Body of European Regulators for Electronic Communications

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BEREC Report on COVID-19 crisis – lessons learned regarding communications networks and services for a resilient society

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Introduction

The COVID-19 pandemic has had a significant impact on the European electronic communications markets. As lockdown measures were introduced across the European Union as of spring 2020, the demand for electronic communications services and electronic communications networks spiked significantly. The crisis has clearly demonstrated that connectivity is essential and a "must-have" for all sectors of society.

Since the beginning of COVID-19 pandemic, the European Commission (hereinafter: EC) and the Body of European Regulators for Electronic Communication (hereinafter: BEREC) were committed to participate to the collective effort to support individuals and businesses to continue their activities and maintain contacts as best as possible through the Internet, during these unprecedented times. BEREC and EC published the BEREC – European Commission Joint Statement[1] (hereinafter: Joint Statement) on 19 March 2020, in which they fully committed to ensuring an open Internet in the EU and to enforcing the provisions of the Open Internet Access Regulation (EU) 2015/21202 (hereinafter: Open Internet Regulation) and called on operators to closely cooperate with national regulatory authorities (NRAs) and competent authorities. Operators were also requested to promptly inform NRAs on any measures they might take to manage traffic congestion in their networks to ensure the necessary transparency for individuals and businesses and in order for NRAs and competent authorities to efficiently and effectively perform their regulatory monitoring tasks. To support these efforts, a special reporting mechanism (hereinafter: SRM) was set-up to ensure regular monitoring and reporting on the Internet traffic situation in each Member State. SRM summary reports were published periodically on the BEREC website.

On 30 November 2020, BEREC released an Overview[3] to summarise the experiences related to regulatory and other measures taken in the European electronic communications' market since the beginning of the COVID-19 crisis.

As it seems that the increased use of networks may become the new norm, BEREC has a clear role in monitoring the situation. Therefore, BEREC – in line with its Work Programme 2021 (WP 2021) – publishes this "*BEREC Report on COVID-19 crisis – lessons learned regarding communication networks for a resilient society*" (hereinafter: Report).

[1] Joint Statement from the Commission and the Body of European Regulators for Electronic Communications (BEREC) on coping with the increased demand for network connectivity due to the COVID-19 pandemic, BoR (20) 66 – https://berec.europa.eu/eng/document_register/subject_matter/berec/others/9236-joint-statement-from-the-commission-and-the-body-of-european-regulators-for-electronic-communications-berec-on-coping-with-the-increased-demand-for-network-connectivity-due-to-the-COVID-19-pandemic

[2] Regulation (EU) 2015/2120 of the European Parliament and of the Council of 25 November 2015 laying down measures concerning open internet access and amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services and Regulation (EU) No 531/2012 on roaming on public mobile communications networks within the Union

[3] (BoR (20) 234) Overview of the Member States experiences related to the regulatory and other measures in light of the COVID-19 crisis

Building upon this work, the Report focuses on the following main areas related to the situation resulting from the pandemic:

- measures adopted at national level with particular focus on the NRAs' actions in order to cope with the impact of the COVID-19 pandemic on the provision of electronic communication networks and services;
- assessment of the effects of the crisis on the industry;
- collection of case studies and potential regulatory lessons;
- identification of further necessary measures that NRAs might take in order to increase preparedness in case of future similar events and long-term readiness of networks in case of crises.

This Report also includes insights concerning commercial practices, traffic management, best practices and ways forward regarding a consistent application of the Regulation across the European Union.

BEREC launched a public consultation on the draft version of this Report. The public consultation lasted between 14 June 2021 and 9 August 2021. 8 stakeholders submitted contributions within the public consultation, which were carefully considered in the final report.

Additionally, relevant input stemming from an external study, commissioned by BEREC, '*Post Covid measures to close the digital divide - BEREC study with a forward-looking approach which could help NRAs in designing the right conditions to improve digital inclusion for all citizens*' is incorporated in this Report.

This Report constitutes a factual overview and is without prejudice to any assessment regarding the legality of the outlined measures.

1 Measures applied by the Member States

Immediately after the dramatic arrival of the pandemic, European institutions, countries and NRAs started cooperating to deal with the crisis situation from a multi-faceted perspective. This cooperation was conducted on the basis of the existing legal framework, which provided an opportunity to assess whether the legal framework is fit to address the situation caused by the pandemic. In this section, we provide an overview of the measures applied in the European countries based on the information BEREC gathered from its members. The information below is as of 30 May 2021.

1.1 Consumer related issues

In March and April 2020, many NRAs initiated information campaigns for consumers about the responsible use of electronic communications services in order to avoid network congestion. Consumers were provided with practical recommendations on the ways they could contribute to avoid congestion issues and support access to essential information, teleworking and distance learning applications by abstaining from downloading large files or streaming high-definition videos during peak hours.

1.1.1 Measures taken by the NRAs and public authorities

Several consumer protection measures were implemented by the NRAs and public authorities in the first stage of the pandemic and many of those measures have remained in place since then. In line with the Joint Statement, all NRAs have been monitoring the market with a special focus on the volume of traffic and zero-rating issues. This is further analysed in Chapter 2 of the Report.

In order to avoid congestion of networks due to the increased use of teleworking and online education, many NRAs (**AT, BG, DE, FR, HU, IE, LV, LT, PT, RS**) published guidelines and information for operators, consumers and special user groups about the responsible use of the Internet and tips how to adapt to the new circumstances. Furthermore, in order to limit the number of physical personal contacts, online shopping and payments were also promoted. In one country (**ES**) the five biggest network operators issued such guidelines by means of a joint press release.

Several countries (**MT, MK, RO, TR**) urged operators to postpone taking actions against subscribers, who usually pay their bills in retail outlets, since these users might not be able to settle their accounts in time, due to the restrictions measures. Operators were also invited not to charge them for late payment nor to suspend their service. Two countries (**PT**, **ES**) also introduced temporary measures to prevent service providers from suspending services during the declared state of emergency. Other countries (**DE**, **HU, HR, PT, SK**) also introduced temporary measures in order to ease the financial burden of the consumers and accommodate changes related to billing. These measures included free Internet services at a fixed location for students and teachers taking part in on-line education and the decrease of VAT for a limited period, the possibility for consumers facing unemployment or loss of income, to terminate their contracts without compensation to the service provider and the possibility to agree on a payment plan whenever there were unpaid invoices.

Another country (**IE**) established a process whereby queries or complaints to the NRA by critical or vulnerable users could be escalated for resolution. A related process was established between the NRA and the universal service provider to respond to such cases on an exceptional basis.

Several countries (**AT**, **BG, DE, EL, FR, IE, IT, LU, NO**) established a well-functioning new cooperation mechanism during the pandemic. It involved the NRAs, the relevant public authorities and ministries and also the operators. Some case studies related to the cooperation are further introduced in Chapter 3.1 of this Report.

1.1.2 Measures taken by operators

During the first phase of the pandemic, almost all operators in Europe launched various measures, mainly on a voluntary basis, to help consumers adapt to the new circumstances. As of March 2020, in every European country, due to the lockdowns, the massive use of teleworking and online education resulted in a considerable increase of Internet use. Therefore, the European service providers (**AT**, **BE, BG, CY, CZ, DE, DK, EE, EL, ES, FR, IT, IE, HU, HR, LU, LV, NO, MT, PL, PT, RO, RS, SK, TR**) initiated various measures to support citizens. These measures included expanding the volume of data given in tariff plans with a data cap, the suspension of the application of data limits in these tariff plans, an increase of mobile data allowances, and a free upgrade of the fixed connection speeds. In some cases, the offers were aimed at all users; in other instances, they addressed only specific categories of people, such as students or doctors.

Besides the internet access services, operators (**BG, DK, LT**) also offered discounts related to calls and SMSs, and special tariff plans were introduced. Some operators (**FR, DK**) also offered special support for their citizens who were abroad and unable to travel home because of restrictions. Several operators (**BG, DE, EL, ES, IE**) offered access to additional content or media services at no extra cost. Major content providers took proactive measures by modifying the transmission quality of their streaming services across Europe to ease the strain on the networks, while still providing high-quality content. In line with governmental initiatives or national legislation, in some countries (**BE**, **DE**, **IT, RS**), operators refrained from taking actions against late payers. Operators also supported accessibility, for example one operator (**SK**) made sign-language translation services free for persons with impaired hearing.

Finally, it should also be noted that operators did not only support the transition from the pre-COVID-19 era to the pandemic times but as service providers, they also had to reorganise and adapt their own activities to the national measures and circumstances. Physical customer services were shut down and moved to the virtual space and new procedures were established in order to handle new installations or reparatory works in compliance with social distancing requirements.

Both incumbent and alternative operators have coped with increasing demand for connectivity and avoid network congestion by upgrading their networks or backhaul infrastructures in order to ensure that customers be served with adequate capacity.

1.2 Disinformation and electronic communications

Some NRAs and governments (**BE**, **CZ, DE, EL, HR, ES, IE, IT, LT, PL, PT, RO, RS, SI**) stepped up their efforts against disinformation, concerning the alleged links between 5G and COVID-19. In a broader perspective, some national regulatory authorities, as well as governments, have launched initiatives around disinformation, especially online, covering matters relating to COVID-19. One country (**BE**) experienced that various websites promoted fake news and information on ways to prevent or treat infections from the virus. Another NRA reported (**DE**) that national warning apps and the national contact tracing app include information about the coronavirus and the situation as well as links to trustworthy institutions. Furthermore, public authorities keep the citizens informed using all kinds of media, such as TV, but also social media platforms. Few NRAs reported (**IT, RO**) that they launched the discussion with online platforms in order to stop the spreading of false information. One NRA (**IT**) also published three issues of its Online Disinformation Observatory specifically dedicated to Coronavirus, reporting the fact-checks, provided by independent fact-checkers, regarding some of the most widespread COVID-19 fake news in Italy and Europe.

1.3 Suspended or postponed activities/temporary licensing

Several countries (**AT, CZ, FR, HR, PL, PT, ES**) suspended or postponed some planned or ongoing procedures mainly related to spectrum awards. In some cases, the suspension of the 700 MHz band's auction is related to delays in the DVBT2 transition due to the need to ensure continuous DTT reception during the crisis and to restrictions on movement and field operations'. One country (**RO**) also reported the annulment of the payment of the annual spectrum fees for the use of frequencies for broadcasting due in 2020, while the postponement for some other categories was granted. This country licensed low-power radio frequencies in the FM band to ensure the soundtrack of drive-in events (e.g., cinema, live concerts) so that the public can enjoy the movies safely from their own cars, using radios.

