INSTITUTE FOR POLITICS AND SOCIETY

Czech Republic, A Country of Small Internet Providers

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Summary

- The majority of Czech households are not connected to the Internet by large multinational giants, but by small local and regional operators, i.e. local companies with Czech owners that are based, pay taxes, and invest in the Czech Republic.
- These companies also invest primarily in the most modern type of connection, fibre optic cable, to houses and apartments (FTTT/B). This helps to meet the objectives of the European Union's Digital Agenda, namely to cover all European households with high-speed internet over 30 Mbps by 2020.
- Thanks to the efforts of these entrepreneurs, the Czech Republic is above the European average in fixed Internet average, while on the other hand is below the European average in prices for fixed internet connection.
- The most common problem small and medium-sized enterprises face, is the construction bureaucracy and local construction conditions surrounding the installation of the fibre optic cable.
- It is primarily due to the number of easements (services) applied by some municipalities which makes the construction of networks in certain areas unprofitable. The decisions made by the Mayor of the municipality or the municipal authority about local fees are one of the most important inputs into the investment thinking of the local operator.
- A problematic aspect can be the conditions applied by state organizations, such as the Office of the State Representation in Property Affairs, Railway Infrastructure Administration or Road and Motorway Directorate. Any restrictions imposed by these organizations on local investors may mean the difference whether a fibre optic cable leads somewhere or not.
- On the contrary, in the vast majority of cases money is not a problem. Operators are able to invest in development without a significant need for lending or subsidies.
- The market is fragmented and small enterprises are the most fundamental competition for large companies such as UPC (Vodafone) or O2. Although there has been a consolidation of small players, even the largest regional operators have a low percentage share in national terms.
- Development of the Czech telecommunications market in the area of fixed internet connection is desirable and healthy for customers and the local economy because they have a fast, modern connection, for a good price.

Czech Republic, A Country of Small Internet Providers

Policy Paper – Ondřej Malý, September 2019

The Czech Republic is currently facing a problem in the area of fixed internet connection that is unprecedented the EU. Approximately half of the households are connected by hundreds of smaller regional operators, which results from statistics of the Czech Telecommunication Office (ČTÚ 2018, p. 33). At the same time, regional and local companies are mostly operating modern optical technology (FTTH / B connections, i.e. fibre optic cables for home or apartment), although wireless technology remains the most important technology in the Czech Republic. The share of the former monopolists, SPT Telecom, then Český Telecom, then Telefonica O2 and today CETIN and its wholesale partners gradually fell to approximately a quarter of all connections. The rest is attributed to UPC and fixed internet service via LTE mobile network, offered by three mobile operators.

According to European statistics from last June, the Czech Republic is a state where the former monopoly has the smallest share of the fixed connection market, while other operators have 77,6% share.[1] This is mainly due to bad business decisions in the past and that there was no way of catching up to public demand for affordable Internet access at the beginning of the century. The market therefore developed very unconventionally, which stands out especially in comparison with the mobile market, where the Czech Republic is one of the most expensive countries in the EU. The result has lead to a very good position for the fixed internet market in Europe, where there is healthy competition and where technological development pushes mainly small and medium-sized local and regional companies owned by Czech capital.

This paper describes the Czech market and its development and recommends the steps that the public administration should take to facilitate the business of local companies and thus maintain a strong competitive environment on the market, which provides customers with a quality Internet connection at a reasonable price.

Incapable Monopolist

The reasons the Czech market developed through many small internet providers is mainly historical and related to the decision-making of Czech officials in the 1990s and to the management of the state enterprise Czech Telecom in the beginning of contemporary century.

In the 1990s, the state was mainly trying to solve the problem with vocal telephones and the huge internal debt in the sector of telecommunications. This problem arose after the period of totalitarianism, when people had been waiting for a phone connection for years, and were now finally getting it installed by the state telecommunications company. Data communication remained less important, because the public were not as interested (households had started to connect to the internet since approximately 1996-97).

[1] https://digital-agenda-data.eu/charts/analyse-one-indicator-and-compare-breakdowns#chart={%22indicator-group%22:%22broadband%22,%22indicator%22:%22bb_ne%22,%22breakdown-group%22:%22total%22,%22unit-measure%22:%22pc_lines%22,%22time-period%22:%222018-06%22,%22ref-area%22:[%22AT%22,%22BE%22,%22BG%22,%22HR%22,%22CY%22,%22CZ%22,%22DK%22,%22EE%22,%22EU%22,%22DE%22,%22EL%22,%22HU%22,%22IE%22,%22IT%22,%22LV%22,%22LT%22,%22LU%22,%22MT%22,%22NL%22,%22PL%22,%22PT%22,%22RO%22,%22SK%22,%22SI%22,%22ES%22,%22SE%22,%22UK%22]}

In the 1990, the state established Eurotel Prague, a joint company of the then Post and Telecommunications Administration (SPT Prague) and enterprises US West and Bell Atlantic. As Jiří Peterka, member of the Board of the Czech Telecommunications Office, writes in his series on the history of the Czech telecommunications market, "One of the goals pursued by establishment of Eurotel was to support generally the development of data communications, which nearly did not exist here." However, the then politicians and officials concluded that the new common project needed consistent protection from eventual competition and therefore they gave it a monopoly on all services consisting in data transmission and provided it as public (i.e. to anyone). This gave Eurotel an exclusive license to provide these services. In practice, it meant that that no other entity had a chance to obtain a license for the same activity. The reason for this was very succinct: "If no monopoly was secured, no one would make necessary investments here!" (Peterka 2001a)

