



Český telekomunikační úřad

CZECH TELECOMMUNICATION OFFICE REPORT

**on results of monitoring of compliance with 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,
carried out between 1 May 2019 and 30 April 2020**

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1. Introduction

The Czech Telecommunication Office (hereinafter referred to as the “Office” or “CTU”), as the national regulatory authority for electronic communications in the Czech Republic, has prepared, in accordance with Article 5(1) of Regulation (EU) 2015/2120¹ of the European Parliament and of the Council (hereinafter referred to as “Regulation (EU) 2015/2120” or the “Regulation”), a report on the results of monitoring of compliance with the Regulation for the period from 1 May 2019 to 30 April 2020.

In the Czech Republic, a total of 2,055 providers of electronic communications services provided the internet access service via fixed networks and a total of 205 service providers provided the service via mobile networks in the monitored period.² A total of 144 service providers offered the internet access service via both types of networks.

A total of 3,286,804 subscribers (or, more precisely, active connections) used internet access services via fixed networks in the monitored period. A total of 10,258,160 end-users (or, more precisely, active SIM cards) used internet access services via mobile networks. This number also includes the number of subscribers using internet access service at a fixed location via mobile networks (fixed LTE). This way of providing internet access service has been constantly growing in recent years. A total of 420,364 subscribers used this form of access to the internet in the monitored period.

In order to fulfil its supervisory and enforcement obligations pursuant to Article 5(1) of Regulation (EU) 2015/2120, the Office focused on monitoring the following areas:

- compliance with end-users’ rights (Article 3(1) of the Regulation),
- business practices of providers (Article 3(2) of the Regulation),
- traffic management practices (Article 3(3) of the Regulation),
- provision of contractual information to end-users (Article 4 of the Regulation).

The Office also dealt with assessment of the performance of the internet access service and the impact of specialised services on the quality of the internet access service (Article 3(5) and Article 4 of the Regulation).

As part of the supervision of compliance with Articles 3 and 4 of the Regulation, the Office carried out inspections of the contractual terms and conditions of internet access service providers, as well as monitored the market situation in terms of newly launched products. The aim of the inspections of the published contractual terms and conditions of internet access service at 107 providers was to verify whether the published information was clear and comprehensible (Article 4(1) of the Regulation) and whether these providers had put in place transparent, simple and efficient procedures to address complaints of end-users under Article 4(2) of the Regulation. In order to assess and verify the performance of the internet access service, the Office carried out practical measurements using measuring tools. The Office also analysed end-user complaints and inquiries. In addition to complaints, other sources of information such as blogs, forums and other discussion groups were used to gather information from end-users.

After several years of efforts when the Office preferred the form of prevention and educational approach from repression in enforcing the Regulation, and when it encountered considerable resistance of internet access service providers to non-binding guidelines, advices

¹ Regulation (EU) 2015/2120 of the European Parliament and of the Council 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.

² The following data is verified by the Office as of 30 June 2019.

and recommendations, the Office presented to the professional public and sector representatives in August 2019 its intention to lay down definitions of basic QoS parameters of the internet access service by means of regulation and to define tolerated discrepancies of the service performance. Setting transparent, practical and user-friendly rules and setting the minimum requirements for the service quality should not only improve customer orientation when choosing a provider, but also facilitate uniform performance of inspection by measuring qualitative parameters both by the Office and by end-users themselves. Last but not least, this measure should support competition between providers of these services in the field of qualitative parameters of the internet access service.

2. Activities of the Office in monitoring the compliance with Regulation (EU) 2015/2120 carried out between 1 May 2019 and 30 April 2020

Based on activities carried out in previous periods, the Office identified an undesirable situation, where IAS providers formally complied with the requirements laid down in Article 4(1)(d) and (e) of the Regulation, but given that each of them set the values of the basic QoS parameters of the internet access service differently, the overall market situation is currently confusing for end-users and does not allow them to easily compare individual offers.

The Office also found that a number of providers stated in the contractual terms and conditions such QoS parameter values by which any measurement result would meet the conditions set out in the contract, and therefore the end-subscriber cannot be successful when submitting a complaint or a claim about performance of the service.

The Office considers this situation to be completely undesirable, because the rights of end-users arising from Article 3(1) of Regulation (EU) 2015/2120 are not guaranteed. For this reason, the Office focused on activities that could lead to rectification of this undesirable situation in the most efficient way. The Office sees the rectification of the situation primarily in laying down a binding definition of basic QoS parameters of the internet access service that IAS providers would be obliged to respect. In order to fulfil this goal, the Office performed a number of internal and external activities in the monitored period.

2.1 Internal activities of the Office

An internal discussion took place within the Office during the period from May to June 2019 which aimed to find a way for the Office to specify the conditions important for compliance with Regulation (EU) 2015/2120, specifically the obligations laid down in Article 4(1)(d) and (e). The publication of a document³ that was not legally binding did not achieve their uniform interpretation and application by internet access service providers. The purpose of this discussion was to define the basic principles and set links between the basic QoS parameters of the internet access service⁴ to ensure that the parameters set in this way are simple, understandable, mutually comparable, as well as achievable in providers' actual networks with regard to technological neutrality. The conclusions of this discussion became the basis for the consultation with the professional public and representatives of the electronic communications sector launched by the Office with a workshop held on 15 August 2019.

According to its amended methodological procedures⁵ and through its measurement system, as well as the publicly available NetMetr measurement tool, the Office

³ Statement of the Czech Telecommunication Office on selected issues of open internet access and European rules of net neutrality.

⁴ Minimum, normally available, maximum and advertised speed for fixed networks and estimated maximum and advertised speed for mobile networks.

⁵ <https://www.ctu.eu/measuring-transfer-data-speed>

prepared a study to verify the quality of the internet access service from the end-user's point of view which, inter alia, was to verify whether there was reduction in the performance of the services provided. 45 students of technical universities throughout the Czech Republic voluntarily participated in this study.