Furthermore, one NRA (**IE**) also issued a licensing framework for the temporary assignment of additional spectrum rights of use, initially for three months, which could be extended for a further period. Besides spectrum, one NRA (**LT**) experienced delays related to market analysis.

1.4 Security

NRAs, other competent authorities and operators were jointly working towards ensuring the continuous availability of essential electronic communications services such as voice and Internet access, especially for critical infrastructures, national services and systems. Some national regulatory authorities prompted operators to adopt contingency plans and to continually assess and mitigate service continuity, integrity and security risks.

Based on the information received from the NRAs, several attacks against electronic communications infrastructures (e.g., masts and Wi-Fi equipment) were identified in some countries (**BE, DE, IE, HR, IT, PL**) (see table below)**.** Two countries (**HR, IE**) responded to the attacks by raising awareness of the serious consequences of such actions for the perpetrators and society at large. One NRA (**RO)** sent a questionnaire to the most important electronic communications providers concerning risk management. Providers took actions to avoid or mitigate the risks and threats identified. Furthermore, some countries (**BG**, **NO, PT, PL, SI,**

TR) have also issued warnings in response to an increase in fraud and cyber-attacks related to COVID-19.

Number of attacks against electronic communications infrastructures

Where?	How many?	When?
Belgium	3	18.04.2020
		14.07.2020
		31.10.2020
Germany	2	May 2020
Ireland	3	April 2020
Italy	6	March/April 2020
Croatia	1	15.04.2020
Poland	2	May 2020

1.5 Wholesale regulatory measures

At the beginning of the crisis, a few NRAs adopted extraordinary wholesale measures in response to the crisis. Examples of specific measures adopted to improve conditions of service provision are:

- reduction in the unit wholesale cost of the incumbent's copper and fibre Ethernet bandwidth (**IT**),
- early opening of the incumbent's new fibre cabinets (**IT**),
- fast provision of transport kits and VLAN (**IT**),
- request to the incumbent to make its infrastructure available in the whole territory of the country (**IT**),
- request to operators to increase bandwidth per consumer or voice interconnection capacity (**IT**),
- postponement of earlier adopted measures on margin squeeze tests which would result in changes to the contracted prices until 1 January 2021 (**HR**),
- the incumbent operator offered free/additional benefits at the wholesale level, if possible, to let alternative operators offer these benefits to their subscribers (**TR**).

1.6 Numbering issues

Several countries (**AT**, **CZ, IT, EL, HR, LV, LT, PT, RO)** assigned specific numbers to COVID-19 hotlines for medical purposes and to facilitate registrations for tests or information related to vaccination in order to avoid congestion to the common European emergency number, 112.

One country (**ES**) adopted temporary restrictions on number portability. Most of the mobile number porting not sold in a fixed mobile convergent bundle was carried out, however only a limited amount of fixed number porting was allowed as this required physical interventions at clients' homes.

1.7 Public warning systems

Since March 2020, public warning systems have been in use in some countries (**AT, DK, EL, PL**) in order to inform the public about the current crisis. One country (**AT**) introduced measures, which included, among other things, using SMS or mobile applications for public warning systems. These measures also introduced, only temporarily, the use of master data and location data of mobile users to send push-SMS to users in certain regions (e.g., users within a village under quarantine), or to users with specific master data (e.g., users above a certain age).

In another country (**DK**) prioritisation of calls over data was established, and emergency calls (112) had the highest priority. Warnings about risks and instructions were issued to Danish citizens abroad through text messages (SMS) and all **DK** subscribers received SMS with notifications from the police.

1.8 Contact tracing applications[4]

In many countries, new legislation was introduced requiring operators to share location data so that the relevant authorities could monitor compliance with restrictions on movement during quarantine or to enforce quarantine orders or, in other cases, to understand movements of the population and assess the health resources needed in every region. Almost all countries developed a dedicated app to assist in tracing citizens who returned a positive test for the virus, based on the prior consent of the individuals. Most of these apps use anonymised or pseudonymised data for tracking and recording the spread of the virus based on questionnaires (initial phase) and Bluetooth-based solutions (at a later stage) to record contacts and warn users if they were a close contact of a person who returned a positive test.

To ensure the interoperability of the contact tracing applications, countries agreed on a set of technical specifications to secure the exchange of information between national contact tracing apps based on a decentralised architecture. Currently, countries are working on the interoperability of the existing solutions.

On 19 October 2020, the EU interoperability gateway went live in order to exploit the full potential of contact tracing and warning apps to break the chain of COVID-19 infections across borders and save lives. The summarised data, which includes information on zero-rating of the applications, can be found in the Annex to the Report.

1.9 Any other activities during the COVID-19 pandemic

As a result of the spread of the COVID-19 various measures were introduced by the governments, affecting the daily functioning of the national regulatory authorities. Teleworking was introduced or further supported in every country. In some countries (**BE, DE, IE**), the telecommunication sector was identified as an essential area of public life, and special measures were introduced to maintain the functionality of the network infrastructures.

[4] Following the publication of the European Commission's Recommendation on 8.4.2020 and of the Common EU Toolbox for Member States on 16.4.2020, BEREC extended its monitoring exercise also to tracing apps.

NRAs had to also adapt to the new working and operational conditions (remote work, e-signature etc.) introduced in the countries.

2 The impact of the COVID-19 crisis

2.1 Financial impact of the crisis

According to most NRAs, the pandemic's overall impact on the financial position of operators was relatively modest, although some segments were significantly affected. Because of the reduced consumer mobility and restrictions on international travel, mobile operators reported a decline in roaming and visitor revenues. In some countries, device sales were also negatively affected (especially during lockdowns). Most European operators reported single digit increases or declines in turnover. Some countries indicated that the impact on operators could not be assessed yet, since financial reports for 2020 would only be available later in 2021.

The Southern European countries (**IT, ES, EL, HR**) reported the most significant impact, as they were hit harder by the reduction in roaming revenues and total operator revenues declined by low-to-mid single-digit figures. Four Central and Eastern European countries (**PL, CZ, HU, LT**) reported that operator revenues were stagnating or increased by low single-digit figures, with significant variation in individual segments' performance (fixed, mobile and IT services). In **PL**, a large operator (Orange Polska) also suffered from a significant (relative) reduction in net incomes. According to one NRA in the Central and Eastern European region (**HU**), smaller operators fared worse than larger operators, but some of the contributing factors were specific to the national situation. One country (**LT)** reported a significant (low double-digit) increase in investments in electronic communications infrastructure (related to fibre and 4G networks), while another one (**HR)** reported a similarly significant decrease in total investments, although noting that this decline could not be exclusively related to the pandemic.

Recent reports by the consultancy and research firm Analysys Mason (hereinafter: AM) support the overall assessment that the impact of the pandemic on operators has been relatively modest. According to AM, the financial performance of large operators during the first nine months of 2020 was strong relative to the economy: while revenue figures for most operators have fallen slightly, the overall impact on operator profitability was even more limited (with roughly flat profit margins).[5]

According to AM, many areas were not hit by the pandemic (e.g., fixed broadband revenue has continued to grow, "driven mainly by ongoing fibre roll-outs"), while there were some aspects of the telecoms sector that have been more significantly (negatively) affected. However, these impacts are expected to be transient. These include reductions in device sales,

[5] Analysys Mason's free report: https://www.analysysmason.com/research/content/comments/post-pandemic-landscape-ren02-ren01-rdmz0-rdmm0-rdmb0-rdmd0-rdmv0-rdmy0-rdcs0-rdvs0/. A more detailed companion report is available to Analysys Mason subscribers only.

roaming revenue and prepaid mobile revenue (in some countries), which were due to a decline in consumer income and reduced mobility (owing to lockdowns and global travel restrictions).

AM also reported a disruption of business spending trends, where revenue "declined sharply for most operators in 2020 and prospects for 2021 are uncertain" but suggested that the pandemic has also accelerated some positive trends, which might bring about new opportunities for operators, including a wider adoption of digital channels, a shift to remote working and the increase iin online consumption of services (esp. entertainment, healthcare and education).

Financial reports published in early 2021 by telecom operators [6](groups) appear to corroborate AM's findings:[7]

Group / Operator	Revenue growth y-o-y 2020/2019	EBITDA growth y-o-y 2020/2019	Evaluation
Deutsche Telekom group	+25.6% (globally; after US merger[8])	+41.6% (globally, adjusted EBITDA AL)	"A record breaking year for us"[9]
KPN	-2.4% (adj. / excl. divestments)	+1.4 (EBITDA AL excl. divestments)	"Delivered on 2020 outlook"
Orange group	+0.3% (includes non-telecom)	-1.0% (includes non-telecom activities)	"Resilient revenues in the context of Covid"
Swisscom	-3.1%	+0.6%	"2020 targets achieved"
Telenor group	-2% (globally), +0.4% (Nordics)	+1.7% (globally)	"Financial robustness confirmed"
TIM group	-12.1% (unadj.), -6.4% (organic)	-17.3% (unadjusted), -5.9% (organic)	"During 2020, TIM further boosted cash generation, both for ordinary and extraordinary operations"
TELE2 group	-2%	28,5% 2% (organic EBITDAAL)	"Financially, we closed the year delivering on our major targets given reasonable adjustments for the pandemic."

Owing to its traditional resilience and the increasing reliance on connectivity and digital services during the pandemic (being recognized as an essential service), the

[6] The operators in the table are selected based on available public information (their shares are publicly traded on stock exchanges, therefore are obliged to regularly report their financial results.
[7] Reports: Deutsche Telekom group, KPN, Orange group, Swisscom, Telenor group, TIM Group, TELE2
[8] https://www.ft.com/content/048a149a-af00-11e9-8030-530adfa879c2
[9] DT's financial report gives a more nuanced account: "It goes without saying that the pandemic has not left us unscathed. For example, temporary travel restrictions have resulted in lower roaming and visitor revenues. Our terminal equipment business also felt the squeeze, as did our corporate customer business."

telecommunications sector was less affected by the sharp decline of stock prices than most other sectors of the economy in February-March 2020.[10]

According to the ITRE report[11], the pandemic boosted the penetration of Information and Communications Technologies and digital adoption during the first wave, with "digital adoption" increasing from 81% to 95% in the EU. They note that digital industries were among the sectors that experienced the smallest drop in value added (-4.8%) during the second quarter of 2020 compared to the previous year. Their assessment suggests that the recovery outlook for the sector is also positive, and they expect that most digital industries which have been damaged by the crisis would start recovering during 2021 (and fully recover by 2022).