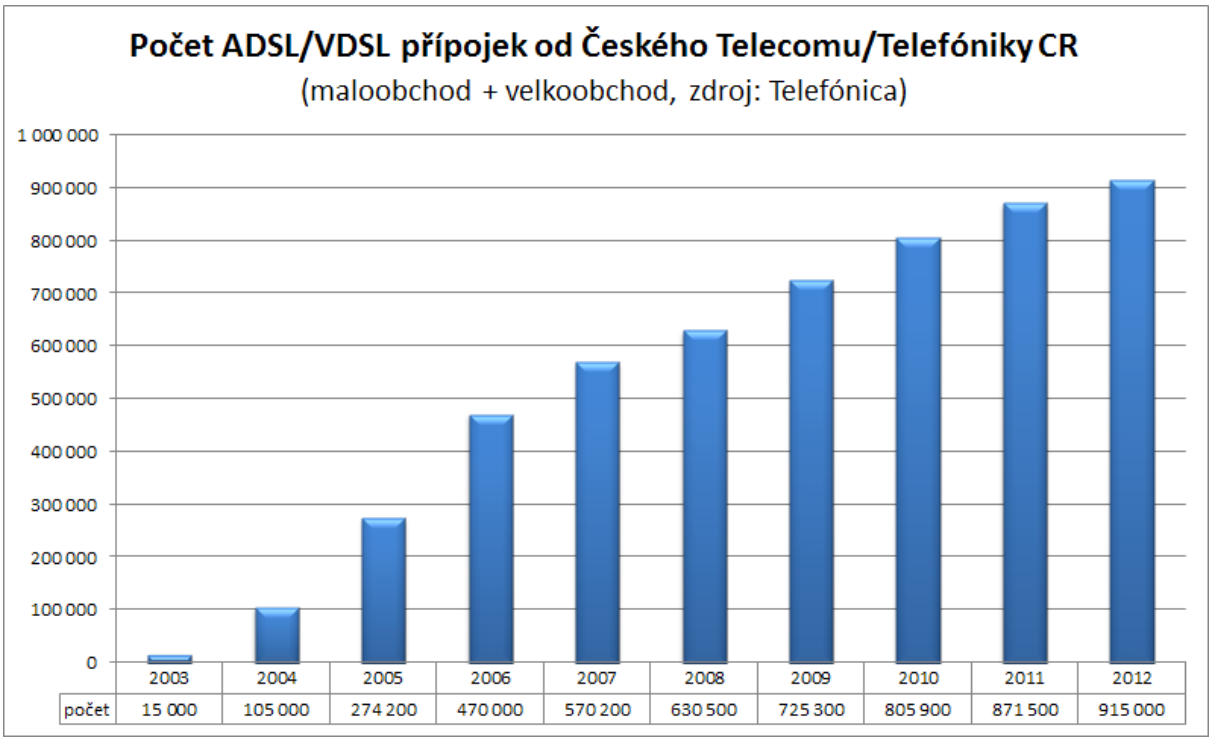
At that time, Eurotel was not a mobile operator, but a company that was supposed to provide data transmission services. At first, the company received a license for NMT networks and later for GSM networks. Until mid-1995, when Eurotel's monopoly ended, no other company could have offered an internet connection as a "publicly available electronic communications service", but Eurotel itself did not offer internet access at all, even despite its exclusivity. After the end of exclusivity, new operators were established very quickly. By the end of 1998, there were over 150 of them. (Peterka 2001b)

At the turn of the century, the primary way households connected to the internet was dial-up connection, even though it was still practically inevitable to use the network of Czech Telecom. Internet providers were paid separately until 1999, when a company, Czech On Line, under the brand Volný came up with free connection and others joined quickly. In 1999, cable operators also began simultaneously providing connection to the internet. However, their connection was then limited to the attractive estates of larger cities, but they offered a fixed speed connection for a flat rate and mostly without a data limit. Gradually, a large part of them have been swallowed up by UPC, which is now very likely to pass to Vodafone this year (the transaction must be finally sanctified by European Commission).

Liberalization of telecommunications progressed very slowly and Czech Telecom was resisting it. In retrospective their decisions were fundamentally flawed, but the managers of the state company considered it logical to delay deploying xDSL technology as long as possible. The xDSL technology would allow for the provision of internet via a fixed line for a flat rate. This happened only in 2003, making the Czech Republic one of the last countries in the EU to integrate it. As Jiří Peterka wrote, "the reason was that the then Czech Telecom invested in ISDN technology and wanted to make the most of this investment. There also played a role (at least in my point of view) that the management of Czech Telecom was in fact in the hands of so-called strategic partner, and that its managers might have thought that they could have done what they wanted in our telecommunications market." (Peterka 2013)

Moreover, at first Telecom introduced its ISDN, and later ADSL, but with relatively strict data limits. In addition, it was forcing customers to buy – if they wanted an internet connection – at least a basic, fixed-line tariff. This made the service considerably more expensive and discouraged customers because at that time many households preferred to solve their telecommunication needs in the voice sector by using mobile phones. Despite this, Telecom and later Telefónica got just under a million active connections, as the following graph shows:

Graph 1: Number of ADSL/VDSL connections to Czech Telecom/Telefónica CR



Resource: Peterka, 2013

Thus, the state company and after the privatization Telefónica O2 failed to capitalize on the fact that their network reached almost every household. Moreover, the network was not able to keep up with the competition in marketing sphere and offered lower speeds for more money. So, the customers were mainly companies or households; which, for various reasons were not able to choose other type of connection – either from a local provider for a better price, or from UPC in a better quality (and often for a better price). Now, the former monopolist tries to modernize their network, they were sold dramatically underfunded by the former Spanish owner, and gradually increased the available speeds to compete with local internet providers, UPC and fixed LTE service.

