A new proposal for an electronic communications Act, which implements the EECC, is expected to be published in 2023. Although not defined by law or Regulation, the Norwegian Parliament has defined a goal for a fixed broadband speed of 100 Mbit/s for everyone.

In Croatia, every three years,the NRA conducts an analysis of the quality of providing universal services in electronic communications in the Republic of Croatia. The obligations previously imposed are also reviewed, as part of this analysis. Similar to Germany, adequate broadband IAS speed should be defined according to the minimum bandwidth enjoyed by the majority of consumers (at least 80% of all users) and also to ensure the bandwidth necessary for social and economic participation in society (adequate broadband IAS shall be capable of delivering the bandwidth necessary for supporting at least the minimum set of services set out in Annex V of the EECC).

In Portugal, legislation allows for the changing of the conditions regarding the Social Internet Tariff on a yearly basis, by Decree-Law 66/2021 (Article 14), taking into account the proposals of ANACOM.

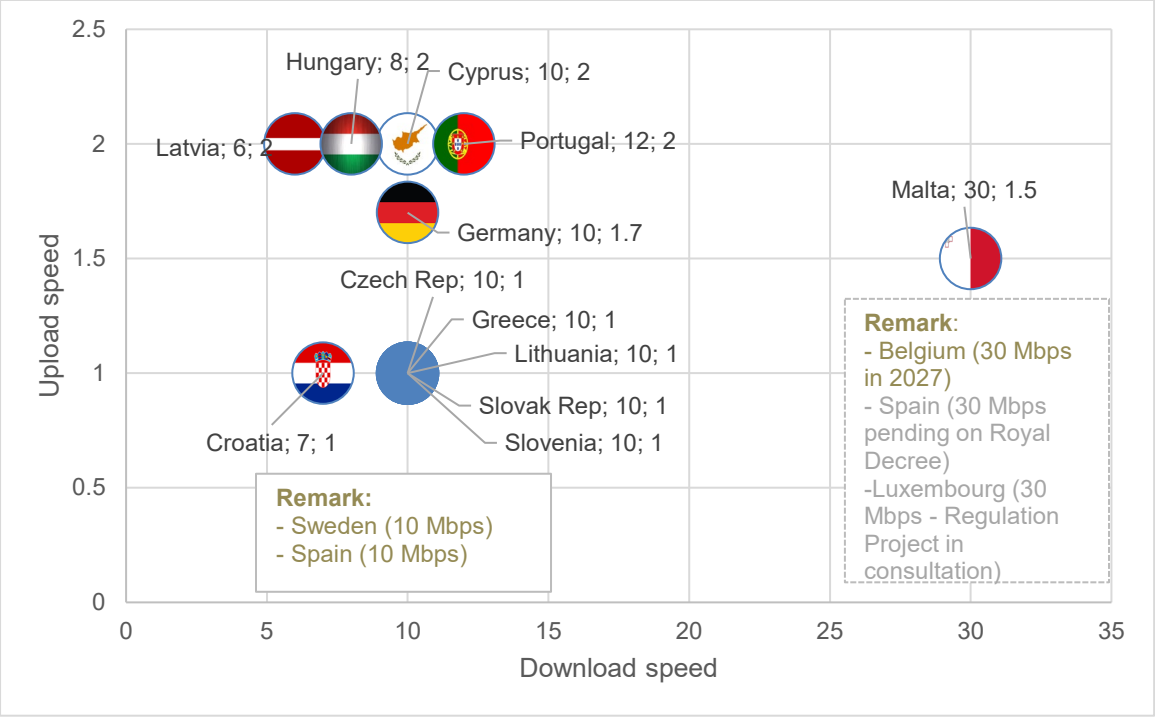

Figure 4. Adequate broadband IAS parameters – minimum download and upload speed

Sweden and Spain have also defined adequate broadband IAS as 10 Mbps (download) but have not defined an upload speed. Finland has defined three thresholds associated with (maximum speed (5 Mbps), normally available speed (4.5 Mbps) , a minimum speed (3.5 Mbps), and has not defined an upload speed. Greece also set a real minimum download speed of 4 Mbps. In Denmark, it has been concluded that to support at least the minimum set of services set out in Annex V of the EECC 2 Mbit/s download and 0.6 Mbit/s upload, so data speed of 5 Mbit/s, both fixed and mobile, must thus be assumed to leave ample margin to secure the services in the telecommunications directive. In Romania, there is no minimum download speed defined but a maximum download speed of at least 100 Mbps. Definitions of download speeds lower than 3 Mbps are no longer defined unlike in the previous BEREC report (BoR (20) 99).

Very few countries have set a latency limit. Czech Republic and Slovak Republic have set a maximum of 150 ms round trip delay, Germany has set a latency limit of 150 ms one-way, and Malta defines latency more broadly (capable of allowing the end-user to make and receive voice and video calls effectively).

Data volume caps also usually do not apply when defining adequate broadband IAS parameters. Portugal is amongst the few exceptions with the lowest data volume cap introduced (15 GB). Malta explicitly set unlimited data usage. Slovenia defines a maximum data usage of 75 GB per month where the access is provided by satellite (it is unlimited for all other technologies). In Greece, where IAS is not provided with a fixed charge (flat rate), a data threshold of at least 30 GB per month applies.

The number of MSs which have introduced broadband IAS in the scope of universal service has increased since the previous BEREC report (BoR (20) 99). 11 out of 29 of the MSs which completed the questionnaire have not defined adequate broadband IAS. Three MSs anticipate that they will consider whether they need to define adequate broadband IAS in 2023. The majority of definitions of adequate broadband IAS are set by NRAs, or in cooperation with the NRA. Within the definition of specific parameters or minimum requirements for adequate broadband internetinternet access service, the download speed is the most commonly specified, followed by upload speed. The most common download speed is 10 Mbps, however a number of MSs are considering specifying higher downloadspeeds. Malta has already defined adequate broadband IAS as 30 Mbps for the minimum download speed. And Belgium is set to increase the minimum download speed to 10 Mbps a priori in 2024 (cf. Adoption of the royal decree) and by 2027 to 30 Mbps. In Spain, even though this parameter has been fixed at 10 Mbps relatively recently, there are plans to increase it to 30 Mbps by royal decree. In Luxembourg, legislation submitted to public consultation between April 24 and May 31, 2023, is also referring to 30 Mbps download (and 5 Mbps upload).

4.2. Methodologies used in defining adequate broadband internet access service

The information that follows is based on the responses of the NRAs to the survey conducted and gives an overview of the methodology followed in each MS for the definition of the minimum requirements of adequate broadband IAS according to the EECC.

Based on the responses to the survey conducted, the following criteria have been taken into consideration by the MSs when defining the minimum requirements for the broadband access in the framework of the universal service:

1. The **national conditions** are the main factor considered by the majority of MS including:
    - The minimum bandwidth enjoyed by the majority of consumers nationally (minimum bandwidth upload rate and/or latency used by at least 80 per cent of consumers according to the EECC) (Belgium, Croatia, Germany, Greece, Latvia, Lithuania, Malta, Romania, Sweden).
    - Current market pricing/ offers (Belgium, Greece, Malta, Portugal).
    - Quality characteristics and/or measurements (Latvia, Lithuania, Malta, Portugal).
    - The percentage of broadband coverage nationally in respect of the relevant broadband characteristics (based on the relevant data from providers) (Romania, Sweden, Lithuania, Greece, Czech Republic, Slovenia, Portugal, Latvia, Malta, Belgium).
    - Deployment status of private networks/ state aid (Belgium, Czech Republic, Germany, Greece, Portugal Slovenia).
2. **Services: (Annex V and beyond)**
    - The minimum set of services set out in Annex V of the EECC (Austria, Belgium, Croatia, Denmark, Finland, Germany, Greece, Lithuania, Portugal, Slovenia, Sweden,).
    - In Croatia and Germany, the set of services explicitly include working/ studying from home requirements (in Croatia based on simultaneous usage by members of an average household)
3. **European benchmarks**:
    - The implementation minimum broadband requirements in other MSs were considered (Belgium, Germany, Greece, Lithuania, Portugal);
    - The experience of MSs provided in BEREC Report BoR (20) 99 (Belgium, Germany, Greece, Lithuania, Portugal);
    - DESI reports (Greece, Malta).
4. **Future needs**
    - The need for broadband services is likely to evolve over time with associated higher speeds. Accordingly, a forecast of likely future demands would assist in defining adequate broadband IAS that would likely cover future end-user needs (Belgium, Germany).
    - Future network migrations, such as copper switch-off (Belgium, Germany).

5. **Affordability and availability** (Belgium, Germany, Greece, Lithuania, Portugal, Slovenia)
    - Service should be affordable for the consumers.
    - Funding from operators and/ or state funds.
    - Services should be made available to all consumers.
6. **Technological solutions used to deliver broadband services** (Lithuania, Germany, Slovenia, Belgium)

- Fixed, mobile, and satellite (according to (i) national conditions and (ii) network availability).

7. Geographical parameters

- Needs/costs per geographic region (Belgium, Romania, Sweden, Slovenia).