2.2 Open Internet perspective related to Regulation (EU) 2015/2120

Open Internet Regulation "establishes common rules to safeguard equal and non-discriminatory treatment of traffic in the provision of internet access services and related end-users' rights"[12]. "It aims to protect end-users and simultaneously to guarantee the continued functioning of the Internet ecosystem as an engine of innovation."[13] In doing so, Articles 3 and 4 of the Open Internet Regulation lays down a set of obligations which cover multiple aspects of the provision of internet access services. The aspects presented in the following sub-chapters refer to examples of issues and practices encountered in various European countries during and, mainly, related to COVID-19 pandemic as they were presented by NRAs via the SRM. Additionally, 29 NRAs **(AT, BE, BG, CH, CY, CZ, DE, DK, EE, EL, ES, FI, FR, HR, HU, IE, IT, LT, LU, LV, MT, NL, NO, PL, PT, RO, RS, SI, SK)** replied to a questionnaire in the beginning of March 2021 aiming to better understand how different stakeholders dealt with the impact of the COVID-19 pandemic.

2.2.1 Commercial practices

Any agreements and commercial practices providers of internet access services might have deployed (or will deploy) during the COVID-19 pandemic are subject to the provisions of Open Internet Regulation and the BEREC Open Internet Guidelines[14].

Article 3(2) establishes freedom of contract for providers of internet access services while clarifying that this freedom is limited where end-users' rights, according to Article 3(1), are affected:

> *„Agreements between providers of internet access services and end-users on commercial and technical conditions and the characteristics of internet access services such as price, data volumes or speed, and any commercial practices*

[10] https://www.adlittle.com/sites/default/files/reports/adl_covid-19_response-compresse.pdf; https://www.mckinsey.com/business-functions/risk/our-insights/covid-19-implications-for-business
[11] https://www.europarl.europa.eu/RegData/etudes/STUD/2021/662903/IPOL_STU(2021)662903_EN.pdf
[12] Art. 1(1) of the Regulation (EU) 2015/2120
[13] Recital 1 of the Regulation (EU) 2015/2120
[14] *BEREC Guidelines on the Implementation of the Open Internet Regulation*, BoR (20) 112, https://berec.europa.eu/eng/document_register/subject_matter/berec/regulatory_best_practices/guidelines/9277-berec-guidelines-on-the-implementation-of-the-open-internet-regulation.

conducted by providers of internet access services, shall not limit the exercise of the rights of end-users laid down in paragraph 1.“

End-users‘ rights are specified in **Article 3(1)**:

„*End-users shall have the right to access and distribute information and content, use and provide applications and services, and use terminal equipment of their choice, irrespective of the end-user's or provider's location or the location, origin or destination of the information, content, application or service, via their internet access service*.“

Recital 7 makes clear that provisions of the Open Internet Regulation (safeguarding open Internet access would be circumvented if agreements or commercial practices were to lead to a restriction of end-user rights. BEREC, in its revised Open Internet Guidelines (paragraph 37)[15], has clarified the relationship between the Articles 3(1), 3(2) and 3(3) stipulating:

“*Neither the rights as set out in Article 3(1) nor the requirements of Article 3(3) can be waived by an agreement or commercial practice otherwise authorised under Article 3(2)*.”

With these provisions the Open Internet Regulation and BEREC Open Internet Guidelines provide a clear framework ensuring end-users' rights while at the same time giving room for economic activities of internet access service providers. This holds also under conditions of COVID-19 pandemic. Most of the commercial practices introduced to cope with the COVID-19 pandemic referred to zero-rating of certain applications and the specific national examples below illustrate the variety of zero-rating practices witnessed at national level and subjected to a case-by-case assessment by NRAs.

It is to be emphasized that the following paragraphs relating to zero-rating reflect the situation **prior to the European Courte of Justice's decisions from 2 September 2021** on zero-rating tariff options proposed by two German internet service providers (ISPs). Against this background, BEREC has observed that the way in which the Court of Justice tackled the cases calls for an update of BEREC's guidance on zero-rating[16] which will be done in the near future

Zero-rating of educational content:

In several countries (**BG, DE, EL, HU, IE, IT, RO, RS, TR**), operators offered zero-rated e-education content. One country (**IE**) specified that this related to websites identified by the Government, while other (**DE**) referred to a discussion in 2020 about the introduction of a so-called education flat rate. In order to improve the situation for home schooling, German

[15] See also *BEREC Report on the outcome of the public consultation on the draft BEREC Guidelines on the Implementation of the Open Internet Regulation*, BoR (20) 111 – https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/9276-berec-report-on-the-outcome-of-the-public-consultation-on-draft-berec-guidelines-on-the-implementation-of-the-open-internet-regulation, p. 15.

[16] See BEREC's press release on 6 October 2021 – https://berec.europa.eu/eng/document_register/subject_matter/berec/press_releases/10047-press-release-berec-will-update-guidelines-following-the-court-of-justice-rulings-on-zero-rating-publishes-recently-adopted-reports-and-calls-for-stakeholders-input.

politicians suggested that mobile communications providers offer low-cost tariffs with access to educational content for students whose parents cannot afford Internet access. DTAG as well as Vodafone are now offering the first corresponding tariffs as business customer offers (since October and November 2020, respectively). To ensure that planned offerings for an education flat rate are in line with the requirements for open Internet, the German Federal Network Agency (BNetzA) entered into a dialog with the network operators at an early stage (note: ISPs are not subject to ex-ante approval of their offers. There was no formal decision taken by BNetzA). Sub-Internet services are not allowed as set out in the BEREC Open Internet Guidelines. However, BNetzA pointed out that there may be legitimate interests of the end-user to apply filtering in the endpoints. For example, schools can specify which content is considered educational content and block certain other content. Accordingly, with the current tariffs, there is neither a determination of educational content nor filtering in the network by the internet access providers in Germany.

Zero-rating of COVID-19 tracing applications:
COVID-19 tracing applications were reported in 25 countries (**AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, HR, HU, IE, IT, LT, LV, MT, NL, NO, PL, PT, SI, TR**) out of which in four (**DE, EE, ES, TR**) they are zero-rated by all operators, while in other two (**CZ, IT**) only one operator is zero-rating their national application. The list of COVID-19 tracing applications is presented in Annex I.

Zero-rating of websites dedicated to COVID-19 issues:
In some countries (**CZ, IE, NO, RS**) websites dedicated to COVID-19 issues were zero-rated.

Other practices (e.g., increased data volumes):
In some countries operators temporarily provided their customers with additional data volumes for their mobile subscriptions without any additional charge (**AL, AT, BE, BG, CY, CZ, DE, EE, EL, ES, FR, HU, HR, IE, IT, LU, ME, NO, PL, PT, RO, SK, SI, TR**) for example, to alleviate e-education or help medical staff during the crisis. Additionally, some operators offered discounts for mobile packages (**EL**), offered pay TV content at no cost (**AL, BE, BG, DE, DK, EL, EE, FR, HR, HU, IT, LT, LU, ME, MT, PT, SI**), provided free mobile minutes and text messages (**EL**, **DK**) or also increased amount of mobile data to customers who were stuck outside their country (**DK, FR**), temporarily provided web-conferencing services for free for schools and companies (**DE**) or increased the mobile speed that applies beyond the included data volume (**DE, FR**).

2.2.2 Traffic management

When drafting the Open Internet Regulation, EU legislators considered the eventuality of situations of network congestion (e.g., due to emergencies) allowing providers of internet access services in these cases to absorb such impending network congestion through appropriate traffic management measures under certain conditions. A provision was also included for such cases, namely that equivalent categories of traffic must continue to be handled equally, even in exceptional circumstances. Furthermore, such measures may only be applied "*except as necessary, and only for as long as necessary*". This underlines the exceptional nature of these measures.

Article 3(3) reads as follows:

> *"Providers of internet access services shall not engage in traffic management measures going beyond those set out in the second subparagraph, and shall not block, slow down, alter, restrict, interfere with, degrade or discriminate between specific content, applications or services, or specific categories thereof, except as necessary, and only for as long as necessary, in order to:*
> *(a) comply with Union legislative acts, or national legislation that complies with Union law, to which the provider of internet access services is subject, or with measures that comply with Union law giving effect to such Union legislative acts or national legislation, including with orders by courts or public authorities vested with relevant powers;*
> *(b) preserve the integrity and security of the network, of services provided via that network, and of the terminal equipment of end-users;*
> *(c) prevent impending network congestion and mitigate the effects of exceptional or temporary network congestion, provided that equivalent categories of traffic are treated equally."*

Recital 15 reads as follows:

> *"[…] Exceptional congestion should be understood as referring to unpredictable and unavoidable situations of congestion […]. Possible causes of those situations include […] large increases in network traffic due to emergency or other situations beyond the control of providers of internet access services. Such congestion problems are likely to be infrequent but may be severe and are not necessarily of short duration. The need to apply traffic management measures going beyond the reasonable traffic management measures in order to prevent or mitigate the effects of temporary or exceptional network congestion should not give providers of internet access services the possibility to circumvent the general prohibition on blocking, slowing down, altering, restricting, interfering with, degrading or discriminating between specific content, applications or services, or specific categories thereof. […]"*

The Open Internet Regulation therefore allows for a deviation from equal treatment, in order to "*prevent impending network congestion and mitigate the effects of exceptional or temporary network congestion, provided that equivalent categories of traffic are treated equally*". Where under such exceptional circumstances a higher capacity utilisation of the overall network makes it appear necessary to give higher priority for instance to video conferencing applications, based on the text of the Open Internet Regulation such higher priority should be given to all equivalent categories of traffic and not only to individual application providers. The requirement for such exceptional traffic management to be applied "*except as necessary, and only for as long as necessary*" is also reflected by requiring that "*recurrent and more long-lasting network congestion which is neither exceptional nor temporary […] should be tackled through expansion of network capacity*".

