

National Plan for the Development of Very High Capacity Networks





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The **National Plan for the Development of Very High Capacity Networks** document is a sectoral strategy focused on the specifics of building and developing infrastructure for high-speed electronic communications services. It is part of the Digital Czech Republic concept and the Czech Republic Innovation Strategy 2019 - 2030. This document is directly linked to the National Investment Plan. **It is valid until 31 December 2027**, unless amended by Government resolution.

1 Introduction

The growing importance of, and interest of citizens and businesses in digital services places increasing demands on the public communications networks through which electronic communications services are provided. The digital agenda tasks that were defined in the Digital Czech Republic¹ Government programme and predicted in the **Innovation Strategy 2030² - The Country for the Future**, cannot be implemented in rural and urban areas of the Czech Republic without a reliable and secure high-speed Internet connection.

The current situation in the high-speed connection of households and businesses in the Czech Republic and current modernization trends point to the essential need to introduce a more reliable and faster Internet connection, which is permitted only by networks with very high capacity ("very high-capacity networks" or "VHCN networks"). VHCN networks are essential for maximizing the growth potential of the digital economy. Immediate transmission of data information with a very low error rate and low latency, and high reliability of data transmission create new possibilities for all areas of industry, telemedicine or for autonomous vehicle operations. Although the extent of all these positive impacts cannot yet be estimated, it is clear, for example, that they will support the development of smart cities, transport, health care and other services for citizens and for businesses. Furthermore, the development of these networks will support so-called digital state administration to the extent necessary to significantly increase the availability of digital public administration services to citizens and businesses, as well as for the exchange of large data sets between authorities.

More and more regions and local authorities consider affordable access to reliable high-speed connections to as an integral part of their political accountability to the population and to businesses in the territory they administer. The construction of VHCN networks will help to address the issue of rural depopulation and the relocation of economic activity to larger centres, and will further support the social and economic development of the regions.

The aim of the National Plan for the Development of Very High Capacity Networks (the "National Plan") is to indicate the essential prerequisites to facilitate investment in VHCN networks, to define the Czech Republic's strategic approach to building these networks and to determine the essential role of the state in achieving coverage with VHCN networks, especially in securing public financial aid while minimizing interference with economic competition. The National Plan also deals with the relationship between public and non-public communication networks and the options for sharing them. With their importance, quality and scope, VHCN networks will ultimately positively influence the economic growth of the Czech Republic and contribute to increasing the competitiveness of Czech businesses and to their sustainability. High-quality and reliable electronic communications networks are also essential for dealing with emergencies and crises, whether local, regional or national.

European Commission (EC) documents also show that the quality of connection to the Internet in the EU is expected to improve significantly by 2025. It is assumed that all European households should have access to 100 Mbit/s connections by 2025, with the possibility to upgrade networks to reach much higher speeds, and that schools, universities, research centres, transport hubs, hospitals, public administration bodies and businesses relying on digital technologies should have access to gigabit-level connectivity³.

The National Plan is a strategic document setting out procedures and tools, the implementation of which will in the long term create the conditions for the development of high-speed Internet connection for citizens, businesses and

¹ Government resolution 629 dated 3 October 2018, <https://www.digitalnicesko.cz/koncepcni-materialy>

² The innovation strategy was approved by Government Resolution No 104 of 4 February 2019.

³ viz <https://ec.europa.eu/digital-single-market/en/policies/improving-connectivity-and-access>

public institutions to a quality and reliability which meet the parameters set out in the EU regulatory framework for very high capacity networks.

During its preparation, the National Plan was discussed with the relevant state administration authorities, unions and associations of local governments territorial self-governments and with professional associations, that is, associations covering electronic communications businesses.

In accordance with the procedure used in approving Government materials, the National Plan was submitted for comments to all members of the Government and to other central state bodies, relevant commentary locations (Confederation of Industry and Transport, Chamber of Commerce, Union of Towns and Municipalities, Association of Czech Regions and Association of Local Authorities) and further to professional associations, that is, associations covering electronic communications businesses.

At the same time, the National Plan meets the so-called enabling condition of a "National or Regional broadband access plan" according to the draft of the so-called General Regulation for EU funds. Meeting this enabling condition will enable the drawdown of financial resources from EU funds during the 2021-2027 programming period.

2 Factors generating the need for VHCN networks

2.1 Link to European Union documents

As early as September 2016, the EC responded to the emerging need for high-speed internet connection in the communication entitled "Connectivity for a Competitive Digital Single Market - Towards a European Gigabit Society"⁴. Specifically, this document states that "... *The full economic and social benefits of this digital transformation will only be achieved if Europe can ensure widespread deployment and take-up of very high capacity networks, in rural as well as urban areas and across all of society.*" One of the main goals of the EC Strategy for a Digital Single Market of May 2015 was therefore to create an investment environment and conditions for the introduction of advanced very high capacity digital networks

Subsequently, some other progressive facts were defined for the area of mobile services in the strategic document entitled "5G Action Plan for Europe" of 14 September 2016.⁵ In this context, the Government has adopted a strategic vision "Implementation and Development of 5G Networks in the Czech Republic - Towards the Digital Economy"⁶, in which the necessary preconditions for the introduction of 5G networks in the conditions of the Czech Republic are indicated. The National Plan and the Implementation and Development of 5G Networks in the Czech Republic are two complementary sets of strategic materials that fundamentally outline the development of VHCN networks in the Czech Republic.

An important European legislative measure that introduces the concept of VHCN networks into national legislation is Directive (EU) 2018/1972 of the European Parliament and of the Council⁷ (Electronic Communications Code), which contains the result of the revision of the previous European regulatory

⁴ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions COM (2016) 587 final
viz <https://eur-lex.europa.eu/legal-content/CS/TXT/PDF/?uri=CELEX:52016DC0587&from=en>

⁵ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions COM (2016) 588
viz <https://eur-lex.europa.eu/legal-content/CS/TXT/PDF/?uri=CELEX:52016DC0588&from=cs>

⁶ See Government Resolution No 35 of 13 January 2020
viz <https://www.mpo.cz/cz/e-komunikace-a-posta/elektronicke-komunikace/koncepcie-a-strategie/narodni-plan-rozvoje-sitanga/implementace-a-rozvoj-siti-5g-v-ceske-republice--cesta-k-digitalni-ekonomice--252026/>

⁷ Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018, establishing the European Electronic Communications Code, see - <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L1972&from=EN>

framework for electronic communications services and networks. One of the aims of the directive is to support the establishment and use of these high-capacity networks. It is reflected in the legal order of the Czech Republic through an amendment to Act No 127/2005, on Electronic Communications⁸.

As electronic communications networks are also playing a key role in responding to the current health crisis, the EC has adopted a recommendation on a common set of EU tools for the deployment of VHCN networks and for ensuring timely access to 5G radio spectrum.⁹ To this end, the EC has created a new "Next Generation EU" instrument, which aims to repair the economic and social damage caused by the coronavirus pandemic, to kick-start the recovery of the European economy and to protect and create jobs.

2.2 Digital Economy and Society Index

Since 2015, the EC has been regularly monitoring the digital competitiveness of individual Member States through the Digital Economy and Society Composite Index ("DESI"), which summarizes relevant European digital performance indicators and monitors growth in the digital competitiveness of EU Member States. The 2020 report assesses the availability of high-speed connectivity, digital skills, internet use, digitisation of businesses, digital public services, the ICT sector and its R&D expenditure, and the use of Horizon 2020 funds in each Member State.

The report on the Czech Republic states, inter alia: "*The Czech Republic improved its score and ranked 17th in the DESI 2020. The country improved in three dimensions: human capital, integration of digital technology and in the use of internet services.*"

	CR		EU
	rank	score	score
DESI 2020	17	50.8	52.6
DESI 2019	18	47.3	49.4
DESI 2018	19	44.7	46.5
DESI 2017	15	45.3	46.9

Table 1: DESI 2020 for the Czech Republic - comparison (Source: EU)

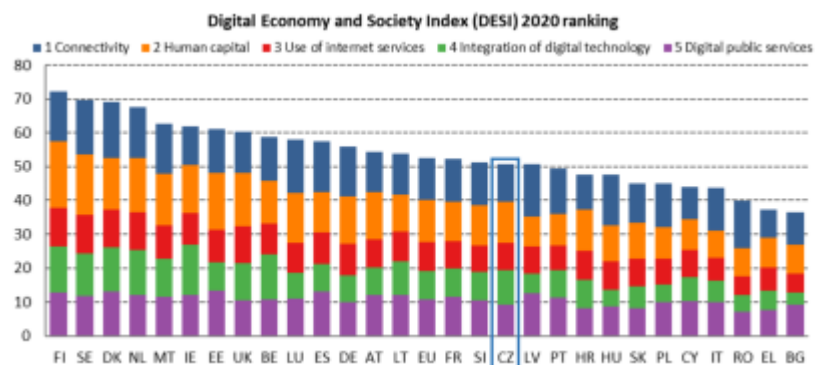


Chart 1: DESI 2020 results for the Czech Republic (Source: EU)

On the contrary, a relatively large year-on-year decline was recorded in the Connectivity chapter (from 19th to 24th place) and also in the Digital Public Services chapter (from 21st to 22nd place).

In the **Connectivity** chapter there are 8 indicators, of which the newly introduced indicator "Fixed Very High Capacity Network (VHCN) coverage" probably has the greatest impact on the Czech Republic's decline. Although the development of high-speed coverage has been relatively stable in recent years (90 % in 2018 and 92 % in 2019), the European target of 100 % coverage has not been reached.

⁸ The amendment to Act No 127/2005, on Electronic Communications, which is to transpose the Electronic Communications Code, is in the legislative process at the time of elaboration of the National Plan.

⁹ Commission Recommendation (EU) 2020/1307 of 18 September 2020 on a common Union toolbox for reducing the cost of deploying very high capacity networks and ensuring timely and investment-friendly access to 5G radio spectrum, to foster connectivity in support of economic recovery from the COVID-19 crisis in the Union, see <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020H1307&from=EN>.

The number of households with a fixed high-speed connection with a speed of at least 100 Mbit/s also recorded only a slight increase (from 18 % to 20 %), which means 19th place for the Czech Republic. However, the only two indicators in this chapter in which the Czech Republic finds itself above the EU average [full average coverage by 4G mobile networks, where 100 % of households are now covered by this technology, and the 5G readiness indicator (15th place)], were not sufficient to redress the balance.

The results of DESI 2020 clearly support the necessity of implementing the intentions stated in the National Plan and the direction of the Czech Republic towards a gigabit society through the nationwide and comprehensive development of VHCN networks.

2.3 Link to other key documents from the Czech Republic

The dynamic development of new technologies and a significant departure from traditional voice telephony services, which has been marked not only in the Czech Republic but also in other economically developed countries, have caused enormous consumer interest in an ever-increasing number of new types of digital services, which have begun to generate ever more demanding requirements for the electronic communications networks through which they are provided.

The implementation plans of the Digital Czech Republic programme were approved in 2019 by Government resolution¹⁰. The basic strategic material was subsequently developed into three main implementation documents: The Information Concept of the Czech Republic, the Czech Republic in a Digital Europe and the Digital Economy and Society.

The "Digital Economy and Society" document follows up on all component aspects brought about by technological development and the advancing digitization of all areas of life. In essence, the document conceives a gradual cross-society change, which is in principle associated with the use of digitization and the Internet, with the development of robotics and artificial intelligence, and above all implicitly includes all existing initiatives such as Industry 4.0, Construction 4.0, Society 4.0, Work 4.0, Education 4.0, as well as all potential new initiatives such as Culture 4.0, Healthcare 4.0, Agriculture 4.0. Such an environment generates an enormous amount of data arising from the use of the Internet of Things, services and people, with this massive quantity of data being transmitted via fixed or mobile VHCN networks. This means that VHCN networks are vital arteries that need to be secured, since they provide links between industrial manufacturing systems, transport networks, energy systems, service and trade areas, social systems and financial systems. Recently, there has been a growth in dynamic interaction between these systems, which, thanks to the massive and global advent of new technologies, is changing entire value chains, creating opportunities for new business models, but also pressure for modern industrial manufacturing flexibility and increased demands for cyber security and an interdisciplinary approach. Currently, data is transmitted by electronic communications networks, which may not have VHCN network parameters.

The adoption of the National Plan is part of the Digital Economy and Society Implementation Plan, specifically for its main objective No. 4 "Support for connectivity and infrastructure of the digital economy and society", which points out, inter alia, that "*... Connectivity is the key to the success of digital services. Infrastructure development is crucial for achieving the goals of sustainable development. The right investment in digital infrastructure development acts as the backbone of better functioning economies and more inclusive societies. One of the fastest ways to transform a country's society and economy is to invest in digital infrastructure.*" The document further states that "*... The prerequisite for the use of digital or digitally friendly of Digital Economy services is their sufficient availability anytime and anywhere. This objective is focused*

¹⁰ This is government resolution No 255 of 15 April 2019, see <https://www.digitalnicesko.cz/implementacni-plany-programu-digitalni-cesko/>.

mainly on tasks related to infrastructure development, the building of networks for internet connection and the digitization of television and radio broadcasting. Connectivity is the key to the success of digital services."

In electronic communications and in the context of society's growing dependence on the secure operation of networks, it is necessary to raise the issue of cyber security. In this context, the National Cybernetic and Information Security Agency has prepared a National Cyber Security Strategy for the Czech Republic for 2021 - 2025.¹¹

The National Plan supports the implementation of objective 9.1 "To develop high-quality, reliable, sustainable and resilient infrastructure, including regional and cross-border infrastructure, to support economic development and improved quality of life, with a focus on economically affordable and equal access for all", which is presented in the Strategic Framework Czech Republic 2030 document.

2.4 National plan for the Development of Next Generation Networks and evaluation of its implementation

The National Plan for the Development of Next Generation Networks¹² (Czech: "NPRSNG") was the first national strategy for electronic communications to work at increased intensity with the issue of public aid. Although other sectors of the national economy have worked routinely with public aid, due to the fact that nationwide support programmes have not been implemented until that point, this activity was initially received in the electronic communications sector with great mistrust and concern, especially with regard to possible negative interference in economic competition. Communication between state administration and the commercial sector was also complicated in respect of the determination of so-called white spots in which market mechanisms were considered to be failing.