Other MSs took other aspects into account, such as: (i) relevant provisions in countries outside Europe (Portugal), or (ii) relevant investments for the definition of the minimum broadband requirements (Sweden).

In Belgium, the following criteria were taken into consideration: 1) new infrastructure deployment plans by operators and relevant agreements with other Parties; 2) Estimation of an ex-ante cost of implementing a broadband USO considering the technology chosen: whether the technology is fixed, mobile, or satellite; 3) Geographic survey: on a constant basis, (number of households lacking internet coverage according to different levels of speed (minimum bandwidths) and to different technologies (fixed, and mobile when access to a fixed location is possible). The speeds used to define adequate broadband internet access service were 10 Mbps and 30 Mbps. The geographic survey is a necessary criterion to consider since the number of households not covered by internet will significantly impact the cost estimation of USO; 4) Comparison with other EU countries that have defined adequate broadband IAS under the EECC. This provided an overview of the universal service environment the relevant criterion considered by other MS. 5) the criterion "benefits of public intervention and effects on competition" and "social and economic disadvantages incurred by those without access to a broadband connection, including disabled end-users" were also considered. 6) financial data from dominant operators (CAPEX, OPEX of deploying new infrastructures and/or modernising current infrastructures to allow households which lack coverage when they consider a specific speed and having access to adequate broadband internet access; and data on revenues such as subscription costs of the internet component). Multiple hypotheses have been considered such as copper and coax technologies' modernisation, and satellite technology (consideration of direct financial aid of 300€ per household since the equipment for satellites is expensive). Relevant information is available in the BIPT consultation document[48].

In Croatia, adequate broadband IAS speed was defined according to (i) the minimum bandwidth enjoyed by the majority of consumers (at least 80% of all users) and to (ii) ensure the bandwidth necessary for social and economic participation in society. Universal service should evolve to reflect advances in technology, market developments, and changes in user demand of the scenario of multiple members of the same household working/studying simultaneously at home was also considered. In Croatia, the average household has 2.8 members. Based on the average, that the following assumptions were made: (i) one adult member of the family worked from home and used video calling tools, and access a remote desktop, (ii) while the others do not work from home because the nature of their work would not facilitate remote working, (iii) one child is being educated remotely (not all children are already within the education system; remote learning only takes place sometimes in the lower classes). Accordingly, the mathematical sum of bandwidth for (i) one remote employee and (ii) one distance-learning child was approximately 4 Mbit/s.Taking into account that the employee or child may also use several applications (e.g., additional e-mail or browsing the

[48] https://www.ibpt.be/consommateurs/publication/consultation-concernant-le-projet-darrete-royal-relatif-a-la-fixation-du-debit-de-lacces-adequat-a-linternet-a-haut-debit-dans-le-cadre-de-la-composante-geographique-du-service-universel-des-communications-electroniques

Internet), a much higher bandwidth is required. Based on the aforementioned, HAKOM concluded that the minimum download speed for a household of three members would be 7 Mbps (DL). In the direction from the user, less bandwidth is required for the minimum upload speed, where making a video call requires the most bandwidth. Accordingly, taking video calls into account and based on the assumption of standard video and sound quality, the necessary upload should be at least 200 kbps to 800 kbps (UL), it is necessary to take into account the possibility of concurrent usage by other family members (such as remote learning) which would also require some upload speeds.

In Czech Republic, the Czech Telecommunication Office used data obtained from the annual collection of data from electronic communications undertakings when reviewing whether to impose reasonable access to the internet. This included information on territorial coverage.

In Germany, the methodology for defining the minimum requirements for adequate broadband is described in detail in the relevant consultation document[49]. The minimum adequate broadband requirements have been defined, taking into consideration that the representative products of the services mentioned in Annex V of the EECC, are functional and provide adequate user experience. Working from home the minimum bandwidths for upload and download, and the one-way latency used by at least 80 % of all users throughout Germany, formed part of the consideration.

In Greece, the data rate used includes a) the current network type (fiber, VDSL, ADSL, rural) and more specifically, the percentage of areas covered by each type of technology, and data/information provided by the operators on future network deployment for the next 4 years, b) data/information on the percentage of households that were receiving broadband connections with specific characteristics at that specific time (i.e. when the adequate broadband definition was being assessed), c) data/information submitted regarding coverage in the previous context of universal service, d) coverage data [reach] regarding various governments' initiatives "Development of Broadband Infrastructure in Rural "White" Areas" (rural) and "Ultra High Broadband Infrastructures ULTRA-FAST BROADBAND' (UFBB). The cost for setting adequate broadband at specific minimum parameters was then calculated based on the present network deployment across the country and the minimum criteria set. The cost of upgrading network cabinets, where necessary, was also taken into consideration.

In Latvia, the Digital Agenda for Europe and the Radio Spectrum Policy Program and the Electronic Communications Industry Policy Plan 2018-2020 requirement was taken into consideration with a target that all residents in 2023 would have a broadband connection with a speed of at least 30 megabits per second. Other factors taken into consideration include: i) the requirements of the previous version of the normative acts, where the minimum guaranteed connection speed is the value of the connection speed for the fixed Internet service, which is not lower than 20% of the upper limit of the maximum (advertised) connection speed range specified in the electronic communication service contract, and ii) the results of Internet access service quality measurements previously carried out by the Regulator (the Regulator calculated and determined the minimum download speed of the fixed network of 6 Mbps and the upload speed of 2 Mbps in the mobile network, at the place of receiving the fixed service, in the coverage area determined by the merchant, in the premises of the end-

[49] https://www.bundesnetzagentur.de/EN/Areas/Telecommunications/Companies/BasicService/start.html

user or in the household, using a router-modem, the minimum download and upload speed was set at 2 Mbps).

In Lithuania, a market data analysis formed the basis for the definition of the adequate broadband IAS characteristics and for the survey on universal service[50]. The survey assumptions were a) geographical segmentation of US provision (60 municipalities evaluated in total). The US is considered as being available in each municipality where operators have already the ability to provide these services. Public electronic communications networks, with at least a 10 Mbps data rate, and geographical coverage of at least 95% of residential premises in the municipality; b) when evaluating the coverage of the networks of public mobile operators, an analysis is performed using the normally available data rate during regular working hours (8 a.m. to 5 p.m.); c) only public electronic communications networks used for internet access services are evaluated to establish coverage (that the assumption is that if sufficient broadband IAS is ensured, access, voice communication services will also be ensured); e) when assessing the coverage of the public fixed communication network in a municipality, where a building has any landline technology, then it is assumed that all premises within building are capable of being served.

Defining an adequate broadband IAS in Malta, the MCA based its assessment primarily on the nationwide coverage of high-speed fixed broadband internet access network and the various technologies used within Malta, the prevailing bandwidth used by the majority of end-users, and the various fixed wired and wireless broadband technology packages available via the different operators. The fact that 98% of all fixed broadband subscribers opt for a package of more than 30 Mbps was also taken into consideration. The entry-level packages offered within the market for fixed BB started at download speeds of equal to or more than 30 Mbps. Data sources included: - MCA's report on the Key Market Indicators for Electronic Communications and Post[51], Local internet access service providers Annual Reports - EU's Digital Agenda Scoreboard 2020 targets - Malta Telecoms Chapter of the Digital Economy and Society Index (DESI) - Broadband Coverage in Europe 2019 Report[52].

In Portugal, the analysis commenced by identifying the minimum speed required to ensure access to services listed in Annex V of the EECC. There was an extensive analysis on several parameters where the following was taken into consideration: • current market offers of broadband IAS; • BEREC's report on best practices from MSs to support the definition of adequate broadband IAS; • the minimum speed required to cover the services listed in paragraph 1 of article 3 of Decree-Law 66/2021, took into account the study "Review of the scope of Universal Service" commissioned by the EC (in 2020, it was around 9.6 Mbps, i.e. in the 10 Mbps download range); • the situation in other European countries. • the number of active users/equipment and the type of use indicated by the FCC (FCC Household Broadband Guide); • the specifications included in tendering procedures for contracting mobile broadband for students at public educational establishments and other relevant data such as the speed reference values defined by ANACOM for the purposes of coverage obligations • SMART study No 2014/0011 entitled "Review of the scope of Universal Service", prepared by Tech4i2 Limited; • Most affordable broadband Internet access offers available on the market (ANACOM

[50] https://www.rrt.lt/wp-content/uploads/2023/01/ATASKAITA_final.pdf
[51] https://www.mca.org.mt/sites/default/files/MCA%20Communications%20Market%20Review%20July%202020-June%202021.pdf
[52] https://op.europa.eu/en/publication-detail/-/publication/077cc151-f0b3-11ea-991b-01aa75ed71a1

based on service providers' data); • Features of broadband Internet offers subscribed to by end users (ANACOM Report on Residential Stand-alone Offers); • Speed reference values defined by ANACOM for the purposes of coverage obligations; • ANACOM NET made speed test tool; • Specifications of tendering procedures for contracting mobile broadband for students in public schools; • BEREC Report BoR (20) 99. More detailed information is provided in the relevant Decision[53] as well as in the ANACOM website[54].

