Council of the European Union

Brussels, 11 June 2020
(OR. en)

8779/20
ADD 4

TELECOM 91
MI 170
IND 73
COMPET 275
PI 37
RECH 234
DIGIT 45
CYBER 92

COVER NOTE

From:	Secretary-General of the European Commission, signed by Mr Jordi AYET PUIGARNAU, Director
date of receipt:	11 June 2020
To:	Mr Jeppe TRANHOLM-MIKKELSEN, Secretary-General of the Council of the European Union
No. Cion doc.:	SWD(2020) 111 final (PART 5/6)
Subject:	COMMISSION STAFF WORKING DOCUMENT Digital Economy and Society Index (DESI) 2020

Delegations will find attached document SWD(2020) 111 final (PART 5/6).

Encl.: SWD(2020) 111 final (PART 5/6)

EUROPEAN
COMMISSION

Brussels, 11.6.2020
SWD(2020) 111 final

PART 5/6

COMMISSION STAFF WORKING DOCUMENT

Digital Economy and Society Index (DESI) 2020

Digital Economy and Society Index (DESI) 2020

Telecom country chapters

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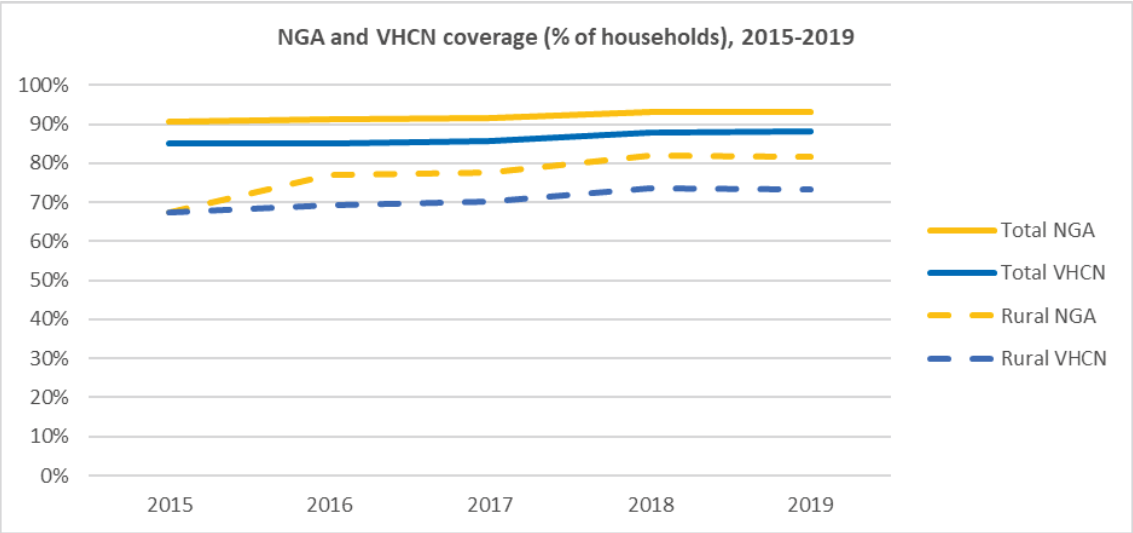
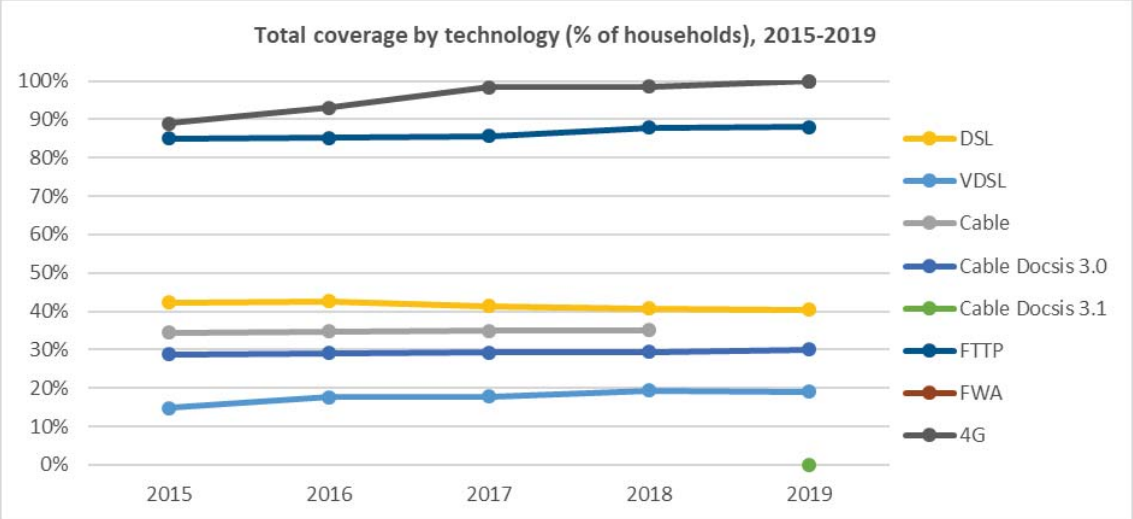
Latvia