These provisions were highlighted in the Joint Statement, which reminded that they should be interpreted restrictively and that operators should take into account the following points:

- *"Operators need to objectively assess that the levels of traffic are very high compared to a similar reference period, and that absent the*

envisaged measures users would be negatively affected by the congestion

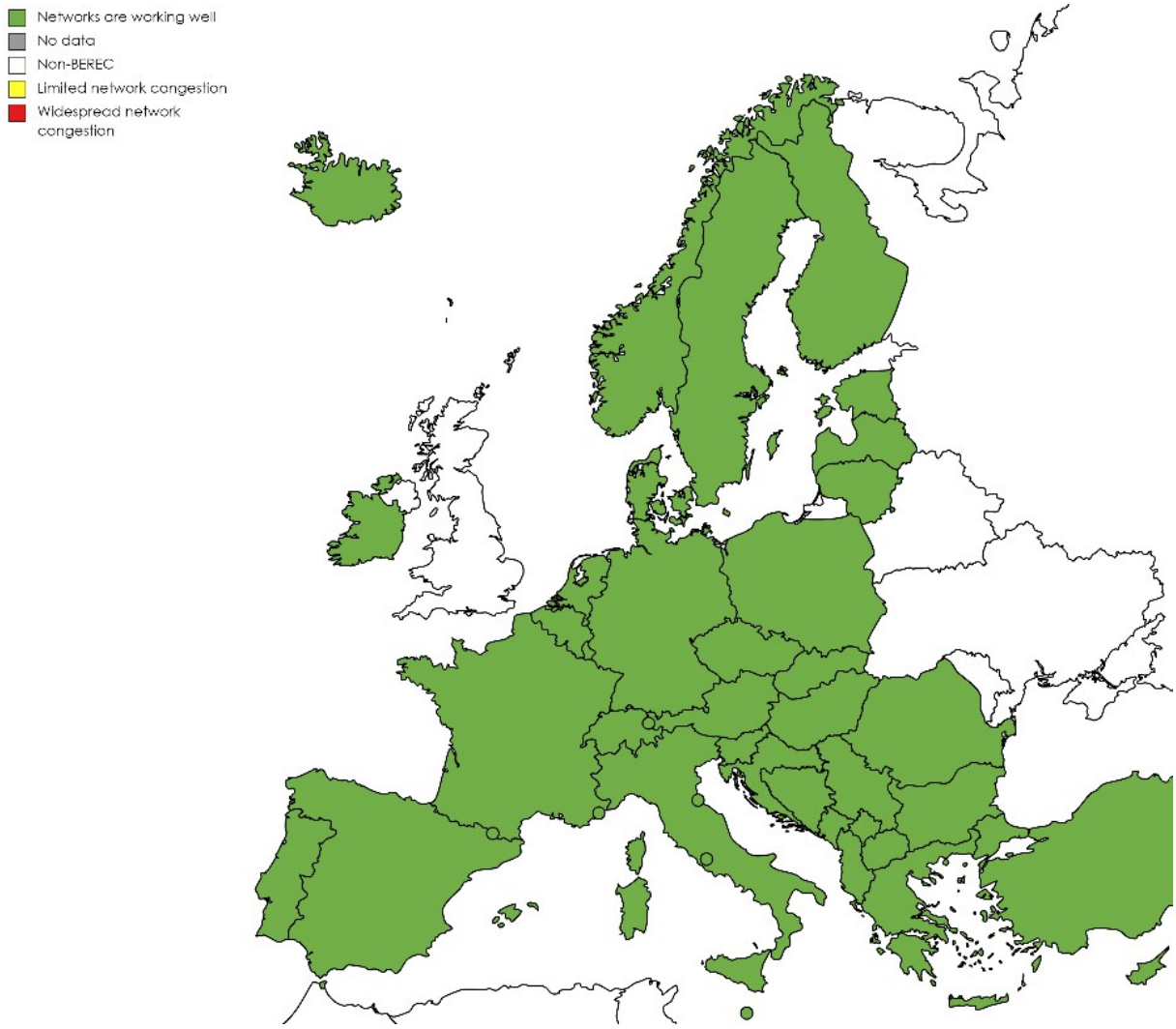
- *An exceptional congestion should be understood as referring to situations which – even when applying the highest standards of professional diligence in network management – result in unpredictable and unavoidable situations of congestion in mobile or fixed networks (e.g. possibly caused by multiple technical failures, unexpected changes in routing of traffic not under the operator's control, or large increases in network traffic linked to the current pandemic crisis or other emergency situations beyond the control of providers of Internet access services).*
- *When implementing exceptional traffic management measures, operators should consider proportionate solutions to the problem observed that would guarantee access to Internet to all users while being effective to manage congestion that might be caused by peak traffic, be limited in time to the strict necessary and ensure that equivalent categories of traffic are treated equally".*

The overall traffic on fixed and on mobile networks has increased during the COVID-19 crisis, but that even in the first weeks of the crisis and Europe-wide lockdowns, no major congestion issues have occurred. According to the information available, network operators have been able to cope well with this additional traffic load. Operators have increased capacity where necessary. Some local and temporary difficulties with the voice and internet access have been observed and mitigated but has not been considered to be out of the ordinary.[17].

[17] "Traffic light" illustration is available since October 2020 via SRM and is showing the overall status of telecommunications networks in the respective countries, based on the following categorisation:

- Green: Networks are working well, COVID-19 pandemic is not creating issues for the availability or general quality of IAS. No exceptional traffic management measures justified.
- Yellow: COVID-19 pandemic is causing limited congestion issues affecting the general quality of IAS (e.g., with 1 or 2 ISPs or networks). Exceptional traffic management measures might be possible but would require close scrutiny of the NRA under Regulation (EU) 2015/2120.
- Red: Severe and/or widely spread network congestion issues due to COVID-19 pandemic affecting the general quality of IAS and exceptional traffic management measures are likely justified and/or used.

Status of networks (based on information submitted by NRAs up to, and including, 30.04.2021)



Out of the 29 NRAs which replied to the questionnaire only two (**ES, IT**) stated that they conducted specific formal assessments of traffic management since the beginning of the COVID-19 pandemic, but without any breach of Open Internet Regulation being reported. In **RO**, ANCOM was entrusted (by means of the Decree of the President of Romania) with attributions to issue decisions regarding the blocking of specific content or websites that presented false news regarding the evolution of COVID-19 and measures of protection and prevention. Blocking the specific “fake” content (by interrupting the transmission in an electronic communications network or by interrupting its storage) or blocking the websites that presented false news was done either by hosting or content providers, or by Romanian electronic communications providers, when it was not possible to find out the identity of the hosting / content providers or when they were not under Romanian jurisdiction. As these blockings were done to comply with Romanian national legislative act, there was no need for a formal assessment (exception mentioned by Article 3(3)(a) of the Open Internet Regulation.

2.2.3 Transparency requirements

During the COVID-19 pandemic, the transparency measures for ensuring open internet access, foreseen in the Open Internet Regulation were still applicable. The objective of those measures is to enable end-users to make informed choices.

According to **Article 4(1)**, providers of internet access services must include, in any contract that includes internet access service, relevant information to end-users related to its service, and publish that information. In particular, **Article 4(1)(a)** establishes that providers of internet access services have to include *"information on how traffic management measures applied by that provider could impact on the quality of the internet access services, on the privacy of end-users and on the protection of their personal data"*. Therefore, they must provide an explanation of traffic management measures applied in accordance with Article 3(3) and a description of the possible impacts of those measures (i.e., how the traffic management measures might affect the quality of the internet access service, namely in cases of network congestion).

Article 4(1)(b) establishes the requirement on providers of internet access services to include *"a clear and comprehensible explanation as to how any volume limitation, speed and other quality of service parameters may in practice have an impact on internet access services, and in particular on the use of content, applications and services".*

As stated in **Article 4(1)(c)**, providers of internet access services have also to provide information on how services other than internet access services, referred to in Article 3(5), included in the end-user's subscription might impact the quality and availability of their internet access service.

In addition, providers of internet access services have to specify in the contract a set of speed values, in accordance with **Article 4(1)(d)**, so that end-users are informed of the speed they are able realistically to deliver and how significant deviations from the advertised speeds could impact the exercise of their rights laid down in Article 3(1).

In order to empower end-users, providers of internet access services have also to inform consumers of the available remedies *"in the event of any continuous or regularly recurring discrepancy between the actual performance of the internet access service regarding speed or other quality of service parameters and the performance indicated"* by the provider of internet access services, as stated in **Article 4(1)(e)**. The relevant facts proving a non-compliance may be established by any monitoring mechanism certified by the national regulatory authority, as laid down in Article 4(4).

In the beginning of COVID-19 pandemic, most of the NRAs' and ISPs' communications with end-users were related to alternative ways of contacting them, recommendations for rational and responsible use of the applications and services and promotional benefits. During this period, there were no significant transparency issues reported. As no country mentioned any derogations, the provisions of **Article 4** still applied as usual. End-users were still able to complain about non-compliance of performance, but no extraordinary figures were reported. Also, no formal assessments were reported in this regard, except **RO**, where ANCOM analysed the contracts concluded by some of the main ISPs and, also, by some of the smaller ones, but the assessment was part of the usual monitoring activities already planned for 2020.

2.3 Impact of the COVID-19 crisis on digital divide

BEREC has commissioned the iClaves-Esade consortium to prepare a study on the impact of the COVID-19 pandemic on the evolution of digital divide in Europe. The *Study on post Covid measures to close the digital divide* is published on BEREC's website[18].