The study found that 16% (in the download direction) and 13% (in the upload direction) of all termination points monitored in the study showed a significant discrepancy from the performance of the service for 3 or more days out of the total number of 7 monitored days. Furthermore, 36% (download) and 33% (upload) of the termination points showed an average speed lower than the contractually defined normally available speed for 3 or more days. In terms of the real achievability of the contractually defined maximum speed, it was found that the value was not potentially⁶ really achievable in 36% (download) and 40% (upload) of all monitored termination points; based on the measurement results, it was proved that there was slowdown in the service due to bandwidth reduction to a specific level (traffic shaping), or the physical properties of a given termination point did not make it possible to achieve the defined value of the maximum speed due to the distance from the access point.

The achieved performance of internet access services provided by access technology based on optical communication systems (FTTx) can be described as surprising results of the study. Out of the total number of 9 monitored FTTx termination points (20% of the study), 56% (both download and upload) showed potential real unachievability of the defined maximum speed, 44% (download) and 33% (upload) of the termination points showed an average speed lower than the contractually defined normally available speed for 3 or more days, and a total of 11% (both download and upload) showed a significant discrepancy from the performance of the service for 3 or more days out of the total number of 7 monitored days. All these findings, including the results of measurements carried out by the Office's staff, confirmed the need to establish a regulatory framework to ensure compliance with the provisions of Regulation (EU) 2015/2120.

For the purposes of inspection, verification and presentation of selected parameters of data services in mobile and fixed networks to the public, the construction of the Electronic Communications Measurement System (hereinafter referred to as the "MSEK") was completed in the form of a comprehensive infrastructure for the purposes of inspection and control measurement and visualisation of selected qualitative parameters of internet access services. In particular, the acquisition and implementation of elements for ensuring cyber security was completed, and measures are currently being taken to perform a security audit of the entire system. The MSEK was launched in pilot operation, including measures revealing its intentional prioritisation (IP in the MSEK scope) by providers when carrying out actual measurements of the quality of internet access services.

For the needs of the general public, a platform was prepared for the deployment of the certified BEREC Net Neutrality Measurement Tool to ensure the verification of the performance of the internet access service for end-users. The measurements carried out by this tool should allow end-users to verify whether the performance of their service is in accordance with the contract and, in case of any discrepancy, to allow end-users to seek remedy. This certified BEREC measurement tool is currently being configured and tested within the MSEK Polygon. It is assumed that after the testing of the tool has been completed it will be implemented within the infrastructure of the MSEK system.

The **MSEK Polygon**, which was created with the aim of unifying measurement procedures and processes for evaluating measured results, proved to be useful, and it is

⁶ The potential real unachievability of the defined maximum speed value means that although there was no conclusive confirmation, for example, using the method based on the ITU-T Y.1564 standard, it was evident from the measurement that the service bandwidth corresponded to a specific one level lower than 95% of the defined maximum speed value.

planned to expand its use and technical equipment. The MSEK Polygon is also used to gain practical experience in studies verifying the impact of basic and additional data parameters on the final performance of services provided. The possibilities of the MSEK Polygon are also perceived within the BEREC working groups; the Office submits individual proposals for setting specific levels of data parameters within the preparation of BEREC guidelines to detailed analysis of their impact on service performance and then applies the results in the comments procedure. From the point of view of the possibility of conducting professional training using the MSEK Polygon, the foreign regulators also showed their interest to use it.

The Office carried out technical monitoring of the parameters of the internet access service provided also via mobile networks. The results of more than 12,000 measurements of radio and data quality parameters in mobile networks are available to the public on the CTU website (gos.ctu.cz/mapa). These visualisations contain results of measurements carried out by the Office at selected stationary points, as well as measurements of the coverage of areas of interest such as motorways and railway corridors. The mentioned visualisation further contains results of measurements from the public tool NetMetr and the results of the calculation (simulation) of coverage by mobile networks based on their actual topology.

2.2 External activities of the Office

As mentioned above, on 15 August 2019 the Office organised a workshop for the professional public and representatives of the electronic communications sector where it presented its intention to lay down definitions of basic QoS parameters of the internet access service and tolerated discrepancies of service performance by means of regulation. In this proposed measure, the Office applied authorisation pursuant to Article 5(1) of Regulation (EU) 2015/2120. In response to the Office's intention presented in this way, the IT and Telecommunications Section of the Czech Chamber of Commerce requested that the Office leave room for internet access service providers themselves to set up self-regulatory mechanisms, if necessary, instead of directly regulating this area. In this context, a joint working group composed of representatives of the Office and representatives of the electronic communications sector was set up to reach agreement on the definition of basic QoS parameters, and this effort was successful in setting the actual definitions. The definitions of the individual QoS parameters and the relationships between them were determined in accordance with the BEREC Guidelines (BoR (16) 127, para. 151), i.e. the maximum, normally available, and minimum speeds defined in the contract are related to the advertised speed, and significant discrepancies from the performance of the internet access service, if provided at a fixed location, are derived from the normally available speed. The maximum speed must not be lower than the value of the advertised speed, the normally available speed must correspond to at least 60% of the value of the advertised speed, and the minimum speed must correspond to at least 30% of the value of the advertised speed. For mobile networks, these are definitions of the estimated maximum and advertised speeds, where significant discrepancies are defined as decreases in the performance of the internet access service below 25% of the value of the advertised speed.

In order to monitor compliance with the Regulation in accordance with Article 5(2) of Regulation (EU) 2015/2120, the Office obtained information from internet access service providers by carrying out inspections of contractual terms and conditions, individual negotiations, or by specific requests for information. In case that a breach of this Regulation was found, administrative proceedings were initiated, and the providers were sanctioned for such conduct (for more details, see Section 4).