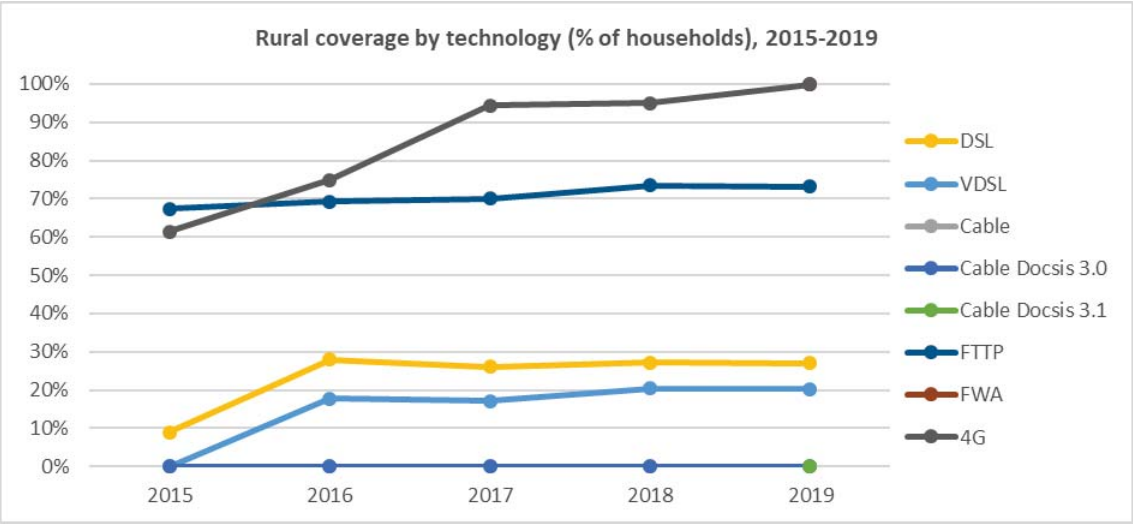


Source: IHS and Point Topic, Broadband coverage in Europe studies.

Enjoying the highest FTTP coverage in the EU (88%), Latvia is among EU's frontrunners in very high capacity network (VHCN) coverage, with 88% coverage of households in 2019, against the EU average of 44%. The availability of VHCNs is combined with an extremely advanced coverage of fast broadband connections (NGA), remaining at 93% coverage of households in 2019, as well as complete aggregate 4G coverage[1]. Latvia's problem is, however, its urban/rural divide.

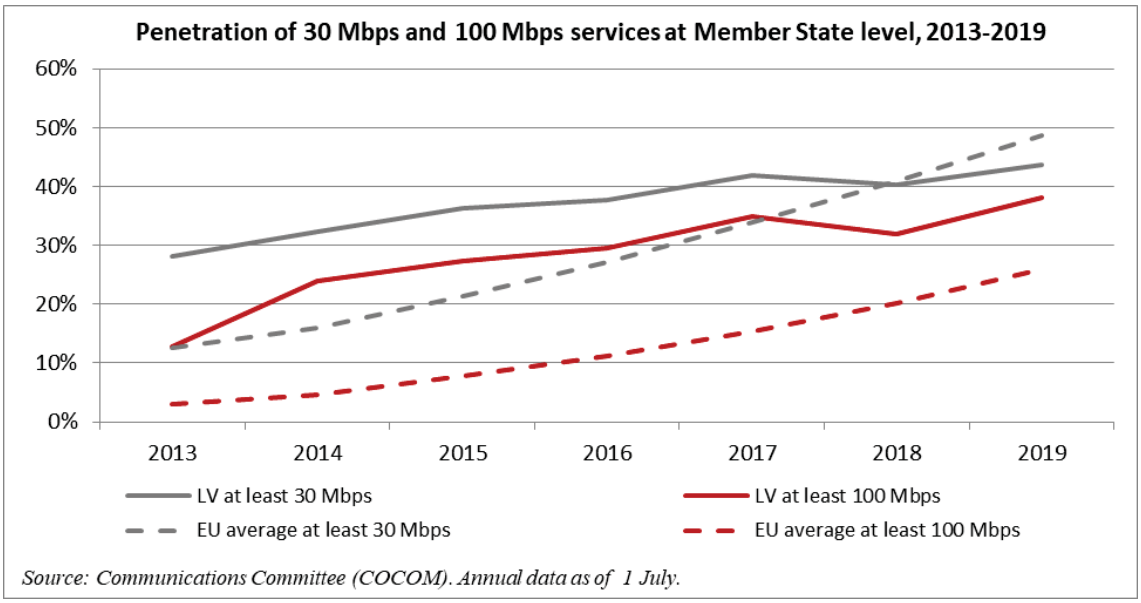


[1] The 4G coverage indicator used in the country chapters differs from the DESI indicator for 4G coverage. The former is an aggregate indicator, i.e. measures the coverage of all operators together. The latter is an average indicator, i.e. the sum of all coverages divided by the number of operators.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



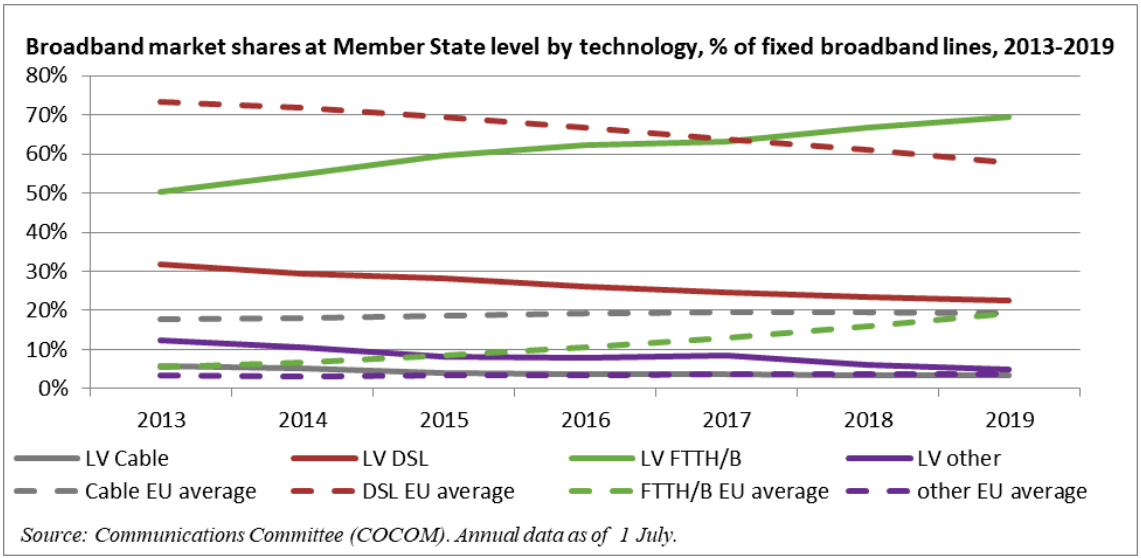
Source: IHS and Point Topic, Broadband coverage in Europe studies.