According to the Study, „*the Covid-19 pandemic has had a major impact on digital divide, playing a dual role. On the positive side, it has accelerated the process of digitisation in many areas that would otherwise have taken years for their digital transformation. On the negative side, the pandemic has brought to light the pre-existing causes of the digital divide (mainly lack of access to high-capacity broadband, lack of adequate equipment in households, limited affordability of such access and equipment, lack of digital skills to use digital services and lack of accessibility of digital services) and it has accentuated the pernicious effects of digital divides (difficulty or impossibility of accessing key services in the fields of education and health, increased financial exclusion, difficulty or impossibility of interacting online with public administrations, greater exposure to online fraud, increased social exclusion).*"

The analysis shows that the cost of several ICT baskets as a percentage of monthly GNI per capita has become more affordable during the COVID-19 pandemic. "*A further analysis of the use of Internet shows that the pandemic has led to a reduction in the divide in some outcomes (e.g., the use of Internet in general terms), but that it may also have caused a widening of previous divides and a deepening in inequalities, a fact that the literature review also suggests*."

[18] Study on post Covid measures to close the digital divide developed by iClaves and Esade - Final Report, available at: https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/10076-study-on-post-covid-measures-to-close-the-digital-divide This document has been prepared for the Body of European Regulators for Electronic Communications (BEREC). However, it reflects the views only of the authors, and BEREC cannot be held responsible for any use, which may be made of the information contained therein.

3 Case studies

This chapter presents 7 case studies drafted by different members of BEREC in order to give illustrative example of measures taken during the crisis and to illustrate the variety of tools available to the regulator and the Internet ecosystem's players during this time-sensitive period. These case studies correspond to specific national contexts.

3.1 National cooperation/dialogue

National cooperation - FR case study

Description of the measure

During the crisis, multi-player dialogue was an important part of some NRAs strategy to get quick feedback on the situation and implement well-tailored and efficient tools (regulatory ones, soft law, communication campaigns). The coordination between various actors of the ecosystem, especially between operators and content and application providers, implemented in France among other countries, is an interesting example of such dialogue.

Fortunately, digital networks were able to cope effectively with the sudden and unprecedented increase in digital uses during the first lockdown. However, some content providers experienced overloads, which disrupted access to their services (videoconferencing, e-learning services, etc.) for a short adaptation period.

This exceptional period highlighted major content and service providers' impact on the networks. In addition to the actions of the operators to maintain networks, an efficient coordination process was established between various stakeholders, like operators and the main content and application providers. This helped them prepare for events that could have an impact on the networks' traffic load and it was one of the tools, which contributed to these players' resilience strategy. It also emphasizes the need for a proactive dialogue between operators and the main content and application providers, beyond the crisis.

Following a proactive dialogue initiated by the Government, or on their own initiative, "heavy" network users, such as video streaming platforms and online gaming platforms reduced the strain their content put on the network by capping the bandwidth their services required, by downgrading the quality of their videos and by scheduling downloads and service updates during off-peak hours.

Qualitative or quantitative impact of the measure

Thanks, on the one hand, to telecommunication networks' capacities and performance and, on the other, to the mobilization of the ecosystem's different players (operators, content and application providers, end users and public institutions), stakeholders' collaboration was efficient in responding to the COVID-19 first "hard" lockdown.

Challenges faced with during implementation

Clearly, working on time-sensitive solutions with various stakeholders can be considered a challenge in itself that was, fortunately, met. The same comments can also be applied to the implementation of urgent monitoring and reporting of networks with operators.

Lessons learnt/conclusion

The outstanding mobilization of all the ecosystem's players (operators, content and application providers, end-users and public institutions) was very valuable during the crisis where digital uses were more central than ever. For future work, this situation has emphasized the need for close collaboration between national (and European when relevant) ICT stakeholders to increase the ecosystem's resilience and react promptly to unexpected events that could have an impact on the networks' traffic load.

National cooperation - IT case study

Description of the measure

4 expert roundtables for permanent consultation with operators and stakeholders in the electronic communications sector (Technical Roundtables).

AGCOM - on 18 March 2020 - approved a first set of measures and initiatives implementing art. 82 of the Cura Italia Law Decree (n. 18 of 17th March 2020), aimed at strengthening the networks infrastructure and ensuring their operations continued, improving their availability, capacity and quality. In particular, the Authority deemed it appropriate to launch four permanent technical roundtables facilitating consultation with operators and stakeholders in the electronic communications sector, concerning several aspects of the different sectors and markets, as following:

- Telco and Consumers roundtable;
- Postal Services roundtable;
- Media Services roundtable;
- Digital Platforms and Big Data roundtable.

The Telco and Consumers Roundtable dealt with network management and relevant consumer protection issues, acting as the interface between AGCOM and the interested parties. Participants were requested to provide information and data on a list of topics and related initiatives taken by AGCOM, and to update them in a timely manner.

A first summary of all inputs received by stakeholders was published on 6 May on AGCOM's Website, illustrating the new measure put in place by AGCOM, the next challenges to be further assessed, possible actions under the remit of other competent authorities, and topics that had not been examined.

Qualitative or Quantitative Impact of the Measure

AGCOM's initiative was meant to stimulate interventions to upgrade the infrastructure and ensure the provision of quality electronic communication services in a period characterised by a sharp increase in the consumption of call services and traffic on the network (fixed and mobile). Therefore, up-to-date information and large-scale collaboration were needed.

Within the Telco and Consumers roundtable, AGCOM has undertaken a monitoring activity regarding data and voice traffic variations on fixed and mobile networks, as well as the analysis of further proposals received from operators and other stakeholders regarding the enhancement and the resilience of electronic communication networks and services during the pandemic.

The monitoring activity, involving all the major fixed and mobile operators, with a coverage of 99% of the fixed market and 97% of the mobile market, has allowed operators to quantitatively assess the impact of the pandemic on networks. The monitoring exercise is still ongoing and has confirmed a growing trend in traffic also in the first months of 2021, due to further restrictive measures imposed both at national and regional level. A dedicated report is periodically published on AGCOM's Website.

Based on such data and knowledge, and in coordination with the operators, AGCOM has rapidly approved a first package of measures addressed to electronic communications networks and services providers, in relation to the objectives of article 82 of the "Cura Italia decree". These measures are aimed at coping with the increase in the consumption of electronic communications services and the traffic on the network, as well as at meeting the needs of the different sectors, mainly the health sector, considered as a priority by the Government's or regional Crisis Units. The series of decisions taken by AGCOM with reference to Telecom Italia (TIM)'s commitment to improve the offer conditions of its network services (unit wholesale costs of the TIM copper and fibre Ethernet bandwidth; approval for early opening of new NGA Cabinets; extended use of broadband services to enable smart working and e-learning, etc.), are a clear and good example of such coordinated process. Besides monitoring, AGCOM asked all operators to make every effort possible to contribute to managing and overcoming the state of emergency.

Challenges Faced with during Implementation

There were no significant challenges apart from the difficulty of overseeing all the complex coordination set ups, arising from the need to manage several inputs and topical issues from different stakeholders in a short period of time and with a great sense of urgency and uncertainty. However, AGCOM has, over time, built up relevant expertise and specific skills for it. Furthermore, the relevant stakeholders have been very collaborative and willing to contribute developing and implementing the shared goals.

Lessons Learnt/Conclusion

The prompt decision of AGCOM to establish, early in March 2020, several expert roundtables, technical fora and other info-sharing platforms has indeed proven to be among the best decisions and tools to address all major issues and challenges during the COVID19 pandemic.

The technical roundtables can be considered a successful tool for designing effective measures, monitoring their impact, reassessing and/or modifying their scope and target, while collecting data and evidence directly from the stakeholder actively involved in the processes (with the typical process of documents/calls for input published by AGCOM and quickly analysed by stakeholders).

AGCOM's technical roundtables have provided solutions to several urgent issues, such as: the expansion of bandwidth capacity, traffic management, promotion of investments, consumer protection, agreements between companies, including temporary derogations from the regulations in force, and any other suitable initiative for the management of emergencies arising from the COVID-19 pandemic, ensuring coordination with AGCOM's regional bodies (Corecom).

3.2 Monitoring activity (incl. monitoring of complaints, consumer protection, QoS measurement)

Monitoring activity - PT case study

Description of the measure

Strengthening complaints monitoring and consumer protection:
Following the implementation of business intelligence tools during 2020, ANACOM was able to analyse in a swift manner complaints that were being submitted daily by end users, mostly through the Portuguese Electronic Complaints Book, which were then characterised. Teams were reorganized in order to ensure a timely and effective information analysis and response to end users' complaints and questions and weekly diagnosis and action points were made to ANACOM's board, reporting the problems end users were facing and the progress of the measures adopted. Based on this, ANACOM was able to carry out timely and consistent work reinforcing consumer protection during the COVID-19 crisis, namely: (i) publishing regularly highlights, frequently asked questions and a Consumer Guide about the impact of COVID-19 on consumers, recommendations and best practices; (ii) disclosing complaints data and information about consumers problems, first on a weekly basis and after monthly, through info-graphics; (iii) proposing to Government the adoption of new legal rules protecting end users from the impact of COVID-19 based on the analysis of complaints; (iv) questioning service providers about the measures adopted to address the issues most complained about, the impact of COVID-19 on their complaints handling procedures, the means of contact available to solve problems at a distance and the procedures in place to comply with the new exceptional legal rights of consumers regarding service maintenance without pay, contract termination or suspension based on loss of income and unemployment - and making all relevant information about these topics, collected from the most complained about services providers, publicly available through ANACOM's Consumer Website.

Qualitative or quantitative impact of the measure

Last year:

- ANACOM´s information guide about the impact of COVID-19 on consumer experience and rights was visualized around 9.000 times;
- ANACOM published on its Consumer Website around 110 information highlights and 18 new frequently asked questions about the impact of COVID-19 on consumers that were visualized over 55.000 times;
- ANACOM handled and answered to over 13,6 thousand complaints and information requests from end users, reducing by around 60% its average response time;
- Around 4,2 thousand consumers required the application of the new exceptional rules to their contracts, with an acceptance rate of 89% by service providers, according to the information collected and published by ANACOM;
- Although complaints about electronic communications raised significantly with the COVID-19 crisis during 2020, mainly about service faults, technical assistance, service connection, Internet speeds, etc., the complaints about the application of the new exceptional consumer rights to face the impact of COVID-19 stayed low.

Challenges faced with during implementation
Reorganizing teams and objectives during the early stages of adaptation to the new forms of work and life. Inspection work done in the field was suspended or limited during the last year. Legal deadlines to answer complaints by service providers were suspended during the first national emergency periods as with other legal deadlines, which made information access much slower.