The Office continued to carry out regular monitoring of selected business practices of IAS providers, especially zero-rating practices. The monitoring was carried out in the form of monitoring the published contractual terms and conditions of services. In connection with the offer of new tariffs which appeared on the market in the summer of 2019 and which included

not only larger data volume limits, but also an offer of unlimited data volumes, there was a gradual decrease in the offer of zero-rated services.

The Office also continuously monitored complaints and inquiries from end-users about the internet access service. Based on the complaints, in order to assess the performance of internet access services at the end-user level, the Office also measured their performance (for more details, see Section 3).

The Office presented its recommendations on the content of contractual terms and conditions, the information on the application of methodological procedures and results of measurements carried out by the Office at a number of professional seminars, conferences and workshops, and educational lectures to increase legal and professional awareness of both internet access service providers and end-users. With regard to the publishing activity, the article entitled “The Quality of the Internet Access Service at a Fixed Location” (<https://telmag.cz>), published in issue 02/2019 of the journal NEXT GENERATI@N Telekomunikace is worth mentioning. Furthermore, the Office presented its activities at the annual meeting of representatives of the regulatory authorities associated within the Memorandum of Cooperation in the field of QoS and spectrum management.

3. Characteristics of complaints and their numbers related to the issues of Regulation (EU) 2015/2120

The Office continuously assesses the numbers and nature of inquiries and complaints of end-users concerning compliance with obligations laid down by the Regulation by internet access service providers.

The complaints received by the Office from end-users mainly concerned the issue of non-compliance with the contractually agreed basic QoS parameters of the internet access service, as well as restrictions on access to internet content and the impact of specialised services on the performance of the internet access service.

In the monitored period, the Office did not notice an increase in the number of complaints; there are still only a few dozen. On the one hand, the reason for this low number of received complaints can be seen in the improvement of the method of providing information by providers on remedies, which occurred due to pressure from the Office in the monitored period. On the other hand, such a low number of complaints is also due to end-users' still low awareness of the QoS parameters contained in their contracts and the possibility of using tools to verify compliance with them.

In connection with complaints about specialised IPTV services, the Office carried out control measurements of data parameters, as well as examined the practices of data traffic management, application of traffic management methods and slowing down the actual transmission speed by reducing traffic bandwidth (traffic shaping). The practical measurements showed that it is the slowdown of the actual transmission speed that seems to be problematic, which the Office perceives as a consequence of the absence of binding definitions of the basic QoS parameters of the internet access service and the interconnections between and among them, which has been mentioned several times.

It can be assumed that the growing demand for these services from end-users could lead to an increase in the number of complaints in the coming periods, mainly due to their offering even in those cases where a sufficient network capacity is not ensured for them.

4. Results of inspections carried out in connection with supervision and enforcement of Regulation (EU) 2015/2120

In the monitored period, the Office carried out inspections of published draft contracts for the provision of the internet access service at a total of 107 providers of such services. Repeated inspections, which aimed to verify elimination of the deficiencies identified in previous periods, were performed at 46 providers, and 61 regional providers of these services were newly inspected. More detailed information was requested from 30 inspected providers. The Office also continued its awareness-raising activities, initiating 34 individual meetings at which the Office drew the attention of the internet service providers to the Office's current interpretative practice concerning the Regulation and any deficiencies identified.

4.1 The most common deficiencies – overall results

Information about QoS parameters in contractual terms and conditions

The inspections revealed that the information contained in the contracts concerning speeds mostly formally comply with the requirements of Article 4(1)(d) of the Regulation, but the values set in this way often do not correspond to reality, and the links between the values of the individual speeds are not technically achievable. What also seems to be problematic, is the determination of speed values, which are expressed either by a number, an interval, or even complex calculations, and thus become very confusing for the end-user and incomparable from the point of view of the market offer. As a result, QoS parameter values that do not correspond to reality in terms of service performance disadvantage those internet access service providers that design their offers honestly, and the values advertised by them are lower than those of competing offers but are really achievable. The missing definition of the impact of a significant discrepancy from the offered (advertised) speeds makes it difficult for the end-user to assess when he/she has the right to activate remedies.

Issues of application of traffic management measures

In this area, the Office focused on inspecting how traffic management measures and their impact on the quality of services are defined in contractual terms and conditions, as well as on carrying on verification by measuring to check compliance with the terms and conditions in applying appropriate traffic management measures referred to in Article 3(3) of the Regulation.

As mentioned above, based on the control measurements carried out, it was found that in some cases the actual transmission speed was affected by bandwidth reduction, or the actual transmission speeds were reduced due to overload of network devices as a result of insufficient capacity of the distribution network.

In connection with the time-limited offer of unlimited data by one of the service providers, the Office also carried out an investigation, ascertaining the use of traffic management measures which could exceed the limits laid down in Article 3(3)(c) of the Regulation; however, due to the real risk of network overload due to a large increase in new activations, and given the fact that the provider only used it for the necessary period of time, the Office did not find a breach of the Regulation in that case. The Office has informed the European Commission of the results of this investigation at its request.

Specialised services and their impact on internet access services

Providers of specialised services, in particular IPTV services, saw a relatively large increase in the number of people interested in these services, especially in connection with the lockdown measures taken as a result of the Covid-19 pandemic. The surveys shows that end-users are

not always aware of the impact the simultaneous use of specialised services may have on the internet access service.

Remedies

Compared to the previous period, the information on available remedies was significantly clarified in providers' contractual terms and conditions, based on the Office's initiative. While previously it was not always clear whether the complaint process was also automatically initiated upon reporting of a technical defect, the largest service providers modified their contracts after the Office's intervention by clearly separating the procedures for reporting technical defects and the procedures for submitting complaints and claiming price reduction due to non-compliance with the agreed performance of the service.

Although the situation described above has improved, the efficient use of remedies for end-users remains problematic, especially in those situations where the absence of binding definitions of QoS parameters and definitions of discrepancies makes it virtually impossible for end-users to detect a possible defect or insufficient service performance.