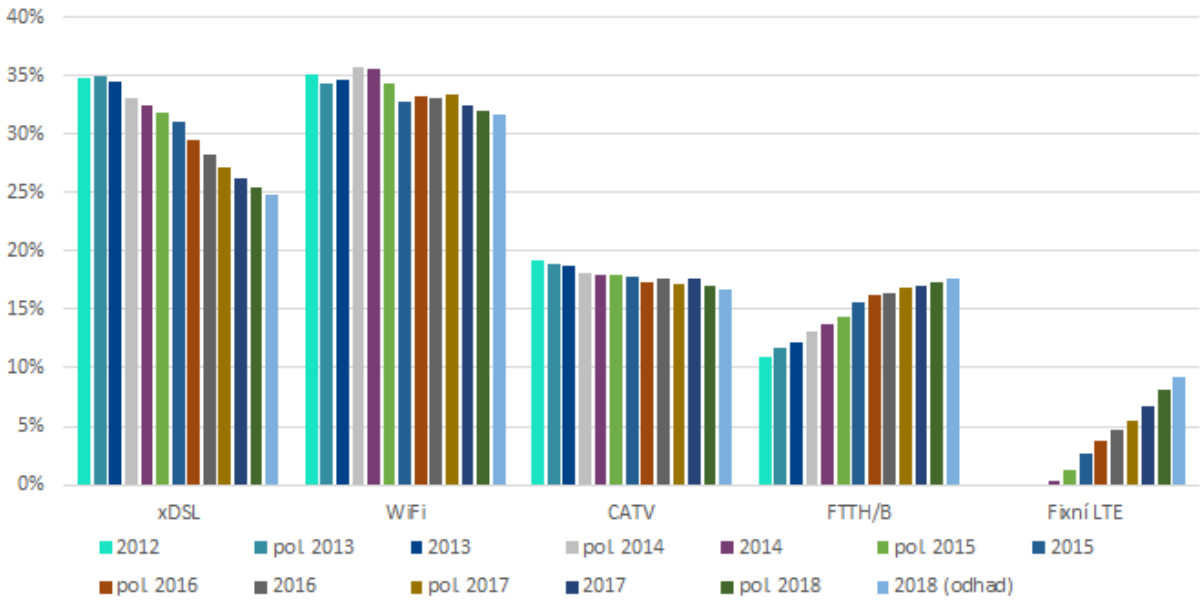
If we go back in a history to the beginning of the century, it was a time where both local operators and community networks started to penetrate to the Czech market. At the beginning of the operation of local companies, their founders often needed to work from home; that was the way networks, such as Rtyně.net from the eastern Czechia or Újezd.net, covering east Prague and its surroundings, were created.

In the beginning, community networks were set up on an enthusiastic basis due to neighbour mutual communication or gaming and later, internet access was added. Some of them have transformed into the traditional internet access service providers, while others still work as registered associations. Probably the largest of them is the Pilsfree network, covering Pilsen and its surroundings with a combination of optical network and Wi-Fi connection. However, the vast majority of the associations are not registered anywhere, and do not need to report any data to the Czech Communication Office. This has resulted in the state not having enough data on the number of its members and what services they offer. Associations are also owners of optical infrastructure, so it is very likely that if they participated in standard data collection, the Czech Republic would move up in the EU ranking when it comes to availability of optical connections.

Who Does Provide the Czechs with Internet?

According to the Czech Telecommunication Office's data, which has been monitoring the shares of various technologies in the fixed line market for many years, 31,7% of customers were connected via Wi-Fi last year, via xDSL 24,9% of customers, via optic 17,6% of customers, via cabling of TV 16,7% of customers and, via fixed LTE 9,2% of customers. Last year, for the first-time optics for the house or apartment (FTTH / B) surpassed cable TV connection. The development of shares in individual technologies is shown by the following graph:

Graph 2: Development of the share of high-speed accesses according to individual technological solutions in the retail market