Fixed rural coverage has not seen any developments in the past 3 to 4 years. Nevertheless, rural households enjoy the highest FTTP coverage in EU (stable at 73% of households in 2019, against the EU average of 18%), and NGA networks covered 82% of households in 2019. The gap is bridged by complete aggregate mobile coverage.

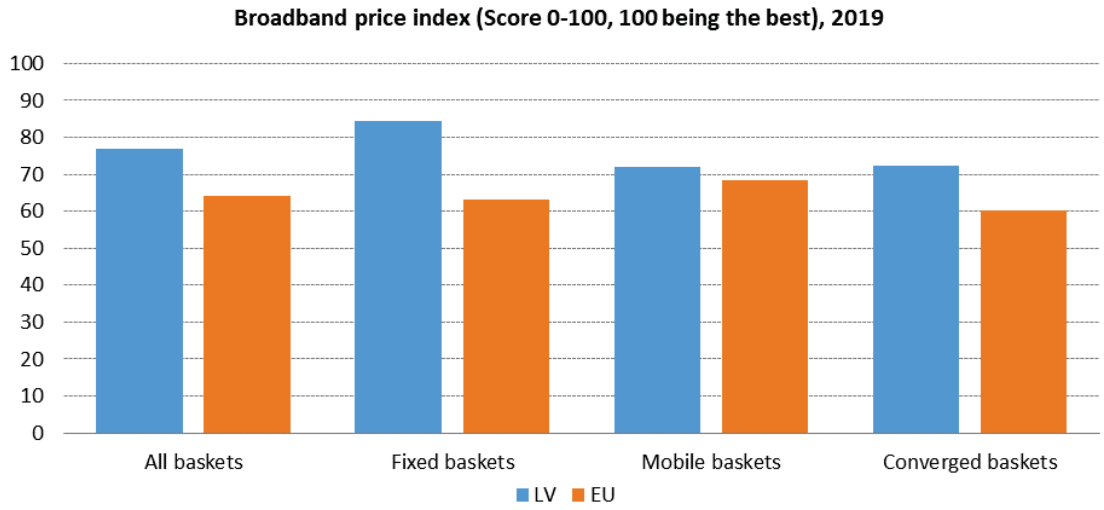


Despite the wide availability of networks, Latvia is trailing behind the EU in overall fixed broadband take-up (64%, against the EU average of 78%), placing the country at a low 24 in the ranking. The take-up of 30 Mbps broadband remains stable, and the take-up of at least 100 Mbps speeds has increased by 6 percentage points (from 32% in 2018 to 38% in 2019), scoring above the EU average of 26%.

The growth of the fixed broadband market continues to be driven by the increasing take-up of FTTH/B broadband connections. Fibre is the most common technology for fixed connections in Latvia, with a steadily increasing market share of almost 69%. Although fibre is the predominant technology, households do not make use of higher speeds, as the take-up of both 30 Mbps and 100 Mbps shows.



In contrast, mobile broadband take-up is substantially above the EU average and has further improved in the last few years, rising from 92 in 2017 to 124 in 2018 and reaching 127 subscriptions per 100 people in 2019. The low usage of high speeds in fixed broadband can be explained by the high take-up of mobile services, despite the low prices for fixed broadband connections in Latvia.



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

Latvian broadband prices are lower than the EU average. Latvia performs better than the EU average for prices in all baskets. The mobile broadband prices are close to the EU average, with a price index of 72 compared to 68.

Fixed broadband prices are notably lower – Latvia's fixed broadband price index is 85, against the EU average of 63. The converged baskets are somewhat closer to the EU average (price index 72 against 60). In particular, bundled subscriptions with fixed and mobile services are closer to the EU average prices, while prices for stand-alone fixed connections are considerably lower.

1. Progress towards a Gigabit Society[2]

Latvia has made good progress on the goals of the national broadband strategy for 2013-2020, which include the Digital Agenda for Europe targets and the Gigabit Society objectives. The 30 Mbps coverage target is near complete through fixed and mobile networks. Although coverage with networks capable of providing speeds of 100 Mbps is high in Latvia, take-up remains substantially below the targeted 50% of households.

Closing the digital divide between urban and rural areas has been one of the main objectives of the broadband strategy. Through the 'middle mile' project, fibre has been deployed (in particular backhaul infrastructures) up to the last mile in white areas (i.e. areas that lack connection), but deploying the last mile has been a challenge. The middle mile is critically important to the development and stability of the last mile networks. However, low income and population scarcity in rural areas cause low commercial interest for deployment of the last mile. Latvia is making further efforts to reach territories not covered by the current State aid programme and to bring the middle mile as close to end-users as possible. This will make deployment of the last mile more economically attractive for electronic communication operators. The middle mile and last mile development measures, including State aid, will be evaluated and included in the broadband plan for 2021-2027.

The national 5G roadmap was approved by the Cabinet of Ministers in February 2020. Latvia is one of the frontrunners in preparation for the deployment of 5G, ranking 5th on the 5G readiness indicator[3], with 33% of 5G spectrum assigned. Commercial 5G services are available in the two cities Jelgava and Daugavpils. The 3.4-3.8 GHz band has been awarded, and the first use of the band is likely to entail a gradual deployment of 4G+ and 4G++, finally moving to a 5G network.

Latvia, Lithuania, Estonia and Poland have agreed on a roadmap to set principles for the the development of infrastructure on the 'Via Baltica' project. In September 2018, the countries signed a memorandum of understanding to gradually deploy the network along the Via Baltica (E67) section that links Tallinn (Estonia), Riga (Latvia), Kaunas (Lithuania) and the Lithuanian-Polish border.

Infrastructure sharing in Latvia is limited. Some fibre installation projects in infrastructures were negotiated based on mutual interest, even before Latvia transposed the Broadband Cost Reduction Directive (CRD). There have been no access disputes over the rules provided for in the CRD. One reason for this is the fact that infrastructure in Riga is largely rolled out by cables on roofs.

2. Market developments

The Latvian telecommunications market is characterised by strong competition between the fixed and mobile network operators. The mobile and fixed incumbents are competitors on the broadband market.

[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.

[3] 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.