Lessons learnt/conclusions
ANACOM strengthened the monitoring of complaints during the national emergency periods, which allowed for a quick and updated diagnosis of the most important end-users problems regarding the use of electronic communications services. This enabled for timely and effective intervention by ANACOM addressing those issues, whether by proposing new legal rules, making recommendations to service providers or ensuring that consumers were getting the information they needed about their rights and how to proceed to handle their problems. At the same time, ANACOM increased the publication of information about the complaints that were being received by the regulator, raising awareness about consumers' problems, and also questioned service providers about the impact of COVID-19 in the way they were handling complaints.

Consumer Protection Measures – IE case study

Description of the measure
As part of the Government led national response to the COVID-19 pandemic, on 15 April 2020 the Irish national regulatory authority (hereinafter: ComReg) and the Department (Ministry) of Communications discussed voluntary commitments from a number of telecommunications providers in Ireland (including via Irish Business and Employers Confederation (IBEC), Telecommunications Industry Ireland (TII)). The telecommunications providers committed to a number of minimum measures to help assist consumers ensuring the continuity of their broadband and voice services as well as access to essential services enabled by ECS during the national COVID-19 restrictions (these commitments were of a limited scope and duration relevant to the circumstances).

The commitments were designed to give consumers reassurance about communications usage, while maintaining the overall stability of the electronic communications networks, at a time when (a) people were relying much more on electronic communications services and (b) people were facing an unprecedented degree of economic and financial uncertainty. These voluntary measures helped to ensure that consumers who were financially vulnerable as a result of the COVID-19 crisis received from their service provider to agree an affordable solution for their voice and data service. Service providers could go beyond these minimum set of commitments and introduce additional measures for their customers. The commitments were in place until 31 August 2020.

Each service provider implemented these minimum commitments individually and in accordance with their own business drivers and service providers had full commercial flexibility on how they implemented the measures. The commitments were signed up to by the following

operators: BT Ireland, eir, Pure Telecom, Sky Ireland, Tesco Mobile Ireland, Three Ireland, Virgin Media Ireland and Vodafone.

The COVID-19 Consumer Commitments were as follows:

- Any fixed broadband customers who did not have unlimited data usage already as standard will be given the opportunity, if they required, to upgrade their package (which may be on a temporary basis), with their current service provider, without entering a new and further minimum term.
- Any customer who did not have fixed broadband and who relies solely on mobile access to the Internet would have the opportunity to avail of affordable unlimited mobile data access/package from their service provider.
- Fair usage policies would not be automatically applied to unlimited fixed and mobile data packages.
- Service providers could implement appropriate permitted traffic management measures to avoid network congestion.
- Access to healthcare and educational resource websites identified by the Government would be zero-rated for all customers where technically feasible.
- So that customers could remain connected during the crisis, service providers would engage with any customer that contacted them who was in financial difficulty as a result of COVID-19 and had difficulty paying their bills to agree the best way of keeping them connected to voice and data.
- Service Providers worked with ComReg in the event of complaints raised to ComReg by consumers, who considered they were not being treated in accordance with these commitments.

These commitments were implemented by operators[19] until 31 August 2020, with each providing details and implementation updates on their own websites.

ComReg monitored the implementation of the commitments made by ECS providers and any consumer who was in contact with their service provider and remained concerned that their service provider was not treating them in accordance with the voluntary commitments could contact ComReg's consumer care team to assist the consumer with the issue.

ComReg also monitored service providers' customer operations during the COVID-19 pandemic through regular meetings and ComReg also introduced a new customer care process regarding outages in circumstances where customers were particularly vulnerable.

ComReg created a new COVID-19 information section on its consumer website, containing information of particular relevance for consumers under the circumstances including – remote top-ups; consumer line operation hours, using Irish Text Relay Service, protecting your business phone system when working remotely, difficulty paying your bill, market research on use of electronic communications during COVID-19. ComReg also co-ordinated a network operators forum, where network stability and relevant operational issues were raised and discussed and fed back into national government and through the BEREC Special Reporting

[19] See press release: https://www.ibec.ie/connect-and-learn/media/2020/04/15/telecoms-industry-announces-covid-consumer-response-initiative
and ComReg website: https://www.comreg.ie/publication/comreg-welcomes-telecoms-industry-commitments-to-assist-customers-during-covid-19

Mechanism. These worked well and proved operationally efficient and effective in managing the information flow between industry and relevant State agencies.

Qualitative or quantitative impact of the measure

ComReg understands that in light of the growth in data usage during COVID-19 the measures concerning data and affordability were of real benefit to consumers. Many service providers introduced commercial offers that are still in place offering unlimited data packages where no fair use limits are applied. These commercial offers continue to satisfy demands for increased data.

The measures to ensure that people remain connected were especially important for those who are vulnerable or who were cocooning.

Challenges faced with during implementation

Implementing some of these measures presented operational challenges for the operators as they required changes to the existing operational procedures. Operators provided qualitative feedback on the impact of the measures, reporting that it was difficult to identify whether customers were merely amending their packages in response to their new circumstances or whether consumers' activity was a direct effect of the measures introduced by the operators. Some consumers incorrectly thought that their temporary upgrade to their unlimited usage was 'free' and ComReg received a number of complaints. Further, there was a lag in putting in place the websites that would be included for zero-rating purposes, resulting in a slower than anticipated implementation by service providers and consumers not being fully aware of the details of the measure.

Further, some service provider's consumer care facilities were adversely impacted when their staff were operationally impacted by local COVID-19 restrictions. In response, the majority of service providers rapidly moved to virtual call centres and experienced an increase in call volumes and associated complaints.

Lessons learnt/conclusion

Following the operational period of the voluntary commitments and as normal commercial activity resumed, ComReg anticipated that many of the commercial offerings and policies that were developed on foot of the commitments would continue to be available and provide ongoing benefit to consumers, whose demands and financial circumstances continued to be adversely altered. In this respect, ComReg welcomed the choice of unlimited offers in the market and ComReg called on service providers to continue to ensure that offers advertised as unlimited are in fact unlimited. ComReg also urged industry to continue to be mindful of the ongoing compromised financial circumstance of some customers and to be open to making appropriate accommodations in addition to continuing the pre-existing individual agreements with consumers under the voluntary commitments.

3.3 Spectrum auctions and temporary spectrum licensing during the pandemic

Temporary Spectrum Award – IE case study

Description of the measure

On 11 March 2020, the World Health Organisation ("WHO") announced that the novel COVID-19 could be characterised as a pandemic. The following day the Irish Government swiftly announced a suite of measures to tackle the extraordinary situation arising from the spread of COVID-19 in Ireland, including:

- the closing of schools, colleges and childcare facilities;
- the cancelation of large public gatherings;
- the closure of all public houses;
- requesting the public to cancel social gatherings; and
- encouraging people to work from home where possible.

The swiftness and impact of these measures resulted in significant changes to the normal traffic levels and patterns of the electronic communications networks ("ECNs") in Ireland.

Qualitative or Quantitative Impact of the Measure

Given the temporary and extraordinary situation presented by COVID-19 and the significant increased traffic demands placed on wireless networks arising from the Government measures to address same, and pursuant to requests from the affected operators, ComReg consulted upon and (with the consent of the Minister) put in place three consecutive licensing frameworks for the temporary assignment of spectrum rights of use[20]. These are:

- the Temporary ECS licensing framework (from 8 April 2020 to 7 October 2020);
- the Further Temporary ECS licensing framework (from 8 October 2020 to 1 April 2021); and
- the Further Temporary ECS licensing framework (No.2) (from 1 April 2021 to 1 October 2021).

Each of these licensing frameworks has provided for the temporary assignment of spectrum rights in the 700 MHz Duplex, 2.1 GHz and 2.6 GHz bands for an overall period of up to 6 calendar months from the date of the coming into operation of the relevant regulations.

Challenges faced with during implementation

There were a number of challenges and specific considerations presented to ComReg in order to implement this measure, including:

- To ensure that the spectrum was only made available to those that could readily use it. ComReg's consultative processes ensured that this aim was achieved and the three mobile

[20] See: www.comreg.ie/industry/radio-spectrum/spectrum-awards/covid-19-temporary-spectrum-management-measures/

operators, which were awarded temporary assignment of spectrum rights, began to use the spectrum without delay.

- To avoid any interference with existing services, ComReg also engaged with other interested parties and published co-ordination procedures, set out in Annex 4 of its initial Response to Consultation and Decision on Temporary Spectrum Rights in the 700 MHZ, 2.1 GHz and 2.6 GHz bands (Document Reference Number: 20/27)
- ComReg ensured that it was clearly understood that such temporary licensing frameworks are intended solely to address the temporary and extraordinary situation presented by COVID-19 and are entirely without prejudice to the award of long-term spectrum rights of use in the Multi Band Spectrum Award[21]. All applicants for these temporary licences have accepted same which they have in the Application Declaration Form when applying for a licence.

To date, temporary spectrum rights in the 700 MHz Duplex and 2.1 GHz bands have been issued to all three MNOs as detailed in the table on page 26.

Lessons learnt/conclusion

There has been a 67% aggregate increase in data traffic on mobile networks since the governments temporary measures were introduced in 2020, which indicates that the temporary assignment of spectrum rights was an appropriate initiative. This is further supported by the MNOs' submissions to ComReg's consultations, where all confirmed that the temporary spectrum rights have been used to provide additional network capacity which supports the provision of voice and data services to consumers in order to address the increased traffic demands arising from IE's COVID-19 measures. The extent of the actual deployment varies per MNO but has been widespread in all three cases.

[21] See: www.comreg.ie/industry/radio-spectrum/spectrum-awards/proposed-multi-band-spectrum-award/

	Spectrum Bands	Temporary ECS Licensing Framework		Further Temporary ECS Licensing Framework		Further Temporary ECS Licensing Framework (No.2)
		Initial Licence	Renewal Licence	Initial Licence	Renewal Licence	Initial Licence
Meteor	700 MHz Duplex, 2.1 GHz Band	9 April 2020 to 8 July 2020	9 July 2020 to 7 October 2020	8 October 2020 to 7 January 2021	8 January 2021 to 1 April 2021	2 April to 1 July 2021
Three	700 MHz Duplex, 2.1 GHz Band	9 April 2020 to 8 July 2020	9 July 2020 to 7 October 2020	8 October 2020 to 7 January 2021	8 January 2021 to 1 April 2021	2 April to 1 July 2021
Vodafone	700 MHz Duplex, 2.1 GHz Band	22 April 2020 to 21 July 2020	22 July 2020 to 7 October 2020	8 October 2020 to 7 January 2021	8 January 2021 to 1 April 2021	2 April to 1 July 2021

Spectrum Award – HU case study

Introduction

Following the COVID-19 pandemic, a number of regulatory actions and procedures have been delayed in several EU Member States. There are exceptions, though, where ongoing procedures were fast-tracked and finished ahead of time under strict security measures.