At the same time, the adoption of the NPRSNG by the Government represented the meeting of the so-called precondition for ESI funds in the 2014–2020 programming period¹³ and the possibility of providing support under the OP EIC. During the implementation of the aid, the Private Design, Build and Operate subsidy model proved successful, which ensures optimum development of next generation networks in designated locations throughout the country, and further eliminates state risks associated with the construction and operation of these networks. This model uses an already established, institutionally secured implementation mechanism and respects the fact that there is no public institution in the Czech Republic that specializes in the development, planning, construction and operation of electronic communications networks. For these reasons, the Private Design, Build and Operate subsidy model will also be preferred in the construction of VHCN networks.

At the same time, it turns out that the electronic communications sector, in addition to specific financial assistance, perceives the need for non-subsidy aid, which would consist of the gradual removal of obstacles and barriers restricting investment in the construction of electronic communications networks. Based on this fact, an Action Plan was adopted to implement non-subsidy measures to support the planning and construction of electronic communications networks¹⁴.

The situation in the electronic communications market and in society is evolving rapidly, some identified obstacles and barriers have been removed, some are now longer an issue due to a change in legislation, while new obstacles and barriers have been identified. For this reason, the Government has approved the Action

¹¹ <https://www.nukib.cz/cs/kyberneticka-bezpecnost/strategie-akcni-plan/>

¹² documents have been approved by the resolution No 885 of 5 October 2016 viz <https://www.mpo.cz/cz/e-komunikace-a-posta/elektronicke-komunikace/koncepce-a-strategie/narodni-plan-rozvoje-siti-nga/narodni-plan-rozvoje-siti-nove-generace-byl-schvalen--222120/>

¹³ In accordance with the General Regulation for the ESI Funds (Regulation 1303/2013, Annex XI) <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32013R1303&from=en>

¹⁴ This document was approved by Resolution No 350 of 10 May 2017.

viz <https://www.mpo.cz/cz/e-komunikace-a-posta/elektronicke-komunikace/koncepce-a-strategie/narodni-plan-rozvoje-siti-nga/akcni-plan-k-provedeni-nedotacnich-opatreni-pro-podporu-planovani-a-vystavby-siti-elektronickyh-komunikaci-byl-schvalen--228387/>.

Plan 2.0 follow-up material to implement non-subsidy measures to support the planning and construction of electronic communications networks¹⁵ ("Action Plan 2.0").

Both action plans complement the state's subsidy policy in the area of electronic communications development.

Another important fact was the implementation at the national level of the European activity of national offices supporting the development of high-capacity networks - Broadband Competence Offices ("BCO"). The role of the BCO Czech Republic, including the role of the territorial coordinators, is described in a separate subchapter No 7.3 of the National Plan.

To optimize the settings for public aid in electronic communications, or more exactly to support the development of a digital society, it is essential to harmonize the various grant titles, the coherence of use of European Structural Funds and the usability of various other tools - investment, applications support, support for disadvantaged regions or socio-economic drivers. An important aspect for investment stimulation is also measures on the demand side through enabling long-term irrevocable leases (see Chapter 6.3).

2.5 Securing electronic communications services in crises

On 12 March 2020, the Government declared a state of emergency due to a health threat related to the proven occurrence of coronavirus (referred to as SARS CoV-2) in the Czech Republic, which was reflected in an increase in Internet traffic of 25 %¹⁶ (assessed at the level of the main interconnection point in the Czech Republic), which was mainly related to the transfer of students and staff to the "home-office" mode and to a change in the consumption of digital entertainment and culture.

An analysis of the situation in the provision of electronic communications services during the state of emergency in the Czech Republic may lead to the following conclusions:

- 1) Compared to a normal period, the importance of public communication networks as an important area of the critical (information) infrastructure of the Czech Republic has increased many times over and the related demands on the volume of data transmission have also increased.

Although public communications networks have withstood the pressure from customers and have not been significantly disrupted, it is desirable to address locations where VHCN networks do not exist or where existing electronic communications networks are not sufficiently robust and reliable in capacity terms by investing in optical networks or strengthening the existing transmission capacity of current fixed and mobile networks in these locations.

- 2) During the crisis, data traffic increased significantly mainly due to the fact that private entities launched completely new activities based on digitization and further enabled using of their applications, content, including the provision of linear and non-linear multimedia services, both free of charge and on financially advantageous terms.

The increase in data traffic was partly due to an increase in the use of digital services in some areas (e.g. education, healthcare, etc.) with regard to measures to prevent social contacts, and ultimately establishing "equality" of these digital services with the corresponding services provided in traditional form.

It is expected that in possible future crises, the increase in the operation of digital services will be subject to even greater requirements, which will require a substantial increase in reliability and expansion of the transmission capacity of electronic communications networks. During this crisis, the operation and importance of private networks also increased significantly, as due to their physical separation they were not affected by the impact of increasing public network data transmission and

¹⁵ This document was approved by Resolution No 778 of 4 November 2019 viz <https://www.mpo.cz/cz/e-komunikace-a-posta/elektronicke-komunikace/koncepcie-a-strategie/narodni-plan-rozvoje-siti-nga/akcni-plan-2-0-byl-schvalen--250300/>

¹⁶ Press release CZ.NIX (www.nix.cz)

thus enabled the operation of critical applications necessary for public administration management and other important services, including services directly connected to the Integrated Rescue Service or those services operated as ancillary infrastructure.

- 3) Due to inadequate access to the Internet, less populated areas of the Czech Republic may suffer from limited communication opportunities in crisis situations; under normal circumstances, they may remain at a disadvantage in the long run or be directly excluded from economic development.

Higher demands on network infrastructure generate higher pressures for investment in public communications networks. Investments in networks are also supported by consumer behaviour not only during the pandemic, but also after it has subsided. Data consumption by customers has been growing for a long time, the situation in 2020 has only accelerated this trend. The behaviour of end-user customers, for example in the field of entertainment, is moving online in the form of the streaming of games or consuming video content, primarily in the form of video-on-demand or Internet television services. A high-speed internet connection is becoming an increasingly essential item for consumers, and a high-quality electronic communications network capable of reliably transmitting high volumes of data with low latency is key. Communication of public administration bodies via electronic communications networks has also proved essential for crisis management and showed handling crisis situations (including working from home) and crisis management to be fundamental.

It will be necessary to continue efforts to reduce the duration of building permit proceedings and achieve a better understanding of the constructions of public and some non-public communication networks as being built and operated in the public interest. This means that buildings must be provided with sufficient support and protection, through appropriate legislative and/or other measures.

3 VHCN networks

3.1 Definition of VHCN networks

The European Communications Code⁶ (the “Code”) defines a very high capacity network’ as *“an electronic communications network which consists wholly of optical fibre elements at least up to the distribution point at the serving location, or an electronic communications network which is capable of delivering, under usual peak-time conditions, similar network performance in terms of available downlink and uplink bandwidth, resilience, error-related parameters, and latency and its variation. Network performance can be considered similar regardless of whether the end-user experience varies due to the inherently different characteristics of the medium by which the network ultimately connects with the network termination point.”*

This approach will in fact lead to *“to bringing the optical fibres closer to the user”*, while in accordance with the principle of technological neutrality, other solutions with comparable parameters to those achieved by systems using optical fibres as a transmission medium will not be excluded. Related to this is the option to deploy future generations of fixed and wireless networks based on improved radio interfaces and an overall denser VHCN network architecture.

In accordance with the Code, the Association of European Regulators (BEREC) has developed guidelines on criteria¹⁷ which the electronic communications network must meet in order to be considered a VHCN network. These are mainly the available bandwidth for downlink and uplink, resilience, parameters related to error rate, latency (delay) and its fluctuation and packet loss rate.

¹⁷ BEREC Guidelines on Very High Capacity Networks;
viz https://berec.europa.eu/eng/document_register/subject_matter/berec/download/0/9439-berec-guidelines-on-very-high-capacity-n_0.pdf

At the same time, VHCN networks being built must take into account and, to a certain extent, anticipate technological developments. As public communications networks will increasingly tend to use IP-based technology in the future, VHCN networks must enable end-user customers, that is, users, to choose from a number of competing electronic communications services providers.

For the sake of completeness, one should draw attention to the definition of the term "high-speed electronic communications network" in Act No 194/2017, on measures to reduce the costs of implementing high-speed electronic communications networks, by which is meant a network permitting the provision of a connected service at a speed of at least 30 Mbit/s. This law is a transposition of Directive 2014/61/EU on measures to reduce the cost of deploying high-speed electronic communications networks.

Further, "EC Regulation 651/2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty"¹⁸, uses the term "next generation access networks (NGA networks)", which means advanced networks having at least the following characteristics:

- a) deliver services reliably at a very high speed rate per subscriber through optical (or equivalent technology) backhaul sufficiently close to user premises to guarantee the actual delivery of the very high speed; and in sufficient proximity to the user's premises to ensure a true high-speed connection,
- b) support a variety of advanced digital services including converged all-IP services, and (c) have substantially higher upload speeds (compared to basic broadband networks) At the current stage of market and technological development, NGA networks are: (a) fibre-based access networks (FTTx), (b) advanced upgraded cable networks.
- c) certain advanced wireless access networks capable of delivering reliable high-speeds per subscriber.

Although different terms are used in European and national legislation for given purposes, a network that has the parameters of very high capacity networks is considered to be a VHCN network. VHCN networks are subject to support and development under the National Plan.

3.2 VHCN network parameters

A long-term problematic area in the operation of high-capacity networks is the quality of the services provided, including the guarantee of defined quality parameters, and the related transparent control.

In Regulation (EU) 2015/2120 of the European Parliament and of the Council¹⁹ an obligation was imposed on all ISPs at a fixed location to publish selected parameters for Internet access services on fixed networks related to the data transfer rate, in the following minimum scope: maximum rate, normally available rate, minimum rate and advertised rate.

The implementation of that Regulation has already taken place. As stated by the Czech Telecommunication Office (the "CTO") in its investigations, some operators of electronic communications networks still do not routinely provide customers with connections with guaranteed parameters. The fulfilment of the parameters of the normally available speed according to the definition of Regulation (EU) 2015/2120 so that the actually achieved normally available speed meets the requirements of a high-speed connection remains problematic.

3.3 Public networks

A public electronic communications network is defined in Section 2(j) of the Electronic Communications Act as a network "*which serves wholly or mainly for the provision of publicly available electronic communications*

¹⁸ <https://eur-lex.europa.eu/eli/reg/2014/651/oj/ces>

¹⁹ 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 viz <https://eur-lex.europa.eu/legal-content/CS/TXT/PDF/?uri=CELEX:32015R2120&from=CS>

services, and which supports the transmission of information between network termination points, or an electronic communications network through which a radio and television broadcasting service is provided."

Investments in public electronic communications networks are largely made by private entities on the basis of market mechanisms, especially in locations with the prospect of high demand (and thus return on investment), which still creates a gap between remote rural and urban areas in their access to high-speed internet access.

3.4 Internet access analysis for the Czech Republic

The National Plan is based on a comprehensive analysis of the state of development of high-speed networks in the Czech Republic, in order to ensure access to the Internet available at a fixed location, based on geographical data collection ("GSD") performed by the CTO. The National Plan as submitted presents only the essential part of the analytical information obtained (based on a declaration of qualitative parameters by network operators and service providers on these networks). The full text of the comprehensive analysis is publicly available on the MIT's electronic website²⁰.

The aim of the analysis was to determine the actual state of availability of reliable and high-quality high-speed Internet access for the population and businesses in the Czech Republic, on speeds used in new generation networks or higher speeds, as the parameters of VHCN networks had not yet been defined. All analytical work which was carried out in the course of 2019 with the broad contribution of the professional public was directed to the implementation of:

- an analysis of the current and planned state of high-speed networks,
- an analysis of the state of demand for Internet connection services.

The number of active connections (i.e. the number of connections on which Internet access service is provided) for the period 2015-2018 shows a trend of gradual growth.



Chart 2: Total number of active connections (accesses) (Source: Geographical Data Collection, Czech Telecommunications Office)

The representation of active connections of individual technologies differs significantly depending on the size of the municipality. In 2018, WAS technology had more than a 50% share of municipalities with less than 2,000 inhabitants. This fact can be explained by the fact that the construction of optical or other cable electronic communications networks in small municipalities is costly (with an extremely long payback period). For this reason, in these locations, investors prefer to build wireless networks, which do not require high investment.

	village up to 500 inhabitants	500 - 1000 inhabitants	1000 - 2000 inhabitants	2000 - 5000 inhabitants	over 5000 inhabitants	Total
CATV	1 095 (0.6%)	4 343 (1.9%)	7 010 (2.7%)	16 847 (5.1%)	4 343 (25.7%)	596 709 (18.6%)

²⁰ <https://www.mpo.cz/cz/e-komunikace-a-posta/elektronicke-komunikace/koncepcie-a-strategie/narodni-plan-rozvoje-siti-nga/analiza-stavu-rozvoje-siti-nga-v-cr---252745/>

FTTB	3 423 (1.8%)	4 915 (2.2%)	9 228 (3.6%)	25 877 (7.9%)	425 135 (19.3%)	468 578 (14.6%)
FTTH	1 151 (0.6%)	3 639 (1.6%)	5 668 (2.2%)	12 585 (3.8%)	130 550 (5.9%)	153 593 (4.8%)
FWA	2 379 (1.2%)	1 771 (0.8%)	1 822 (0.7%)	1 712 (0.5%)	9 468 (0.4%)	17 152 (0.5%)
WAN	139 029 (72.7%)	142 302 (63.1%)	146 850 (56.9%)	157 784 (48.1%)	500 079 (22.7%)	1 086 044 (33.9%)
xDSL	44 170 (23.1%)	68 695 (30.4%)	87 351 (33.9%)	113 364 (34.5%)	571 319 (25.9%)	884 899 (27.6%)

Table 2: Total number of active connections by technologies broken down by size of municipalities (year 2018)
(Source: Geographical Data Collection, Czech Telecommunications Office - data declared by providers, CSO data on the number of inhabitants in municipalities) ²¹

The percentage of FTTB/H solutions grows with the size of municipality. This finding is especially important for work with public aid, where, in addition to the subsidy itself, it is also essential to support investors' interest in covering such an area with non-subsidy funds.

3.5 Coverage map of the Czech Republic for high-capacity internet access networks 2019 data

Basic settlement units (ZSJ), in which high-capacity internet access is currently provided with speeds of at least 100+ Mbit/s and the corresponding percentage coverage of address points in ZSJ, are highlighted in grey or black on the following overview map.