Content and high quality connections are drivers of competition. Mobile network operators (MNOs) mostly, if not exclusively, offer unlimited data volumes at low prices. While use of over-the-top services is increasing, TV subscriptions and content are more important determinants for the choice of internet subscription.

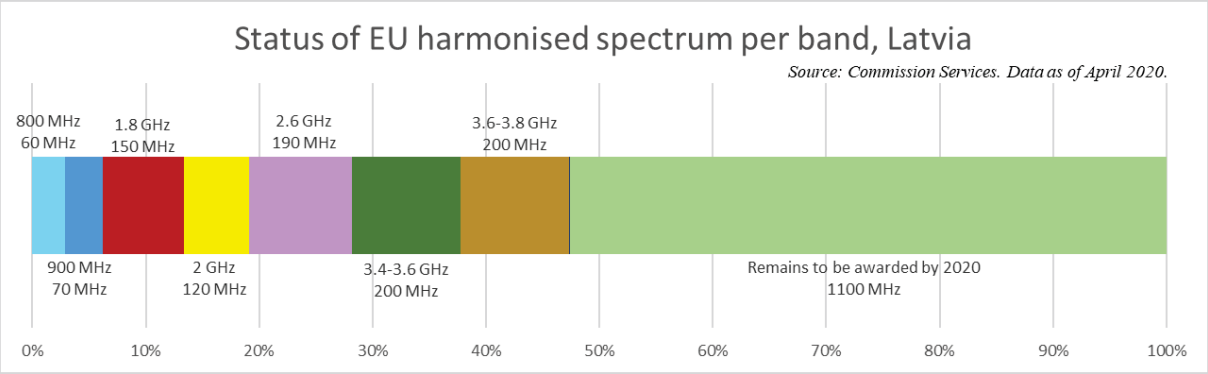
In September 2019, the MNO Bite signed an agreement to take control of the fixed/TV operator Baltcom. The Latvian Competition Council approved the operation in February 2020. The acquisition is a way for Bite to enter the fixed market as well as the content market.

Bite and the MNO Tele2 signed a joint agreement for spectrum sharing in the context of the upcoming 5G roll-out; they plan to start operations in 2021. The MNOs have not formally notified the joint agreement as they consider that it is not a full-function joint venture.

3. Regulatory developments

The Ministry of Transport is planning to hold a public consultation on the draft European Electronic Communications Code (EECC) in the second quarter of 2020, before passing the draft regulation to Parliament for adoption.

3.1. Spectrum assignment



Overall, Latvia has assigned 47% of the 2,090 MHz spectrum harmonised at EU level for wireless broadband, of which a part is also available for 5G. Of this spectrum, the 3.4-3.8 GHz band is completely available since 2018 at technical conditions suitable for 5G. Two blocks of 50 MHz were auctioned in 2017, and one block of 50 MHz in 2018. The six remaining blocks were previously acquired through beauty contests and they have been renewed with amended licences until 2028. As the fixed incumbent Tet does not otherwise have a presence on the mobile market but had a licence in this band (used for WiMAX), it could renew its licence for one block of 50 MHz for the TDD duplex mode. The MNO Bite was not awarded any spectrum, but has acquired 100 MHz through its acquisition of the operator UNISTARS that in turn has inherited its licence. The network sharing agreement between Bite and Tele2 will allow the two MNOs to use 150 MHz of contiguous spectrum. The incumbent MNO, LMT, has 100 MHz of non- contiguous spectrum. As a consequence, although the assignment of the 3.4-3.8 GHz band in general enabled large blocks of spectrum to be acquired, some operators were not allocated contiguous blocks. In the medium term, this could create some technical difficulties in the deployment of 5G.

There are plans to award the 700 MHz band for 5G through auction in 2020, with use of spectrum from 2022, when the band will be available for wireless broadband. The reasons for the 2-year delay are the current use of the band for TV broadcasting until December 2021 and unresolved frequency coordination issues with Russia.

The plan is to start the refarming of the 26 GHz band in 2020 to allocate at least 1 GHz by the end of the year. The 1.5 GHz band will be refarmed for 5G from 1 January 2021.

3.2. Regulated access (both asymmetric and symmetric)

In July 2019, SPRK, the national regulatory authority, adopted a final decision concerning the review of the market for wholesale voice call termination on individual mobile networks (Market 2 of the 2014 recommendation on relevant markets[4]). In its Comment, the Commission called on SPRK to notify updated price remedies without delay, especially as SPRK proposed to maintain the level of mobile termination rates (MTRs) set in 2017 (0.8868 euro cents/minute), calculated based on data that are no longer up to date.

In December 2019, SPRK adopted a final decision concerning the deregulation of the market for wholesale high-quality access provided at a fixed location (Market 4 of the 2014 Recommendation on relevant markets[5]). The Commission had no comments.

In 2020, the regulator is expected to issue a new decision on the market for wholesale local access provided at a fixed location and on the market for wholesale central access provided at a fixed location for mass-market products (Markets 3a/3b of the 2014 Recommendation on relevant markets). SPRK concluded in its latest decision in 2018 that mobile broadband is not a full substitute to fixed broadband. Moreover, the Latvian fixed broadband market still has strong infrastructure-based competition due to high roll-out of cable on roofs in Riga.

SPRK notifies fixed termination rates (FTRs) separately from the market analysis. This is due to frequent market entries and exits on the market for wholesale call termination on individual public telephone networks provided at a fixed location (Market 1 of the 2014 Recommendation on relevant markets). According to the NRA, this approach has proven to be an effective way to combat abusive FTRs.

4. End-user matters

a. Complaints

In 2019 SPRK received and replied to 41 consumer complaints, compared to 45 in 2018. The main sources of consumer complaints in 2019 were contracts (22%), quality of service (22%), bills (15%), tariffs (12%) and other issues (27%). The Consumer Rights Protection Centre (PTAC), the general consumer protection agency, received 85 individual complaints, up from 39 in 2018.

b. Roaming

One Latvian MNO appears to exclude its zero-rated offer from Roam-Like-At-Home, meaning that otherwise zero-rated traffic is not zero-rated while roaming in the EU/EEA. SPRK has not yet issued any formal decision on this circumstance. However, the Body of European Regulators for Electronic Communications (BEREC) has concluded that such treatment of zero-rated services does not comply with the Roam-Like-At-Home rules.

c. Emergency communications – 112

As regards emergency communications and access to the European emergency number 112, Cell ID based caller location is implemented. In addition, an SMS application, 'My Safety' (Mana drošība), enables emergency communication for users with disabilities through text messaging. The application instantly communicates user handset-based location to the public safety answering point.