In Romania, the definition of adequate broadband IAS was based on the national circumstances and the minimum bandwidth available for consumers. In Q2/2022, 88% of connections were capable of providing speeds up to at least 100 Mbps, with an average download speed, at national level, of 259.8 Mbps (at fixed location) in 2021.

In Sweden, a list of online services based on social and digital inclusion (which is reflective of Annex V of EECC) was used to estimate the bandwidth needed for adequate broadband internet access service. A model was developed and used to estimate the connectivity levels (in Mbps) and investment needed. Other factors taken into consideration were (i) the expected availability of broadband, absent public intervention (ii) the potential demand for a broadband US in terms of both, data transmission rates, and the number of people reliant on the USO (iii) the benefits of public intervention and the effect on competition (iv) the estimated cost of implementing a broadband USO (v) the results of a geographic survey and the potential market distortion (vi) consideration of a list of online services which are required to be accessible in order to guarantee social and digital inclusion. The definition of adequate broadband IAS was implemented in 2018, before the implementation of the EECC.

In Slovenia, data pertaining to the need for services, spatial data in relation to network connection points and their capacities, and mobile network coverage (to assess number of potential beneficiaries) were used. A geo-analysis was also conducted (using data about NTP, population data, and cadastre). Technologies with the lower costs at every location were also considered, which resulted in a price cap for satellite connections.

The analysis of the availability and affordability within the framework of the universal service illustrated that 9 MSs consider both availability and affordability together, 7 MSs that analysed them separately, and 3 MSs conducted the only in respect of affordability as availability was examined as part of the geographical survey.

[53] https://dre.pt/dre/detalhe/portaria/274-a-2021-175043517
[54] : https://www.anacom.pt/streaming/DecLarguraBanda_en.pdf?contentId=1711524&field=ATTACHED_FILE

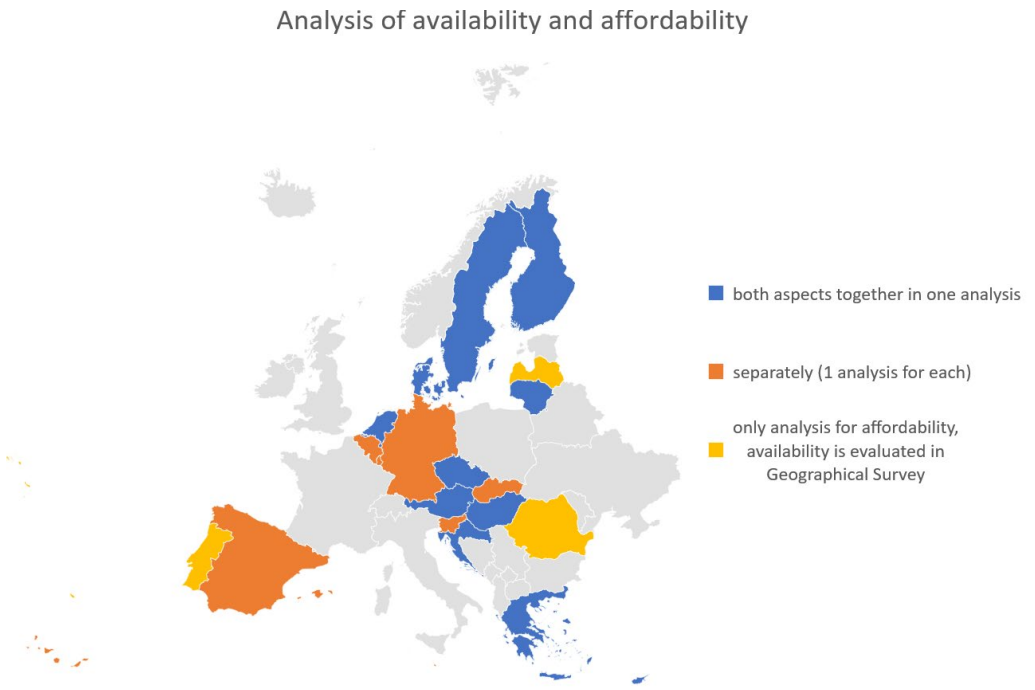

Figure 5. Analysis of availability and affordability[55]

The following chart displays the number of countries and the user type to whom availability and affordability measures currently apply. Availability applies to all consumers in 12 MS. To all consumers, microenterprises and SMEs and non-profit organisations in 8 MS and end-users in 1 MS. In 11 MSs affordability applies to consumers with low income and with special social needs, in 7 MS affordability to all consumers and in 3 MS affordability to all consumers, microenterprises and SMEs and Non-profit organisations.

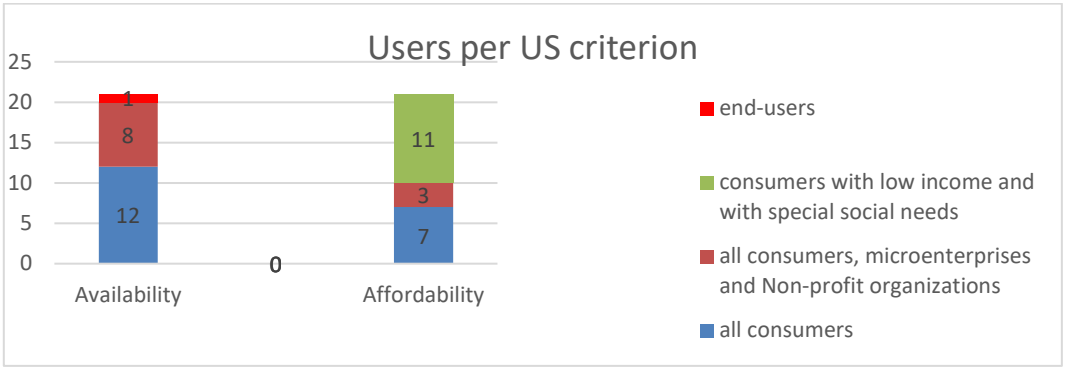

Figure 6. Type of users - availability and affordability[56]

[55] Both aspects in one analysis: Austria, Croatia, Czech Republic, Cyprus, Denmark, Finland, Greece, Hungary, Lithuania, Sweden, and The Netherlands.
Only analysis for affordability and availability is evaluated in the Geographical Survey: Latvia, Portugal, and Romania.
Separately (1 analysis for each): Belgium, Germany, Luxemburg, Malta, Slovakia, Slovenia, Spain.

[56] Availability: All consumers: Belgium, Croatia, Czech Republic, Cyprus, Denmark, Hungary, Latvia, Lithuania, Luxemburg, Slovakia, Spain, The Netherlands. All consumers, microenterprises, SMEs and Non-profit organizations: Austria, Greece, Finland, Malta, Portugal, Slovenia, Sweden, Romania. End users: Germany.

The NRA's provided also comments/ clarifications and the availability/ affordability definitions that apply nationally which are set out below.

In Austria, universal service is considered particularly important for companies in rural areas and microenterprises, so the scope is extended to include them. The Austrian law provides social tariffs with specific direct subsidies for people in need offered by all relevant telcos (fixed, mobile). Under current law disabled end-users are eligible for social tariffs. Regarding affordability, the current Telecommunications Act states that operators of public communications services shall publish comparable, adequate, and up-to-date information about the quality of their services and on the measures taken to ensure equivalence in access to publicly available telecommunications services for users with disabilities and provide the regulatory authority with this information at its request prior to publishing.

In Croatia, in the last universal service analysis conducted (under the old regulatory framework, as EECC was transposed in 2022 in Croatian national legislation), considered the criterion of availability. There was no distinction between consumers, microenterprises, and SMEs and Non-profit organisations. Special price tariffs and discounts were introduced for consumers with low income and with special social needs, to avoid a risk of social exclusion arising from the lack of such access and to allow for their social and economic participation in society. Users who provide confirmation of their social status, can obtain monthly fee reductions (65% discount, which determined on the basis that the average salary in the Republic of Croatia is 65% higher than the social allowance).

In Cyprus, availability applies to all consumers (per household) on a national level, affordability applies to low-income consumers/ households based on the criteria set by the Ministry of Finance and consumers with special needs (based on the criteria set by the United Nations).

In Germany, affordability applies to all consumers, and non-commercial use.

In Greece, beneficiaries were extended to include SMES and non-profit organisations, as per the provisions of EECC and related provisions in the current General Authorization Regulation (especially provisions relevant to the transposition of article 107 of the EECC).

In Lithuania, the analysis considered the coverage at residential premises. The Rules of Provision of Universal Services (Point 1)[57], define beneficiary end-user categories as: a) indigent residents who have the right to receive, or receive monetary social support, according to the Law of the Republic of Lithuania on Monetary Social Support for Indigent Residents, b) recipients of social services who receive social services in accordance with the procedure and conditions established by the Law of the Republic of Lithuania on Social Services.

