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PART 4/6

COMMISSION STAFF WORKING DOCUMENT

Digital Economy and Society Index (DESI) 2020

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Digital Economy and Society Index (DESI) 2020

Telecom country chapters

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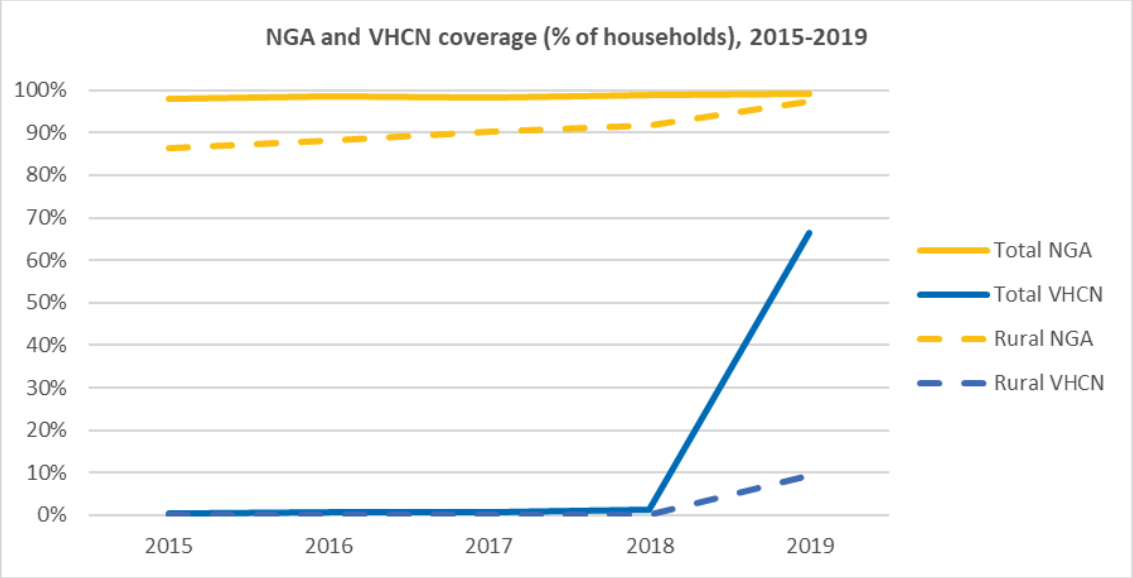
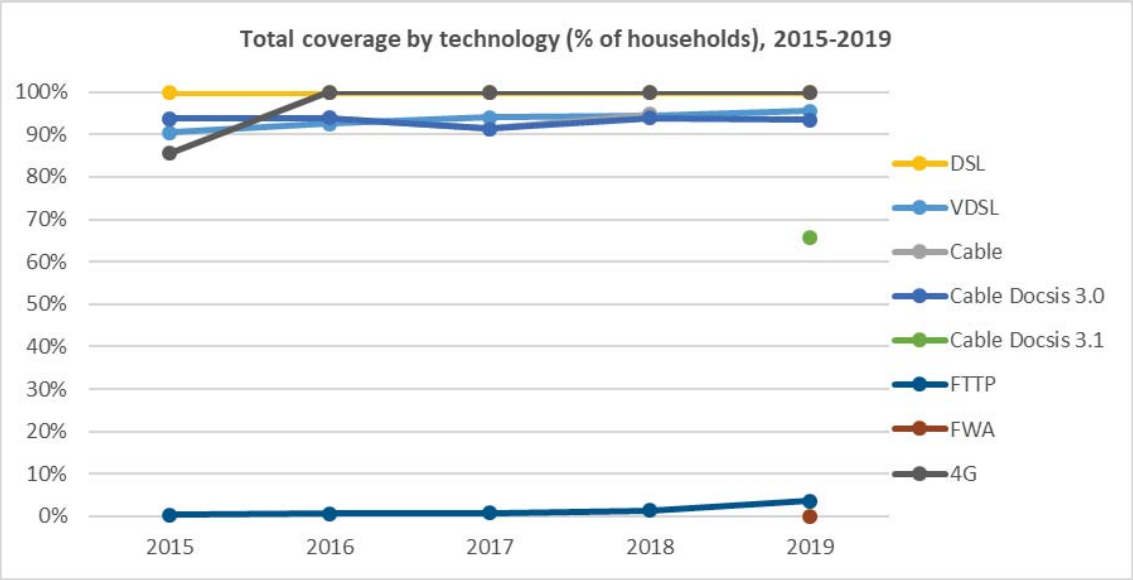
Belgium



Source: IHS and Point Topic, Broadband coverage in Europe studies.



Source: IHS and Point Topic, Broadband coverage in Europe studies.

Belgium has a wide availability of legacy networks and has shown progress in achieving the Gigabit Society objectives, gaining ten places in the connectivity ranking thanks to the upgrading of its cable networks. More specifically, it has very good coverage of very high-speed digital subscriber line (VDSL) (96% total and 59% rural for 2019) and Cable DOCSIS 3.0 networks (93% total and 46% rural for 2019), significantly above the EU average in all these categories. Cable network operators have started upgrading to the new DOCSIS 3.1 protocol, which now covers 66% of households (19% in rural areas). In 2019, only 4% of households were covered with FTTP, exclusively in urban areas, far behind the EU average for FTTP coverage in total (34%) and in rural areas (18%). This is despite Belgium ranking 6th for broadband take-up of at least 100 Mbps (45% of households against 26% at EU level), which shows that demand is following.

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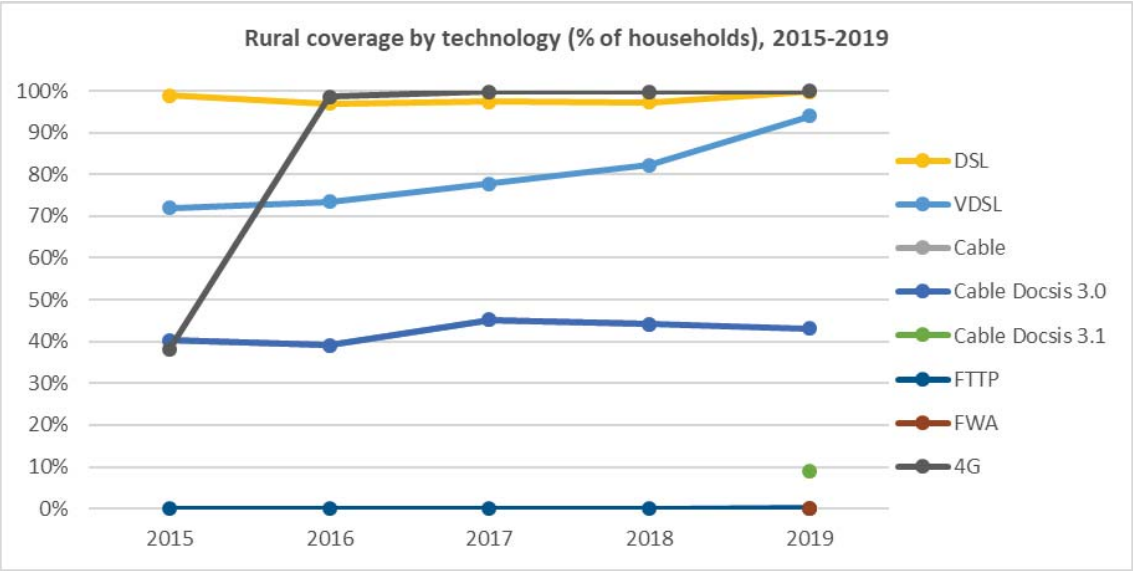
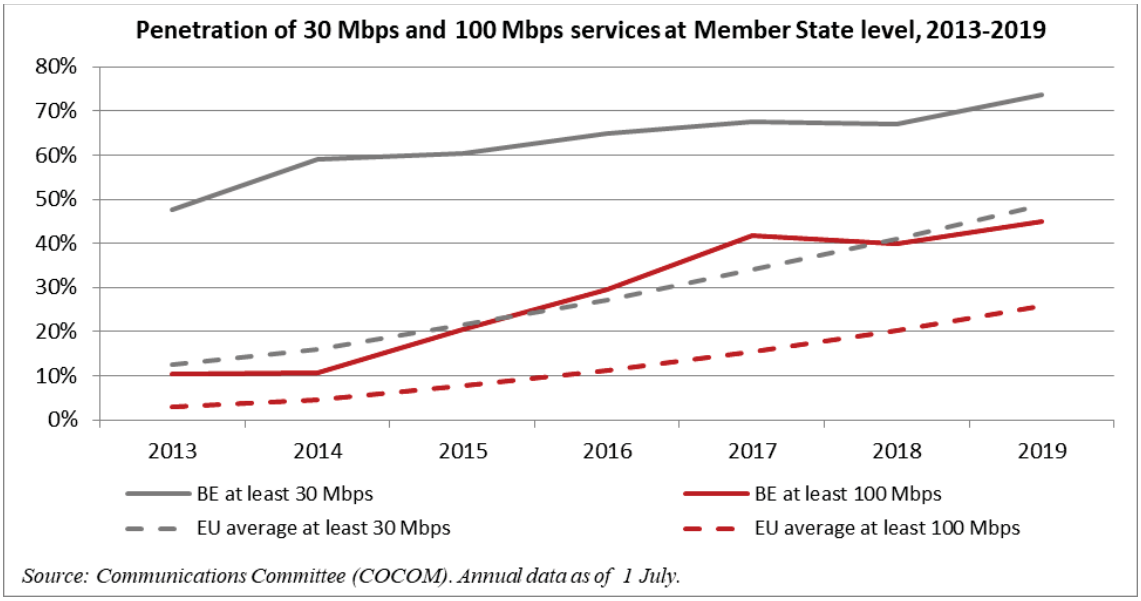


Source: IHS and Point Topic, Broadband coverage in Europe studies.

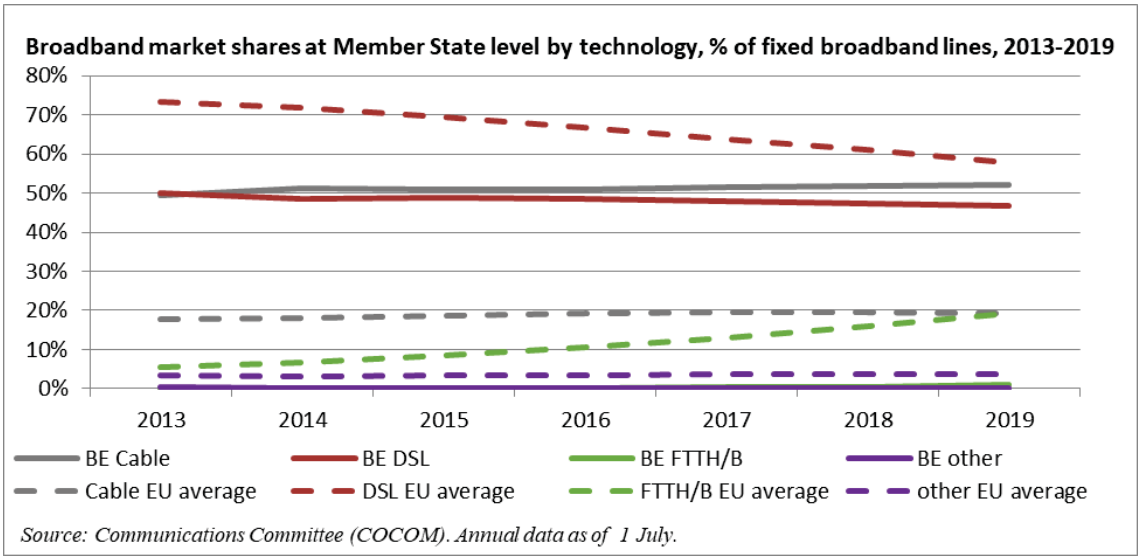
Average 4G coverage is almost everywhere thanks to the investments by the country's operators to significantly reduce the number of municipalities with significantly worse 4G coverage (from 39 to 18). Despite good coverage, take-up of mobile broadband is very low, with Belgium ranking only 26th[1].

Belgium increased its rate of penetration for broadband offers of at least 30 Mbps and at least 30 Mbps and of at least 100 Mbps reaching 73% (increase of 6 pps) and 45% (increase of 5 pps) respectively and outperforming the EU averages of 48% and 25%.

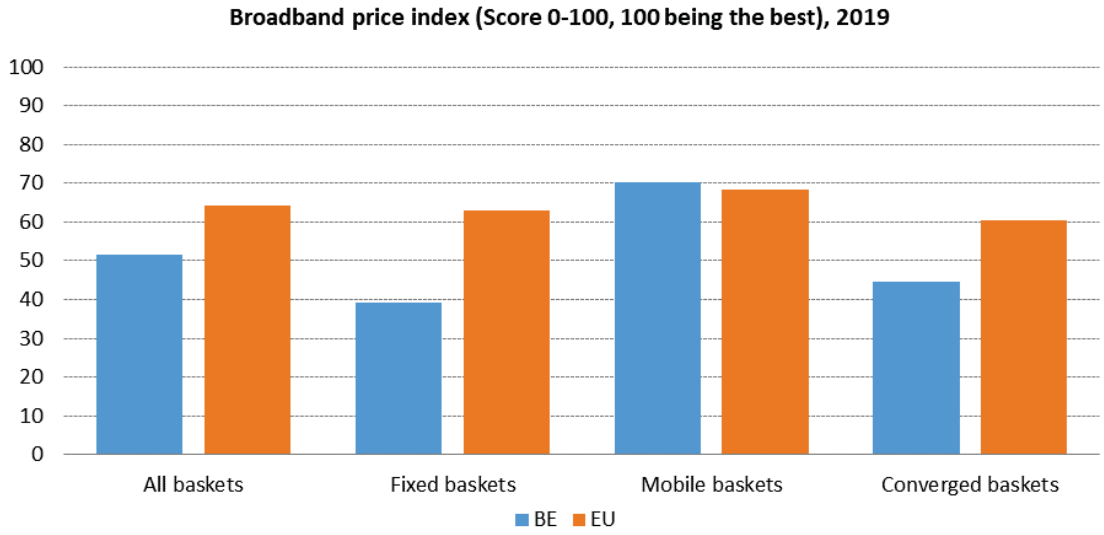


The Belgian broadband retail market remains dominated by cable (52 %) and DSL (46%). The gap between the EU average of 19% and Belgium in FTTH penetration continues to grow as it only reached 1%.

[1] The figure for take-up of mobile broadband is according to the BIPT underestimated because 2 full MVNOs did not provide data before the end of 2019. When counted, mobile BB penetration increases from 79% to 87.5% (end of 2019).



Belgium continues to be among the most expensive markets in the EU for broadband prices, ranking 23rd. Fixed broadband prices in Belgium are significantly higher than the EU average, by almost 38%. For converged baskets, the difference is less prominent than for fixed. The prices of mobile baskets are slightly lower than in the rest of the EU.



Source: Commission services based on Empirica (Retail broadband price studies).

1. Progress towards a Gigabit Society[2]

To ensure a 4G and LTE Advanced roll-out throughout Belgium and to facilitate a proactive 5G roll-out, the country's national broadband plan 'Digital Belgium – Plan for Ultrafast Internet in Belgium 2015-2020' aims to provide speeds of up to 1 Gbps to half the country by 2020. Belgium currently has a good chance of achieving these targets, although some white areas remain. Nonetheless, the main challenge remains fostering Gigabit network deployment, especially in rural areas, and the timely deployment of 5G.

[2] It is noted that statements regarding planned or potential State aid measures record intentions declared by Member States and do not pre-judge or pre-empt the assessment of such measures by the Commission under the relevant state aid rules. The DESI report is not meant to provide any assessment of the compliance of such measures with state aid rules and procedures.

At the moment, private investment is the only source of support for achieving the plan's objectives, as there is no public funding. At the end of March 2020, the copper incumbent announced that it would accelerate its fibre roll-out with the aim of connecting 2.4 million homes to fibre by 2025. Some alternative business operators plan to expand their own fibre networks in business zoning areas[3]. The utility company Fluvius has started the roll-out of an open access fiber-optic network, for use by alternative operators. However, at this stage only a number of small-scale pilot projects in 14 city centres[4] have been completed. It is too early to assess the impact of this initiative on the market.

In September 2019, Telenet commercially launched 1 Gbps offers throughout Flanders and Brussels (available to more than 3 million households and businesses). Cable operators are planning to upgrade to DOCSIS 3.1 in 2020. In April 2020, the copper incumbent followed these offers by launching a 1 Gbps commercial offer for buildings already connected to the FTTH network.

The Belgian authorities anticipate delays in the deployment of 5G due to delays in the authorisation of the 5G pioneer bands. In February 2020, BIPT announced it was contemplating granting, as a temporary solution, provisional licences for the total of 200 MHz of available spectrum in the 3600-3800 MHz band, which would be valid until the auction. At the end of March 2020, BIPT opened a public consultation for awarding provisional rights of use for 5 eligible operators[5].

Moreover, with the current EMF limits, it would be impossible to use the 5G pioneer band frequencies in the Brussels area. The situation is considerably better in Flanders and Wallonia, where relevant secondary legislation would still have to be adapted before the current sites could be upgraded to 5G.

The long delayed transposition of the Cost Reduction Directive (Directive 2014/61/EU) was completed in 2019, with the adoption by the Brussels Region of an Ordinance[6] on access to and exchange of information on underground cables and on underground pipes and pipelines. In the meantime, the Court of Justice ordered Belgium to pay a penalty of €530,000, which corresponds to the period of non-conformity. In practice, however, the Cost Reduction Directive did not have an impact in Belgium. Nevertheless, telecommunication providers have concluded access and/or cooperation agreements with utilities providers on a commercial basis: Fluvius opened its pilot deployments to cooperation with telecom operators. Disagreement over who controls the infrastructure appears to be an obstacle for further cooperation.

2. Market developments

The Belgian market is characterised by the high take-up of bundles, although some change has been noticed in their composition. While some operators are continuing with 'bundle upselling' practices, others are focusing more on affordable unlimited standalone broadband products[7]. This, together

[3] Fluvius (utility company) started the roll-out of an open fibre-optic network, but now only a number of small-scale pilot projects are provided, and they are limited to city centres.
[4] Genk, Diksmuide Hasselt, Antwerp, Charleroi, Ghent, Liège, Namur, Brussels, Roeselare, Leuven, Aalst, Vilvoorde, Knokke.
[5] https://www.ibpt.be/public/files/fr/23078/Consultation_droits_utilisations_provisoires_5G.pdf
[6] MNE(2019)55906) amending the Ordinance of 26 July 2013. In Belgium, the matters covered by Directive 2014/61/EU fall mostly within the competence of the federated regional authorities. Although the dispute settlement body was subject to a cooperation agreement between the regions, each region nonetheless has its own single information point, as does the federal state.
[7] According to the BIPT, Belgium is, together with Iceland, the only country in Europe that still commercialises fixed products that are limited in terms of data allowance.

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with the introduction of app-based TV through mobile internet and the increased usage of OTTs, has driven the increase in mobile data usage.

The territorial duopolies of 'Proximus – Telenet' on the one hand and 'Proximus – VOO' on the other are still dominating the fixed market, in spite of the successful entry of Orange BE[8]. The future telecom market structure in Wallonia remains uncertain, as Orange and Telenet have taken legal action to annul the recent sale of Voo to the international fund Providence; the matter is therefore still pending. In the business segment, Proximus continued to dominate the market in 2019, although Telenet increased its share by 1.5 pps.

In the mobile market, there was 0.3% growth in active SIM Cards as of the end of 2019. The growth is stimulated by the MNOs (up 0.5%) and full MVNOs (up 2.4%).

Between 2012 and 2019, the total number of voice calls (in minutes) initiated from fixed accesses decreased at a compounded annual growth rate (CAGR) of 10.6%, while it increased from mobile accesses (CAGR of 2.8% over the same period).

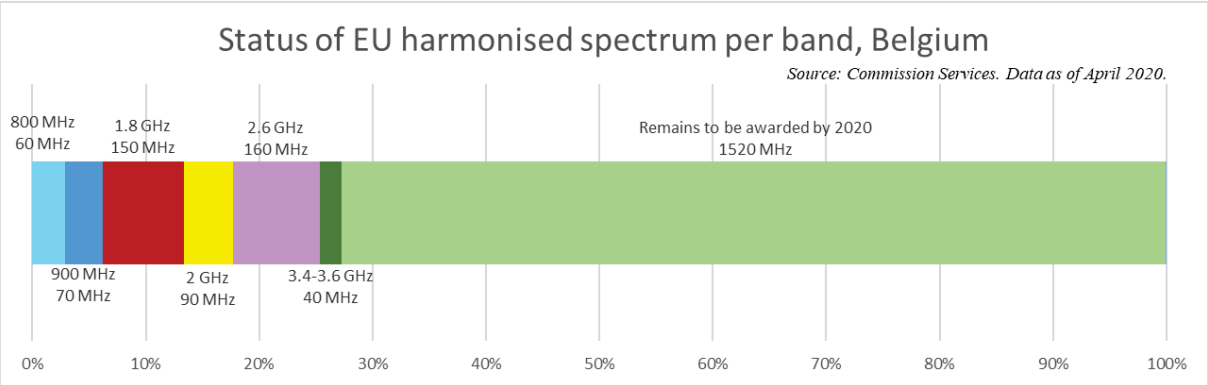
The growth of average monthly mobile data consumption continues, stimulated by the introduction of unlimited subscriptions, new zero-rating offers and roam like at home[9].

On the take-up of TV/content, BIPT has identified a shift from a 'per channel' to a 'per theme' approach. In the regulator's view, operators are evolving towards 'one-stop' providers of access to content. According to market research carried out for BIPT, including TV/content in a bundle ensures higher income per user.

3. Regulatory developments

Given the absence of a regular government at federal level (caretaker government in place), it is highly likely risk that Belgium will not be able to transpose in time the European Electronic Communications Code. At technical level, a draft law amending the current Electronic Communications Act was submitted for public consultation between 6 December 2019 and 17 February 2020[10].

3.1. Spectrum assignment



[8] Orange Belgium makes full use of the regulated cable access offering. The LOVE Trio (3PBB+TV+MT,fixed telephony is optional) and LOVE Duo (2PBB+MT) convergent customer base increased to 258k customers at the end of Q4 2019. LOVE Duo was launched in July to attract 'cable cutters'.

[9] + 692 megabytes to 1.86 gigabytes/month. In 2018, approximately 6,087 exabytes were used via the fixed broadband internet connections of the five largest operators: Proximus (including Scarlet), Telenet, Orange, Brutélé and Nethys. This amounts to an average of 114.35 gigabytes per fixed broadband line per month.

[10] https://www.bipt.be/operators/publication/consultation-on-the-first-draft-act-transposing-the-european-electronic-communications-code-and-amending-various-provisions-on-electronic-communications.

Belgium has assigned 570 MHz, which is 27% of the spectrum harmonised at EU level for wireless broadband. This is below the EU average of 39%.

The timely deployment of 5G depends on the timely availability and assignment of 5G spectrum. However, the auctioning of the 5G pioneer bands is held back because of delays in reaching a political agreement between the federal state and the regions on how the proceeds from the auction will be divided up. Given that the 700 MHz band was previously used for TV broadcasting (regional power), and that broadband spectrum is more and more used for the transmission of content, the regions claim a bigger part of the proceeds. To facilitate the conclusion of an agreement, the BIPT launched a survey on the share of media data in mobile traffic[11]. Another reason the auction is being held up is the lack of consensus regarding the design and conditions of the auction, more specifically the conditions favouring entry.

Moreover, existing 2G and 3G licences in the 900, 1800 and 2100 MHz bands will expire in 2021. Belgium expects to auction this spectrum together with the 5G spectrum in 2020/2021. In case of delay, short extensions (6 months) are envisaged. 4G licences (800 MHz and 2600 MHz) can be extended by periods of 5 years, according to their terms of assignment.

In mid-March, BIPT launched a consultation on the designation of temporary 5G licenses (3600-3800 MHz) to 5 operators. At the end of March 2020, Proximus announced that it had launched 5G light (2100 MHz band) in 20 municipalities. On 20 February 2020, BIPT launched the procedure for granting rights of use for the remaining spectrum of 15 MHz duplex at 2.6 GHz. These usage rights are valid for 15 years, and can be extended for an additional period of 5 years. In the 26 GHz band, 1 GHz of spectrum is currently available. There appears to be little or no market demand for the time being.

3.2. Regulated access

In 2019, BIPT notified the Commission of its review of the market for wholesale high-quality access provided at a fixed location[12]. BIPT determined that the geographic market is national, as it considered that any existing differences (in particular between Flanders, Wallonia and the Brussels region) are insufficient to justify the geographic segmentation of the market; yet the differences are taken into account when imposing the remedies.

In its draft measure, BIPT found that Proximus had significant market power and proposed to impose upon this operator access and price control obligations in particular. However, BIPT proposed not to impose price control remedies in those parts of the country where there is sufficient presence of three fibre networks. The Commission[13] noted that a relatively high level of infrastructure competition exists in certain areas of the country, in particular in the urban areas of Brussels, Antwerp and Ghent. Following the Commission's comment, BIPT amended its final measure[14] in order to ensure that the list of areas subject to lighter regulation will be updated on a regular basis.

Regarding numbering regulation, BIPT adopted a decision on extending the supply of 0800-numbers and made efforts to mitigate fraud and misuse of telephone numbers (e.g. spoofing). BIPT noted the increasing demand for a flexible use of numbering resources (e.g. IMSI for specialised networks).

In 2019, BIPT and the media regulators also continued their work on implementing the decision

[11] Communication of 18 April 2020.
[12] Market 4 in Commission Recommendation 2014/710/EU of 9 October 2014.
[13] Case BE/2019/2208.
[14] Adopted on 13 December 2019.

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adopted in 2018 to carry out an analysis of the fixed wholesale local and central access market[15]. In particular, it consulted the stakeholders on the BULRIC model to be used to determine the wholesale access prices for the cable networks. The draft decision on the monthly rental fees for wholesale access was notified to the Commission on 6 April 2020.

4. End-user matters

a. Complaints

In 2019 (up to and including 22 October), the Office of the Telecommunications Ombudsman received 9,464 requests for mediation with telecom operators and 3,613 requests for identification of suspected malicious call offenders. The complaints were primarily about invoicing, contractual matters, and failures and malfunctions. But there were also complaints about disputes over telecom connections and complaints about number porting, telecom operators' custom services and (lack of) security. In only a few cases were there complaints about NI-ICS and OTTs.

b. Open Internet

The BIPT launched certain projects on measuring the quality of the experience of the internet access service, such as through the use of a crowdsourcing application and drive tests carried out with measuring vehicles[16].

BIPT intervened in two cases of zero-rating involving Proximus. More specifically, it required the zero-rated platform used by Proximus for their EPIC offers to be opened to all content and application providers (CAPs), and ordered Proximus to develop the general terms and conditions of access to this platform and to publish an online application form.

c. Roaming

BIPT held discussions with an operator on calculating the Fair Use Policy limits; the operator agreed to adapt its FUP following BIPT's proposal.

d. Emergency communications – 112

The Belgian authorities plan to have in place a centralised public safety answering point (PSAP) architecture by the end of 2020. The system will push the network-based location information to all PSAPs. Until the new system is fully implemented, the regions of Antwerp, Limburg, Liège and Hainaut will benefit from a pull system. Apart from network-based location, handset-based Advanced Mobile Location is available to all Belgian PSAPs. Disabled end-users can access emergency services through text messages (SMSs) or the Belgian emergency application.

e. Universal service

There have been no changes since January 2019. On the geographical component, the bit rate for functional internet access is still set at a minimum of 1Mbps per day – no provider designated; on payphones, the universal directory enquiry service and the provision of the universal directory, there has been no obligation to provide universal services since 2013.

Broadband falls within the scope of the universal services obligation: the bitrate for functional internet is set at a minimum of 1Mbps per day. The BIPT coverage map (situation on September

[15] Notified to the Commission and assessed under cases BE/2018/2073-2074-2075.
[16] Annual report on net neutrality monitoring in Belgium (1 May 2018 - 30 April 2019).

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2019) shows that 99.9% of the country's dwellings have access to fixed broadband at a speed of a minimum 1 Mbps.

On social tariffs for fixed telephony and fixed internet, there has not been any change yet. Beneficiaries are low-income consumers who have a disability, low-income elderly consumers, very low-income consumers, the hearing impaired, people who have undergone a laryngectomy, the war-blinded military. The number of beneficiaries (September 2019) totalled approximately 230,000. There has been no change in the amount charged: a single discount on the installation fee (50% of the standard price) + monthly discounts on the subscription fee (€3.1) and communications (40% up to a maximum of €8.4).

5. Other issues

On must-carry obligations, the federal state (BIPT) only has jurisdiction in the Brussels area. The current must-carry obligations have been imposed by the Brussels Media Act of 5 May 2017. Their first review is scheduled in 2022.

6. Conclusion

Belgium has incurred significant delay in deploying future-proof digital infrastructure to meet the 2025 Gigabit Society targets. While existing legacy networks continue to be upgraded, with this upgrading expected to ensure that VHCN networks become available in urban areas, fibre deployment is lagging behind. Moreover, the assignment of the 5G pioneer bands and, subsequently, the 5G roll-out are being delayed due to complex political circumstances. The timely deployment of 5G depends on reaching a political agreement between the federal state and the regions. The multiband auction was initially planned for 2019, but the legal framework has still not been adopted yet, and existing 2G and 3G licences expire in 2021. Reaching such an agreement is crucial in preventing Belgium from lagging behind in 5G deployment. Providing regulated access to fixed networks on terms that enable sustainable competition should also be conducive to greater competition on the mobile side and could be beneficial for the Belgian market.

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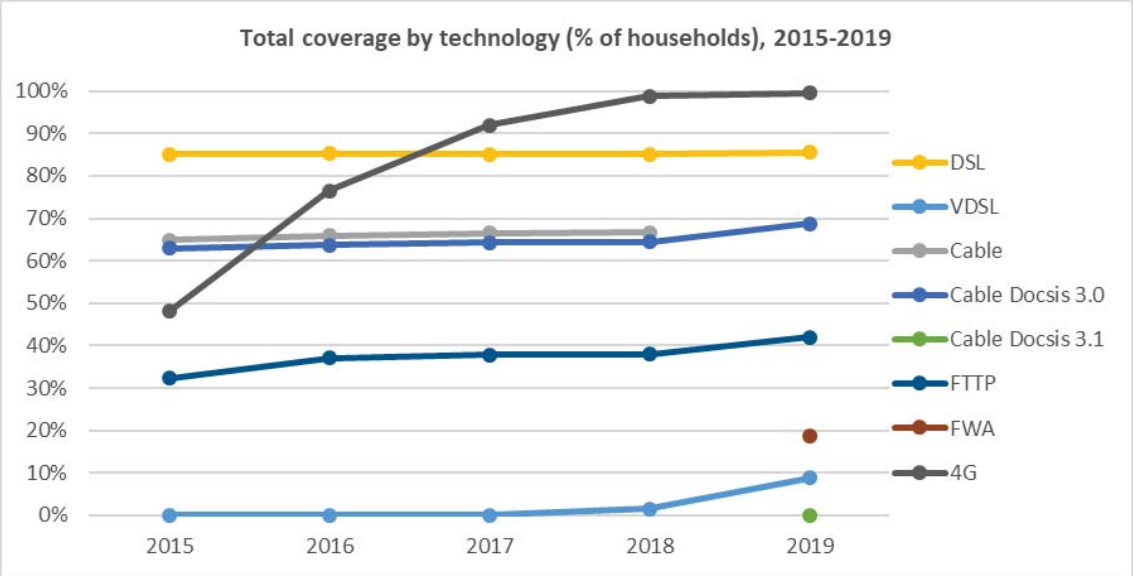
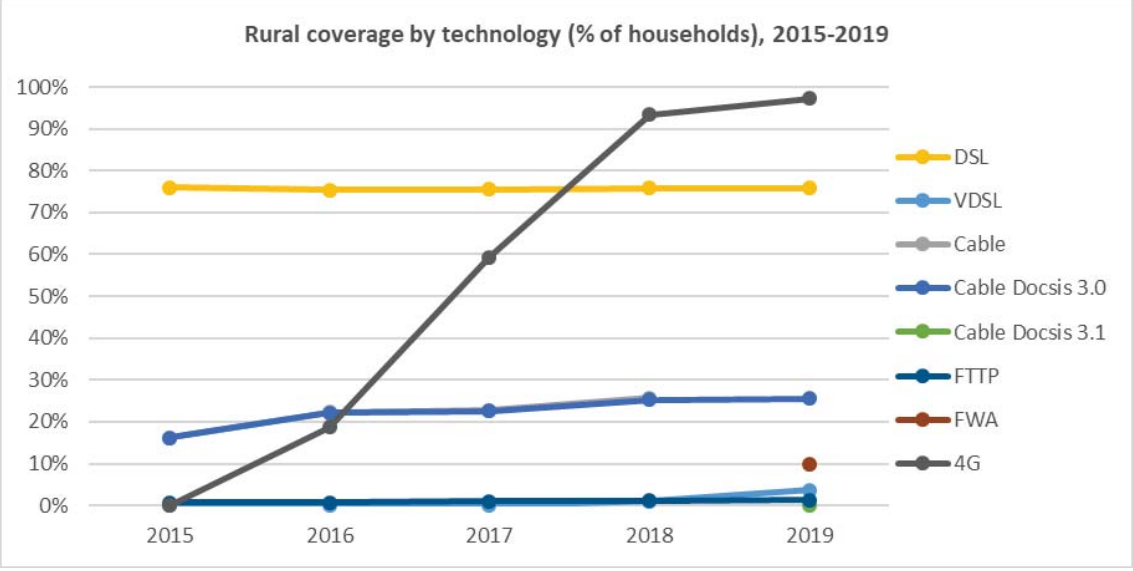
Bulgaria

Bulgaria's 30 Mbps broadband coverage (NGA) (75% in 2018) and VHCN coverage (38% in 2018) have shown very little improvement since 2014. In 2019 NGA coverage increased 2 percentage points (pps) to 77% and VHCN coverage increased 4 pps to 42%, but they are still below the EU average (respectively 86% and 46%). The situation in rural areas is less satisfactory: only 1% of rural households have the benefit of VHCN technology — well below the EU average (20%). FTTP increased to 42% but is still at a standstill in rural areas, where it reaches only 1% of households, which is significantly below the EU average (18%). In 2019, FWA reached 19% in total and 10% in rural areas. The footprint of cable networks has been relatively stable for the last 5 years.





Source IHS and Point Topic, Broadband coverage in Europe studies

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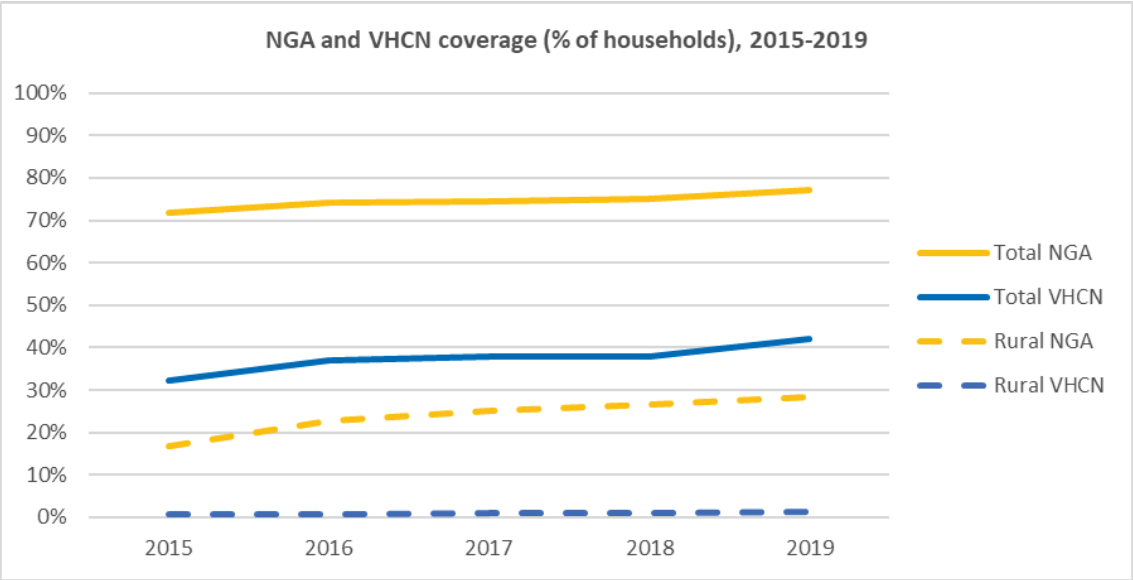
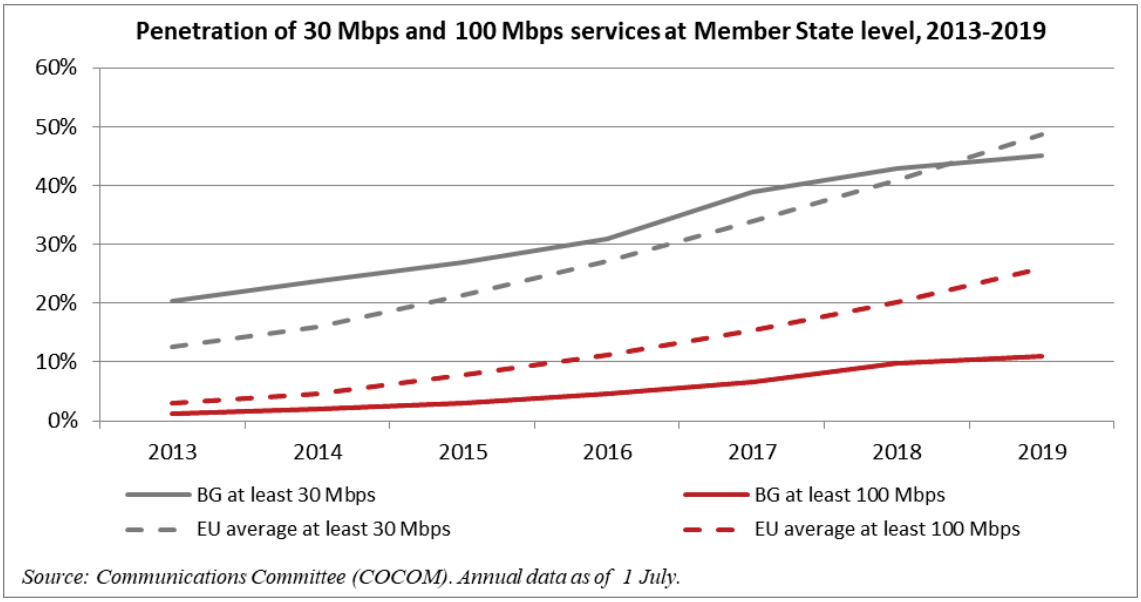


Source IHS and Point Topic, Broadband coverage in Europe studies

Total VDSL coverage increased by 8 pps to 9%, which is still significantly below the EU average of 59%. However, Bulgaria performs particularly well on aggregate 4G coverage[17], matching the EU average both overall and in rural areas (respectively 99% and 97%).



Regardless of the relatively good availability of networks, Bulgaria ranks bottom in the EU in overall broadband take-up with only 58% households subscribing to some form of fixed broadband. While it shows some limited progress in terms of 30 Mbps and 100 Mbps services uptake, this is still slower than the EU average. On 30 Mbps broadband penetration, Bulgaria, at 45.1%, remains 3.6 pps below the EU average (48.7%). Despite a good coverage with very-high capacity networks, take-up has not followed: it is 11% against an EU average of 25.9%. In mobile broadband the situation is far better,

[17] The 4G coverage indicator used in the country chapters differs from the DESI indicator for 4G coverage. The former is an aggregate indicator, i.e. measures the coverage of all operators together. The latter is an average indicator, i.e. the sum of all coverages divided by the number of operators. Because of this difference, the two indicators may produce different results.

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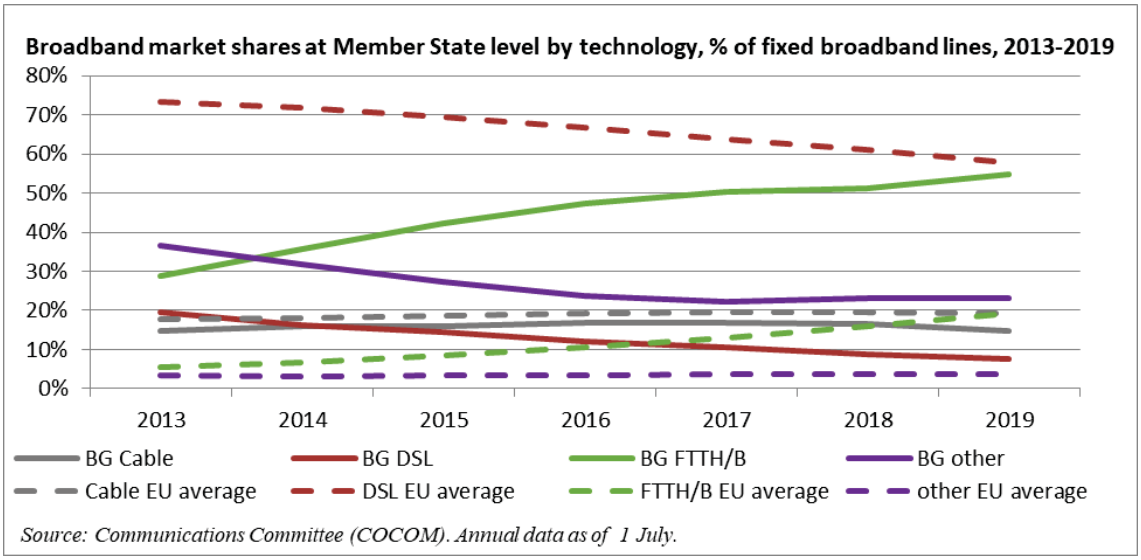
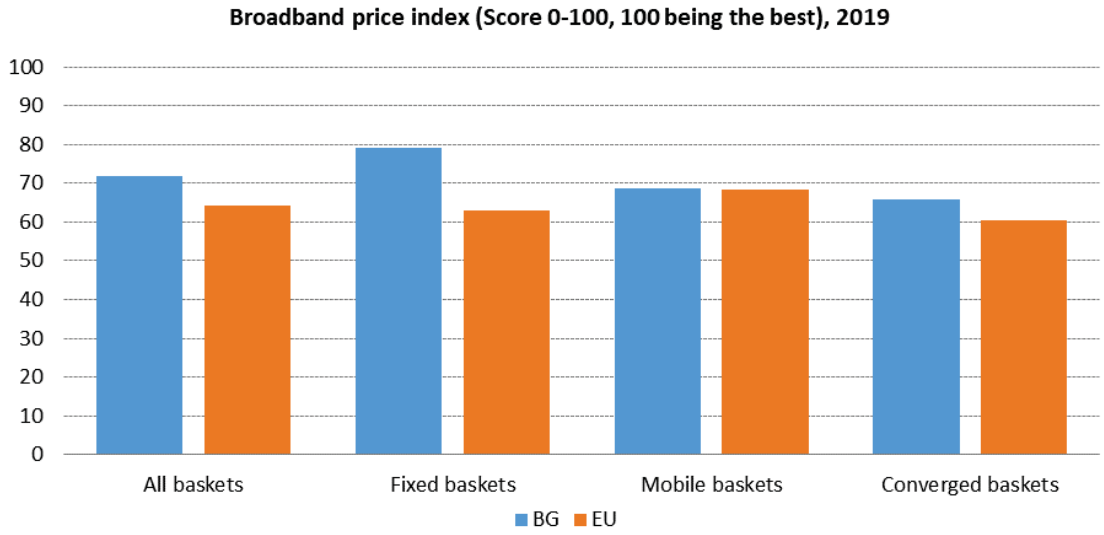
with a high take-up steadily increasing from 87 subscriptions per 100 people in 2017, to 98 in 2018 and 103 subscriptions per 100 people in 2019. This places Bulgaria slightly above the EU average.

Bulgaria shows progress and remains considerably above the EU average in terms of its share of FTTH/B (54.7% against 19.3%) and share of other technologies (23% against 3.8%). In contrast, cable's market share in Bulgaria shows a slight decline and is below the EU average by 4.4 pps. DSL shows a greater decline and stands at 7.6% against the EU average of 57.8%.





Source Commission services based on Empirica (Retail broadband prices studies)

With regard to prices (adjusted for purchasing power parity) in all the baskets, Bulgaria performs slightly better than the EU average. It boasts relatively low prices for fixed broadband compared with the EU average – its fixed broadband price index equals 79, against the EU average of 63. Additionally the converged price index (66) is lower that the EU average (60). However, the mobile price index (69) is similar to the EU average (68).

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1. Progress towards a Gigabit Society[18]

Even though Bulgaria does not seem to be close to reaching the 2020 targets due to poor high-speed network coverage in rural areas (missing 25% 100 Mbps coverage), it has delayed the adoption of its new broadband plan, which has still not been subject to public consultation.

Nevertheless, the development and deployment of high-speed networks is set as a priority in Bulgaria's National Development Programme (NDP) Bulgaria 2030[19] . In line with the national priorities set in the NDP, the new plan will focus on: deploying high-speed networks, especially broadband in rural areas; effective assignment of the spectrum for wireless broadband and 5G; accelerated development and take-up of BB-dependent services such as cloud, IoT, etc.; and the development of digital skills and services.

Bulgaria has also submitted for public consultation an overall strategic framework for digital transformation[20]. The document's first strategic goal is the deployment of secure digital infrastructure, including efficient use of spectrum. The new broadband plan is expected to elaborate on these documents and to be adopted in the first half of 2020.

As of September 2019, the National Broadband Plan (NBP) for 2014-2020 had an implementation rate of 60% of approximately €75,671,000. The Roadmap to the NBP includes measures for developing NGA infrastructure as well as increasing demand and attracting investment. Bulgaria aims to tackle the missing 25% of 100 Mbps coverage by 2023 with €30 million from the European Agricultural Fund for Rural Development (EARDF), attributed to the State eGovernment Agency. Bulgaria is considering a state-aid measure aiming to finalise its design by mid-2020.

In addition to this, a mapping project based on 30 Mbps coverage at municipality level was completed in 2019.

Large investments have been made in state-owned fibre backbone infrastructure. The over 7,000 km of backbone infrastructure is used by the state administration to provide reliable, innovative e-services. To promote and encourage the use of digital services nationwide, the Bulgarian authorities upgraded the state network by investing €5 million in 2019. They connected 50% of the municipalities to the state network. The Ministry of Education and Science further extended and integrated the unified backbone network for the needs of education and science by connecting it to the state network and subsidising internet access or building long-term optical connectivity to educational and scientific organisations. Since the end of 2019 all of the ministry's 28 regional departments (RED) and more than 3,000 schools are connected. The network has also been used to develop high quality wi-fi that can be used free of charge on school property. Commercial operators can also use part of the state network to offer connection in areas where there is lack of demand.

The information campaign of the Ministry of Transport, Information Technology and Communications to promote the aims and benefits of the WiFi4EU initiative and the possibilities of building free high-speed and high-quality wireless internet connection in public spaces was quite successful. It led to 227 municipalities (86 % of all municipalities in the country) winning a voucher.

Although the national Electronic Communication Networks and Physical Infrastructure Act (ECNPIA), which transposed the Broadband Cost Reduction Directive (BB CRD) into national law, entered into

[18] It is noted that statements regarding planned or potential State aid measures record intentions declared by Member States and do not pre-judge or pre-empt the assessment of such measures by the Commission under the relevant state aid rules. The DESI report is not meant to provide any assessment of the compliance of such measures with state aid rules and procedures.

[19] Vision, Goals and Priorities of the National Development Programme BULGARIA 2030

[20] Strategic Framework for Digital Transformation of Bulgaria

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force in March 2018, Bulgaria introduced a Single Information Point (SIP) only in 2019. Despite the efforts made to establish the SIP, the long and cumbersome permit-granting procedures appear to be an obstacle for operators. National authorities are currently working on simplifying the procedures for upgrading antennas to 5G.

Bulgaria has not assigned any spectrum for 5G purposes but has taken some steps to deploy spectrum in 2020. Previously one of the main obstacles to network deployment was the high annual spectrum use fees. In March 2020, the Council of Ministers approved revised spectrum fees with considerable reductions in various bands.