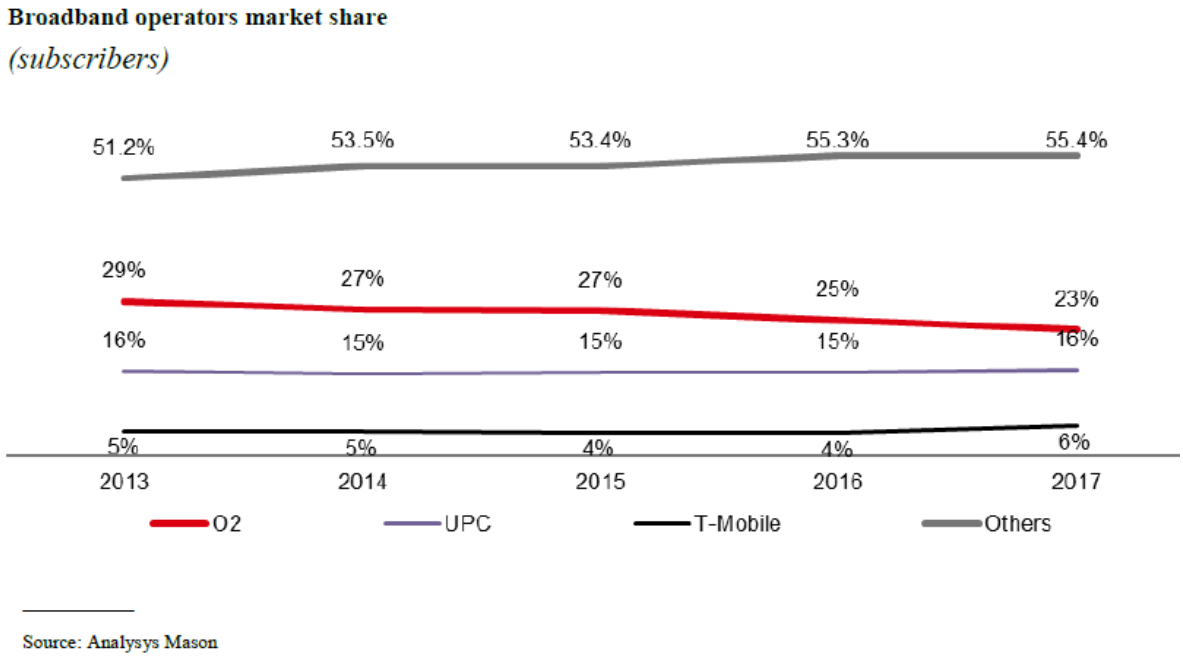
Resource: ČTÚ, 2018

Technology is a good indicator of who is a provider. Connection via xDSL is provided exclusively by a former monopolist, now it is CETIN and its wholesale partners, i.e. dominantly O2 with smaller shares belonging to T-Mobile, Vodafone and several other smaller companies. Regional and local operators are practically the exclusive users of Wi-Fi and FTTH / B technology (CETIN's share in this technology is very low and only applies to the new housing development). Cable TV networks are then the domain of UPC and several smaller cable operators. It can be seen from the graph that if "rural" cable operators are included (i. e. cable operators outside UPC, which serve about 2,5 % of households), **half of the Czech households are served by smaller Czech local companies and not by multinational giants.**

As we can see on the graph, the proportional share of xDSL access has been dramatically decreasing in the monitored period, reaching its maximum amount of access in mid-2015 (over 955 thousand). However, due to the growth of the amount of access, the share has been annually decreasing. In recent years, the fastest growth has been monitored in optics and, above all, fixed LTE technology, which mobile operators are markedly aiming to the customers using xDSL technology. The number of xDSL lines as a percentage of total access decreases every year despite CETIN's investments in fixed network acceleration. On the other hand, CTO estimated that the decline in xDSL lines, expressed by absolute amount of access, has actually stopped.

As the parent company of CETIN "PPF ARENA 1 B.V." released bonds in March, other data on Czech market, which are included in the leaflet to these bonds, are also available[2]. In terms of market share per customer, the leaflet shows development this way:

Graph 3: Share on the market of the broadband operators



Source: Analysys Mason

Resource: PPF ARENA 1, 2019

In this case, "others" present the overwhelming majority of regional and local operators. The analytical company, Analysis Mason, used by a parent company of telecommunication enterprises owned by PPF as a data source, is somewhat more "optimistic" in its data than the CTO when it comes to the share of regional and local providers.

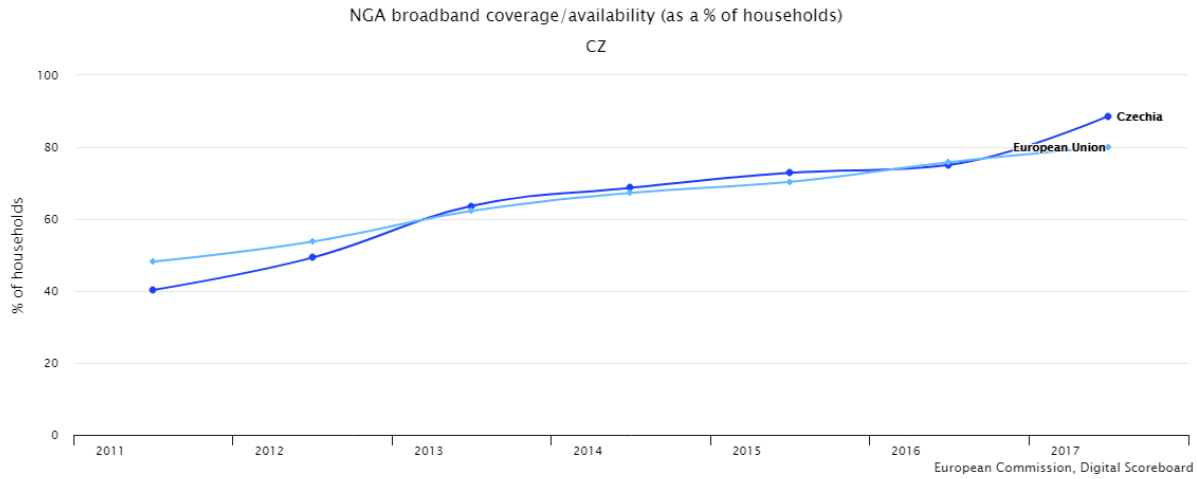
According to the estimates of PFF ARENA 1, the fixed broadband market has an annual turnover of approximately 12 billion crowns; and according to the revenues, the largest operator is O2 (31%), then local and regional operators (29%), UPC (17%), local operators of optical networks (15%), and T-Mobile (8%).

The Czech Republic Has a Quality Fixed Infrastructure

The Czech fixed internet infrastructure can be evaluated as being of good quality, even if it is assessed in compliance with the statistics of the European Commission (Digital Agenda Scoreboard). According to them, at the end of 2017 88,6% of households had "NGA internet" in the Czech Republic, which the European Commission defines as 30 Mbps and more. Two years ago, the Czech Republic was already above the European average before the significant investments of CETIN and local operators showed up.