In Malta, in order to minimise the imposition of costs on industry, and unreasonable requests from end-users, an end-user would be eligible for an adequate broadband internet access service at a fixed location under a USO to the extent that the following conditions are met: a) The connection is to a fixed location consisting of a permanent place of residence (home), of a business premises, or of a premises used by a non-profit organisation. Only those premises which are legal residential premises or registered business premises (including not-for profit-organisations) will be considered eligible for an adequate broadband internet access service

Affordability: All consumers: Belgium, Czech Republic, Denmark, Germany, Latvia, Luxemburg, The Netherlands. Consumers with low income and special social needs: Austria, Croatia, Cyprus, Hungary, Lithuania, Malta, Slovakia, Slovenia, Spain, Portugal, and Romania. All consumers, microenterprises, SMEs, and Non-profit organizations: Finland, Greece, and Sweden.

[57] https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.407087/asr

under a USO; b) A prospective end-user requests that a connection is provided to that location; and c) A broadband IAS service on an existing network that meets or exceeds the minimum functional characteristics is not available to that location. Regarding affordability, currently, there are a number of broadband IAS schemes, mainly provided by Government entities, which are available to end-users with low income, pensioners, students, and those with special social needs. Given the number of schemes already being offered by the Government, the MCA considers that currently, there is no need to include any further affordability measures for the provision of an adequate broadband IAS under the Universal Service regime.

In the Netherlands, availability and affordability also applies to microenterprises.

In Slovenia, as stipulated by Electronic Communication Act. Microenterprises, SMEs and non-profit organisations can apply only if they carry out their business in an area where there is no network available. Only one connection per microenterprise/SME/non-profit organisation is allowed with the same characteristics as for consumers. A lower service price is allowed only if the increase in the price of US is more than 5% higher than CPI, and if the increase of the average salary is 5% lower than the increase of prices of US (both criteria cumulative). Currently these criteria are not met. Affordability also applies to consumers who receive social welfare support. Disabled-end users with low incomes are entitled to additional benefits over and above those with low income.

In Spain, a future royal decree will determine the criteria for consideration of low income or with special social needs households. A Royal Decree could also extend availability to include microenterprises, and SMEs and Non-profit organisations.

In Sweden, according to a Government Ordinance from 2018, PTS shall secure internet access to primary residential and permanent business premises, which cannot obtain functional internet access (specified as a minimum download speed of 10 Mbps) from the market, at a cost for the connection of 5,000 SEK, or less.

In Portugal, Law 16/2022 refers to end users (Article 150.º). According to Article 148.º the Government may extend the scope of application to end-users that are microenterprises and small and medium-sized enterprises and not-for-profit organisations. The aforementioned Law defines that affordability is to be applied to consumers with low income or with special social needs (Article 151.º, 2)[58]. Specifically, regarding the Internet Social Tariff, Decree-Law 66/2021 defines the social tariff for broadband Internet access services to be applied to consumers with low income or with special social needs[59].

The abovementioned methodologies used by MSs prove that a variety of methods could be considered to address the criteria taken into account analysing the universal service and its provision.

4.3. Obligations

This section observes the obligation mechanisms, including procedural aspects as well as affordability measures, established for the actual designation of the universal service providers when the market fail to ensure the service on a commercial basis.

(1) Procedural aspects of obligations

[58] https://dre.pt/dre/detalhe/lei/16-2022-187481298
[59] https://dre.pt/dre/en/detail/decree-law/66-2021-168697989

In some MSs, universal service is not considered necessary to ensure affordable and adequate internet access to consumers, as it is provided on a commercial basis by the market. Accordingly, no regulatory intervention is mandated. In other MSs, the universal service regime remains important for consumers since, due to geographical characteristics, and the statii of network deployments, there are significant difficulties for end users in remote areas to access adequate broadband internet at an affordable price.

According to the NRAs responses, only 9 countries (Croatia, Cyprus, Greece, Finland, Hungary, Iceland, Lithuania, Slovenia, and Spain) have placed obligations on service providers to ensure universal service, including adequate broadband IAS, at a local or national level. The majority of the countries have not imposed obligations or do not intend to consider imposing obligations.

While no undertakings have been designated as Universal Service Providers (USPs) for the provision of adequate broadband IAS at a fixed location in Malta, the Malta Communications Authority (MCA) may designate an undertaking as a USP on a case-by-case basis. If an eligible end-user requests the MCA's support, the MCA would issue a written request for interest to assess whether an existing provider would be willing to provide the end-user with an adequate broadband IAS under normal commercial conditions. In the same request, the MCA would also request information on the provider's broadband networks deployed in the relevant area. If no provider would be willing to provide the service, or if alternatively, an interested provider who applies does not satisfy the criteria set out in the written request, then the MCA would directly designate a provider it deems best suited to deliver the USO, taking into consideration the public electronic communications networks closest to the end-user's location.

Portugal responded that there is not a designation process for one or more universal service providers, as under the national legislation, all providers that offer internet access services to residential customers are obliged to provide it throughout the country, as long as there is available infrastructure and/or mobile coverage. The ability to impose the obligation to offer specific tariff options or packages only on designated providers is, however, foreseen in the legislation.

In Sweden, no service provider is obliged to provide universal service, but there is a state aid measure, administered by PTS (Swedish regulator). It is possible for an end-user to apply to PTS for support to obtain a broadband connection where no internet access is offered by the market at a primary residence or a workplace, and where the cost of such a connection exceeds 5,000 SEK. PTS will secure an appropriate solution by means of public procurement which provides the end-user with functional internet access.

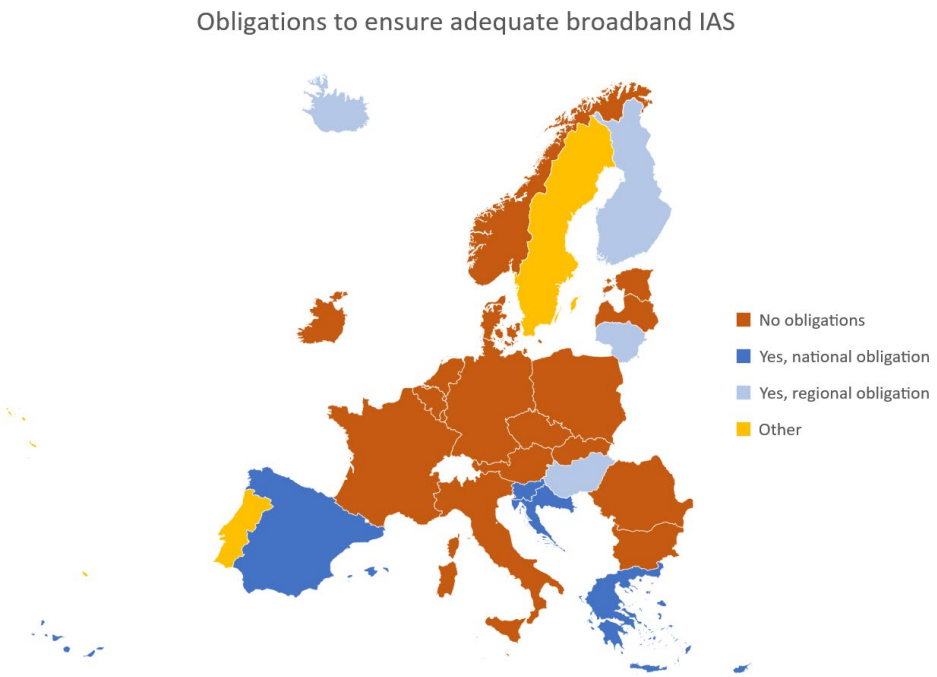

Figure 7. Designation of the universal service providers within MSs

MSs which have defined adequate broadband IAS and imposed a designation have used a variety of approaches to identify the most appropriate universal service provider(s). The obligations related to universal service should not increase the risk of market distortion. There were 6 MS (Croatia, Germany, Greece, Lithuania, Slovenia, and Spain) which have established additional voluntary steps for the stakeholders to express their interest to be obliged to provide the universal service.

Three MSs initially sought to use public tender process (Croatia, Slovenia, and Spain) to identify the USP(s). All three MSs received no expressions of interest in the public tender processes.

Two of these three MSs (Croatia and Slovenia) then used the criterion of network reach and coverage. In the other MS (Spain), the USP was appointed directly by the Ministry, absent of any expressions of interest. All three MSs have national designations.

Greece used a public auction process. There was one bidder, whose submission was reviewed against the relevant criterion, and it was subsequently designated as the USP, on a national basis.

Germany sought service provider commitments to serve on a voluntary basis. Where no service provider commits on a voluntary basis or where the commitment is not suitable, the MS designates one or more service providers within a three-month period. At the time of the analysis of the results of the survey, BNetzA has not imposed a universal service obligation (yet).

After publishing the report on the universal service provision and stating that there are 5 (out of 60 municipalities where universal service is not ensured), Lithuania requested stakeholders to engage in providing the universal service voluntarily; however, no such expressions were received. Hence the obliged stakeholders were appointed by NRA.

Four MSs (Cyprus, Finland, Hungary, and Lithuania) used some of the following criteria obliging to provide universal service (i) geographic coverage and reach, (ii) affordability of

offers, (iii) market shares and revenues, (iv) a number of subscribers (v) financial stability (vi) associated possible regulatory burden and (vii) and the capabilities of service providers when considering who should be designated as the USP(s).

Cyprus considered the service providers' national geographical coverage level. The designation is on a national basis for a duration of three years.