NGA Networks. 100 Mbit/s+
Situation, at 31 December 2019

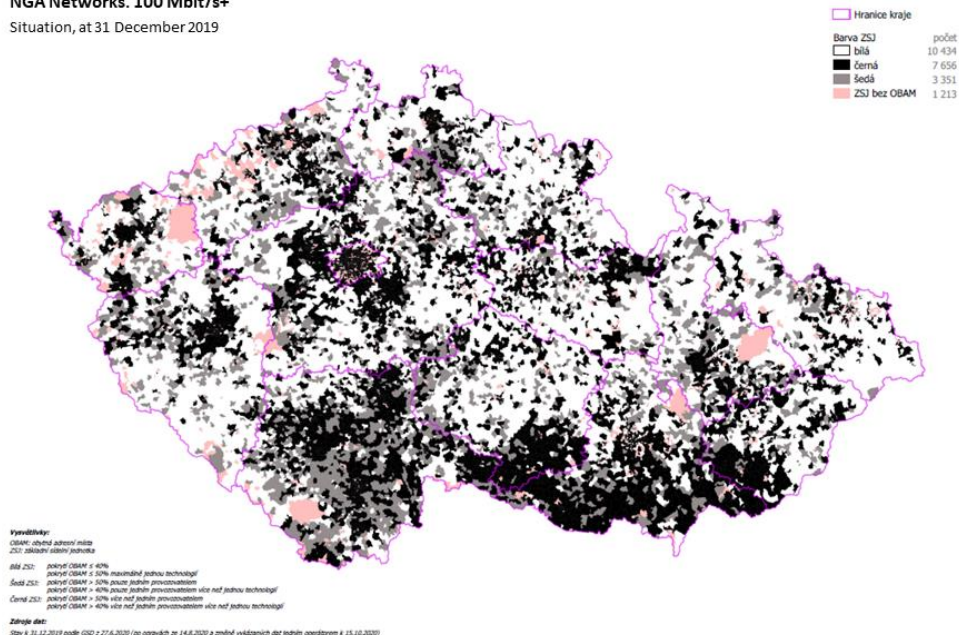


Fig. 1: Coverage map of the aggregation state of residential addresses in ZSJ with the possibility of Internet access at a speed of 100+ Mbit/s; status as of the end of 2019 (Source: Czech Telecommunications Office)

²¹ <https://www.czso.cz/csu/czso/pocet-obyvatele-v-obcích-za0wri436p>; data as of 1 January 2019

The following map shows the provision of high-capacity Internet access at speeds of 1 Gbit/s. Both maps are based on CTO GSD data for 2019. The colours have the same meaning as in the previous map.

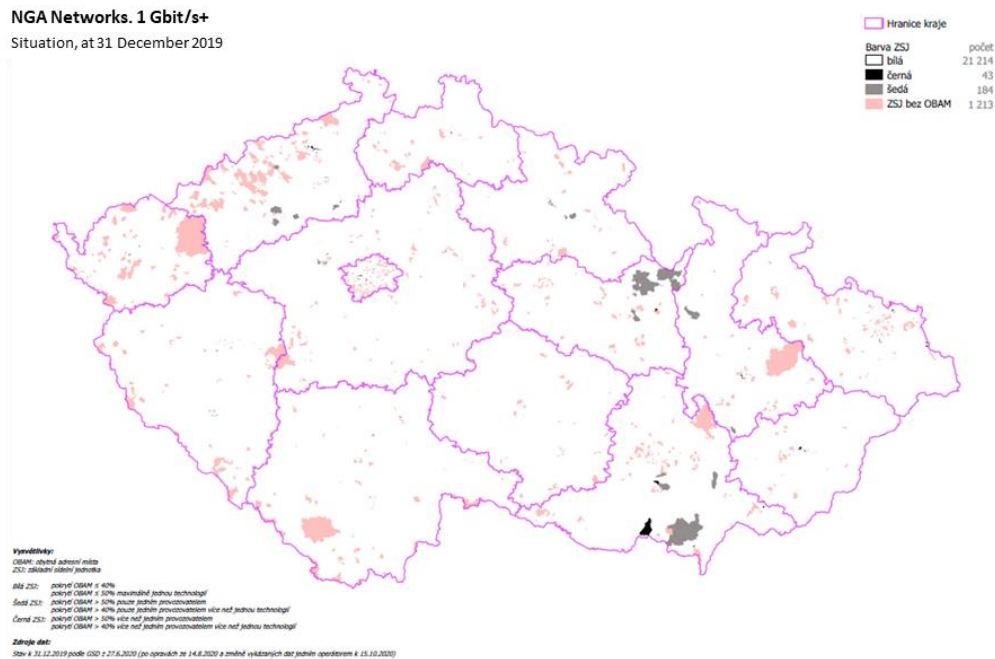


Fig. 2: Coverage map of the aggregation state of residential addresses in ZSJ with the possibility of Internet access at a speed of 1+ Gbit/s; status as of the end of 2019 (Source: Czech Telecommunications Office)

3.6 Non-public networks

In addition to non-public communication networks for the provision of electronic communications services, private networks are also being built and operated in the Czech Republic.

In the case of non-public networks, these are:

- critical infrastructure,
- non-public administration networks, including national infrastructure for science, research and education,
- other networks, especially private ones.

Non-public critical infrastructure networks

Critical infrastructure is subject to Act No 181/2014, on cyber security, which regulates the competence and powers of public authorities in the field of cyber security, ensuring the security of electronic communications networks and information systems.

The Ministry of the Interior (the “MoI”) operates a non-public electronic communications network for the Czech Police, components of the integrated rescue system and territorial state administration bodies called the Integrated Telecommunications Network of the MoI (“MoI ITS”). As a priority, MoI ITS uses communication infrastructure owned by the MoI. The connection to small buildings is typically handled using leased communication circuits and services from public providers. The transmission infrastructure is common to all the communication systems - voice, data and radio communication. MoI ITS is divided into regional sub-networks, which are interconnected by an optical backbone network so as to ensure sufficient transmission capacity (currently 1 Gbit/s; transitioning to 10 Gbit/s).

The MoI ITS also includes the PEGAS radio communications network designed for radio communication and control of components of the integrated rescue system. The network is divided into 14 regional networks in accordance with the current territorial administrative division of the Czech Republic; it is integrated into all operational centres of the Czech Police and the Fire Brigade.

In addition, the Ministry of the Interior operates a Central Services Point (the “CMS”), intended primarily for the guaranteed, secure and audited exchange of information between individual public administration bodies. It is the only place for the exchange of data between individual public administration information systems (“ISVS”) and at the same time the only place for connection to the public Internet and specific non-public networks, such as EU networks. The CMS enables each public administration body to gain efficient access to relevant information. CMS is one of the basic building blocks of the public administration communications infrastructure and its services enable public administration bodies to reduce the costs of securing the communication environment. As such, the CMS is an integral part of the MoI's non-public telecommunications infrastructure.

Non-public networks operated within the competence of the Ministry of the Interior and the Ministry of Defence (the “MoD”), which are built by the MoI and MoD in accordance with Act No 181/2014, on Cyber Security, are considered to be non-public networks built in the public interest.

Public administration non-public networks

A non-public public administration network can be defined as a new generation data network based in whole or in part on technology using optical communication elements and operated by a public authority (state or local government authorities or entities authorized by them) for public administration and public services. The category of non-public public administration networks includes regional and municipal networks in particular. The network is not used by households or private entities, with the exception of organizations founded or set up by municipalities, regions or the state. The network may not be commercially further leased on and no charges are levied on users for its operation.

In the Czech Republic, regional data networks are operated by four out of thirteen regions, principally in larger municipalities. The main service is to provide access to the CMS. Schools, hospitals, social services facilities, museums, and components of the integrated rescue system are also connected to a regional data network. The speed of a regional data network is usually higher than 1 Gbit/s.

Analogous to regional networks, so-called metropolitan networks operate within some municipalities, usually based on a combination of different technologies using optical fibres and wireless systems. These networks provide the necessary connectivity and transport capacity to the municipality and its organizations.

After the entry into force of the transposition amendment to the Electronic Communications Act, data on the existence of such networks will be collected under geographical mapping according to Article 22 of Directive 2018/1972, so that the mapping outputs can be used to share or facilitate the construction of public electronic communications networks while maintaining the required security aspects.

Other non-public networks

Other non-public networks include, for example, networks on company sites, securing the operation of manufacturing and processing lines. These networks are generally not subject to regulation or data collection as part of geographical mapping.

3.7 Relations between public and non-public networks

Having regard to the efficient use of public funds used to finance the investment construction of electronic communications networks, it is desirable to respect the following principles:

1. Investments from public funds in non-public networks must not jeopardize the existence of private investments in the locality²². These non-public networks built from public funds should not duplicate any existing public network technical infrastructure, unless this need arises, for example, from legislation.
2. The capacity of existing public networks should be used for the implementation of data services (even non-public ones), if it suits the given purpose, where this is not excluded, for example, by legal regulations.
3. The minimum sustainability period of non-public networks built using public funds should be at least 15 years.
4. Public services should not be provided free of charge or for a fee to third parties, i.e. to the public or businesses through non-public networks built using public funds.
5. Before beginning the construction of non-public networks using public funds, it is desirable that the relevant state administration or local government bodies develop a strategy for the construction, operation and regulation of non-public networks, which they will publish.

These principles do not apply to non-public networks built in the public interest, i.e. the networks listed in Chapter 3.6, section "Non-public critical infrastructure networks", and other non-public networks referred to in Chapter 3.6, section "Other non-public networks".

The enabling precondition for drawing funds from public sources for building infrastructure for high-capacity Internet access is their rational and effective use, which must be implemented in full by state and local governments, including their organizational units or business entities established by them, in accordance with the appropriate provisions of the relevant laws. Part of the rationality test is, in particular, the mapping of the accessibility of services provided through networks owned by electronic communications businesses and a comparison of the payment required by these for the provision of services with the value and rate of return of the planned investment. If the test of rationality and efficiency of investing public funds in a given locality is not met, the construction of high-capacity infrastructure should not be carried out from public sources. It seems appropriate to develop a national concept plan for the development of non-public networks.

3.8 Use of non-public networks and other infrastructure for the development of high-capacity electronic communications networks

Act No 194/2017, on measures to reduce the costs of introducing high-speed electronic communications networks, governs the right of authorized persons to request access to existing physical infrastructure for the purpose of introducing a high-capacity electronic communications network. The state and local authorities own or operate, including through third parties, electronic communications infrastructure, but also other suitable infrastructure (e.g. transport, energy, sewerage), which in accordance with Action Plan 2.0 can be used for the development of electronic communications services and networks. Access to these resources can significantly ease the construction of high-capacity electronic communications networks, and not only in urban agglomerations.

Increasing awareness of the availability of existing and planned physical infrastructure (taking into account the legitimate security interests of its owners or operators) which is suitable for sharing can also be used to

²² EU Guidelines for the application of State aid rules in relation to the rapid deployment of broadband networks (2013/C 25/01), viz [https://eur-lex.europa.eu/legal-content/CS/TXT/PDF/?uri=CELEX:52013XC0126\(01\)&from=CS](https://eur-lex.europa.eu/legal-content/CS/TXT/PDF/?uri=CELEX:52013XC0126(01)&from=CS)

develop public communications networks. One very effective way is also to coordinate relevant investment projects, both in the planning phase and during implementation.

In view of the above, it seems essential that state institutions and entities managing state or local government assets publish information and offer appropriate physical infrastructure for sharing or other use in order to facilitate the deployment of public communications networks for the provision of public electronic communications services.

It is understood that it is necessary to take into account any specific aspects for critical infrastructure pursuant to the relevant legal regulations (e.g. Act No 181/2014, on cyber security), which Act No 194/2017 respects.

4 Demand analysis for high-speed services in the Czech Republic

4.1 Household demand analysis for high-speed services

In 2019, a detailed survey of opinions on Internet connection was carried out among inhabitants of the Czech Republic²³.

The results of the survey can be characterized as follows:

- the public is very interested in the topic of the internet (see the large number of survey respondents),
- public opinion on the internet is very consistent,
- respondents were evenly distributed across all demographic characteristics.

The results of the survey are clearly sorted and presented publicly on the MIT website.

4.2 Analysis of the coverage of the main socio-economic actors by high-speed internet access service

This analysis was carried out using information from the individual ministries which are responsible for the development of a given area of socio-economic actors, including the creation of related strategic materials. One of the conclusions of the analysis is a statement that for a future more detailed analysis of current and future demand, the analysis must be continued.

For socio-economic actors, the situation often arises where there is a demand for a high-speed internet connection, but on the other hand, these actors do not have sufficient financial resources to cover the related operating costs. It is planned to address this serious issue through the Indefeasible Rights of Use (IRU) method²⁴, i.e. through the capitalization of these operating costs.

²³ <https://www.mpo.cz/cz/e-komunikace-a-posta/elektronicke-komunikace/koncepcie-a-strategie/narodni-plan-rozvoje-siti-nga/pruzkum-nazoru-na-internetove-pripojeni-v-roce-2019--252747/>

²⁴ An Irrevocable Right of Use (IRU) is a type of permanent telecommunications contract that is irrevocable, between the owner of a communications system and a customer of that system. The word "irrevocable" means "cannot be cancelled, or reversed". The customer purchases the right to use a certain amount of system capacity for a certain number of years. IRU contracts are almost always long-term, usually for 20 to 30 years. The communications system may be, for example, a laid optical cable or optical fibres. The owner of an IRU may unconditionally and exclusively use the relevant capacity of the cable for the specified period of time. These contracts oblige the buyer to pay part of the operating costs and maintenance costs of the cable, including all costs incurred in repairing the cable after accidents.

Public Administration Institutions

The demand for services from the main socio-economic actors will in the future be associated mainly with a higher degree of digitization of society (with the need for online video transmissions or a higher rate of use of cloud services and the Internet of Things, so-called IoT). Within the Government Digital Czech Republic programme, individual specific projects defining the demand for services are defined.