Bulgaria's strict EMF limits may pose obstacles for the roll-out of 5G. Currently the limits are 45-100 times lower than the EU Council Recommendation. The market does not expect that the Council Recommendation will be respected, due to a lack of political will.

Despite uncertainties regarding the 5G roll-out, three operators are already conducting successful 5G trials. CRC has granted three temporary licences for 5G testing in the 3.4-3.8 GHz band. In July 2019 A1 Bulgaria presented the country's first operational 5G network after receiving a testing licence within the pioneer band 3.4-3.8 GHz. In preparation for 5G roll-out, A1 upgraded its current network to 4.5G. Telenor successfully completed 5G tests in the health field. VIVACOM launched the VIVACOM TECH LAB and is planning to upgrade its current 4G base stations to make them 5G-ready.

2. Market developments

The Bulgarian market is characterised by a high number of market players (643 IAS providers, 5 mobile service providers, 24 fixed voice service providers, with 89 of the total 1120 registered providing bundles). The mobile providers A1, Telenor, BTC and Bulsatcom provide both mobile telephony and mobile data services, while Ti.Com provides mobile data services only.

In the mobile market, A1 has the largest market share by number of subscribers (38.8%), followed by Telenor (31.1%) and BTC (30.1%) while Bulsatcom has only0.03% and Ti.Com 0.02%.

Total mobile internet traffic increased a 53.8% in 2018. There is also significant increase in mobile voice traffic in roaming (reaching 51.4% in 2018).

The trends on the fixed voice market remain characterised by drops in the number of fixed telephone lines, in outgoing traffic and in total revenues.

The number of businesses providing fixed broadband access is increasing and has reached 643. As of July 2019 the incumbent BTC maintains its leading position in the fixed broadband access market with 27.6% of total subscribers. A1 has the second-highest market share at 26.4% and continues to grow.

The most popular bundle is double-play (89.9%); triple-play penetration decreased by 21.8%.

United Group BV (owned by BC Partners) agreed to acquire the incumbent BTC for a reported €1.2 billion. This is the second acquisition by United Group in this region in less than a year as it had previously acquired Tele2 Croatia last May. The acquisition is expected to close in the second quarter of 2020 following approval by the competent competition authority.

3. Regulatory developments

The CRC is working with the Ministry of Transport, Information Technology and Communications to transpose the EECC on time by amending the current national law. The draft law was published for public consultation for 45 days on April 1 2020.

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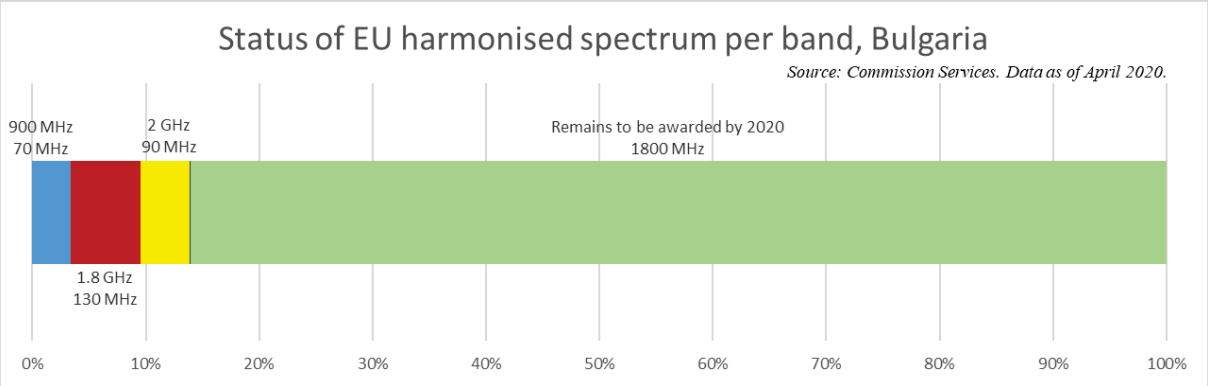
4. Spectrum assignment



Overall, Bulgaria has assigned only 14% of the spectrum for wireless broadband. Spectrum assignment has been challenging due to use by the military and aircraft communications of parts of the 700 MHz, 800 MHz and 3.4-3.8 GHz bands.

In particular, in the 3.4-3.8 GHz band, 30 MHz are used for national security purposes. Spectrum (2 x 45 MHz) is expected to be released (from civil aviation) to add to the 280 MHz already available. Parts of the 700 and 800 MHz bands are used for aircraft communication at four airports.

Only 2 x 20 MHz of the 700 MHz band will be released in June 2020 (40 MHz will remain unavailable, and 2 x5 MHz are destined for PPDR)). In the 800 MHz band, only 2x10 MHz are released.

Tests on sharing use of the 800 MHz band between the military and mobile providers are ongoing. The Ministry of Transport, Information Technology and Communications is optimistic that a feasible solution can be found similar to that for the 900 MHz band. Indeed, in the latter, the MNO BTC managed to ensure coexistence by using spectrum without harmful interference to ground-to-aircraft communication.

Nevertheless, Bulgaria is making preparatory steps to organise the 5G spectrum auctions. The National Plan for Radio Frequency Allocation was amended in 2019 in order to release radio spectrum in the 700 MHz and 26 GHz bands for 5G networks. This created the necessary conditions for the national regulatory authority, CRC, to plan and organise public consultations in advance of the competitive procedures for granting spectrum for 5G.

The first auction of available spectrum in the 2.6 GHz and 3.4-3.8 GHz bands was scheduled for the second quarter of2020. The auction of the 700 MHz band was also scheduled for the second quarter of 2020, while the auction for the 26 GHz band is scheduled for 2021. Consultation with stakeholders on their intentions for using radiofrequency spectrum in the 700 MHz, 2.6 GHz and 3.4-3.8 GHz bands is ongoing. When the consultation is completed additional information on the matter will be provided.

4.1. Regulated access (both asymmetric and symmetric)

In June 2019, CRC notified to the European Commission its third round of analysis of the wholesale market for local access at a fixed location[21]. CRC concluded that there is effective competition and that all remedies previously imposed should be withdrawn.

CRC set a transition period of 12 months from the publication of the general terms and access conditions, including prices on BTC's website. This was done to allow market participants to more

[21] Market 3a of Commission Recommendation 2014/710/EC of 9 October 2014 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation.

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easily adjust to the new conditions after the withdrawal of the obligations imposed on market 3a and, if necessary, to renegotiate their contractual relations in accordance with the ECNPIA.

In its notification, the CRC underlined the impact of the BB CRD on the deployment of high-speed electronic communications networks. According to the CRC, the national law transposing this Directive significantly reinforced its provisions by including obligations for access, non-discrimination, transparency — including the publication of a reference offer — and price control equivalent to a significant extent to the set of obligations imposed on BTC due to its SMP status. On price control, CRC noted in its notification that the law provides the criteria for the cost methodology in a way that ensures observance of the principles of transparency, non-discrimination and lack of anti-competitive cross-subsidisation. However, the methodology for the allocation of costs for determining the prices for providing access to and sharing of physical infrastructure under the ECNPIA was set out in an Annex to Ordinance No. 34 of 24.10.2018 issued by the Minister of Transport, Information Technology and Communications, and published in Official Gazette no. 92 of 6 November 2018. This is despite the CRC being the dispute resolution body under the national legislation transposing the CRD. Moreover, it appears that an external contractor was commissioned to develop this methodology without the involvement of the CRC.

CRC plans to notify the termination markets in 2020.

CRC heard two disputes between undertakings, over a) access to a mobile network by a new entrant mobile virtual operator and b) interconnection charges.

5. End-user matters

a. Complaints

There is a downward trend in consumer complaints in Bulgaria. CRC received 2,245 complaints concerning different end-user issues in 2019, against 2,935 in 2018. Among the most frequent complaints are billing and pricing, termination of contracts and roaming in border areas.

A consumer association filed complaints with the Consumer Protection Authority about ‘pre-ticked boxes’ in contracts which led to higher domestic than international prices, as well as about the practice of automatically prolonged contracts with non-transparent terms and conditions.

b. Open internet

Two mobile Bulgarian providers offer zero-rating services (music and video streaming), while several of the zero-rated offers previously present on the market have been withdrawn, according to the CRC. CRC is not aware of any specific reason for this change.

CRC adopted a ‘Position on the implementation of the requirements of Article 3 and Article 4 of Regulation (EU) 2015/2120’. This does not constitute a legally binding act and its purpose is to serve as guidance for IAS providers by providing examples and clarifications of certain definitions, such as temporary congestion.

c. Roaming

CRC did not find any cases of non-compliance with the RLAH rules in 2019.

d. Emergency communications – 112

In January 2019 an updated version of the web-based and mobile application providing access for persons with disabilities to the European emergency number 112 was deployed. They can access emergency services through Android, iOS and Windows applications.

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In 2019, the Ministry of Interior took measures to improve location accuracy. The 'National 112 System' Directorate is currently preparing documents for a public procurement to implement the handset-based Advanced Mobile Location.

6. Conclusion

Although Bulgaria has high overall broadband coverage, the country needs to take additional measures to increase demand and achieve the NBP's objectives on schedule, including deploying the funds earmarked for high-speed broadband deployment. Bulgaria would gain by making sure that all EU-harmonised spectrum, including the 5G pioneer bands, are made available promptly to all relevant market players on terms which incentivise achievement of the Gigabit Society goals. Although 5G tests and trials demonstrate commercial interest in investment, the lack of sufficient spectrum remains an obstacle to timely 5G deployment.

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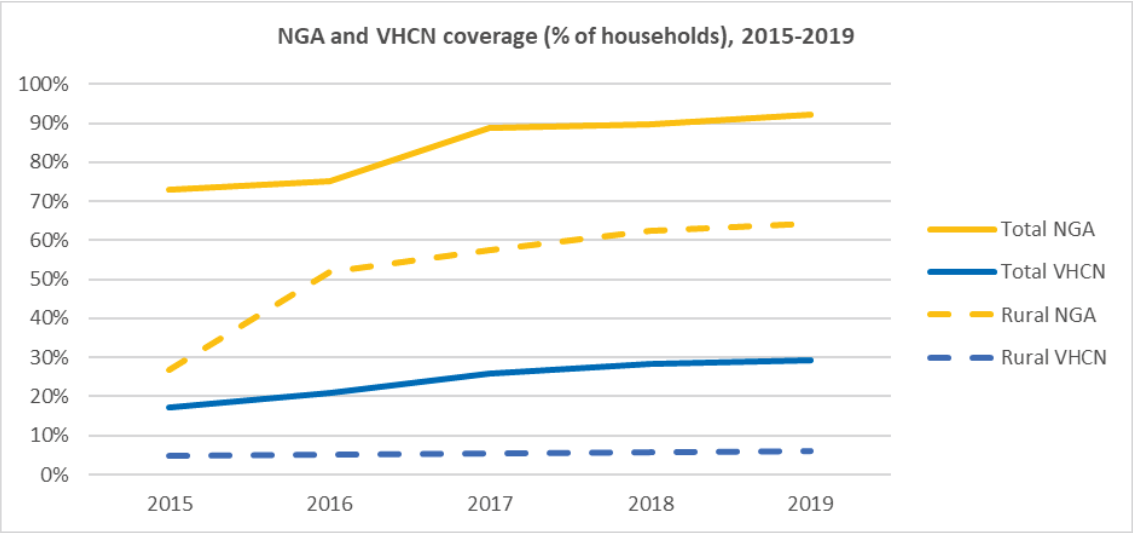
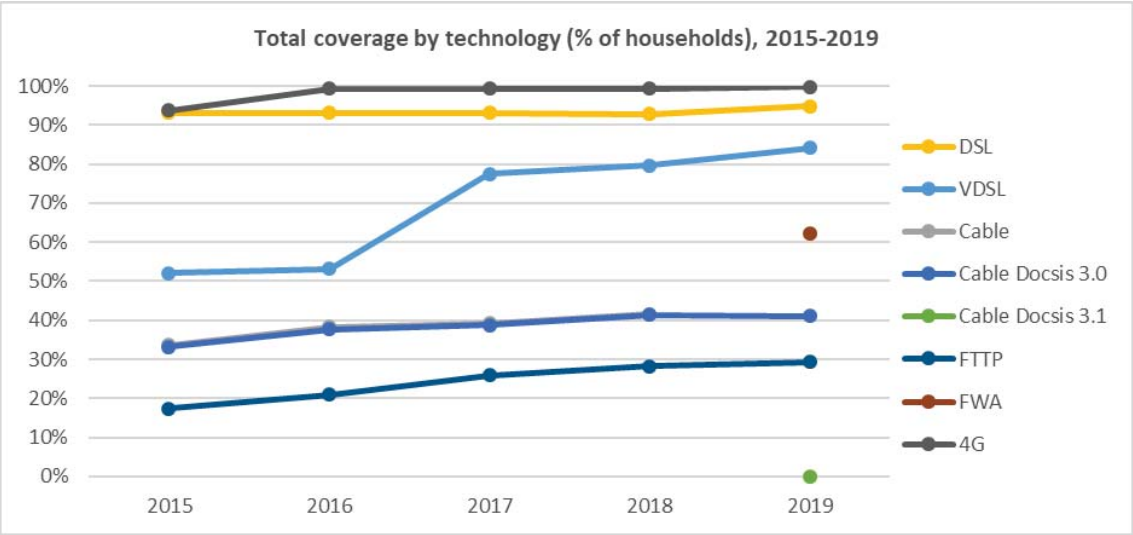


Czechia

Source IHS and Point Topic, Broadband coverage in Europe studies

Czechia lags behind the EU average in very high capacity network (VHCN) coverage (29% versus 44%), and is characterised by a strong urban/rural divide. It performs well on next generation access (NGA) coverage, ranking 11th in the EU on fast broadband NGA coverage. Its VDSL coverage (84% of all households) is significantly above the EU average (59%), while its FTTP coverage (29% of all households) is only slightly below the EU average (34%). Czechia's performance is equally strong for VDSL coverage in rural areas, as 60% of rural households have access to the technology compared to an EU average of 42%. Nevertheless, Czechia has more ground to gain in its FTTP coverage in rural areas, as only 6% of rural households have access to it, against the EU average of 18%.



Source IHS and Point Topic, Broadband coverage in Europe studies

The overall fixed broadband take-up in Czechia is below the EU average (74% versus 78%). However, Czechia has made some progress in broadband penetration with speeds of at least 30 Mbps since 2018, increasing by 4.3 percentage points to reach 41.1% of all households in 2019. It also improved

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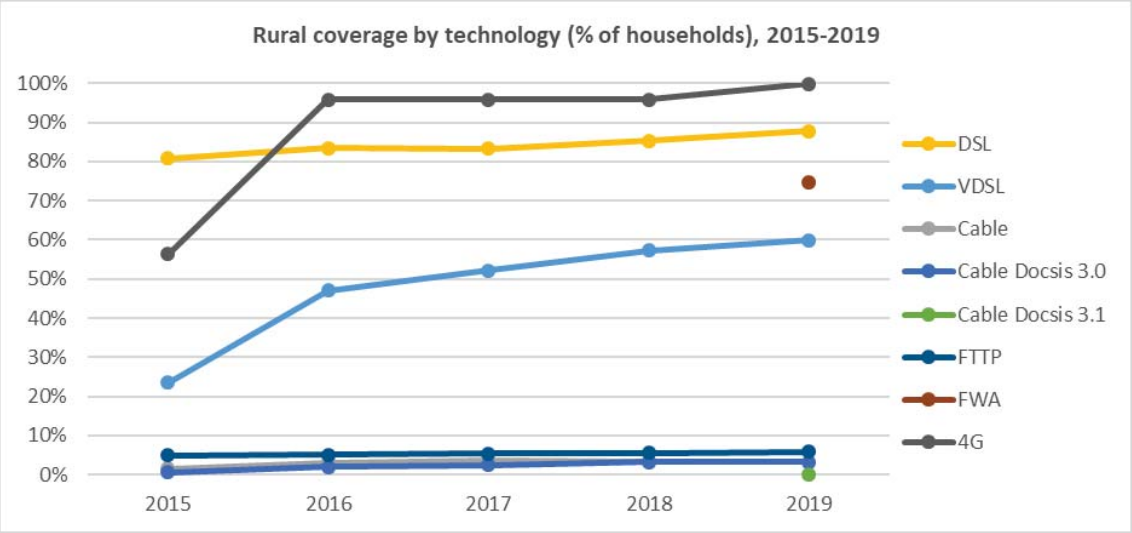
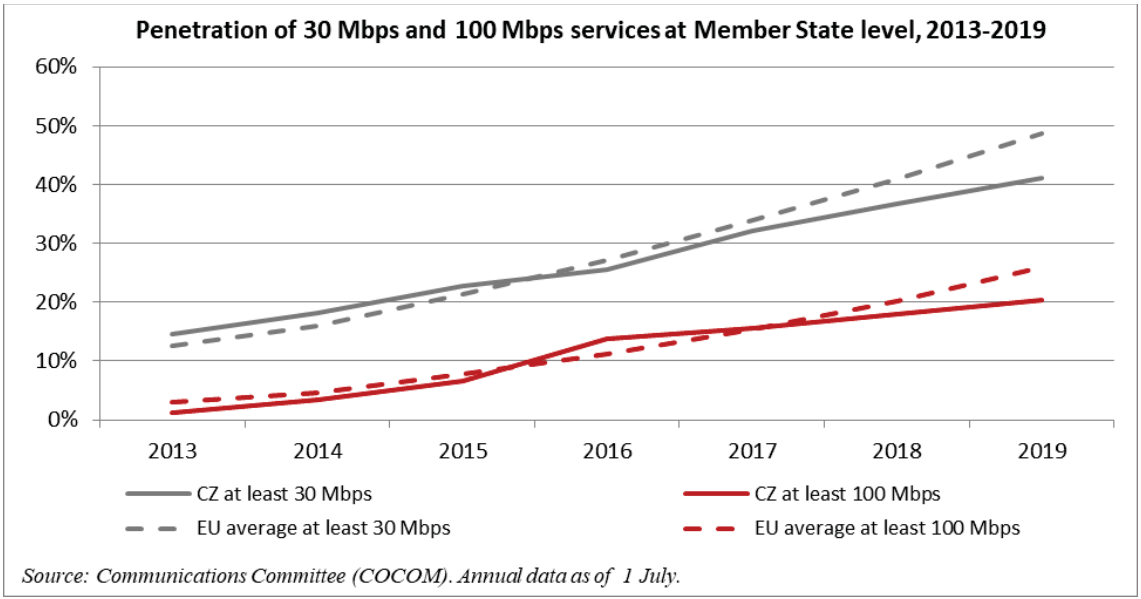
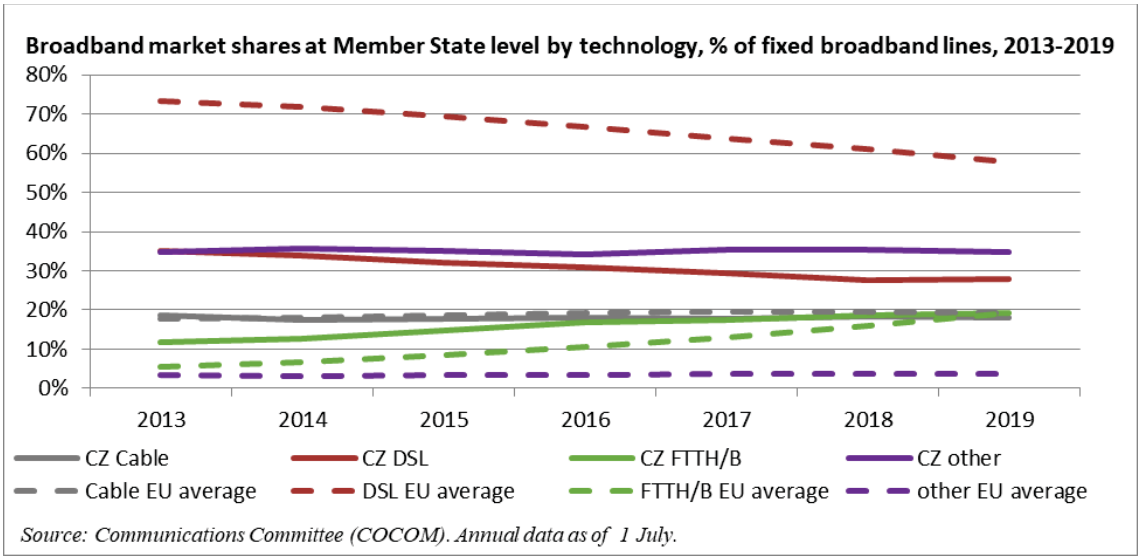
somewhat on broadband penetration with speeds of at least 100 Mbps, which reached 20.4% in 2019. Despite these advances, Czechia still falls short of the EU average on both indicators.

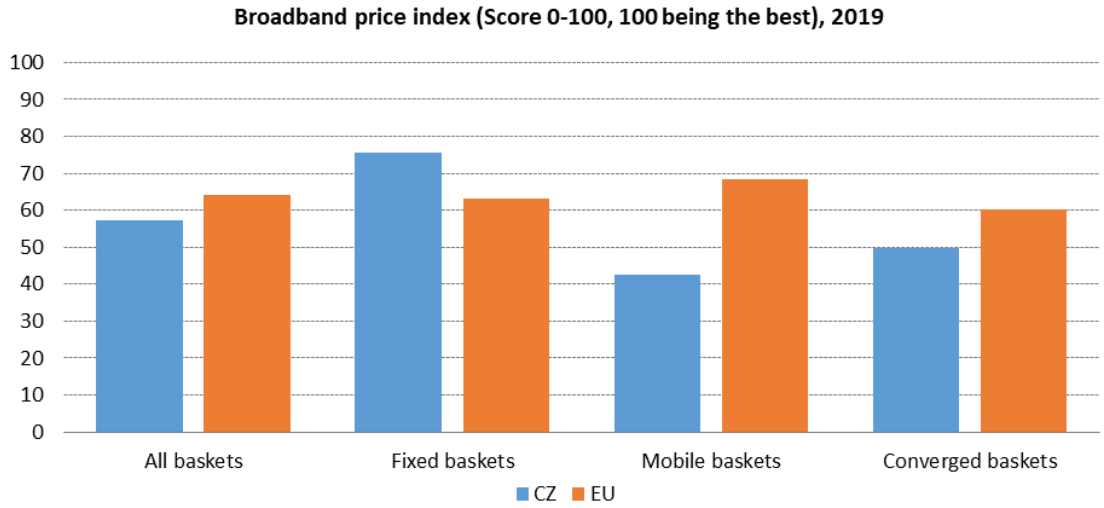


Source IHS and Point Topic, Broadband coverage in Europe studies





The shares of respective broadband technologies in Czechia have remained almost unchanged compared to 2018. Czechia relies heavily on other technologies (WiFi/FWA) for its connectivity needs – these technologies accounted for 34.9% of all broadband lines in the reporting period. DSL connections constituted 27.8% of all the lines, with cable accounting for 18% of all the connections. The share of fibre stands at 19.3%, which is the EU average for this type of technology[22].



Source Commission services based on Empirica (Retail broadband prices studies)

Retail prices for mobile baskets in Czechia are among the highest in Europe – the country's broadband price index in the mobile baskets segment is 43, compared to the EU average of 68. As an example, consumers can expect to pay €20.92 (adjusted for purchasing power parity) for the least expensive offer for 1GB mobile data with 30 minutes of calls, which is almost twice the EU average price. The prices in the converged baskets segment are equally high (index of 50, compared to the EU average of 60). At the same time, the fixed broadband price index (76) is above the EU average (64), meaning that customers can benefit from relatively low prices.

1. Progress towards a Gigabit Society[23]

In November 2019, Czechia adopted its action plan 2.0 on non-subsidy measures to help plan and construct electronic communications networks. The ultimate aim is to remove barriers to building and operating these networks. The two priority measures are: (i) to use newly established or significantly renovated line constructions[24] for building electronic communications networks; and (ii) to significantly reduce the cost of laying electronic communications infrastructure on land owned by the state or municipalities. The country also adopted a strategic document on the basis of which a new Broadband Competence Office Czech Republic (BCO) started to operate in February 2020. The Office has been tasked with coordinating and supporting the regions in developing VHCNs. Czechia also intends to adopt a new national plan for developing VHCNs, and studies are under way to inform the plan.

[22] Total fixed wireless access (FWA) coverage in the graph 'Total coverage by technology' declined significantly in 2019. This is mainly due to the change in methodology for the CTU's processing and reporting of data to IHS Market for the 'Broadband coverage in Europe' study. This decline of FWA coverage therefore most likely does not describe the real development in FWA coverage in Czechia.

[23] It is noted that statements regarding planned or potential State aid measures record intentions declared by Member States and do not pre-judge or pre-empt the assessment of such measures by the Commission under the relevant state aid rules. The DESI report is not meant to provide any assessment of the compliance of such measures with state aid rules and procedures.

[24] Line construction is understood as e.g. roads (including tunnels), railways, technical networks, etc.

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Public funding to support the objectives of the current national plan (e.g. increasing coverage of rural areas) is provided through the 2014-2020 Operational Programme Enterprise and Innovation for Competitiveness (OPEIC), especially through relevant calls (announced or planned). There have (up to March 2020) been two rounds of State aid calls, one in 2019 and one in March 2020. The 2nd call of the programme for high-speed internet, with a planned budget of €36 million, was published on 7 February 2019 specifically to increase the coverage of high-speed internet access. The 4th call, with a planned budget of €54 million and the same specific target, was published on 4 March 2020.

OPEIC support for broadband roll-out has been reduced from the initial budget of €521 million down to €281 million, owing to a reduction in the intervention areas (areas without NGA coverage) and lower operator demand for funding than initially expected.

The strategic document 'Implementation and Development of 5G Networks — Way to the Digital Economy' was approved by the Governmental Resolution No 35 of 13 January 2020. It sets out a national strategy of 5G deployment in the coming years.

Following the '5G for 5 Cities' contest supported by the Czech government, five Czech cities[25] were selected for the earliest 5G tests in the country. This contest aims to help create digital ecosystems to accelerate the development of 5G for 'smart cities'.

Czechia intends to build - together with Germany - a Prague-Munich 5G network corridor, for which it would like to benefit from financing from CEF 2 for 2021-2027.

The draft measure transposing the European Electronic Communications Code is currently undergoing inter-ministerial consultation. The Ministry expects to submit the draft to the government before the 2020 summer break and then to the Parliament after the summer break, with adoption and publication expected early 2021.

2. Market developments

The most significant market development was the acquisition of UPC by Vodafone in summer 2019. Through this acquisition, Vodafone strengthened its position in the fixed broadband market, gaining the means to become more competitive in providing combined services ('multiplay' bundles). The integration activities were initiated in August 2019: Vodafone became the second largest provider of fixed services in the corresponding market and remains the third largest provider in the mobile market. With UPC, Vodafone also gained a significant share of the cable TV market.

The PPF Group, the majority owner of the Czech fixed infrastructure incumbent CETIN and retail service provider O2 Czech Republic, signed a contract for the acquisition of Central European Media Enterprises (CME). CME operates TV channels in five European markets, the Czech market included. The acquisition has not yet been approved.

Another development in 2019 was the entry in the fixed access market of PODA and Nordic Telecom, which acquired rights of using the spectrum to provide fixed LTE-based services. The new players are expected to have an impact on the retail and wholesale fixed access service markets.

In October 2019, T-Mobile Czech Republic acquired a share of Planet A, which provides broadband access services under the brand 'AIM'. Planet A is a major retail provider of fibre broadband access services in Prague. This acquisition is part of T-Mobile Czech Republic's strategy to cover 1 million households by the end of 2025.

The Czech market awaits the follow-up to the Commission's investigation into the network sharing agreement between major Czech operators O2 Czech Republic/CETIN[26] and T-Mobile, which began

[25] These awarded cities were Bílina, Jeseník, Karlovy Vary, Plzeň and Ústí nad Labem.

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in October 2016. The Commission sent a statement of objections taking the preliminary view that their network sharing agreement would restrict competition, and therefore be in breach of EU antitrust rules. The network sharing cooperation between O2 Czech Republic /CETIN and T-Mobile began back in 2011 and has been increasing in scope. It currently covers all mobile technologies (2G, 3G and 4G) and the entire territory of Czechia except for Prague and Brno, thus covering around 85% of the population and serving approximately three quarters of retail subscribers.

There are 143 mobile virtual network operators (MVNOs) on the mobile services market, of which three are partially owned by mobile network operators (MNOs[27]). The trend in total MVNO market share is stagnant, and the negligible influence of MVNOs on the mobile market is evidenced by the fact that even the largest independent MVNO (SAZKA a.s) has a market share of only 1.3%. The Czech Telecommunication Office (CTU) data revealed that 95% of MVNOs were not able to increase their market share over 0.1%. MVNOs' customers are practically all residential ones, since they are unable to provide business customers with better retail offers than MNOs.

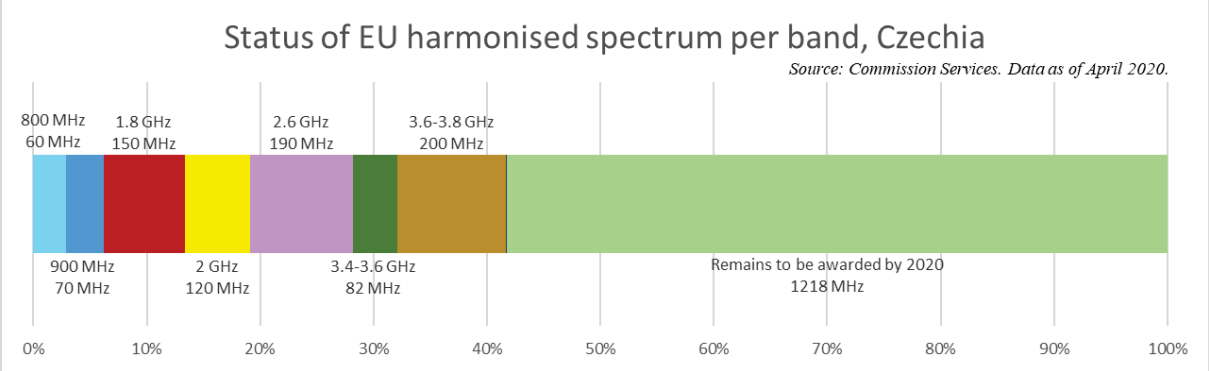
The level of mobile data prices remains a source of complaints by customers and politicians alike. Nevertheless, the mobile market saw a wave of products offering full flat tariffs, i.e. tariffs that contain unlimited voice calls, SMS and data. The tariffs are offered mainly by the MNOs, with the MVNOs not yet able to replicate those retail offers.

3. Regulatory developments

3.1. Spectrum assignment

In Czechia, 42% of the spectrum harmonised at EU level for wireless broadband has been assigned.

A public consultation on the upcoming 5G auction for the 700 MHz and 3.4-3.6 GHz bands ended in 2019, and in January 2020 the government approved a strategy for developing 5G networks[28]. In January 2020, however, the Czech government decided to take a different approach to the original auction design that the national regulatory authority (NRA) put forward for public consultation the



previous year. As a consequence, while the launch of the 5G auction is planned for 2020, it risks being delayed beyond 30 June 2020, which is the deadline for allowing the use of the 700 MHz

[26] O2 Czech Republic's mobile infrastructure and wholesale business were in the past transferred to CETIN, a network infrastructure company belonging to the same corporate group.
[27] O2 Family (100% stake of O2); Tesco Mobile (50% stake of O2) and Coop Mobil (33% stake of Vodafone).
[28] The 3.6 – 3.8 GHz band was awarded in 2017 with one operator acquiring a block of 80MHz. Three out of four operators who were successful in the recent auction started providing wireless broadband access services.

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band[29]. The public consultation on the auction design closed on 4 May 2020, and the authorities are analysing the comments.

The Commission approved in January 2020, under the EU State aid rules, a plan to compensate the direct costs incurred by digital terrestrial television (DTT) platform operators to migrate from the 694-790 MHz frequency band to lower frequencies.

3.2. Regulated access (both asymmetric and symmetric)

The NRA notified the market for wholesale access and call origination on public mobile telephone networks (ex-Market 15 of the 2003 Recommendation, i.e. a market which does not feature in a Commission Recommendation since 2007) (Case CZ/2019/2189) to the Commission. The NRA argued that the market was fulfilling the 'three criteria test', and thus being susceptible to ex ante regulation. While the analysis of the three criteria test is not in the scope of Article 7 (4) of the Framework Directive under the current regulatory framework and the Commission was therefore not empowered to raise serious doubts on the three criteria test, the Commission considered that the notified draft measure did not provide sufficient evidence that the three criteria are cumulatively met and that the market is susceptible to ex ante regulation.

CTU included the new market into its list of markets susceptible to ex ante regulation in December 2019. This market analysis is important to the ongoing discussion on potential new entry in the mobile market. CTU plans to finalise its SMP analysis of that market in the first half of 2021. In February 2020 CTU notified the European Commission of its proposed analysis of Market 1 (Wholesale call termination on individual public telephone networks provided at a fixed location) and Market 2 (Wholesale voice call termination on individual mobile networks) within the meaning of Commission Recommendation on relevant markets (2014/710/EU).

In Czechia, the most popular wholesale access is via bitstream. LLU uptake has significantly decreased over time. VULA access as well as dark fibre access have not been used yet. Ducts are not regulated under SMP regulation (only under cost reduction transposition measures).

4. End-user matters

In November 2019, an amendment to the Electronic Communications Act was adopted on contract termination and number portability. Under the new rules, if a fixed-term contract with a consumer or entrepreneur is terminated within 3 months, the amount due cannot exceed 5% of the total monthly payments for the agreed duration of the contract. Furthermore, the amount should be calculated on the basis of the actual monthly payments during the contract's term (i.e. including discounts), and not on any 'official' price list. As for the number portability process, it can now be performed by a receiving provider upon a subscriber's request, with a 'one-stop shop' procedure. Moreover, under the new rules there is a maximum notice period of 2 days as of the date of the notice of porting made by a receiving provider to a transferring provider. Both providers must ensure continuity of service. The new rules came into effect on 1 April 2020.

a. Complaints

Consumer complaints on electronic communications services fall within the competence of CTU only. Up to the end of September 2019, CTU registered 1,528 complaints from consumers and business customers, which is 59 fewer than in 2018. Most complaints were on contract terms and billing. There were no complaints on bundles.

[29] Article 1, Decision (EU) 2017/899 of 17 May 2017 on the use of the 470-790 MHz frequency band in the Union.

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b. Open Internet

In 2019, there were no major challenges in the implementation of EU Regulation 2015/2120. At the end of 2019, CTU initiated a discussion with operators on the definition of IAS speed specification (including quality parameters) to make such information more transparent and enforceable for end users. The self-regulation codex is expected to be issued in 2020.

Zero-rated services are currently offered in by Vodafone (Vodafone Pass). T-Mobile has withdrawn its zero-rated product service (StreamOn) and only provides it to customers who have used it in the past. Both operators declare that content providers have free non-discriminatory access to their platform (to be included in the zero-rated applications). No further services are currently offered as zero-rated by MNOs. The importance of these services is likely to decline further in connection with the availability of unlimited data tariffs and with increasing data volumes in tariffs.

c. Roaming

No cases of confirmed or potential non-compliance with the Roam Like at Home rules were identified in 2019. Neither were there cases of roaming retail derogations being granted.

d. Emergency communications – 112

The European Commission sent a letter of formal notice to Czechia on 26 July 2019 for incorrect application of Article 26(4) of the Universal Service Directive. The Commission has concerns that Czechia does not ensure that disabled people have the same access to emergency services as others.

Czechia is working on implementing advanced mobile location (AML).

e. Universal service

A public consultation was held on whether to introduce a mandatory partial service for people with special social needs, to give them access to special prices or pricing plans not available to other customers.

On 17 September 2019 CTU set the new list of public payphones to be included in the universal service for 2020.

On 26 November 2019 CTU launched a review of the reasons for providing the partial public payphone service or similar technical facilities that enable access to the publicly available telephone service.

5. Other issues

Mr Jaromír Novák resigned as Board Chairman of CTU on 27 January 2020, announcing his departure date as 31 January 2020. The Czech government subsequently dismissed Mr Novák and appointed Ms Hana Továrková as the new Board Chairwoman of CTU on the same day, i.e. on 27 January 2020.

6. Conclusion

Once adopted, the new national broadband plan for developing very high capacity networks is expected to introduce measures to accelerate the development of infrastructure, to target the persistently high number of white spots, and to address the country's still below average broadband penetration. The upcoming 5G spectrum auction is unlikely to be carried out on time, at least for the 700 MHz band (deadline: 30 June 2020). The recent resignation and subsequent dismissal of the head of CTU raises concerns about the Czech regulator's independence.

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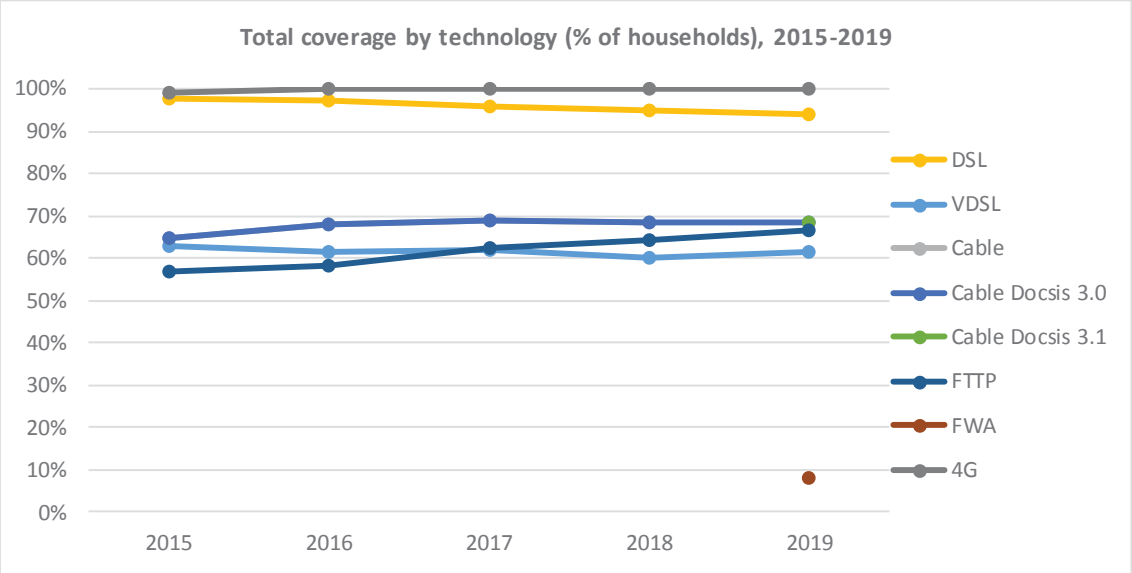
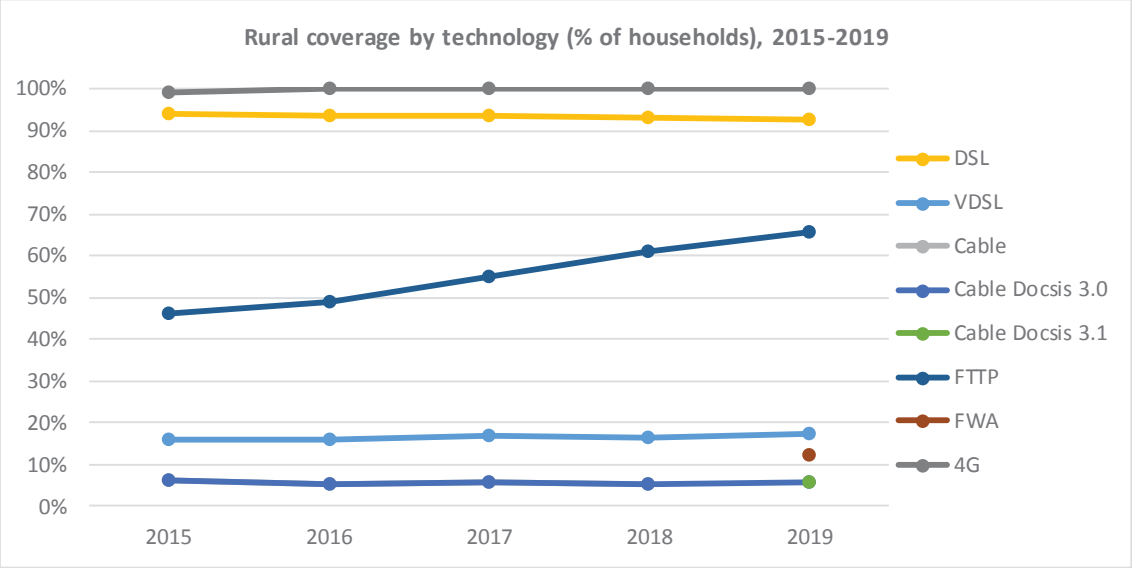
Denmark



Source IHS and Point Topic, Broadband coverage in Europe studies

Denmark has among the best 4G and digital subscriber line (DSL) total coverage in the EU, at 100% and 94% of households respectively. As fibre roll-out continues, fibre-to-the premises (FTTP) coverage has reached 67%.



Source IHS and Point Topic, Broadband coverage in Europe studies

Rural FTTP coverage has improved significantly, and with 66% coverage there is almost no difference with overall coverage. Also in DSL coverage, the difference between the total coverage of 94% and rural coverage of 92% is only very small. As coverage for both cable (6%) and very high speed digital subscriber line (17%) is low in rural areas, rural fibre roll-out will play a crucial role in closing the small remaining rural-urban divide.

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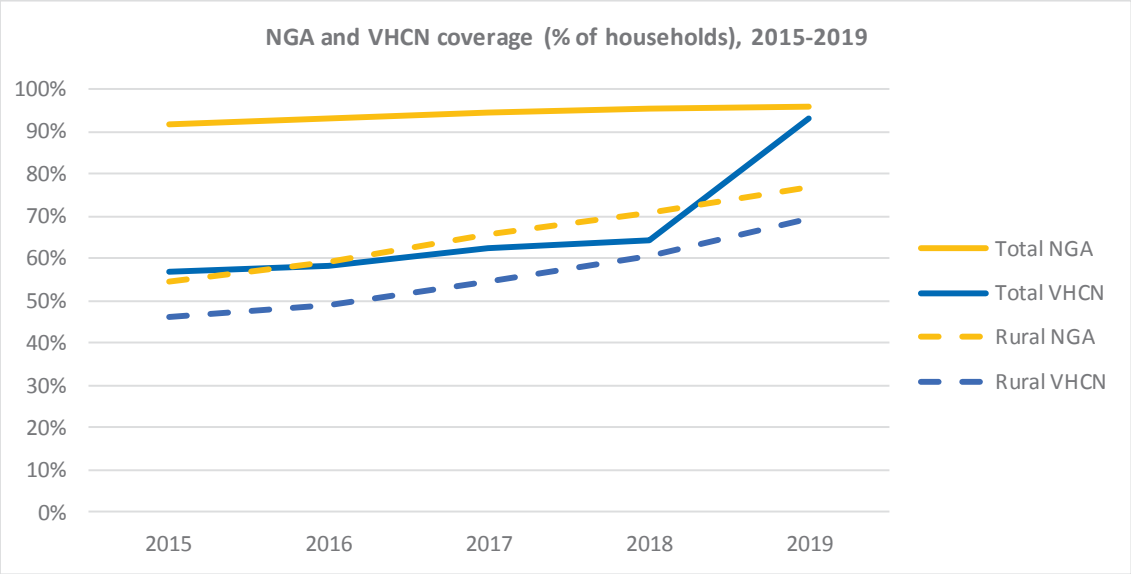
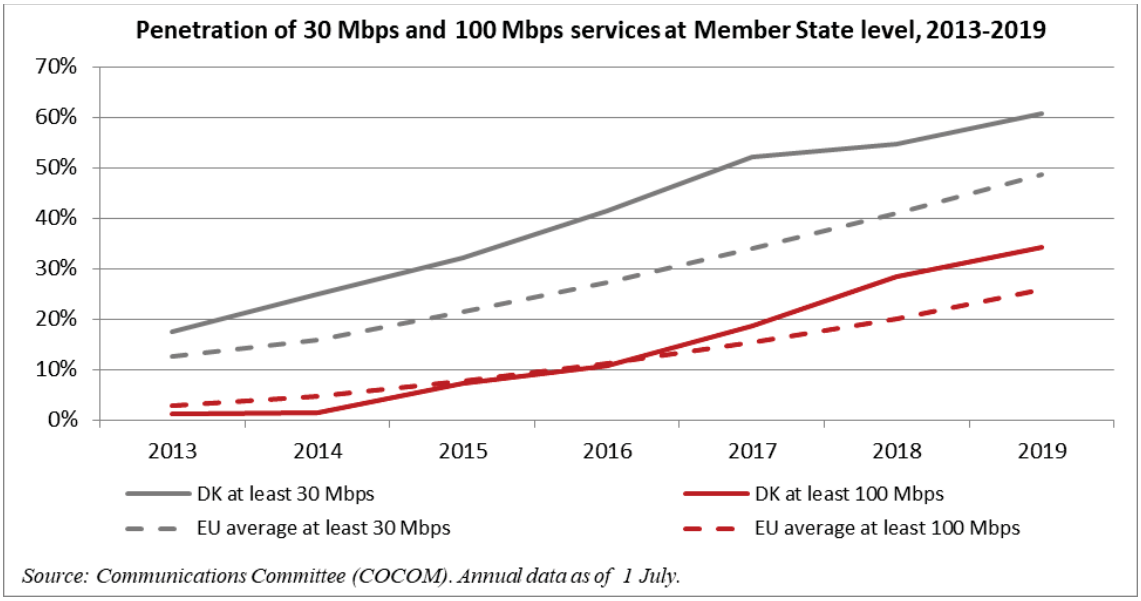
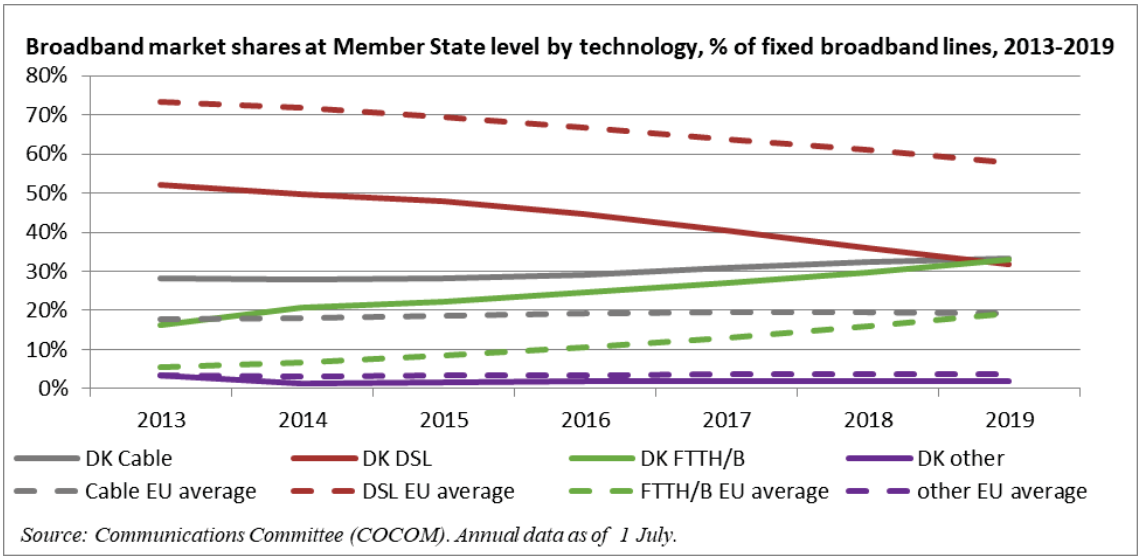


Source IHS and Point Topic, Broadband coverage in Europe studies

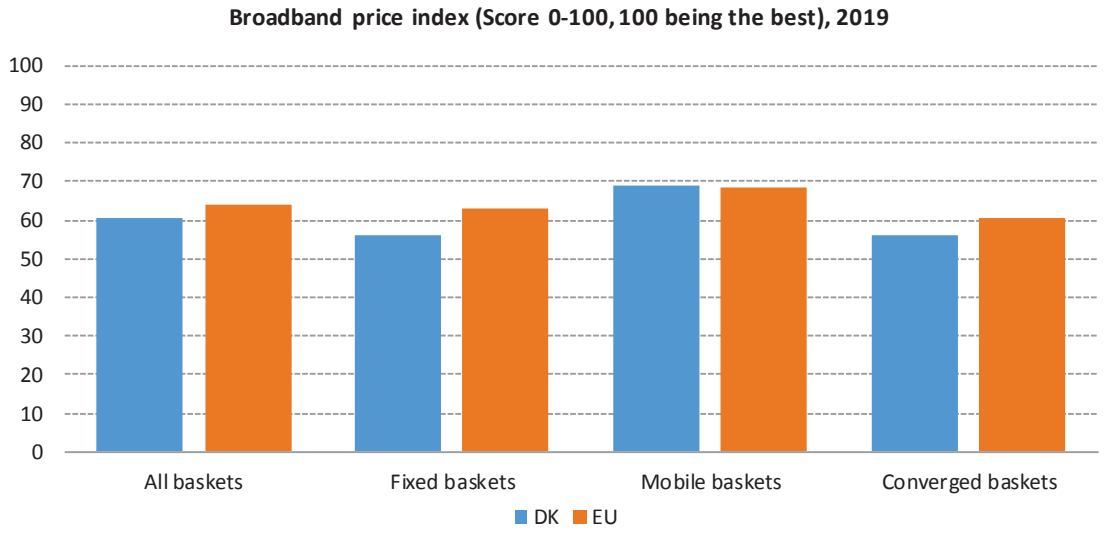
Total fast broadband next generation access (NGA) coverage is at a very high level (96% of households), compared to the EU average of 86%. Rural NGA coverage has continued to increase significantly, rising by 6 percentage points in 2019 to a level of 77%, significantly above the EU level of 59%. Fixed very high capacity network (VHCN) coverage - including FTTP and DOCSIS 3.1 - is also very high (93% total and 69% rural, compared with EU averages of 44% total and 20% rural). As VHCN figures for 2019 include DOCSIS 3.1 for the first time, they are not directly comparable to figures for previous years.