Finland considered both (i) the availability of adequate broadband IAS at the postcode level and (ii) the affordability of such available offers. Subsequent designations were based on those service providers with the best-associated capabilities. There are three USPs designated geographically (based on the criterion), and the designation period is until further notice, i.e. (no defined period).

Hungary defined a threshold level of service provider coverage of greater than 40% (in the relevant geographical numbering area(s)). There are 3 USPs designated geographically (based on the criterion), and the designation period is three years.

None of the MSs that have designated providers to ensure universal service, including the adequate broadband IAS, considered population density and (or) population percentage in urban or rural areas to be the criteria in the process of the obligation.

(2) Affordability measures

Ten MSs (Austria, Czech Republic, Cyprus, Croatia, Hungary, Lithuania, Luxembourg, Portugal, Slovenia, and Spain) have affordability measures in place to address consumers with low-income or special social needs. Most countries do not set a specific price limit (those which do: 5-10 euros for a specific data volume allowance, which varies from 1 GB to 30 GB). In other countries, the principle to ensure affordability for the benefiting end-users is established. In Cyprus and Slovenia, there is a 50% discount on regular prices for low-income households, and adequate broadband IAS is free to consumers with special needs. In Croatia, special tariffs and discounts are applicable to consumers with low-income and special social needs.

In Germany and Finland, these affordability measures are addressed under specific national legislation related to public policy tools (separate and discrete from universal service).

(3) Additional measures for the end-users with disabilities

Seven MSs (Cyprus, Finland, Greece, Hungary, Lithuania, Portugal, Slovenia, and Spain) responded having measures in place to address consumers with disabilities.

In Cyprus, adequate broadband IAS is free to end-users with special needs/disabilities.

In Finland, consumers with hearing and/or speech impairment are provided with QoS parameters of at least 512 kbps to support video conferencing, where the data transmission delay cannot exceed 150 milliseconds.

In Greece, end-users with disabilities are provided with information in relation to special equipment to ensure equivalence of access to adequate broadband IAS. They are also provided with information on prices for those with disabilities (that are different to the standard prices).

In Hungary, the NRA sets an affordable price for those with disabilities.

In Lithuania, the specific provision of information regarding the availability of special equipment for equivalent access to services, and compensation for the specialised equipment is applied to users with disabilities, but the regulation is outside universal service obligations.

In Portugal, the Internet Social Tariff also applies to some consumers with disabilities (people who benefit from the social disability pension).

In Slovenia, the following measures are in place for end-users with disabilities (i) adapted terminal equipment at the standard purchase price (ii) 50% discount on the adequate broadband IAS connection charge (iii) 50% discount on the adequate broadband IAS rental charge.

In Spain, disabled end-users must be offered specific measures to enable them to have access to adequate broadband IAS at the same level and manner as all other end-users.

In Germany, a separate section of the national Telecommunications Act distinct from universal service as well as other national laws provide for those with disabilities.

Summarising this section, it can be observed that only 9 MSs have designated service providers to ensure universal service, including adequate broadband internet access service, at a local or national level. The majority of the MSs informed that they hadn't imposed obligations or even do not intend to consider obligations. That being said, it is obvious that MSs use discretion and flexibility if it is based on a thorough analysis in light of national circumstances.

4.4. Funding

In this section different aspects of the Universal Service funding are considered such as (i) the source of funding in each MS, (ii) principles methodologies adopted by each MSs to calculate the net cost. (iii) whether the MS has established a methodology for determining whether the net cost represents an unfair burden.

(1) Financing universal service

Among the 29 MSs which have responded to the questionnaire there are a number of different funding mechanisms in place. The financing mechanisms among MSs are shown in Figure 8.

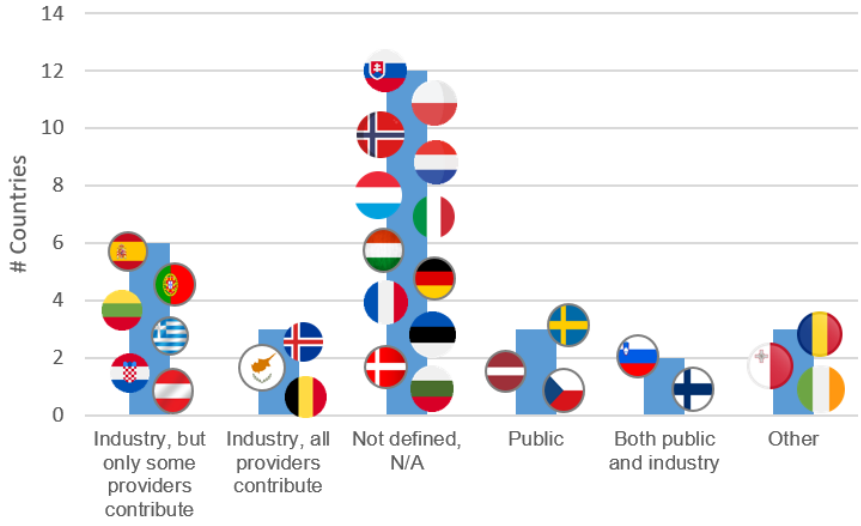

Figure 8. Source for financing universal service.

There are 9 MSs where adequate broadband internet access service in the scope of USO is industry funded (Austria, Belgium, Croatia, Cyprus, Greece, Iceland, Lithuania, Portugal, and Spain). In Cyprus and Iceland, all undertakings, engaged in electronic communications

activities, contribute to any funding/sharing mechanism while in the other 6 countries only some undertakings contribute to a sharing mechanism.

In the case of Lithuania, all undertakings contribute, except where an undertaking's revenue is below € 500,000 or it has provided public electronic communications networks and/or services for less than 24 months prior to the period for which USO is calculated. In Greece, the cost of the universal service is shared among operators who provide voice and/ or broadband and/or premium rate and/or directory services with an annual turnover of minimum € 9,000,000. In the case of Spain, all undertakings with annual turnover above € 100,000,000 must contribute. In Portugal, all undertakings whose annual eligible turnover is equal to or higher than 1% of the sector's overall eligible turnover are liable to contribute to the compensation fund. In Austria, undertakings generating more than € 5,000,000 in annual revenues through the provision of communications services contribute 70 % of the financing of the universal service fund and of the fund administration. Undertakings with more than 350,000 end users contribute 30 % of the financing of the universal service fund and of the fund administration. In Croatia, all operators of public communications services with share exceeding 2% in total revenue on national retail markets for electronic communications services shall contribute to the funding mechanism.

In 3 MSs (Czech Republic, Latvia, and Sweden) the funding mechanism for supporting the adequate broadband USO is from public funds.

There is another group of MSs (Finland and Slovenia) where the funding mechanism is financed by both public and industry funds. In Slovenia, Undertakings with annual revenues over € 2,000,000 and accessibility provision is from public funds. In Finland, according to legislation, a universal service provider shall, from State funds, be compensated for the part of the net costs of the universal service that is deemed to constitute an unreasonable economic burden.

There are 3 MSs (Ireland, Malta, and Romania) where there is a funding mechanism which is different from the ones mentioned above. In Ireland, where the NRA, on the basis of the net cost calculation establishes that the net cost of meeting an obligation represents an unfair burden on an undertaking shall establish a sharing mechanism administered by it or by a body independent from the designated undertakings, which body shall be under the supervision of the NRA and the unfair burden shall be borne by industry, unless the Minister intends to introduce a mechanism to compensate the undertaking for the determined net costs under transparent conditions from public funds.

In Malta, the USP may be compensated for the determined net costs from public funds (with the approval of the Minister responsible for Communications and of the Minister responsible for Finance) and/or share the net cost of the USO between providers of electronic communications networks and services. Accordingly, the source of funding will be decided on a case-by-case basis.

In Romania, the funding mechanism is from public funds, representing a surplus managed by ANCOM from previous years from the Universal Service Fund and/or European funds. If needed, the following sources can be used (alone or together): i) from the market; ii) from

ANCOM's funds consisting of a surplus of incomes from previous years, if such expenditures are approved by the Parliament; and iii) from State budget.[60]

(ii) Unfair burden

The method of assessing the existence of an unfair burden has been defined, in 8 MSs (Czech Republic, Greece, Hungary, Lithuania, Malta, Portugal, Slovenia and Spain). There are 21 MSs (Austria, Belgium, Bulgaria, Croatia, Cyprus, Denmark, Estonia, France, Finland, Germany, Iceland, Italy[61], Ireland, Latvia, Luxembourg, Norway, Poland, Romania, Sweden, Slovakia and The Netherlands) where a method for assessing, whether an unfair burden exists, has not been defined.