The COVID-19 pandemic reached Hungary in early March 2020 making it necessary to implement strict measures for the sake of protecting employees' health both by the National Media and Infocommunications Authority (hereinafter NMHH) and the Government of Hungary. NMHH set the conditions for teleworking while the Government announced the **State of Emergency.**

The prolonged duration of the pandemic jeopardised the sustainability of the original timescale for NMHH's spectrum bands auction project. Even the feasibility of the project was put at risk, jeopardising the timely awarding of the **900 MHz and 1800 MHz spectrum bands**. The awarding schedule played a key role as this auction affected spectrum bands that are currently in use and also because of the explicit request of industry stakeholders for a full year of spectrum band availability, for the purpose of allowing for preparations for the smooth transition foreseen for April 2022 and for **ensuring continuity of service**.

In the interest of keeping the original deadlines, the period of the pandemic was highlighted as a risk in the **project** and, accordingly, the protection of the health of project participants was prioritized, together with pursuing the feasibility of the project even at the cost of additional expenses **mitigating risk factors**.

Description of the measure

- Instead of personal meetings, **online consultations** were held (via 'Microsoft Teams' and 'Skype').
- Even at the initial stage of the awarding procedure the **use of medical protective equipment** became compulsory (face masks, rubber gloves, disinfection materials, non-contact thermometers) during necessary personal meetings, whereby colleagues were expected to show discipline and compliance.
- Unconventionally, the **public consultation** - part of the awarding procedure - was held in a large room applying a **hybrid solution** making offline and online participation also possible.
- Participating colleagues from NMHH formed **two equal groups** for testing and preparing the auction location. Tests were made at different times by the groups avoiding personal interaction.
- For consultation purposes, health protection measures and expectations applied at participating bidding companies were collected in the form of a so-called "**COVID declaration"**.
- Parallel to special health protection measures a **medical service provider** was involved in ensuring health checks were conducted upon entry to the venue, testing, regular disinfection and airing.
- On-site bidders and NMHH colleagues were obliged to have a **PCR test** several times during the auction. Entry to the venue of the auction was only possible with a negative PCR test and body temperature measurement.
- Representatives of on-site bidding service providers were required to participate in a **hermetically isolated bidding booth of an appropriate size** in order to ensure participants' health protection and social distancing.
- At the final stage of the awarding process a reserve day was designated between the test auction day and the actual auction day as a guarantee to mitigate eventual risks. It was also preferred to do the on-site **awarding of both spectrum bands within the same day of the actual auction.**

Qualitative or quantitative impact of the measure

- Implemented measures caused little increase in costs; at the same time, the original deadlines could be kept due to the management of change.
- Mutual trust and cooperation between NMHH and participating service providers were strengthened, priority was saving human lives.
- NMHH staff motivation increased.

Challenges faced with during implementation

- No previous protocols or precedents existed for the hybrid (personal and online presence at the same time) public consultation; therefore, compliance with legal obligations and on-site application of health rules had to be examined separately.
- Construction of the auction venue (redesign) was largely influenced by compliance with health expectations as well as existing (legal, technical, economic) conditions.

Lessons learnt/conclusion

As a result of the extensive implementation of health protection measures a successful awarding procedure could be organised and concluded with satisfied service providers and record revenues[22]. Measures implemented – contrary to extreme conditions – elevated the sense of safety both in NMHH staff and representatives of service providers. **All participants tested negative for COVID-19** during the successfully organized auction procedure.

[22] https://english.nmhh.hu/article/217525/Mobile_frequencies_expiring_in_2022_sold_for_1502_billion_forints

3.4 e-Contract termination

e-Contract termination – TR case study

Description of the Measure

A new service called “e-contract termination” allows the termination of subscriptions through the e-Government gateway, which entered into force in TR. The need for contact between consumers and operator employees has been eliminated with this regulation. Subscribers can enter the e-Government gateway by providing established security criteria can apply for the termination of a subscription of their choice from the listed subscriptions. The service informs the subscribers if the termination application is rejected due to an incomplete application. Subscribers are also notified by the e-Government gateway when e-contract termination is completed.

Qualitative or Quantitative Impact of the Measure

First of all, consumers shared their positive feedbacks with the NRA, BTK, as they could apply to terminate their contract without leaving their homes or offices and without directly contacting operator employees during the COVID-19 pandemic.

After the e-contract termination service began to be offered, thousands of consumers terminated their contracts without physical contact in October 2020.

As of the end of March 2021, 263.943 subscribers applied for contract termination by using the service and the vast majority of applicants terminated their subscriptions as a result.

Challenges Faced With During Implementation

The biggest challenge was that the operators have different data structures and time restriction. Significantly, different types of data structures caused a prolonged preparation process. However, the operators developed the necessary software and hardware needed for the e-contract termination. The e-contract termination service was tested for two months before it was activated.

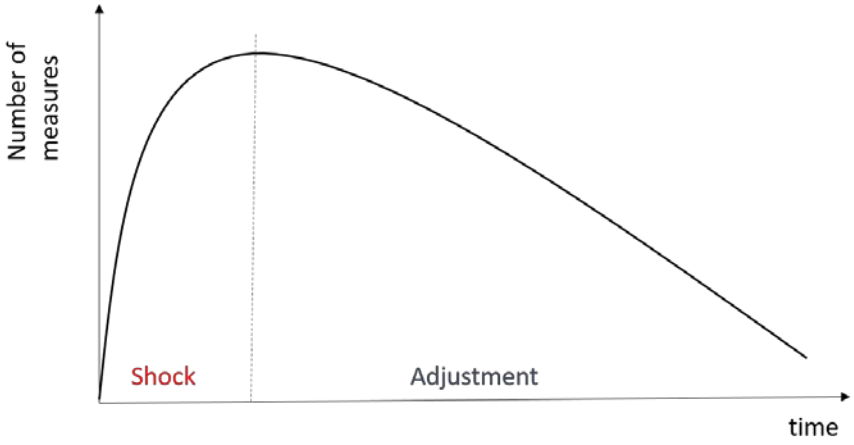
Lessons Learnt/conclusion

In critical times like pandemics, the compatibility of operators’ data structures and strong software development capabilities become very important. The provision of e-contract termination service in Turkey proved that it is very advantageous to offer as many consumer transactions over the Internet as possible or through an e-Government gateway in the electronic communications sector. The implementation of this service provided consumers with a tool to save time and be protected from COVID-19.

4 Regulatory lessons and further measures

4.1 Two stages of emergency management

The COVID-19 pandemic has demonstrated the importance of speedy and coordinated interventions at national and European levels in emergencies.



4.1.1 The "shock phase"

In the initial *"shock" phase* of the COVID-19 crisis, immediately after the "lockdown" announcements across all European countries, NRAs and BEREC focused on understanding the situation and ensuring the uninterrupted functioning of electronic communication services through daily/weekly monitoring activities and prompt interventions (if needed).

Several NRAs initiated information campaigns and educated consumers about the responsible use of services in order to avoid network congestion. Operators were asked to monitor and report network traffic, performance and downtime closely. In some countries, they were also requested to assess and mitigate risks regarding service continuity, integrity and security. A few NRAs also adopted extraordinary wholesale measures in order to improve conditions of service provision.

The COVID-19 pandemic highlighted the need to ensure the availability of electronic communications services throughout the territories, including in rural areas, in order to provide citizens with access to all public services, from education (online schools) to digitization of public administration and enabling work-from-home. There have been several initiatives to reduce the digital gap, such as providing hardware (laptops, tablets) and software suitable for online schooling.

4.1.2 The "adjustment phase"

In a subsequent *"adjustment" phase*, when telecom networks have proven to be coping well with the increased traffic, NRAs shifted their focus towards reviewing earlier measures and fine-tuning their emergency regulations (e.g. changing the frequency of monitoring reports). Several countries introduced further measures to support consumers and business users. For instance, relief measures were introduced to protect vulnerable consumers from being cut off from essential communication services due to late payments. NRAs have also responded to deleterious fake news on 5G networks and consequent physical attacks against critical network infrastructure by stepping up their communication efforts in cooperation with the EC.

Countries put considerable effort into developing tracing applications; that in later phases turned into valuable communication platforms targeted towards citizens, as regards useful information on the various aspects of the pandemic.

4.2 Regulatory lessons

The crisis prompted all institutional parties (NRAs, BEREC, operators, national governments and the European Commission) to seek solutions to the problems at hand in partnership with each other, and reap the synergies from their joint activities when their interests were aligned. The well-established relationships between NRAs, operators, national and European institutions have also proven to be very reliable in a crisis situation. A great willingness to cooperate was a key success factor especially in the early days of the pandemic.

While NRAs have switched to teleworking ("home office") models during lockdowns, they were still able to perform their duties almost as efficiently as previously.

However, some activities requiring the physical presence of stakeholders (e.g., spectrum auctions or consultations) had to be suspended, or postponed and redesigned to ensure that they could be conducted in a safe and responsible manner. One important regulatory lesson to be taken may be that flexible working conditions that are adjustable to both the NRAs and the sector are important during critical times like pandemics.

The majority of NRAs, as well as the stakeholders, have found that the NRAs had sufficient regulatory tools (including soft measures and public policy tools) at their disposal to react to the crisis adequately.

Fortunately, European telecom networks by default are dimensioned for peak-loads; they have proven to be remarkably resilient, withstanding increased network traffic even for extended periods during the strictest lockdowns. Although download speeds were occasionally affected by network congestion, major disruptions or lasting outages were not reported. BEREC agrees that network congestions should be avoided and a holistic and technologically neutral approach should be maintained in crisis situations.