Impact of limitations of data volume, speed, and other quality parameters

What seems to be problematic in this area is the insufficient explanation of the purpose or type of applications that the offered service is mostly suitable for, especially with regard to those offers (mobile tariffs) that offer small data volumes or low service performance only.

The survey showed that this problem occurs in one third of the inspected number of contractual terms and conditions of regional internet access service providers.

In this context, the Office also focused on whether contractual terms and conditions provide information on additional QoS parameters such as latency, jitter and packet loss, which would allow end-users to better understand the effects of these parameters on the use of certain applications. Even in this case, deficiencies were mainly found at regional service providers.

Business practices

As part of its supervisory activities, the Office also monitored some selected business offers of internet access service providers, in particular the practice of zero-rating. The Office verified whether the provision of these services compromised the rights of end-users referred to in Article 3(1) of the Regulation.

In the Czech Republic, as with the other EU Member States, the most frequently used zero-rated services and applications are mainly social media, chat services, online music databases and cloud storage. During the monitored period, there was a significant decrease in the use of zero-rated services by end-users as a result of new offers from internet access service providers which included an increase in data volumes in tariffs and possibly unlimited data. Some large internet access service providers responded to this decrease by ending zero-rated tariffs. The development of the situation in this area is continuously monitored by the Office, but its dangerousness is significantly decreasing.

Terminal equipment

Thanks to the Office's initiative, the situation from the last monitored period, where the selection of terminal equipment was often subject to a fulfilment of certain conditions laid down by the providers, was corrected in this area. At present, the contractual terms and conditions in most cases only contain a list of technical parameters that the terminal equipment must meet, but they do not restrict end-users in the choice of their own terminal equipment.

In some cases, however, providers declare that in order to ensure a guarantee of the quality of the service provided, it is recommended to use the terminal equipment offered by the provider. Although the Office does not perceive such recommendations as a breach of the Regulation, it exerts pressure on providers to refrain from making similar statements in this respect.

A graphical representation of the identified deficiencies in the newly inspected entities is shown in more detail in Figure 1.

Identified deficiencies in the newly inspected providers pursuant to the provisions of Regulation (EU) 2015/2120

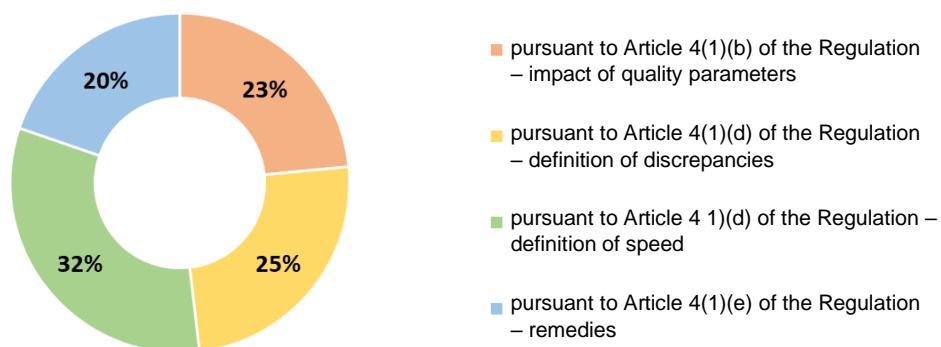


Figure 1: Identified deficiencies in the newly inspected providers pursuant to the provisions of the Regulation

4.2 Enforcement

Although the Office preferred the implementation of rather preventive and awareness-raising activities, the Office initiated offence proceedings in cases where a breach of the Regulation was found, which was qualified as an offence pursuant to Act No. 127/2005 Coll.⁷.

A total of 7 new administrative proceedings were initiated, 4 of which were terminated by the issuance of a final decision. Furthermore, out of the total number of 9 administrative proceedings, which were conducted in the previous monitored period, 8 were finally terminated, and 1 continues after the application of the remedy. The highest fine imposed by the Office in administrative proceedings for an offence was CZK 180,000. The numbers of administrative proceedings are given in Table 1.

⁷ Act No. 127/2005 Coll., on electronic communications and on amendments to certain related acts.

Table 1: Number of administrative proceedings and their current status as of 30 April 2020

Administrative proceedings	Proceedings transferred from the period from 1 May 2018 to 30 April 2019	Issued decisions	Of which pending proceedings	Newly initiated proceedings	Issued decisions	Of which pending proceedings
on the imposition of the obligation to amend the contractual terms and conditions	2	2	0	0	0	0
on an offence	4	3	1*	4	3	1
on an offence and the imposition of the obligation to amend the contractual terms and conditions	3	3	0	3	1	2*
Total:	9	8	1	7	4	3

* Administrative proceedings in which a remedy (remonstrance) has been made.

5. Results of technical monitoring and measurements and their assessment in relation to compliance with Regulation (EU) 2015/2120

Technical monitoring and practical measurements were ensured for the purposes of inspection and verification of the quality of internet access services by our own measurement system MSEK, as well as by the publicly available NetMetr tool, operated by CZ.NIC. Network monitoring, or more precisely, verification of the quality of services provided to end-users, was performed in order to compare the actual achieved parameters of the internet access service with the declared values of parameters in the providers' service offers. In the monitored period, the Office did not operate its own certified tool for verifying the parameters of the internet access service which would be available to end-users; in this respect, only testing of the BEREC Net Neutrality Measurement Tool was started. If the tool tests are successful in the MSEK environment, the Office expects to extend the functionality of this tool with the possibility to compare measurement results in relation to specific values stated in the end-user contract and, the parameter values under the contract will not be achieved, to provide the end-user with documents for a potential complaint procedure with the operator.