5. Other issues

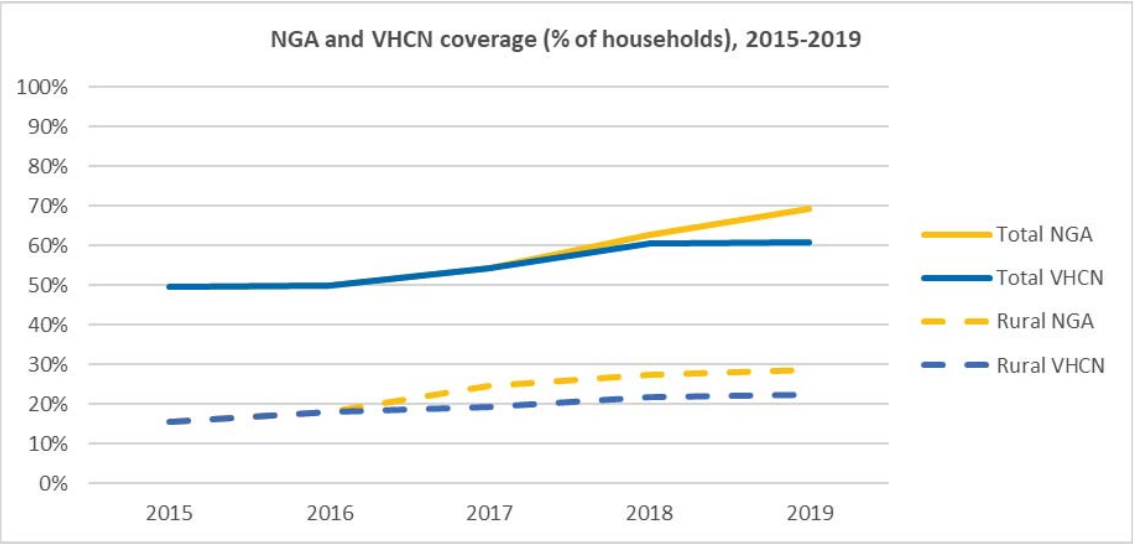
[4] The corresponding draft measure was previously notified to the Commission under case LV/2019/2163.
[5] The corresponding draft measure was previously notified to the Commission under case LV/2019/2203.

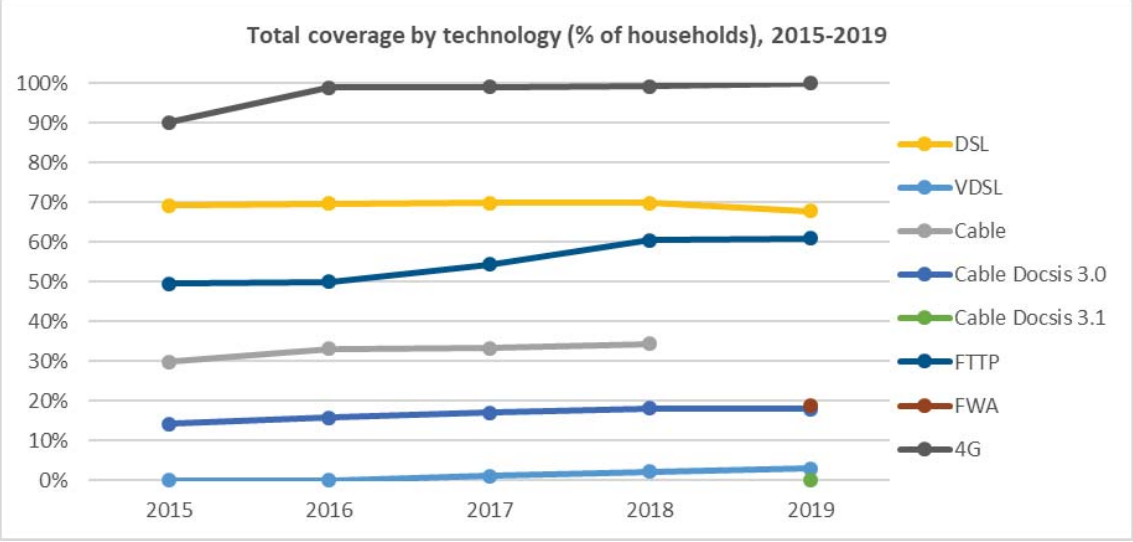
The Latvian authorities have noted that elaborate fraud is carried out with the use of (non-assigned) Latvian numbers. The Latvian numbers are used in another Member State in the EU/EEA to generate high volumes of calls to a third Member State. The Ministry of Transport has proposed the introduction of fees on numbering allocation to combat fraudulent use of Latvian numbers.

6. Conclusion

Latvia is well equipped with good coverage of very high-capacity fixed network infrastructure, has near-complete 4G coverage of households, and is prepared for 5G deployment in the 3.4-3.8 GHz band. However, in the medium to long term, negotiations with Russia are delaying the use of the 700 MHz band, which is crucial for 5G and important for coverage, and this may hinder future 5G deployment. Moreover, deploying the last mile in a number of white areas remains a challenge. Further network roll-out in the already advanced market requires national efforts to create the necessary economic incentives for investments in the already identified investment gaps identified.