Broadband take-up for households at 1 July 2019, both for capacities of at least 30 Mbps and for capacities of at least 100 Mbps continues to increase and is well above the EU average (61% compared to an EU average of 49% for at least 30 Mbps; 34% versus an EU average of 26% for capacities of at least 100 Mbps). In 2019, there were 139 subscriptions to mobile broadband services per 100 people, against an EU average of 100. The high digitalisation of Danish society and the low price level are contributing factors to the high take-up of broadband. The main drivers of demand for high-speed access, including in rural areas, are video-based services and potentially in the future also smart society solutions, supported by facilities such as sensors.



In terms of broadband market shares, DSL, cable and fibre are now on a par, with both cable and fibre significantly above the EU average and DSL significantly below.



Source Commission services based on Empirica (Retail broadband prices studies)

Price index levels (taking account of purchasing power parity) for broadband access (both mobile and fixed) are (slightly) higher than the EU average, in particular for fixed baskets and for converged baskets. Converged baskets include fixed and mobile calls, fixed and mobile data and TV. Prices for mobile baskets are slightly below the EU average.

1. Progress towards a Gigabit Society[30]

The national broadband target for 2020 is for all households and businesses to have coverage with speeds of minimum 100 Mbps download / 30 Mbps upload. By 2019, this had been achieved for 93% of all households and businesses. Work on a new broadband strategy started in early 2020, and focusses mainly on rolling-out fast broadband to the remaining 7% of households and businesses and preparing Denmark for the internet services of the future. The investment climate in Denmark

[30] It is noted that statements regarding planned or potential State aid measures record intentions declared by Member States and do not pre-judge or pre-empt the assessment of such measures by the Commission under the relevant state aid rules. The DESI report is not meant to provide any assessment of the compliance of such measures with state aid rules and procedures.

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has improved, with actual investment both in fibre and 5G increasing and more being announced. Fibre roll-out by (regional) energy utilities (typically owned by their users) continues, with the aim of first connecting all co-owners and then entire regions. One consortium alone has announced investment of an additional DKK 4.6 billion (€0.62 billion) in fibre between 2019 and 2023. The incumbent telecoms operator, TDC Group, increased its investment budget in 2019 from DKK 3.5 billion to DKK 4.5 billion (€0.47 billion to €0.6 billion) and announced an ambitious investment programme for its network company (TDC NET) to connect one million addresses to fibre by 2025. The current roll-out of fibre and the roll-out plans of the utilities mean that there will be overlap, so a number of households will have the choice between different fibre infrastructures.

5G roll-out starts with installation of macro cells on existing sites, and will then be extended to 10-15% more sites. Small cell roll-out is not part of the current schedule. By the end of 2020 TDC NET is expected to have rolled out a nationwide 5G network.

In general, Denmark has a good coverage with high-speed broadband, also in rural areas. However, there are still white spots with poor coverage. Most of these white spots are in the rural areas.

The national regulatory authority responsible for this, the Danish Energy Agency (DEA) expects most postal addresses in Denmark to receive access to very high-speed broadband through commercial rollout. Some white spots (notably in rural areas) may remain, at least within the foreseeable future. The National Broadband Fund, which was established in 2016, and has been more strictly focussed on less populated areas since 2018, offers grants for rolling-out broadband with at least 100/30 Mbps in areas which only have access to maximum 10/2 Mbps. For 2019 the fund had a volume of DKK 100 million (€13.5 million). In 2020, the DEA is planning a state aid scheme, establishing a more concise framework for financial grants from municipalities to support the local roll-out of digital infrastructure.

As part of ensuring that only addresses with maximum 10/2 Mbps are funded the DEA collects information in order to provide very detailed mapping of broadband coverage (at postal address level). As collecting these data may require significant resources on the side of the operators, the DEA has introduced processes to reduce the data collections and thereby reducing the administrative burden that such a detailed mapping creates. Furthermore, some operators consider the open access requirements as an administrative burden preventing them from participating in funding projects, in particular where projects are small (50-100 addresses, or fewer). In the parts of Denmark covered by such operators it is therefore more difficult to use state aid to ensure coverage for white spots.

The DEA published the 5G action plan for Denmark in February 2019. It focuses on four topics (frequencies, roll-out, use cases and regulation) and presents a series of measures to increase demand for 5G, facilitate network roll-out and access to spectrum by 2020, and ensure that Denmark ranks amongst the countries that make the best use of 5G technology. A DEA workshop in October 2019 explored how companies can make use of 5G networks, focussing on concrete use cases. A similar workshop addressing the public sector is planned for 2020. Collaboration projects between industry, business organisations and the public sector aim at identifying and testing 5G use cases. This is in addition to TDC's and Telia's own tests and demonstrations. Trial spectrum licenses can now be obtained for 600 DKK (81 €) under criteria set out by DEA. A 5G award was presented on 23 October 2019 calling for projects and pioneering examples showing how 5G can help remove barriers in society, increase welfare and fight climate change.

TDC announced plans to roll out 5G nationwide by the end of 2020. Telenor and Telia have already activated several 5G sites.

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To enable further network roll-out, it is important for industry to have the necessary contracts with landowners for the use of existing and new sites, and the aim is to have contracts with full flexibility regarding technology. Using street furniture will also be important. Many Danish municipalities see 5G as an opportunity.

2. Market developments

In the course of 2019, TDC completed the separation (functionally and legally), into TDC NET and a retail company (Nuuday). Both companies are 100% owned by TDC group which handles some central activities including strategy, communication, HR, public affairs and legal affairs. The investors (50% Macquarie and 50% Danish pension funds) are interested in keeping the TDC NET, as its assets are considered to be long-term and low-risk. TDC's revenues are concentrated in retail, whereas investment is concentrated in the network. TDC still has the largest market share in fixed telephony (56%), mobile telephony (39%) and broadband connections (52%).

2.1. Fixed markets

A new operator, Fastspeed entered the Danish broadband market as a new service provider on TDC's coaxial network in May 2019 and reported 10,000 broadband customers in October 2019 and 20,000 in January 2020[31]. Two of the largest (energy) utility companies, South Energy and Eniig, have merged after receiving clearance from the Danish Competition Authority in June 2019. The merged company Norlys provides more than 40 % of Danish households with fibre or coaxial networks.

Norlys runs the wholesale platform OpenNet, on which a limited number of wholesale fibre access agreements are executed, including one giving TDC access to parts of Norlys' fibre network. Further agreements have been concluded on the platform but are not actively used so far. Market shares have not shown significant changes since last year except from Norlys now being the second biggest actor on the fixed broadband market with a market share of 19 % at the end of 2019. Fixed voice subscriptions (VoIP, PSTN and ISDN) continue to decrease. From mid 2018 to mid 2019 the number of fixed subscriptions fell by 11% to approx. 900,000. Fixed internet usage (up- and download) has increased from 2,968,000 Terabyte (TB) in the second half of 2018 to 3,580,588 TB in mid 2019 (plus 21%). It is 7.4 times higher than data traffic in mobile networks.

2.2. Mobile markets

According to the DEA, most mobile subscriptions are sold as bundles with call minutes, SMS, MMS and data allowances included in a single tariff. The wide range of different plans/bundles offered in the past has narrowed. According to the DEA, each operator typically offers three to six plans/bundles with different volumes and prices. Bundles including OTT services like film and music streaming services and bundles with unlimited minutes, SMS/MMS and data are still offered. OTT services generate significant traffic in the mobile networks. OTT services such as Netflix, Spotify, TV2 Play, Viasat and HBO generate substantial revenues, to which a few operators react by including third party OTT services in their service offerings or in some cases equivalent own services. In one year, data traffic volumes have increased by 31.1%, reaching 484,000 TB in mid-2019. The data growth rate in the mobile network is 11% higher than in the fixed network. Mobile call volumes (calls originated) have increased by 6.9% to 7.8 billion minutes in the second half of 2019. However, SMS services continue to decrease slightly. From the second half of 2018 to the second half of 2019, SMS services fell by 1.6%, from 2.74 billion to 2.69 billion units.

The network sharing agreement between Telenor and Telia has been in place since 2012 and covers the companies' radio access networks (2G, 3G and 4G). In February 2019, Hi3G entered into a

[31] The announced goal is to have 40,000 broadband customers by end 2020.

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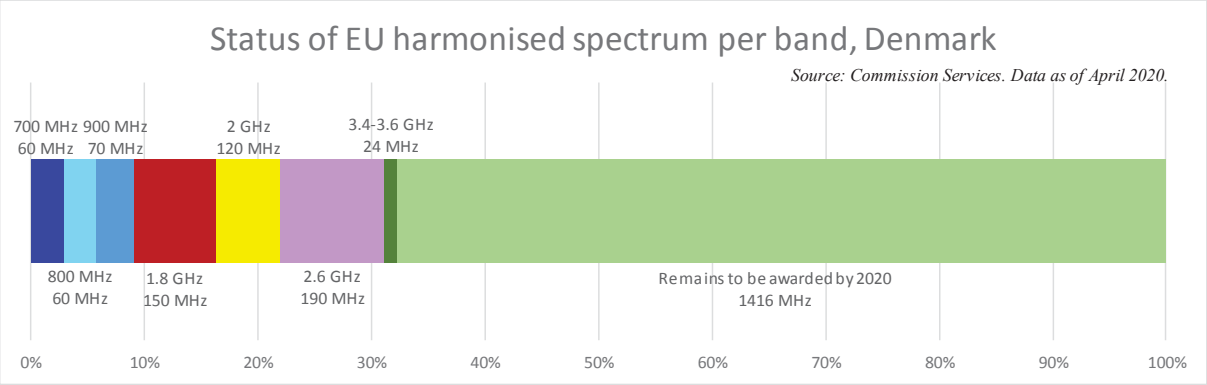
commercial agreement with TDC on national roaming covering mobile voice and mobile data on 2G, 3G and 4G.

3. Regulatory developments

3.1. Spectrum assignment



Denmark ranks 4th in the 5G readiness indicator[32]. It has assigned 32%[33] of the total 2090 MHz spectrum harmonised at EU level for wireless broadband.

The roll-out of 5G has started with the installation of macro cells on existing sites, and is due to be extended to 10-15% more sites. Small cell roll-out is not part of the current schedule. The 700 MHz, 900 MHz and 2300-2400 MHz bands were auctioned in March 2019. All Danish operators, TDC, Hi3G and TT-Netvaerket, were awarded spectrum, raising a total of €296 million. The 700 MHz and 900 MHz licences are valid from April 2020, while the 2300-2400 MHz band licenses are valid from April 2019. The next 5G spectrum auction is planned for the fourth quarter of 2020 and will include the 1.5 GHz, 2.1 GHz, 3.5 GHz, 26 GHz bands and the remaining part of the 2.3 GHz band. This will be an important auction since it will include the last wireless broadband spectrum bands to be made available for the next 8 years.

3.2. Regulated access (both asymmetric and symmetric)

TDC has not yet contacted the Danish Business Authority as to the regulatory treatment of a wholesale-only company. Opening up utilities' fibre network has been discussed for years but it now seems like a growing number of utilities are moving forward by announcing dates for when they expect to open up for access. Market analysis for wholesale broadband (market 3 of the 2014 recommendation on relevant markets) is planned to be conducted during 2020. As a first step, geographically specified submarkets – instead of a national market defined today – are suggested in order to assess the situation of regional players.

Effective from 1 April 2019, TDC's wholesale prices for services on the fixed network had been revised, due to minor errors in the long-run average incremental cost model. In 2020 it is planned to analyse the wholesale markets for fixed and mobile voice call termination, wholesale local access

[32] The 5G spectrum readiness indicator is based on the amount of spectrum already assigned and available for 5G use by 2020 within the 5G pioneer bands in each EU Member State. For the 3.4-3.8 GHz band, this means that only licences aligned with the technical conditions in the Annex to Commission Decision (EU) 2019/235, are considered 5G-ready. For the 26 GHz band, only assignments aligned with the technical conditions in the Annex to Commission Implementing Decision (EU) 2019/784 are taken into account. By contrast, the percentage of harmonised spectrum takes into account all assignments in all harmonised bands for electronic communications services (including 5G pioneer bands), even if this does not meet the conditions of the 5G readiness indicator.

[33] This figure does not take into account an assignment of 20 MHz of supplementary downlink spectrum in the 700 MHz band.

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provided at a fixed location/physical network infrastructure access and wholesale central access for mass-market products provided at a fixed location/wholesale broadband access (markets 1, 2, 3a and 3b of the 2014 recommendation on relevant markets).

4. End-user matters

a. Complaints

Consumers complained increasingly about issues when roaming outside the European Economic Area. Marketing promises like 'livelong/forever prices' were challenged in court and the verdicts found that such prices would be applicable for a period of 3 to 5 years. There has been an increase in complaints regarding misuse of '*NemID*', a common secure login on the Internet used in Denmark for online banking, finding information from public authorities or engaging with a business.

b. Open Internet

A minority of operators in Denmark offer zero-rated products. Operators generally include large amounts of data in the subscription plans which makes zero-rated products a lesser-used strategy among operators. The categories of zero-rated products offered are music streaming services, video streaming/IPTV services and social media services. However, many operators have informed that several of these products are no longer being advertised as they are being phased out.

In the area of 5G services, DEA is currently working together with a television broadcasting company on testing potential use cases of specialised services for TV broadcasting.

c. Roaming

In February 2019, the DEA reopened a case of non-compliance with the roam-like-at-home rules. The case concerned the same operator which the DEA had monitored in 2018. The main issue related to the operator's general terms which limited the customers to making calls only within the Member State where the customer was located, and to Denmark. On 19 March 2019, the operator had made the necessary changes and the DEA closed the case.

d. 112 Emergency calls

The public service answering points (PSAPs) have changed their provider of 112 interconnection services from TDC to LinkMobility, an SMS operator. Advanced mobile location services are implemented in the Danish network and work on Android, but not yet on Apple. In the context of transposing of the European Electronic Communications Code, the legislator is considering clarifying if and how the requirement for the service to be free for end users and PSAPs would relate to interconnection charges across networks.

5. Conclusion

Fixed broadband and mobile network coverage are significantly above the EU average. As Denmark overwhelmingly relies on private investment, decisions about regulated access to fibre networks resulting from the market reviews under preparation will be significant for investors. The new investment patterns implemented in TDC are relevant also in other Nordic countries, since they focus on long term, relatively safe returns from network investment. The fact that VHCNs are owned by their customers in the case of the utilities and by public pension funds in the case of TDC is specific to Denmark, as a way how citizens can take ownership – directly or indirectly - of their own technological future.

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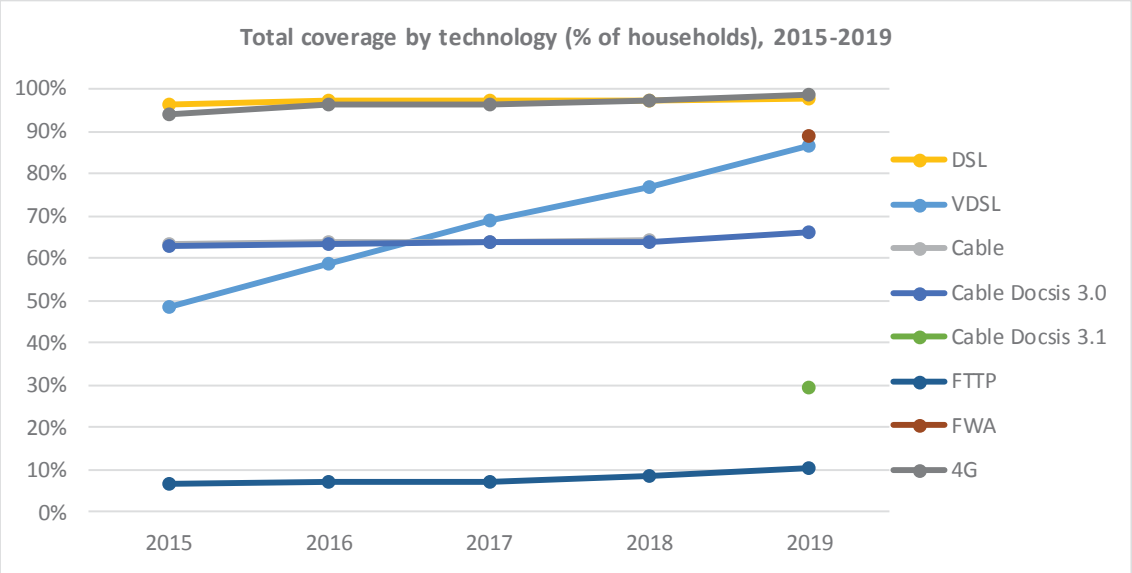
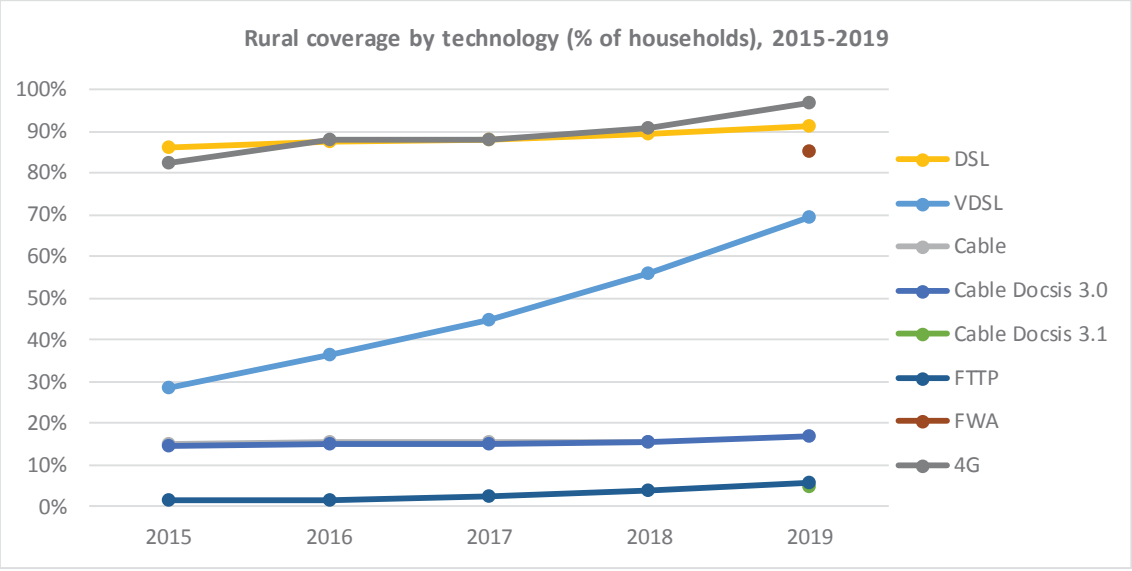
Germany



Source IHS and Point Topic, Broadband coverage in Europe studies

In terms of fixed coverage[34], Germany outperforms in DSL (98% of all households versus an EU average of 91%), VDSL (87% versus 59%) and cable. The increase in VDSL coverage over the last 5 years stands out in particular. VDSL2 vectoring coverage (not included in the chart) stands at 65%, against an EU average of 28%. On the other hand, Germany lags some way behind in fibre to the premises (FTTP) coverage (11% versus an EU average of 34%) and annual progress is slow (2% of households added per year, compared to 3% to 5% in the EU). Aggregate 4G coverage[35] is approximately the same as the EU average (99%).



Source IHS and Point Topic, Broadband coverage in Europe studies

[34] Source for charts – unless otherwise indicated - HIS and Point Topic.

[35] The 4G coverage indicator used here in the country chapter differs from the DESI indicator for 4G coverage. The former is an aggregate indicator, i.e. measures the coverage of all operators together. The latter is an average indicator, i.e. the sum of all coverages divided by the number of operators. Because of this difference, the two indicators may produce different results.

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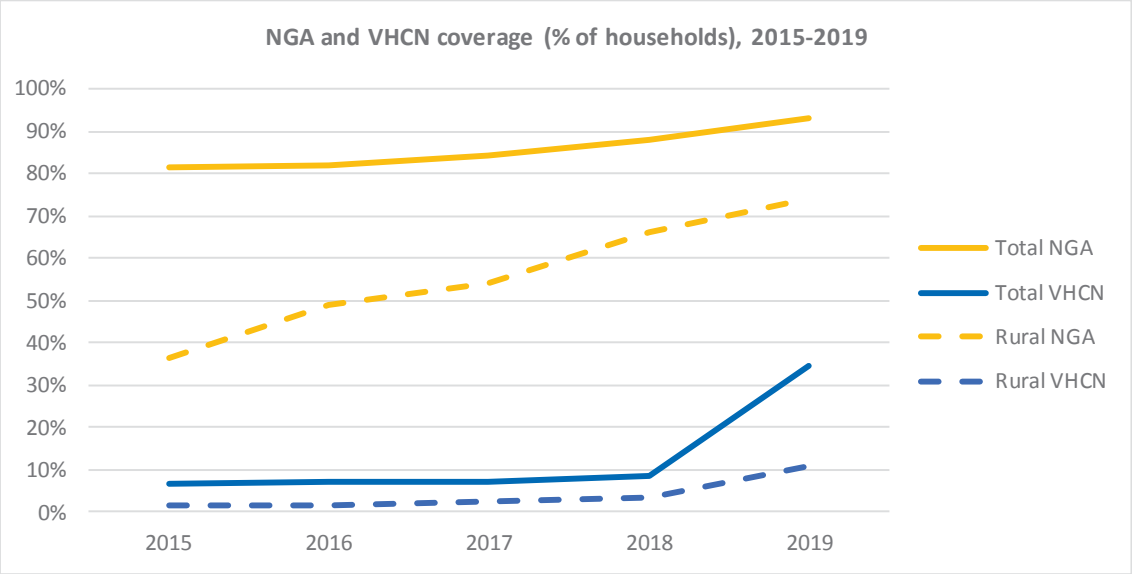
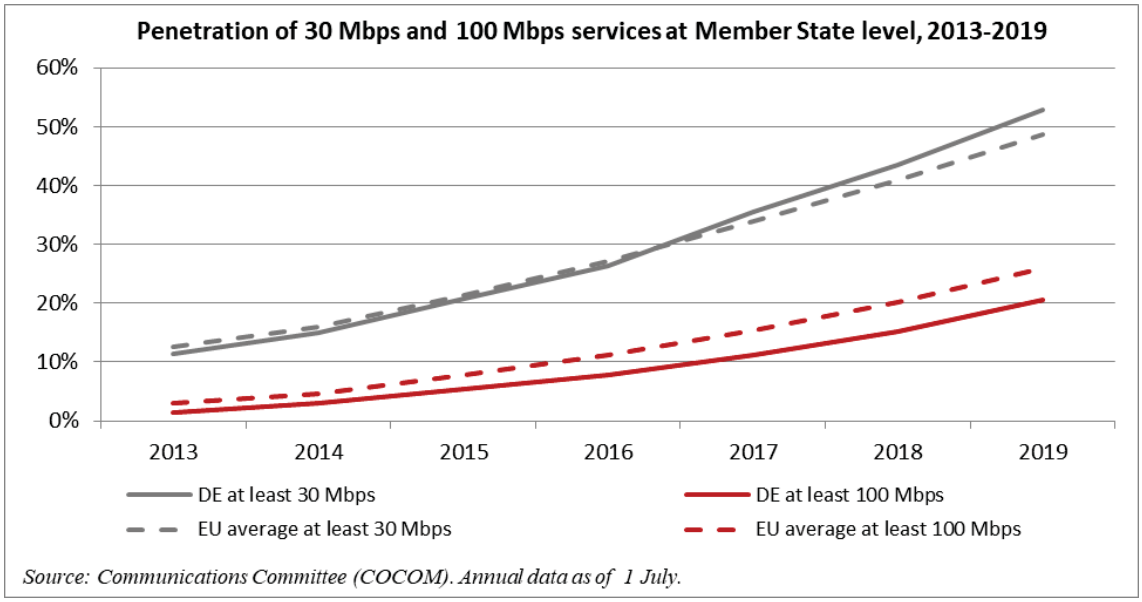
Germany performs well in rural DSL and VDSL coverage, but rural FTTP coverage is a mere 6% (versus an EU average of 18%). Aggregate rural 4G coverage of 97% is almost on a par with the EU average of 98%. Rural VDSL2 vectoring coverage (not included in the chart) is 41%, against an EU average of 11%.

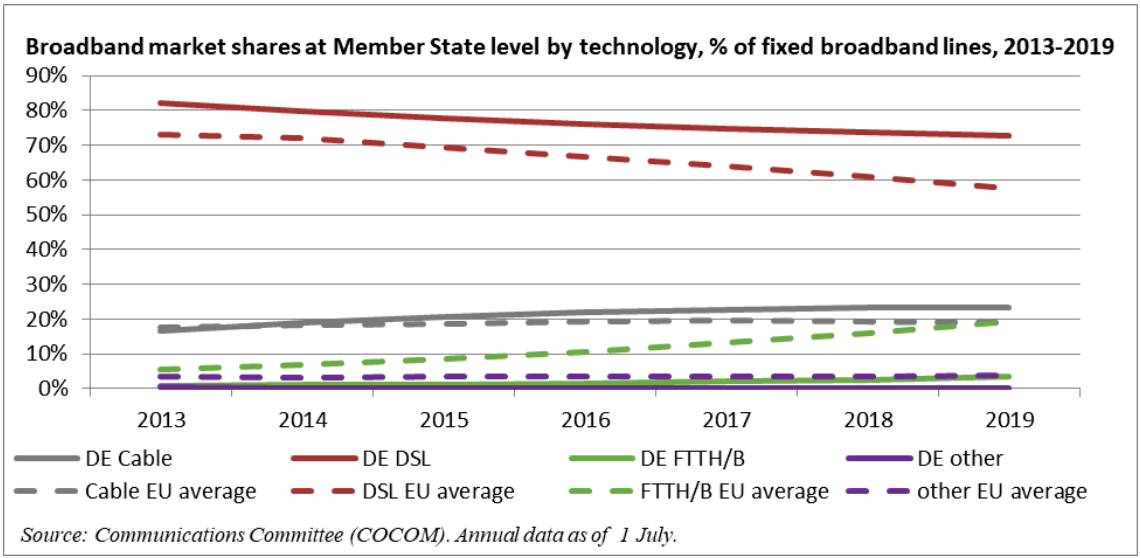


Source IHS and Point Topic, Broadband coverage in Europe studies

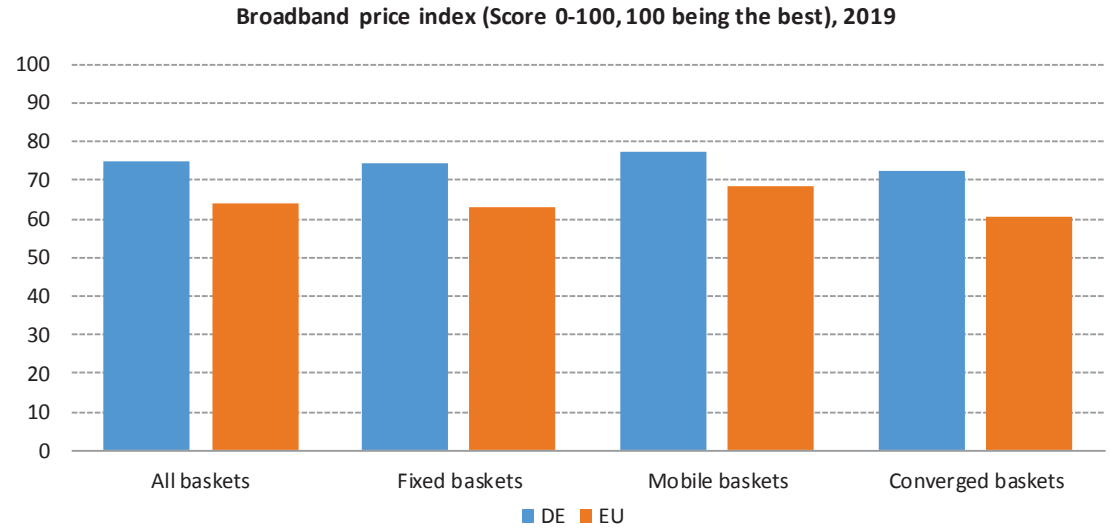
Next generation access (NGA) coverage in Germany remains very high (92% of households in total and 75% rural, versus an EU average of 86% in total and 59% rural). While the gap between total and rural NGA coverage has narrowed, it remains significant. At the same time, fixed very high capacity network (VHCN) coverage – including FTTP and DOCSIS 3.1 – is relatively low (33% in total and 10% rural, compared with an EU average of 44% in total and 20% rural). As VHCN figures for 2019 include DOCSIS 3.1 for the first time, they cannot be directly compared with figures for previous years.



In the fixed broadband market, Germany performs well on broadband take-up for capacities of at least 30 Mbps (53% of all households compared to an EU average of 49%), whereas take-up for capacities of at least 100 Mbps is relatively low (21% compared to an EU average of 26%).



DSL[36] take-up continues to predominate, albeit with a shrinking market share (73% in July 2019, compared to 74% a year ago). Cable market share is almost flat at 23%. Germany currently has approx. 1 million fibre (FTTB/H) subscriptions up and running. The market share of FTTH/B has increased by one percentage point (3.62%, compared to 2.6% a year ago), following increased supply, but remains increasingly well below the EU average (19.3 %, compared to 16% a year ago). In the mobile market, there are 85 subscriptions per 100 people, significantly below the EU average of 100 subscriptions per 100 people.



Source: European Commission services based on Empirica (retail broadband prices studies)

Broadband prices in Germany are substantially lower than the EU average for all speeds and types of product. This is reflected in the broadband price index, where Germany ranks 8th among the EU Member States with a broadband price index of 75 (versus the EU average of 64). It ranked 7th for mobile broadband prices.

[36] Including VDSL.

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1. Progress towards a Gigabit Society[37]

The German government set the political objective of providing nationwide full gigabit network coverage by 2025. Commercial fibre roll-out has continued. Vodafone took over the cable operator Unitymedia in July 2019 and committed to grant Telefonica access to its merged cable network for providing broadband subscriptions to end-users.

Industry structure in the provision of funded fibre connections is highly heterogeneous and involves among others an increasingly high number of small operators. In one of the large *Länder* alone there are 13 municipalities[38], 5 operators in parts of municipalities, 6 operators covering full municipalities, 1 regional operator and 1 national operator, with the regional and the national operator in a joint venture. In some small rural areas fibre has been rolled out, but no service provider uses the infrastructure.

All four mobile network operators (MNOs) have signed an agreement with the government for extended coverage obligations, in exchange for a pay-as-you-use plan for the 2019 auction payments. The government adopted a national strategy in November 2019 and considers several measures to improve mobile infrastructure supply in poorly served areas. These measures may include among others a subsidy programme for areas with no coverage, a strategy on how to streamline permit procedures and how to facilitate access to state-owned real property for extending and for densification of mobile networks[39].

In August 2019, the government launched a 5G competition to promote implementation of the 5G mobile broadband standard. Winning projects will receive during the concept phase €100,000 each and up to €4 million in the implementation phase. 5G is being trialled by MNOs and verticals. Telekom Deutschland GmbH (TDG) and Vodafone have launched commercial offers at their first 5G sites. Various research projects for automated driving (including in urban test fields and on motorways) and for integrating 5G into industrial communications networks are currently ongoing.

2. Market developments

In the fixed broadband market, competitors of the incumbent TDG increased their market share by a small margin. It has been above 60% since 2017.

Cable operators are investing in DOCSIS 3.1, TDG in a technology mix that still includes super-vectoring. Around 80% of the commercial fibre roll-out is based on GPON[40] topology.

Vodafone took over the cable operator Unitymedia in July 2019 and committed to grant Telefonica access to its merged cable network so it can provide broadband subscriptions to end-users. Telefonica has a similar cable wholesale access agreement with another operator.

The Bundeskartellamt (national competition authority) approved the joint venture on fibre roll-out between TDG and EWE-Tel. The company Glasfaser Nordwest was been created in January 2020 and will start rolling out fibre in parts of Lower Saxony and in Bremen.

[37] It is noted that statements regarding planned or potential State aid measures record intentions declared by Member States and do not pre-judge or pre-empt the assessment of such measures by the Commission under the relevant state aid rules. The DESI report is not meant to provide any assessment of the compliance of such measures with state aid rules and procedures.
[38] Directly acting as operators.
[39] At the regional level, in Bavaria, a state aid scheme funding passive mobile infrastructure had been approved by the Commission in November 2018, see document C(2018) 7540 final.
[40] Gigabit passive optical network: It has a point-to-multipoint architecture where passive splitters in the fibre distribution network enable one single feeding fibre to serve multiple subscribers.

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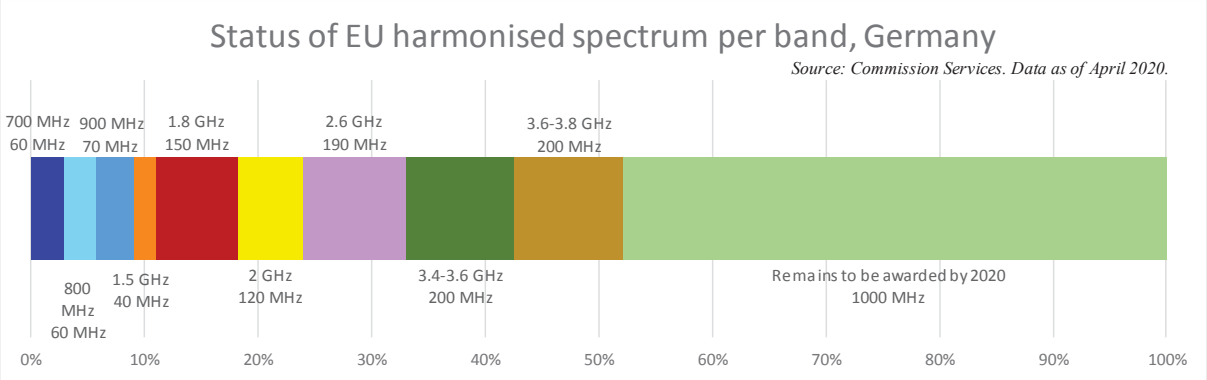
Since 2013, the size of the business market segment has shrunk by 10% in absolute terms and now represents 36% of the telecommunications services sector[41]. The demand structure in this segment is increasingly multi-dimensional (including not only mere bandwidth, but also parameters such as packet loss, latency, data security, fault repair times, redundancy). This is matched not only by roll-out of new physical connections but also by increased flexibility of networks as regards Ethernet technology, slicing, software defined networks and network function virtualisation.

Fixed and mobile broadband are currently seen as complements rather than as substitutes as streaming typically requires a fixed broadband subscription because unlimited mobile data plans are still rare and expensive (80€/month with TDG).

The three incumbent MNOs have agreed to share new-to-be-built sites in white spots.

3. Regulatory developments

3.1. Spectrum assignment



In Germany, 52% of the total 2090 MHz spectrum harmonised at EU level for wireless broadband has been assigned. Germany ranks first in the 5G readiness indicator. It auctioned spectrum in the 700 MHz band in 2015, which is available for 5G use. A second auction took place between March and June 2019, where the frequencies in the 2 GHz and 3.6 GHz bands were assigned. The three incumbents and one future new MNO (currently operating among others as service provider on incumbent mobile networks) successfully acquired spectrum. In the 3.7-3.8 GHz sub-band, property users can apply since November 2019 for frequencies to create their own local 5G networks on factory grounds or other types of property for several use cases. These include factory automation and campus networks but exclude provision of public communication networks.

The 24.25- 27.5 GHz band should be awarded by the end of 2020. This includes the option of assigning directly to industrial users with the possibility of spectrum sharing with other users (such as MNOs) outside industrial sites.

3.2. Regulated access (both asymmetric and symmetric)

In December 2019, BNetzA (Federal Network Agency) deregulated the market for access to the fixed telephone network[42].

BNetzA is preparing a decision on TDG's rental fees for wholesale terminating segments of leased lines for its Synchronous Digital Hierarchy (SDH) products and it's Ethernet-over- SDH products[43]). In

[41] See https://www.vatm.de/wp-content/uploads/2018/12/VATM_TK-Marktstudie-2018_091018_f.pdf and https://www.vatm.de/wp-content/uploads/2018/12/VATM_TK-Marktstudie-2018_091018_f.pdf

[42] Market 1 of Commission Recommendation of 17 December 2007, on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services (OJ L 344, 28.12.2007, p. 65–69).

its comments, the Commission invited BNetzA to review the pricing methodology to ensure that it provides appropriate incentives for efficient investments and innovation. For TDG's corresponding new "pure" Ethernet 2.0 products, BNetzA plans to consult nationally the draft pricing decisions in the first half of 2020. The Commission asked BNetzA to consolidate market analysis and corresponding remedies to allow full and comprehensive insight into regulatory concerns and the respective remedies considered.

BNetzA approved new mobile and fixed termination rates based on a pure bottom-up long run incremental cost (BU LRIC) approach, setting a glide-path for 2019-2021 (or until adoption of the Eurorate, expected at the end of 2020) based entirely on internal cost model calculations[44]. Moreover, it removed access and price control obligations for mobile calls originating from outside the European Economic Area (EEA). This is subject to the condition that the mobile termination rate applied by the relevant German MNO does not exceed the rate charged for a comparable termination service in the relevant non-EEA country.

In September 2019, BNetzA notified its new draft market analysis for the market for wholesale local access provided at a fixed location (market 3a/2014 of the 2014 Recommendation on Relevant Markets). BNetzA proposed, among others, to define the relevant geographic market as national. In its comments, the Commission urged BNetzA to improve and further substantiate the indicators used for the analysis of competitive conditions, in particular the coverage of alternative networks and the evolution and distribution of market shares. It called on BNetzA to consider differentiating remedies on a geographic basis, in order to take into account differences in conditions of competition in the different geographic areas. In a parallel proceeding, BNetzA started reviewing TDG's regulatory obligations on this market and published key considerations and discussion points in summer 2019.

Furthermore, BNetzA approved TDG's prices for additional services for SDH and Ethernet leased lines and approved changes in the standard offer for Layer-2-Bitstream-'Super-Vectoring'. As regards prices for wholesale local access (market 3a/2014), BNetzA notified draft decisions on new monthly rates for access to the local loop, rates for collocation at the street cabinet, rates for access to ducts and dark fibre and for various rates for its virtual unbundled local access (VULA) products provided at the street cabinet. It is currently finalising these decisions.

The DigiNetz-Gesetz (law on facilitating the efficient expansion of digital high-speed networks), which transposed the Broadband Cost Reduction Directive 2014/61/EU into national law, amended the Telekommunikationsgesetz (German telecommunications law)[45]. Since March 2017, 44 cases have been referred to BNetzA for dispute resolution to, 21 of which involved infrastructure sharing. BNetzA has issued 25 decisions so far, allowing it to establish certain principles. For example, in case of co-use of physical infrastructure of communication operators, the extra-costs caused by co-use have to be covered by the access seeker, the project-related costs are shared and a share of common costs is added. For the co-use of utility infrastructure the extra-costs caused by co-use have to be covered by the access seeker, plus an extra amount which is required by national legislation

[43] Market 4 of the Commission Recommendation of 9 October 2014, on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services (OJ L 295, 11.10.2014, p. 79–84).

[44] The Commission did not comment on the proposed fixed termination rates, but challenged the appropriateness of price control for call origination (market 2/2007 of the 2007 Recommendation on Relevant Markets).

[45] By adding article 77(a) pp.

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and had been fixed by BNetzA at 20% of the market price for use of ducts. For the co-ordination of physical works, the applicant has to cover any extra costs caused by co-ordination. Other investment costs related to planned physical works can be shared by the cooperating parties. In accordance with these principles, decisions are taken on a case-by-case basis.

4. End-user matters

a. Complaints

The number of complaints remained high: BNetzA received 109,574 complaints and questions in 2019 (as per 31 October 2019) on misuse of numbers and another 49,685 written complaints on illicit telephone advertising. For both, BNetzA received 18,758 calls via its hotline. BNetzA established rules on the conditions under which MNOs may bill services from third parties. Customers are protected by classical interventions such as switching off numbers and administrative orders that prohibit illicit billing and liquidation. Other complaints were related to ping calls, hacking and nuisance calls.

b. Open Internet

BNetzA's decision of 15 December 2017 prohibiting the use of video throttling as part of the zero rating product "StreamOn" could not be enforced for almost 20 months due to TDG's urgent appeals before German administrative courts. BNetzA finally prevailed in the interim proceedings[46] and TDG abandoned video throttling in August 2019.

Other major activities by BNetzA related to connectivity problems due to the lack of provision of publicly available IPv4 addresses with the use of network address translation and to traffic management measures by Internet access service providers. These cases could largely be resolved by internet service providers coming up with alternative connectivity solutions for the users concerned. Moreover, BNetzA examined several tariffs in which providers imposed traffic management measures. It found that these did not lead to the unequal treatment of data traffic within a tariff. A few end-user complaints concerned the restricted usability of services due to restrictions in terminal equipment. The provider concerned has meanwhile removed these restrictions.

c. Roaming and Intra EU calls

In 2019 several emergency court rulings and court orders fully backed the orders that BNetzA had issued in 2017 on TDG´s zero-rated 'StreamOn' offer and in 2018 on the 'Vodafone Pass'. Subsequently, TDG has made 'StreamOn' available for roaming in the EEA since September 2019 and consumers can use the zero-rated offer like at home subject to the application of a fair-use policy. Vodafone Pass has also been available for roaming in the EEA since December 2019. In both pending main proceedings, the administrative court referred questions to the European Court of Justice for a preliminary ruling.

Consumer complaints and inquiries mainly addressed the lack of welcome SMS (especially in non-EEA countries), inadvertent roaming in the border region with Switzerland and lower quality of data services than at home. BNetzA urged the mobile service providers concerned to comply with the roaming provisions. In addition, it emphasised that the transparency requirements also apply for roaming outside the EEA. As a result, the number of complaints about the lack of welcome SMS has fallen. On quality of service, BNetzA is investigating the market and tracking the number and type of complaints and enquiries.

[46] Higher Administrative Court Münster, decision of 12 July 2019 - 13 B 1734/18.

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Mobile operators are not obliged to send detailed pricing information to customers while roaming in networks operated on ships or planes. Due to an increase in complaints and enquiries, in 2019, BNetzA took action together with the Federal Ministry of Economics to make pricing information more transparent for customers, especially on ships. As a result, most German roaming providers send pricing information to roaming customers or – if roaming on ships is not blocked anyways – interrupt data usage after a certain financial limit is reached while roaming in networks operated on ships.

BNetzA launched several formal proceedings against call-by-call providers[47] to ensure compliance with the pricing rules on intra-EU calls. Subsequently, the providers adapted their tariff plans to bring them in line with the Regulation. In some cases the providers also changed to their charging interval, extending it to 300 seconds. BNetzA reported that following its request, call-by-call providers have adjusted the charging interval back to 60 seconds[48].

d. Emergency communications – 112

The Commission sent a letter of formal notice to Germany in July 2019 for incorrect application of Art. 26(4) of the Universal Service Directive. This involved the failure to ensure equivalent access for users with disabilities. Germany informed the Commission that preparations are on schedule for the introduction of an emergency call app targeted at people with hearing and speech impairments and including the required transmission of user location data to the emergency services and are expected to go live in the 3rd or 4th quarter of 2020. Germany has implemented Advanced Mobile Location for emergency calls thanks to the HELP 112 II project financed by the EU.

e. Universal service

German authorities have not designated any provider for the minimum set of services of specified quality permitting among others functional Internet access, to which all end-users have access, at an affordable price. The incumbent Deutsche Telekom provides the universal service on a voluntary basis. In case of complaints, the right for subscribers, that reasonable requests for a fixed connection are met is addressed by the consumer department of BNetzA.

5. Conclusion

While progress is being made on the policy for encouraging demand for 5G services, and regulation will focus on implementation of the coverage and rollout obligations in the spectrum licences, Germany continues to face challenges on the fixed and mobile markets. There is still a significant urban-rural digital divide in terms of fixed NGA coverage and the proportion of fibre connections is increasing, but still very low. Although new funding approvals under the federal broadband scheme were granted exclusively to fibre, incumbents rely on a technology mix where the role of fibre could be extended and better defined.

[47] With the call-by-call procedure, available in Germany and other Member States, fixed subscribers can dial a prefix to use another service provider to handle a voice call. A similar procedure for mobile subscribers is called “callthrough”.

[48] BNetzA also informed several regional and city carriers about the pricing rules on intra-EU calls and asked them to adjust their tariffs in line with the intra-EU provisions. In the meantime, all of the regional and city carriers who have been contacted amended or stated that they were about to amend their tariff plans to bring them in line with the Regulation.