An overview of the demand for the service of connecting public institutions to the Internet, including an outlook for future needs, is given in the following table:

Ministry/Department	Is the current achieved speed 1Gbit/s?	Demand for internet connection service in the future	Outlook for the future needs of individual ministries, including projects included in the Digital Czech Republic programme
Ministry of the Interior (MoI)	YES	The backbone network has an adequate Internet connection Currently, there is a demand for VRI in particular, in approx. 100 excluded localities.	<ul style="list-style-type: none"> - Improving services in the field of citizen security - Improving the quality of online video transmissions - 28 specific projects approved within Digital Czech Republic
Ministry of Health (MoH)	n/a	n/a	Selection of projects within Digital Czech Republic: <ul style="list-style-type: none"> - National Health Information Portal - eHealth, telemedicine and mHealth, eConsultation, eOrdering - Management of access approvals - ePrescription, eReceipt and CPOE - National Centre for Electronic Healthcare - Integrated user system for regional fire brigades - National Register of Healthcare Professionals, Intensive Care, Paid Health Services, Reproductive Health and National Diabetes Registry
Ministry of Education, Youth and Sports (MoE)	YES NO YES YES	The Ministry of Education has an adequate optical connection. Elementary and secondary schools Universities Research centres	<ul style="list-style-type: none"> - Digitization of education - Departmental Information System - Introduction of intergenerational programs and community learning to improve the accessibility of digital education - Creation of teaching resources, teaching texts and online materials for students and teachers - Availability of a database on the use of digital technologies in education

Ministry/Department	Is the current achieved speed 1Gbit/s?	Demand for internet connection service in the future	Outlook for the future needs of individual ministries, including projects included in the Digital Czech Republic programme
Ministry of Transport (MoT)	YES YES	The MoT has an adequate optical connection. Railway Infrastructure Authority and Highways Authority	<ul style="list-style-type: none"> - ITS development
Ministry for Regional Development (MRD)	YES NO	The MRD has an adequate optical connection. Subordinate organisations Self-governing authority	<ul style="list-style-type: none"> - Digitization of construction management (to be implemented from 2023) - Digitization of maps within the Digitization of building permit proceedings - Smart cities - new projects - Improvements to existing systems: Czech Point, Critical Information System, Monitoring system for services development in Regional Development Centres.
Ministry of Industry and Trade (MIT)	YES NO	MIT 9 subordinate organisations	A total of 25 projects approved under the Digital Czech Republic programme
Ministry of Culture (MC)	NO NO	The Ministry of Culture currently does not have adequate connectivity. 29 departmental organisations	<ul style="list-style-type: none"> - JGEI - Electronization of all processes connected with the administration of subsidy titles and certain legal records within the competence of the Ministry of Culture - National eLibrary - ELVIS system (electronic administration and registration of museum collections and agendas) - Czechiana (Digitization of cultural heritage) - RCNS system (Information system for churches and religious societies) - Departmental information system – electronic filing service - ERP (Access of any newly established subsidised organization of the

Ministry/Department	Is the current achieved speed 1Gbit/s?	Demand for internet connection service in the future	Outlook for the future needs of individual ministries, including projects included in the Digital Czech Republic programme
			Ministry of Culture to this central system) - Departmental information system – Facility management solutions
Ministry of Labour and Social Affairs (MLSA)	NO	MLSA - has an adequate connection speed and there are no known requirements for new services in the future	
	NO	Czech Social Services Directorate - no information about future services	
	NO	Labour exchanges	

Table 3: An overview of the demand for the service of connecting public institutions to the Internet, including an outlook for future needs (Source: MRD and MIT)

Based on this analysis, it can however be stated that virtually all public administration institutions are currently connected to the Internet, although not all achieve sufficient connection quality. Most **central and regional headquarters of individual public administration institutions** are covered by a sufficiently high-quality connection to meet European targets (i.e. a connection with a capacity of 1 Gbit/s and higher), with most of these institutions currently using lower real connection speeds (they do not need higher speeds at present).

The analysis also shows that **outside the central and regional headquarters**, connection quality is for a large proportion of public administration institutions currently inadequate or will become inadequate. The main barriers include in particular the lack of availability of Internet connections allowing gigabit speeds at the headquarters of these institutions (which applies to most institutions located outside municipalities with extended powers), the financial possibilities of these institutions, but also the lack of the capacity (especially technical) needed to provide and manage internal networks at these institutions.

The data on the coverage of public administration institutions using the CTO mapping for 2019 are as follows:

Speed range	Speed	Number of offices
0	No coverage	3
1–30	up to 30 Mbit/s	40
31–99	Over 30 Mbit/s	91
100–999	Over 100 Mbit/s	546
1+	Over 1 Gbit/s+	32
	Total offices	712

Table 4: Speed of internet connection in public administration institutions (Source: MIT)

Elementary, secondary and higher vocational schools

From the Czech Schools Inspectorate report²⁵ from 2017 it follows that the current speed of connection of elementary schools, secondary schools and higher vocational schools must be assessed as being entirely inadequate.

Furthermore, this report states that the situation is especially critical in elementary schools, where the national percentage of the use of digital technologies is less than 10% and at secondary schools and higher vocational schools is 20%. This crisis is mainly represented by absolutely inadequate standard software and hardware provision, lack of an ICT strategy or own ICT administrator and insufficient internal network coverage to connect computers and other devices.

The survey conducted by the Czech Schools Inspectorate in this area was completed by 5,315 kindergartens, elementary schools, secondary schools and higher vocational schools.

Connection speed	Kindergarten	Small elementary schools	Large elementary schools	Secondary and higher vocational schools
Less than 1 Mbit/s	6.0	2.1	0.6	0.6
1–10 Mbit/s	41.9	35.3	13.4	11.9
11–30 Mbit/s	31.9	39.4	43.0	33.4
31–100 Mbit/s	16.6	19.7	35.3	42.6
More than 100 Mbit/s	3.6	3.5	7.7	11.6

Table 5: Speed of internet connection in primary schools, secondary and higher vocational schools - share of schools in percent. (Source: Czech Schools Inspectorate)

Data on the coverage of all schools using the CTO mapping for 2019 are listed in the following table. Although this information was obtained in a different manner than that used for the report of the Czech Schools Inspectorate, it is possible to infer an improvement in the connection situation compared to 2017.

Speed range	Speed	Total - all schools ²⁶
0	No coverage	153
1–30	up to 30 Mbit/s	845
31–99	Over 30 Mbit/s	2,122
100–999	Over 100 Mbit/s	6,435
1+	Over 1 Gbit/s+	374
Total schools		9,929

Table 6: Coverage data using CTO mapping for 2019. (Source: MIT)

Universities and Research centres

The administration of networks and connectivity of universities and Academy of Sciences research institutes is provided by the CESNET association²⁷. Universities are connected to the Internet at an average speed of 10 Gbit/s (in some cases up to 100 Gbit/s) and are covering their current needs.

²⁵ Czech Schools inspectorate, Thematic Report - Use of digital technologies in kindergartens, elementary, secondary and higher vocational schools, 2017

²⁶ Kindergarten, elementary, secondary, higher vocational schools and conservatoires

²⁷ CESNET is an association of universities and the Academy of Sciences of the Czech Republic, which operates and develops the national e-infrastructure for science, research and education, including a computer network, computing grids, data repositories, collaborative environments and offering a wide range of services.

There is an optical network connection in university buildings where teaching or research takes place. In other school buildings, there is an optical connection wherever more than 50 employees work.

There are 54 research institutes in the Czech Republic; in major cities these are connected to the metropolitan optical network. For their separate workplaces, research institutes rent an optical network with a connection speed of 100 Gbit/s. Since 2013, the main backbone of the CESNET networks (Prague - Brno - Olomouc - Hradec Králové, Prague) has been based on optical fibre with a transmission speed of 100 Gbit/s.

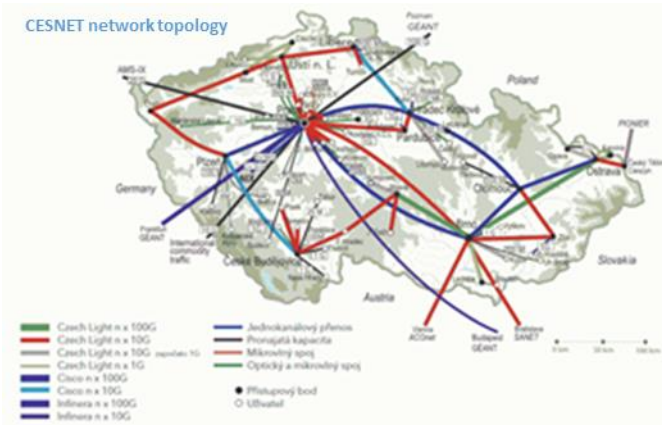


Fig. 3: CESNET network topology (Source: CESNET)

Key to Figure: CESNET network topology. Jednokanálový přenos = Single-channel transmission; Pronajatá kapacita = Leased capacity; Mikrovlnný spoj = Microwave connection; Optický a mikrovlnný spoj = Optical and

The core of the current network, which CESNET began building in 2005, is an infrastructure with dozens of transmission channels with speeds of 100, 40, 10 and 1 Gbit/s. The CESNET Association is continuously expanding both the number of connected nodes and the number and capacity of channels as needed.

Hospitals and Health care facilities

According to available public sources, there are approximately 30,000 health care providers and approximately 31,600 health care provision points in the Czech Republic. Among them, hospitals represent the following amounts:

Type of facility	Number
University hospitals	10
Hospitals	141
Follow-up care hospitals	37
Care homes	34

Table 7: Basic numbers of hospitals in the Czech Republic. Source: MoH)

Data on the connectivity of hospital facilities are not public available due to cyber security.

Transport hubs and corridors

In 2018, railway transport hubs (i.e. the 21 most significant transport points) were connected to the backbone optical network of the Railways Administration. Currently, the transport connection is being updated in respect of cyber security, when data operations must be separated out. Modifying the system will bring about a connection speed of up to 100 Gbit/s, which is sufficient to ensure current and future data flows. However, there is a significant difference between major railways/corridors and regional, local lines, especially in difficult terrain, where the basic communications to ensure the safety of rail transport are often lacking.

All significant road traffic routes are under a permanent monitoring system under the administration of the Czech Highways Authority (the "RSD"). 10 Gbit/s optical networks cover current needs. In the future, the RSD

will focus on improving the quality of the camera system (higher resolution of online transmission), which will require an increased need for quality and speed of the Internet connection.

4.3 Analysis of the demand for high-speed services in highly digitized companies

According to Eurostat²⁸, in 2019, only 15% of heavily digitized companies in the Czech Republic had fixed internet at a speed of at least 100 Mbit/s. EU-wide an average of 23% of companies had such a connection.

Heavily digitized companies need qualified staff (especially with a focus on ICT) and it is assumed that this is usually available in locations with functioning high-speed Internet access. At the same time, it is clear that the situation will change dynamically in other localities due to the fact that the Czech Republic is at the forefront of the European community in the development of artificial intelligence, which automatically raises the need for digital transformation. Heavily digitized companies can thus be a factor that will have a positive effect on the development and construction of VHCN networks and 5G networks.

5 Strategic goals and priorities for the development of VHCN networks

Analyses of the coverage of the Czech Republic by VHCN networks and the need for access to high-speed Internet have shown what strategic goals need to be focused on from 2021 to 2027:

1. Building a robust, secure and reliable infrastructure of electronic communications networks with VHCN network parameters primarily for all localities representing the main engine of the Czech Republic's social and economic development, and also in localities where high-capacity network infrastructure has yet to be built.
2. Create suitable conditions for ensuring high-speed internet access via a VHCN network in both rural and urban areas:
 - for households, with a speed of at least 100 Mbit/s and the option of achieving up to a gigabit transmission speed in the direction to the customer,
 - for business entities, state administration, territorial self-government and socio-economic entities, with the option of achieving at least gigabit speed symmetrically.
3. Create suitable conditions for ensuring the construction of non-public networks built in the public interest, preferably in line with the national strategic plan for the development of non-public networks and established using the infrastructure of the VHCN networks of commercial entities and, if necessary, also using their own non-public telecommunications infrastructure.
4. Create suitable conditions for ensuring high-speed Internet access using appropriate technologies for households in rural locations with extremely difficult options for operate electronic communications networks, i.e. in places where the expected operating revenues do not cover ISPs' operating costs.
5. Create suitable conditions for ensuring the connection of municipalities through connection or distribution networks for high-speed Internet access at the level of individual municipalities.

²⁸ https://appsso.eurostat.ec.europa.eu/nui/show.do?query=BOOKMARK_DS-057214_QID_-42E3F953_UID_-3F171EB0&layout=TIME,C,X,0;GEO,L,Y,0;INDIC_IS,L,Z,0;UNIT,L,Z,1;SIZEN_R2,L,Z,2;INDICATORS,C,Z,3;&zSelection=DS-057214INDICATORS,OBS_FLAG;DS-057214UNIT_PC_ENT;DS-057214INDIC_IS,E_ISPDF_GE100;DS-057214SIZEN_R2,10_C10_S951_XK;&rankName1=UNIT_1_2_-1_2&rankName2=INDICATORS_1_2_-1_2&rankName3=INDIC-IS_1_2_-1_2&rankName4=SIZEN-R2_1_2_-1_2&rankName5=TIME_1_0_0_0&rankName6=GEO_1_2_0_1&ppcRK=FIRST&ppcSO=ASC&sortC=ASC_-1_FIRST&rStp=&cStp=&rDCh=&cDCh=&rDM=true&cDM=true&footnes=false&empty=false&wai=false&time_mode=ROLLING&time_most_rece nt=false&lang=EN&cfo=%23%23%23%2C%23%23%23.%23%23%23

6. Create suitable conditions for ensuring the optimal development of 5G networks in all urban and rural areas and in the main transport corridors.
7. Create suitable conditions for further coverage of the territory of the Czech Republic by mobile services in sparsely populated localities.
8. Create suitable conditions for the coverage of railway corridors, including tunnels, with a mobile signal.
9. Through targeted support, implement subsidy titles for the development of building VHCN networks in compliance with the principle of technological neutrality exclusively in localities where there are none, and when it cannot be assumed that they will be built there under the influence of market mechanisms, under commercial conditions.
10. Look for a way to cover operating costs, especially for socio-economic actors.

6 Subsidy measures

From the information obtained, obtained by collection or direct consultations with representatives of socio-economic actors, it is clear that it will not be possible to achieve the objectives set only through the market environment. It will be necessary to use the various targeted interventions and tools available to the state to achieve these objectives. The tools used may vary depending on the nature of the existence and activities of the various actors. However, they have one fundamental aspect in common, and that is the use of subsidy support from public sources. It is necessary to identify the individual options, describe them and quantify the necessary resources in relation to their availability and the absorption capacity of the market. Subsidy support will be based on basic principles:

- Defining the territory suitable for support and mapping it.
- Public consultation to verify the data and the possibility of submitting a credible investment plan.
- Ensuring compliance of the measure with state aid rules using the GBER or notification of the measure.
- Ensure wholesale access to the networks being built.
- Discuss the proposed measure with relevant partners.

6.1 Identification of market failures and suboptimal investment position

Economic theory refers to market failure as a situation where the actions of an entity in its own interest can lead to undesirable phenomena for society as a whole. The purpose of state interventions in the economy (in the form of direct or indirect regulation) is to increase the efficiency of the market, i.e. to support and protect its functioning and to solve problems that the market cannot solve on its own.