For the presentation of monitoring and measurement results, the Office introduced and used a tool for visualisation of the measured (and calculated) values of radio signal coverage of mobile networks and the measured values of selected data parameters on a map layers, which is accessible to the public at <https://qos.ctu.cz/mapa>, including the English version. This tool currently allows end-users to compare the signal availability and the quality of services provided by mobile operators. The application offers a comparison of mobile services; subsequently, it is expected to be further expanded to also display the results of measurements of fixed networks in relation to address locations. The application already has several layers in its current version and allows users to display the results of measurements carried out by the Office, as well as end-user measurements using the NetMetr tool and possibly other data sources. The benefit of this tool lies in the quick, approximate survey of the quality of services in individual locations, as provided by mobile operators, including a clear graphic representation, see Figure 2.

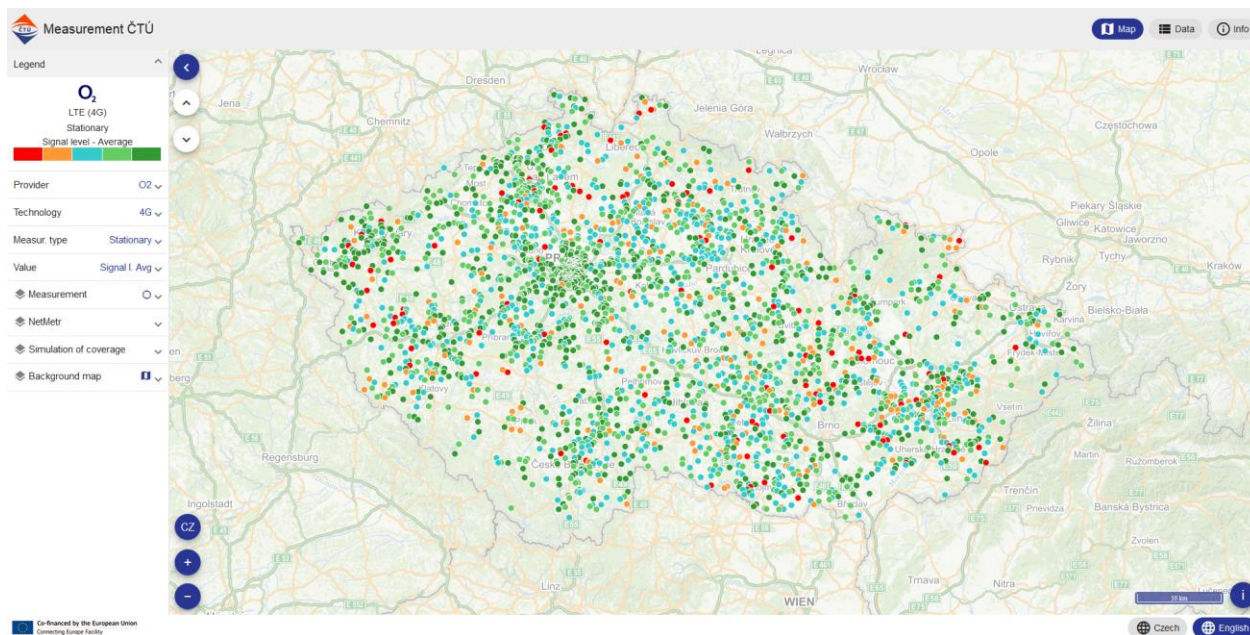


Figure 2: Web presentation of the visualisation tool at qos.ctu.cz

Actual measurements and verification of the performance of the internet access service, or more precisely, the actual achieved speed according to the IETF recommendation RFC 6349 (TCP throughput) also make it possible to identify the average packet loss in the form of TCP efficiency parameter (%) and the average packet delay in the form of buffer delay parameter (ms). Both of these additional parameters fall into the category of “TCP metrics”. For more detailed information on the status of the internet access service at a fixed location, the Office uses a measuring tool based on the ITU-T Y.1564 standard, the results of which correspond to layer L2 (none of the measuring technology manufacturers has implemented so far a measuring tool, whose results would correspond to layer L3). This approach is used to verify the real achievability of the defined maximum speed, or more precisely, whether the bandwidth of the internet access service corresponds to the contractually defined parameters and whether the traffic management method (change of bandwidth over time) was applied during the measurement process, as well as information on the values of additional QoS parameters of the service, or more precisely, latency, jitter and frame loss.

Due to the fact that carrying out actual measurements at end-users requires their cooperation and is very time consuming, the MSEK Polygon was built within the MSEK measurement system, allowing the Office to carry out a wide range of verification measurements and tests using simulations and serving also for training and improving inspection staff in practical skills in carrying out specific measurements. In the monitored period, the MSEK Polygon was used to carry out studies which verified the influence of basic and additional data parameters, including practices in the form of applying traffic management methods and slowing down the actual transmission speed by reducing bandwidth on the resulting performance of the services provided; in January 2020, work also began on the implementation of the certified BEREC Net Neutrality Measurement Tool in the MSEK environment.