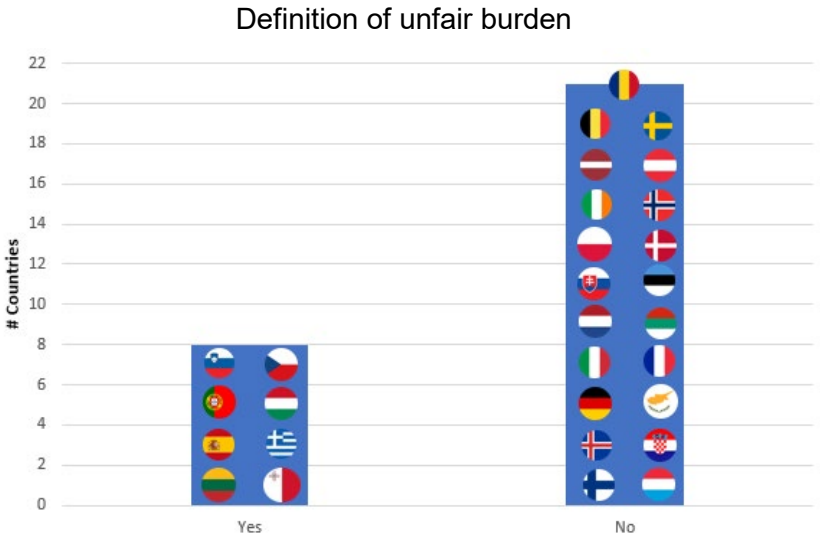

Figure 9. Countries that have defined methods of assessing the existence of an unfair burden

In the Czech Republic, there are two criteria: (i) net cost to profit and (i) net cost to revenue. The net cost compared to profit and revenues of the USP are compared with the values calculated for other companies in the electronic communications sector to assess whether the net cost compensation would be an advantage as compared to its competitors. Accordingly, no threshold for assessing net cost as an unfair burden for the universal service provider (USP) is specified.

In Greece, an unfair burden exists if the USO significantly affects the ability of the USP to earn a fair percentage return on capital employed, this is, if it affects the ability of USP to compete on equal terms with its competitors.

In Hungary, the burden is unfair when the net cost of providing the universal service is more than 1% of the net sales revenue of the USP´s electronic communications services for the year.

[60] According to the Report on the compilation of better practices that allow to improve the coverage and universalize the services and identify the development of models that allow reducing the digital divide connecting those who are not connected in neglected or insufficiently attended rural areas. In the case of the countries which form the Organization of American States, universal access funding comes from both operators through payments, incomes, rates, fines, fees, payment spectrum and by donations, financial yields and the general budget of the countries.

[61] Italy noted that they have developed a methodology for assessing eventual unfair burden applied for the previous regulatory framework that shall be fine-tuned when the definition of adequate broadband IAS will be approved.

In Lithuania, the unfair burden criterion are: i) the undertaking´s share of the relevant universal service markets in terms of revenues or number of the end-users shall be less than 20% and ii) the ratio between the amount of losses in the provision of universal service and/or losses in the provision of affordable universal service, and the provider's EBITDA profit earned during the reporting period shall exceed 3%.

In Malta, a universal service provider wishing to submit a request for funding shall provide the MCA with sufficient and detailed evidence to substantiate its claim that the provision of a universal service has resulted in the calculated financial unfair burden. When claiming for the net costs arising from the various components of the universal service obligations, any market benefits accrued by the universal service provider shall also be taken into account.

In Portugal, an unfair burden exists where: i) the net cost arising from the provision of this service, is equal to or greater than 3% of the revenue obtained with this service; or ii) the criterion of point i) above is not fulfilled and the service provider is able to demonstrate that its competitive capacity in the market has been affected in a relevant way, taking into account, in particular: the evolution of profitability indicators and related metrics, market share, prices charged by the provider and competitors and the ratio of Internet Social Tariff customers/accesses to non-regulated market customers/accesses.

In Spain, an unfair burden exists where: i) there is a significant economic impact on the USP in providing the US. The US net cost is compared with parameters such as USP EBITDA, USP revenues and USP cost of capital; and ii) the market power of the USP, which is measured by the evolution of its share in markets such as retail fixed broadband or retail fixed telephony.

(iii) Net cost calculation

12 MSs (Austria, Belgium, Czech Republic, Cyprus, Greece, Hungary, Iceland, Latvia, Lithuania, Portugal, Slovenia, and Spain) have provided some insights as to how the Universal Service Cost is calculated.

In Belgium for calculating the USO cost several parameters are considered: i) Costs = CAPEX + OPEX; ii) Revenues and iii) Direct Net Costs (referred to as “Direct” because intangible benefits are not factored in) = Costs – Revenues. It is important to highlight that to effectively designate potential universal service providers, a more precise estimation of the USO cost (also including intangible benefits) would be necessary.

In Cyprus, Long Run Incremental Cost (LRIC) is defined as the model to be used to calculate the costs incurred by the USP. In Greece, a bottom-up model (Long Run Incremental Cost +) is developed by the US provider and is submitted with all required documents and data when claiming a compensation for the provision of the US services.

In the Czech Republic, the universal service obligation cost calculation is based on a calculation of total monetary amount of obligatory discounts for people with special needs (maximum discount CZK 200 per month can be compensated). In Slovenia, the incremental costs to provide US connection are calculated and the most economical solution must be chosen (satellite included). In practice, it means there is a cost cap equal to the level of costs of satellite connection. In Austria, the calculation is based on the net costs attributable to: i) elements of the communications services that can only be provided at a loss or provided under cost conditions falling outside normal commercial standards; ii). those end users who can only be served at a loss or under cost conditions falling outside normal commercial standards, while

taking into account the market benefit accruing to the provider under obligation, including intangible benefits and lifecycle effects.

In Hungary, the net cost of the universal service is defined as the difference between the costs that would not arise in the absence of the provision of universal services and the value of the revenues and indirect benefits from the provision of universal services.

In Iceland, it is evaluated the request which should include detailed information on the losses involved in the service and a breakdown thereof. In assessing the financial contributions, a report from a chartered accountant or instruct such a party to evaluate the profitability in the field of operation concerned may be demanded. It could also be demanded access to the accounts of undertaking in assessing the cost of universal service.

In Latvia, the net costs of providing access to new consumers are the costs that the universal service provider would incur without access, taking into account the income obtained from providing access. The calculation of net costs indicates only those costs incurred in connection with the specified service. The net costs of the universal service provider are calculated as the sum of the net costs of ensuring universal service obligations, which are formed from the amount of universal service determined for the universal service provider, which provides an additional benefit.

In the case of Lithuania, the amount of the contribution to the account of public electronic communications networks and/or public electronic communications service providers participating in the implementation of the compensation mechanism for universal service provision losses and/or affordable universal service provision losses is calculated according to the formula[62]: $I_i = \frac{PVTRP_i}{\sum_{i=1}^{n} PVTRP_i} \times UPN$

In Portugal, the net cost of the USO corresponds to the difference between the net cost, for the USP, of operating with the universal service obligations and operating without those obligations. It is calculated as the difference between avoidable costs and lost revenues adjusted for indirect benefits obtained. Net costs must be determined based on the values contained in the accounting records, operating data and other elements which are deemed necessary considering the methodology.

---

[62] where:

I_i - payment to the provider of public electronic communications networks and/or public electronic communications services;

$PVTRP_i$ - the income of a specific provider of public electronic communications networks and/or public electronic communications services received from the provision of public electronic communications networks and/or public electronic communications services during the reporting period, for which losses of universal service provision and/or affordable universal services are calculated compensation for loss of provision, excluding public electronic communications networks and/or public electronic communications service provider's income for these services, which it would not provide if it were not obliged to ensure the availability of universal services and provide universal services and/or obliged to provide affordable universal services;

n – the number of public electronic communications networks and/or public electronic communications service providers paying contributions;

i – index indicating a specific provider of public electronic communications networks and/or public electronic communications services participating in the implementation of the universal service loss compensation mechanism and/or affordable universal service loss compensation mechanism; i varies from 1 to n;

UPN - Loss of universal service and/or loss of affordable universal service approved by the Communications Regulatory Authority.

In Spain, the current USO calculation methodology establishes that there is a calculation of the Net Cost of Unprofitable Areas, Net cost of special measures to Disabled Users and Net Cost of end users benefiting social tariffs. In calculating the Net Cost of Unprofitable Areas, the first step is to divide the country into different areas according to the fixed network structure of the USP. Then for each area the costs and revenues of the USP related to US provision are allocated, resulting in a Net Cost for each area, which adds to Net Cost of Unprofitable Areas. For the Net cost of special measures to Disabled Users and Net Cost of end users benefiting social tariffs from the total cost of the USP for providing the services included the cap price is deducted, resulting in the Net Cost.

In summary, there are diverse sources among the MSs of funding in place (public, industry, public and industry), with an industry funding mechanism being the most common.

The 8 MSs have defined the method of assessing whether an unfair burden exists. The criteria for assessing it, are mainly based on the impact of the capability to compete, and loss of revenues by the US provider.

The information provided by the MSs about the US net cost calculation makes it difficult to draw conclusions. Generally, mechanisms established for universal service designation and administration should not be difficult to supervise in order not to preresent an excessive administrative burden.

4.5. Monitoring and compliance

It is at the discretion of individual MSs to decide whether or not to provide for monitoring and compliance of available universal services. an overview of the different access and regulatory responsibilities in the MSs, an assessment criterion regarding the quality of service to be provided, and other monitoring and compliance obligations of the universal service providers is set out below.