The Czech Republic is one of the countries with a developed and competitive backbone optical infrastructure at least to the level of district towns, or to the level of municipalities with extended powers (ORP), so further development and potential subsidy support should be directed primarily to connection and access parts of the networks which are missing.

For this reason, support from public funds should be directed to the two hierarchically lowest levels of the network, i.e. to create interconnection points that would have sufficient capacity to secure strategic goals, and to build access networks with the parameters of VHCN networks (ideally using optical infrastructure), namely:

a) **Connection of municipalities and connect up their local parts (districts)**

From the earlier conclusions of the survey of infrastructure providers²⁹ it follows that non-existence or insufficient competition has been found, at the level of connection infrastructure (backhaul). The problem is evident and long lasting, especially in municipalities with less than 1,000 inhabitants. Based on the analysis, the total investment gap to ensure the optical connection of access areas (optical backhaul), which are not and will not be covered from private funds in all municipalities in the Czech Republic (by at least one operator) was calculated **to be about CZK 2.2 billion** and is close to the lower estimated limit.

However, this amount does not cover the high-capacity optical connection of all individual basic settlement units of the municipality, of which there are usually several within a single municipality. For economic reasons, local operators of access networks still prefer to connect remote ZSJs of a municipality using wireless technology.

b) **Connection of remote areas within municipalities**

It was also found that the capacity to connect up remote localities or remote residential parts of larger municipalities (over 5,000 inhabitants) is insufficient/non-existent. Thus, although there is a presumption of the existence of optical connectivity in these larger "black" municipalities, due to market failure, there remain "white", more remote locations that do not have an optical connection available. The analysis³⁰ identified 1,540 ZSJ in which market failures have occurred³¹. To cover them by locating handover points so as to enable the provision of electronic communications services of the specified VHCN network quality parameters throughout the territory, would require the construction of 2,720 km of optical connection networks, which would correspond to an investment gap of CZK 2.7 billion.

However, in order to comply with the principle of efficient disbursement of EU funds, it is necessary to take into account population density and the required distance. To estimate the real investment gap, very remote ZSJs are excluded, in which only 7% of the population is present, while the costs would mean 40% of the total necessary allocation. So the **real investment gap** is **CZK 1.6 billion**, to cover 916 ZSJ.

c) **Connecting address points to VHCN networks**

Current access networks with the parameters set for VHCN networks (or for NGA networks) have been built either in economically lucrative localities (i.e. in densely populated areas with a payback period of up to 10, maximum 15 years) or using synergies associated with the construction of other infrastructure, thanks to which a reasonable business return was achieved even in otherwise economically less lucrative localities.

In general, the current situation can be illustrated in a simple diagram expressing the dependence between the amount of investment in the available connection (or the return on this investment), the degree of total coverage and the possibility of ensuring a real return on investment. The diagram shows that there is still a relatively significant group of connections which are already declared by the network operators as high-capacity (indeed with an access speed of 100 Mbit/s), but which will in fact have to be modernized (or rebuilt) to be able to attain the requirements for VHCN access networks.

Outside this group of connections, real returns can be achieved either through subsidies from public funds or through synergies in construction. If purely subsidy instruments are taken into account, it is clear that it is not possible to achieve a commercially interesting return in many places through

²⁹ See footnote 18 to this document

³⁰ Determining the remoteness of required handover points in larger agglomerations, market research and setting wholesale prices for backhaul network handover points, Grant Thornton Advisory, 2020

³¹ The analysis identified 1909 remote ZSJ. Due to the population density, the distance in 369 of them is up to 10 m/dwelling, which does not preclude construction on the market principle. However, with a greater required distance, the investment can no longer be profitable.

subsidy financing using today's parameters (e.g. through the OP EIC). Therefore, it is assumed that there will still be a significant number of remote locations where it will be necessary to seek out additional financial resources, such as co-financing from special European funds (e.g. the CEF for cross-border construction or grant titles related to rural support or for fair transformation), from national, regional or even municipal subsidy sources, etc.

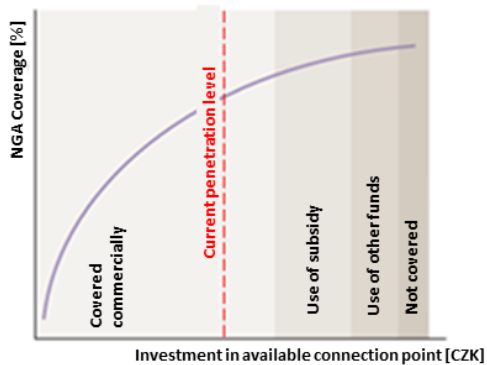


Fig. 4: Coverage rate versus investment amount
(illustration)
(Source: MIT)

Key to Figure: Míra pokrytí NGA [%] = NGA coverage [%]; Komerční zajištění = Covered commercially; Využití dotačních zdrojů = Use of subsidy; Využití dalších zdrojů = Use of other funds; Nebude pokryto = Not covered; Současná úroveň penetrace = Current penetration level; Výše investice do disponibilní přípojky [Kč] = Investment in available connection point [CZK]

The calculation of the investment gap for the construction of high-capacity available connections throughout the Czech Republic shows that by the end of the 2021-2027 programming period, 470,000 apartment connections would not be built, or more exactly modernised, under commercial conditions. With an average investment of CZK 30 thousand per one available high-capacity connection, the investment gap to cover all address points in the Czech Republic with VHCN networks amounts to **approx. CZK 14.1 billion**.

It will be necessary to reduce this amount by approximately CZK 2.6 billion (expert estimate), taking into account the fact that in investment-intensive locations with the inability to cover operating costs from revenues, it will never be possible to build VHCN networks with fixed customer connections. It will therefore probably be useful to prepare a more detailed analysis that would recommend certain limits (probably for small municipalities with a small population) where it will no longer be effective to subsidize the construction of a VHCN cable network. The estimate of the **real investment gap** to cover **all address locations** therefore comes out at **CZK 11.5 billion**.

For the purposes of preparing support programmes using different sources of funding, an estimate of the distribution of the investment gap may be, for example:

- by region, when the aforementioned real investment gap would be divided proportionally according to the number of inhabitants in individual regions, or other corresponding criteria, or
- by customer type (household, entrepreneur or socio-economic actor), since the calculations in the National Plan are constructed from the point of view of the address point, i.e. the investment intensity for the construction of the connection is similar for all types of customers, the estimate will be approached by the number of uncovered address points (schools, medical facilities, authorities, etc.).

Based on estimates of the above individual categories

	Real investment gap	Absorption capacity (75%)
for backhaul - provision of optical connection infrastructure to all municipalities - connection of remote areas within municipalities	CZK 3.8 billion CZK 2.2 billion CZK 1.6 billion	CZK 2.9 bn
to ensure connectivity of all address points in the Czech Republic	CZK 11.5 bn	CZK 8.6 bn

the **real investment gap** totals **CZK 15.3 billion**. If we were to start from this amount of total eligible expenditure (CZV) of CZK 15.3 billion and consider an average aid intensity of 75%, then when recalculated through this average aid intensity of 75% of eligible costs, subsidy support from public sources will be needed for these activities to the amount of approx. **CZK 11.5 billion**. In reality, however, the level of support will vary according to the source of funding, the region category and other parameters, as indicated in Chap. **Chyba! Nenalezen zdroj odkazů.** Also in some calls competition may be introduced in such a way that applications that require a lower level of support will be favoured.

When resolving high-speed connections, it is necessary to mention the following negative factors, where their influence on the absorption capacity can be evaluated only by expert estimation:

- 1) The Czech Republic is characterized by a large number of small municipalities - out of the total number of approximately 6,300 municipalities, almost 96% are municipalities with a population of up to 5,000. At the same time, more than 55% of the total number of municipalities have a population of up to 500. This fact to a large extent influences the behaviour of investors, as a large number of small settlements scattered across the landscape is very demanding in terms of building line structures.
In addition, there are municipalities in the Czech Republic (their number is in the order of single percentages), where even when investing with a 100% subsidy (i.e. with zero involvement of private funds) operating income can never generate enough resources to cover operating costs. For such municipalities, it will be necessary to create a special regime, e.g. through a mobile connection at a fixed location or through another wireless connection, which will be able during service peaks to provide services to end-user customers under the usual conditions and matching the threshold performance parameters of VHCN networks.
- 2) Customers are often comfortable with a lower-speed Internet connection, even though a high-speed connection is available at their address location. The reason is often the customer's belief that the current speed is adequate for his/her needs. This problem can be addressed (to a limited extent) through more effective marketing and advertising tools, but it can be assumed that it will be better reduced by a wider range of useful digital services with higher demands on transmission speed and quality, although the economic reasons for such an approach from current customers must be considered.

This investment gap was calculated on the basis of a comprehensive analysis of the state of development of high-capacity networks in the Czech Republic to ensure access to the Internet available at a fixed location.³² This means that the calculation was based on the definition of next generation networks, while the calculation also included electronic communications networks which are similar to VHCN networks in their construction and speed to the customer. According to an expert estimate, the error rate of the calculation

³² <https://www.mpo.cz/cz/e-komunikace-a-posta/elektronicke-komunikace/koncepce-a-strategie/narodni-plan-rozvoje-siti-nga/analyza-stavu-rozvoje-siti-nga-v-cr---252745/>

will not exceed 10-12% of the real situation, as the calculation did not take account of the impact caused by the protection of private investment, which can be defined in more detail after the updating to the EC instructions (Guide to High-speed Broadband Investment).

6.2 Supply-side measures

Definition of the territory for state aid

Assistance from public funds will be directed primarily to places and localities where existing commercial networking models fail without such support. By optimally defining the supported locations and areas, it will be possible to suppress the failure of commercial models and it will be possible to ensure higher availability of high-speed connections in white spaces, i.e. address locations without any high-speed Internet connection. At the same time, this will increase the coverage of the entire Czech Republic.

In order to achieve an across-the-board increase in the coverage of the area with the offer of access to high-speed Internet, or more exactly, to eliminate as many white spaces as possible in all regions of the Czech Republic, for the use of support from public funds it is appropriate to map the lack of availability of infrastructure with the smallest possible granularity, so that support can be targeted only at specific white addresses in the event of support for the building of end-user connections. The granularity for mapping and aid may vary from measure to measure. It is always necessary to prove that in the territory a connection with the corresponding parameters does not exist.

Before each planned measure the mapping data will be verified in a public consultation. This will also be announced in order to find out in which areas investors plan to build networks over the next three years. They shall support their intentions with credible investment plans in accordance with Article 65 of the EU Guidelines for the application of State aid rules in relation to rapid deployment of broadband networks.

If the feasibility of the declared plans is not documented or if they are not fulfilled, their protection against the possibility of construction supported by public funds will no longer be guaranteed and these places or areas can be included, without further discussion, in a proposed state aid programme.

To support the connection of address points, based on the scatter of individual white address points and confirmation of its accuracy in a public consultation, the managing authority of the Operational Programme Technology and Applications for Competitiveness ("OP TAC"), or the managing authority of the relevant RRF reform, will define a set of intervention areas that will apply to the call concerned. The following rules are laid down for determining the intervention areas:

- a) An intervention area can be defined only from a set of so-called white address points, which are not subject to investment protection and which can be grouped into larger territorial units so that the grouping is logical, transparent and supports efficiency of construction and operation of the supported VHCN network.
- b) An intervention area will be defined according to specific local demographic, geographical, territorial-administrative and other conditions based on the principle of economic efficiency, support for competition and future development of services in connection with the fulfilment of OP TAC or RRF monitoring indicators.
- c) When defining the areas of intervention, particular account will be taken of the rules on state aid, the conditions in the EU Guidelines and the conditions set out in the National Plan.
- d) The sizes of intervention areas will be designed to strike a balance between the optimal size of the area and the cost of building networks, where a large number of small areas renders construction costs per unit more expensive and too large an area restricts competition.
- e) The managing authority of the OP TAC or the managing authority of the RRF reform will approach the intervention areas individually according to the distribution of individual white address points, and thus will always define the individual intervention areas for a given grant project.

- f) In determining the intervention areas, the long-term sustainability of the operation will be considered, thanks to the state aid for the infrastructure being built, which must meet the criteria for fixed VHCN networks.
- g) When determining specific intervention areas, a suitable solution will be proposed that efficiently combines these parameters.
- h) The identified intervention areas will be the subject of public consultation with the professional public.

In respect of where and how white address points are currently located, and in the context of the protection of existing and planned investments, it is believed that it will not be possible to include in eligible expenditure on connecting "non-white" address points, i.e. with a VHCN network connection, if they occur in the given intervention area.

To support the connection of municipalities and the connection of their local districts and the connection of remote areas within municipalities (backhaul), the definition of intervention areas will be done according to the results of ongoing consultations with the EC, based on the principles set out in the introduction to Chapter 6.

Investment models

The preparation of development objectives for the construction of VHCN networks was based on the valid dispositions of the EC³³ specifying the relevant investment models used in similar projects in EU Member States. Among the most frequently recommended and used investment models for combining public and private investments may be included:

Bottom-up Model

This model is *based on the initiative of the local community* and includes a group of end-users who are organized into a jointly owned and democratically controlled group and are able to oversee the construction and operation of their own local networks.

Private Design, Build and Operate (DBO) Model

The model is focused on support for entrepreneurs. It builds on the existence of a managing authority that spends funds (often in the form of grants/aid from public funds) with the private sector to support the expansion of their networks. The public sector has no specific role in owning or operating the networks, but may impose obligations on making access to financial funding.

Public Outsourcing Model

Within this model, there is a single contract that covers all aspects of network construction and operation. Its main characteristic is that the network is operated by the private sector, but the public sector retains ownership and some control over the network.

Joint Venture Model

A joint public-private partnership is an arrangement whereby network ownership is shared between the public and private sectors. Construction and operational activities are usually carried out and provided by the private sector.

Public Design, Build and Operate Model

In this model, the public sector owns and operates networks without the involvement of the private sector. All aspects of network development are managed by the public sector, which may operate the entire network or provide access on a wholesale basis. Private entities then offer the retail services.

³³ Guide to High-speed Broadband Investment, viz http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=12881

Each model is applicable under different circumstances, depending on the scope of the required infrastructure, specific objectives, according to the type of managing authority, the degree of risk of the individual parties involved, etc. In parallel, there is the option to combine these models. So far, the Czech Republic has experience mainly with the **Private Design, Build and Operate Model**, which was successfully applied in grant calls for building connections for households.

Justification of the selected investment model

One advantage of the selected investment model is the fact that the state may set certain conditions in connection with aid, such as wholesale access to the supported network.