[2] PPF ARENA 1 B.V. (a private company with limited liability incorporated in the Netherlands) EUR3,000,000,000 Euro Medium Term Note Programme unconditionally and irrevocably guaranteed by certain subsidiaries of PPF Arena 1 B.V.
https://www.ise.ie/debt_documents/ListingParticulars_4795750f-9b55-4ba8-b1c0-e6b36db57fe2.PDF

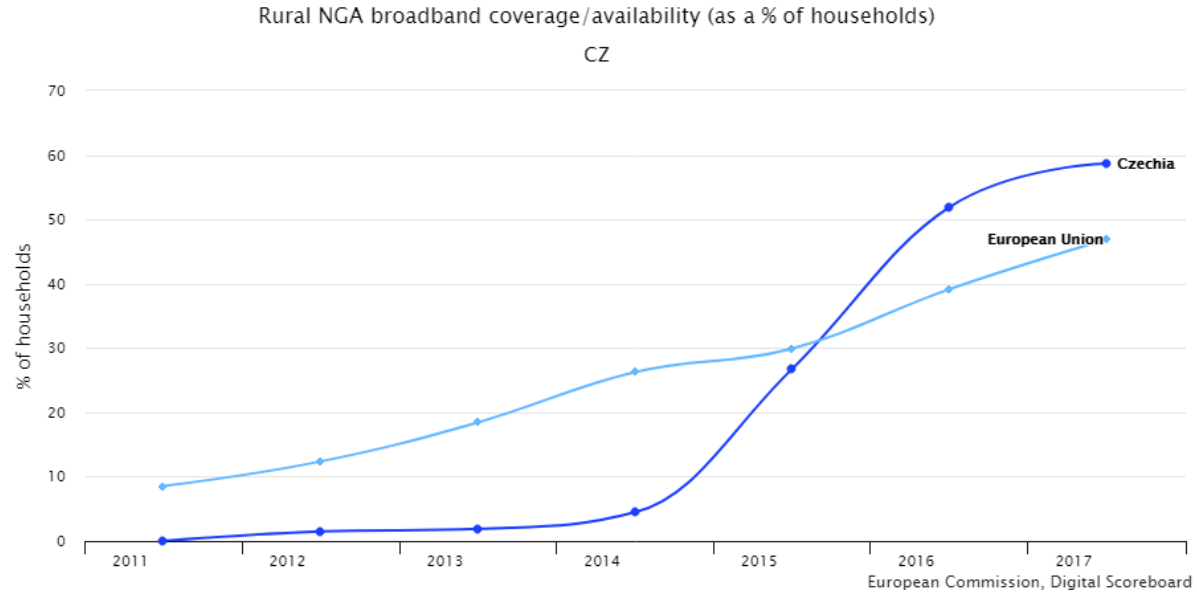
Graph 4: NGA broadband coverage/availability (as a % of households)



Resource: European Commission, Digital Scoreboard

With the availability of NGA internet in rural areas, the Czech Republic is also above the European average with 57,8% of rural households covered:

Graph 5: Rural NGA broadband coverage/availability



Resource: European Commission, Digital Scoreboard

Mapping for the purposes of the subsidy program from the Operational Program of Business and Innovation for Competitiveness also offers comprehensive data on the Czech market. Mapping is annually provided by the CTO and based on this data, it creates intervention areas designed for subsidies. These intervention areas are places located in the basic settlement unit, where at least half of the addresses are not covered by the internet with the speed of at least 30 Mbps and where operators do not plan to state this coverage as theirs in nearly three years. The Ministry of Industry and Trade has identified **87, 000** grant-eligible areas for the purposes of this year's call (Veřejná konzultace, 2019). This implies that the Czech Republic is not in a bad position regarding the availability of fast, fixed internet and will definitely stand in the European comparison. **The often-repeated statement particularly by**

representatives of mobile operators, that the quality of the fixed internet in the Czech Republic is poor, is not based on the truth.

It is also important to not forget the biggest single player in the fixed line market, CETIN, which was established by dividing O2 into a service provider (O2), and into an infrastructure owner (CETIN). CETIN is the only company in the Czech Republic that uses metallic fibres and the only one that provides internet via xDSL technology. It is able to offer this service in 4,3 million households, which is about 84% of all households in the Czech Republic. (PPF ARENA 1 2019, str 203).

The following table shows the changes in CETIN's network speeds over the last year (PPF ARENA 1 2019, p. 203):

Table 1: CETIN network data change rate (comparison 2017 and 2018)