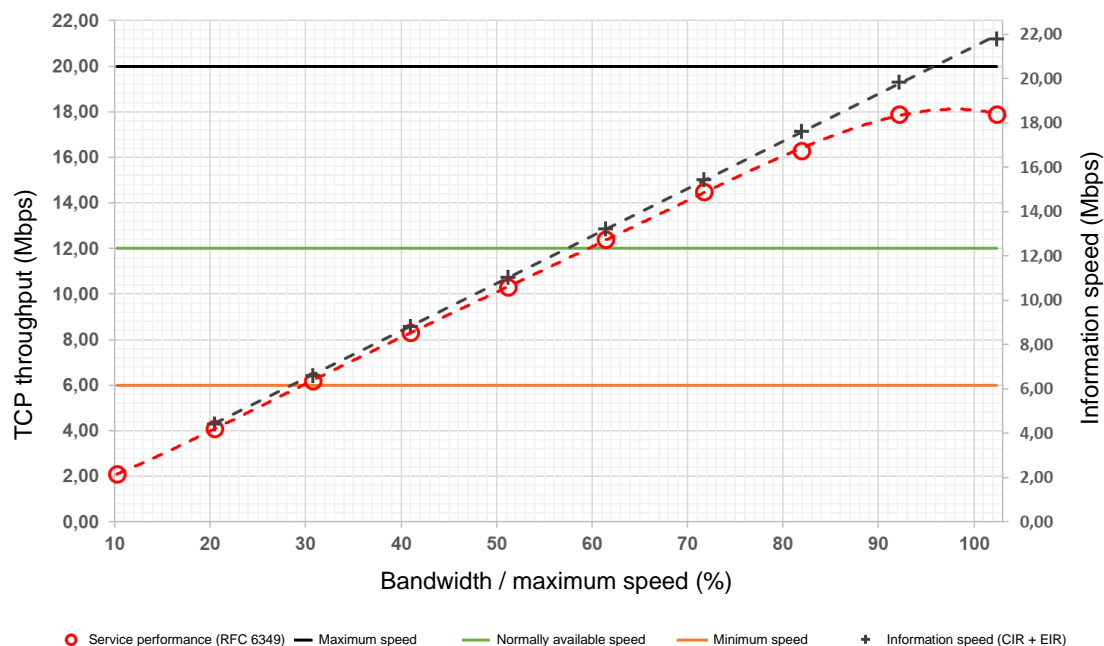


Figure 3: Study of the influence of qualitative data parameters on the resulting performance (TCP throughput; IETF RFC 6349) of the internet access service at a fixed location, defined advertised speed = maximum speeds = = 20/2 Mbps, IPLR = 0.1% and IPTD (RTT) = 50 ms. The information speed is measured according to the ITU-T Y.1564 standard

An example of the result of using the MSEK Polygon is a study of the influence of qualitative data parameters on the resulting TCP throughput of the internet access service, which shows the impact of additional QoS parameters on the resulting service performance, as well as the fundamental impact of the bandwidth on the service performance. Figure 3 shows the influence of the bandwidth value on the resulting performance of a typical service with a defined advertised speed = maximum speed of 20/2 Mbps (L4), while the actual bandwidth (for example, distance from the DSLAM) corresponds to a value of 22 Mbps (L2). The values are based on the situation where the measured section from the termination point to the nearest peering node shows a packet loss of IPLR = 0.1% and a packet delay of IPTD (RTT) = 50 ms. At reduced bandwidth = 60% of maximum speed, the service performance achieves the normally available speed, which seems fine at first glance, but the measuring tool according to the ITU-T Y.1564 standard revealed that the decrease in the service performance (TCP throughput) is not caused by normal operation (for example, peak hours), but by reducing the bandwidth of the service. This results in slowdown. The aim of the study was to demonstrate the accuracy of the method for detecting slowdown of the internet access service, for example, when the set level of traffic shaping is lower than the maximum speed based on the ITU-T Y.1564 standard. The obtained results were used to propose definitions of basic QoS parameters of the internet access service at a fixed location, which were consulted with service providers and which, in the Office's view, should become binding for internet access service providers in the Czech Republic.

Other results of studies conducted using the MSEK Polygon include measurement-determined recommendations for defining the values of additional QoS parameters of internet access services at a fixed location. If the normally available speed is defined as at least 60% of the value of the advertised (maximum) speed, the values of additional QoS parameters in the technical specification MEF 23.1 PT 2 (Regional) CoS L can be used for advertised speeds up to 30 Mbps, in the case of MEF 23.1 PT 2 CoS M for advertised speeds up to 150 Mbps and in the case of MEF 23.1 PT 2 CoS H for advertised speeds up to 500 Mbps. Higher values of the advertised (maximum) speeds of internet access services at a fixed location must

already fall into the VHCN category in terms of the values of additional QoS parameters. The acquired knowledge was used as a basis for proposing links between the basic QoS parameters of the internet access service at a fixed location.

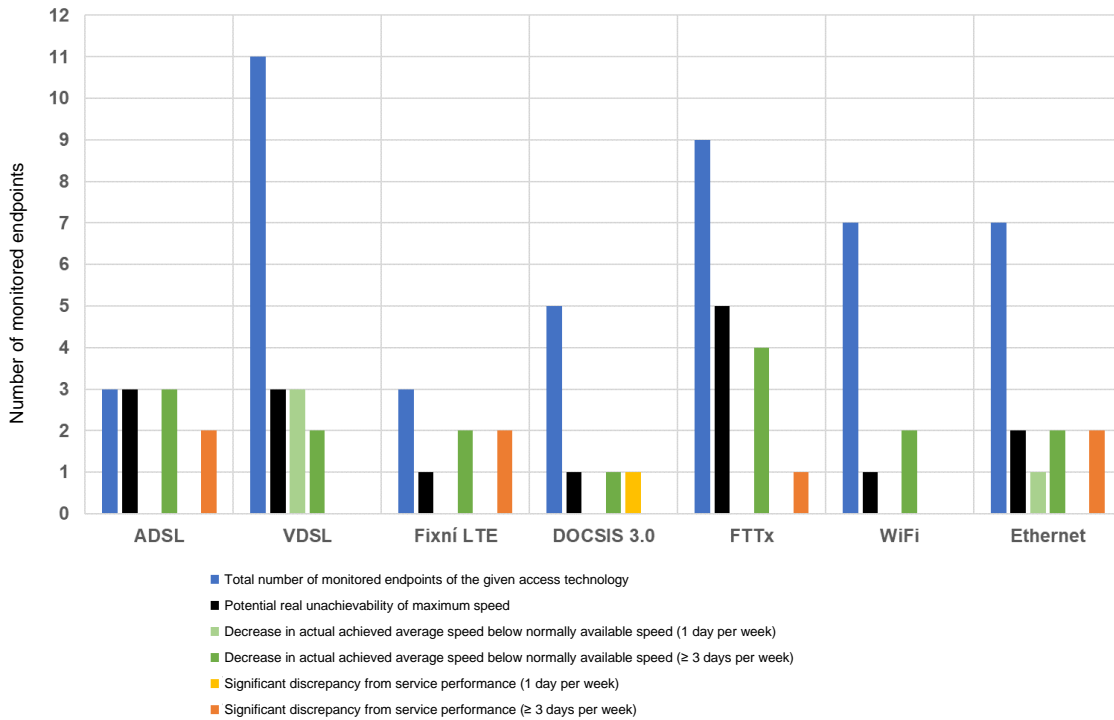


Figure 4: Study of the quality of the internet access service at a fixed location using the publicly available NetMetr tool; the results correspond to the download direction (a total of 45 monitored termination points)