One may operate on the basis that the **Private Design, Build and Operate** model:

- a) best eliminates state risks related to the construction and operation of VHCN networks,
- b) uses an already established, institutionally secured implementation mechanism,
- c) uses the already established, institutionally secured regulatory framework, equally valid for all entities,
- d) respects the fact that there is no public institution in the Czech Republic that specializes in the planning, construction, development and operation of public communication networks.

The main benefits of using this investment model are:

- a) The directing of investments to places and areas that are currently not commercially attractive to existing potential investors, but at the same time the amount of private investment in building access networks will be strengthened.
- b) The option of directing the prices of wholesale services towards the level achieved in commercially interesting areas by not including the value of support from public sources in the costs for their determination.
- c) Strengthening of the competitive environment by making these VHCN networks built partly from public support funds compulsory when providing wholesale services.

The last two advantages also apply to another suitable model.

Another reason for choosing the Private Design, Build and Operate investment model is the fact that it allows the specific investor for each intervention area to be selected on the basis of a tender, which will consider the amount of aid required from public funds. The required subsidy amount will be one of the evaluation criteria for the tender. This will create a competitive environment and optimize the use of public funds.

Another investment model that can lead to the stipulated goal in certain circumstances is the **Public Outsourcing Model**. In the case of sites where, based on mapping, coverage cannot be expected through commercially built networks (the so-called white spaces) and where VHCN networks cannot be built even using the Private Design, Build and Operate model, the use of the Public Outsourcing investment model may be considered. If interest in the use of this model can be demonstrated, agreement with economic, social and territorial partners will be found on the principle of partnership, and it will be designed in accordance with the rules and objectives of the grant programme. Its basic functional idea consists of the fact that VHCN networks will be built by municipalities, preferably in coordination with the construction of other infrastructure (water supply, sewerage, public lighting, pavements, etc.). Through this synergy, there will be significant savings in total investment costs. Municipalities will build infrastructure usable for VHCN networks, but network operations will be overwhelmingly provided by the private sector. This will ensure transparent and non-discriminatory wholesale access to a network built using public funds and will minimize the risks of obstructing private investment and breaching state aid rules.

The use of other investment models in the future cannot be ruled out.

Impacts of the selected investment model

The preferred investment model of business support (the Private Design, Build and Operate Model) will affect not only the implementation of state policy, but also, in terms of the impact of this policy and the selected investment model, that part of the private sector which will be involved in the construction of electronic communications networks in the Czech Republic.

It should be noted that the emphasis placed by the state on the development of VHCN networks, i.e. networks that are able to reach today's required speeds of 100+ Mbit/s, as well as technological development towards 5G and higher networks, as well as on the development of artificial intelligence, is reflected in increased private sector interest in building VHCN networks.

The share of private investment in building VHCN networks

The estimated total amount of investments necessary to achieve the declared targets of coverage of households by VHCN networks is approximately CZK 97 billion, excluding private investments already made. This amount, explained in the calculation of the investment gap (see Chapter 6.1 of this document), is based on the current level of prices and bears all the current costs necessary for implementation of the networks. This amount does not include the possible positive impact of measures to reduce the investment demands of the construction of electronic communications networks, as listed in Chapter 7 (Measures to Achieve the Objectives) of this material.

The vast majority will be provided by investment from private funds on a fully arm's length basis. However, it will not be possible to establish a connection at all address locations under standard economic conditions. From discussions to date with representatives of the sector, one may conclude that this interest will increase if identified barriers to construction are removed. This is evidenced by the sector's declaration to build as many connections as possible on its own and to receive assistance from the state particularly in the form of removing barriers to construction, either by modernizing construction legislation or using the objectives of Action Plan 2.0. Removing barriers can bring about a similar economic effect, consisting of reducing the necessary investment costs by about 20%, according to expert estimates.

The share of support from public funds for building VHCN networks

Building VHCN networks is a key prerequisite for building not only the digital economy, but for the development of a gigabit society as a whole. It is the task of the state to support the construction of new generation access networks where the construction of such networks is not economically viable for businesses.

The mapping described in Chapters 3.4 and 3.5 has shown that such areas exist in the Czech Republic. The mapping to be carried out in the upcoming years will show possible changes in the specific focus of support from public funds. In their plans, businesses focus on areas in which there are approximately 1.2 million permanently inhabited dwellings, which corresponds to a situation where blocks of flats predominate. According to the 2018 mapping, state intervention in the form of support from public funds should relate to areas with much sparser building frequency and with difficult serviceability, which may affect approximately 360,000 permanently inhabited dwellings located mainly in one-dwelling buildings. Based on the priorities of the Government Digital Czech Republic document and current phenomena, *inter alia*, the ever-increasing incidence of working from home, it is in the state's interest to cover these areas also, to the quality required for access networks.

In the context of the above, however, it needs to be said that support from public funds serves more or less as an incentive for the private sector, as it is only thanks to public support that private investment in these

white address points will be around CZK 2.9 billion. In addition, competitor business models are envisaged which will be able to secure not only the construction of VHCN networks but also their long-term operation.

Although the state is not a business entity, in the economic analysis it is necessary to consider the elements needed when drawing up a business plan in order to determine whether the funds considered for support from public sources will be sufficient. Furthermore, whether there is a realistic presumption that VHCN networks built with this support will be viable, so that businesses operating these networks will be able to operate them.

In addition, the calculations of the investment gap for the construction of VHCN networks and the related component amounts were intentionally performed only for Internet access services, including wholesale access. The minimalist economic view regarding the revenue side did not consider the option for other potential business models. The reason for this was to check the functionality of the worst possible investment option, using support from public funds.

It is essential to say that even in areas with a high degree of Internet access coverage of address, there is still a number of address points where it is not possible to establish a connection under standard economic conditions. Even in these areas, it is possible to consider providing support to cover them.

Further private investments in connection networks to the value of CZK 0.9 billion will be stimulated through public support.

6.3 Demand-side measures

One of the key objectives on the road to a gigabit society is to ensure the connectivity of socio-economic actors (schools, hospitals, authorities, etc.). The public sector (regions, municipalities, central administrative bodies) ensures the operation of these authorities and established/founded the vast majority of schools and hospitals and other actors. Ensuring the connectivity of socio-economic actors is therefore the responsibility of these founders. Individual founders should prepare comprehensive projects ensuring the gigabit connectivity of all actors they may establish.

As part of these projects, public contracts will be announced for electronic communications businesses, by means of which the founders will tender out the necessary connectivity for their actors. The completion of the necessary infrastructure is then carried out by the business (investment from private funds). A particular price will be paid for the service purchased in this way, which in principle consists of:

- a) depreciation of the investment made to connect this actor to the network,
- b) maintenance costs (e.g. energy costs, rentals, servicing, repairs, monitoring),
- c) internet connectivity services,
- d) business profit.

Under a), the founder prepays part of these costs for 20 years in the form of an irrevocable long-term lease (see Chapter 4.2). For this part of the costs, the founder will be provided with co-financing from EU funds. The remaining part of the costs under letters b) to d) no longer represents a substantial increase in operating costs over the baseline. From the actor's point of view: the actor will pay as much for the Internet as before, but will receive an order-of-magnitude better level of service.

The applicant/beneficiary for subsidies in this case will usually be the founder. This subsidy to the public founder is likely to constitute compatible public support. The arm's length principle and competition for individual businesses is then ensured at the level of public procurement (e.g. to tender out connectivity for individual address points). With this project, a founder will secure the connection of its individual actors, and at the same time ensure connectivity to a higher network level.

With regard to the necessary high expertise needed for project preparation and the necessary professional background, the BCO will play a coordinating role, prepare the necessary templates and professionally assist the founders with project preparation.

Through this scheme, actors will be networked even in black spots, private investment will be stimulated and will be implemented by electronic communications businesses. Furthermore, existing networks will be used as efficiently as possible to connect actors, there will be no significant increase in actors' costs for access to the Internet (in some cases, on the contrary, they may decrease), while actors will receive an order-of-magnitude better level of service. It is also important that this scheme builds on the current model for financing actors.

6.4 Methods of financing from EU funds (description)

The availability of high-speed internet access for citizens, businesses and socio-economic actors through VHCN networks is of strategic importance for sustainable and inclusive economic growth and innovation implementation. It will also lead to improved conditions for social and territorial cohesion. The existence of a high-speed internet connection has socio-economic benefits and promotes social inclusion and employment in a locality.

It is assumed that the financing of the investment gap will be covered by a combination of resources. It is understood that specific quantification will be performed when proposing specific measures. Ongoing information on negotiation progress can be summarized at the time of elaboration of the National Plan, since further developments are taking place, as follows:

	RRF 2021- 2023	JTF 2023- 2027	ERDF CP3 2023-2027 [OP TAC]	CEF 2 2021-2027 [EK]	InvestEU 2021-2027	ERDF CP1 2021-2027	ERDF TP 2021-2027
Households	CR	X	Other MRD regions (85%) PRR (70%)	X	VRR (FN)	X	
Companies	CR	X	Other MRD regions (85%) PRR (70%)	X	VRR (FN)	X	
Education and research	Czech Republic (100%)		IROP	X	X	Czech Republic (85%, 70%, 40%) [IROP]	
Health care	Czech Republic (100%)			X	X		
Authorities	Czech Republic (100%)			X	X	Czech Republic (85%, 70%, 40%) [IROP]	
Security, Integrated Rescue Services	Czech Republic					Czech Republic (85%, 70%, 40%) [IROP]	
Cross-border core networks				X	Czech Republic (FN)		
Backhaul	Czech Republic	UR (85 %)	MRD (85 %), PŘR (70 %)	X	VRR (FN)		

5G corridors	Czech Republic (75 %)	Czech Republic (FN)
Community connections (WAN)	Czech Republic (100 %)	
BCO		Czech Republic [OP TAC]

Table 8: Model use of EU funds for financing individual supported activities (Source: MRD)

Caption:	(max. co-financing level)	Supply-side measures - building networks in white spaces
		Demand-side measures
		Non public networks of public administration
		Information and technical assistance

Abbreviations - explanatory:

X - use is optional, but not on the whole optimal

UR "coal regions" - Moravian Silesia, Karlovy Vary, Ústí, (max. level of EFRD co-financing 85%)

MRR other less developed regions - Zlín, Olomouc, Pardubice, Hradec Králové, Liberec regions (max. level of EFRD co-financing 85%)

PŘR transition regions - South Moravia, Vysočina, Central and South Bohemian regions, Plzeň region (max. level of EFRD co-financing 70%)

VRR More Developed Regions - City of Prague (max. level of EFRD co-financing EFRD 40%)

JTF Just Transition Fund, MA MoEnv

RRF Recovery and Resilience Facility

EFRD European Regional Development Fund

CEF 2 Connecting Europe Facility, MA EC

Invest EU

The following table shows the relationship of other funds to the OP TAC (ERDF) and the possibility of financing from the following EU public sources:

Funding source	Activities supported	Relationship to OP TAC
<p>Integrated regional operational programme (IROP)</p> <p>Programme duration: 2021–2027</p>	<p>Support for the implementation of so-called non-public state-owned networks, i.e. partial provision of connectivity for socio-economic actors under Policy Objective 1 - Smarter Europe.</p>	<p>In the event of the inclusion of these activities in the IROP programme, there should be no overlap of activities aimed at increasing digital connection, as IROP does not finance the construction of infrastructure.</p> <p>An essential condition for the use of IROP is the resolution of the use of IRU in the Czech Republic (GBER accepts the use of IRU).</p> <p>There is potential for cooperation between these programmes.</p> <p>This is not a programme from which the activities of the OP TAC could be financed as an alternative, since these are focused on public networks within Policy Objective 3 - A More Connected Europe.</p>

Funding source	Activities supported	Relationship to OP TAC
<p>Program Connecting Europe Facility (CEF 2)</p> <p>Programme duration: 2021–2027</p>	<p>Support for activities aimed at building a European digital network linking public administration, the business sector and the public. These are activities aimed at supporting the high-speed connection of socio-economic actors, supporting the provision of high-quality wireless connection in local communities, resolving transport corridors, etc.</p>	<p>The CEF 2 programme is focused mainly on research and pilot (demonstration) projects, not on investment support for specific solutions at the business entity level.</p> <p>Together with the relatively high competition of potential applicants in EU programmes, no negative impact on the absorption capacity of the OP TAC can be expected.</p> <p><i>Inter alia</i>, the Czech Republic, together with Bavaria, intends to implement the "5G Prague - Munich Corridor" project, which is not yet included in the CEF 2 priorities.</p>
<p>Digital Europe (DEP)</p> <p>Programme duration: 2021–2027</p>	<p>Support for high-performance computing and the deployment of digital capacity and interoperability, including high-quality high-speed connectivity.</p> <p><u>Note:</u> <i>The Digital Europe programme will not be effectively deployed until the second half of the programming period, when interest is expected in powerful computer technology for AI; this will complement the potential of VHCN networks.</i></p>	<p>The Digital Europe programme partially overlaps the activities of the ERDF. Given the competition at the level of European programmes, it can be assumed that for activities related to user coverage at the level of the Czech Republic, potential applicants will prefer support at the national level, i.e. from the ERDF.</p>
<p>Just Transition Fund (JTF)</p> <p>The fund is currently in preparation.</p>	<p>Supporting the transition from coal-fired to low-carbon and clean energy. Investments in digital infrastructure will also be supported.</p> <p><u>Note:</u> <i>The JTF will be used to strengthen and complement the financing of the development of VHCN networks in localities where they can be used (in the Moravian-Silesian, Ústí nad Labem and Karlovy Vary regions). One shortcoming is the time lag between the implementation of the ERDF and the JTF.</i></p>	<p>There is a potential overlap of digital interconnection activities between the ERDF and the upcoming JTF. For projects targeted in this way, the JTF may represent an alternative to the funding of activities defined in the ERDF for the relevant regions.</p> <p>The potential of financing alternative to the ERDF can only be evaluated when the mechanism for implementing support from the JTF is known.</p>
<p>Invest EU (EU)</p> <p>Programme duration: 2021–2027</p>	<p>Investment support using financial instruments in the field of digital interconnection.</p> <p><u>Note:</u> <i>The Invest EU programme will be used mainly to finance the connectivity of socio-economic actors through the IRU (Irrevocable Right of Use), which will be</i></p>	<p>The Invest EU programme represents an alternative in the financing of investment projects in the field of digital interconnection.</p> <p>The potential of Invest EU lies in its support through financial instruments. The possibility of alternative financing will increase in the event that an allocation from the Invest EU programme is</p>

Funding source	Activities supported	Relationship to OP TAC
	<i>implemented through vouchers provided to these actors.</i>	determined directly for the Czech Republic, when transferring funds from the ERDF.
RRF Programme duration: 2021–2023	Supporting investments to accelerate the implementation of national plans to achieve the objectives of a gigabit society as defined by the European Union in COM(2016)587 final	The programme will focus on building infrastructure and promoting the use of high-speed internet access. The concurrence of objectives will be separated in time and within specific calls within the management of the OP TAC and the relevant part of the RRF, will be directed so as to avoid duplication of funding.