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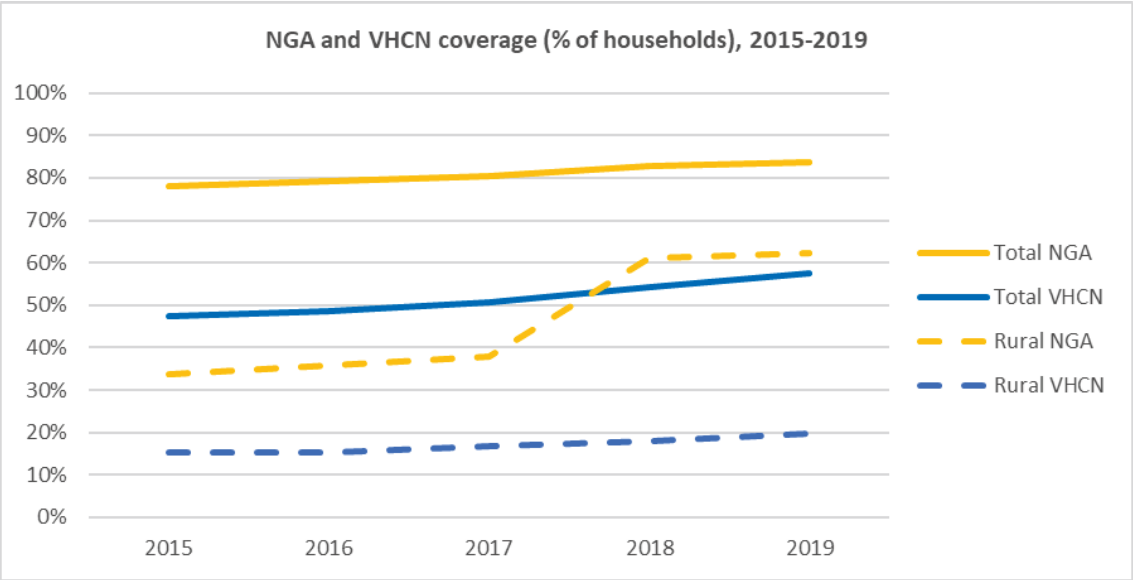
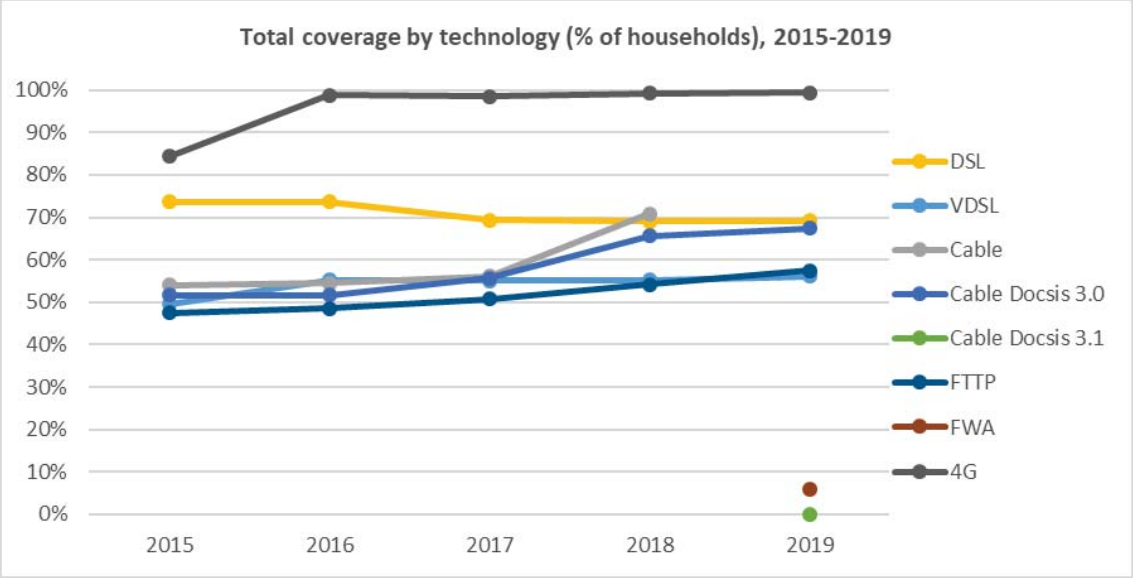
Estonia

Estonia has slightly better very high capacity network (VHCN) coverage (57%) than the EU average (44%), but lower next generation access coverage (84% against an EU average of 86%). However, in rural areas only 20% of households can benefit from the VHCN, which is the same as the EU average (20%). Fibre to the premises increased steadily in 2019, reaching 57% of households. This is an increase of 3 percentage points (pps) in comparison to 2018. On the contrary, the footprint of very high speed digital subscriber lines and cable DOCSIS 3.1 networks has remained stable in the past year. The aggregate 4G coverage[49] has reached 99% of households.



Source IHS and Point Topic, Broadband coverage in Europe studies



Source IHS and Point Topic, Broadband coverage in Europe studies

[49] The 4G coverage indicator used in the country chapters differs from the DESI indicator for 4G coverage. The former is an aggregate indicator, i.e. it measures the coverage of all operators together. The latter is an average indicator, i.e. the sum of all coverages divided by the number of operators. Because of this difference, the two indicators may produce different results.

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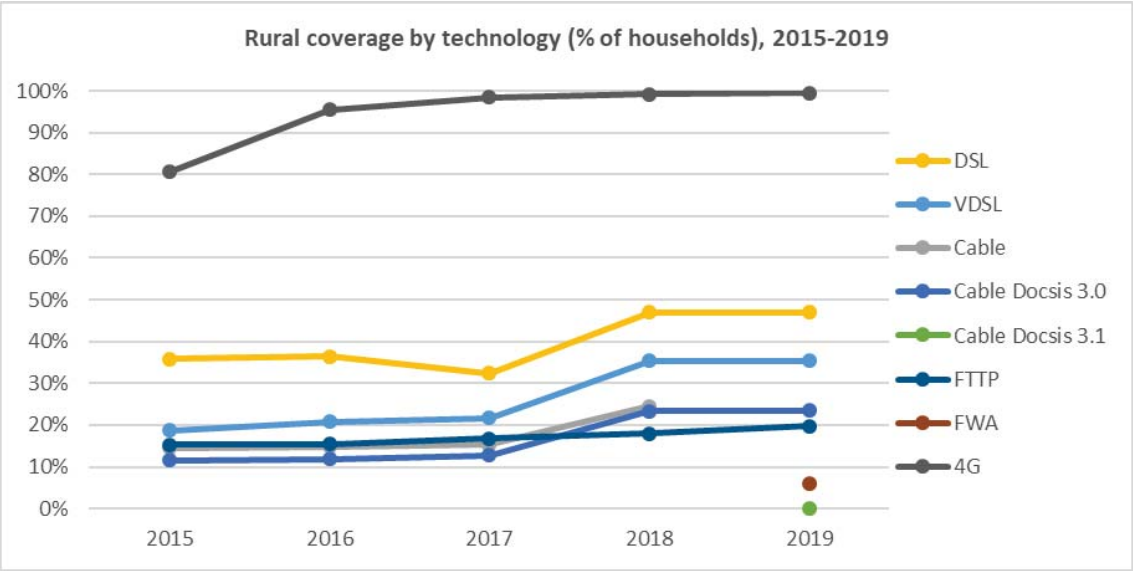
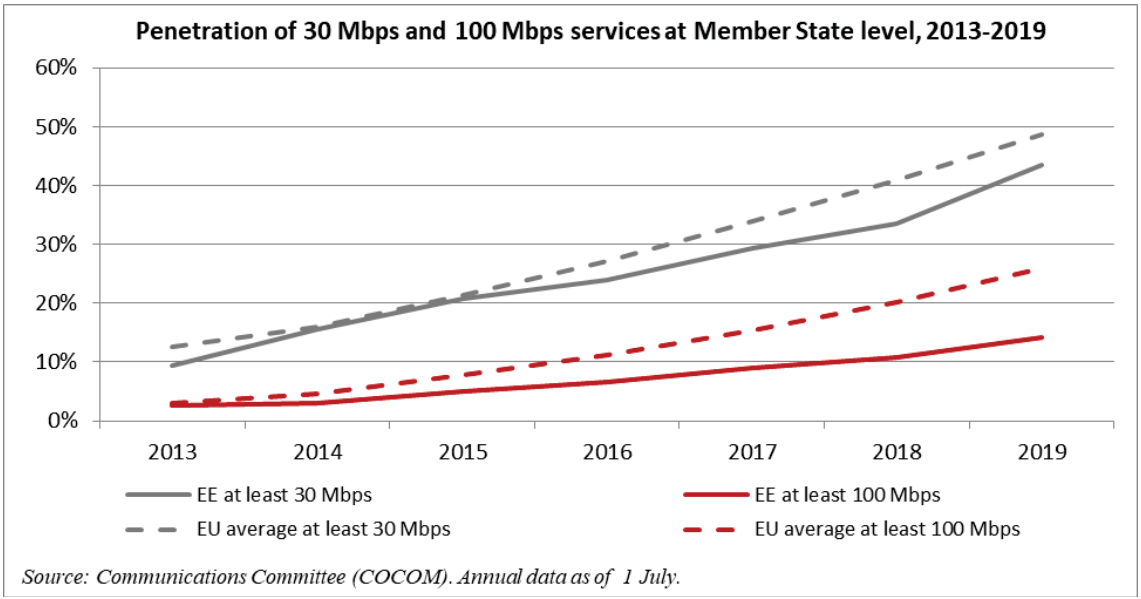
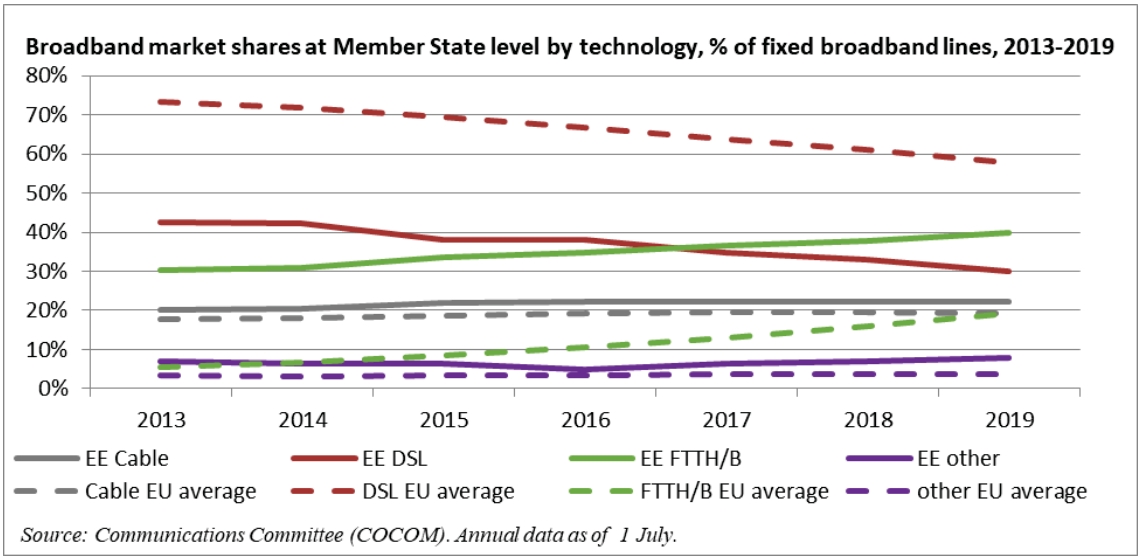


Source IHS and Point Topic, Broadband coverage in Europe studies

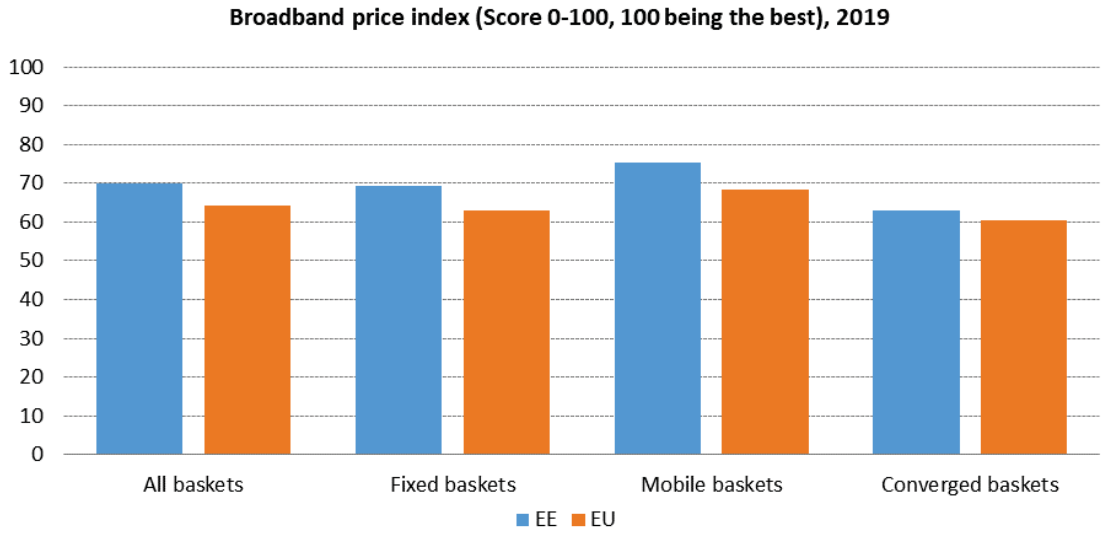
Despite high-quality infrastructure, Estonia still ranks below the EU average in terms of at least 30 Mbps broadband penetration (43.6%) and at least 100 Mbps (14.1%) broadband penetration.



Estonia's fixed market is characterised by a strong presence of fibre. The share of fibre to the home/business FTTH/B has shown a steady increase since 2016 and was at 40% in 2019, more than double the EU average (19.3%). Estonia's share of cable technologies (22.1%) is only slightly above the EU average of 19.1%. The share of digital subscriber lines DSL (30%) is very low compared to the EU average of 57.8%, and has been falling on the decline since 2013.



Overall Estonia's market for electronic communications is slightly cheaper than the EU average. It boasts relatively low prices for mobile baskets compared with the EU average – its mobile baskets price index equals to 75, against the EU average of 68. Additionally broadband prices in the fixed and converged baskets are lower than the EU average.



Source Commission services based on Empirica (Retail broadband prices studies)

1. **Progress towards a Gigabit Society**[50]

The objectives of Estonia's current national broadband plan, the 2020 Digital Agenda, are not yet aligned with those of the Gigabit Society. The strategy aims to provide all residents with internet access above 30 Mbps and to achieve at least a 60% rate of household subscriptions with a speed of above 100 Mbps. Nevertheless, Estonia's new information society strategy 2020+ has been in preparation since the end of 2019. This strategy will align its connectivity targets to those of the Gigabit Society (including the availability of speeds of 100 Mbps upgradeable to 1 Gbps to all residents).

[50] It is noted that statements regarding planned or potential State aid measures record intentions declared by Member States and do not pre-judge or pre-empt the assessment of such measures by the Commission under the relevant state aid rules. The DESI report is not meant to provide any assessment of the compliance of such measures with state aid rules and procedures.

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The Estonian wideband infrastructure network (EstWin) project delivered 7,000 km of backhaul network by January 2020. Concerning investment in broadband infrastructure, the implementation of a State aid scheme to support the last mile access part in next generation access white spots was ongoing in 2019. The project is expected to finish by the end of 2023. Estonia also continues to use the European Regional Development Fund (ERDF) to support backhaul development. It has allocated all the €40.5 million of ERDF funding planned for 2014-2020.

The Estonian government launched a public consultation in December 2019 in order to map further investment needs with a view to meeting the EU's 2025 Gigabit Society objectives. In particular, the authorities aim to map Estonia's high-speed broadband needs and obtain stakeholder views on which type of broadband technologies would be most suitable to address the connectivity shortages, particularly in rural areas. The consultation will also analyse possible state support measures and explain the applicable State aid rules. The process is expected to close by the end of 2020.

As regards Estonia's ambition on 5G connectivity, Estonia published its 5G roadmap[51] in March 2019. The country would like to achieve 5G connectivity in major cities by 2023 and along transport corridors by 2025. A dedicated working group on 5G has been set up at ministry level. Work is ongoing to assess business use and find the best financing model for the 5G deployment. The authorities are also committed to cooperating on 5G corridors with Latvia and Lithuania in the framework of the Via Baltica project. The Baltic States would like to map the electronic communications infrastructure alongside the corridor and to identify infrastructure gaps.

As of January 2020, the award of 5G pioneer bands in Estonia was still pending. Two operators have 5G test licences and have already carried out 5G tests. For instance, Tallink, Telia, Ericsson and Intel have created a 5G test and exploration area at the Port of Tallinn, where the trial network delivers 5G internet connectivity to the commercial passenger cruise ships and their passengers while in port.

2. **Market developments**

There were no noteworthy market developments in Estonia in 2019 – the market landscape remained unchanged compared to 2018.

Regarding wholesale-only broadband network operators, the Estonian Broadband Development Foundation (ELASA) develops, manages and provides access to their optical cable backbone network only at wholesale level. The objective of the scheme is to build a 7,000 km long backbone network in rural areas by the end of 2020. Monthly mobile data volume per user was 18 GB in the third quarter of 2019, which constitutes a 27% growth compared with the third quarter of 2018 (14 GB). The monthly mobile calls volume per user was 151 minutes in the third quarter of 2019, which was the same as the third quarter of 2018. The monthly SMS volume per user was 31 SMS in the third quarter of 2019, which is a drop of 6% compared with the third quarter of 2018. Compared with the third quarter of 2018, fixed calls volume per user also decreased by 6% in 2019 to 102 minutes.

There is some evidence for fixed-to-mobile substitution in the calls segment. In the period from the third quarter of 2018 to the third quarter of 2019, the amount of fixed telephone originated calls minutes fell by 18% and mobile telephone originated calls minutes increased by 2%.

Both mobile and fixed broadband users increased by 6% and 2% respectively between the third quarter of 2018 and the third quarter of 2019.

[51] Available at: https://www.mkm.ee/sites/default/files/eesti_5g_teekaart.pdf

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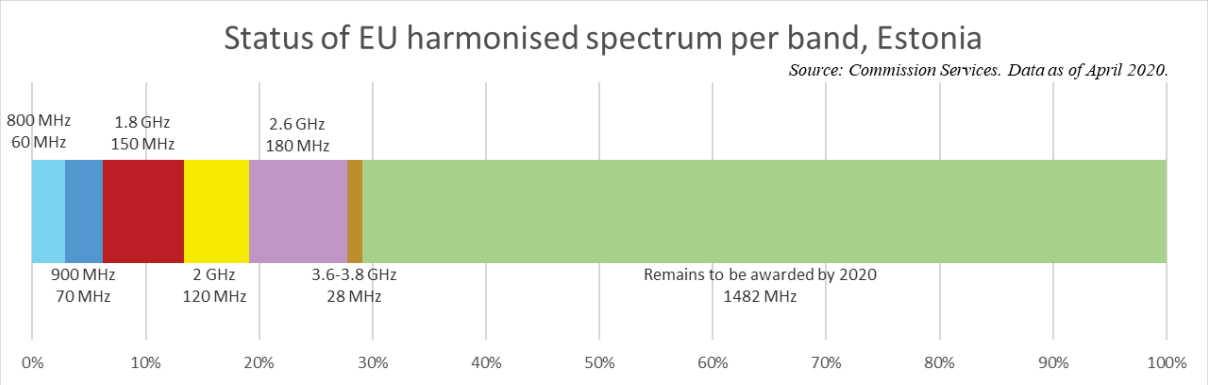
3. Regulatory developments

The European Electronic Communications Code is expected to be transposed into Estonian law through an Electronic Communications Act. The Ministry of Economic Affairs and Communications undertook a stakeholder consultation from December 2018 to April 2019. Following the public consultation, the Ministry prepared a draft law, which will be consulted with the other ministries from January to May 2020. The draft law will then be discussed in Parliament, which is expected to adopt the act in December 2020.

3.1 Spectrum assignment



Estonia has assigned 29% of the total 2090 MHz spectrum harmonised at EU level for wireless broadband. In view of the 5G roll-out, the public offer for the **3.6 GHz band** was opened in March 2019. The Estonian authorities face restrictions stemming from cross-border coordination issues with non-EU countries, leading to difficulties in allowing the use of sufficiently large blocks in the band. In light of those restrictions, the regulator decided to put on offer licences consisting of three blocks of 70 MHz, 60 MHz and 60 MHz in the lower part of the band and three blocks 60 MHz, 70 MHz and 70 MHz in the upper part. The regulator's intention was to combine the blocks in the lower and upper part following a successful conclusion of coordination agreements. However, an operator has subsequently contested such an auction design in terms of the authorities' restriction to three lots, arguing that at least four lots should have been offered. The claim led to the suspension of the auction. The case has since reached Estonia's Supreme Court and the final decision is expected in mid-2020.[52]

The regulator carried out a public consultation on the **700 MHz** at the end of 2019 and is in the process of analysing the submitted comments. The regulatory authority reported no difficulties in migrating broadcasters from the 700 MHz band. However, the Ministry of Interior is assessing whether there is likely to be a future need for reserving a portion of the band for public protection and disaster relief purposes. The Authorities aim to begin the auction in the third quarter of 2020.

Regarding the **26 GHz band**, the authorities are in the process of analysing comments submitted during the public consultation organised at the end of 2019. The government does not anticipate any obstacles to allowing the use of at least 1 GHz of the band by the end of December 2020, subject to market demand.

[52] In March 2020, Estonia's Supreme Court dismissed the appeal and the Ministry of Economic Affairs and Communications was able to continue with the auction, however the deadline was postponed once again due to the emergency situation. The deadline for participating in the public offer was extended to 18 June 2020.

3.2 Regulated access (both asymmetric and symmetric)

The National Regulatory Authority (NRA) is currently reviewing both markets 3a (wholesale local access provided at a fixed location) and 3b (wholesale central access provided at a fixed location for mass-market products). The NRA plans to notify both market reviews to the Commission by September 2020.

Telia plans to upgrade its copper network extensively with vectoring technology. This is expected to determine a further decrease in the take-up of copper local loop unbundling and ultimately its phasing out due to technical incompatibility with vectoring. Meanwhile, a new passive product (Bitstream) was introduced by Telia in 2019. The NRA expects that fibre access and access to ducts will remain as the main access products.

4. End-user matters

a. Complaints

The Consumer Disputes Committee, an independent unit within the Consumer Protection and Technical Regulatory Authority, received 53 complaints in 2019, compared to 80 complaints in 2018.

The Authority received from consumers 244 written enquiries in the field of electronic communications, compared to 378 in 2018. It registered 585 enquiries through telephone and oral consultations, compared to 875 in 2018. The Authority carried out 48 proceedings, compared to 52 in 2018.

Consumer complaints and enquiries in 2019 touched mainly on issues regarding pricing and billing, in particular contractual penalties, unilateral changes of fixed-term contracts and price increases, bundled offers and unsolicited services. Consumers have experienced problems understanding the conditions applicable to roaming, and have reported bill shocks for using data services, including in border regions and on ships.

b. Roaming

Some operators have expressed concerns regarding uncertainty as to the regulatory treatment of roaming calls made to toll-free numbers (either in the home or roaming country) in the EU. Some Estonian roaming providers have reported paying high wholesale charges imposed by the visited network operators for providing the roaming call. The Estonian operators are unclear whether such a practice is in contravention of Article 7 of Regulation (EU) No 531/2012 on roaming on public mobile communications networks[53].

c. Emergency communications

112 is the only emergency number in Estonia, with contact points for all emergency services located in the Estonian Emergency Response Centre. Handset based advanced mobile location is available for both Android and iOS phones. Hearing or speech-impaired users can use text messages to contact 112.

5. Other issues

The Consumer Protection and Technical Regulatory Authority is a governmental organisation established in 2019 by merging the Consumer Protection Board and the Technical Regulatory Authority. On the structural level, the merger resulted in a decreased number of management staff. The operators have expressed positive views about the merger but it is too early to assess its practical consequences.

[53] Article 7 of Regulation (EU) No 531/2012 of the European Parliament and of the Council of 13 June 2012 on roaming on public mobile communications networks within the Union, OJ L 172/10.

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6. Conclusion

Estonia continues to invest in the deployment of its broadband infrastructure and uses both public and private funds to do so. Once implemented, Estonia's new information society strategy 2020+ and the ongoing public consultation could be positive steps towards addressing the country's connectivity needs, particularly in rural areas. However, Estonia's ambitious 5G plans risk being compromised by the delayed auction of pioneer spectrum bands.

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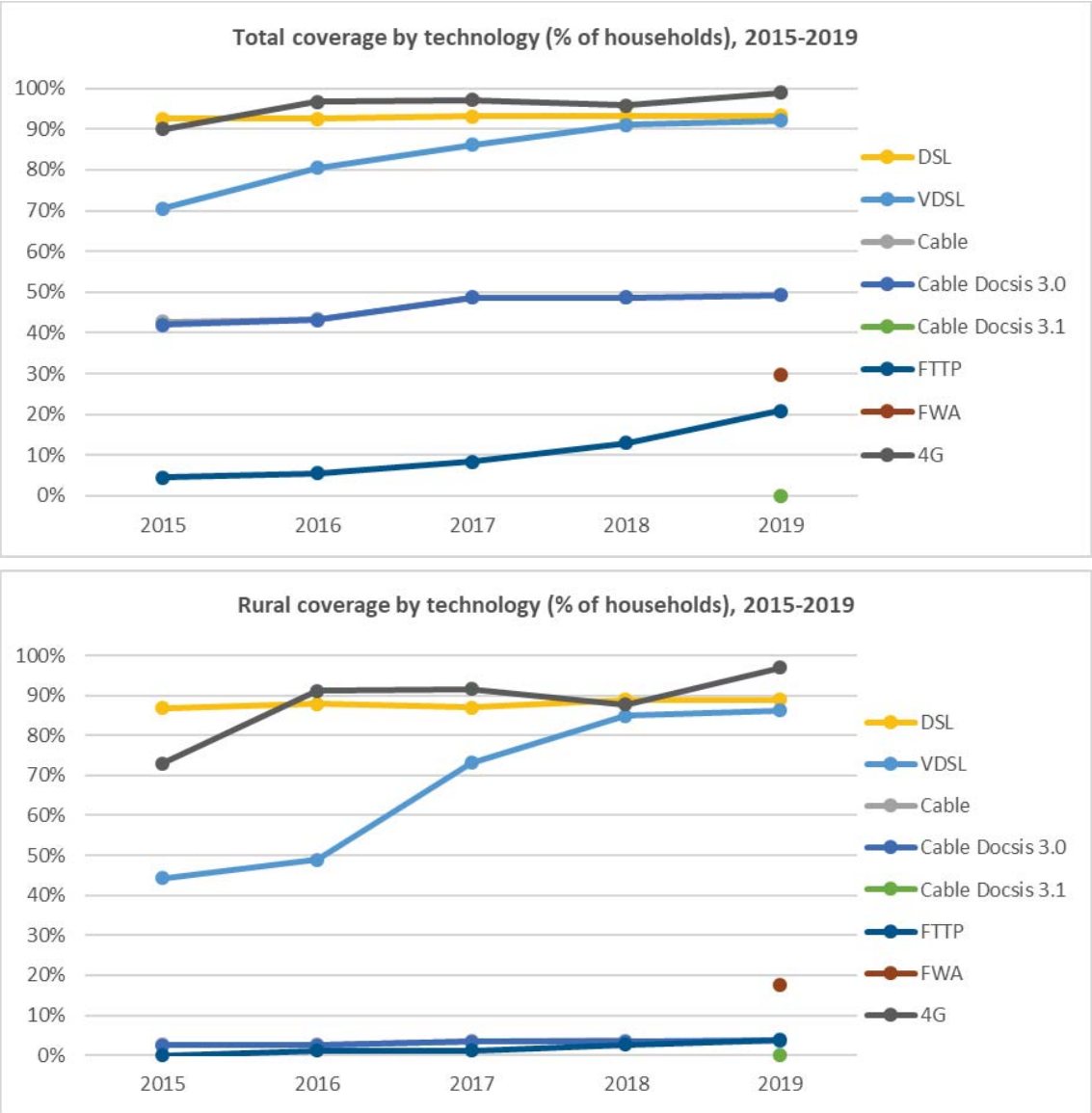
Ireland



Source: IHS and Point Topic, Broadband coverage in Europe studies

In terms of fixed coverage, Ireland outperforms the EU on DSL (at 93%, compared to 91% the EU average), on cable (49%, compared to 46% the EU average) and especially on VDSL (92%, ranking third in the EU, far above the EU average of 59%). However, it lags substantially behind on FTTP coverage (21%, surpassing only six EU Member States, compared to 34% the EU average), on cable DOCSIS 3.1[54] (with no coverage, compared to 19% the EU average) and on fixed wireless access (FWA) (30%, compared to 49% the EU average). Rural FTTP coverage in particular is only 4% (far below the EU average of 21%). This reflects the fact that Ireland's geography and population distribution prevents market players from deploying very high capacity network (VHCN) countrywide and the need for state intervention in underserved areas.

Ireland also performs well on mobile coverage with 99% of 4G coverage, almost on par with the EU average.

[54] This indicator was added in the DESI 2020 report and is used to track very high capacity network coverage.

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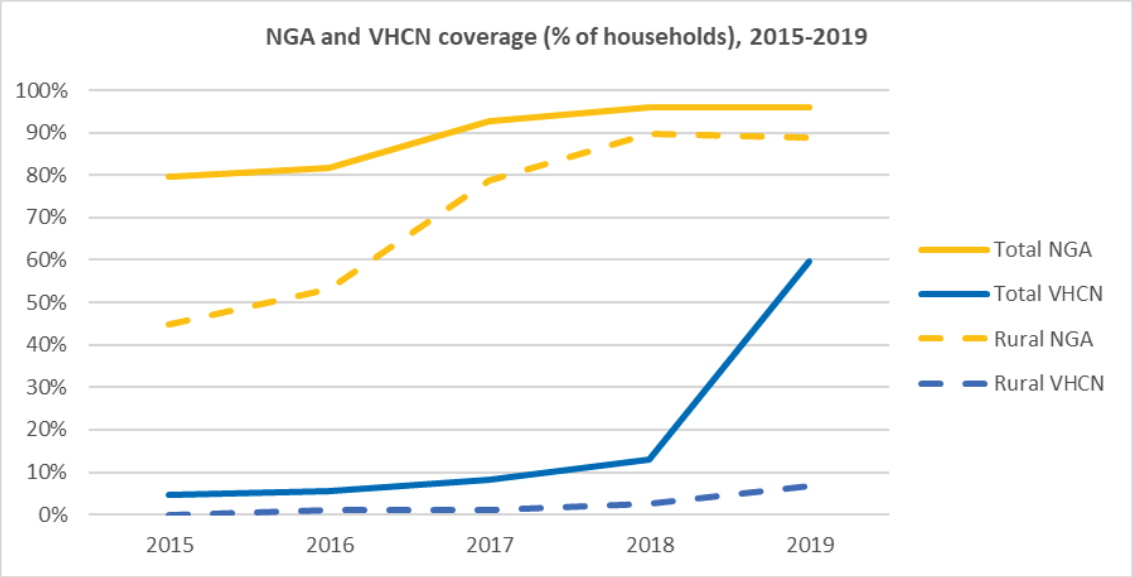
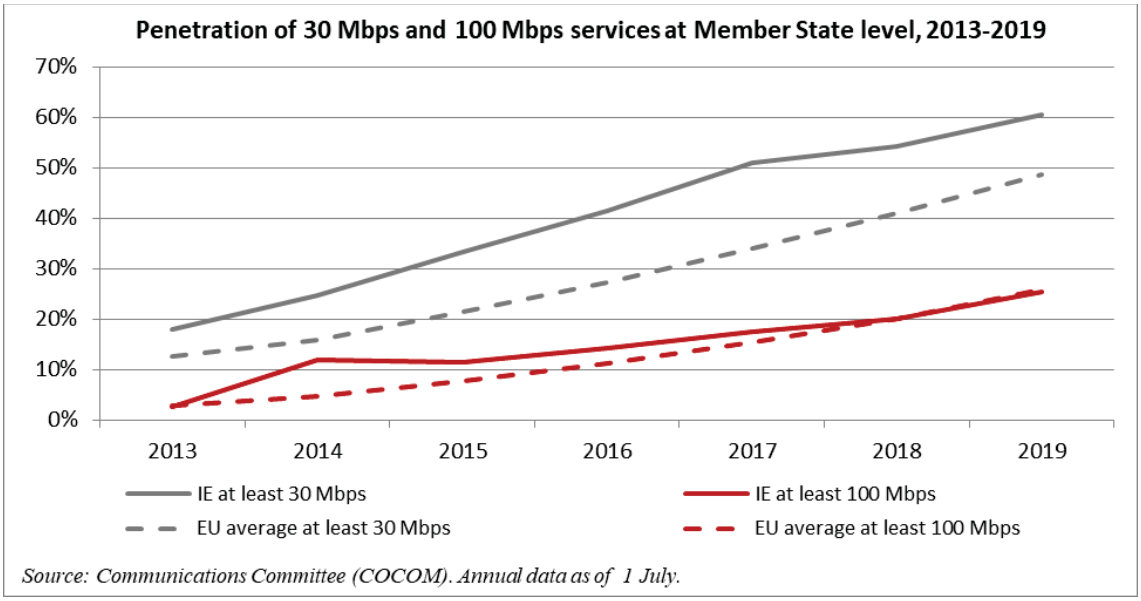
Next generation access in Ireland remains very high (at 96% overall, and 90% in rural areas, versus the EU average of 86% and 59% respectively). Fixed VHCN coverage has increased from 13% in 2019 to 21% in 2020, but remains well below the EU average of 44%.

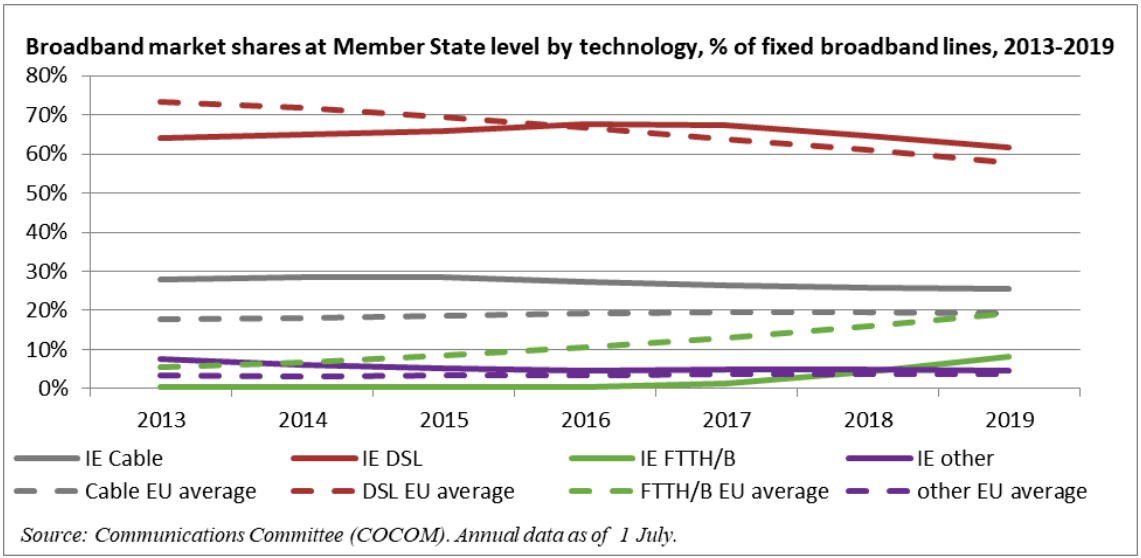


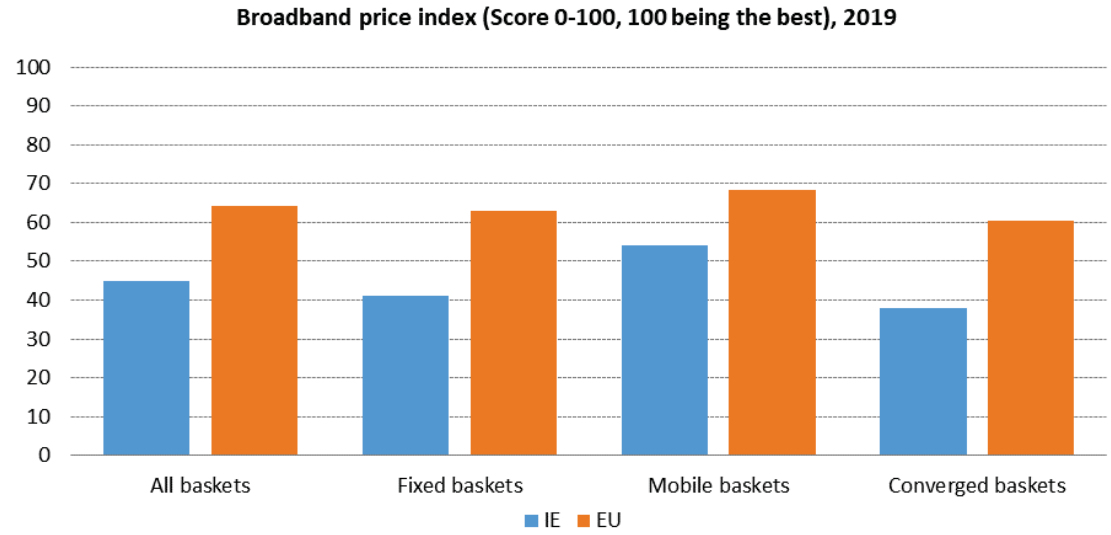
Source: IHS and Point Topic, Broadband coverage in Europe studies



In the fixed market, Ireland exceeds the EU average on broadband penetration for speeds at 30 Mbps and above (60.6% per household compared to 48.7% the EU average – data as at July 2019) but has now fallen slightly behind for speeds at 100 Mbps and above (25.5% per household compared to 25.9% the EU average). DSL continues to be predominant, but with a falling market share (62% in July 2019, down from 65% a year ago). Cable subscriptions are also continuing to lose ground slightly (25.5% in July 2019, down from 26% the previous year). The share of FTTH almost doubled in a year (8.2%, up from 4.2% the previous year), demonstrating that demand is ready to follow supply, though it remains well below the EU average (19.3%).

In the mobile market, Ireland reported just over 5 million mobile broadband subscriptions as at Q2 2019, which equates to a market penetration of 103%, slightly above the EU average (100%).





Source: European Commission, based on data from Empirica (Retail broadband prices studies)

Broadband prices[55] in Ireland are substantially higher than the EU average for all speeds and types of product. This is reflected in the broadband price index, where Ireland ranks 27th in the EU with a broadband price index of 45 (against the EU average of 64). In fact, for most the fixed and converged price baskets, Ireland ranks among the five most expensive EU countries. However, the gap is substantially smaller in the higher end baskets, especially the standalone offering above 200 Mbps, on which Ireland is practically on par with the EU average.

Mobile broadband prices also tend to be higher in Ireland than the EU average. For data-only packages, the difference is higher at lower data allowances (twice as much for up to 1 GB) but substantially smaller at higher data allowances (39% more expensive for 5 GB but 14% cheaper for 20 GB). The trend is similar for mobile voice and data packages, where for a 20 GB allowance, the baskets in Ireland are 40% cheaper than the EU average.

[55] Source: Study for fixed broadband prices in Europe 2019 (Empirica, project SMART 2016/0044) - forthcoming. Comparisons are for the least expensive price (PPP) per basket. Each basket is defined based on the speed bracket (up to 10 Mbps, 10-30 Mbps, 30-100 Mbps, 100-200 Mbps) and the service components (internet, '2-play' with internet+telephone or internet+TV, and '3-play' with internet+telephony+TV).

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1. Progress towards a Gigabit Society[56]

Ireland is making substantial progress towards the Gigabit Society targets. Market players continue to deploy very-high-capacity networks (VHCN). The FTTH network run by the incumbent operator, Eircom, covers 375,000 premises (as of December 2019)[57]. In January 2020, Eircom launched a new project to upgrade its FTTC network to FTTH, aiming to cover 1.4 million households over the next five years (a €500 million investment). SIRO, a joint venture between the ESB (the state-owned electricity distribution network operator) and Vodafone, which offers wholesale-only services, covers approximately 300,000 premises and targets 500,000 premises in 50 towns. Virgin media is also expanding its own network.

However, Ireland's geography and population distribution prevent market players from deploying VHCN countrywide. The Irish national broadband plan (NBP) is designed to respond to this challenge and aims to ensure high-speed broadband access to all premises in Ireland, via a combination of commercial investment and State aid intervention. Following a lengthy procurement process launched in December 2015, which faced substantial challenges [58], the contract for the national broadband plan was signed on 19 November 2019. The contractor, National Broadband Ireland (NBI), will build a predominantly fibre-based network to cover 540,000 premises in Ireland. NBI will be a wholesaler offering passive and active wholesale products to all retail and wholesale service providers willing to provide services in the area.

Under the aegis of the Mobile Phone and Broadband Taskforce, which has worked on over 70 measures since 2016 focusing on issues that have a negative impact on the roll-out of essential telecommunications infrastructure, the Department of Rural & Community Development has created and funded the role of the Broadband Officers in local authorities. Their role is to act as local contact points for network operators and the public regarding telecom matters. Market players and other stakeholders have highlighted their appointment as an extremely important development. As the NBP is rolled out, Broadband Officers will also support and contribute to the development of digital strategies in local communities.

The Irish authorities are also implementing initiatives to support digitalisation and the uptake of broadband services. They include the Smart Community Initiative, the Trading Online Voucher Scheme, the School Digital Champion Programme and the Digital Skills for Citizens Grant Scheme.

Vodafone and Eir have already announced the commercial launch of 5G services, although deployment only covers limited numbers of locations (5 and 10 towns respectively). According to the market players, the two main challenges are the timely availability of spectrum[59] and access (including cost of access) to sites and to public land.

All operators expressed concerns over the potential impact of campaigns across Ireland to stop the installation of 5G antenna systems and even previous generations of antenna systems. As a result, several Irish county councils passed resolutions against 5G.

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[56] It is noted that statements regarding planned or potential State aid measures record intentions declared by Member States and do not pre-judge or pre-empt the assessment of such measures by the Commission under the relevant state aid rules. The DESI report is not meant to provide any assessment of the compliance of such measures with state aid rules and procedures.

[57] https://www.eir.i.e./pressroom/eir-FY19-Full-Year-Results-Announcement/

[58] E.g. the reduction of the intervention area in 2017 to exclude commercial investment planned by Eircom and the withdrawal of two participants, SIRO and Eircom, in 2017 and 2018 respectively, left only one bidding consortium, led by Granahan McCourt.

[59] *Infra* section 3.1 Spectrum assignment.

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The transposition of Article 18 of Directive 2014/61 (Broadband Cost Reduction Directive) on in-building physical infrastructure is still pending. This could hinder the deployment of high-speed electronic communications networks to reach end-users.

2. Market developments

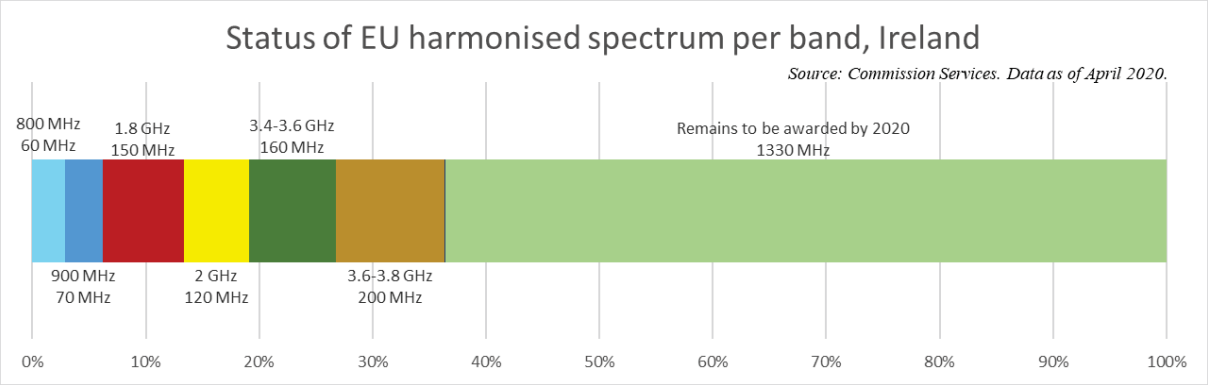
The most important development in the market in 2019 is the establishment of National Broadband Ireland (NBI), a new player in the broadband market that resulted from the award of the NBP tender. NBI will be a wholesale player that will operate only in the intervention area.

Competition is intense, as reflected by the market share of the incumbent operator in fixed broadband subscriptions (32.2% as at Q2 2019, compared to the EU average of 39.3%, surpassing only 5 of the 26 Member States that have provided relevant data).

ComReg is monitoring mobile coverage and has developed an outdoor mobile coverage map and mobile application. The map went live in February 2019. ComReg is preparing the release of the mobile application in 2020 and plans further enhancements.

3. Regulatory developments

3.1. Spectrum assignment



Overall, Ireland has awarded 760 MHz, i.e. 36.4% of the total 2,090 MHz harmonised spectrum for broadband[60]. The awarded spectrum is in the 800 and 900 MHz and the 1.8, 2 and 3.4-3.8 GHz bands. ComReg is in the process of awarding rights of use in the frequency bands of 700 MHz, 2.1, 2.3 and 2.6, but not in the 26 GHz band.

For the 700 MHz band, ComReg does not anticipate any difficulties in migrating existing users or in clearance of the band, which was completed on 4 March 2020. According to the current timetable, the spectrum award process is planned to begin in Q4 2020. A number of steps remain to be taken, including an additional public consultation and the adoption of legislation to provide the legal basis for the auction process.

Market players have expressed concerns on the delay in the award of the 700 MHz band. Two market players have expressed concerns on the combinatorial clock auction method adopted.

The 3.6 GHz band was awarded in June 2017. However, the band is not completely free for use, as it has been used to provide services to more than 20,000 customers predominantly in rural areas,

[60] The 5G spectrum readiness indicator is based on the amount of spectrum already assigned and available for use for 5G by 2020 within the '5G pioneer bands' in each EU Member State. For the 3.4-3.8 band this means that only licences aligned with the technical conditions annexed to Commission Decision (EU) 2019/235, are considered 5G-ready. On the contrary, the percentage of harmonised spectrum takes into account all assignments in all harmonised bands for electronic communications services (including 5G pioneer bands), even if this does not meet the conditions of the 5G readiness indicator.

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where in some cases, the incumbent fixed wireless operator may have been the only available provider of broadband services to homes and schools. To ensure continued services for such users, ComReg has developed a transition licensing framework, which was consulted with the market and implemented by way of the 3.6 GHz Band Award rules, contained in the 3.6 GHz Band Spectrum Award Information Memorandum[61]. According to ComReg, there has been considerable progress in making an orderly transition of the band, which has facilitated the take-up of spectrum rights for all new licensees. ComReg regularly publishes updated transition information via a dedicated page on its website[62].

3.2. Regulated access (both asymmetric and symmetric)

In Ireland, all markets included in the 2014 Recommendation on Relevant Markets are subject to regulation, along with a few legacy markets[63].

In November 2019, ComReg addressed the delay it had accumulated in the past years in conducting market reviews, by notifying its analysis and draft measure for the market for wholesale high-quality access provided at a fixed location (market 4 of the 2014 Recommendation on relevant markets[64]). To avoid future delays, ComReg has committed to carrying out mid-term reviews of the markets.

In May 2019, ComReg published the Market Analysis Decision[65], and the related Price Control Decision[66] concerning the markets for wholesale call termination on individual public telephone networks provided at a fixed location, and for wholesale voice call termination on individual mobile networks (markets 1 and 2 of the 2014 Recommendation respectively). For market 2, ComReg set FTRs and MTRs based on a Bottom BU (Pure) LRIC cost model (bottom up modelling approach using pure long run incremental costs), with rates adjusted on a glide path.

ComReg has also notified a set of regulatory measures concerning the wholesale and retail bids for tenders to non-geographical numbers.

ComReg has commenced work (including engagement with external stakeholders) on reviews of three additional markets: markets 1 and 2 of the 2007 Recommendation on relevant markets and market 18 of the 2003 Recommendation on relevant markets. ComReg expects to be in a position to run public consultations on its reviews of these markets in Q2 2020.

DCCAE and ComReg are working together to transpose the Code, but there are significant challenges. The current intention is to use predominantly secondary legislation. The market has expressed concerns on the timely completion of the process and the lack of engagement so far. According to Irish authorities, a number of targeted stakeholder engagement events were planned in early 2020 with the telecommunications and the OTT sector. In view of COVID-19 restrictions, other online events are planned in Q2-Q3 2020.

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[61] Document 16/71.

[62] See https://www.comreg.i.e./industry/radio-spectrum/spectrum-awards/3-6-ghz-band-transition/

[63] (a) The retail market for access to the public telephone network at a fixed location for residential and non-residential customers (market 1 of the 2007 Recommendation on relevant markets; (b) the market for call origination on fixed networks (market 2 from the 2007 Recommendation); and (c) the broadcasting transmission market (market 18 from the 2003 Recommendation).

[64] Commission Recommendation 2014/710/EU of 9 October 2014 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services Text with EEA relevance, OJ L 295, 11.10.2014, p. 79-84.

[65] ComReg Document 19/47.

[66] ComReg Document 19/48.

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4. Issues for end-users

a. Complaints

According to information provided by ComReg, during the period 1 January 2019 to 31 December 2019, residential and business customers raised 36,565 issues to ComReg's consumer line. ComReg's consumer line team could deal with and close the majority which were queries (31,016). Only the 6,004 complaints required direct escalation to the service provider. Most complaints concerned premium-rate services, billing (including disputed charges), service issues (such as loss of service and quality of service) and contractual matters (contract termination requests and terms and conditions).

b. Net neutrality

Following ComReg's empowerment to enforce net neutrality rules, on 12 July 2019, it launched a number of investigations into undertakings' compliance with their obligations under the net neutrality rules. The investigations are still pending.