The studies conducted within the monitored period included voluntary involvement of technical university students as end-users who regularly measured the performance of their internet access service for 7 days at the same selected peak hours (between 5 p.m. and 11 p.m.), namely 6 times in 10-minute intervals using the publicly available NetMetr measurement tool. The results of the study for the download direction are given in Figure 4, and for the upload direction in Figure 5. A total of 45 end-users throughout the Czech Republic participated in the survey of the performance of internet access services at a fixed location. Potential real unachievability of the maximum speed means that none of the measured values achieved at least 95% of the value of the defined maximum speed, which is possible due to the load of the actual traffic (peak traffic), but in that case it was a demonstrable slowdown of the service to a specific level (traffic shaping), or there was such a distance from the access point that the service provider was unable to provide the defined maximum speed value (xDSL) for physical reasons. Other values were assessed in a summary for the whole day, i.e. in the case of the value of the decrease of the actual achieved speed below the normally available speed (1 day per week) it is not a decrease of one measured value, but a situation where the average value of service performance during the day was lower than the defined normally available speed.

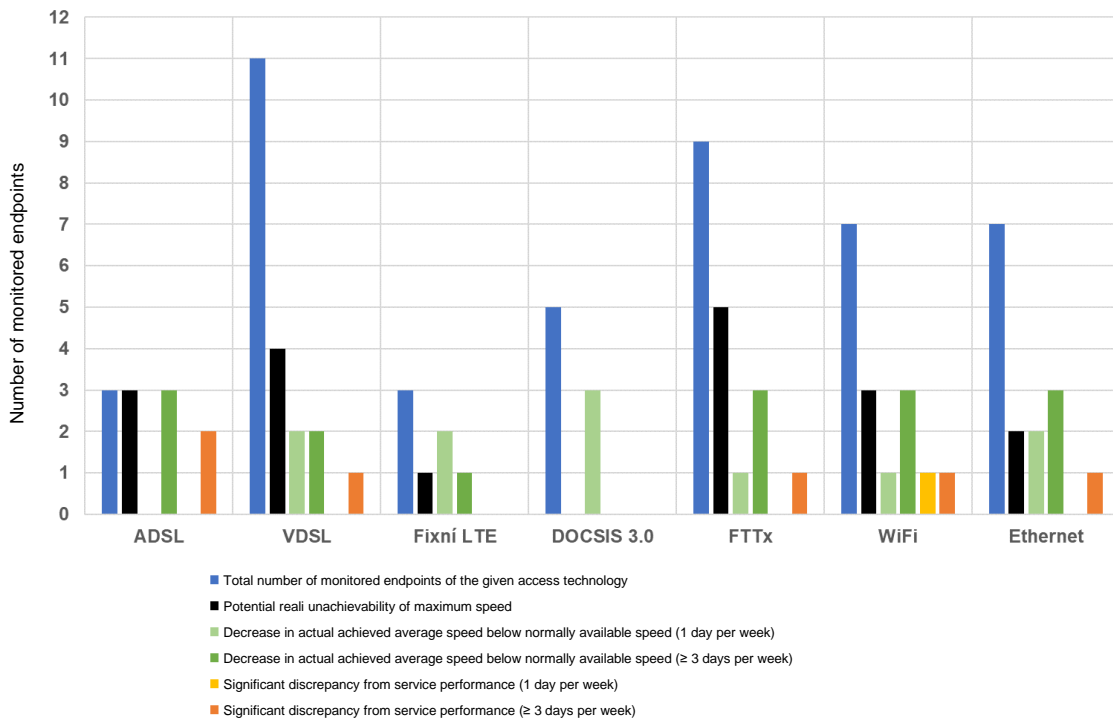


Figure 5: Study of the quality of the internet access service at a fixed location using the publicly available NetMetr tool; the results correspond to the upload direction (a total of 45 monitored endpoints)

Based on complaints concerning the suspected violation of Article 3(3) of the Regulation, the Office carried out specific measurements to verify whether some selected ports in mobile networks were blocked. These measurements did not show that the blocking by the internet access service providers was intentional.

In order to gain technical knowledge about the methods of measuring the quality of the specialised IPTV service, namely its multicast option, a study of the influence of fixed network data parameters on multimedia services was conducted, which will serve the Office staff as a basis for measuring the quality of this option of the IPTV service, or for handling complaints or submissions concerning this service. However, the Office must respond to the dynamic development of IPTV services, as this type of service uses the full spectrum of possible solutions (H.264 or H.265 codecs, adaptive streaming, variants of audio AAC format with different sampling rates, including the issue of A/V sync impact, etc.) and, especially, the TCP transport layer protocol, so measuring the quality of IPTV services is very problematic. The result of the study is not only the acquisition of technical knowledge, but another need to design methods for measuring and verifying the quality of the unicast variant of IPTV services. A possible solution is offered in a dedicated measuring device, which analyses the resulting output image from the IPTV set-top box sent via a HDMI cable to the television. An analysis of the HDMI cable itself is an integral feature of this dedicated device. The Office plans to verify the capabilities of this solution of the method of measuring the quality of specialised IPTV services and possibly implement it in actual practice, but the technical prerequisites for providing these specialised services must still apply, i.e. sufficient capacity in distribution/connection networks, sufficient bandwidth of internet access services, and sufficient performance of the service, including sub-limit values of additional QoS parameters for the given specialised service.