Table 9: Alternative financing options for the development of VHCN networks using other EU public funds, (Source: MIT)

It should be noted that the concurrence of different European programmes can be used for a similar financing purpose - for example, for corridors, both CEF 2 and OP TAC or Invest EU for digitization could be used in a very similar way. The complementary functions of various funds can be used, for example, for socio-economic actors, who generally have priority in the European programming period 2021-2027 - OP TAC (especially for part of the access network, the so-called backhaul) or RRF can be used to ensure access to high-speed internet, while internal wiring in a school could be covered by IROP.

In any event, the various functionalities and conditions of EU programmes will be used in cooperation with other state administration entities, not only with the Ministry of Regional Development, but also with the Ministry of the Interior, the Ministry of Transport and, if necessary, other ministries. The intention is a synergistic effect and efficiency - that the built networks are not only built, but can be fully functionally interconnected. The foregoing means that the possibility of using services, especially for socio-economic actors, needs to be secured, since small municipalities in particular and their socio-economic actors will have very few options for covering the costs associated with the operation of high-speed internet.

7 Additional measures to achieve the objectives of the National Plan

7.1 Action Plan 2.0 to implement non-grant measures to support the planning and construction of electronic communications networks

The objective of Action Plan 2.0³⁴ is to define the range of existing barriers and increased financial demands that have a negative effect on the planning and construction of electronic communications networks, as well as the existing financial barriers affecting the operation of such networks. At the same time, the document outlines measures that should lead to the elimination of identified problems in the planning and construction of electronic communications networks, while proceeding in accordance with public support rules; in the

³⁴ <https://www.mpo.cz/cz/e-komunikace-a-posta/elektronicke-komunikace/koncepce-a-strategie/narodni-plan-rozvoje-siti-nga/akcni-plan-2-0-byi-schvalen--250300/>, approved by Government Resolution No 778 of 04 November 2019

event of the identification of cumulative fulfilment of public support definition markers, to apply relevant legislation in the area in question.

The document contains two priority measures, the nature of which can be perceived as the most significant for facilitating, accelerating and reducing the cost of construction of electronic communications networks, as well as 13 other measures aimed at removing identified obstacles and barriers; these complement the priority measures. The priority measures are as follows:

- a) The use of newly established or significantly renovated line structures for the construction of electronic communications networks;
- b) A substantial reduction in the remuneration for the establishment of easements for the location of a public communications network on state and local government land.

This issue was discussed in detail with the CTO (in relation to issues related to its competence) and with professional associations, that is, with those associations covering electronic communications businesses. The document also incorporates the results of a number of meetings with representatives of relevant ministries and state administration authorities, the Czech Association of the Regions, the Czech Union of Towns and Municipalities, the Czech Association of Local Authorities and representatives of associations and professional associations covering electronic communications businesses.

7.2 Establishment of the Alliance for 5G Network Development and Implementation in the Czech Republic

Pursuant to the strategic vision entitled "Implementation and Development of 5G mobile data networks in the Czech Republic - The Path to a Digital Economy", the MIT has established an Alliance for the Development and Implementation of 5G Networks in the Czech Republic (the 5G Alliance), whose aim is to identify the obstacles and problems limiting the implementation and use of 5G networks in the Czech Republic. Further, it is to propose measures to eliminate these identified negative phenomena, so that the nationwide implementation of 5G networks in the Czech Republic immediately supports the emergence of new opportunities for Czech industry, raise the quality of smart cities/villages/regions to a qualitatively higher level, while supporting a high level of competition in the market for services provided through these networks, which will make it possible to achieve the best conditions for end-users. Last but not least, it is necessary to make use of the potential of 5G mobile data connection technologies for the needs of the security and rescue services, for crisis management and other specific needs of the public sector in the performance of its agendas. The 5G Alliance will also address the use of the 5G network in relation to research and development of the necessary applications and services.

Primarily, the activities of the 5G Alliance will be focused on solving problems related to the development of 5G networks:

- a) in industrial agglomerations,
- b) in the built-up areas of cities and municipalities, where it will be essential to redefine the relationship of electronic communications network operators with the population and local self-government,
- c) in cyber security,
- d) in combatting misinformation about the dangers of operating these networks.

Secondarily, the activities of the 5G Alliance will be expanded to include the introduction of 5G services in the areas of healthcare, agriculture, culture, education, etc.

In terms of the option to support coverage by 5G networks from public funds, whether on transport corridors or in other areas, this will be based on current European legislation on state aid rules, in particular the update of the so-called block exemption.

7.3 BCO Czech Republic

Within technical assistance, the Broadband Competence Office Czech Republic (BCO) project supports the building of professional and technical capacity in the Czech Republic, with a focus on facilitating the implementation of projects approved for public support, especially the OP TAC. The intention is not only to continue the project, but to expand it specially to cover the needs of socio-economic actors. The BCO is part of the European BCO network, an initiative of the European Commission to support Member States in achieving the objectives of the EU Digital Agenda.

The development of VHCN networks is associated with a number of difficulties, as construction is carried out on the land of various entities (state, local governments, business entities and the population). Knowledge of plans for construction or reconstruction of all line structures in a locality can significantly save investment funds (especially from public funds), energy, administrative complexity of implementation and can significantly reduce the burden and nuisance for the population caused by repeated construction activities in a locality. It is desirable to share best available practice through mediation, to eliminate illogical barriers associated with building permit proceedings, construction conditions, land purchase, or the creation of easements, etc.

The BCO was created with the intention of making use of local and regional knowledge, to be held by selected territorial coordinators, and linking it with the overall overview, knowledge and goals at either the BCO headquarters in Prague or within state administration and self-government.

Through its headquarters and territorial coordinators, the BCO works mainly in pre-project preparation for the development of VHCN networks - it responds to specific suggestions and assists municipalities, electronic communications network investors and end-user customers of these networks. Further, for future investment construction it gathers information on how individual municipalities and regions approach the development of electronic communications network infrastructure in their territories and at the same time seeks ways to help simplify and accelerate the actual construction of VHCN networks. The BCO is in direct contact with the Ministry of Industry and Trade and the CTO, cooperates with the Czech Union of Towns and Municipalities, the Czech Association of Local Authorities and the Czech Association of the Regions. The BCO explains aspects of the construction of VHCN networks to local government representatives and bodies, seeks to support the irreplaceable role of local governments in the development of their locality and promotes continuous awareness at local level. It advocates increasing the availability of high-speed internet services, which has socio-economic benefits for the region (slowing down rural depopulation) and has a positive effect on employment in the locality. Despite the difficult conditions caused in 2020 by the overall health crisis, when a number of promotional events and individual meetings had to be cancelled, the territorial coordinators carried out more than 600 meetings with representatives of local governments over the 4 months of their activity. The BCO also processed about 40 requests for direct support from local governments and potential investors, requesting support in negotiations. More about the BCO's activities can be found on its website www.bconetwork.cz.

The BCO Czech Republic project is being implemented within Priority Axis 5 Technical Assistance of the Operational Program Enterprise and Innovation for Competitiveness 2014-2020 (OP EIC). It is planned that the project will subsequently continue within the follow-up programme OP TAC 2021-2027.

7.4 Cooperation of investors and local governments in the municipality built-up areas

The currently planned development of VHCN networks (especially aimed at creating conditions for building 5G networks) will affect the built-up areas of cities and municipalities; we can therefore expect somewhat increased intensity of communication in respect of local governments and residents. For this reason, it will

be essential to develop an innovative approach to investment in built-up areas of cities and municipalities, based on the principles of trust and cooperation between the investor and the local authority, focusing on:

- a) facilitating the development of electronic communications networks in the locality in question and support for it from city/municipal authorities, including a change in the rules in use,
- b) joint coordination with the investor of construction work on line constructions in a city/municipality,
- c) high-speed connection of socio-economic actors in the locality in question,
- d) simplified access to land and real estate owned by a city/municipality,
- e) joint coordination of the development of a city/municipality (it should be considered from the beginning that the future of a city/municipality must be in line with all possibilities of digitization options),
- f) considering and respecting the local character of a city/municipality,
- g) reduction of interventions in the daily life of the population in the given locality,
- h) quality of life of the population,
- i) sharing the infrastructure of electronic communications networks,
- j) joint support and protection of trees and greenery in the given locality,
- k) joint creation of a new operational model for streets in a given locality.

7.5 Single Information Point

With the entry into force of Act No 194/2017, on measures to reduce the costs of introducing high-speed electronic communications networks, the CTO was given powers in the area of support for building electronic communications networks. A Single Information Point was established, the CTO, whose main competence is to provide the information and data necessary for the construction of high-capacity electronic communications networks. The CTO is also the competent body for resolving possible disputes.

In addition, the CTO collects, records, processes, stores and publishes on-line, and is a data provider. The CTO publishes:

- data on conditions and procedures pursuant to the Construction Act and essential data for the purposes of the implementation of elements of high-capacity electronic communications networks,
- final decisions,
- contract templates it has created,
- references to information from obligated persons related to the fulfilment of their obligations, which the obligated person shall communicate to the CTO.

Act No 194/2017 brings into Czech legislation a number of measures (e.g. the right to access physical infrastructure or the obligation to coordinate certain construction works), on the basis of which it will be possible to simplify, speed up and reduce the cost of implementing high-capacity networks, and of intersectoral coordination.

A significant part of the costs of building high-capacity networks can be attributed to inefficiencies in the construction management process. This is also related to the insufficient use of existing infrastructure. Therefore, the use of existing cable ducts, pipes, shafts, distribution boxes, poles and masts, antennas, towers and other supporting structures, i.e. physical infrastructure, can significantly reduce costs.

Based on an analysis conducted in 2019 of the practical application of Act No 194/2017, an amendment to this Act was prepared as part of the transposition of the Code, and other aspects that will facilitate the construction of electronic communications networks, such as the anchoring of digital technical maps in Act No 200/1994, on Surveying, and the digitization of building permit proceedings in general, are being addressed on an ongoing basis.

8 National Plan implementation

8.1 Competences matrix

Ministry of Industry and Trade.

- arranges the preparation of legal regulations in the field of electronic communications services and networks, with the exception of implementing regulations, for the issuance of which the Ministry of the Interior, the CTO and the Office for Personal Data Protection are authorized,
- submits to the Government the draft of the state policy on electronic communications and monitors its implementation,
- supports free competition in the provision of electronic communications networks and services,
- promotes a level playing field for all business entities in electronic communications,
- is the Managing Authority of the OP TAC, under which support for the development of VHCN networks will be implemented.

Ministry of Transport

- is the central body of state administration in matters of transport, responsible for the creation of state transport policy and, within the scope of its competencies, for its implementation.

Czech Telecommunication Office

- is the sectoral national regulator for electronic communications services and networks,
- performs mapping of the white, grey and black areas, on the basis of which localities that can be the subject of support from public funds are identified,
- collaborates in the formulation of conditions for wholesale access, including pricing conditions,
- within its scope, ensures that there is no distortion or restriction of competition in the electronic communications sector,
- provides the activity of the Single Information Point,
- ensures efficient management and effective use of radio frequencies,
- within its scope, removes obstacles to the provision of electronic communications networks, associated facilities and ancillary services, and the provision of electronic communications services.

Ministry for Regional Development

- performs the function of the National Coordination Body (NCB),
- is the central body of state administration in matters of territorial building planning, territorial decision-making and building regulations,
- performs methodological activities, directs and unifies the performance of state administration and the practice of spatial planning bodies and building authorities in the field of territorial planning and territorial decision-making,
- in territorial planning and building regulations, it draws up the territorial development policy for approval by the Government.

Ministry of the Interior

- plays a coordinating role for information and communication technologies in the field of electronic state administration,
- arranges non-public electronic communications networks for the Czech Police, components of the integrated rescue system and territorial state administration bodies,
- coordinates and creates conditions to support the development of electronic state administration,
- coordinates and creates conditions to support the development of electronic commerce,

- in cooperation with other state administration bodies, prepares a strategic framework for ensuring the effective use of territorial information in public administration agendas (GeoInfoStrategy),
- processes and updates (considering legitimate security interests) the list of address points of public interest buildings.

Ministry of Finance

- ensures the valuation of rights corresponding to easements,
- provides a methodology for valuing easements, which is also used to value the easements needed for the construction of electronic communications networks,
- ensures legal regulation in the field of accounting regulations and the introduction of international, especially European, accounting regulations into national law.

Business and Innovation Agency

- is a state-subsidized organization subordinated to the Ministry of Industry and Trade, which supports the competitiveness of the Czech economy through the support of small and medium-sized enterprises,
- performs the activity of an intermediary body for the provision of support to entrepreneurs using EU funds, in accordance with the directly applicable regulation of the European Union,
- participates in the evaluation of project applications by expert evaluators,
- cooperates in monitoring the subsidy process and in passing on information.

Office for the Protection of Competition

- has powers in the protection of economic competition,
- supervises the award of public contracts,
- ensure the monitoring and coordination of implementation of support from public funds.

Territorial self-governments

Territorial self-governments have participated in the development of VHCN networks and continue to participate systematically, in particular by creating the conditions to support the construction of networks financed by electronic communications businesses. They will continue to have a major impact on the projects being prepared in the future (link to zoning plans, property rights processes, concurrence and coordination of construction, etc.). There is intensive communication between local governments and the BCO, as well as between state bodies and associations of local governments.

8.2 Implementation timeframe - supply-side measures

The time frame for the implementation of the National Plan in respect of subsidy titles will be specified and updated in line with its content and the manner of fulfilment. Several operational programmes - the implementation structure of the RRF, OP TAC, IROP, and the JTF - will be involved in the implementation of the National Plan in 2021-2027. The framework dates will be approved by the relevant Monitoring Committees, or by the appropriate implementation structures.

Due to the volume of funds in the RRF and the time frame for the use of the RRF, priority will be given to calls from the RRF, and possibly also JTF. Only then will calls from the OP TAC be implemented.

For the preparation of each call for coverage of address points, a template time schedule is being considered, which is based on the relevant moment for geographical data collection (end of the calendar year) - moment T.