In the following countries, the NRA is solely responsible for monitoring the compliance of adequate broadband IAS: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Cyprus, Denmark, Finland, Germany, Lithuania, Greece, Hungary, Ireland, Latvia, Malta, Portugal, Romania, Slovak Republic, and Slovenia, Sweden. In the Netherlands and Italy, monitoring is within the responsibility of the respective Ministry; in Spain, both the NRA and the respective Ministry are responsible for monitoring. In Estonia, France, Iceland, Ireland, Luxembourg, Norway, and Poland, the law currently doesn’t provide for a monitoring procedure, which is why there is currently no competent authority’s responsibility.

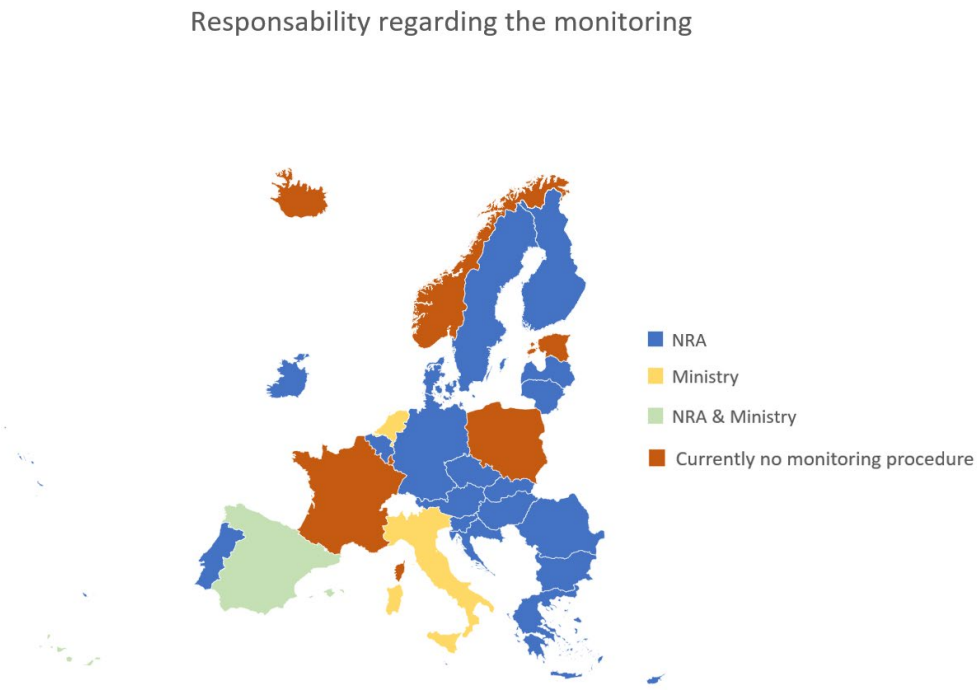

Figure 10. Responsibility regarding the monitoring

In Bulgaria, Denmark, Latvia, Slovak Republic, and Slovenia compliance with adequate broadband IAS obligations is only monitored if there are complaints (e.g., by affected end-users). The Czech Republic monitors compliance on its own discretion. Belgium, Croatia, Germany, Finland, Portugal, and Romania monitor compliance both on their discretion and based on complaints.

Belgium also reported that universal service providers must first be designated as a prerequisite for overseeing the compliance with obligations. On the basis of the information available at the time of writing, Belgium intends to establish quality-of-service requirements for adequate broadband IAS. The universal service provider should, guarantee a download speed of at least 10 Mbps, and by 2027, 30 Mbps every day of the year, at all hours of the day, except during a maximum period of one hour a day. Monitoring initiated by the NRA and monitoring on the basis of any end-user complaints were both considered; reporting obligations for the universal service provider were also mentioned as an additional option. Belgium plans to estimate the coverage of households by fixed technologies again as several deployment projects are currently undertaken by the operators in Belgium (National plan for fixed and mobile broadband; call for projects Last Mile; deployment of 5G and fibre in the German Community etc.).

In Austria, the Federal Ministry of Finance must review every five years whether adequate broadband IAS is being provided by the market under competitive conditions or not. In the latter case, the universal service must be subject to a public tender process and a corresponding contract awarded through a decision, in accordance with the procedural provisions on the procurement of services. The Netherlands requires providers to report regularly on adequate broadband IAS.

Cyprus, Greece, Hungary, Lithuania, Malta, and Spain adopt a mixed approach. Lithuania had conducted a survey on quality-of-service parameters, which revealed that five out of 60 municipalities do not provide telecommunications services on a commercial basis that meet the technical requirements for universal service. The Lithuanian NRA issued an order on 21 April 2023 obliging one provider in each of these five municipalities to provide universal service; the universal service obligations entered into force on 1 July 2023. In Malta**,** a designated provider of adequate broadband IAS as part of the USO is required to report annually on (1.) the type of technologies used as well as the underlying connection at a fixed location to an end-user, (2.) functional characteristics of the service, (3.) the supply time for the initial connection to an end-user's premises and (4.) and the type of premises (residential, business, or not-for-profit organisation) connected and their location. Spain stated that quality-of-service of adequate broadband IAS is also subject to its monitoring procedure.

Adequate broadband IAS is not subject to quality-of-service targets in Austria, Croatia, Czech Republic, Cyprus, Denmark, Estonia, Finland, Hungary, Iceland, Latvia, Luxembourg, Norway, Sweden, Slovak Republic, Romania, and The Netherlands.

Greece has issued a Quality-of-Service Regulation for universal services, which sets out the following requirements for broadband Internet access: The percentage of fault report per line must not exceed 13.5 per 100 connections per year. 95% of connection faults must be repaired within 144 hours; 85% of connection faults must be repaired within 72 hours; 70% of connection faults must be repaired within 36 hours. The deadline for initial connection states that, universal service providers may not exceed a period of 12 weeks in 99% of cases. A time limit of 9 weeks applies to 95% of cases and a time limit of 3 weeks to 80% of cases. With regard to the technical definitions and the measurement methods, the regulation refers to the ETSI EG 202 057 standards. In Lithuania, 95 percent of orders to provide universal services must be fulfilled within a period of no longer than 60 calendar days; in cases where providers on a commercial basis offer to provide access to a public electronic communications network, orders for the provision of universal services must be fulfilled within the same time frame as for the fulfillment of orders for the provision of other voice communication services and/or Internet access services offered by these providers. In Portugal, the Internet Social Tariff must be activated 10 days after the provider receives the information from ANACOM that the end user fulfills the criteria to have access to the Internet Social Tariff. Further quality of service requirements will be addressed by the Quality of Service Regulation, as it develops.

In Malta, a designated undertaking is required to supply the broadband IAS and/or voice communications services (that meet or exceed the established minimum functional characteristics), including the underlying connection, to the end-user's premises within a maximum period of 30 calendar days after the eligible end-user has placed his/her order with the designated USP. Such a period may not apply if the MCA considers that there are justified exceptional circumstances that make it difficult for the designated undertaking to provide the service(s) within such a period."

In Slovenia, the General Legal Act on the quality of universal service stipulates that the universal service has to be at the same quality as comparable services available on market (to prevent discrimination due to affordability or accessibility reasons). Belgian (designated) universal service providers must guarantee a download speed of at least 30 Mbps every day of the year, at all hours of the day, except during a maximum period of one hour a day. The rationale behind this requirement is to make sure that users have continuous access to internet

(with the exception of one hour) and to incentivise universal service providers to make sure that their service is of high quality.

In Spain, the initial connection supply time period is limited to a maximum of 60 days and the download speed must stay above 1 Mbps during a rolling observation period of 24 hours; and any service interruption time must be less than 24 minutes per month. In Portugal, the connection period of adequate broadband IAS may not exceed 10 days, starting from the receipt of the NRA's notification that the respective end user fulfills the criterion to have access to adequate broadband IAS.

In summary, NRA-led monitoring procedures are in place in the majority of MSs. Some MSs initiate these procedures *ex officio*, while others do so only in response to end-user complaints; in some countries, such as Greece and Spain providers are also required to report to the competent authority at regular intervals on the universal service they provide. However, a few MSs do not have any monitoring procedures. Only Belgium, Greece, Lithuania, Portugal and Spain impose precise, technically specified quality of service levels on universal service providers.

5. Other aspects of adequate broadband internet access service and future challenges

This section covers other aspects of adequate broadband internet access service such as whether the pandemic had any impact or not the definition of adequate broadband internet access service or the list of online services (Annex V) that must be supported. Other factors which might affect it and future challenges are reviewed.

Most of the countries stated that the pandemic did not affect the definition of adequate broadband internet access service or the list of online services that must be supported. Only two (Slovenia and Belgium) stated that this has had an impact on the definition, namely speed parameters. In Slovenia, the upload and download speeds were increased to meet the needs of an average family of two adults and two children (light remote work and light remote learning). BIPT in Belgium stated that online training, online education, and homeworking, among other activities, are an example of the increase in consumer demand for online services since the pandemic. Several users in the same household need to access these new online services simultaneously which means that a shared 10 Mbps might need to be increased to share.