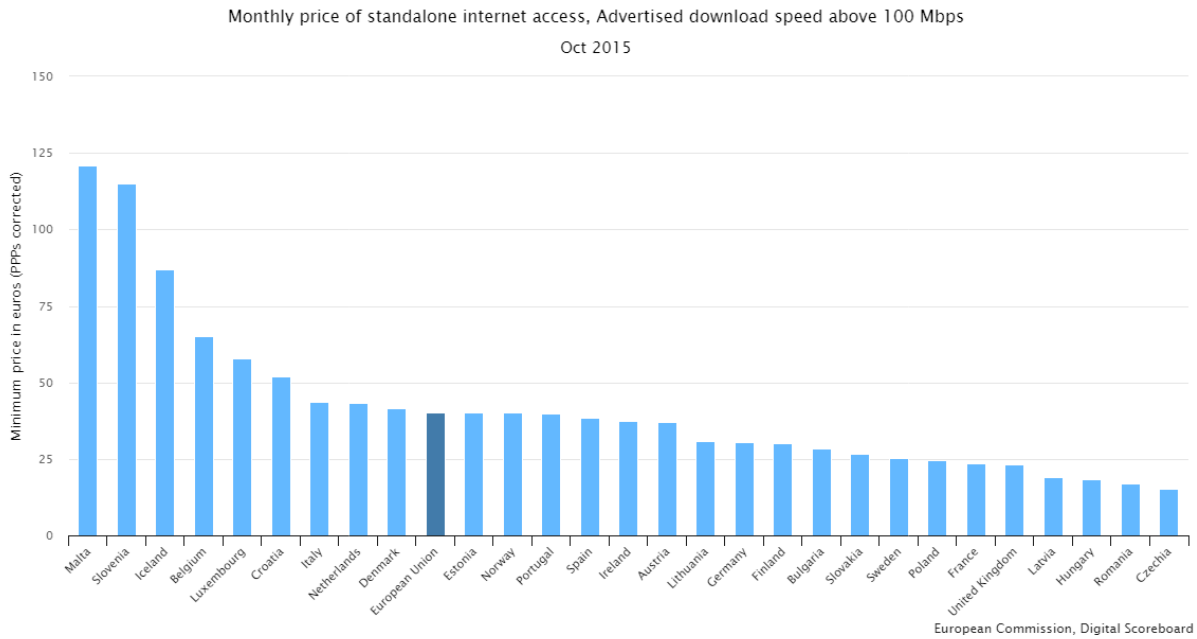
	Year ended 31 December	
	2017	**2018**
	(in per cent.)	
100-250 Mbps	4%	7%
80-100 Mbps	13%	29%
40-50 Mbps	25%	29%
20 Mbps	40%	20%
2-6 Mbps	17%	15%
Total	**100%**	**100%**

(i) Metallic Network

Resource: PPF ARENA 1 2019, p. 203

But, all statistics above are based on data from the maximum available speeds on the connection. Most operators though, assert speed limits on their networks, according to which they sell their service to customers with prices based on the speed they desire. When it comes to prices, the Czech networks are among the cheapest in Europe, which becomes apparent especially at the highest speeds above 100 Mbps. Unfortunately, the latest European comparison is from 2015:

Graph 6: Monthly price of standalone internet access, Advertised download speed above 100 Mbps (October 2015)



Resource: European Commission, Digital Scoreboard

Measuring real speed is difficult

The actual connection speed of the customer is influenced by many factors. It is not only the available technology or infrastructure, but also the speed that the user orders from his operator. Logically, internet service providers offer a spectrum of services for different prices on the infrastructure to satisfy both price-sensitive customers and those who demand higher speeds and hence higher quality of service. The use of different speed meters is thus burdened primarily with the speed of the ordered service. If low internet speeds are seen as a pattern on some statistics in the Czech Republic, it is mainly a reflection of the price sensitivity of those customers who order slower speeds for a lower price even on the quality infrastructure.

For example, in CETIN's network, a company providing connectivity to its business partners mainly via xDSL technology, according to the answers for the question of the IPPS, only 45% of end customers activated the maximum available speed in a given location (this also includes connections where only one speed is available). The rest has a slower and less expensive service.

Reaching speeds of regional operators and cable networks are also difficult to measure. But according to a data-supplying probe for Ookla, which was installed by the UVT Internet provider and which conducted over 10, 000 measurements in March, the average speed is around 60 Mbps downloads and 30 Mbps upload. However, the measurement variance is high (between 5 and 500 Mbps downloads) and indicates that speed measuring in this way has only limited reliability.

Besides the ordered service, the measuring is also influenced by the customer's end device, a Wi-Fi router that was purchased for only a few hundred crowns will perform differently than the powerful router for several thousand crowns. It will also be dependant on where the customer is actually placed the in-home Wi-Fi, the difference between measuring directly at the router or behind three walls can be in tens of megabits per second.

The reliability of such measurements is therefore very low and for assessing how good the internet infrastructure in the Czech Republic is, speed measurements are irrelevant. The only reasonable thing is to monitor the infrastructure itself as it is declared by the operators themselves in the reports for the Czech Telecommunication Office or the Ministry of Industry and Trade or the results of professional measurement CTO technique.

Optics is mainly built by small companies

As the CTO statistics show, the most technologically advanced connection i.e. optics, is being built in the Czech Republic primarily by local and regional operators. This is confirmed by the CTO's annual report for 2018 **(ČTÚ 2018),** which states that, "it remains that wireless and optical networks through the Czech Republic are mainly implemented by smaller local providers.". The Office optimistically assumed last year that the company T-Mobile, which announced significant investment in fibre optic connections, would start construction. However, this has not happened. One of the reasons is the significant bureaucratic obstacles mentioned by T-Mobile's Business Director Juraj Bóna at the business breakfast organized by the Institute for Politics and Society. He claimed that it took an average of 350 days to start construction, and the record had been 500 days. However, these obstacles restrict all operators regardless of their size. The sector has now united in this area and negotiations are underway between associations and unions of telecommunication companies and the Ministry of Industry and Trade, which should succeed in resolving these obstacles.

The problem is partially solved by Act No. 169/2018 Coll., changing Act No. 419/2019 Coll. on accelerating the construction of transport, water, energy and electronic communication infrastructure, as amended by subsequent regulations and other related acts. This includes a special regulation on the authorization processes and procedures for obtaining the necessary rights. Among other things, it also includes the construction of electronic communication infrastructure. The law shortens the bureaucratic process by approximately three to nine months depending on the company's circumstances.