During the COVID-19 pandemic, NRAs introduced a **close dialogue with their ISPs** to monitor the status of their networks, which faced an overall traffic increase, on both fixed and mobile networks. Therefore, most of the European NRAs (**AT, BE, BG, CZ, CY, DE, EL, ES, FI, FR, HR, HU, IE, IT, LV, NL, NO, PL, PT, SK**) implemented a **regulatory monitoring mechanism** with their ISPs to gather information on their networks. The frequency of these collecting data processes ranges from once per day to once or several times a week[23]. Moreover, 11 NRAs (**AT, BE, DE, EL, ES, FR, HR, IE, IT, PL, RO**) had **close cooperation**

[23] For a more detailed situation in each country, please refer to the periodical reporting on the status of the Internet capacity in light of Covid-19 crisis, published by the BEREC Office

with representatives from the **telecom industry, private stakeholders** (e.g., associations) and **public institutions** (e.g., other national authorities, ministerial departments, Government) to discuss potential cross-cutting issues generated by the pandemic crisis.

17 NRAs (**AT, BE, BG, DE, DK, EE, ES, FI, FR, HU, IT, NL, PL, PT, RO, SI, SK**) also **asked ISPs to be notified if traffic management measures needed to be taken**, in particular in case of any exceptional traffic management measure according to exception Article 3(3)(c) of Open Internet Regulation. In addition, **NRAs relayed the Joint Statement** to their ISPs that laid out guidance on how ISPs are authorised to apply exceptional traffic management measures to prevent impending network congestion and to mitigate the effects of exceptional or temporary network congestion, always under the condition that equivalent categories of traffic are treated equally. Likewise, four NRAs (**AT**[24]**, DE**[25]**, FI**[26]**, IT**[27]) also **published additional guidelines** in line with the Open Internet Regulation and the BEREC Open Internet Guidelines in the event of networks being overloaded.

All the stakeholders (end-users, telecom operators, content and application providers) contributed to the smooth functioning of the Internet during this critical period. Thus, **NRAs** (**AT, BE, BG, ES, FR, HU, IT, LV, LT, PL, PT**) **recommended end-users to reasonably use their internet access services** during the crisis. For example, they issued advice by producing videos on how to use telecommunication services in a responsible way, including guidance to end-users on how to enhance their home Wi-Fi access or by providing recommendations for schools, teachers and students on how to organise online learning processes, while ensuring children's online safety. NRAs also warned end-users about a potential increases in fraud and in cyberattacks due to the increasing use of online services and some NRAs created a dedicated coordination unit, available to end-users if needed.

Beside NRA recommendations to end-users, **telecom operators** offered end-users guarantees to ensure connectivity and a minimum quality of services and relayed public messages on responsible use of communication services to end-users. They also supported consumers staying-at-home, in particular the most vulnerable ones, by maintaining subscribers' internet access, even in case of non-payment as well as extending services on mobile and fixed internet access at no additional cost (for detail information see Chapter 2.2.1 above), for example by increasing the amount of mobile data and/or minutes, zero-rating[28] temporarily additional services or offering free-of-charge services, increasing the bit rate once the data cap is reached or offering free additional pay TV contents.

[24] https://www.rtr.at/TKP/presse/pressemitteilungen/pressemitteilungen/pinfo18032020.de.html
[25] https://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/Areas/Telecommunications/Companies/TelecomRegulation/NetNeutrality/Corona/Guidelines%20on%20traffic%20management%20measures.pdf?__blob=publicationFile&v=1
[26] Traficom only sent the information to ISPs via email
[27] https://www.agcom.it/tavolo-telecomunicazioni-e-consumatori

[28] As set out in Chapter 2.2.1, the issue of zero-rating needs to be re-evaluated in the light of the European Court of Justice's decisions from 2 September 2021. Therefore, BEREC plans to adopt an update of its Open Internet Guidelines in June 2022, and will put forward a consultation on draft documents, containing BEREC's detailed view on zero-rating, in March 2022

Following a dialogue initiated either by NRAs, Commissioner Thierry Breton or even on their own, content and application providers also contributed to the collective effort during this COVID-19 pandemic. **Larger content and application providers**, such as video streaming platforms and online gaming platforms, reduced the strain their content put on the network by temporarily **limiting the bitrate transmission** of their services, by downgrading the quality of their contents at endpoints or by scheduling downloads and service updates during off-peak hours.

The resilience of the Internet ecosystem made it possible to cope with the unprecedented increase of traffic on fixed and mobile networks in Europe during the COVID-19 crisis, and finally no major congestion issue occurred. All NRAs conclude that despite the severity and difficulties introduced by this public health crisis in Europe, the Open Internet Regulation and the latest version of the BEREC Open Internet Guidelines demonstrated their considerable flexibility and their suitability to withstand such circumstances.

The crisis highlighted the importance of regular and intensive dialogue between NRAs and other national stakeholders (e.g., ministries); NRAs often acted as mediators between telecom operators and other authorities/institutions involved in the fight against the pandemic. Apart from national dialogues, cooperation with European institutions (e.g., BEREC, EC) has also significantly contributed to the successful management of the COVID-19 crisis. Daily information exchanges between NRAs, and a very early intervention with the Joint Statement by the European Commission have proved to be crucial in finding the best ways of dealing with the pandemic.

The European Commission, the European countries, and NRAs were all trying to fight against disinformation campaigns around COVID-19, and warned against fraud, cyber- and physical attacks against the telecom networks. However, the most efficient communication channels to cope with these problems remain to be discovered; a considerable European effort is needed to have a visible impact in this area.

Within the existing framework, the coordinated action of NRAs and other competent public bodies, along with ISPs and content and applications providers allowed the electronic communications networks to contribute to maintaining a significant level of the economic and societal activities in the EU.

Such considerable efforts worked well throughout the long-lasting pandemic despite the lack of emergency measures specifically designed to address such extraordinary events. Citizens and businesses rely more than ever upon the proper functioning of the electronic communications' networks and, more broadly, of the Internet, which has proven to be a key asset for our daily lives in critical times.

Overall, the European electronic communication sector has demonstrated its capability to successfully deal with the situation caused by the pandemic by supporting the daily activities of citizens and businesses in the EU.

Operators were constantly monitoring their networks' ability to cope with the increased traffic so to pre-empt capacity shortages, finding solutions proactively in partnership with NRAs, governments, and digital platforms. At a time when people were relying much more on electronic communications services and were facing an unprecedented degree of economic and financial uncertainty, operators voluntarily introduced relief measures and new tariff plans to cater to the particular needs of certain consumer groups such as doctors or families with schoolchildren. Experience shows that strong collaboration among stakeholder groups is essential to cope with the crisis situation.

ANNEX I.

List of COVID-19 tracing applications

Country	Name of the application	Information (link)
AT	Stopp Corona App	https://www.austria.info/en/service-and-facts/coronavirus-information/app
BE	Coronalert	https://coronalert.be/en/
BG	VirusSafe	https://virusafe.info/
CH	SwissCovid	https://www.bag.admin.ch/bag/en/home/krankheiten/ausbrueche-epidemien-pandemien/aktuelle-ausbrueche-epidemien/novel-cov/swisscovid-app-und-contact-tracing.html
CY	CovTracer	https://covtracer.dmrid.gov.cy/dmrid/covtracer/covtracer.nsf/home_en/home_en?opendocument
CZ	eRouška	https://erouska.cz/en
DE	Corona-Warn-App	https://www.bundesregierung.de/breg-de/themen/corona-warn-app/corona-warn-app-englisch
DK	Smittestop	https://smittestop.dk/en
EE	HOIA	https://www.hoia.me/en/
ES	Radar Covid	https://radarcovid.gob.es/
FI	Koronavilkku	https://koronavilkku.fi/en/
FR	TousAntiCovid	https://www.economie.gouv.fr/tousanticovid#
HR	Stop COVID-19	https://www.koronavirus.hr/en
HU	VirusRadar	https://virusradar.hu/
IE	COVID Tracker	https://covidtracker.gov.ie/
IT	Immuni	https://www.immuni.italia.it/
LT	Korona Stop LT	https://koronastop.lrv.lt/en/
LV	Apturi Covid	https://www.apturicovid.lv/#en

MT	COVIDAlert	https://covidalert.gov.mt/
NL	CoronaMelder	https://coronamelder.nl/en/
NO	Smittestopp	https://www.helsenorge.no/en/
PL	ProteGO Safe	https://www.gov.pl/web/stopcovid-en
PT	StayAway COVID	https://stayawaycovid.pt/landing-page/
SI	#OstaniZdrav	https://www.gov.si/en/topics/coronavirus-disease-covid-19/the-ostanizdrav-mobile-application/
TR	Hayat Eve Sığar	https://hayatevesigar.saglik.gov.tr/index-eng.html

Information available as of 31.03.2021

ANNEX II.

Summary of recommendations for NRAs to mitigate digital divide[29]

Recommendation	Stems from	Timeframe of expected impacts	Adequacy to the criterion			
			Costs and benefits	Feasibility	Effectiveness	Risks and future uncertainties
Foster infrastructure sharing	Literature review	Short-medium term	High	High	High	Medium
Foster dialogue between NRAs and international organisations to promote Open RAN architectures	Consultancy	Medium-long term	High	High	High	Medium
Foster collaboration among stakeholders to identify bottlenecks and obstacles to network deployment	Interviews	Medium term	Medium	High	High	Medium
Establish mobile coverage obligations to address underserved areas	Consultancy	Short-medium term	High	High	High	Medium

[29] Study on post Covid measures to close the digital divide developed by iClaves and Esade - Final Report, p141. available at: https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/10076-study-on-post-covid-measures-to-close-the-digital-divide
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Develop or support the creation and use of comparison public tools of telecom services	Case studies	Short-medium term	High	High	Medium	Medium
Conduct systematic research into the motivations of those who do not access the internet	Case studies	Medium term	Low	High	Low	Medium
Promote communication and awareness campaigns on the benefits, safety and accessibility of the internet	Literature review – Interviews	Short-medium term	Medium	High	Medium	Low
Include specific programs to address digital inclusion for persons with disabilities in Universal Service obligations and mandate NRAs to monitor the accessibility of services	Interviews	Medium-long term	High	Medium	High	Medium