Findings in studies published after the Covid-19 pandemic show that both the importance and the frequency of engaging in telework, teleconferencing, online learning (e-learning), telehealth, and online shopping (e-shopping) significantly increased during COVID-19 compared to pre-COVID-19. Using data from a nationwide survey Greece (2021)[63], report substantial increases in importance for telework (31% increase), teleconferencing (34% increase), online learning (34% increase), and telehealth (21% increase). Those who, teleworked, teleconferenced, and made video calls with family or friends on a daily basis, quadrupled during COVID-19, while daily online learners increased seven-fold. Concerns about the digital divide have been particularly acute during the COVID-19 pandemic as the internet and digital devices have played an important role in allowing people to access

[63] https://www.sciencedirect.com/science/article/pii/S2210670721004637

services, attend medical appointments and stay in touch with friends and family. O'Sullivan et al. (2020)[64] reflect on the rural primary healthcare response during the COVID-19 pandemic and state that rural communities have nuanced risks related to their mobility and interaction patterns coupled with heightened population needs, socio-economic disadvantage, and access and health service infrastructure challenges. This requires specific risk assessment and communication that addresses the local context.

Given the natural evolution and development of technologies, in accordance with national circumstances, the list of minimum services that comprise an adequate broadband IAS might be the subject for periodical re-evaluation.

6. Conclusions

The European Union focuses on the universal service as a safety net to ensure that a set of at least the minimum services are available to all end-users. Universal service is one aspect in the complex of measures to close the digital divide. EC provides the periodic review of the scope of universal service considering social, economic, and technological developments, taking into account, inter alia, mobility and data rates in the light of prevailing technologies used by the majority of subscribers. A number of studies and surveys take into consideration the relevant level of technologies as a basis for the legislative proposals and reports adopted by BEREC directly or indirectly meeting the target of the end-users' social inclusion. Periodical adaptation of the services that make the social inclusion in the context of universal service must be considered in time to evolve and adapt according to technological development.

Recent change of universal service now includes adequate broadband IAS within its scope. The implementation of the universal service regime varies significantly among MSs as the definition of adequate broadband IAS varies according to the current infrastructure deployment in each territory. There are currently 18 MSs which have defined the concept of adequate broadband IAS while 2 countries have stated that they have not, and 9 countries informed that they have not yet, due to pending decisions or other various reasons.

The state of play is also different among MSs in respect of the obligations and designation processes. Only 9 MSs have designated service providers to ensure universal service, including adequate broadband IAS, at a local or national level. The majority of the MSs reported that they have not yet imposed obligations or do not intend to consider imposing any obligations.

The most common level of a minimum download speed is 10 Mbps, although there are a few MSs which defined adequate broadband IAS with lower data speed parameters or took different approaches relying on other parameters. However, some countries have set, or are planning to, determine a 30 Mbps value for this parameter. Besides Malta, which had already defined 30 Mbps in 2021, also Belgium, Luxembourg, and Spain are also considering the same data speed.

Monitoring of universal service is mostly performed by NRAs (in 20 MSs out of 29 MSs who responded). Some of the MSs initiate these procedures ex officio, while others do so only in response to end-user complaints; in some countries, providers are also required to report to the competent authority at regular intervals on the universal service they provide. However, a few MSs do not provide any monitoring procedures.

[64] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7450525/

Among the MSs there are diverse sources of funding of universal service in place (public, industry, public and industry and other), being the industry funding mechanism the most common.

Summarising the observed aspects, the recent developments and newly raised need for the end-users, especially during Covid-19 pandemic (i.e., challenge for digitalisation of healthcare or telework), show that the list of the minimum set of services of adequate broadband IAS, enjoyed by the majority of the end-users, should be further carefully assessed periodically and a revision of quality of adequate broadband IAS should be scheduled in light of national conditions and technological development.

Annex 1. List of Participating Countries/NRAs

The following countries / NRAs have provided data for the Report:

AT Austria (RTR)
BE Belgium (BIPT)
BG Bulgaria (CRC)
CY Cyprus (OECPR)
CZ Czechia (CTU)
DE Germany (BNETZA)
DK Denmark (ADSI)
EE Estonia (ECPTRA)
EL Greece (EETT)
ES Spain (CNMC)
FI Finland (TRAFICOM)
FR France (ARCEP)
HR Croatia (HAKOM)
HU Hungary (NMHH)
IS Iceland (ECOI)
IE Ireland (COMREG)
IT Italy (AGCOM)
LV Latvia (SPRK)
LT Lithuania (RRT)
LU Luxemburg (ILR)
MT Malta (MCA)
NL Netherlands (ACM)
NO Norway (NKOM)
PL Poland (UKE)
PT Portugal (ANACOM)
RO Romania (ANCOM)
SE Sweden (PTS)
SI Slovenia (AKOS)
SK Slovakia (RU)

Annex 2. Experience of FCC

Broadband Speed Guide, provided by FCC

Activity	Minimum Download Speed (Mbps)
General Usage	
General Browsing and Email	1
Streaming Online Radio	Less than 0.5
VoIP Calls	Less than 0.5
Student	5 - 25
Telecommuting	5 - 25
File Downloading	10
Social Media	1
Watching Video	
Streaming Standard Definition Video	3 - 4
Streaming High Definition (HD) Video	5 - 8
Streaming Ultra HD 4K Video	25
Video Conferencing	
Standard Personal Video Call (e.g., Skype)	1
HD Personal Video Call (e.g., Skype)	1.5
HD Video Teleconferencing	6
Gaming	
Game Console Connecting to the Internet	3
Online Multiplayer	4

Date Last Updated/Reviewed: Monday, July 18, 2022

Household Broadband Guide, provided by FCC

	Light Use (Basic functions: email, browsing, basic video, VoIP, Internet radio)	Moderate Use (Basic functions plus one high-demand application: streaming HD video, multiparty video conferencing, online gaming, telecommuting)	High Use (Basic functions plus more than one high-demand application running at the same time)

1 user on 1 device	Basic	Basic	Medium
2 users or devices at a time	Basic	Medium	Medium/Advanced
3 users or devices at a time	Medium	Medium	Advanced
4 users or devices at a time	Medium	Advanced	Advanced

Date Last Updated/Reviewed: Monday, July 18, 2022

Basic Service = 3 to 8 Mbps*| Medium Service = 12 to 25 Mbps| Advanced Service = More than 25 Mbps.Mbps (Megabits per second) is the standard measure of broadband speed. It refers to the speed with which information packets are downloaded from, or uploaded to, the internet.

A document was prepared by the Congressional Research Service (CRS) in 2021 which stated that «Congress may want to consider policy options that encourage a higher benchmark that closely reflects consumer usage, while taking into account anticipated deployment costs and feasibility» by referring to the Covid-19 Pandemic, which led some policymakers to call for symmetrical broadband speeds, with equal download and upload capacity. Pandemic-related remote work, schooling, and telemedicine has increased household demand for online video conferencing, and this requires upload capacity. This document also recovers a bipartisan letter of March 4, 2021, to the Secretary of Agriculture, Secretary of Commerce, FCC Acting Chairwoman, and Director of the National Economic Council, asking for an update to the definition of high-speed broadband to 100 Mbps both upload and download: «Our goal for new deployment should be symmetrical speeds of 100 megabits per second (Mbps), allowing for limited variation when dictated by geography, topography, or unreasonable cost».

On July 15, 2022, FCC Chair Jessica Rosenworcel circulated a Notice of Inquiry to her colleagues. This Notice of Inquiry proposes to increase the national broadband standard to 100 Mbps for download and 20 Mbps for upload and discusses a range of evidence supporting this standard, including the requirements for new networks funded by the Infrastructure Investment and Jobs Act. The FCC previously set the broadband standard at 25/3 Mbps in 2015 and has not updated it since. There is also a proposition that the Commission considers affordability, adoption, availability, and equitable access as part of its determination as to whether broadband is being deployed in a reasonable and timely fashion. In this communication, it is also highlighted that “The needs of internet users long ago surpassed the FCC’s 25/3 speed metric, especially during a global health pandemic that moved so much of life online” and “The 25/3 metric isn’t just behind the times, it’s a harmful one because it masks the extent to which low-income neighborhoods and rural communities are being left behind and left offline. That’s why we need to raise the standard for minimum broadband speeds now and while also aiming even higher for the future, because we need to set big goals if we want everyone everywhere to have a fair shot at 21st century success.”

According to «The State of Broadband 2022: Accelerating broadband for new realities» (ITU/UNESCO Broadband Commission for Sustainable Development) a family of four needs around 100 Mbit/s download speed and 35 Mbit/s upload to support good quality simultaneous videoconferencing whereas a single person requires 25 MB/s download and a minimum of 5

MB/s upload. Globally, median mobile broadband speeds were 30 Mbps down and nine up in March 2022 while fixed broadband stood at 63 Mbps down and 27 Mbps up. The median mobile speeds would just be sufficient for one person videoconferencing while the fixed speeds would be the minimum for a family. These are global medians so over half of households with broadband have insufficient quality for acceptable videoconferencing. There are wide differences in median download speed performance across income groups and region with North America leading (131 Mbps fixed and 68 Mbps mobile) followed by East-Asia & Pacific (52 Mbps fixed and 39 Mbps mobile) and Europe and Central Asia (57 Mbps fixed and 42 Mbps mobile).