Lithuania

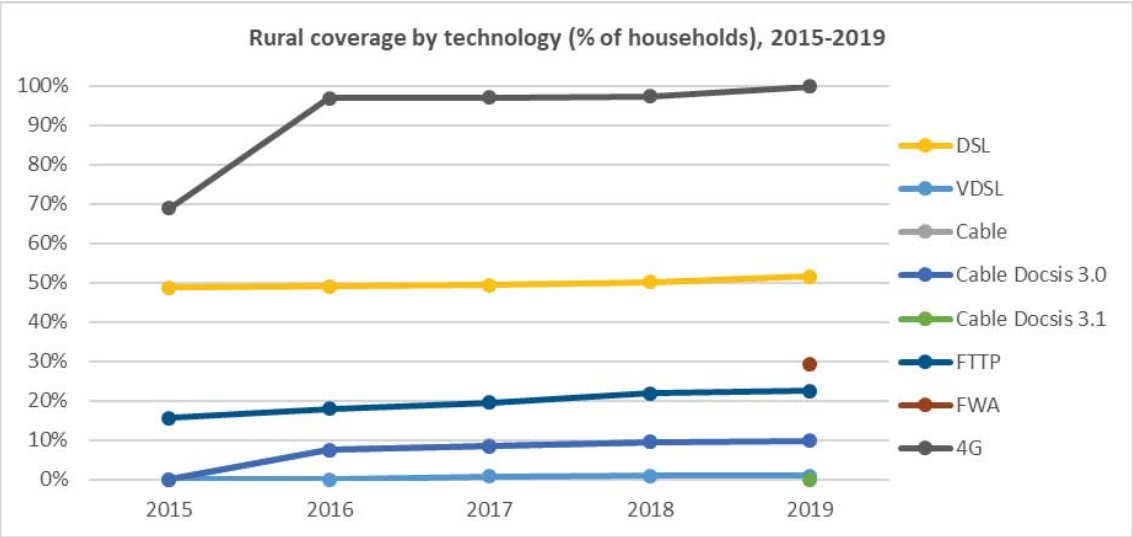




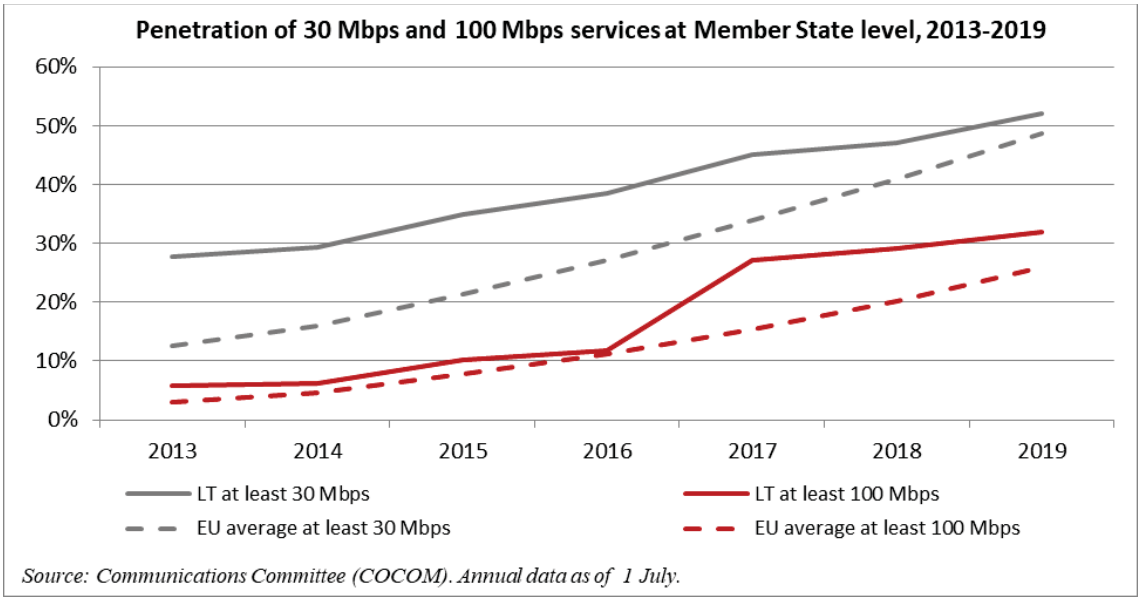
Source: IHS and Point Topic, Broadband coverage in Europe studies

With only 63% of its households covered by fixed networks capable of 30 Mbps in 2018 and only a small increase to 69% in 2019, Lithuania scores well below the EU average (86%), but is catching up.

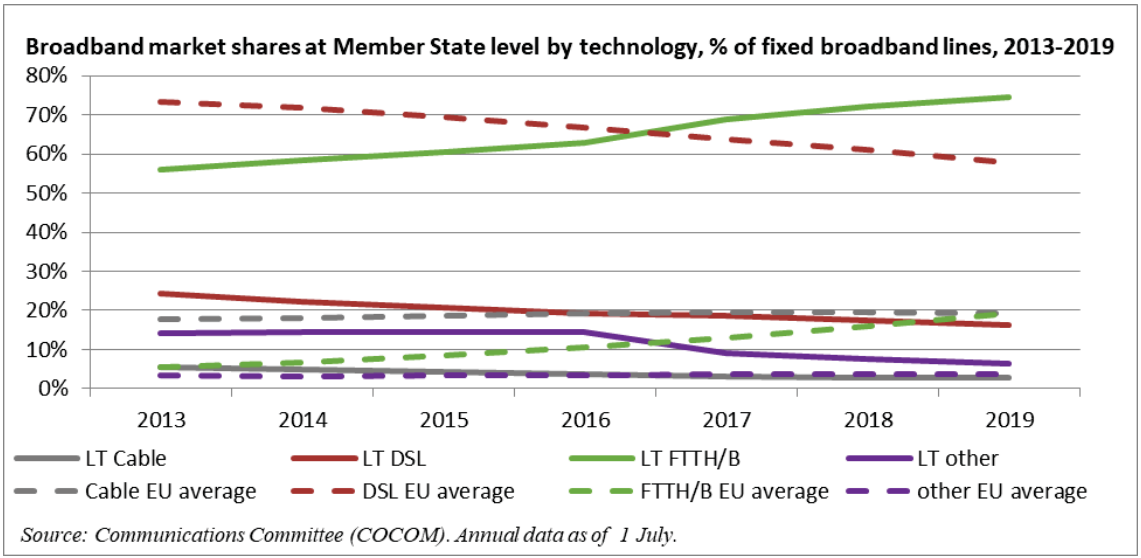
The country has seen practically no new fibre deployment, except for an increase of 1 percentage point (pp) in rural FTTP coverage (23%). Nevertheless, Lithuania's fibre coverage in urban areas is almost double the EU average (61% against 34%) and surpasses the EU average in rural areas as well (23% against 18%). Legacy networks are not being upgraded: there has been no upgrade to DOCSIS 3.1 yet and DOCSIS 3.0 covers only 18% of households. In addition, only a fraction of DSL networks are VDSL. Aggregate 4G coverage is almost ubiquitous and mobile broadband penetration is slightly higher than the EU average.