However, operators generally complain about the unpredictability and complexity of fixing easement prices, especially in municipalities and state-managed organizations such as the Office for Government Representation in Property Affairs, Railway Infrastructure Administration or Road and Motorway Directorate. The states next steps should adjust the rules for fixing easements, the amount of which often determines whether a project is to be completed or not.

There are several reasons why mainly the small operators were involved in the construction of optics. Unlike other countries, the former monopoly, Czech Telecom and later Telelónica, invested minimally into the optics headed to the house. Now their successor, CETIN, is trying to cover this investment gap and it focuses mainly on building, "optics to the street cabinet (FTTCab)", bringing the highest quality optical connection as close as possible to end users to a distribution point located in the street from which the older metal line leads to the households. As a result, CETIN is now able to offer higher speeds, in some locations up to 250 Mbps.

The former monopolist has created room with this strategy for investments of other players because xDSL has not been able to meet the demand from households for quality internet for a reasonable price. In addition, regional operators did not carry the burden of previously built infrastructure, and their investments in fibre optic networks are a logical replacement for wireless technology wherever the financial capabilities of operator and local conditions allow.

The situation of the Czech Republic is thus significantly different, for example from a number of Nordic countries, the Baltic States, or Spain where it was only former monopolists who started investing in optical networks. There was also no pressure from the state or the regulators, who due to high competition in the fixed connection market, did not see any reason to intervene in the market beyond the regulation that is, in the European context, common in the fixed networks. This means they only regulate the basics such as access to infrastructure and access to the data flow of a company with significant market power; in the case of the Czech Republic this pertains to Czech Telecom, Telefónica and then CETIN. Since there was little effort from the former monopoly to actively strive for wholesale of its infrastructure (it traditionally perceived a regulation as a necessary evil), smaller operators focused on building their own infrastructure. For wireless networks that grew up in the Czech Republic at the beginning of the century, it was a natural step towards building optics to end users.

Due to the fact that the largest operator (former Czech Telecom and then Telefónica) did not invested much in the quality of its network in the past, the construction of fast internet, optics or cable networks, was left to smaller local and regional operators and UPC. Logically, houses with a larger number of flats and housing estates came first, as this is more favourable for operators. Now, smaller operators are concentrated also on family houses and smaller municipalities because larger towns have already been prefabricated and had their housing estates "dismantled". However, there are no unusual situations in the Czech Republic where more than one optical infrastructure goes into one house and it is covered by more operators.

Smaller operators also profited from the free capital as they grew significantly on wireless networks that did not have so many fixed or operating costs. But at the same time, they do not provide a certainty that in the future that there will be no other technology that will meet the wishes of customers for faster internet that will be better and less expensive. Since at least 2007, the community of wireless internet service providers have voiced the need to bury optics where it is possible and do it faster than Telefónica O2 (which, despite some later proclamations, had no intention to invest into its fixed network. The investments increased only after the acquisition of PPF and after the division of the company into the infrastructure part and service providers.).

Smaller operators are much closer to their customers, local representatives, mayors, and events in the communities. That is why they are able to use the reconstructions or other buildings to bury the optics for a lower price. Traditionally, they are able to embark on relatively small projects of tens to hundreds of connections, i.e. to cover the municipality or its part and to use their money. Many of them are practically indebted, often reinvesting a large amount of their profits back into the network.

Recently, it has already been more practical to cover apartment buildings, either through optics from local operators or cable mostly from UPC. Smaller players move with their optics towards family houses and smaller villages. Nevertheless, it is necessary to take the structure of municipalities of the Czech Republic into consideration when, according to data of the Czech Statistic Department, over three quarters of municipalities are less than a thousand inhabitants and more than half are less than five hundred inhabitants.[3] It is more favourable to cover more municipalities with a wireless network connected to the optics rather than building fully optical networks in small municipalities that are more remote from a larger regional centre.

[3] https://www.czso.cz/documents/10180/46186417/32019917003.pdf/adf9352e-fba9-40f1-87fd-f59530802fc4?version=1.0

Consolidation

As we have shown, the Czech market is very fragmented and above all, regional operators are among the largest investors in optics being available for installation in an individual's or a family's house. However, there is a relatively high consolidation in the market with larger operators often using free cash to buy smaller networks and expanding into cities where they have not been present yet. Consolidation takes place at all levels. Medium-sized operators buy the smallest and larger regional operators buy the medium ones (and even smaller). But this year, the largest purchase will likely remain the transnational acquisition of the second largest Czech fixed network provider, UPC, by mobile operator, Vodafone, thus creating converged fixed network operator that reaches over 1,5 million Czech households.

From 2009-2011, Telefónica Czech Republic was already trying to consolidate, realizing that it had no chance of defeating regional and local networks and growing organically at their own expense. The practical solution was to make more acquisitions. Telefónica gained several smaller networks and associated them under its subsidiary company Internethome. Nevertheless, the pressure to switch to xDSL-based services and pressure for customers to also pass under a large corporation which was coupled with competition from other providers at the certain place, caused that brand to be unsuccessful and Telefónica lost a great number of its customers. Now, Telefónica's successor, O2 Czech Republic with PFF as a majority stockholder, no longer owns customers or networks connected to Interhome.