According to ComReg, the development of zero-rated services is still at an early stage in Ireland.

c. Emergency communications – 112

In Ireland, user location for fixed calls is based on installation addresses and Eircodes. User location for mobile calls is based on network infrastructure data and mainly on advanced mobile location (AML). AML was rolled out in 2017 for voice calls over Android and in 2019 for SMS over Android and voice calls over IoS. Authorities estimate that AML is available for about 55% of mobile calls. For the remaining mobile calls, caller location relies on cell information. Currently, Ireland is looking to extend AML for EU roamers.

For persons with disabilities (speech impaired), SMS is the primary means for communicating. The mechanism relies on forwarding SMSs to the PSAP. An alternative is the Irish Text Relay Service, an enhanced text relay service that provides the translation of text into voice and voice into text to help people who are deaf or hard of hearing in making and receiving calls. The service is accessible from mobile phones (Android and iOS), tablets and PCs, enabling conversations through text.

d. Universal service

Eir is the designated universal service provider and has submitted applications for USO funding for the financial years 2010 to 2016. ComReg has assessed the direct net cost, intangible benefits and the unfair burden. It has issued individual consultation documents and final decisions for the financial years 2010-15[67]. For each of these cases, ComReg concluded that there was a positive net cost of €7.5 million in respect of Eir's provision of the universal service obligation and that this positive net cost does not represent an unfair burden on Eir. On 15 May 2019, Eir, appealed to the High Court against these decisions.

Currently, broadband internet access service is not included in the scope of universal service.

5. Other issues

In 2019, the national authorities approved an increase in staffing for ComReg, from 125 to 147 permanent positions.

Furthermore, as of 12 July 2019, ComReg has been granted powers to impose penalties for breaching net neutrality rules. Such powers have been granted through secondary legislation. However, legislation for intra-EU calls enforcement powers is still pending. The DCCAE has in parallel

[67] ComReg Decisions D05/19, D06/19, D07/19, D08/19 and D09/19.

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initiated a project to prepare primary legislation that will reinforce ComReg's sanctioning powers. This is a standalone process separate from the transposition of the EECC.

In December 2018, ComReg and Eir signed an agreement settling, on the one hand, several legal proceedings brought against Eir for breaching the access regulations and, on the other hand, a legal proceeding brought by Eir against the Minister for Communications on the validity of the legislation upon which ComReg's compliance litigation had been based. The main element of this agreement was the establishment of an enhanced Regulatory Governance Model in Eir. The main aspect of the model includes establishing an Independent Oversight Body, increasing the independence of the wholesale arm and ensuring that access to IT systems is governed properly. Alternative operators have expressed concern that this model cannot reinforce Eir compliance with telecoms legislation.

ComReg has completed the review and reform of the non-geographic numbers (NGN) regime. A new retail regulation reduces the number of ranges from 5 to 2 (1800 for free phone and 0818 for normal calls). In parallel, a new wholesale regulation imposes price control (BU-LRIC+) for the wholesale origination rate. This is based on Article 5 of the Access Directive, in combination with Article 28 of the USD and Articles 8, 9 and 13 of the Access Directive. It was notified on 11 November 2019. The new rates will be effective from 1 May 2020. Some operators expressed concerns on the wholesale approach, both on the approach taken and on the economic implications.

6. Conclusion

The award of the contract for implementing the national broadband plan is a major development for Ireland. It can help bridge the geographical divide and expand the footprint of ultrafast broadband networks in rural Ireland, helping achieve the country's Gigabit Society targets for 2025. For implementation to be successful, it will be important to monitor and enforce the rules effectively in the Irish electronic communications market. There is a risk that the long delay in transposing Article 8 of the Broadband Cost Reduction Directive 2014/61 hinders the deployment of high-speed electronic communications networks to reach all end-users. Equally important is for the 5G spectrum to be awarded without delay. Ireland has already awarded 5G spectrum in the 3.6 GHz band and is now moving forward with the award of the 700 MHz band according to the published timetable. The award process is planned to begin in Q4 2020. From an institutional viewpoint, the increase in staffing and the powers granted to enforce net neutrality rules are significant, positive developments for ComReg.

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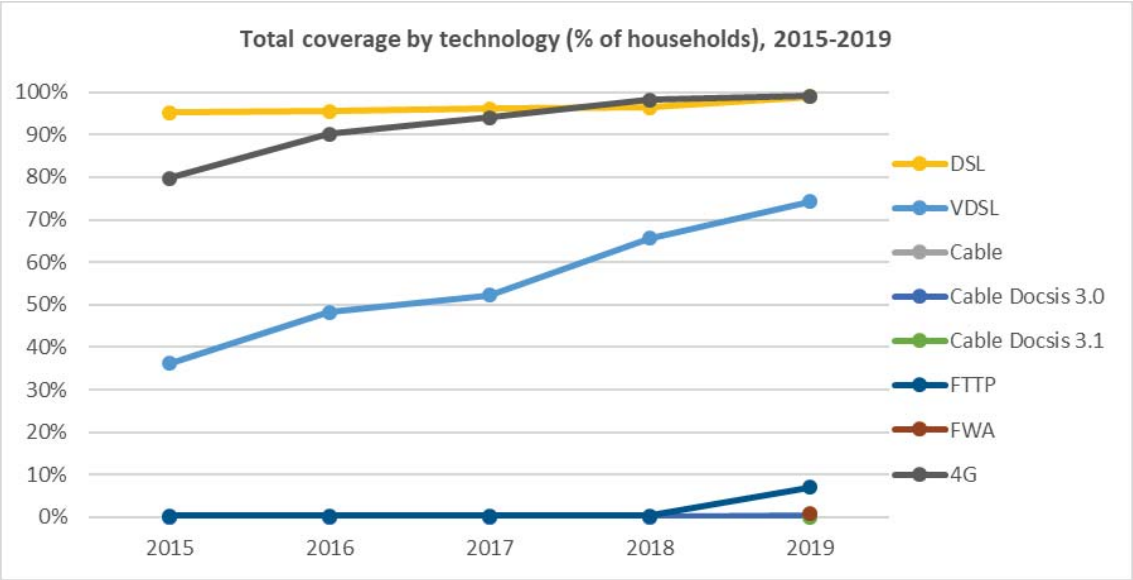
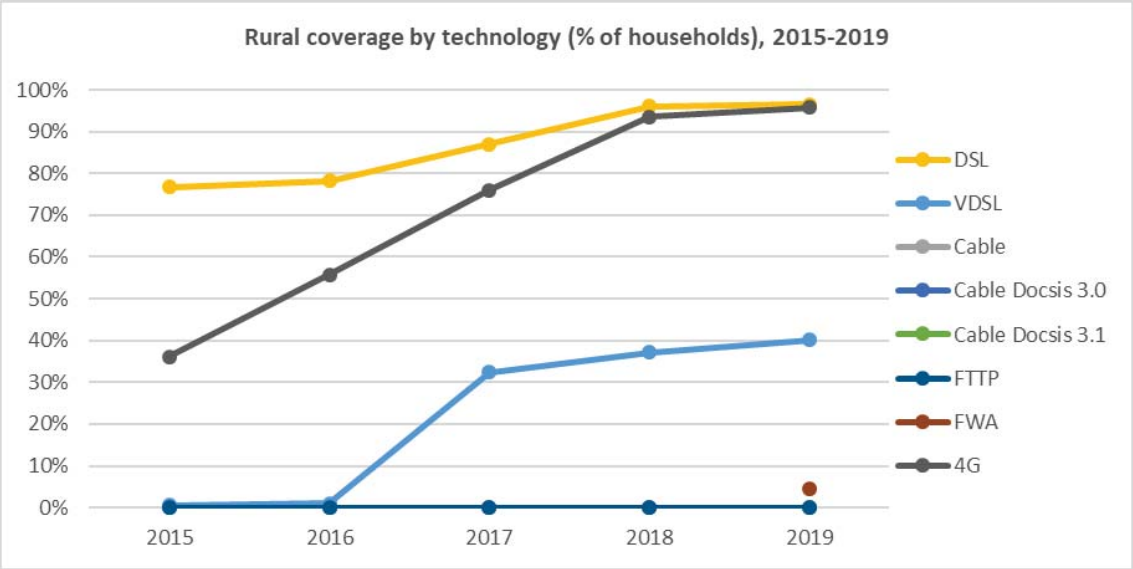
Greece





Source IHS and Point Topic, Broadband coverage in Europe studies

Greece is progressing at a very high pace in fast broadband (NGA) coverage showing a substantial progress of 15 percentage points in 2019 reaching 81%, only 5 percentage points below the EU average of 86%. Moreover, the country has finally started to engage in the deployment of very-high-capacity networks and its fixed very-high-capacity-network coverage reached 7% from 0% the previous year, though this is still far below the EU average of 44%. Total coverage of both DSL (99%) and VDSL (74%) in 2019 was above the EU average (at 91% and 59% respectively)[68]. In addition, DSL rural coverage in 2019 (at 96%) was above the EU average (81%) and VDSL rural coverage (40%) almost reached the EU average (42%) in 2019. However, fibre deployment was only 0.4% of

[68] Based on coverage data per category of speed, Greece is progressing at a very high pace in broadband coverage >30 Mbps showing a substantial increase of 18.7 percentage points in 2019 to reach 79.7%, remaining slightly below the EU average of 83.3%. Greece shows a significant increase of 41.2 percentage points in broadband coverage >100 Mbps in 2019 to reach 41.6% (from 0.4% in 2018), but this still remains far below the EU average of 68.4%.

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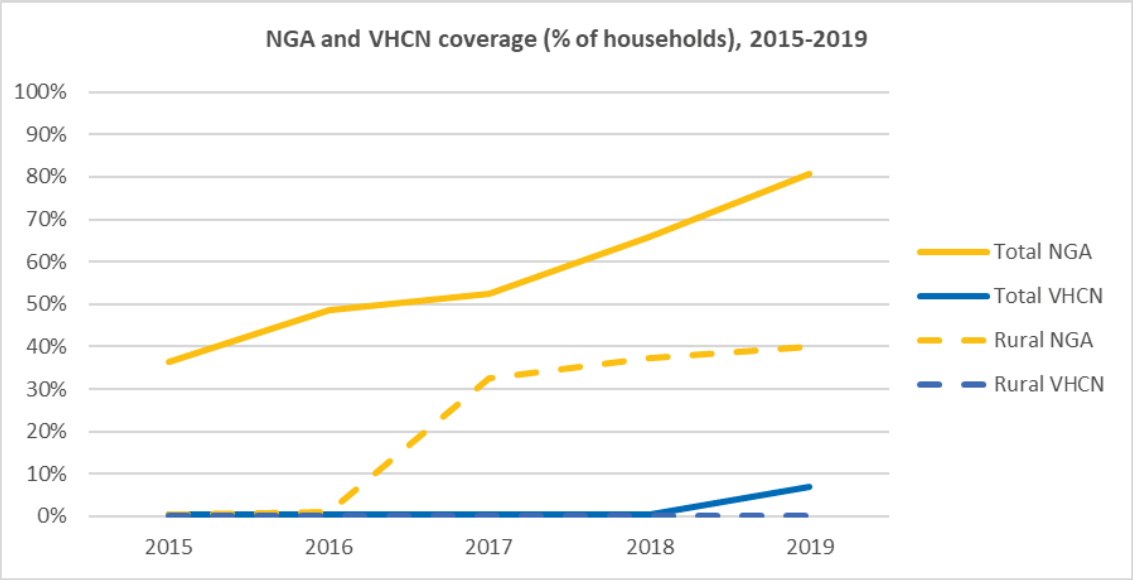
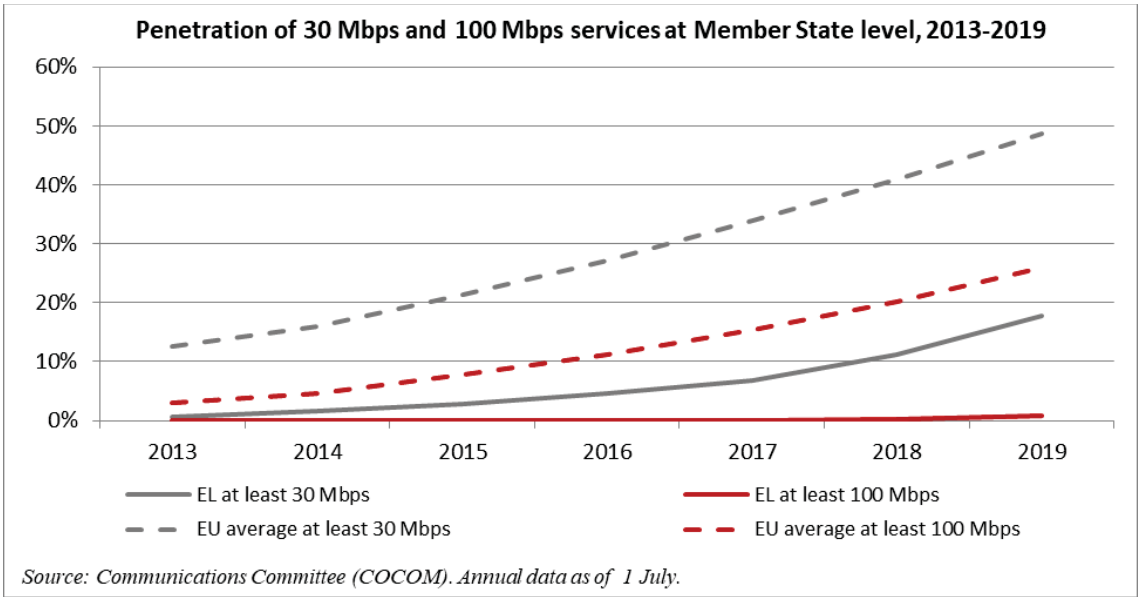
households in 2018 and increased to only 7% in 2019. Greece performed better on 4G, with an overall coverage reaching the EU average (99%).



Source IHS and Point Topic, Broadband coverage in Europe studies



The overall fixed broadband take-up is still progressing at a slow pace, reaching 76% in 2019 (up from 74% in 2018) remaining below, but close to the EU average (78%). Moreover, the penetration rate of at-least-30 Mbps broadband demonstrates increased by 6.4 percentage points (from 11.3 in 2018 to 17.7 in 2019). This increase could be attributed to the progressing network deployment and related market campaigns on high-speed internet and video-streaming products. However, the penetration rate of broadband of at-least-100 Mbps increased only slightly from 0.3% in 2018 to 0.8% in 2019.

The transition to very-high-speed connections is slower than in other EU Member States, with Greece ranking last in 2019. This could be linked to the fact that Greece has a low coverage of very-high-capacity networks and to the late introduction of very-high-capacity networks in Greece, in comparison to other EU countries. Despite the 11-point increase in mobile broadband take-up, it currently has 86 subscriptions per 100 people, well below the EU average of 100 subscriptions per

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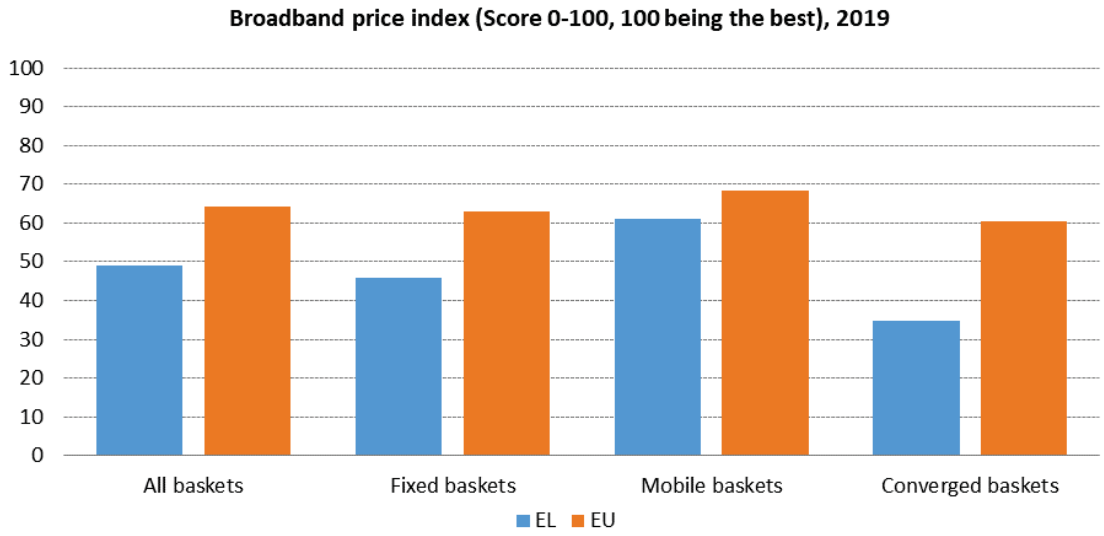
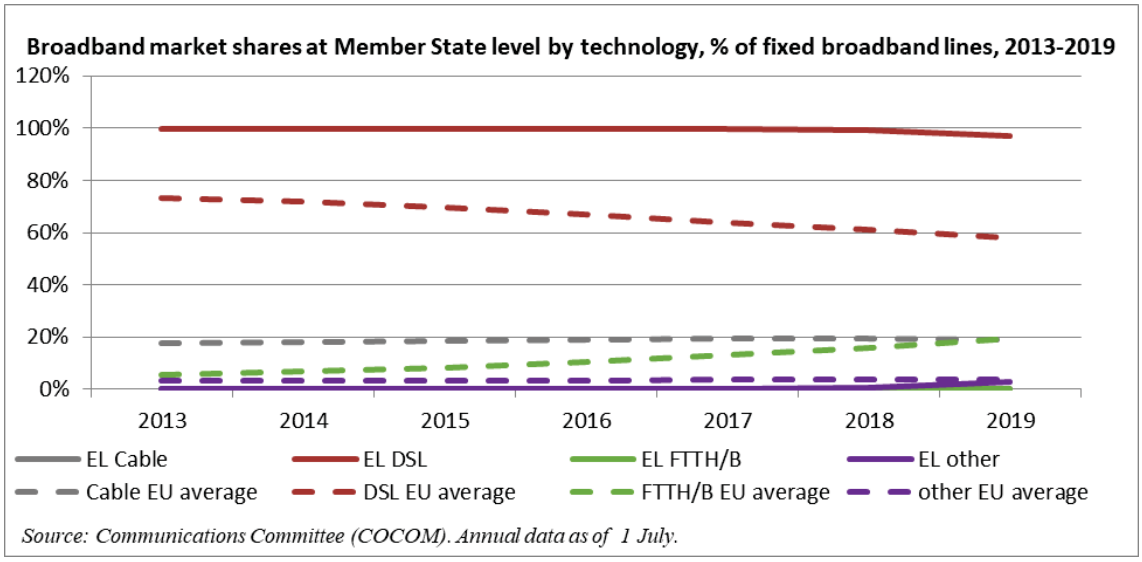
100 people. The slow transition to very-high-capacity networks and the low penetration rate could be also linked to prices, which remain relatively high compared to the EU average. Greece ranked last in 2018 and now 26th in the EU countries on the broadband price index. Prices in Greece for high-speed internet-baskets are higher than the EU average, whereas prices for lower-speed-baskets remain close to EU average.



Source: Commission services based on Empirica (Retail broadband prices studies)

More specifically, for fixed broadband (including converged fixed and mobile bundles), prices in Greece are close to or even below the EU average, for baskets below 30 Mbps. However they are substantially higher (20-50%) than the EU average for 30-100 Mbps baskets. Greece is the most expensive country for all baskets at 100-200 Mbps, but does not appear to supply the baskets above 200 Mbps. For mobile broadband, prices in Greece seem to be substantially lower than the EU average for low-data allowance baskets with no calls (second cheapest, 45% below the EU average for the 2 GB basket with no calls). This gap narrows as the allowance increases (almost on par with the EU average for the 20 GB basket with no calls). However, Greece is more expensive for most baskets that include voice calls and is one of the most expensive countries for the 20 GB basket with 100 or 300 calls.



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DSL remains the dominant technology available to deliver broadband access services in Greece, accounting for 97.1 % of the retail fixed broadband lines in the broadband market shares by technology. In Greece, there are neither cable networks nor competition from FTTH/B technology. Competition is mainly based on regulated access to the incumbent's (OTE), access network.

1. Progress towards a Gigabit Society[69]

Greece has set very high in its political agenda for the next four years the digital transformation of the state and the improvement of the digital status and the connectivity of the country. Greece is in the process of updating the National Broadband Plan (Law 4635/2019, Article 43) and finalising the "Digital Transformation Bible", which will result in a structured, actionable and measurable digital strategy for Greece, with announcements expected in 2020.

The major broadband infrastructure project and Greece's main priority is the "Ultra-Fast Broadband" (UFBB) project, which aims to help the country fill the gaps on very-high-speed connectivity (in the supply side) and achieve its Gigabit Society targets. During the first stage of the tendering procedure, nine bidders expressed their interest; three of them are electronic communication service providers, whereas the rest are from the construction and the energy sector. Greece expects that this project will bring new wholesale-only players into the market and will foster cross-sector synergies. Despite the unprecedented circumstances imposed by the COVID-19 pandemic, the Ministry's ambitious plan is to stick to the initial schedule and sign the contracts in 2020.

The project's total budget is estimated at € 700 million of which € 300 million is public funding. Further to the Commission's approval of the measure under State aid rules on 31 July 2019, on 31 January 2020 the European Commission approved European financing for the UFBB project in amount of € 223 million, with over € 196 million from the European Regional Development Fund (ERDF) and € 27 million from the European Agricultural Fund for Rural Development (EAFRD) with the purpose of providing modern and fast internet access to users throughout the country. It is expected to cover almost 18% of the country (in terms of infrastructure availability) and to become operational as of May 2021.

The three operators (OTE, WIND, Vodafone), to which exclusive areas of NGA deployment have been allocated by the National Regulatory Authority (EETT)[70], have accumulated delays on the initial plan for roll-out due to issues with power supply and permit granting. Although most of the NGA deployment under the vectoring deployment plan concerns implementation of FTTC/VDSL vectoring access networks, operators also deploy FTTH network to a lesser degree.

Regarding the deployment of NGA access networks in the context of the vectoring procedure for allocated outdoor cabinets and the approximate number of subscribers per technology, in March 2020 OTE has 15, 305 active outdoor cabinets for NGA and 2, 295, 750 active subscribers[71]. It plans to allocate 331 outdoor cabinets for VDSL by Q1 2021. However, OTE has no active FTTH cabinets and plans to allocate 397 outdoor cabinets for FTTH. Vodafone has 1, 646 outdoor cabinets for NGA

[69] It is noted that statements regarding planned or potential State aid measures record intentions declared by Member States and do not pre-judge or pre-empt the assessment of such measures by the Commission under the relevant state aid rules. The DESI report is not meant to provide any assessment of the compliance of such measures with state aid rules and procedures.

[70] C (2016) 8300 final concerning the Case EL/2016/1936 and Case EL/2016/1937 (Market review 3a (Vectoring decision)).

[71] The data of EETT are calculated on the approximation that approximately 150 subscribers correspond to one cabinet.

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already active and 346 planned, with 246, 900 subscribers for its active cabinets. Vodafone has the highest number of active FTTH outdoor cabinets (234), which it plans to increase by 475 more and it has 35, 100 active FTTH subscribers. In March 2020, Wind had 1, 563 active outdoor cabinets for NGA and 234, 450 active subscribers, with the plan to allocate 1, 253 outdoor cabinets for NGA by Q1 2021. Wind also had 37 active FTTH cabinets and 5, 550 active subscribers, and plans to allocate 218 more FTTH outdoor cabinets.

In January 2020, the operators announced further plans to deploy NGA networks based on fibre (FFTH). According to information on additional FTTH deployment (i.e. outside the vectoring procedure) provided by the operators to EETT in March 2020, Vodafone has 99 outdoor cabinets already active in 2 LEXs and 14, 850 active subscribers[72]. In addition, for 2020, 78 outdoor cabinets in 3 LEXs are planned by Vodafone. As for OTE, as of March 2020, it has 1, 085 outdoor cabinets already active in 56 LEXs and it plans 1, 189 outdoor cabinets in 65 LEXs over the period 2020-2021. OTE has 162, 750 active subscribers. Wind is planning to add 202 outdoor cabinets in 6 LEXs for 2020. Finally, Forthnet does not intend to deploy NGA network in this timeframe.

Greece also considers a "Submarine Cable Scheme" to work towards its Gigabit Society targets for the Greek islands, to promote digital cohesion, and to create adequate backhauling facilities. The project may cover 43 submarine links running to a total length of 2, 400 Km and an international link between Rhodes and Cyprus. The project budget is estimated € at 100 million.

The "Superfast Broadband project" (SFBB)[73], which aims to stimulate demand and support citizens in subscribing to a service at speeds from at least 100 Mbps, readily upgradable to 1 Gbps, is now progressing effectively, after resolving initial delays in absorption of vouchers. The total subsidy for a 24 months period is € 360, including the fixed initial connection fee. Greece has issued over 6,500 vouchers and the number of beneficiaries is expected to rise significantly as VHC availability improves. In February 2020, Greece extended the Superfast Broadband (SFBB) program to businesses, mainly small and medium-sized. The total budget of the programme is € 50 million per year.

Greece is one of the Member States that was successful in the WiFi4EU first call as it won 117 vouchers (about 40 % of those applied, 268 in total). The Ministry is preparing a complementary project (WiFi for GR), with enhanced technical specifications that aims to extend the public Wi-Fi availability. The project's budget is € 15 million and it will be funded by ESIF (ERDF).

The new antenna licensing law[74], voted as part of the recent Greek Growth Act, was welcomed by all involved parties (operators, EETT and EEKT) as an important step towards the simplification of the antenna licensing procedure and for the preparation for the 5G roll-out. The simplification and acceleration of the process will be achieved by providing authorization and installation of antenna constructions in two distinct stages, with one being a prerequisite for the next. In particular, for the installation and operation of new antenna constructions, the issuance of a construction permit by EETT is preceded and then the issuance of an antenna construction approval through the electronic

[72] The data of EETT are calculated on the approximation that approximately 150 subscribers correspond to one cabinet.
[73] DG COMP approved the extension of the project's scope and duration until 31/3/2020 (Decision SA. 56599/5.5.2020).
[74] The licensing of antenna constructions is mainly regulated by sections 20 to 38 (Part A of Chapter IA) of Law 4635/2019 (Government Gazette A 167) and EETT Decision 919/26 / 16-12-2019 "Regulation Antenna Licensing Offshore" (Government Gazette 4872 / B / 31-12-2019).

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building permits system provided for in the new town planning legislation follows. Digitalisation and transparency are achieved as the foreseen process is carried out electronically through the Electronic Application System and the Electronic Building Licensing System (e-licenses). Specifically, the application for the relevant license from EETT is submitted through the SILYA system, while the application for approval for the installation of antenna construction is submitted through the e-licenses System. SILYA and the e-licenses System are interconnected and it is also envisaged to link SILIA with all other services involved in the licensing process.

Regarding the implementation of the Broadband Cost Reduction Directive, according to the Greek Law 4463/2017[75], the full functioning of the Single Information Point (SIP) requires the adoption of secondary legislation by the Ministry of Digital Governance, yet to be adopted. There are still complaints and delays concerning the granting of permits by the Municipalities. To address these issues, the General Secretariat of Telecommunications and Post is preparing a new system to manage and coordinate the permit granting procedures. The system will operate as one-stop-shop and it is anticipated to facilitate the co-investment and the cross-/intra-sector synergies. The indicative timeframe for the concluding the contract for this new system and for starting the trial phase is Q3 2020.

2. Market developments

The merger between Vodafone-Panafon Hellenic Telecommunications Company S.A. and CYTA Hellas SA, following the acquisition of the latter by the first, was completed by the end of the first quarter of 2019. OTE completed the sale of its entire stake in Telekom Albania Sh.A. to Albania Telecom Invest AD, for a total gross equity consideration of € 50 million. Forthnet announced the signing of an agreement with Vodafone for acquiring wholesale access to the latter's radio network. This agreement enables Forthnet to offer retail mobile voice and data services as a Mobile Virtual Network Operator (MVNO). The initial duration of the agreement is four years after the commercial launch of the retail services mentioned above, which is planned for the first quarter of 2020. This agreement is based on the decision of EETT concerning the settlement of two disputes between Forthnet and OTE, which was notified to the Commission in November 2018. The disputes concerned the terms and conditions for Forthnet's access to the MNOs networks.

Another interesting development of the Greek mobile market, relates to the only sharing agreement of the market, which EETT is currently examining, after the parties notified to the authority the amendment/upgrade of their agreement to 4G (LTE) technology. It concerns the RAN-SHARING agreement, which was signed between number 2 and 3 of the Greek mobile operators, namely Vodafone-Hellas SA and Wind Hellas. EETT is examining the risks of any anti-competitive effects that may arise, as well as the fulfilment of the conditions of Article 1, par.3 of the Greek Law on Competition (Law 3959/2011) and Article 101, par.3 TFEU. There were three MNOs and one MVNO (CYTA) until the end of the first quarter of 2019, when CYTA merged with Vodafone and thereafter only three MNOs, OTE, Vodafone and Wind, present in the mobile market. OTE is the market leader in terms of revenues, active subscribers, traffic and mobile data.

The use of mobile networks was mainly characterized by a small increase of the domestic voice minutes, a considerable drop of SMS volume and a significant increase in the volume of data services. Between 2015 and 2018, OTE reported a slightly falling market share in mobile traffic, i.e.

[75] According to Law 4463/2017, SIP is an online platform operated by the Ministry of Digital Governance. Issues related to the functioning of the Single Information Point shall be determined by a decision issued by the Ministry of Digital Governance.

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voice, and an increasing market share in mobile data.

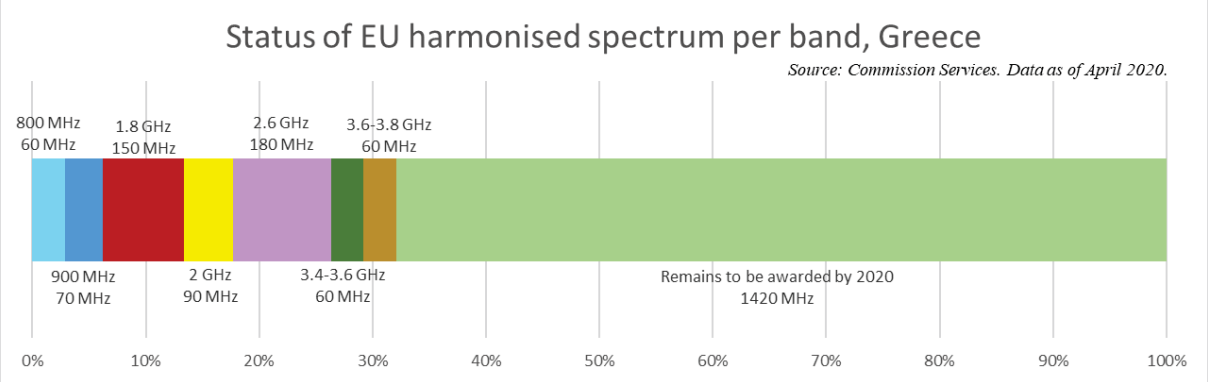
There are five main operators active on the fixed market: the incumbent, OTE, and three alternative operators, Vodafone, Wind and Forthnet. Cyta remained an active fixed operator up until the end of the first quarter of 2019. The fixed telephony market was mainly characterized by a small increase in the total revenue, a slight decline in terms of subscriptions and a continuing drop regarding the fixed voice traffic. Between 2016 and 2018, OTE appeared to retain stable market share of fixed telephony and broadband networks. It is worth mentioning that over the same period OTE continued to upgrade its access network from PSTN to IP technology. At the end of 2018, 55% of OTE's access lines were VoB (managed VoIP).

Competition in bundles remains intense in Greece, which is ranked among the Member States with the highest bundles' penetrations. Wind launched the first Android TV subscription service in Greece and among the first in Europe in April 2018. Given the above, all four operators offer 3-play bundles with television (ie "FV+FBB+ TV") in the Greek market, while fixed-mobile bundles are provided by all expect NOVA.

3. Regulatory developments

In 2019, the General Secretary of Telecommunications and Post set up a team composed of Ministry and EETT experts, to work together to implement Directive 2018/1972/EE, the European Electronic Communications Code (EECC). This task force has already produced a draft legislative proposal for the transposition. The public consultation on this draft proposal is expected to be launched in May 2020.

3.1. Spectrum assignment



The Ministry launched a new study regarding a 5G strategy, which will be finalised and published in Q3 2020. Greece ranks 18th on the 5G readiness indicator. On 17 December 2019, it published the decision on the modifications of the National Frequency Allocation Map concerning the TV broadcasters in the Government Gazette[76]. 32.06% of the total spectrum harmonised at EU level for wireless broadband has been assigned. Delays are expected in making the 700 MHz band available, as the final date for its use for broadcasting was 15 December 2020. The auction is expected to be held in 2020 and the 700 MHz spectrum will be available for use by the mobile service by mid-2021. The challenge is to facilitate the migration of DTT below 694 MHz, with the lowest possible impact to the public. Legal and technical issues may arise during the process of amending the licenses of the two DTT network providers (one private, DIGEA, and one public, ERT). On 6 February 2020, EETT launched the public consultation on the process of granting rights of use in the 700 MHz, 2 , 3.4 – 3.8

[76] Government Gazette, FEK 4652/17 December 2019.

and 26 GHz bands, due to be completed on 30 April 2020. The Ministry is also assessing the scenario of running one tender for all 5G pioneer bands. A new antenna licensing law, voted recently as part of the new Greek Growth Act, constitutes an important step towards simplifying the antenna licensing procedure and towards preparing for the 5G roll-out.

3.2. Regulated access (both asymmetric and symmetric)

EETT attributes current investments in NGA infrastructure to the 2016 Vectoring decision[77] on the market for wholesale local access provided at a fixed location (market 3a of the 2014 Recommendation on relevant markets) and the market for wholesale central access provided at a fixed location for mass products (market 3b of the 2014 Recommendation on relevant markets). It regards the outcome as a success, considering the starting point of the market. However, the level of infrastructure competition is low and the incumbent, OTE, enjoys a high market share. Alternative operators had little success in getting areas assigned: the incumbent got 773 local exchanges against only 65 for Vodafone and Wind together.

All operators, including the incumbent, complained about the delay since 2016 of EETT to adopt a new Bottom-up Long Run Incremental Cost plus (BULRIC+) model for market 3a and 3b and underlined the necessity to have the final prices for Virtual Unbundled Local Access (VULA) as soon as possible, to be able to compete and progress with their investment plans and ensure the availability of their products. EETT sets as high priority to finalise this new cost model and set prices for VULA on that basis. The new cost model was notified to the Commission on 17 February 2020[78]. OTE complained that the price level for copper (as nationally consulted) would be too low; whereas other operators welcomed the cost model. Vodafone expects that the price of copper will remain stable while the price for NGA access will go down. A full review of Markets 3a and 3b is envisaged to be notified in Q4 2020.

Concerning the analyses of the markets for leased lines and trunk segments of leased lines[79], a second public consultation was conducted until June 2019 and EETT finally notified the draft decision to the Commission on 21 June 2019[80]. On 19 July 2019, the Commission issued a serious doubts letter[81] and opened a Phase II investigation regarding the notified draft decision of the wholesale terminating segments market, while providing comments on the wholesale trunk segments market. The Commission, had serious doubts as to the compatibility with EU law of EETT's draft measures concerning the proposed very light touch regulation for the area of Athens/Piraeus and the proposed exceptions to the margin-squeeze regulation regarding the market for wholesale terminating segments of leased lines. This area represents a very large segment of the market, reaching 84% of all leased lines offered in Greece. EETT, withdrew the notification, updated the market review, carried out a short consultation with the participants of the first two public consultations and notified the amended draft measure. The Commission urged EETT to finalise the

[77] C (2016) 8300 final concerning the Case EL/2016/1936 and Case EL/2016/1937 (Market review 3a (Vectoring decision)).
[78] EL_2020_2237.
[79] I.e. the market for wholesale high-quality access provided at a fixed location (market 4 of the 2014 Recommendation on relevant markets), the market for retail leased lines (market 7 of the 2003 Recommendation on the relevant markets) and the market for wholesale trunk segments of leased lines (market 14 of the 2003 Recommendation on the relevant markets.
[80] CIRCABC://circabc.europa.eu/faces/jsp/extension/wai/navigation/container.jsp?FormPrincipal:_idcl=FormPrincipal:_id1&FormPrincipal_SUBMIT=1&id=e08f7147-f9cd-46e8
[81] C (2019) 5523 final.

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new cost model in order to set prices for the above-mentioned markets. In the meantime, EETT is expected to notify to the Commission long term prices under the normal rules of Article 7(3), however this does not prevent EETT from taking urgent action under Article 7(9).

In December 2019, EETT launched a public consultation on market analysis of the Interconnection Markets (Market 1/2014 and Market 2/2007), which runs until 9 March 2020. EETT is planning to notify the Interconnection Markets still in Q2 2020. According to the draft measure that was subject to the consultation, EETT proposes deregulating Market 2/2007.

4. End-user matters

a. Complaints

According to the Consumer Ombudsman, the main category of consumer complaints for 2019 concerned the provision of Premium Rate Services (PRS) through the use of PSMS. There has been an increasing number of complaints related to fraud through PRS, most of which takes place via technologically advanced methods, with the use of hacked applications installed in smart mobile devices. EETT has been investigating this issue and is in cooperation with all the relevant Public Authorities involved. Since February 2020, EETT has amended the Code of Conduct for Premium Rate Services. According to this regulatory amendment, the enrolment in these specific services requires the explicit consent of end-users and in this way any arbitrary end-user charges are prevented[82]. Furthermore, EETT made website updates and media releases to raise public awareness of PRS issues.

b. Open Internet

According to EETT's binding regulatory decision on net neutrality[83], the inclusion of speed values in contracts was planned for 5th October 2019. However, this deadline was prolonged for 12 months, following requests from most major Internet Service Providers (ISPs). The extension period should allow ISPs to finalize the methodology for estimating speeds and proceed to pilot implementations before announcing the speeds to the public. The extension was provided with EETT Decision 909/2/30-9-2019, which also contained an amendment to the existing Decision, stipulating that ISPs can also request the active participation of the subscriber for verifying a complaint about speeds, in order to reduce costs and avoid sending technicians for on-site checks. The majority of ISPs complained that the estimation of speeds especially for mobile is very complex from a technical perspective, very costly and not necessary, demanding a lot of time and resources to be implemented.

On 18 November 2019, EETT also issued (with EETT Decision 916/4/18-11-2019) an interim directive for Greek ISPs offering Internet Access Services with so-called "speed guarantees". The directive applies until the entry into force of the provisions regarding Internet speeds (on 5 October 2020), and includes transparency obligations that ISPs should adhere to regarding the provision of speed guarantees.

[82] EETT decision 923/12/17.02. 2020 published in Government Gazette as 651/B'/28-2-2020.

[83] EETT issued a binding regulatory decision on net neutrality (EETT decision 876/7B/17-12-2018) in the area of Articles 4(3) and 5(1) of the Regulation and the BEREC Guidelines. The decision was published in the Government Gazette18 and entered into force on 05 February 2019. This decision sets out additional transparency requirements for Internet Service Providers (ISPs) and provides clarifications for the application of traffic management and commercial practices. It also entails a methodological framework for estimating speeds.

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In November 2018, EETT initiated investigations against two mobile operators offering zero-rated offers. EETT informed the operators that their discriminatory practices would breach Article 3 par 1 and 3 of Regulation (EU) 2015/2120, and after exchanges with the operators all discriminatory practices were ceased by April 2019. In November 2018, EETT initiated investigation into the breach of Article 3 par 3 against one mobile operator for throttling video streaming traffic to a specific service. The grievance was that this throttling is not consistent with the objective quality requirements of this traffic category, and that congestion in the network cannot justify the application of such selective throttling. The operator ceased the practice. In November 2019, EETT sent notification letters to three operators regarding their application of the transparency provisions laid down in EETT Decision 876/7B/17-12-2018, and indicated shortcomings and points to improve the information provided to end-users. The operators were asked to amend their contract and website information within 30 days.

c. Emergency communications – 112

The Commission sent a letter of formal notice under Article 258 Treaty on the Functioning of the European Union on 25 July 2019, because the Greek authorities had continuously failed to ensure the correct implementation of Article 26 (3), (4) and (5), with regard to the implementation of equivalent access solutions for disabled end-users to emergency services and the timely provision of caller location information for emergency calls in Greece. However, progress was succeeded so far and the new call centre that receives 112 calls is fully operational since 01 January 2020. It ensures Cell ID based caller location information for all incoming calls throughout the entire country (mainland and islands) and automatic provision of the relative information. There are two 112 PSAPs both located in Athens (primary and secondary), where all the incoming calls are received and handled. Disabled end-users may contact the emergency services mainly through SMS and MMS to 112. In addition, the new 112 PSAP uses Cell Broadcast technology to send alert messages to mobile handsets of citizens in a specific area affected by natural or other kind of disasters. The new 112 PSAP has also the ability to send alert messages (via SMS or/and voice calls to fixed telephone connections) to pre -registered users.

5. Conclusion

Under its ambitious new digital strategy, Greece is working to address the delays in implementing the projects and in absorbing the funds allocated. Timely implementation of the “Ultra-Fast Broadband” (UFBB) project and creating the right conditions for investments will improve its digital competitiveness. Tackling the significant delays in the process for antenna permit granting under the new law and promoting 5G development will improve the country’s digital status. For the 5 G roll-out to be a success, it is crucial to implement the 5 G strategy and to assign the 5 G pioneer bands (700 MHz, 3.6 GHz and 26 GHz) without delay.

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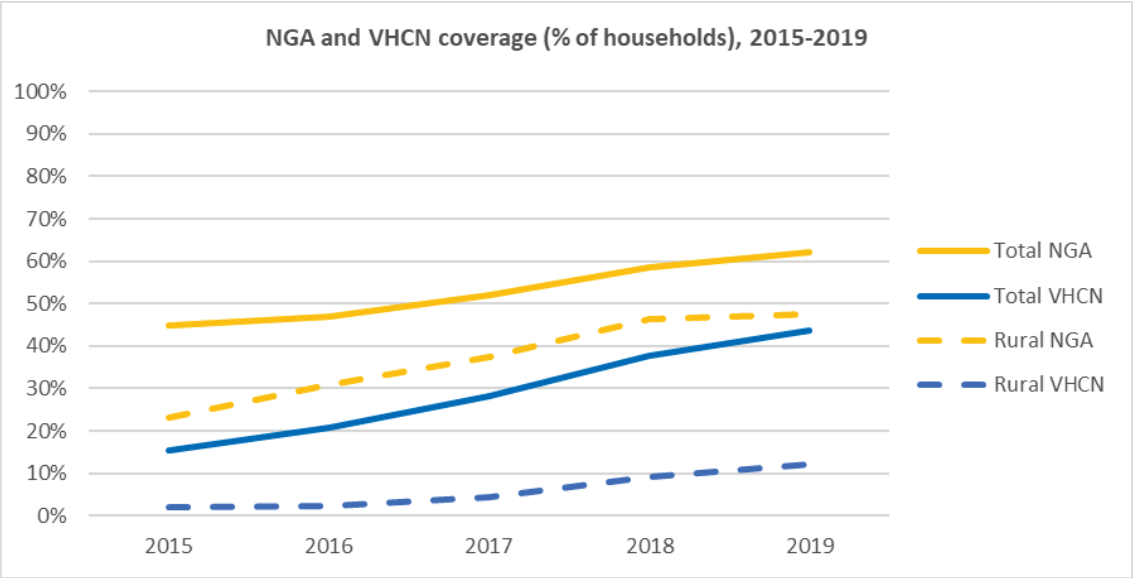
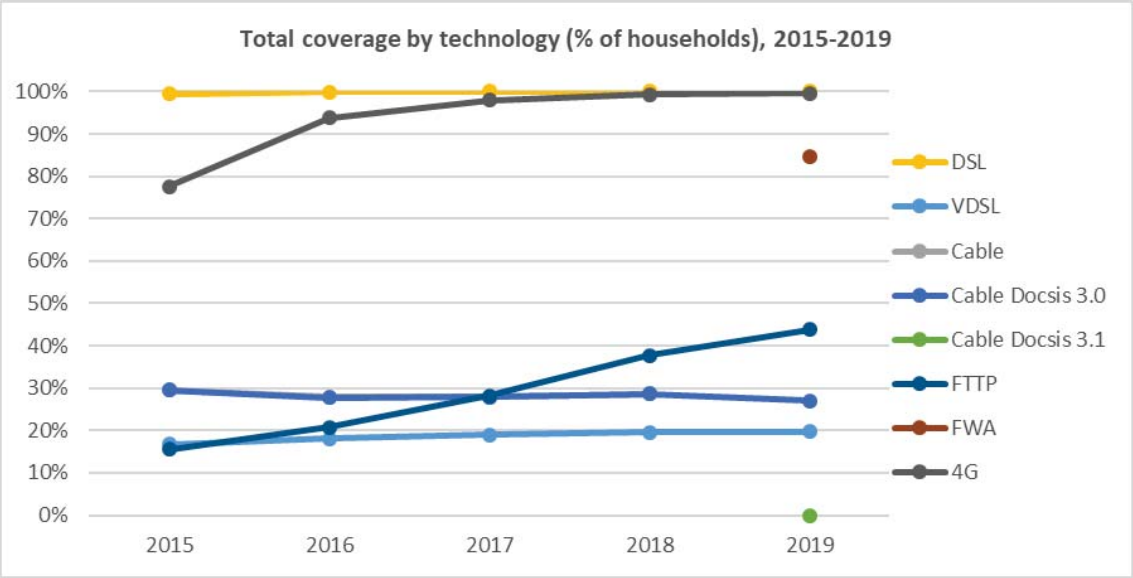
France





Source: IHS and Point Topic, Broadband coverage in Europe studies

France made significantly faster progress in both VHCN and NGA coverage during the period in question. Coverage of households with FTTP has now reached 44% (against an EU average of 34%), while 27% of households are linked to DOCSIS 30 cable networks. Overall, VHCN coverage reached 44%, the EU average. In rural areas, progress is slower but steady: VHCN coverage reached 12% in 2019, behind the EU average of 20%. Total NGA coverage stands at 62% (against an EU average of 86%), while rural coverage is 11 percentage points behind the EU average (48% against 59%). Aggregate 4G coverage is ubiquitous in both urban and rural areas.

As regards internet access type, nine out of ten new subscribers have opted for FTTH technology[84]. In parallel, DSL subscriptions have been in decline for the last seven years.

[84] Data from Arcep shows that, as of Q3 2019, nine out of ten new customers of very high-speed broadband opted for FTTH technology. This choice was possible because growing numbers of households are eligible for this technology.