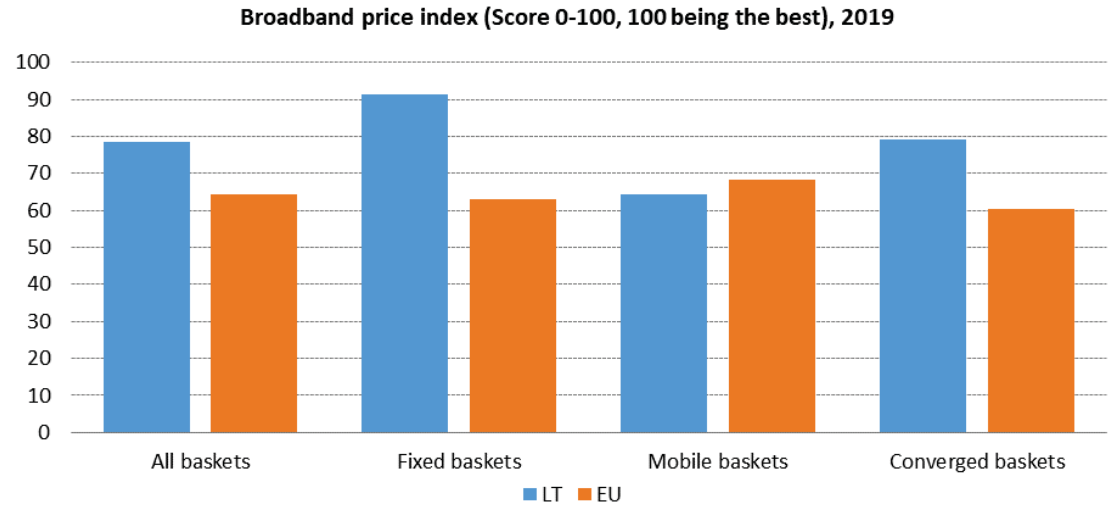


Source: IHS and Point Topic, Broadband coverage in Europe studies



Although it only ranks 22nd in the EU on overall fixed broadband penetration, 10 pps below the EU average of 78%, Lithuania lies comfortably above the EU average in both at-least-30 and at-least-100 Mbps penetration, partly thanks to its very low fixed and converged bundle prices. With a 74.6% market share, fibre remains the predominant technology used to access the internet, while the use of both copper and coaxial is decreasing. Lithuania scores consistently well in the broadband price index ranking as the 4th cheapest Member State, thanks to very low prices for fixed broadband and converged bundles.





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

1. Progress towards a Gigabit Society[6]

In 2019, the Ministry of Transport and Communications set up a working group on 5G to discuss and develop together with stakeholders 'Guidelines for the development of next generation mobile networks (5G) in the Republic of Lithuania for 2020-2025'. The government should approve these guidelines in 2020. They contain a set of measures that would facilitate the deployment of 5G in Lithuania, e.g. measures on access to sites for radio-network building.

Moreover, in order to facilitate 5G roll-out, Lithuania adopted new legislation aligning its EMF limits with the 1999 Council Recommendation[7] which entered into force on 6 March 2020. Together with the other Baltic states, Lithuania also started mapping the existing infrastructure in preparation for a cross-border 5G corridor (most likely across the Via Baltica motorway). Additionally, an international

[6] 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.

[7] 1999/519/EC: Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz), OJ L 199, 30.7.1999, p. 59–70.

consortium of stakeholders from the Baltic region are preparing to test autonomous driving in the cross-border areas.

The implementation of state aid measure RAIN 3 is ongoing; 468 km of fibre-optic cable lines have already been deployed and 165 telecommunication facilities have been connected. However, no telecommunication towers have been built yet, although work on design and permit granting is ongoing. According to the data provided by Communication Regulatory Authority of Lithuania (*"Ryšių Reguliavimo Rarnyba"*, RRT), investment in the electronic communications network infrastructure amounted to €19.1 million by Q2 2019, and came mainly from Telia Lietuva.

The Ministry of Transport and Communications plans to identify, by Q4 2020, the areas that need investment to reach the 2025 Gigabit objectives.

2. Market developments

Tele2 and Bite Lietuva signed a network-sharing agreement for all mobile technologies (2, 3, 4 and 5G). The details of the agreement and possible impact on the participation of both companies in future spectrum auctions as well as on the general competitive dynamic in the Lithuanian market are not yet clear. The Competition Council blocked two acquisitions in 2019 (by Telia Lietuva and Cgates).

The mobile broadband market is growing very fast, in terms of both value and subscribers. Growth in data consumption reached almost 48% between Q1 2018 and Q1 2019.

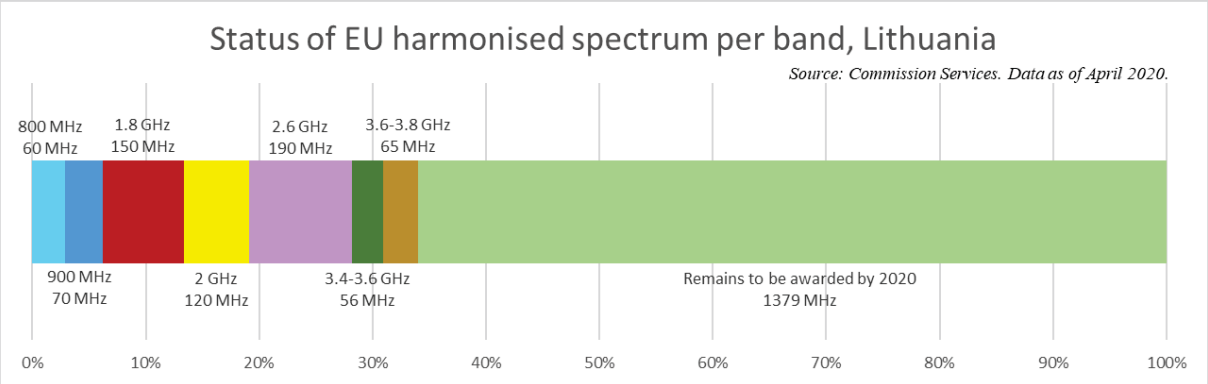
The total number of service providers decreased from 120 to 117 by the end of Q2 2019 (compared to the end of Q2 2018). On the other hand, subscriptions for services provided using fixed networks (e.g. fixed telephone, pay TV, fixed internet services) decreased or remained constant.