Today, Nordic Telecome is one of the most actively consolidating operators, which together with the investment company, DRFG, acquired twenty-two providers and by 1th January 2019 merged nine under the Libli brand. In total it has more than 100 000 customers and a plan to provide approximately 330 000 customers with internet access (Sedlák 2019). Nordic Telecom is also a company that bought a large part of the 3,6 – 3,8 GHz frequency spectrum at the 2017 auction (with a total of 80 MHz spectrum block in this band) and it plans to target areas where CETIN has not invested into internet acceleration yet and in fields where there is a free bandwidth(Wi-Fi) connection that is no longer able to cope with higher speeds. Particularly in places where there is a high level of interference due to more local providers such as Polabí. In addition, the company intends to use its fixed customer base as a springboard for potential mobile services if it participates in the 700 MHz and 3,4-3,6 GHz frequency bands auction which the CTO will launch at the end of this year and if it succeeds.

Another large entity consolidating regional and local internet service providers is Nej.tv belonging to the Kaprain Group of businessman Karel Pražák. Nej.tv is originally cable TV. In 2017, it acquired a relatively large regional operator Rio Media and smaller one KT Mimoň. At the end of 2017, it took over the subsidiary company Internethome from O2, and last year Telconet and Kyklop which operates in the north of Moravia. Nej.cz currently provides internet to approximately 250, 000 households.

Last year, energy company Innogy, which recently bought a majority stake in Magnalink which operates the metropolitan network in Hradec Králové as well as Helios MB and Cerberos which are all a part of the largest providers between Mladá Boleslav and Liberec, entered telecommunications.

In 2018, company PODA also reported a significant acquisition. PODA, which is another operator from Nordic Telecom, have 3,7 GHz frequencies and try to offer a fixed, high-speed wireless connection on them. PODA purchased COMA, which provided the network under the Unet brand mainly in the east of the Czech Republic. It currently serves with its connection approximately one hundred thousand customers. PODA has been active in acquisitions of

smaller operators for a long time. Another major player on the market is Starnet, which in 2018 absorbed about ten smaller local providers.

At the same time, market fragmentation can be demonstrated on these major acquisitions as the combined market share of Nej.tv, Nordic Telecom / Libli and PODA is, according to the CTO's annual report, below 10% (ČTÚ, 2019, p. 32).

Entry of mobile operators and new technologies

Mobile operators also entered the market in 2017 in large numbers, when they began offering fixed-line connection via the LTE mobile network. Due to the overcapacity in many of their base stations, they can offer a fixed connection to households to compete with local Wi-Fi operators or xDSL especially where this connection has not been accelerated yet. The main advantage is the possibility to offer a fixed connection to almost any household in the Czech Republic. CTO states in its latest annual report, that an estimated 323 thousand subscribers use the fixed LTE service, which is 9,2% of subscribers (ČTÚ 2018, p. 30). In addition, mobile operators are able to offer bundles of mobile calling service, mobile internet, television and fixed internet service for a reduced price, which is a complication for smaller local and regional operators in terms of competitive struggle. Given the relatively restrictive wholesale prices set by the network mobile operators, they cannot simply replicate the offer of mobile operators. After all, as CTO stated in its preliminary analysis of the wholesale mobile data market, "virtual operators (despite a significant number of them) do not have an influence to favourably influence the price level for the benefit of customers, especially for mobile tariffs with high data volumes." (ČTÚ 2019, p. 38).

Network mobile operators thus use fixed LTE as an acquisition marketing offer and are able to offer it at a high discount. This has also contributed to a sharp increase in the share of this type of connection. It is possible to assume a strong input of operators who bought or will buy in the next auction frequencies in the band 3,4 to 3,8 GHz. This bandwidth is ideal for providing fixed wireless internet (FWA). A pair of new operators (Nordic Telecom and PODA) have already begun with it. Due to the fact that it is a licences band, it offers more stable speeds and immunity to unwanted interference. This is a problem especially in places where there are relatively more providers and at the same time, a strong infrastructure for signal propagation.

Another technology, that has a chance to turn the market in the future, is releasing the 60 GHz license-free band. According to the general authorization it has been forbidden to use this zone for permanent outdoor connections so far and its use is possible only inside buildings. In many countries of the world however, this band has been already released and often used. The band is ideal for point-to-point connections, is resistant to interference, and it offers a link at relatively small distances built on very fast speeds 60 GHz band (over long distances there is a major disadvantage of this frequency, thus high attenuation due to resonance with oxygen molecules). Due to the fact that the band is often used outside the Czech Republic, there are already entire infrastructures based around it and connections are very affordable. These are qualities mainly appreciated by the regional operators.

Conclusion and policy recommendations

- The Czech Republic is unique in the EU due to the amount of local and regional operators.
- These small and medium-sized businesses often build internet connections on the most modern technologies. According to regulator data, it is local providers that overwhelmingly distribute optical connections to the house or apartment.
- Companies are neither indebted nor subsidized. They often provide internet access in regions that large firms have not wanted to go at all until recently.
- The state should treat them as "a national wealth" – in the vast majority of cases, these are Czech companies with Czech owners and set in the Czech Republic, paying taxes in the Czech Republic and reinvesting large parts of profits throughout the regions.
- What is bothering them are unclear building regulations and bureaucracy and, above all, easement prices.
- A major obstacle in construction is the absence of a database of investment plans financed from public funds (whether the state or local governments from regions to municipalities). The rapid construction can be achieved by coordination of buildings, even in places where it would not be otherwise economically rational.
- The state should expeditiously look for a solution at least to the issue of the prices of servitudes (easements) applied to operators by organizational units of the state and the state corporations (Railway Infrastructure Administration, Roads and Motorways Directorate, State Representation for Property Affairs).
- It is also desirable to initiate steps towards solving the problems of associations and their business or no business in the telecommunication market. While lots of associations are genuine "neighbourhood networks", many of them has thousands of members and are far more about entrepreneurship than associational activity, but with different conditions than ordinary electronic communications entrepreneurs have.

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