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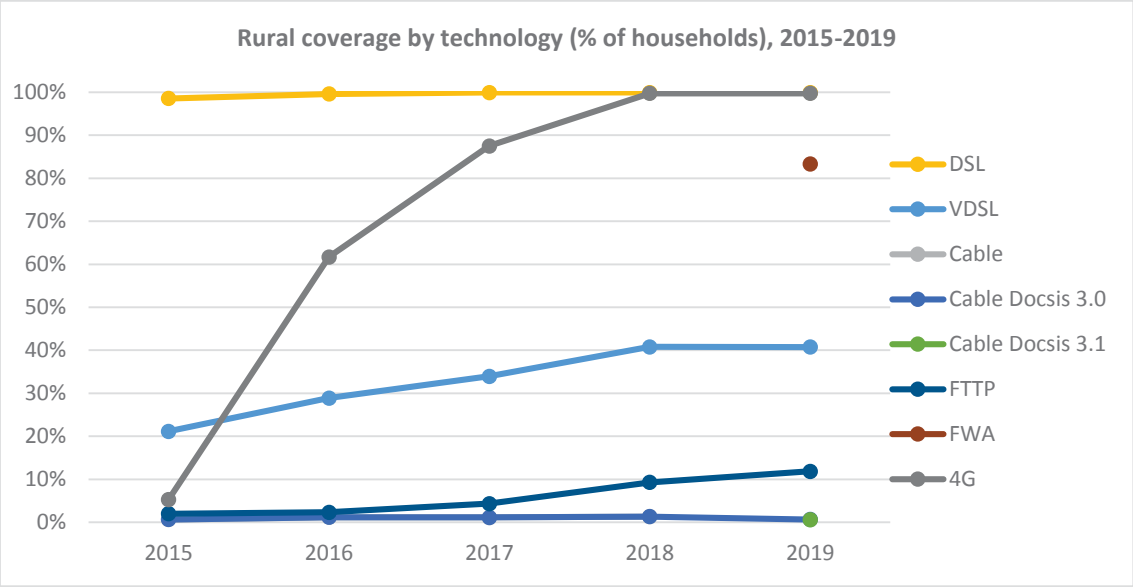
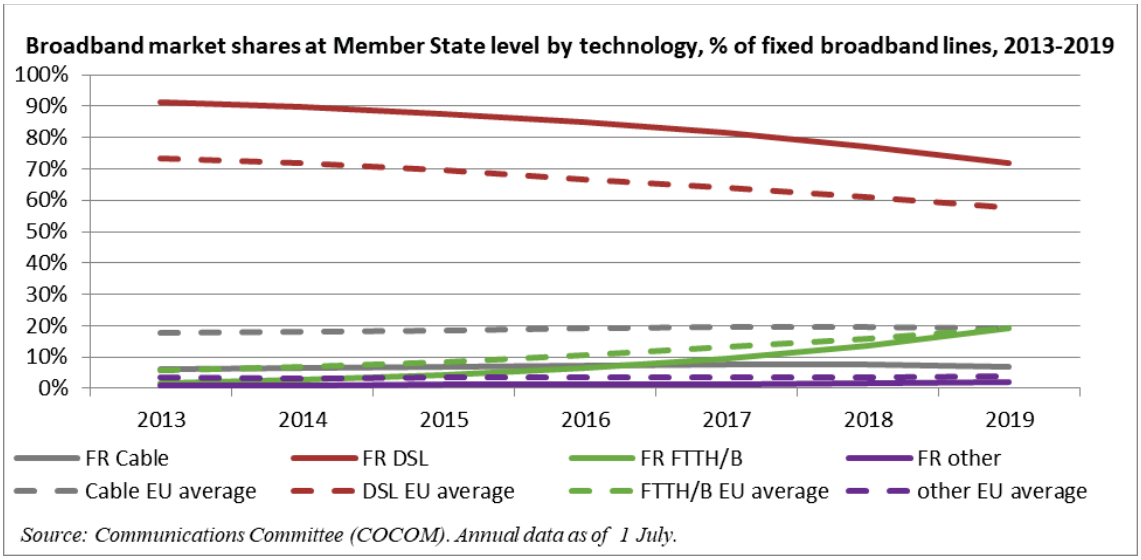
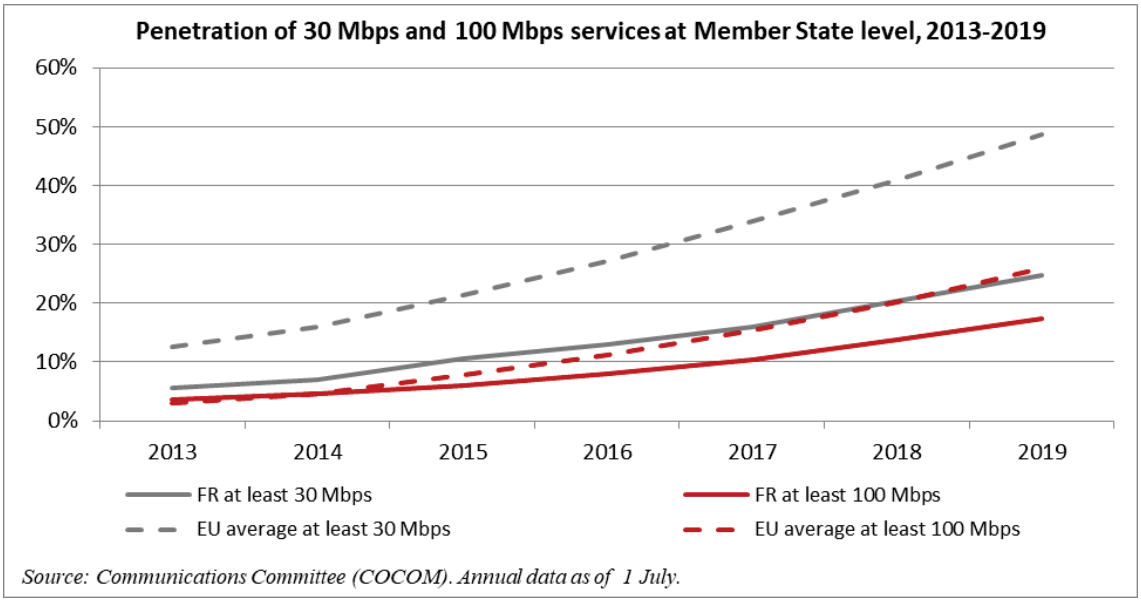
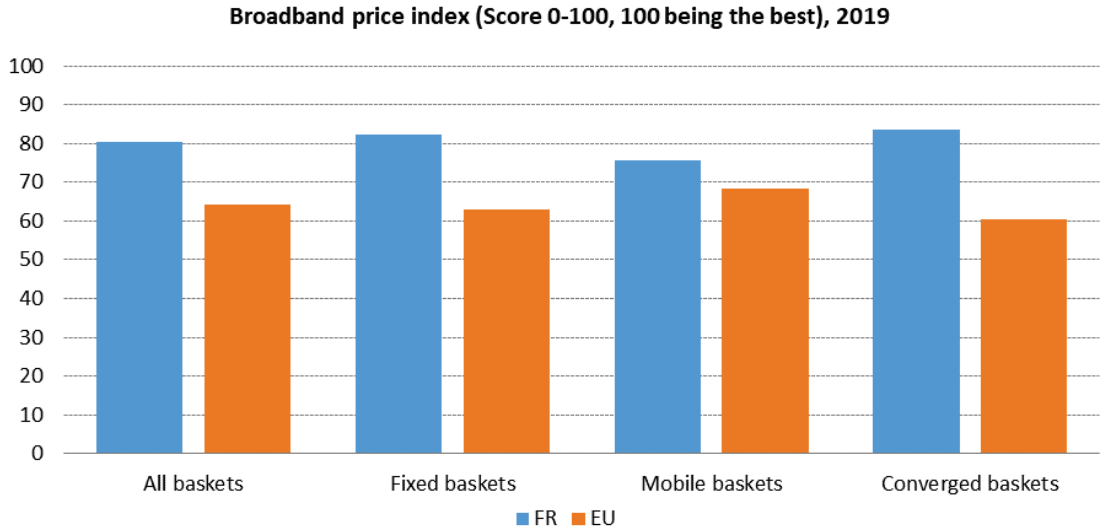
The penetration rate of 30 Mbps services stood at 24.8% in 2019, a long way below the EU average of 48.7%. The penetration rate of 100 Mbps services was 17.4%, far below the EU average of 25.9%.



Source: IHS and Point Topic, Broadband coverage in Europe studies







Source: European Commission, based on Empirica (studies of retail broadband prices)

France is third among EU countries in terms of the broadband price index, ranking higher overall than the EU average for all baskets (fixed, mobile or converged). It scored 80 (against 64) for all baskets in 2019.

1. Progress towards a Gigabit Society[85]

To improve its high-speed connectivity coverage, France is implementing its national broadband plan, (Plan France Très Haut Débit). This is designed to speed up the roll-out of fibre networks and connect all households with networks providing speeds of 30 Mbps (and above) by 2022 (i.e. two years after the EU objective). France also aims to provide fibre to the home (FTTH) for all users nationwide by 2025. The plan relies mainly on FTTH deployment (target: 80% coverage by 2022), though it sets no explicit objective of providing internet broadband connections of 1 Gigabit. The

[85] It is noted that statements regarding planned or potential State aid measures record intentions declared by Member States and do not pre-judge or pre-empt the assessment of such measures by the Commission under the relevant state aid rules. The DESI report is not meant to provide any assessment of the compliance of such measures with state aid rules and procedures.

plan, which started in 2013, involves investing an estimated total of €20 bn (with €3.3 bn of state investment initially planned to compensate for the lack of private initiative in rural areas). The ultimate aim is to reach a 95% coverage target. According to the French authorities, €280 million has been saved from the above-mentioned €3.3 bn of dedicated public investment and will be invested in new fibre line.

In November 2019, fibre to the home (FTTH) deployment reached around 90% in very densely populated areas, while approaching 60% in less densely populated areas. In rural areas ('*zones moins denses d'intérêt public*'), however, deployment only reached around 15%, showing that more speed is needed to reach the 2025 Gigabit targets. The private sector has already achieved around 62.5% of its objectives under this plan. Deployment on the basis of public intervention, in less densely populated areas, started later, reaching about 28.4% by the end of 2019[86].

In May 2019, 15.5 million households and companies were FTTH-eligible[87].

As for 5G, on 31 December 2019 the Government launched a call for tender with a view to awarding licences to use frequencies in the 3.4 – 3.8 GHz band.

This is in line with France's 5G roadmap, with over three quarters of the 3.4 – 3.8 GHz band to be awarded, enabling 5G commercial services to be launched in France's major cities in 2020.

All four of mainland France's national mobile network operators submitted a bid package by the 25 February 2020 deadline and were accepted to take part in the award procedure. In the first phase, the four candidates made the commitments set out in the specifications, and each will be able to obtain a block of 50 MHz for €350 million at the end of this procedure. They are now authorised to participate in the auction stage, during which the 11 blocks of 10 MHz still available in the 3.4 – 3.8 GHz band will be awarded. The auction has been postponed because of the Covid-19 crisis.

5G rollout has been prepared by the Government and the national regulatory authority, Arcep, which have adopted a 'battle plan' under which 5G trials have been carried out in the 3.4-3.8 GHz band since 2018, while further 5G trials are being conducted in the 26 GHz band. In October 2019, 11 projects were awarded a licence to use 26 GHz band frequencies for 5G experimentation platforms. The players whose projects were selected must have an operational 5G trial network by 1 January 2021 at the latest, and make it available to third parties to perform their own 5G trials.

2. Market developments

On the corporate market, *Kosc,* created in 2016 to encourage competition on the wholesale corporate market, declared insolvency in 2019. A hearing before the Paris Market Court, held in early December 2019, granted the company six months to remedy the situation[88].

On the consumer market, most of the main telecoms operators reported that they had invested increasingly throughout 2018 and 2019. Overall, investments rose over the 10 years up to 2018, reaching a total of about €10 billion in that year (overall figure for investments made by all telecoms operators in France, excluding purchase of mobile frequency rights[89]). There continues to be fierce

[86] Data from the DGE.
[87] Source: Arcep
[88] Altitude Infrastructure, an infrastructure operator, presented a continuation plan before the Paris Market Court at the end of January 2020.
[89] Source: Arcep

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competition on the consumer market, and prices for services are lower than in most EU countries.

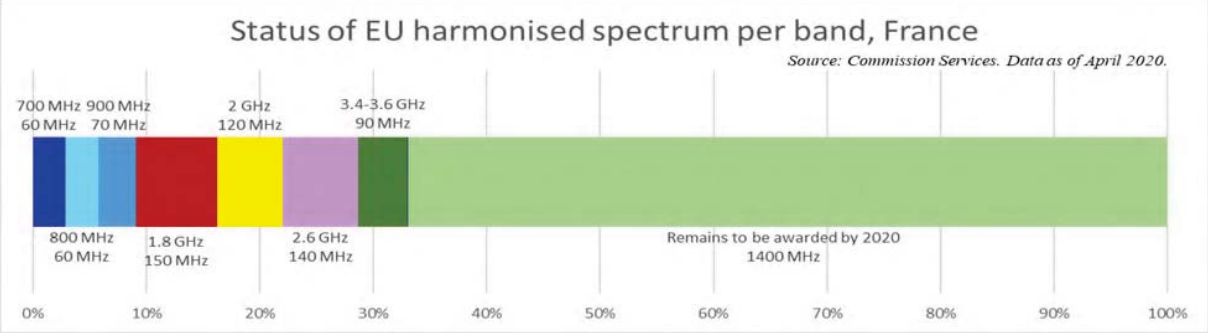
In Q3 2019[90], the operators' overall revenue on the telecoms market showed a 1% decline year-on-year. The only increase in revenue in 2019 was in mobile services (+1.2% within a year). In contrast, revenue from the fixed market has been in decline over the last decade (-2.3% within the past year), owing to an ongoing decrease in low throughput accesses. Moreover, revenue from the sales of high speed and very high-speed internet accesses has been stagnating, even though French households are increasingly gaining access to very high-speed internet.

As regards data traffic, the volume of data consumed on mobile networks is increasing rapidly (+50% within a year). 95% of French people have a mobile phone, which is a smartphone in eight cases out of ten. 51% of the French population prefer to use smartphones to connect to the internet, against 31% who prefer the computer, representing an increase of four percentage points within a year[91].

3. Regulatory developments

A draft of the legal provisions incorporating the European Electronic Communications Code (EECC) into French law was submitted for public consultation in mid-January[92].

3.1. Spectrum assignment



In France, 33% of the spectrum harmonised at EU level for wireless broadband has been assigned. The spectrum yet to be assigned is mainly in the 1.5 GHz, 3.6-3.8 GHz and 26 GHz bands.

As regards 4G, the four main mobile network operators have continued to abide by the new obligations added to their respective licences in 2018. The aim is to provide ubiquitous 4G coverage nationwide, improve coverage on roads, and improve quality of service, both indoors and outdoors. In Q4 2019, they provided the following coverage in mainland France:

- Bouygues - 99% of the population,
- Free - 96% of the population,
- Orange - 99%,
- SFR - 99%[93].

Mobile operators will have to switch all existing mobile sites to very high-speed mobile broadband (i.e. at least 4G) by the end of 2020; one exception is that 75% of the sites covered by the

[90] Source: Arcep, 'Marché des communications électroniques en France (T3 2019)'
[91] Source: Arcep, 'Marché des communications électroniques en France (T3 2019)'
[92] https://www.entreprises.gouv.fr/numerique/consultation-publique-relative-a-la-transposition-du-code-des-communications-electroniques
[93] Source: Operator's data as of 31 December 2019.

programme 'zones blanches centres-bourgs'[94] that was underway on 1 July 2018 will have to be covered with 4G by the end of 2020, the figure being 100% by the end of 2022. As of Q4 2019, between 85% and 87% of MNO's mobile sites are equipped with LTE[95].

As for the 3.4-3.8 GHz band, Arcep plans to allocate only 310 MHz of spectrum in mainland France, as the remaining spectrum is to be used for fixed wireless access (FWA) until 2026.

There is currently no information about the prospective use of this remaining 90 MHz after the rights linked to its current use have expired.

The frequencies will be allocated for 15 years initially. The licence duration can subsequently be extended by five years, either with no modification of the licence conditions other than the duration, or with modifications to the licence conditions if such modifications are needed to meet objectives associated with:

- territorial development,
- genuine, undistorted competition,
- development of investment, innovation and competitiveness, or
- the efficient use and management of frequencies.

In both cases, licence holders will be notified of the licence extension conditions at least two years before their rights expire, and they are at liberty to decline extension. Each bidder can acquire up to 100 MHz of spectrum through this procedure.

The award mechanism is based on obligations for all the winning candidates and an optional set of commitments that give rights to a block of 50 MHz and become binding obligations once they are entered into. Some obligations require each licence holder to achieve 5G coverage, launch commercial services in at least two cities by the end of 2020, and continue to roll out 5G across an increasing number of sites until 2025. Licensees are also required to provide increased throughput while achieving ubiquitous 5G coverage. As of 2022, at least 75% of sites must provide services of at least 240 Mb/s each. This obligation will be gradually extended to include all sites by 2030. The award mechanism also provides for obligations to do with road coverage and with granting reasonable requests from businesses by providing them with customised solutions in terms of coverage and performance or, if the operator so wishes, by assigning its frequencies locally. Two interim reviews are scheduled for 2023 and before 2028 to check whether operators are meeting their obligations, along with market requirements, particularly as regards mobile network coverage and quality of service.

3.2. Regulated access

No market review was notified in 2019. Arcep plans to notify new market analyses for the following markets in 2020:

- wholesale local access provided at a fixed location (market 3a in the 2014 Recommendation on relevant markets),

[94]The coverage programme known as 'Zones blanches centres-bourgs' aims to provide mobile coverage in village centres identified as having no such coverage. By December 2019, 4000 village centres were covered by the programme, representing 1% of the population (source: Arcep)
[95] Source: Arcep

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- wholesale central access provided at a fixed location for mass-market products (market 3b in the 2014 Recommendation on relevant markets), and
- wholesale high-quality access provided at a fixed location (market 4 in the 2014 Recommendation on relevant markets).

Arcep has identified three main stakes for the next market analysis cycle:

1. the need to introduce flanking measures at the same time as decommissioning the copper network and to incentivise operators to switch to fibre networks where available; however, as subscribers are transferred from the copper to the fibre network, the cost per subscriber of maintaining the copper network may increase and with it the attention given to the applicable quality of service requirements;
2. the need to consolidate competition on the retail fibre market;
3. the need to intensify competition on the corporate market.

Arcep considers that the market has been developing positively since the last market analysis in 2017. Some new offers have emerged on the wholesale passive market, making the wholesale market more dynamic.

4. End-user matters

a. Complaints

The 'J'alerte l'Arcep' platform enables end-users to report problematic cases to the national regulatory authority[96]. However, the purpose of this tool is not to refer complaints formally to that authority, but rather to provide end-users with targeted advice for follow-up action on a reported problem. In 2019, the 'J'alerte l'Arcep' platform received 24,425 alerts against 34,000 in 2018, showing a downward trend. Alerts come from consumers (90%), businesses (9%) and local or regional authorities (1%). The downward trend may be linked to two factors: less visibility of the platform in the media, and an increase in customer satisfaction since the previous year. For example, in 2019, 47% of alerts concerned availability and quality of service, down from 62% of those received in 2018[97].

b. Open internet

On 27 June 2019, Arcep published the 2019 edition of its report on the state of the internet in France. It was submitted to Parliament and presented to the media and sector experts. In December 2018, Arcep had published a code of conduct for firms providing tools to measure the quality of fixed and mobile internet networks. The 2019 report states that five such measuring tools are compliant with Arcep's code of conduct[98].

c. Roaming

In France, four MVNOs are allowed to charge roaming surcharges: Afone, Euro-Information Telecom, Lebara France Ltd and Syma. These together account for under 5% of the French mobile market.

d. Emergency communications – 112

[96] However, Arcep does not have the power to resolve disputes between operators and users.
[97] Source: Arcep
[98] nPerf, Speedtest UFC-Que Choisir (developed by UFC-Que Choisir), DébiTest 60 (the internet speed test from 60 millions de consommateurs), 4GMark (developed by QoSi) and IPv6-test

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The European emergency number 112 is used in France, along with the 114 national emergency number for disabled users. The latter is accessible via text message, an internet application, a dedicated website, and fax. Although the 112 emergency number is used in France, the Commission is currently monitoring the extent to which it works in practice. This is because the relevant Commission departments have been informed that not all public safety answering points have the technical capability to provide emergency services with instant caller location.

e. Other issues

On the mobile internet market, measurements show marked improvements in service quality.

The quality of data services has reportedly improved on all four operators' mobile networks, taking all area types into account (rural, medium-density and high-density areas). The average downlink speed measured in mainland France stood at 45 Mbit/s, against only 30 Mbit/s in 2018, while downlink throughput doubled in rural areas over the same period (from 14 to 28 Mbit/s)[99].

5. Conclusion

France continues to implement its national broadband plan, designed to provide better nationwide connectivity in terms of speed and coverage. While fibre deployment targets have been almost fully met in very densely populated areas, less densely populated areas, including rural areas, still need to be covered with fibre.

As regards LTE, action is still being taken to meet the obligations introduced in licences in 2018, but they have already improved coverage and quality of service, especially in rural areas.

As for 5G, the obligations included in the adopted spectrum award mechanism are designed to gradually achieve coverage across the country between 2020 and 2030.

[99] Source: Arcep

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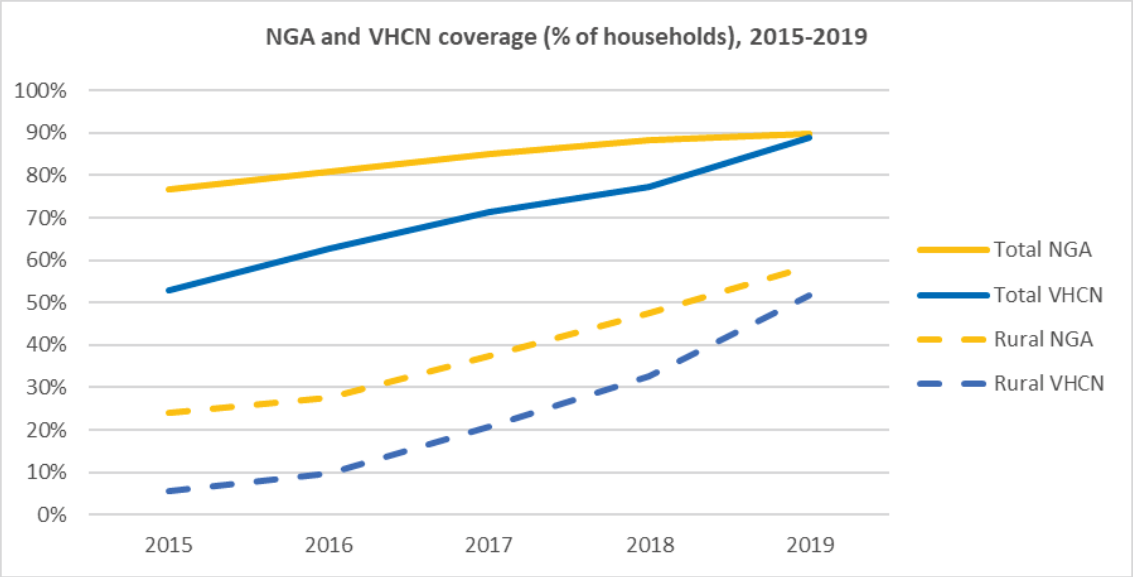
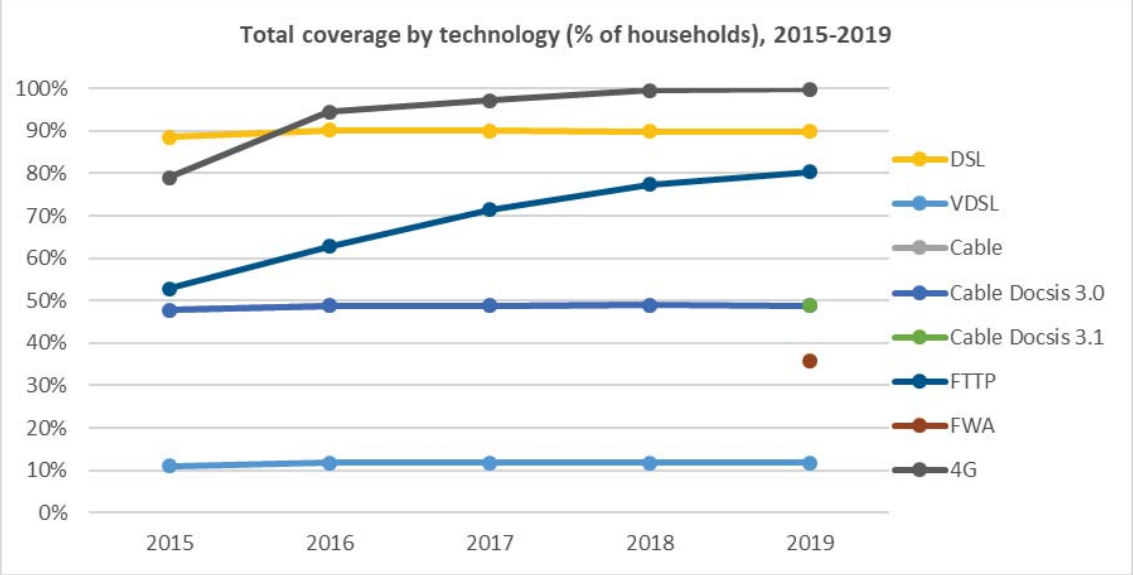
Spain

Spain performs particularly well when it comes to VHCN coverage. The deployment of FTTP networks continues to be an important feature of the Spanish digital market, covering 80% of households, above the EU average of 34%. Despite the significant differences between urban and rural areas, rural FTTP coverage in Spain reaches 46% of households, significantly above the rates of both EU rural and total FTTP coverage (21% and 34% respectively). Thanks to extensive fibre deployment and the upgrade of cable networks to DOCSIS 3.1, VHCN covers 89% of households, 12 percentage points (pps) above last year and well above the EU average (44%). NGA networks cover 90% of households, above the EU average (86%). Aggregate 4G coverage[100] reached 100%, 1 pp above the EU average (99%).





[100] The 4G coverage indicator used in the country chapters differs from the DESI indicator for 4G coverage. The former is an aggregate indicator, i.e. measures the coverage of all operators together. The latter is an average indicator, i.e. the sum of all coverages divided by the number of operators. Because of this difference, the two indicators may produce different results.

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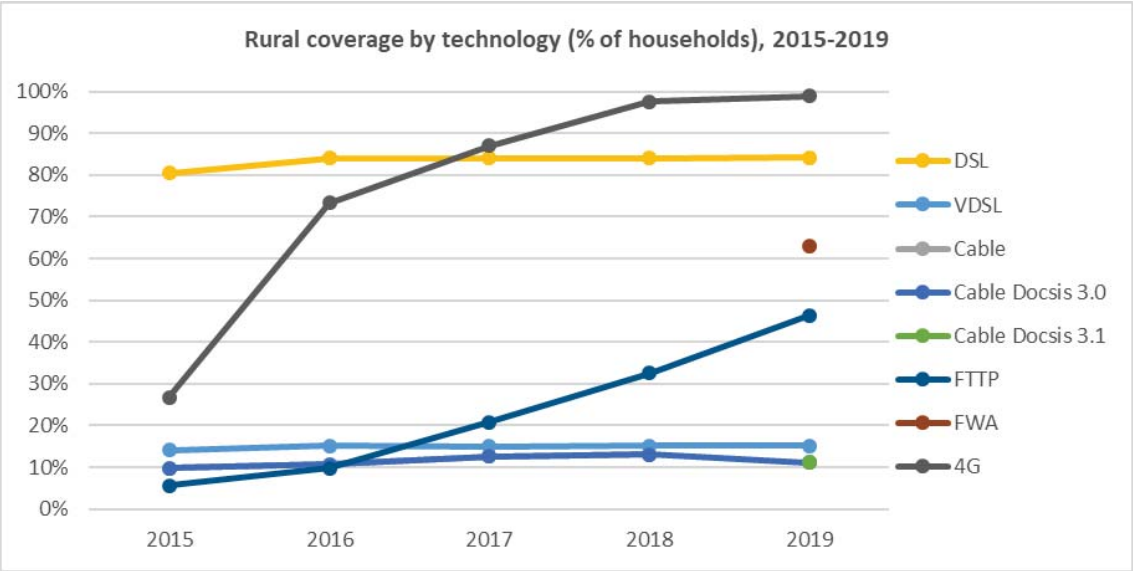
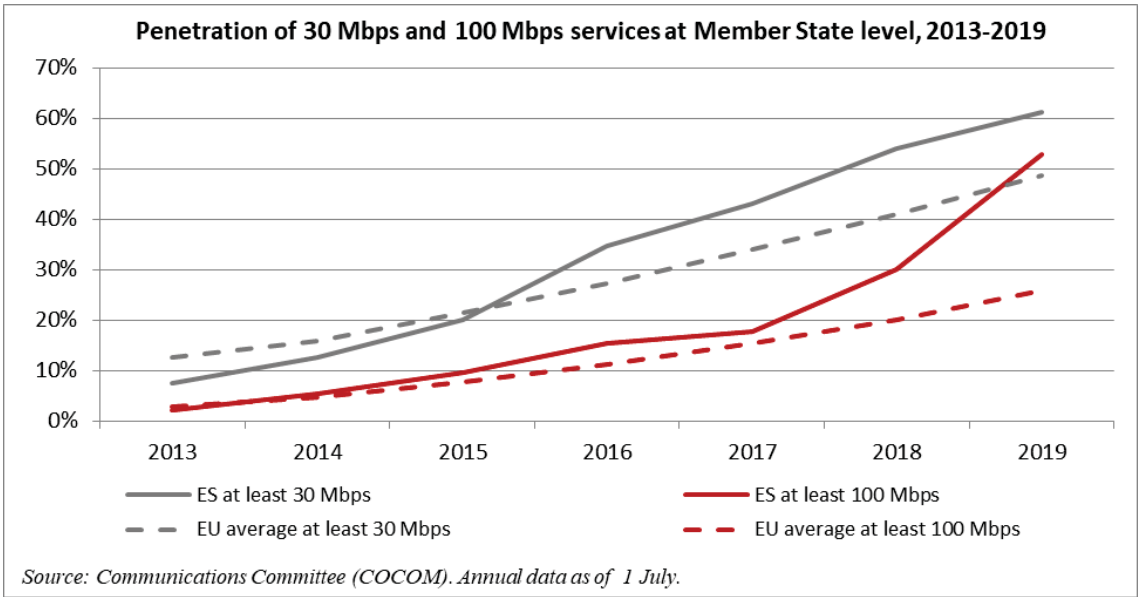


Source: IHS and Point Topic, Broadband coverage in Europe studies.

Overall fixed broadband take-up increased 1 pp (from 77% in 2018 to 78% in 2019). Take-up of broadband of at least 100 Mbps has grown significantly by 23 pps (from 30% in 2018 to 52.9% in 2019), well above the EU average (26%). The growth of the broadband market continues to be driven by the strong increase of the take-up of FTTH broadband connections.



Moreover, at least 30 Mbps broadband take-up has increased 7 pps (up from 54.1% in 2018 to 61.2% in 2019), also well above the EU average of 48.7%.

There is a downward trend in the share of cable (from 16.8% to 15%) and DSL (from 31.2% in 2018 to 21.7% in 2019) in broadband access, and conversely a strong upward trend for FTTH/B (from 50.7% in 2018 to 61.6% in 2019), a reflection of the migration of customers to the new technology. As already observed in previous years, this growth was driven by the roll-out of FTTH networks by operators, which jointly amounted to 50.80 million accesses[101]. The Spanish competition regulator CNMC (*Comisión Nacional de los Mercados y la Competencia* - National Commission on Markets and Competition) reported that Telefónica holds the largest fibre network, with more than 222.68 million building units (BUs), followed by Orange with 14.61 million BUs. Between Q1 2018 and Q1

[101] Information provided by CNMC.

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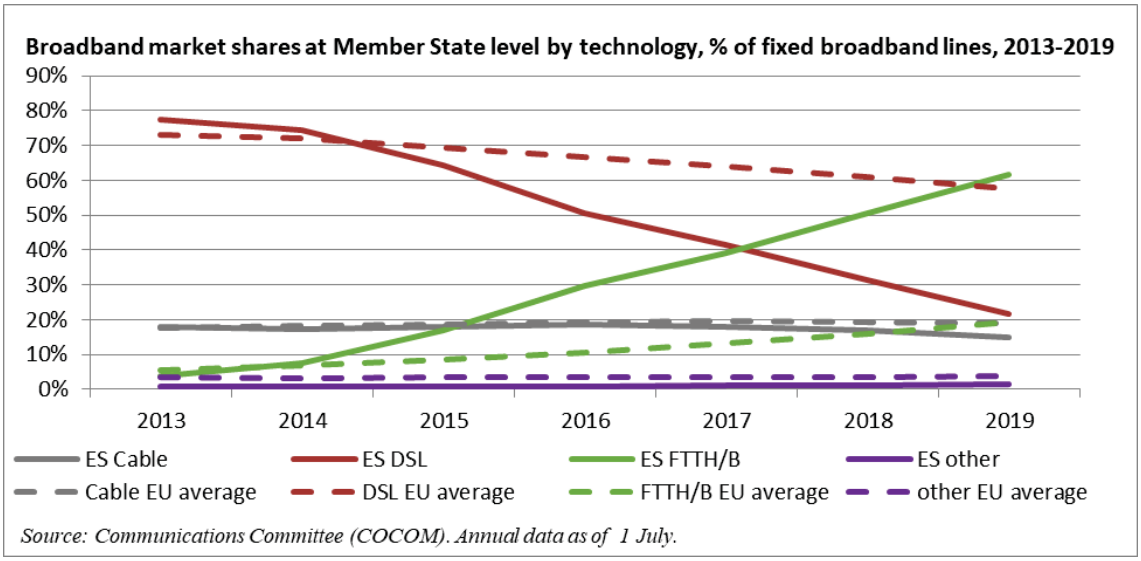
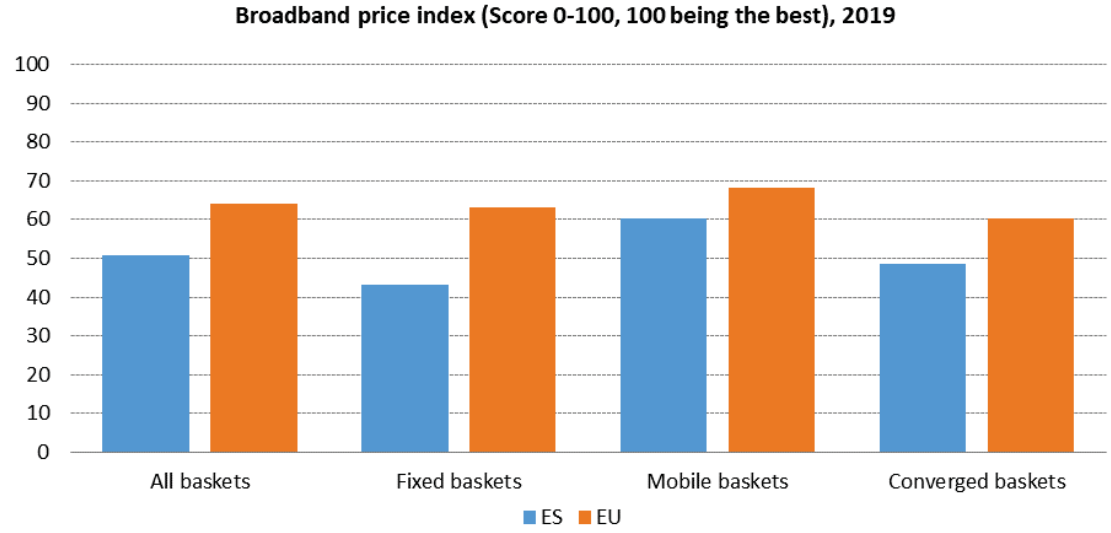
2019, Telefónica and Orange added around 1.89 and 1.31 million BUs respectively to their FTTH networks between Q3 2018 and Q3 2019. As in 2018, Másmóvil ranked first for fibre roll-out by adding almost 4.07 new BUs to its FTTH network between Q1 2018 and Q1 2019. Másmóvil´s FTTH network reached 8.84 million BUs in Q1 2019 thanks to the co-investment agreement signed with Orange. By contrast, neither Vodafone nor Euskaltel significantly expanded the footprint of their networks. Vodafone´s NGA network comprised 3.6 and 7.6 million BUs passed with FTTH and HFC respectively. Euskaltel covered 2.3 million BUs with its HFC network in the northern regions of the Basque Country, Asturias and Galicia; its FTTH network is marginal with only 284K accesses.





Source: Commission services based on Empirica (Retail broadband prices studies).

Prices in Spain are higher than the EU average, ranking 25th in DESI, but do not seem correlated to take-up. On the contrary, take-up of at least 100 Mbps networks grew significantly. Prices for convergent bundles, the most representative method used by operators to sell electronic communications services in the country, are 19 pps higher than the EU average.

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1. Progress towards a Gigabit Society[102]

The national programme for the extension of next-generation broadband networks[103] continues to provide financial support for the roll-out of broadband networks in underserved areas. The 2019 call (through the current PEBA-NGA scheme) awarded €140 million in grants to FTTH network deployment projects to provide coverage to half a million homes. Spain also notified to the European Commission a modification of its PEBA-NGA €400 million scheme for 2020-2022 to include grey areas, by rolling out infrastructure capable of providing speeds of 300 Mbps symmetrical, upgradeable to 1Gbps symmetrical. On 10 December 2019, the European Commission declared the new Spanish Scheme compatible with EU State aid rules[104][105].

By means of Ministerial Order ECE/1166/2018 of 29 October, Spain approved the plan[106] to provide coverage at a minimum speed of 30 Mbps to at least 90% of the inhabitants of settled areas whose population is less than 5,000. According to the Ministry of Business Affairs and Digital Transformation (*Secretaria de Estado de Telecomunicaciones e Infraestructuras Digitales*, SETID), broadband coverage after execution of this plan is equal to 94.3%, according to the methodology used in the national report.

Following the publication of the 5G national plan for 2018-2020, SETID guaranteed the possibility of using certain frequency bands for 5G pilots and established the regulatory basis for granting subsidies to 5G technology pilot projects. These pilot projects will use spectrum in the 700 MHz, 3.6 and 26 GHz bands. On that legal basis, Red.es awarded two 5G pilot projects using the 3.6 and 26 GHz bands[107] in April 2019, and in October 2019 it published a new call for tenders for eleven 5G pilot projects, for a budget of €45 million[108].

With regard to private investment in Gigabit connectivity, CNMC reported that in September 2019 the total number of FTTH, FTTN and HFC-DOCIS 3.0 accesses in Spain amounted to 61.5 million. The growth of NGA broadband network between Q1 2018 and Q3 2019 was slightly lower than the growth registered during the same period in 2016, 2017 and 2018.

Two new commercial agreements for co-investment and wholesale access agreements and three new wholesale access agreements were signed in 2019[109].

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[102] It is noted that statements regarding planned or potential State aid measures record intentions declared by Member States and do not pre-judge or pre-empt the assessment of such measures by the Commission under the relevant state aid rules. The DESI report is not meant to provide any assessment of the compliance of such measures with state aid rules and procedures.

[103] ('Programa de Extensión de la Banda Ancha de Nueva Generación', PEBA-NGA http://www.mincotur.gob.es/PortalAyudas/banda-ancha/Paginas/Index.aspx

[104] https://ec.europa.eu/competition/state_aid/cases1/201952/282618_2120578_133_2.pdf

[105] The new terms and conditions that set up the regulations of this State aid scheme were approved by ministerial order on 14 April. See: http://www.mineco.gob.es/portal/site/mineco/menuitem.ac30f9268750bd56a0b0240e026041a0/?vgnextoid=df4985eb8c771710VgnVCM1000001d04140aRCRD&vgnextchannel=864e154527515310VgnVCM1000001d04140aRCRD.

[106] The holders of public concessions in the 800 MHz band (Telefónica, Orange and Vodafone) should meet this obligation to provide this coverage, in accordance with the technological neutrality principle.

[107] https://www.red.es/redes/es/que-hacemos/pilotos-5g

[108] https://www.red.es/redes/es/que-hacemos/pilotos-5g

[109] (i) In February 2019, Telefonica and Másmóvil signed a wholesale access agreement (VULA type product and bitstream NEBA local NEBA FTTH respectively); (ii) in March 2019, Telefonica and Vodafone signed Addendum I to their wholesale access agreement (VULA type product and bitstream NEBA local NEBA FTTH respectively); (iii) in April 2019 Vodafone and Orange signed a co-investment (reciprocal access) and wholesale access agreement; (iv) in June 2019 Telefónica and DIGI mobil signed Addendum I to their wholesale access

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The Broadband Cost Reduction Directive (BCRD), Directive 2014/61/EU[110], has had a very limited impact in Spain. This is probably due to the fact that access to the physical infrastructure of the significant market power operator (Telefonica) has been available since 2008 at cost-oriented prices. During 2019 CNMC settled five disputes concerning BCRD. Three disputes concerned the provision of access to physical infrastructure and two disputes concerned access to information on physical infrastructure. In April 2019, the government approved a regulation on the functioning of the single information point (SIP)[111], which is now operational[112].

2. Market developments

CNMC reported that the three big nationwide convergent players (Telefonica, Orange and Vodafone) still control most of the market (86% in terms of broadband lines), but their joint share continued to go down, decreasing by more than 3 pps between Q1 2018 and Q3 2019. This is mainly due to the share gained by Másmóvil ahead of Euskaltel, which plans to expand its footprint across Spain using the Virgin brand.

CNMC reported that for the first time Telefonica´s share fell below the threshold of 40%. Its share in the market encompassing only FTTH and HFC broadband lines is also lower (35%). The difference is due to the stronger position of Vodafone and, to a lesser extent, Euskaltel, i.e. to the presence of HFC cable-based offers. The competitive pressure from the commercial strategy of Másmóvil and other operators (namely Digi Mobile) constrained retail broadband prices.

The three big operators have maintained the multi-brand strategy to address different segments: (i) the low end segment using flanker brands (such as Telefónica's O2, Orange's Amena, SIMYO, Jazztel and Vodafone's Lowi) and no frills offers and (ii) the mid-high end segment using their own brands and differentiated and comprehensive offers to meet all the communication needs of households.

In April 2019 Vodafone launched an unlimited tariffs offer, and in June 2019 it launched commercial 5G services in 15 Spanish cities[113] with approximately 50% coverage. In 2020, two more cities have been added[114].

Bundled offers continue to shape the broadband market. In Q1 2019, more than 97% of the broadband lines were commercialised on a bundle basis. Convergent bundles account for more than 80% of the fixed broadband market and almost half of them are 5-Play.

The main driver of demand for audiovisual content is football. Only Telefonica and Orange are offering all football content this season along with Mediaset, which also started to offer football content through its OTT Mitele. As some operators informed, the cost-sharing model imposed on the incumbent as part of merger commitments[115] has increased competition in movies and TV

agreement (bitstream-NEBA FTTH); and (v) in October 2019, Orange and Másmóvil signed Addendum III to their co-investment (one way) and wholesale access agreement.

[110] Directive 2014/61/EU of the European Parliament and the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (*OJ L 155, 23.5.2014, p. 1–14*).

[111] Order ECE/529/2019 of 26 April 2019.
https://www.boe.es/buscar/doc.php?id=BOE-A-2019-6997

[112] https://sedeaplicaciones.minetur.gob.es/piu

[113] Madrid, Barcelona, Valencia, Málaga, Sevilla, Pamplona, Bilbao, Zaragoza, Logroño, Vitoria, San Sebastián, Santander, Gijón, A Coruña and Vigo.

[114]Benidorm and Badajoz.
http://www.saladeprensa.vodafone.es/c/notas-prensa/np_primera_llamada_5G_SA/

[115] Telefonica / DTS merger commitments: CNMC's approval of the Telefonica and DTS merger was subject to Telefonica making several commitments. These included that Telefonica make its exclusive content available to other ECS operators through a wholesale channel offering, with wholesale prices (cost per subscriber) being simultaneously cost-oriented and replicable by alternative operators.

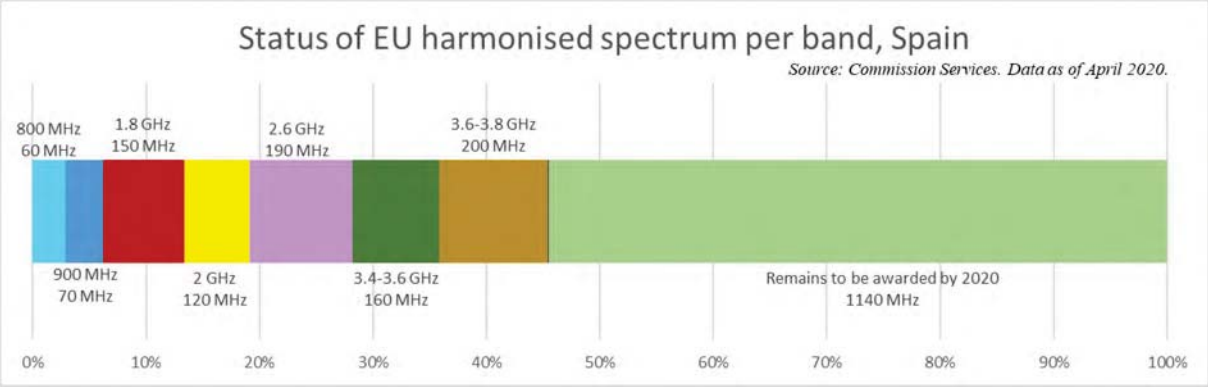
shows[116] but not in premium sport channels[117]. It was reported that the decision to extend, adapt or remove Telefonica/DTS commitments (in force until April 2020) would be delayed due to the COVID-19 pandemic[118].

OTT services have affected consumer demand, replacing traditional text messages (SMSs) and multimedia messaging services (MMSs). OTTs have had very little effect on MNO's voice services, mainly because of the widespread practice of retailing unlimited call tariffs.

The business market, which operators address with complex customised offers, is not as dynamic as the mass market, which comprises both residential and business customers who want standardised products. Telefonica's market share is slightly decreasing but is still very high (above 60%).

3. Regulatory developments

3.1. Spectrum assignment



In Spain, 45% of the spectrum harmonised at EU level for wireless broadband has already been assigned. Regarding the 700 MHz band, in June 2019[119], the government approved a new national technical plan for Digital Terrestrial Television (DTT technical plan) as well as necessary regulatory measures for the release of the 700 MHz band. In June 2019, SETID published a draft proposal for managing the 700 MHz, 1.5 and 26 GHz bands in which general aspects of the auctions where consulted[120]. The 700 MHz band was expected to be awarded in May 2020[121], but due to the COVID-19 pandemic the auction process has been delayed. SETID reported that the market has shown little interest in the 26 GHz band as there is currently spectrum oversupply. Spain decreased four positions in the 5G readiness indicator[122] (from 6th to 10th), as it has not assigned any additional spectrum in the 5G pioneer bands.

[116] Price set at a variable cost per subscriber.
[117] A minimum guaranteed cost (MGC) distribution mechanism is in place.
[118] Deadlines have been suspended, as laid down in Royal Decree 463/2020 of 14 March in which Spain declares the State of Alarm due to the COVID-19 pandemic. https://www.boe.es/diario_boe/txt.php?id=BOE-A-2020-3692
[119] Approved by means of Royal Decree 391/2019 of 21 June 2019. https://www.boe.es/buscar/act.php?id=BOE-A-2019-9513.
[120] https://avancedigital.gob.es/en-us/Participacion/Paginas/Cerradas/modelo-gestion-bandas-frecuencias.aspx
[121] http://www.mineco.gob.es/portal/site/mineco/menuitem.ac30f9268750bd56a0b0240e026041a0/?vgnextoid=691e2c9571c21710VgnVCM1000001d04140aRCRD&vgnextchannel=864e154527515310VgnVCM1000001d04140aRCRD
[122] The 5G spectrum readiness indicator is based on the amount of spectrum already assigned and available for 5G use by 2020 within the 5G pioneer bands in each EU Member State. For the 3.4-3.8 GHz band, this means that only licences aligned with the technical conditions in the Annex to Commission Decision (EU) 2019/235,

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The entire 3.6 GHz band is now available to operators at 5G conditions. Defragmentation of the entire 3.4 to 3.8 GHz band is necessary, as Vodafone is the only operator with contiguous spectrum (90 MHz). Different portions of spectrum have several right holders and different expiry dates, which makes the defragmentation process complicated. Moreover, there are military radars using 2x20 MHz[123] (3480-3500 MHz and 3580-3600 MHz) in the band, which are expected to free the band in the short to medium term.

CNMC expected that in the short to medium term the volume of frequencies used for 2G and 3G will be reduced and thus concentrated in the 900 MHz band. 1800 MHz and 2100 MHz bands will be used fully by LTE. However, as M2M services are offered mostly using 2G networks, operators seem to be planning to leave at least one of these old technologies deployed.

3.2. Regulated access (both asymmetric and symmetric)

On 17 July 2019 and 25 July 2019, CNMC adopted the final measures maintaining regulation of the wholesale markets for broadcasting transmission services to deliver broadcast content to end users (market 18 of the 2003 Recommendation on Relevant Markets[124]) and voice call termination on individual fixed telephony networks[125] (market 1 of the 2014 Recommendation on Relevant Markets[126]) respectively.

Regarding broadband markets, operators are asking for a review of markets 3[127] and 4[128] of the 2014 Recommendation on Relevant Markets, arguing that infrastructure competition is not reflected in the current regulatory decisions. CNMC reported that the European Commission is expected to receive notification after summer 2020[129], but there is a chance this will be delayed due to the COVID-19 pandemic.