Call X

Provision of data by operators for geographic data collection	T + 3 months.
Verification and processing of information from operators of electronic communications networks and services	T + 6 months.
Preparation of Call texts including Evaluation Criteria	T + 9 months.
Public consultation to evaluate the collected information, including settlement of comments from public consultation	T + 10 months.
Approval procedure for the Call proposal	T + 11 months.
Call Announcement	T + 12 months
Deadline for project submission	T + 17 months.
Evaluation of submitted projects, including settlement of any deficiencies and appeals	T + 29 months.

Implementation of the so-called non-subsidy measures will take place in line with the Action Plan 2.0 material and Implementation and Development of 5G networks in the Czech Republic.

8.3 Implementation timeframe - supply-side measures

A precondition for the implementation of the pre/notification of this scheme is a solution which results in public support being compatible with the internal market. The second enabling precondition is the introduction of IRU into accounting standards, or the adoption of the necessary legislative amendments necessary for use of the IRU.

A timetable is being considered for the preparation of the call for coverage of address points, to consider the timeframe for funding from the RRF.

Call Y

Prenotification of the scheme at DG COMP	T
Creation of legislative preconditions for IRU	T + 6 months.
Preparation of Call texts including Evaluation Criteria	T + 6 months.
Approval procedure for the Call proposal	T + 8 months.
Call Announcement	T + 9 months
Deadline for project submission	T + 17 months.
Evaluation of submitted projects, including settlement of any deficiencies and appeals and conclusion of legal acts	T + 17 months.
Project implementation	T + 23 months

8.4 Monitoring of implementation of support from public funds

The MIT is responsible for the systematic and continuous monitoring of the subsidy mechanism in the area of support from public funds for the construction of VHCN networks.

On the issue of control, the MIT works closely with the Agency for Entrepreneurship and Innovation and with the CTO, which collects and subsequently updates data on the existence of electronic communications

networks - from 2021 it will be possible to map VHCN networks (for the first time on 2020 data). The CTO, after completion of the collection and verification of the data as collected, forwards the data to the MIT for evaluation. Based on the evaluation results, the MIT then identifies those places and areas where support for VHCN network construction projects can be provided from public funds.

Before announcing a call for projects that may be the subject of public funding, the MIT will verify in a public consultation whether the proposed sites and support areas meet all the necessary conditions to ensure the protection of existing or planned (three-year horizon) investments in the proposed sites and areas.

The actual settings of the system for monitoring investment support projects for the construction of VHCN networks using public funds will be included in the intervention logic of the programme, which on the basis of situation analysis and problem/needs/causes identification will define the program strategy and define individual specific objectives.

As part of programme monitoring, the Managing Authority will monitor whether the relevant activities/measures are being implemented and whether implementation of the programme is proceeding in line with expectations. At the same time, the values of the result indicators and whether they are changing in the desired direction (decreasing or increasing) will be monitored. The main tool for monitoring the programme will be a unified information monitoring system and progress in programme implementation will be regularly reported in the annual implementation reports, which include the trend in the indicator values. An assessment of programme implementation status and of its financial and material progress will be the subject of regular meetings of the Monitoring Committee.

In addition, the Government will be informed annually about activities aimed at fulfilling the National Plan for the Development of VHCN Networks. This information will also be published on the websites of the Ministry of Industry and Trade and the Agency for Entrepreneurship and Innovation (API).

9 Conclusion

Digitization has reached such a position in society that it is no longer possible for its development to stop or even slow down. The digital society, by its very nature, requires that the transmission capacity of fixed or mobile electronic communications networks does not limit it in its digital boom. Currently, the demand for high-speed Internet connection is enormous, having a global nature, and thus initiating a growth in Internet connectivity. This trend will continue over the coming years and the size of data transmissions will gradually multiply, among other things by routine implementation of virtual or augmented reality, holographic images, 3D images, cloud streaming services, integration of artificial intelligence into decision-making processes and the development of reliable fast networks with short response times for the needs of self-driving/management not only of means of transport but also of other modern digital services. The National Plan for the Development of Very High Capacity Networks maintains continuity in increasing the transmission capacities of high-capacity electronic communications networks which it began with the approval of the National Plan for the Development of Next-Generation Networks in 2016.

When implementing the plan to build a gigabit society, the Czech Republic has a more difficult position due to the complexity of its construction legislation, which is subsequently significantly reflected in the time and financial demands for the construction of the necessary line structures. At the same time, it must be said that in the Czech Republic the process of modernizing construction law is extremely long and complicated.

Therefore, the Ministry of Industry and Trade, in close cooperation with the CTO and professional associations, that is, associations covering electronic communications businesses, is concerned with identifying those obstacles and barriers in the construction and operation of electronic communications

networks which most complicate and limit investment in these networks. The aforementioned entities are jointly designing and implementing measures aimed at facilitating, accelerating and reducing the cost of building electronic communications networks, of their operation; and accelerating their return on investment.

In order for the Czech Republic not to lag behind in the development of its digital infrastructure, there is a need to focus on supporting the deployment of electronic communications networks with speeds of 1 Gbit/s and higher. It will also be necessary to focus on ensuring symmetrical high-capacity connectivity for elementary and secondary schools, as the most important socio-economic actors for the development of the knowledge and information society, including finding ways to ensure traffic and adequate internal equipment in line with cyber security requirements.

Similarly, the development of high-capacity networks will be crucial for the digitization of health care, where it will help the introduction of new digital services aimed at increasing the availability, quality and efficiency of care.

It is expected that a new initiator on the demand side for the development of high-capacity robust and reliable electronic communications networks will be Industry 4.0 projects, the requirements of individual socio-economic actors and the requirements arising from changes in societal behaviour and a strengthening in the digital skills of the population. At the same time, it is essential to constantly address cyber security and privacy. These aspects will be reflected in completely new dimensions and intensities that have never before nor anywhere in the world been satisfactorily addressed in modern digital democratic societies.

The National Plan deals primarily with the development of networks in 2021-2027, but prefers such solutions as allow their usability and easy modernization towards anticipated stricter parameters, so that these networks can serve to meet the requirements for services in the future.

Fulfilment criteria for Enabling Condition 3.1

The text of Enabling Condition 3.1 is set out in Annex IV to the Proposal for a Regulation of the European Parliament and of the Council laying down common provisions on the European Regional Development Fund, the European Social Fund Plus, the Cohesion Fund, and the European Maritime and Fisheries Fund and financial rules for those and for the Asylum and Migration Fund, the Internal Security Fund and the Border Management and Visa Instrument; COM (2018) 375 final, 29 May 2018.

Fulfilment criteria for Enabling Condition 3.1 ³⁵ : <i>National or regional plan for broadband access</i>	Have the criteria been met?	
	YES/NO	Non-compliance elements
Is there a national or regional plan for broadband access, which includes	YES	
1. Assessment of the investment gap to be addressed to ensure that all Union citizens have access to high-capacity networks ³⁶ , based on: a) current mapping ³⁷ of existing private and public infrastructure and service quality using standard broadband mapping indicators b) consultations on planned investments in accordance with state aid requirements	YES Chaps. 3.4 3.5, 4.2 and 6.1 Chap. 1	
2. Justification for planned public intervention based on sustainable investment models that: a) strengthen affordability and access to open high-quality infrastructure and services that will continue to work in the future b) adapt the forms of financial assistance to identified market failures c) allow for the complementary use of different forms of funding from Union, national or regional sources	YES Chap. 6.4 Chap. 6.4 Chap. 6.4	
3. Measures to support the demand for and use of high-capacity networks, including measures to facilitate their deployment, in particular through the effective implementation of the EU Directive on reducing the cost of building broadband access ³⁸	YES Chaps. 5 and 6.3 Chap. 7.5	

³⁵ The wording of the basic conditions corresponds to Annex IV of the draft CPR according to the compromise version discussed by the Permanent Representatives Committee II. part (COREPER II) on 18 December 2019. Working translation from English into Czech.

³⁶ In accordance with the objective defined in Article 3(2)(a), together with Measure 25 of Directive 2018/1972 of the European Parliament and of the Council establishing the European Electronic Communications Code.

³⁷ In conformity with Article 22 of Directive 2018/1972 of the European Parliament and of the Council establishing the European Electronic Communications Code.

³⁸ Directive 2014/61/EU on measures to reduce the cost of deploying high-speed electronic communications networks.

4. Technical assistance and advice mechanisms, such as broadband advice offices to strengthen the capacity of local stakeholders and advice for those submitting projects	YES Chap. 7.3	
5. Monitoring mechanism based on standard broadband mapping indicators	YES Chap. 8.4	

Explanation of abbreviations and concepts

Abbreviation Concept	Meaning in Czech / translation	Meaning in English	Note
5G	Mobilní komunikační sítě páté generace	Fifth generation mobile communication networks	ITU designated IMT2020 (ITU-R Rec. M.2083)
AI	Umělá inteligence	Artificial intelligence	
Backhaul	Přípojná síť	Backhaul	That part of a VHCN network that connects the distribution part of the VHCN network to the backbone network
BCO	Informační kancelář pro vysokorychlostní připojení	Broadband Competence Office	
BEREC			Association of European Regulators for Electronic Communications
CATV	Kabelová televize	Community Antenna Television	Cable network consisting of optical and coaxial cables, transmitting multimedia services and Internet access based on frequency multiplexing
CEF	Nástroj pro propojení Evropy	Connecting Europe Facility	EU programme to support the construction of access networks
CISCO		Cisco Systems, Inc.	
CMS	Centrální místo služeb	Central place of services	A system whose primary purpose is to mediate the controlled and registered interconnection of the information systems of state administration entities to state administration services (applications), i.e. access to eGovernment services. see NAKIT
CR	Česká republika	Czech Republic	
CSO	Český statistický úřad	Czech Statistical Office	
CTO	Český telekomunikační úřad	Czech Telecommunication Office	
COSMC	Český úřad zeměměřičský a katastrální	Czech Office for Surveying, Mapping and Cadastral	
ČVUT	České vysoké učení technické	Czech Technical University	
Distribution part of the access network			Ensures the connection of the main node of the access network (CO) with the relevant geographical area, usually the size of a municipality, or several

Abbreviation Concept	Meaning in Czech / translation	Meaning in English	Note
			neighbouring municipalities or city districts, or also an area the size of a district city
		Download/Downlink	The direction of internet/data traffic in the downlink direction, i.e. from the internet towards the subscriber's terminal device
DSL	Digitální účastnické vedení	Digital Subscriber Line	Technology that allows the use of existing metal cable used for telephone connections for high-speed data transmission
ERDF	Evropský fond pro regionální rozvoj	European_Regional Development Fund	
EC	Evropská komise	European Commission	
EU	Evropská unie	European Union	
Eurostat			Statistical Office of the European Union
FTTB	Vlákno do budovy	Fibre to the Building	Type of optical connection terminating in a building (e.g. in the basement of an apartment block)
FTTH	Vlákno do domu	Fibre to the Home	Type of optical network connection with termination in the subscriber's household
FWA	Fixní bezdrátové připojení	Fixed Wireless Access	Radio systems using the radio spectrum on the basis of an individual authorization from the CTO
GSD	Geografický sběr dat ČTÚ	Geographical data collection by CTO	
GSM			Mobile telephone standard (Groupe Spécial Mobile)
ICT	Informační a komunikační technologie	Information and Communication Technologies	
IoT	Internet věcí	Internet of Things	
IP	Internetový protokol	Internet Protocol	The basic protocol used in data networks, which uses an IP address to distinguish between individual network interfaces
IROP	Integrovaný regionální operační program	Integrated regional operational programme	
IT	Informační technologie	Information Technologies	
ITU	Mezinárodní telekomunikační unie	International Telecommunication Union	
ITS	Integrovaná telekomunikační síť	Integrated telecommunications network	

Abbreviation Concept	Meaning in Czech / translation	Meaning in English	Note
IZS	Integrovaný záchranný systém	Integrated rescue system	
KHS	Krajská hygienická stanice	Regional Hygiene Station	
LAN	Lokální datová síť	Local Area Network	Subscriber local network (Data network connecting a small area, e.g. household, company)
LTE		Long Term Evolution	Technology enabling high-speed Internet transmission over the mobile network
MIT	Ministerstvo průmyslu a obchodu	Ministry of Industry and Trade.	
MoE	Ministerstvo školství, mládeže a tělovýchovy	Ministry of Education Youth and Sports	
NAKIT	Národní agentura pro komunikační a informační technologie, s. p.	National Agency for Communication and Information Technologies, sp	Strategic partner of the state providing communication and information services for emergency and security forces and public administration
NGA	Přístupové sítě nové generace	Next Generation Access Networks	The characteristics and parameters of NGA networks are given in the National Plan for the Development of Next Generation Networks
POP	Fyzický síťový uzel	Point of Presence	A network node at which the transmission technology and the interface between the provider's backbone network and the access network are located
Přípojka sítě elektronických komunikací		Electronic communications network connection	That part of an electronic communications network that enables the connection of a network termination point to a public communications network interface [Section 2(i) of Act No 194/2017]
OP PIK	Operační program Podnikání a inovace pro konkurenceschopnost 2014-2020	Operational Program Enterprise and Innovation for Competitiveness 2014-2020	
OP TAC	Operační program Technologie a Aplikace pro Konkurenceschopnost	Operational Programme Technology and Applications for Competitiveness	
ŘSD	Ředitelství silnic a dálnic	Highways Directorate	
SŠ	Střední škola/střední školy	Secondary school(s)	

Abbreviation Concept	Meaning in Czech / translation	Meaning in English	Note
T-Mobile	T-Mobile Czech Republic a.s.		
		Upload/Uplink	The direction of internet/data traffic in the uplink direction, i.e. from the subscriber's terminal device to the internet
VDSL	Vysokorychlostní digitální účastnická přípojka	High speed digital subscriber connection	DSL technology enabling faster data transfer than ADSL
VOŠ	Vyšší odborná škola	Higher vocational school(s)	
VHCN	Sítě elektronických komunikací o velmi vysoké kapacitě	Very High Capacity Networks	
VRI	Vysokorychlostní internet	High-speed internet	
VŠ	Vysoká škola/vysoké školy	University/universities	
WAS		Wireless Access System	Radio system for access at a fixed location using radio spectrum on the basis of a general authorization from the CTO
xDSL	Viz DSL	Viz DSL	See DSL, the letter x indicates the type of digital transmission technology
SŽDC	Správa železnic, státní organizace	Railway Infrastructure Administration	
ZSJ	Základní sídelní jednotka	Basic settlement unit	That part of the territory of a municipality with unambiguous territorial technical and urban conditions or the catchment area of a grouping of residential or recreational buildings
ZŠ	Základní škola/základní školy	Elementary school(s)	