By continuously monitoring the quality of internet access through its measuring technologies, as well as by using the publicly available NetMetr tool, the Office verified the actual conditions in a situation, where most services are presented in the market mainly by the maximum values of the parameters, which as a result do not correspond to the real situation; in the Office's view, this situation is significantly more advantageous for service providers, who

state these parameters unrealistically. The results of a series of practical measurements showed that, for the Office's needs, knowledge of the state of service performance both in terms of the actual achieved speed and in terms of additional QoS parameters is crucial. In some cases, it was found that the internet access service does not show significant discrepancies from performance in speeds, but the obtained bandwidth values of the service clearly showed that the bandwidth does not correspond to the defined maximum speed – this results in slowdown of the service, which was also shown by the resulting delay amounting to seconds. In summary, based on the obtained results of the practical measurements, it can be stated that the absence of definitions of the basic QoS parameters of the internet access service and the interconnections between and among them does not contribute to the objective safeguarding of end-users rights.

6. Monitoring of data traffic and compliance with Regulation (EU) 2015/2120 in the context of the Covid-19 pandemic

There was a significant increase in data traffic in the Czech Republic during the state of emergency due to the Covid-19 pandemic and the measures taken. Monitoring the situation, the Office neither recorded extraordinary network overload, nor did it identify the application of extraordinary traffic management measures by internet access service providers. According to the results of monitoring the individual peering nodes, a sufficient reserve was identified in most cases, but that did not imply that partial components of the internet access service providers' networks had the same sufficient reserve. Given that this trend of increased need for data transmission was growing, the Ministry of Industry and Trade, together with the Office, joined the call of the European Commission and the Body of European Regulators for Electronic Communications (BEREC) of 19 March 2020⁸, addressing, in a press release, domestic streaming service providers to consider temporary reduction in the quality of streaming video.

The Office also responded to a call from representatives of internet access service providers which, in cooperation with the Ministry of Health, identified domains that were perceived as key information channels of the Government of the Czech Republic and public health authorities containing up-to-date information on measures and developments related to the Covid-19 pandemic, providing end-users with zero-rated access to selected domains. This measure, which was applied at end-users with an active data service, was temporary and its application was linked to the duration of the state of emergency in the Czech Republic. End-users were informed of these measures on the websites of their internet access service providers. In this regard, the Office recommended that large providers take into account this offer also towards MVNOs to which they supply services wholesale. The Office did not assess this method of handling traffic as disproportionate, discriminatory, and in conflict with the Regulation. These measures were demonstrably not driven by commercial interests or other illegal practices. There were no negative reactions from both end-users and service providers.

The Office also participated in the extraordinary monitoring set up by BEREC and the European Commission and regularly provided information on the situation and on ensuring of end-user access to internet services in the Czech Republic.

⁸ Joint Statement from DG CONNECT and BEREC on coping with the increased demand for network connectivity due to the Covid-19 pandemic.

7. Measures taken and applied pursuant to Article 5(1) of Regulation (EU) 2015/2120

In conclusion, based on the above facts, the Office would like to summarise its findings as follows.

In the first years after the Regulation came into effect, the Office emphasised and focused its efforts on ensuring that service providers' contracts with end-users contain the elements required under the Regulation, as well as on raising awareness, both among end-users and, especially, providers in order to clearly define which practices are considered to be illegal by the Office (in line with the interpretative practice of BEREC and the European Commission), and how end-users should be informed of the service performance parameters, laid down in Article 4 of the Regulation, and their rights regarding possible activation of remedies. The Office believes that this basic objective has been achieved, although it is now necessary to state that awareness of the conditions laid down by the Regulation is still relatively low among small and regional service providers.

However, now that the Office already has the results of a number of technical measurements, it is clear that there has been some stagnation in the approach of service providers to compliance with the Regulation. Providers have contented with formally complying with the Regulation, incorporating the required data into their contracts and not using manifestly prohibited practices, but in terms of offering their services there is no further shift towards the objective pursued by the Regulation, i.e. full awareness of end-users of the actual performance of their internet connection and the contractually guaranteed quality of that connection.

On the contrary, based on the Office's findings in the past period, it can be stated that "scissors have been opening up" between exaggerated advertised parameters of service quality, which are intended to influence end-users regarding their decision to conclude contracts, and the practically achievable performance of the offered connection. Therefore, the Office considers it necessary to establish binding definitions of QoS parameters and discrepancies from the actual performance of the service to ensure that providers can no longer "entice" end-users to unrealistic connection quality and that end-users have more relevant and clear information for their choice of connection provider or are able to activate remedies more effectively and efficiently.

Negotiations with representatives of providers on possible self-regulation described above are considered by the Office to be partially successful, especially when it comes to agreement on the technical expression of definitions, but given that no agreement has yet been reached on the form of expression of the self-regulation principles, everything now indicates that the agreed definitions of parameters and discrepancies will be laid down by the Office by a binding regulatory measure.

The Office considers the aforementioned binding determination of definitions of parameters and discrepancies from the performance of the service as its priority but, of course, the Office will continue in other activities as well.

In the following period, the Office will complete and publish a study on the influence of limit values of additional QoS parameters according to individual recommendations, technical specifications and instructions of BEREC on the final performance of internet access services provided at a fixed location. Given that it has proved useful to involve also voluntary end-users, especially from among students of technical universities, in the implementation of studies focused on the quality of internet access services, the Office will continue to use this opportunity.

The Office will also commence a study of the impact of the dependence of the percentage ratio between the normally available speed and the advertised (maximum) speed, as well as the number of end-users connected to the access point or of aggregation rates, on the capacity and additional QoS parameters of distribution (connection) networks. The results of routine measurement of service quality carried out through a calibrated measurement system will be published by the Office on an ongoing basis, by means of the operated visualisation tool.