According to the analysis of broadband markets, a bitstream FTTH service (NEBA) has also been available in areas where only the VULA service (NEBA local) was mandated, albeit temporarily as long as the latter was not effectively available. In May 2019, CNMC verified that the VULA service

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are considered 5G-ready. For the 26 GHz band, only assignments aligned with the technical conditions in the Annex to Commission Implementing Decision (EU) 2019/784 are taken into account. By contrast, the percentage of harmonised spectrum takes into account all assignments in all harmonised bands for electronic communications services (including 5G pioneer bands), even if this does not meet the conditions of the 5G readiness indicator.

[123] According to SETID, some test done in the band concluded that the effect of military radars on electronic communications stations is very limited. Radars should migrate to another frequency band before 1 January 2023 (https://avancedigital.gob.es/es-es/Participacion/Documents/proyecto-orden-modifica-orden-cnaf/Proyecto-Orden-Modif-CNAF.pdf. Draft Order for the amendment of the National Table of Frequency Allocation (currently under public consultation).

[124] Commission Recommendation of 11 February 2003 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communication networks and services (*OJ L 114, 8.5.2003, p. 45–49*).

[125] The CNMC updated the fixed termination rates applied by all fixed operators, set until then at 0.0817 eurocents/min. The new FTR are: 0.0643 in 2019, 0.0593 in 2020 and 0.0545 from 2021 until the euro tariff enters into force.

[126] Commission Recommendation of 9 October 2014, on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services (OJ L 295, 11.10.2014, p. 79–84).

[127] Market 3(a) Wholesale local access provided at a fixed location and Market 3(b) wholesale central access provided at a fixed location for mass-market products.

[128] Market 4 Wholesale high-quality access provided at a fixed location.

[129] A public consultation is expected early 2020.

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(NEBA local) launched in January 2018 was correctly implemented, so that the transitory bitstream service (NEBA transitorio) could be discontinued. Therefore, the regulated NEBA local is currently available nationally, with the exception of the so-called ultrafast broadband (UFB) municipalities[130], whereas the regulated NEBA is available in those parts of the country defined as non-competitive in the 2016 market review. The VULA service (NEBA local) is being enhanced[131] with a multicast frame replication functionality, which will optimise transmission of IPTV.

CNMC set clear rules on copper switch-off whereby Telefonica is allowed to discontinue wholesale and retail services based on the copper network in locations where fibre can be used instead. Currently, 1,805 sites are in some stage of the decommissioning process, of which 402 non-LLU sites had been decommissioned by the end of 2019 after a 12-month transitory period. More than 800 LLU sites are already scheduled for decommissioning after a five-year period.

4. End-user matters

a. Complaints

SETID reported that the main sources of complaints have been pricing and billing (30.9%) and contract termination (21.4%). In relation to the service involved, bundled services received the largest number of complaints (58.7%), followed by fixed services (22 %) and mobile services (18.4%)[132].

b. Net neutrality

Article 6 of Regulation (EU) 2015/2120[133] is currently transposed in Spain by means of general penalty provisions provided in the General Telecommunications Act. Notwithstanding the above, SETID committed to inflict specific roaming and net neutrality penalties in case of infringement while transposing the European Electronic Communications Code[134].

c. Roaming

As CNMC informed, at wholesale level, prices are decreasing significantly below the regulated caps, suggesting competition at the wholesale level. The introduction of RLAH seems to have led to a significant increase in roaming traffic, and wholesale operators are competing for it.

[130] There are 66 UFB municipalities, including Madrid, Barcelona and several other big Spanish cities, that cover 35% of the Spanish population.

[131] Decision of April 2019. Implementation was ready in December 2019. A three-month test phase with real customers is to take place in 2020, prior to commercial deployment.

[132] The most recent data available is from 2018.

[133] 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 (Text with EEA relevance), *OJ L 310, 26.11.2015, p. 1–18.*

[134] Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code (*OJ L 321, 17.12.2018, p. 36–214)*

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d. Emergency communications – 112

In Spain, the autonomous communities are in charge of managing calls to 112. There are nineteen 112 public safety answering points (PSAPs) that depend on regional governments which manage 112 emergency communications, including access to emergency service for disabled end-users. In January 2020, to ensure equivalent access to emergency services for disabled end-users, the Ministry of Interior deployed an 'Alertcops' application[135] available throughout Spain.

e. Universal service

In January 2020, universal service obligations for the provision of public payphones were extended until 1 January 2022[136]. SETID supports the service's suppression, but political instability prevented it from passing the law to eliminate the service, which is expected for the end of the year. CNMC also agrees that this service should be suppressed, given the progressive abandonment of its use reflected in the decline in call traffic, income and territorial distribution of its use.

5. Other issues

In Spain, there are currently no plans to migrate to digital radio broadcasting. In practice, the digital radio market is not fully developed in Spain. Although several digital radio licenses were awarded in 2000, there is almost no audience for these channels.

6. Conclusion

Spain is one of the top performers in the roll-out of VHC networks as well as the take up of ultrafast broadband connections of at least 100 Mbps. Deployment is driven by commercial investment made by several telecom operators; a regulatory framework focused on supporting deployments through effective regulated duct-access and geographically differentiated access obligations and an ambitious national strategy that provides subsidies in sparsely populated and rural areas is also. The ground is being prepared for 5G deployment, with several pilot projects assigned and under way, with pioneer spectrum assignment well under way and with the 700 MHz auction initially expected in spring 2020[137]. Concerning equivalent access to emergency services for disabled end-users, Spain has deployed an accessibility solution that is available throughout the country.

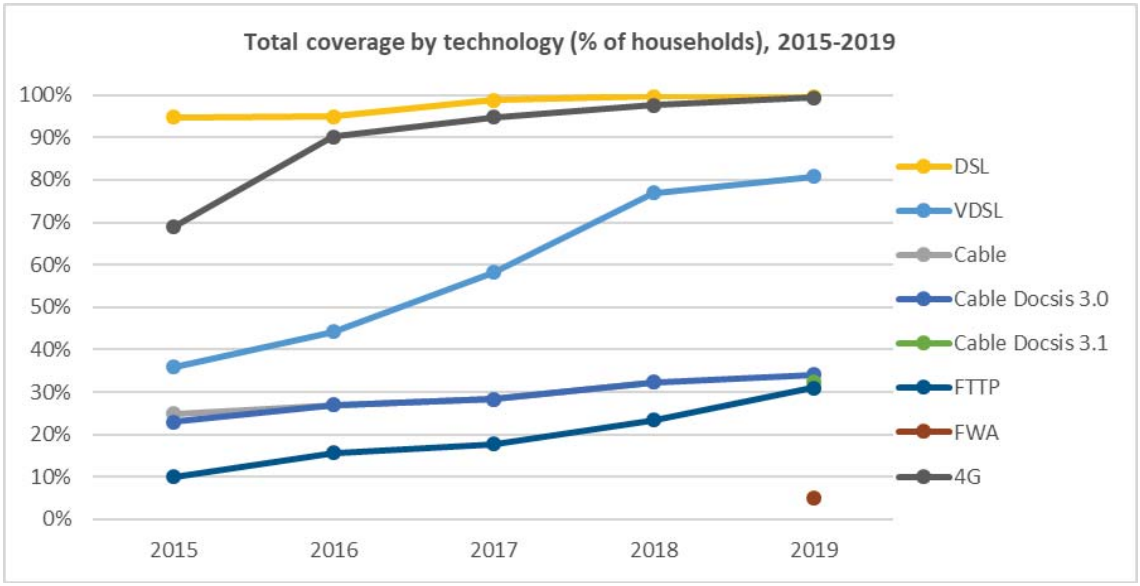
[135] https://alertcops.ses.mir.es/mialertcops/en/index.html
http://www.proteccioncivil.es/sala-de-prensa/noticias/-/asset_publisher/UP61ywtci2Co/content/30-12-2019-interior-actualiza-alertcops-para-facilitar-el-acceso-de-personas-con-discapacidad-auditiva-a-los-servicios-de-emergencia

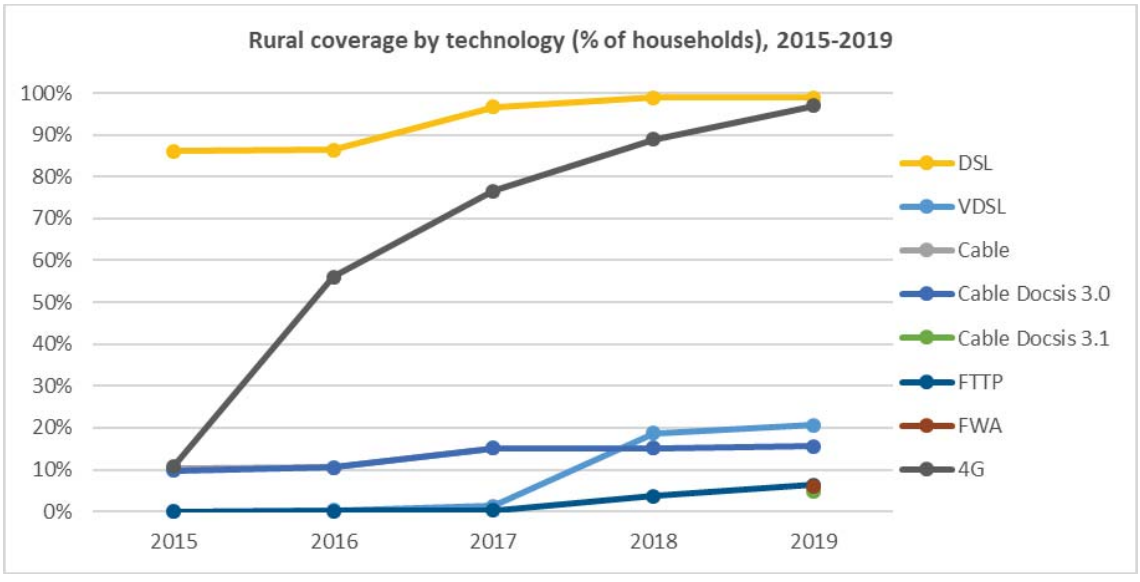
[136] https://www.boe.es/diario_boe/txt.php?id=BOE-A-2020-401

[137] As a consequence of the Emergency State Declaration because of COVID-19, the foreseen 700 MHz auction has been postponed.

Croatia

Croatia continued its steady, but rather modest progress in increasing its coverage, ranging between 2 percentage points (pps) and a maximum 8 pps depending on the technology. Total coverage of fibre to the premises (FTTP) increased to 31% (up from 23% last year), but coverage in rural areas stood at only 6%[138]. In 2019, deployment of fixed wireless access (FWA) in Croatia reached 5% in total and 6% in rural areas. Total very high-speed digital subscriber line (VDSL) coverage also increased by 4 pps, reaching 81%. Overall, coverage of very high capacity networks (VHCNs) reached 43%, slightly below the EU total average of 44%. However, the gap between VHCN coverage in rural areas of Croatia and the EU average for rural areas is now 10 pps.





Source IHS and Point Topic, Broadband coverage in Europe studies

[138] According to HAKOM, Croatia's national regulatory authority, this disparity is mostly due to the unfavourable demographic situation in rural parts of Croatia, which have a low and ageing population with low purchasing power. This demographic situation results in very low economic activity in these areas, making them unattractive for broadband investment.

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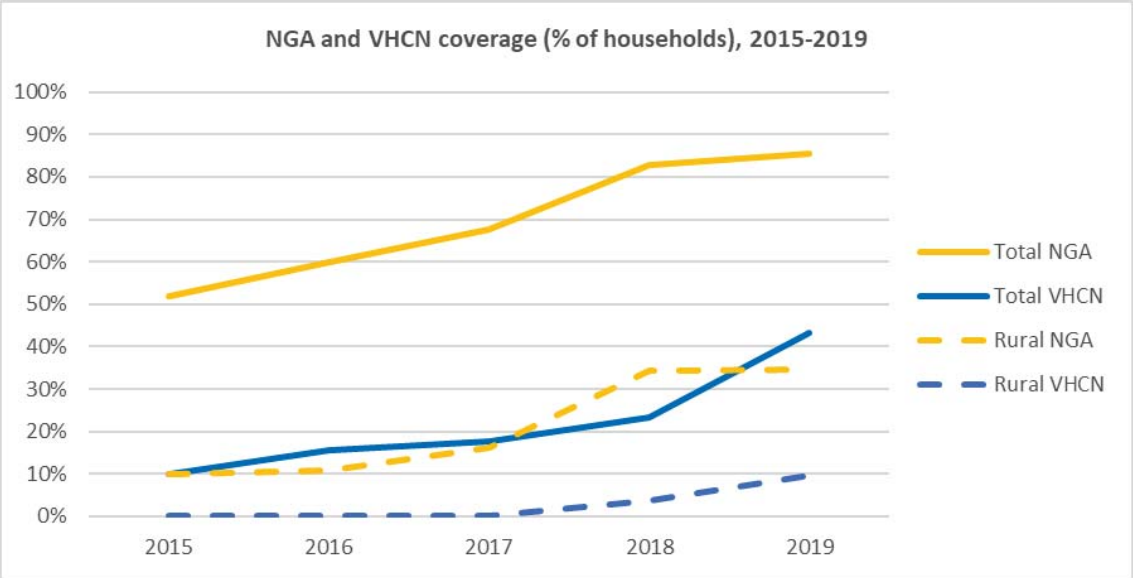
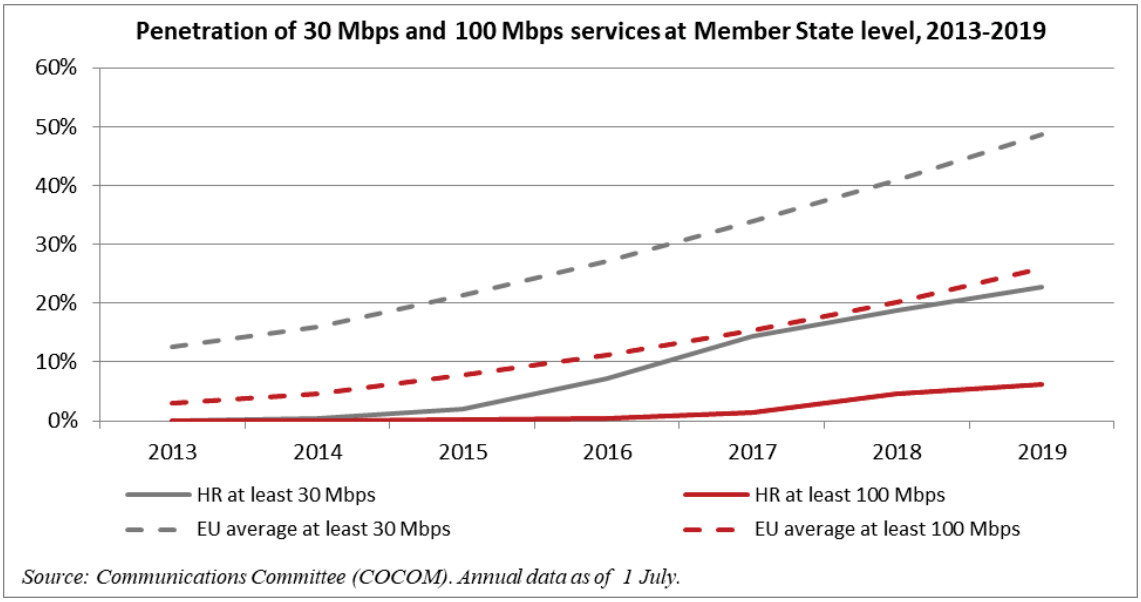
Despite Croatia's modest progress on penetration of broadband of at least 30 Mbps and 100 Mbps, the gap between Croatia and the EU average continues to widen. Penetration of broadband of at least 30 Mbps reached 22.8% (up 4 pps), in comparison to the EU average of 48.7%. The gap is even more pronounced for the penetration of broadband of at least 100 Mbps, which in 2019 reached 6.2% (up 1.6 pps), compared with an EU average of 25.9%. The gap between Croatia and the EU average is now 19.7 pps, versus 15.5 pps in 2018 and 14 pps in 2017.



Source IHS and Point Topic, Broadband coverage in Europe studies



Overall, market shares for broadband mostly did not change. The prevailing technology remains xDSL (ADSL is constantly declining, having been superseded by VDSL, which has been vectorised and upgraded to G.fast where possible), but its decline continued in 2019. Overall, VDSL2 vectoring coverage in total terms (not included in the chart) stands at 9%, against an EU average of 28%.

Cable remains stable in second place. Since 2013, the proportion of fibre has remained very low, despite coverage reaching 31% of households.

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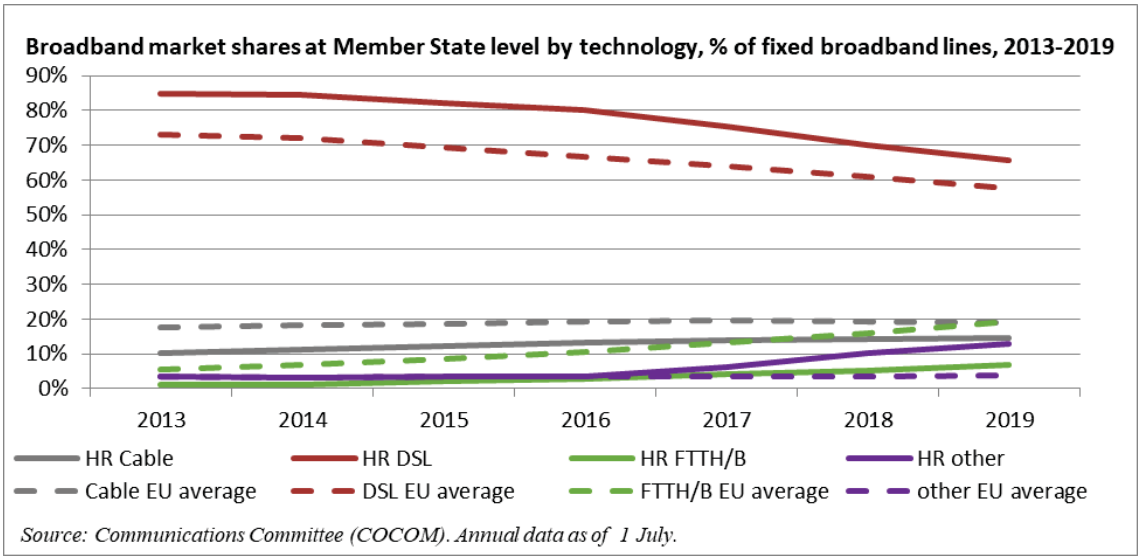
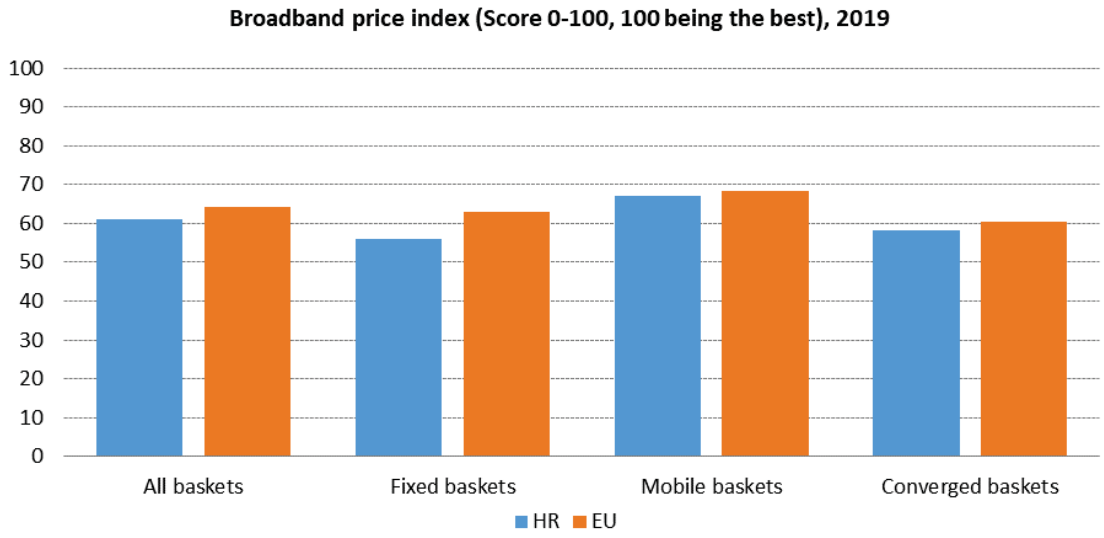


Croatia's electronic communications market of is slightly more expensive than the EU average, ranking 18th. When comparing fixed, mobile and converged broadband baskets, the fixed basket is the most expensive. Unlike Croatia's fixed market, which has only two big operators, its mobile market has three operators, resulting in stronger competition: this could explain why the mobile basket is the cheapest of three observed baskets.



Source: European Commission, based on Empirica (Retail broadband prices studies).

1. Progress towards a Gigabit Society[139]

The EU 2025 goals for gigabit coverage are unlikely to be achieved. The Croatian authorities are currently drafting a national plan for broadband development for 2021-2027, which would further elaborate on the 2030 national development strategy due for adoption in 2020.

Although there continue to be delays in implementing two national, EU-co-financed next-generation network schemes, in 2019 Croatia made some progress on broadband infrastructure. Firstly, two out of three selection phases were completed in the national programme to develop broadband-access

[139] It is noted that statements regarding planned or potential State aid measures record intentions declared by Member States and do not pre-judge or pre-empt the assessment of such measures by the Commission under the relevant state aid rules. The DESI report is not meant to provide any assessment of the compliance of such measures with state aid rules and procedures.

infrastructure in areas of no commercial interest. There are now 21 pre-selected project proposals for this programme, covering 126 municipalities and 903,774 inhabitants. However, the Commission remains worried about delays in implementing the national backhaul infrastructure project. These delays put at risk the absorption of the available funds. In any event, it is important to monitor developments in improving connectivity across the entire country, to avoid leaving any areas behind.

Market players significantly increased their investments in building fibre to the premises in 2019 compared to previous years. A new wholesale-only market entrant, RUNE, emerged to serve rural areas in Istria and Primorje-Gorski Kotar county, rural areas of Croatia currently not covered by fibre, and where there is no commercial interest. RUNE committed to providing ultra-fast broadband fibre to 110,000 households, financed by the Connecting Europe Broadband Fund with an equity capital contribution of €30 million.

The 5G frequency spectrum working group consisting of HAKOM, three Croatian mobile network operators and equipment vendors continued its work in 2019. This resulted in more intensive 5G outdoor and indoor testing in Croatia, using 80 MHz to 100 MHz blocks in the 3500 to 3700 MHz frequency band. For that purpose, HAKOM granted temporary licences for test operations in a number of areas[140]. Osijek should be the first '5G enabled' city in Croatia.

According to the Croatian mobile operators, the EU 5G action plan targets translated to Croatia would mean that 470 settlements in urban and tourist areas and on highways should have 5G coverage by 2025. To achieve these targets, in autumn 2019 all three Croatian mobile operators proposed to the government that it further reduce annual fees for already assigned radio frequencies and for the 5G frequencies assigned in the future. The operators would commit €36.81 million derived from the reduction in the 5G network roll-out; this could put Croatia on track for its Gigabit 2025 targets.

As yet the recent belated transposition of the Cost Reduction Directive does not appear to be producing a market effect, despite the interest among operators, especially given the cost of deploying 5G infrastructure. The main reason for the lack of market effect is that the single information point only recently became operational.

Furthermore, the permit-granting process for the roll-out of electronic communication infrastructure usually takes 1-2 years. The operators voiced strong concerns about the lawfulness of more stringent requirements in the spatial plans adopted by a number of 428 municipalities. Such strict spatial plan regimes slow down the roll-out of infrastructure and will affect 5G roll-out even more. The operators are bringing these cases before the courts, which until now have ruled in their favour. However, court proceedings are time consuming.

Previous DESI reports cited operators' complaints on excessive right-of-way fees charged by local municipalities. The obligation to pay right-of-way fees is laid down in the Electronic Communications Act and the fees' levels are set in a HAKOM order on confirmation and compensation for the right of way[141]. In 2018, HAKOM initiated discussions with the relevant stakeholders on possible future amendments to the rules on right-of-way fees. The incumbent, which is the most affected by right-of-way fees, committed to investing any amount resulting from a potential reduction of the fee in building new and upgrading old infrastructure. However, despite positive indications that both the government and HAKOM will tackle this issue, as reported in DESI 2019, there was no progress on

[140] Zagreb, Samobor, Sveta Nedelja, Osijek, Rijeka, Split, Krk Island, Dubrovnik, Hvar, Novalja, Jastrebarsko, Rab and Bjelovar.

[141] Order on confirmation and compensation for the right of way, Croatian Official Gazette 152/2011, 151/2014, 95/2017.

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this matter in the last year. Achieving political consensus on this issue remains challenging as right-of-way fees are a revenue for local municipalities. Achieving significant improvements in connectivity requires a clear national strategy addressing all barriers, especially country-specific ones, and all relevant public stakeholders jointly implementing the strategy.

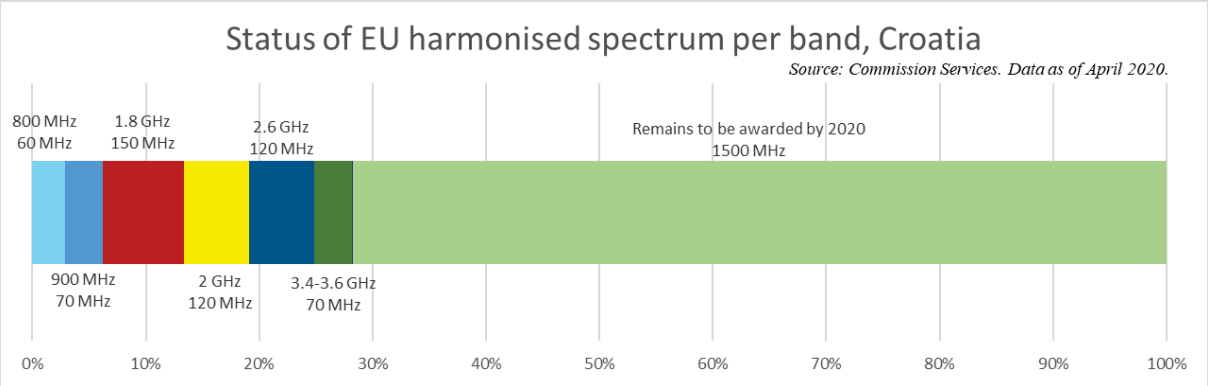
2. Market developments

In May 2019, United Group announced the acquisition of TELE2 Croatia. In 2018, United Group already acquired NovaTV and N1 (TV channels). In November 2019, the Croatian Competition Agency (CCA) opened a phase 2 in-depth investigation into possible spillover effects from the media market to the electronic communications market, as well as possible barriers on wholesale markets and the connected retail markets. The acquisition was cleared on 3 February 2020[142].

Since 2014, in the context of an insolvency procedure, the incumbent has had a time-limited right of control over Optima Telekom and had to initiate the sale of its shares in the company and the transfer of its control in January 2020[143]. In July 2019, the Croatian Competition Agency confirmed that the incumbent had provided notification of its plans. On 31 January 2020, Hrvatski Telekom HT, Croatia's incumbent operator, announced the start of the sale of all of its shares held in Optima. The deadline for submission of offers was initially 2 March 2020[144], but was later extended until 18 March 2020. This is an opportunity for new entry in the Croatian market, which could increase competition and bring benefits to end users in terms of better service, lower prices, etc.

3. Regulatory developments

3.1. Spectrum assignment



Croatia has assigned 590 MHz, which is 28% of the spectrum harmonised at EU level for wireless broadband. This is significantly below the EU average of 39%. In 2019, HAKOM held an auction award procedure and assigned 2x10 MHz to Tele2 and 2x5 MHz to A1 in the remaining part of 2100

[142] https://www.aztn.hr/en/slovenia-broadband-and-tele2-merger-approved/

[143] In June 2014, HT, Croatia's incumbent operator, took over management of alternative fixed network operator Optima Telekom following the completion of the latter's pre-bankruptcy settlement procedure, in which HT and Zagrebačka Banka were the largest creditors. Initially, the Croatian Competition Agency ruled that the concentration of HT and Optima Telekom should be limited to a period of 4 years, later extending it to a maximum 7 years. Upon expiry of the sixth year of the control takeover, HT had to initiate a competitive tendering process for the sale of Optima's shares, in which it also had the right to sell Optima Telekom shares held by Zagrebačka Banka. The contract between the bank and HT will end after 10 July 2021 (the expiry date of the seven-year concentration period), as will HT's control over Optima Telekom. HT will be required to transfer its management rights to either Zagrebačka Banka or to a third party unaffiliated to HT, while the bank will be authorised to sell HT's Optima Telekom shares.

[144] www.t.ht.hr/tender

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MHz band. Following a public call procedure, HAKOM assigned 2 x 20 MHz in the 2600 MHz band to each of three mobile operators.

There are obstacles to assigning sufficiently large blocks of spectrum in the 3400-3800 MHz band by the end of 2020. More specifically, in the 3400-3600 MHz band, 70 MHz is not available in two counties in northern Croatia due to existing FWA licences. Moreover, available spectrum is not continuous, meaning that large blocks are not available and only continuous blocks of 50 MHz can be assigned at the moment. Frequency refarming of the band is expected to solve the issue by the end of 2020. After 4 November 2023, the entire 3400-3600 MHz band will be available countrywide. The entire 3600-3800 MHz band will be available countrywide after 31 July 2020, while one continuous block of 100 MHz has already been available from 1 September 2019.

In July 2019, the Commission sent a reasoned opinion to Croatia for not adopting the national roadmap for the 700 MHz band. In March 2020, Croatia placed the roadmap draft in public consultation and its adoption is expected in first half of 2020[145]. However, HAKOM initiated negotiations with a broadcast network operator to 'refarm' this lower part of the band preferably in 2020. The success of this process greatly depends on cross-border coordination (there is interference in the 470-694 MHz band) and on the successful completion of a demanding transition procedure, since DTT is a dominant TV platform with a 48% share of households. The current roadmap draft does not contain plans for any auction before the second half of 2020. From December 2019 until January 2020, HAKOM held a public debate on its spectrum award plan for the 700 MHz, 3.6 GHz, 1500 MHz and 26 GHz bands. In February 2020, HAKOM published its conclusions, announcing its plans to auction the 700 MHz, 3.6 GHz and 26 GHz bands in the second half of 2020. Due to lack of interest, the 1.5 GHz band will not be included. Adoption of the national roadmap for the 700 MHz band is a pre-requisite for the auction to take place.

3.2. Regulated access (both asymmetric and symmetric)

In January 2019, HAKOM adopted a decision on three criteria test and a market analysis of the wholesale fixed voice call origination market (ex market 2 (2007)). HAKOM continued to regulate this market, in which the incumbent operator, HT, was defined as having significant market power. HAKOM continues to regulate a market that is no longer proposed for *ex ante* market regulation since 2014 because a significant number of customers still use public voice telephony as a stand-alone service in Croatia. According to HAKOM, call pre-selection (CPS) (together with wholesale line rental, WLR) is the only wholesale service for which alternative operators can offer their customers public voice telephony as a stand-alone service on a profitable basis.

In May 2019, the Commission registered two notifications, one concerning the market for wholesale local access provided at a fixed location, and the other for the market for wholesale central access provided at a fixed location for mass-market products (markets 3a and 3b of the 2014 Recommendation respectively). The specific character of the notified markets was the market definition, which includes hybrid broadband access. Hybrid broadband access is a method of broadband internet access that combines copper pair xDSL access with access through mobile networks. To ensure that operators using HT's naked bitstream service are able to replicate the hybrid access service at retail level, HAKOM imposed an ancillary remedy to ensure access to the hybrid product. In its decision, the Commission did not contest the need to impose this remedy but called on HAKOM to closely monitor the market developments. HAKOM adopted final measures in June 2019.

[145] The roadmap was adopted on 8 May 2020.

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In October 2019, the Commission registered a notification from HAKOM concerning the methodology for the margin squeeze test (MST). HAKOM updated the MST methodology to address acknowledged problems on the retail broadband market, which are related to the HT Group's high and stable market share and the increasing share of bundles including both regulated and non-regulated inputs. The Commission had no comments on the notification. The notification's applicability has been postponed from 1 April 2020 to 1 January 2021 due to the COVID-19 pandemic.

4. End-user matters

In 2019, HAKOM amended its Ordinance on the manner of and conditions for provision of electronic communications networks and services in order to raise the level of end-user protection and ensure fairer treatment. The amendments change the rules on distance selling, on obligations for operators in removing the conclusion and termination of contracts, on shortening or setting deadlines for operators to comply with end-user requests and on removing network failures.

a. Emergency communications – 112

In July 2019, the Commission sent a letter of formal notice to Croatia for incorrect application of the rules ensuring provision of caller location for calls to the 112 emergency number and ensuring equivalent access to emergency services for disabled users[146]. Following the letter of formal notice, Croatia invested further efforts in finalising deployment systems that provide caller location for both network-based location data and advanced mobile location (AML), while an SMS chat application giving equivalent access for disabled users was deployed in 2019.

According to the Communications Committee 112 implementation report for 2019, Croatia registered almost 11,000 calls placed by roaming end users to the 112 number [147].

b. Universal service

From 1 January 2020, HAKOM changed the conditions of broadband universal service speeds. Download speed increased to 4Mbit/s download (with an upload of 512 Kbit/s), compared to the previous 1Mbit/s. The incumbent and Imenik d.o.o. remain the designated providers for universal services in Croatia for following 3 years.

5. Conclusion

As in previous years, Croatia continues to make consistent progress. However, this progress has been insufficient to change its 25th ranking in connectivity. To significantly improve connectivity, it is important for Croatia to have a clear national connectivity strategy It is also important that the strategy addresses country-specific barriers to connectivity, and for it to be jointly implemented by all public stakeholders. Croatia has an opportunity to set ambitious and achievable goals in its new national broadband development plan. It is important to make further efforts to remove country-specific barriers to investment and to the absorption of EU funds. It would be beneficial to promptly make the 5G pioneer bands available under the 5G specifications, and make better use of the Cost Reduction Directive.

[146] https://ec.europa.eu/commission/presscorner/detail/en/INF_19_4251
[147] https://ec.europa.eu/digital-single-market/en/news/2019-report-implementation-european-emergency-number-112

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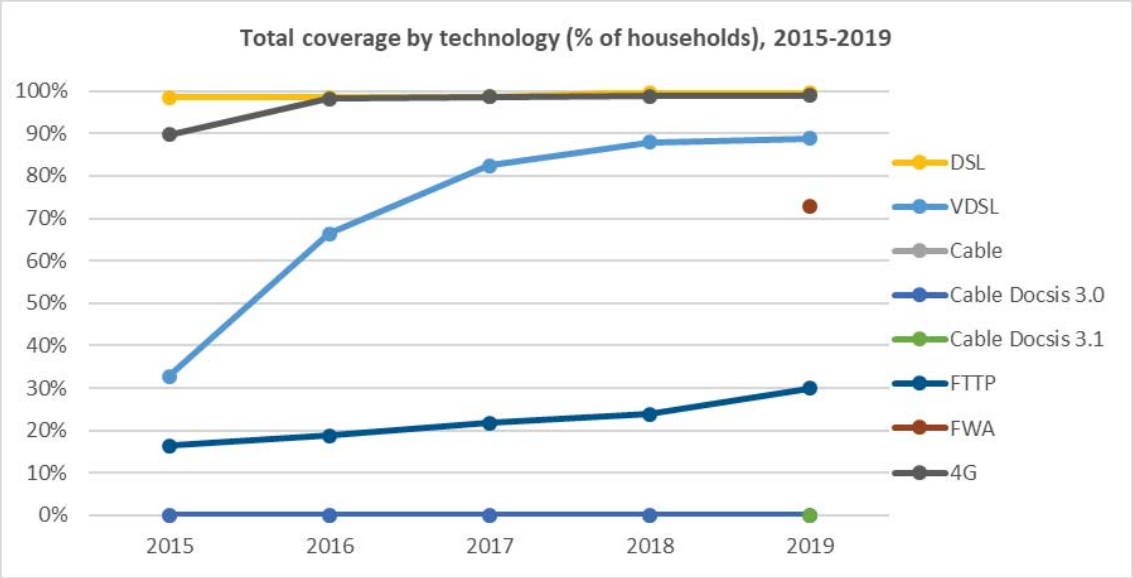
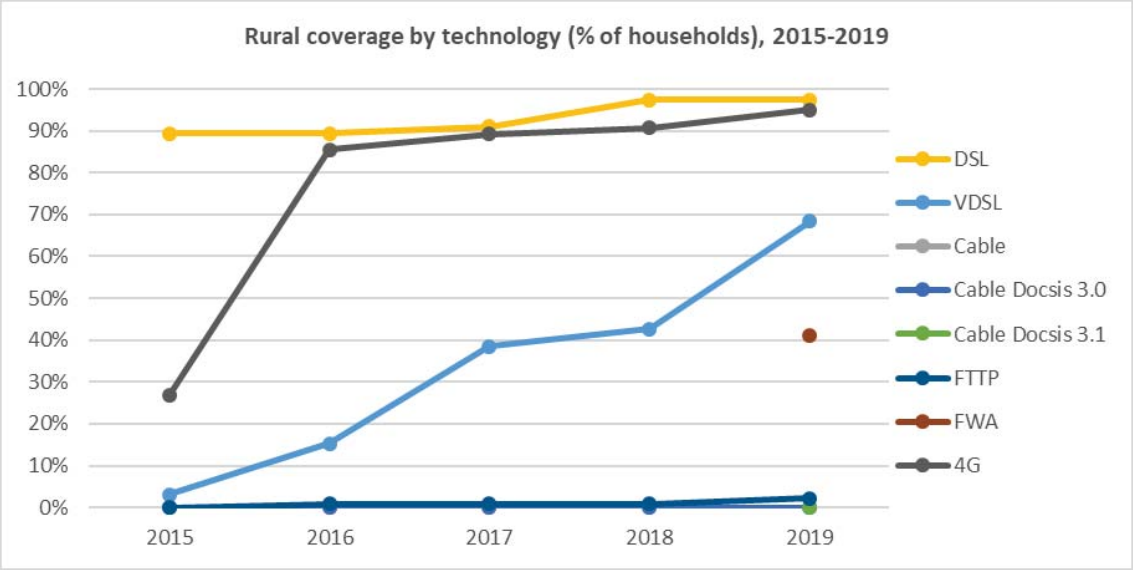
Italy

Italy is steadily increasing its FTTP coverage (from 24% in 2018 to 30% in 2019). It has upgraded roughly 90% of its DSL networks to VDSL.



Source: IHS and Point Topic, Broadband coverage in Europe studies

The graph above shows a high level of deployment of FWA technologies, reaching 73% in 2019, significantly above the EU average (49%). The use of FTTP has steadily increased (reaching 30% of households, an increase of 6 percentage points since the previous year). It is still below the EU average (34%) but the gap has significantly narrowed.



Source: IHS and Point Topic, Broadband coverage in Europe studies

Regarding rural coverage, the tables above and below show that, except for DSL (already over 90%), rural coverage of all the other technologies is increasing. Although NGA rural coverage increased significantly from 2018 (43%) to 2019 (68%), VHCN coverage increased by only 1 percentage point to reach 2% in 2019, well below the EU average (20%).

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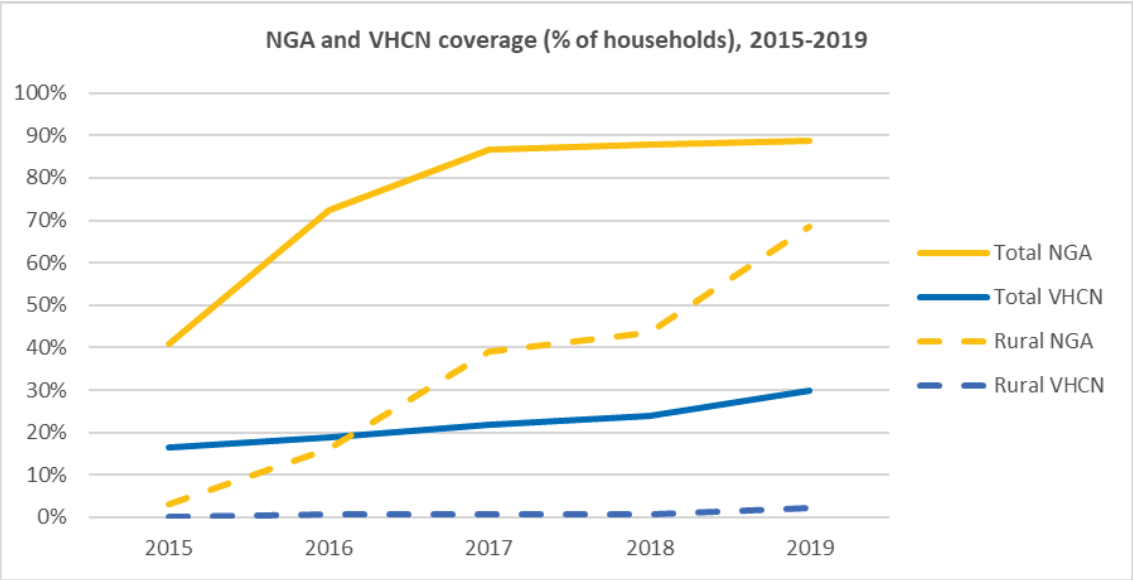
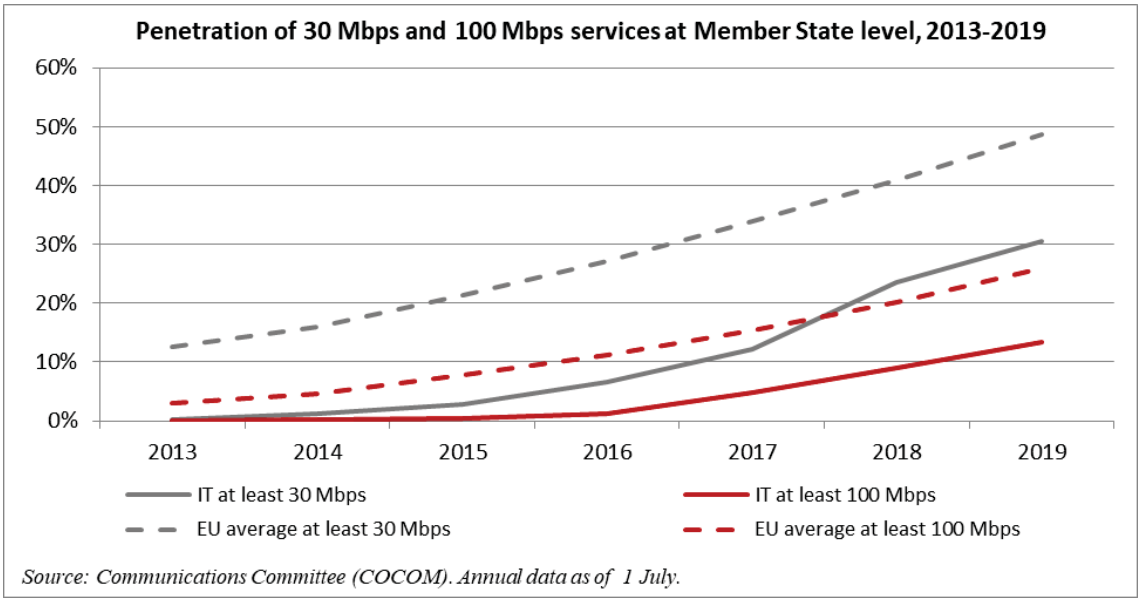


Source: IHS and Point Topic, Broadband coverage in Europe studies

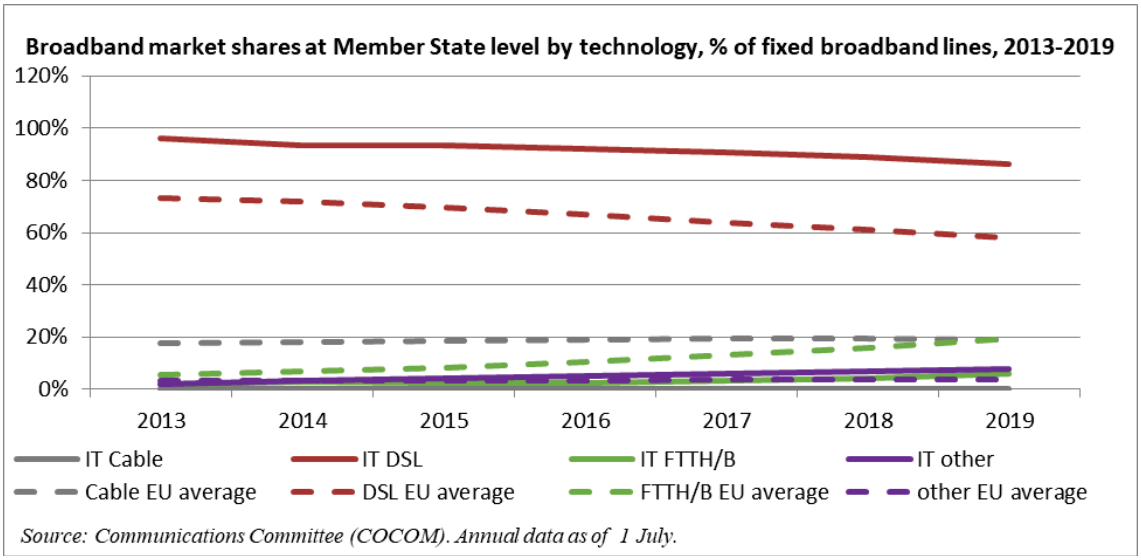


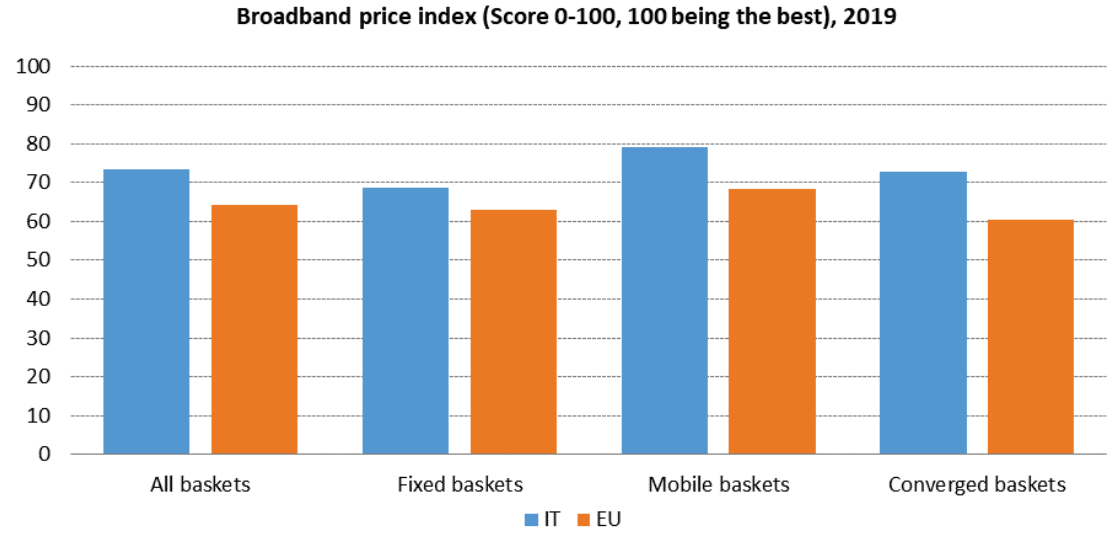
Both the “at least 30 Mbps” (30.6%) and the “at least 100 Mbps" (13.4%) penetration in Italy, despite a significant increase, remain below the EU average (respectively 48.7% and 25.9%). It is important to note the steady increase in use over the last three years in parallel with an increasing infrastructure competition at national level. Nonetheless, there remains a gap between Italy and other EU countries in terms of take up.

In Italy there is no cable. The other technologies are distributed as follows: 86.1% DSL technologies (of which 48,6% represented by VDSL lines[148]) against an EU average of 57.8%, showing that in terms of technology, Italy still mainly relies on DSL though the share is slowly decreasing (down 10 percentage points since 2013)[149]. Although it covers slightly under a third of households, FTTH/B technology has only 6% market share, very low in comparison to the EU average of 19.3%.

[148] AGCOM reported that 73.3% of the VDSL lines are marketed at a commercial advertised speed ≥100 Mbps.
[149] According to AGCOM, in Italy, thanks to the short copper lines and the use of VDSL2 technology (whose coverage - not included in the chart – stands at 56% against an EU average of 28%), at least two thirds of the FTTC lines support the speed of 100Mbps.

Other technologies account for 7.9% market share against an EU average of 3.8%.





Source: Commission services based on Empirica (Retail broadband prices studies)

On prices, Italy performs above the EU average in all price baskets illustrated in the table above. The difference is more evident in the mobile market price index, where Italy scores 79 against an EU average of 68.

1. Progress towards a Gigabit Society[150]

In 2019, Phase I of the Italian Ultra Broadband Plan for white areas (so called "C&D areas") was launched in all Italian regions and the last of the three relevant tenders was assigned to the wholesale-only operator Open Fiber. The practical roll-out of the plan is now fully ongoing but it is still subject to very serious delays and the target to roll-out 80% of the plan by 2020 will most probably be missed. Some of the reasons behind these delays are linked to difficulties in accessing existing infrastructure and persisting difficulties in obtaining permits despite the implementation at national level of the Cost Reduction Directive. A partial solution has been found thanks to the

[150] It is noted that statements regarding planned or potential State aid measures record intentions declared by Member States and do not pre-judge or pre-empt the assessment of such measures by the Commission under the relevant state aid rules. The DESI report is not meant to provide any assessment of the compliance of such measures with state aid rules and procedures.

Conferenza di Servizi, a legal instrument that aims to simplify procedures where the public administration is involved, which produced positive results, limited to the regions where it was implemented. In addition, Italy brought in a new legal provision in the 2019 Simplification Decree with the aim of accelerating the permit-granting process. According to the Italian authorities, in mid-April 2020, work had begun in over 2,600 municipalities and the infrastructure has been completed in 600 municipalities

'Phase II' of the Italian broadband plan involves issuing vouchers to encourage take-up of broadband and an investment plan for grey areas. In July 2019, the Committee for ultra-broadband (CoBUL), a ministerial committee involved in the implementation of the national broadband strategy, approved the launch of the above mentioned Phase II.

At the beginning of 2020, the Italian competition authority closed its investigation into whether TIM's competitive behaviour in white areas breached competition rules by hampering the entry of Open Fiber. The competition authority concluded that TIM had implemented an anti-competitive strategy aimed at preserving its market power in the supply of fixed network access services and telecommunications services to end customers and had hindered the entry of other competitors. The authority imposed a fine of around €116 million[151].

Black NGA areas[152] are facing increasing infrastructure competition, confirming the trend seen in recent years.

The main private investment plans for the deployment of fibre-based networks in Italy are from TIM, Open Fiber and Fastweb. These investments mainly focus on the deployment of FTTH networks; only Fastweb is still expanding the coverage of its FTTC network, until 2020, with the objective of covering a further 1 million households and reaching a total FTTC coverage of 5.5 million households.

TIM, through Flash Fiber (the joint venture with Fastweb), is in the process of upgrading its FTTC network to FTTH; the objective of Flash Fiber is to build FTTH coverage of 3 million of households in 2020.

Lastly, the wholesale-only operator Open Fiber is building a FTTH network.

5G trials started in 2017 and are still ongoing both as part of the programme launched by the Ministry of Economic Development '5 cities for 5G' and based on voluntary agreements between operators and municipalities. In 2019, some Italian operators started marketing 5G offers in the main cities.

In 2019, in the context of the WiFi.Italia.It project, the Italian government launched the 'Piazza Wi-Fi Italia' project. This has a dedicated fund of €45 million and envisages installing new public Wi-Fi hotspots, extending the previous intervention fund of €8 million euros aimed primarily at small municipalities (with fewer than 2,000 inhabitants) and at the municipalities affected by the 2016 earthquake. At the end of March 2020, 2,896 municipalities had joined the project and the authorities launched the procedure to install Wi-Fi hotspots in 1,112 of them. In March 2020 Infratel Italia launched the 'Wi-Fi Italia Ospedali' project, an initiative for the installation of up to 5,000 Wi-Fi

[151] See https://en.agcm.it/en/media/press-releases/2020/3/ICA-TIM-fined-116-million-for-hindering-fiber-development

[152] The Black areas are geographical zones where there are or there will be in the near future at least two basic broadband networks of different operators and broadband services are provided under competitive conditions (infrastructure-based competition) and therefore it can be assumed that there is no market failure. See EU Guidelines for the application of State aid rules in relation to the rapid deployment of broadband networks in OJ C 25, 26.1.2013, p. 1–2

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Access Points in public hospitals, in order to provide free digital support to users in hospital structures during the COVID-19 emergency. 510 Italian municipalities were issued vouchers following the second WIFI4EU tender in April 2019 and 142 Italian municipalities were issued vouchers following the third tender in September 2019, covering a total of 652 municipalities in 2019.

2. Market developments

With regard to the mobile market, in 2019, one operator, Fastweb (previously operating as MVNO) officially became the fifth Italian mobile operator, after having acquired spectrum.

In 2019, two network-sharing agreements were signed:

In June 2019, Fastweb and Wind Tre announced an agreement leveraging on the operators' respective assets, aimed at the roll-out of a nationwide shared 5G network supporting next-generation mobile services. The shared 5G network will include Wind Tre and Fastweb macro and small cells, connected through dark fiber from Fastweb, to be deployed nationwide, with the target to cover 90% of the population by 2026. Wind Tre will manage the 5G network, and both operators will remain independent in the commercial and operational use of the shared infrastructure. Under the agreement, Wind Tre will provide Fastweb with roaming services on Wind Tre's existing network (4G and legacy technologies), thus allowing Fastweb to extend its mobile coverage to national level. Fastweb will provide Wind Tre wholesale access to Fastweb's FTTH and FTTC networks. The agreement has an initial duration of 10 years. The Ministry, with the positive opinion by AGCOM, authorised the agreement, subject to compliance with certain conditions. A competitor filed a court case before the Administrative Court, which is still pending.

In July 2019, TIM and Vodafone agreed to expand their existing passive sharing agreement and entered into an active mobile network sharing partnership to jointly roll-out 5G infrastructure (including active sharing of their existing 4G networks to facilitate 5G active sharing). The aim is to allow more efficient deployment of the new technology over a wider geographic area and at a lower cost. TIM and Vodafone will combine their passive networks within the tower operator INWIT, creating Italy's biggest tower company and the second largest in Europe, with more than 22,000 towers. The agreement was notified to the European Commission which gave clearance for the deal on 6 March 2020, subject to the acceptance of certain commitments.

It is also worth mentioning the growth of the operator Iliad which represented 3.7% of all mobile lines and 4.7% of the 'human' mobile lines in June 2019.

Once again, 2019 saw dynamism in the wireless fixed access (FWA) segment, with the number of FWA lines (7% of fixed access lines) exceeding the number of FTTH lines (6% of fixed access lines)[153]. Part of the UBB plan in white areas has also been implemented making recourse to FWA technology.

3. Regulatory developments

3.1. Spectrum assignment

In Italy, 94% of the spectrum harmonised at EU level for wireless broadband has been assigned. The auction of the three '5G pioneer bands' was completed in 2018. With regard to these bands, whereas 3.6 GHz and 26 GHz are already assigned and available, the Italian authorities are still in the process of taking the steps needed to make the 700 MHz band available by 2022; its refarming is ongoing. The delay in comparison with the deadline of 30 June 2020 under the UHF Decision (EU)

[153] See AGCOM Communication Markets Monitoring System N. 4/2019 available here: https://www.agcom.it/documents/10179/4386532/Allegato+23-1-2020/7b245499-7f9f-45af-80c0-76b41a197b7c?version=1.0

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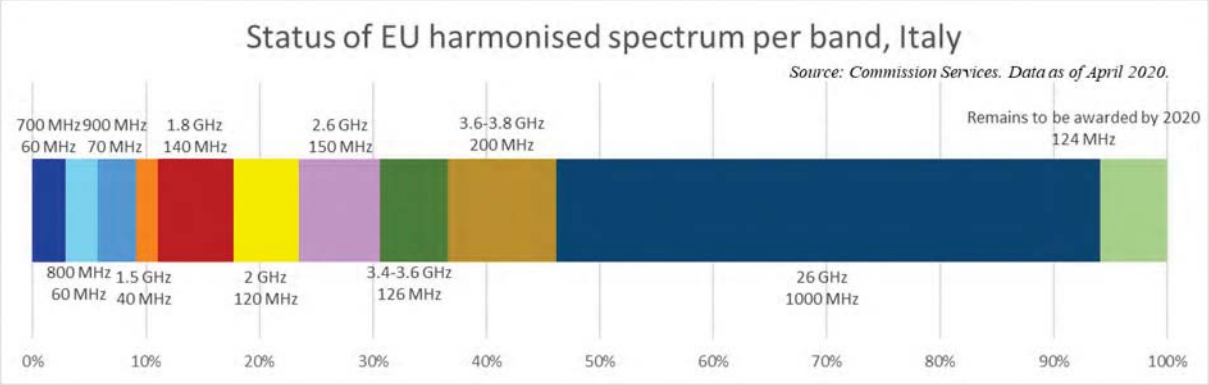
2017/8991 is mainly due to the complexity of the refarming process. 5G commercial services have been launched in some of the assigned and available bands. The 26 GHz band is currently being used mainly for 5G FWA testing. Some operators have reported that they could soon offer 5G FWA services with the FTTA technology (fibre to the antenna).



In July 2018, on the basis of an opinion issued by the national regulatory authority (AGCOM), the Ministry of Economic Development extended the existing rights of use in the 3.4-3.6 GHz band, originally intended for broadband wireless access, until 2029. This was a measure taken under the Italian Electronic Communications Code, with the aim of aligning the new deadline with the deadline for right of use granted in other bands (900 MHz, 1800 MHz and 2100 MHz). When the extension was granted, the Italian authorities set the price for those extensions in line with the reserve price set for the assignment of the rights spectrum in the 3.6-3.8 GHz band in the context of the then planned 5G auction. Both decisions by the Ministry and by AGCOM gave rise to appeals before the Italian courts. In November 2019, the Italian administrative tribunal decided that, though the extension itself was lawful, the price to which such extension should have been granted must be adjusted to the market value of the frequencies as it resulted from the outcome of the subsequent 5G auction (significantly higher than the reserve price). The decision has been appealed and is now pending before the Supreme Administrative Court.

In August 2019, the Ministry of Economic Development assigned rights of use of broadcasting frequencies to national network TV operators on the basis of the criteria defined set out AGCOM (Decision n. 129/19/CONS).

An assignment of additional capacity for the broadcasting service resulting from the spectrum refarming process in the 700 MHz band (‘*procedura onerosa senza rilanci competitivi*’) should have taken place by November 2019. However, the process is still ongoing, since meanwhile AGCOM had to implement rulings n. 5928/2018 and n. 6910/2019 issued by the highest administrative court. In particular, the implementation of ruling n. 6010/2019, issued on 11 October 2019 (following the appeal for clarifications presented by AGCOM), requires AGCOM to carry out further analyses.

3.2. Regulated access (both asymmetric and symmetric)

In 2019, AGCOM notified the market analysis of the wholesale local and central access markets as well as its assessment of TIM's separation project. As there was a significant development of alternative infrastructures affecting the competitive situation on the considered markets since the previous market analysis in 2015, AGCOM carried out an analysis of the competitive conditions on a sub-national geographic basis. The analysis took into account in particular the number of operators, the number of alternative networks and their coverage, as well as the distribution and change in market shares over time. As a result, AGCOM defined two separate geographic markets for both wholesale access markets: Milan and the rest of Italy. Milan was found to be a competitive market

and therefore regulation was withdrawn. For the rest of Italy, AGCOM set out criteria to assess the level of competition in the different geographic areas using the municipality as the geographic unit. AGCOM drew up a list of 26 more competitive municipalities in which to apply differentiated remedies. As the competitive situation is deemed to change significantly over the regulatory period, AGCOM will update the list of more competitive municipalities each year.

In March 2018, TIM notified to AGCOM its plan to create a legally separate wholesale company (NetCo). In 2019 AGCOM then conducted a coordinated analysis under Article 13b of the Access Directive assessing the impact of the potential separation on the markets for wholesale local and central access as well as on the market for wholesale high quality access. In 2019, AGCOM concluded that the separation would not affect the market definition of the analysed markets. As regards the assessment of significant market power, AGCOM underlined that, even after the legal separation, TIM will still benefit from vertical integration and therefore the impact is limited to some less relevant aspects of the remedies.

AGCOM also approved a plan proposed by Telecom Italia for the decommissioning of copper. In particular, two conditions must be met before announcing the decommissioning of a given local exchange: i) 100% coverage to be reached with FTTH/FTTC and partially FWA and ii) 60% of retail customers (from both TIM and OAO) must have already migrated to fibre. AGCOM also set the timeframe for the related migration process.

4. End-user matters

a. Complaints

From 1 April 2019 to March 2020, the Italian NRA received 130,417 applications via the *ConciliaWeb* online platform, to resolve disputes between users and operators. 94,705 procedures have already handled and concluded: 60% with an agreement between the parties, 14.5% with non-agreement, and 9.5% with user's withdrawal, 8% for inadmissibility, 2.5% for absence of the user at the hearing and 0.02% for lack of operator participation. Over the same period, AGCOM received 3,395 complaints reporting breaches of consumer protection provisions, and around 10,000 informal complaints. The main sources of consumer complaints are linked to costs for contract termination (18%), modifications of contractual conditions (12.5%), delays in terminating the contracts (11.5%), service interruptions (10%) and problems in the switching process (10%).

Although the Supreme Administrative Court issued a final decision for the mandatory reimbursement of additional sums payed by end-users due to the (unlawful) introduction of 28-days billing period tariffs, operators are still not automatically reimbursing customers who are still obliged to submit specific requests to this end. AGCOM launched and concluded a penalty procedure against non-compliant operators and has imposed penalties for around €9 million.

b. Open Internet

In 2019, the Italian administrative court confirmed AGCOM's 2017 decision setting penalties on an offer including a zero-rated music app because it was still functioning even after the data bundle was used up.

c. Roaming

In 2019, AGCOM authorised four sustainability derogations, without any change to the amount of surcharge[154]. AGCOM started investigating one non-compliance case regarding zero-rated offers. In

[154] According to Regulation (EU) No 531/2012 of the European Parliament and of the Council of 13 June 2012 on roaming on public mobile communications networks within the Union (recast) (Text with EEA relevance),

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particular, in that case, the operator was charging, while roaming, the zero rating traffic as normal Internet traffic. After discussions with the NRA the operator took measures that the NRA considered to be compliant with the existing rules and did not deem it necessary to take a formal decision on the case.

d. Emergency communications – 112

In 2019, the Italian authorities deployed a new system ensuring access to 112 emergency services to people with hearing impairments[155]. In addition, the 'Where Are U app' has been updated to support real-time chat. Italy is now taking preliminary steps to implement AML solutions for localisation. In particular, in April 2019, the Ministry of Interior, supported by the committee defined under Article 75bis of the Italian Electronic Communications Code, decided on the implementation of a handset-based location technology based on AML/ELS technology. The service is expected to be fully available in the country by the end of 2020.

e. Universal service

The long-running litigation over the possibility for AGCOM to request also to mobile operators to contribute to the financing of the universal service obligation is still ongoing. A recent decision by the Italian Supreme Administrative Court established that the substitutability criterion, so far used to justify mobile operators' contribution to the financing, is not adequate and asked AGCOM to revise it.

5. Other issues

In the second part of 2019, AGCOM has operated in *prorogatio* regimen while awaiting the appointment of the new Board. The current Board's mandate was extended several times, most recently by Law-Decree n. 18 of 17 March 2020. However, AGCOM reported that the *prorogatio* regimen did not affect AGCOM's functions as it fully exercised the powers conferred on it by the law.

Moreover, in the context of the COVID-19 emergency measures, Article 82 of the Decree called 'Cura Italia' provides for specific measures requesting electronic communications network and service operators to strengthen the networks, guarantee their functioning and service operation and continuity, to enhance and guarantee uninterrupted access to emergency services.

Under Article 82, AGCOM has taken several measures regarding wholesale and retail services and has set up a permanent roundtable on electronic communication services and consumers, with the aim of sharing proposals with stakeholders on how to manage urgent needs stemming from the emergency.

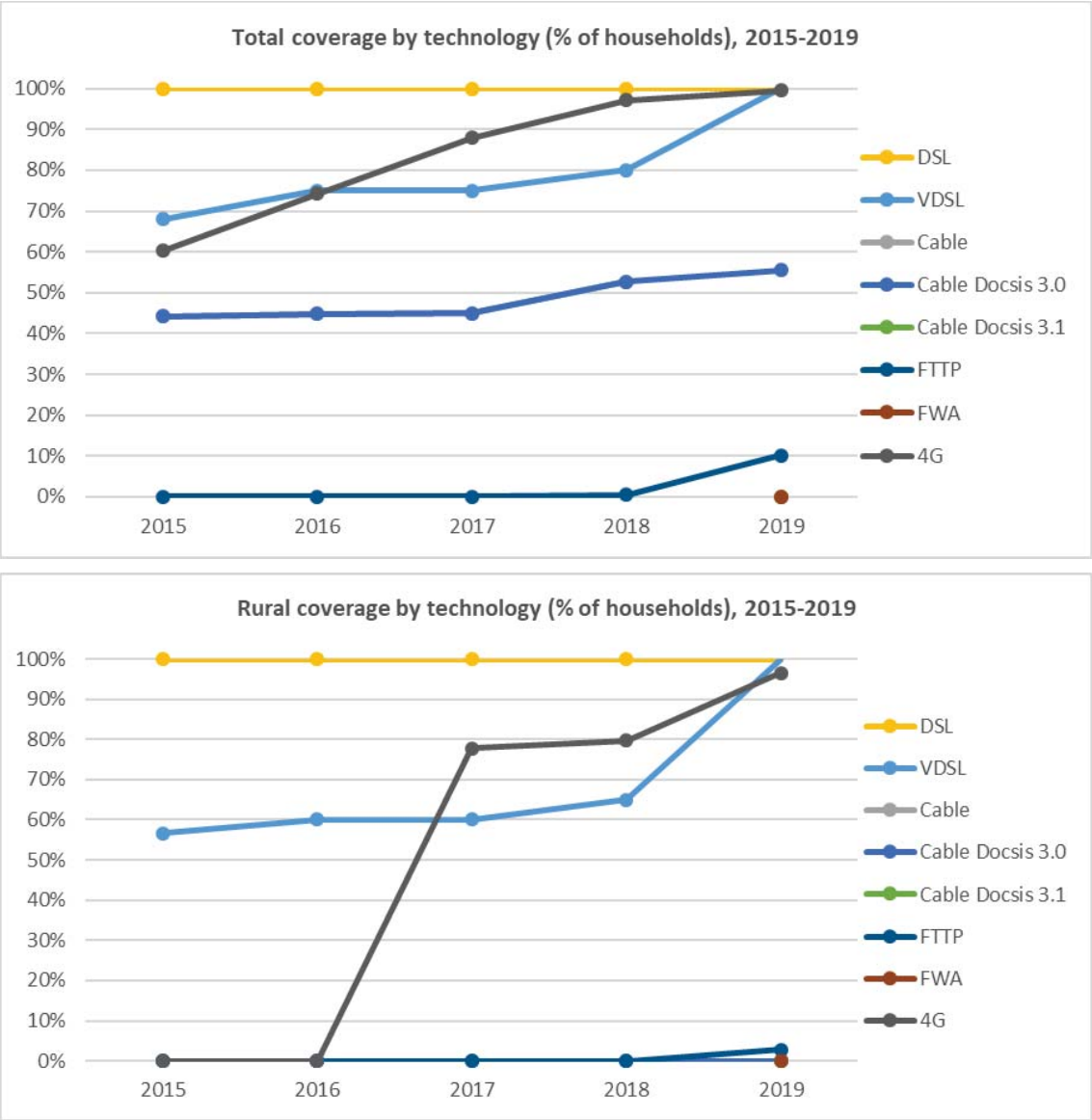
6. Conclusion

In terms of 5G preparedness, Italy certainly ranks highly due to the fact that all pioneer bands were assigned and they are currently used extensively for testing and for the launch of the first commercial services. In terms of broadband deployment, it has made evident progress in the competitive areas where the increase in private investments in FTTH technologies is having a positive impact on the coverage indicators. In white areas, more structural solutions are needed to address the delays that still occur in rolling out the Italian ultra-broadband plan. Italy is taking some steps to address the ongoing delays in completing works in white areas.

Article 6c and Commission Implementing Regulation (EU) 2016/2286 of 15 December 2016 laying down detailed rules on the application of fair use policy and on the methodology for assessing the sustainability of the abolition of retail roaming surcharges and on the application to be submitted by a roaming provider for the purposes of that assessment. For the relevant decisions see: https://www.agcom.it/roaming-internazionale

[155] https://112sordi.flagmii.it/?culture=it-IT#howSection

Cyprus



Source IHS and Point Topic, Broadband coverage in Europe studies

Cyprus has reached comprehensive coverage for DSL and VDSL (100% for both, versus the EU averages of 91% and 59% respectively), and high coverage levels for cable Docsis 3.0 (56%, above the EU average of 46%) and 4G (99.6%, above the EU average of 99.4%[156]). However, it lags behind in cable Docsis 3.1 (no coverage, versus an EU average of 19%) and fibre to the premises (FTTP) (10%, far below the EU average of 34%).

On rural coverage Cyprus outperforms the EU in DSL and VDSL (100% for both, versus the EU averages of 81% and 42% respectively). However, it lags behind in cable (no coverage for either

[156] The 4G coverage indicator used in the country chapters differs from the DESI indicator for 4G coverage. The former is an aggregate indicator, i.e. measuring the coverage of all operators together. The latter is an average indicator, i.e. the sum of all coverages divided by the number of operators. Because of this difference, the two indicators produce different results for Cyprus. According to the present (aggregate) indicator, Cyprus outperforms the EU. However, according to the same DESI indicator, Cyprus lags behind the EU (94% versus 97%).

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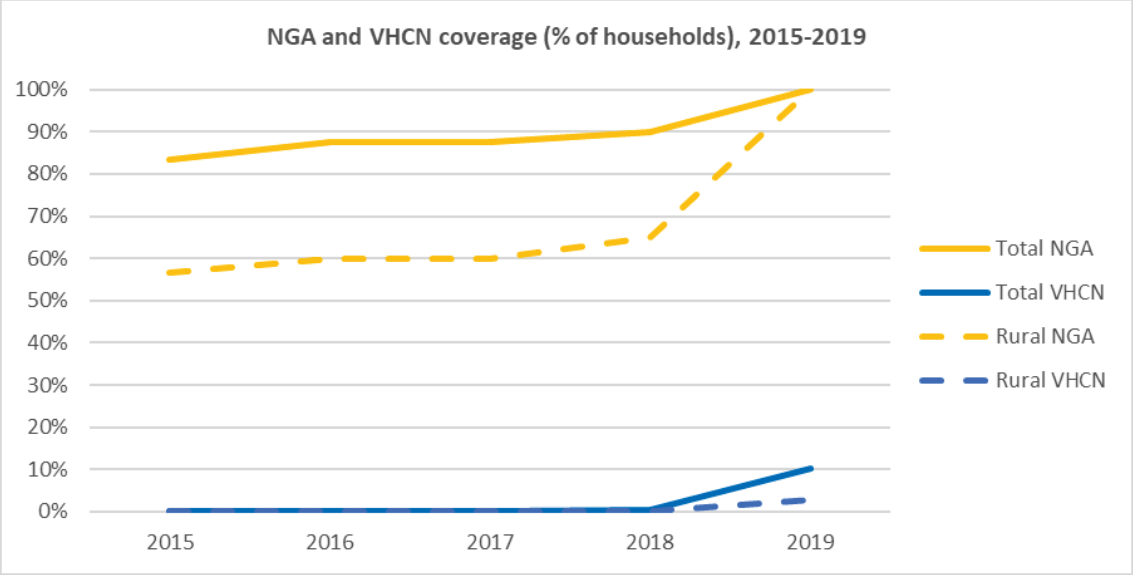
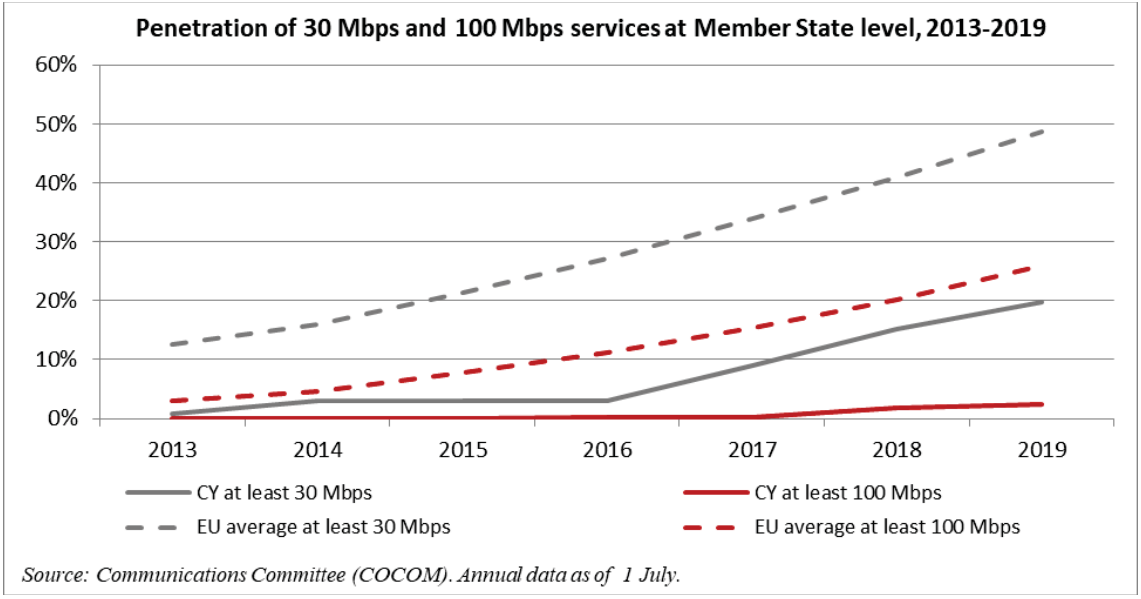
Docsis 3.0 or 3.1, versus the EU averages of 11% and 4% respectively), 4G (96%, just short of the EU average of 97%) and FTTP (3%, far below the EU average of 29%).

Cyprus has made strong progress in next generation access network (NGA) coverage, reaching 100% (versus an EU average of 59%). The difference is even more remarkable in rural coverage (100% in Cyprus, versus an EU average of 51%). However, despite its considerable progress in very high capacity network (VHCN) coverage, Cyprus lags behind the EU, standing at 10% compared to 0.5% a year ago (versus the EU average of 46.5% compared to 29% a year ago). This lag is greater in rural areas, where coverage stands at 3% compared to 0% a year ago (versus the EU average of 24% compared to 14% a year ago).



Source IHS and Point Topic, Broadband coverage in Europe studies



In the fixed market, Cyprus slightly outperforms the EU on broadband penetration per household (87% compared to the EU average of 78% – data as of July 2019). DSL remains the predominant technology for the delivery of broadband access services, albeit slightly decreasing (77% as of July 2019, compared to 79% a year ago). The main competition comes from cable, which accounts for around 21%, and has been practically stable over the past 3 years. FTTH/B is only now picking up, reaching 2.2%. Fast penetration (at least 30Mbps) and ultrafast penetration (at least 100Mbps) are

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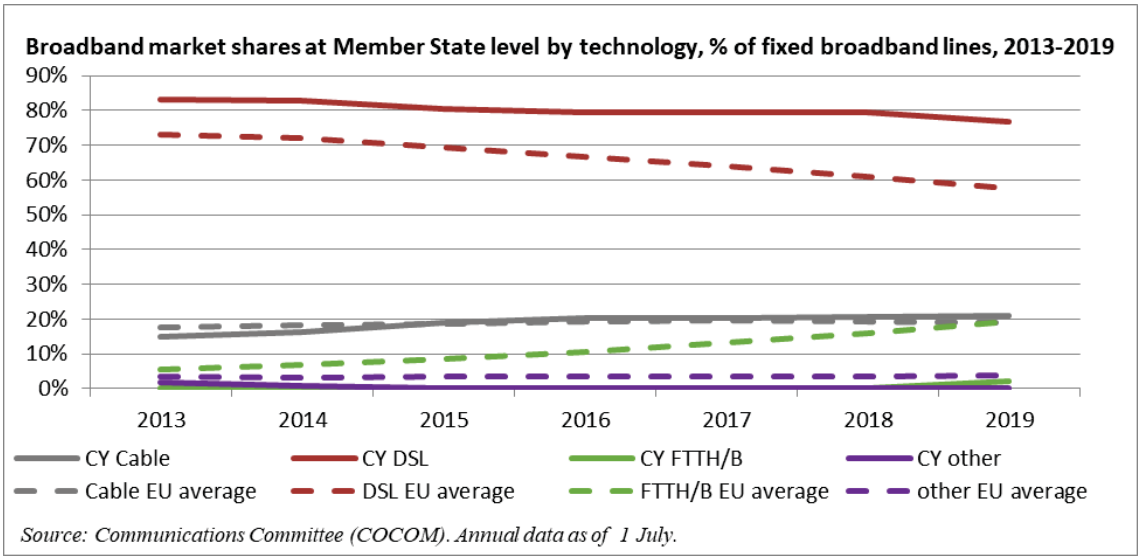
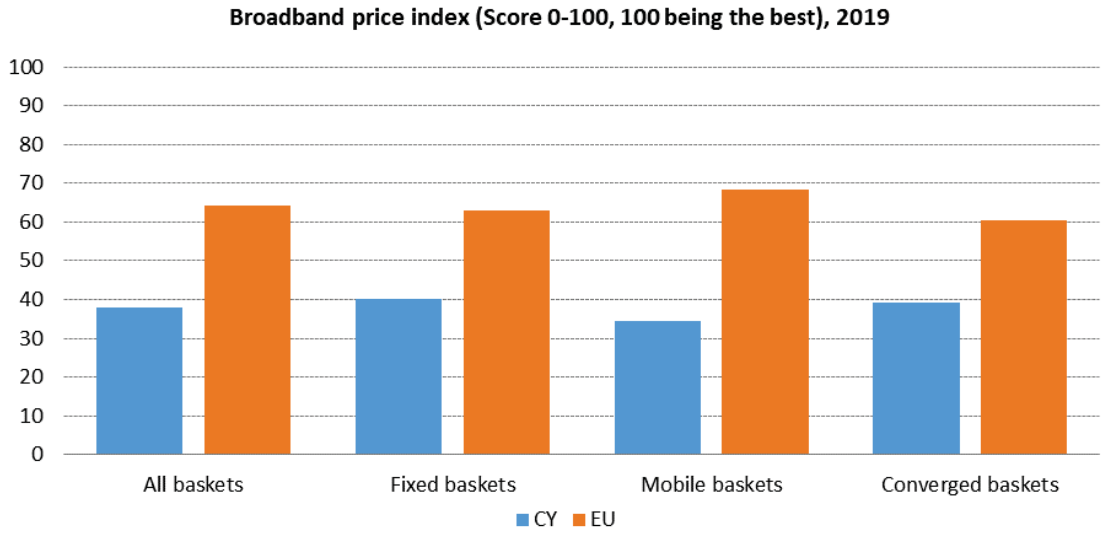
picking up, reaching 20% and 2.4% respectively in July 2019 (up from 15% and 1.8% a year ago), but Cyprus is lagging further behind the EU average (49% and 26% respectively). Cyprus significantly outperforms the EU on mobile broadband penetration (117 subscriptions per 100 people as of July 2019 compared to 110 a year ago, and versus the EU average of 100).





Source Commission services based on Empirica (Retail broadband prices studies)

Broadband prices in Cyprus are higher than the EU average, as reflected in the pricing indicators. In baskets that include fixed broadband access the difference is relatively small at low speeds, but increases rapidly as the speed increases. For internet only access, Cyprus is 11% more expensive than the EU average for speeds below 12 Mbps, but is 53% more expensive for speeds in the 30-100 Mbps bracket and five times more expensive for speeds above 200 Mbps.

The difference becomes less prominent, as the number of services included in the basket increases. For example, in the 30-100 Mbps band, Cyprus is 53% more expensive for single play baskets (only internet access), 24% more expensive for double play baskets (internet access and fixed telephone) and 17% for triple play baskets (internet access, fixed telephone and TV). A similar trend is observed, though a bit less clearly, for converged baskets that include fixed and mobile internet.

Prices for mobile broadband services are also higher in Cyprus than in the rest of the EU. This difference peaks for the basket with 5GB allowance. For mobile broadband only, access prices in

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Cyprus are more than double the EU average (except for the 0.5 GB allowance). For mobile broadband and mobile telephony the difference ranges from below 10% (0.5 GB allowance and 30 calls) to 100% (5 GB allowance with 30 calls).

1. Progress towards a Gigabit Society[157]

All major operators in Cyprus actively invest in ultra-high speed networks. In 2019, the incumbent operator, CYTA, started to deploy a G-PON fibre-to-the-home (FTTH) network as part of a ten-year €100 million investment plan, meant to cover mainly urban areas. According to the Cypriot authorities, CYTA is ahead of schedule on its plan for 2019 and has already covered more than 61,000 premises. Thanks to the fibre installation, CYTA is now also offering higher speed products of up to 300 Mbps (1Gbps for businesses).

The cable operator, Cablenet, already covers more than half of the premises in Cyprus with a DOCSIS 3.0 network. Cablenet has announced that all new installations will be fibre based. It is currently deploying a FTTH access network in a suburb of Nicosia (targeting 5,000 premises) and plans to deploy FTTH access networks in Pafos (2020) and Paralimni (2021). Primetel and EPIC (ex. MTN Cyprus) also plan to deploy their own fibre networks.

Following CYTA's announcement on the deployment of a fibre network, all three operators expressed interest in co-investments. Discussions are ongoing but it is not clear if they will lead to any agreement.

National authorities recognise the persisting digital divide in Cyprus and seek to reduce it and accelerate digitalisation. To that end, they are preparing a new national broadband plan for 2021-2025, aiming to have it ready by mid-2021. The new NBP will include ultrafast broadband projects in underprivileged socioeconomic areas and their surroundings, especially rural and suburban areas. It will also include measures to increase the demand for ultrafast broadband connections and encourage investment in VHCNs.

Ongoing demand-side Government measures include the Pilot Voucher Scheme that subsidises new subscriptions (or upgrades) for speeds of 100 Mbps and above for 12 months. Even though it is a pilot programme with limited budget and no major impact on the connectivity statistics, this subsidy clearly raises the public's interest in ultrafast broadband connections and gives them the chance to experience the benefits of ultrafast speeds. According to the Cypriot authorities, this measure seems to have encouraged operators to accelerate their investments in VHCN infrastructure. The scheme was extended for another year, following operators' requests.

Market players are looking forward to the 5G auction, planned for 2020. However, they express concern on the permit granting process - especially the involvement of local authorities, and on the impact of a recent campaign against the installation of new antennas. Under pressure from this campaign, several local authorities have declared their opposition to the installation of additional antennas. Market players worry that this could pose a substantial hurdle to the expansion of their wireless networks and their ability to deploy 5G and achieve the coverage required in the upcoming auction.

2. Market developments

[157] It is noted that statements regarding planned or potential State aid measures record intentions declared by Member States and do not pre-judge or pre-empt the assessment of such measures by the Commission under the relevant state aid rules. The DESI report is not meant to provide any assessment of the compliance of such measures with state aid rules and procedures.

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In 2019, the biggest change in the Cypriot market was the granting of a new mobile license to Cablenet, through an auction procedure in June. Cablenet already operated as a mobile virtual network operator (MVNO) and has therefore already been providing mobile services. Cablenet has published a request for proposals (RFP) to the other three mobile operators for radio access network (RAN) sharing agreements as well as an RFP to equipment suppliers for building a new RAN.

In addition, following its acquisition by Monaco Telecoms, MTN's name was changed to EPIC.

Operators focus on bundling to gain a competitive advantage. They seek to offer packages that combine fixed telephony, mobile communications, broadband internet and pay TV with prime content, especially football. As a result, 88% of fixed broadband subscriptions are part of a bundle and of these, around 40% comprise three or four services, including a pay TV component. Given the importance of prime time content, two operators have agreed to exchange TV content.

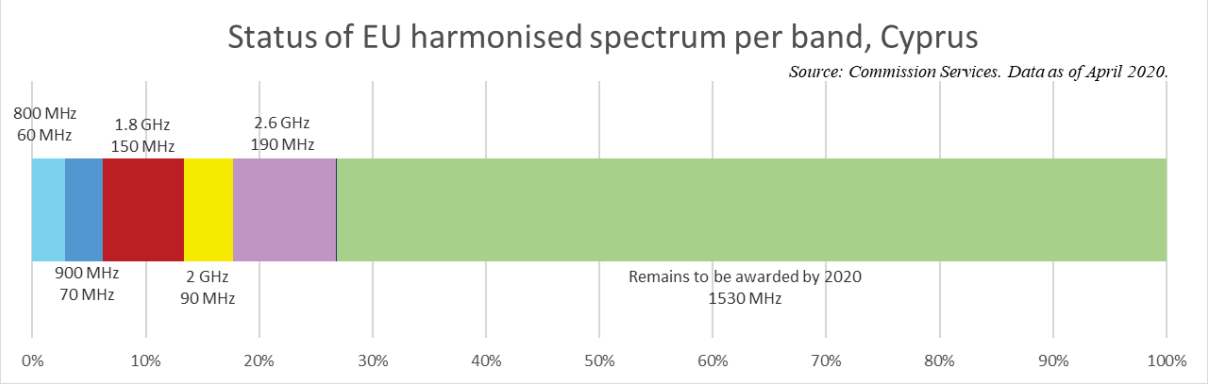
CYTA continues to dominate both the fixed and mobile market but its market shares are eroding due to increasing competition.

Cypriots often use over-the-top (OTT) services. According to a survey carried out for the Office of Electronic Communications & Postal Regulations (OCECPR) in May 2019, 75% of mobile subscribers send messages and 70% make calls using OTTs. The number of calls made through OTT services are around 14% of the total number of fixed and mobile calls. Based on the quality of the service and the usage pattern, as indicated in the consumer survey, OCECPR has concluded that OTTs do not constitute a substitute to fixed or mobile telephony but rather a complementary service.

The Competition authority notes a decrease in cases in the electronic communications market.

3. Regulatory developments

3.1. Spectrum assignment



Overall, Cyprus has awarded 26.8% of the total 2,090 MHz harmonised spectrum for broadband[158]. The awarded spectrum is in the 800 and 900 MHz and the 1.8, 2 and 2.6 GHz bands. The spectrum that remains to be awarded is mainly in the 700 MHz and the 3.4-3.8 band. Finally, according to Cypriot authorities, there is lack of demand for the remaining spectrum in the 1.5, 2[159] and 26 GHz band.

[158] The 5G spectrum readiness indicator is based on the amount of spectrum already assigned and available for use for 5G by 2020 within the '5G pioneer bands' in each EU Member State. For the 3.4-3.8 band this means that only licences aligned with the technical conditions annexed to Commission Decision (EU) 2019/235, are considered 5G-ready. On the contrary, the percentage of harmonised spectrum takes into account all assignments in all harmonised bands for electronic communications services (including 5G pioneer bands), even if this does not meet the conditions of the 5G readiness indicator.

[159] In the 2 GHz band, 90 MHz have been awarded while for the remaining 30 MHz there is a lack of demand.

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The Department of Electronic Communications (DEC) is moving forward with the auction of 5G spectrum, seeking to award the rights of use before the end of 2020. The auction will include the 3.4-3.8 GHz band and the 700 MHz band, but not the 26 GHz band since the market has shown no interest so far. The DEC's intention is to break the auctioned spectrum into four pieces. The contest was scheduled to start during the 2nd quarter of 2020, but the launch of the auction process was postponed due to the COVID-19 outbreak. A new date has not yet been set, but the Cypriot authorities intend to re-evaluate the situation and resume the procedure as soon as the conditions associated with the outbreak allow.

Regarding the availability of the bands, the 3.4-3.8 GHz band is currently free of use. For the 700 MHz band, the Ministry had reached an agreement with Velister, to free this band completely by September 2020. However, Velister informed the DEC that it faces major difficulties to migrate its existing DTV transmissions out of the 700 MHz band before the agreed deadline, due to the COVID-19 outbreak. This is mainly due to the acquisition of the required new equipment, which needs to be tested by the manufacturer, imported and installed. At the writing of this report, the DEC was evaluating the situation and expected to extend the deadline. Interference from the areas which are not under the effective control of the Republic of Cyprus in the 700 MHz band continues. However, Cypriot authorities are confident that such interference will cease by September 2020, because of a parallel migration from TV to mobile telephony use.

In June 2019, Cablenet obtained a new mobile license by auction. It was assigned 2x10 MHz in the 800 MHz band, 2x20 MHz (FDD) and 15 MHz (TDD) in the 2.6 GHz band.

3.2. Regulated access (both asymmetric and symmetric)

In 2019, the OCECPR notified the market for wholesale call termination on individual public telephone networks provided at a fixed location and the market for wholesale voice call termination on individual mobile networks (markets 1 and 2 of the 2014 Recommendation[160] respectively), the market for access and call origination on public mobile telephone networks (ex-market 15 of the 2003 Recommendation[161]) and the market for broadcasting transmission services to deliver broadcast content to end-users (ex-market 18 of the 2003 Recommendation).

Performing the three criteria test, OCECPR concluded that ex-market 15 is not susceptible to ex-ante regulation and that the regulatory obligations should therefore be lifted. This is mainly because increasing the number of MNOs to four (with the addition of Cablenet) is expected to make the market competitive.

However, OCECPR concluded that the other three markets are susceptible to ex-ante regulation, and it imposed nearly identical remedies to the previous notification (transparency, non-discrimination, accounting separation, access to and use of specific network facilities, price control and cost accounting).

OCECPR does not plan any additional notifications for 2020. The market for wholesale high-quality access provided at a fixed location (market 4 of the 2014 Recommendation) was notified in 2018 and

[160] Commission Recommendation 2014/710/EU of 9 October 2014 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services.

161 Commission Recommendation 2003/311/EC of 11 February 2003 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communication networks and services.

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is planned for notification in 2021. The market for wholesale high-quality access provided at a fixed location (market 3a of the 2014 Recommendation) and the market for wholesale central access provided at a fixed location for mass-market products (market 3b of the 2014 Recommendation) were notified in 2017. For markets 3a and 3b, OCECPR had obtained an extension due to delays in the implementation of the incumbent's FTTP network that had consequently delayed the activation of the remedies imposed during the last round of market analysis, thus rendering an earlier notification premature.

Already since 2018, OCECPR had approved the prices of CYTA for access to its network (VULA product) also in view of its fibre investment. Operators complained that the cost of connecting at the Local Point of Handover was excessive. CYTA responded with a commercial offer (not submitted to OCECPR for approval), which aggregated traffic, allowing operators to interconnect at regional level.

In 2019, the regulator dealt with three dispute resolution cases. The first one concerned the broadband cost reduction directive (BBCRD). Specifically, an operator requested information on the location and availability of the poles and ducts of the Electricity Authority of Cyprus (EAC). EAC did not reply in a timely manner, so the mobile operator requested that OCECPR resolve the dispute. OCECPR issued a decision in November 2019, ordering EAC to provide all the requested information. The second case concerned a similar request by the same operator, this time for information about physical infrastructure on the CYTA network, notably its location and routes, as well as its type, current use and availability. The Commissioner issued a decision on 9 August 2019 ordering CYTA to provide all the requested information. The third case involved a request by the same operator for information on the CYTA network. This case mostly concerned the access directive and to a lesser degree the BBCRD. The Commissioner's decision is pending.

4. End-user matters

OCECPR developed a new, interactive tool (cyCompare[162]) that allows consumers to compare the retail product (fixed and mobile) tariffs of the different operators. This will cover all retail products (fixed and mobile).

a. Complaints

In 2019, OCECPR received around 160 complaints most of which concerned pricing and billing (60) and to a lesser extent the availability of service (mainly broadband) and contractual terms.

This is considerably less than in 2018 (420 complaints, the vast majority of which concerned subscription to multimedia services). In late 2018, the Commissioner adopted a new process, requiring that the customer's mobile operator verify that the customer explicitly agrees to a multimedia subscription before the multimedia service provider can add the new subscriber to its database. This has practically eliminated complaints on premium rate services.

b. Open internet

Two zero rated practices observed by OCECPR since 2018 were terminated in 2019, on 1 April and 16 June respectively, as their business case diminished. OCECPR also observed a case of traffic management practice in the form of a fair-use policy on a monthly basis. Specifically, when consumption reaches a monthly data cap (relatively small volumes both for download/upload stream), the ISP may limit the access rate of the user for the rest of the month. OCECPR assessed the practice and requested action from the ISP in order to ensure compliance with Regulation 2015/2120 and Decree 72/2017.

[162] http://cycompare.ocecpr.org.cy/

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OCECPR has developed a new measurement tool (cyNettest[163]) that allows consumers to measure and thus evaluate the performance of their broadband services. The App is also available for Android and IoS devices.

c. Roaming

OCECPR investigated a case in which SIM cards issued by an operator registered in another Member State for M2M communication were acquired through an intermediate seller and offered for internet access by a company in Cyprus. As there was no M2M limitation and no agreement with mobile operators in Cyprus, this constituted a possible infringement of Regulation (EU) 2015/2120. The Commissioner, after consulting with the NRA of the operator issuing the SIM cards, and the mobile operators in Cyprus, ordered the company to withdraw the SIM cards from the Cypriot market, and applied all relevant legal measures under national legislation in order to resolve the case. There have only been a few complaints about the high charges for tourists unintentionally using the services of mobile operators active in the area of the Republic of Cyprus which is not under the effective control of the Government of the Republic of Cyprus.

d. Emergency communications – 112

The deployment of the European emergency number '112' service was awarded to a consortium of companies that also took responsibility for e-call deployment. A smartphone application has been developed and deployed successfully. It enables user location and allows voice-based two-way communication - though not text-based, which would be necessary for communicating with hearing or speaking impaired people.

In 2019 the emergency SMS to 112 was also deployed but restricted to one network. According to the Cypriot authorities, extending it to users of all networks is being planned for the first half of 2020.

The Commission is currently assessing how emergency communications and the 112 number is working in Cyprus, particularly the insurance of equivalent access for disabled end-users.

e. Universal service

There were no new developments or changes in scope of the universal service (which includes access to fixed telephony, special retail packages to end-users with disabilities and/ or low income, electronic directory services) or the designation process. Broadband is currently not included in the universal service, but it will be once the European Electronic Communications Code (Directive 2018/1972) has been transposed into national law.

5. Other issues

A new law was approved in early 2020, creating a Deputy Ministry of Research, Innovation and Digital Policy[164]. The new Deputy Ministry began operating on 1 March 2020, with the DEC transferred to it. The Commissioner advises the Deputy Minister on issues relating to electronic communications.

The Deputy Ministry (DEC) and OCECPR are working on transposing the Code. The draft law by DEC has been put in public consultation from 18 October to 27 November 2019. The comments received have been analysed and a final draft version has been prepared. The draft law by OCECPR is

[163] http://www.ocecpr.org.cy/el/content/cynettest-systima-ektimisis-poiotitas-eyryzonikon-syndeseon#English_Version

[164] In Cyprus it is not possible to create new Ministries due to constitutional restrictions. Deputy Ministries can be created and report directly to the President of the Republic.

currently under preparation. The two draft laws will be submitted to the legal service for vetting, with a view to adopting them by the end of 2020.

6. Conclusion

Cyprus is making progress on rolling out VHCNs, as all main operators are seeking to deploy fibre networks. In parallel, the new national broadband plan (scheduled for adoption by mid-2021) includes measures to expand VHCNs in digitally excluded rural areas. The uptake of high-speed broadband continues to face significant challenges, such as a lack of demand and operators' uncompetitive retail pricing structures.

Market players seem keen to invest in new networks and launch 5G services. National authorities have set concrete targets for awarding 5G spectrum and have taken the necessary steps to free the 700 MHz band. However, operators express concerns on the permit granting process, in particular for wireless networks, especially when local authorities are involved.

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