Between 2017 and 2018, revenue from retail services of mobile telephony, fixed internet and pay TV slightly decreased (by 2.8%, 1.8% and 2.5%, respectively). A bigger decrease was noted for fixed telephony (13.5%) and other data transmission services (11.1%). On the other hand, revenue from mobile internet increased significantly (31.8%).

The peak in bundle use was reached in 2017. Since then, bundle use has been decreasing.

3. Regulatory developments

3.1. Spectrum assignment



Overall, 34% of the spectrum harmonised at EU level for wireless broadband has been assigned so far in Lithuania. However, none of the spectrum in the 5G pioneer bands is assigned at 5G

conditions, and Lithuania scores 0 in the 5G readiness indicator[8].

Cross-border coordination issues with Russia related to the 700 MHz and 3.6 GHz bands persist. Lithuania hopes to conclude an agreement on 700 MHz after Russia decides on moving broadcasting from this band, even though this will only allow the band to be used for 5G after 2022. Use of the 3.6 GHz band for 5G purposes remains problematic due to Russia's use of this band in Kaliningrad for military and satellite communications. The next round of exchanging proposals is planned for summer 2020. Before assigning this spectrum (the auction is scheduled for the second half of 2020) and to preserve competition in the Lithuanian market, the NRA needs to consider the existing rights of use for a part of this band granted to the state-owned company LRTC through a 'beauty contest' in 2012.

For the 26 GHz band, a public consultation completed at the beginning of 2020, taking into account that there is no market demand for 5G in this band yet.

3.2. Regulated access (both asymmetric and symmetric)

In 2019, the Lithuanian NRA carried out a review of: the market for wholesale call termination on individual public telephone networks provided at a fixed location (market 1 in the 2014 Recommendation on relevant markets[9]) the market for wholesale local access provided at a fixed location (market 3a in the 2014 Recommendation on relevant markets), and; the market for wholesale central access provided at a fixed location for mass market products (market 3b in the 2014 Recommendation on relevant markets).

As regards market 1, the fixed termination rate was set using a benchmarking methodology (the benchmark being pure BU-LRIC FTRs applied in EEA countries based on the most recent BEREC Report on Termination Rates[10]). It was lowered from 0.13 eurocents/minute to 0.09 eurocents/minute.

In market 3a, the NRA introduced a change to the price control obligation. As of 1 January 2020, Telia cannot differentiate prices for access to local loop unbundling (LLU) based on whether the end users of the retail services are natural or legal persons.

The review of market 3b resulted in the geographical segmentation of two areas in which competition conditions differ: area A covering 58 municipalities and area B covering 2 municipalities. Area B was deregulated, since RRT found that no operators hold significant market power (SMP) and the market is therefore effectively competitive. Market players have been particularly waiting for the application of the new price remedies imposed on Telia in Area A, especially the obligation

[8] 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.

[9] 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).

[10] https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/8306-termination-rates-at-european-level-july-2018

preventing the incumbent from changing its wholesale central access price more than once per year. This should ensure lower prices and predictability for market players, and may bring to light possible cross-subsidisation. The remedies became effective as of January 2020. Also as of 1 January 2020, Telia cannot differentiate the prices of wholesale central access based on whether the end users of the retail services are natural or legal persons.

The Lithuanian NRA notified the Commission its review of the market for access to public telephone network at a fixed location for residential and non-residential customers (market 1 in the 2007 Recommendation on relevant markets[11]) in March 2020. The market was found competitive and all regulatory obligations were lifted. The notification of the market for wholesale voice call termination on individual mobile networks (market 2 in the 2014 Recommendation on relevant markets). has been delayed to the Q2 2020.

Discussions between the Ministry of Energy and the national energy regulator have started to evaluate bottlenecks related to access to energy utilities infrastructure. It has been agreed to amend the relevant technical rules, with a view to removing unjustified technical restrictions limiting co-building of energy and electronic communications infrastructure, and access to energy infrastructure.

4. End-user matters

a. Complaints

In 2019, the Lithuanian NRA received 354 consumer complaints and 46 complaints from other end users. In comparison, the year before RRT received 291 and 28 such complaints, respectively (a 25.4% increase in total). According to the NRA, most complaints concern billing and insufficient knowledge and understanding of the contract.

In 2019, the Lithuanian NRA solved 50 out-of-court disputes between consumers and providers of electronic communications services and 23 out-of-court disputes between other end users and providers of electronic communications services. In comparison, in 2018 RRT solved 73 and 25 such out-of-court disputes, respectively. According to the Lithuanian NRA, most disputes were related to contract termination, pricing, billing and quality of service.

b. Roaming

For the first time since the introduction of RLAH, Telia did not apply for a sustainability derogation.

c. Emergency communications – 112

In September 2019, in Lithuanian case C-417/18 - AW e.a., the Court of Justice of the European Union (CJEU) ruled that telecommunications companies are required to transmit location information to the 112 emergency call authorities for free, even if the call is received from a mobile phone which is not equipped with a SIM card. Handset-based advanced mobile location has been implemented in Lithuania since 2017.

The Lithuanian authorities expect a delay in the full deployment of 112 application for smartphones, which will ensure equivalent access to emergency services for disabled people. Currently, the

[11] Commission Recommendation of 17 December 2007on 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.

deployment of this application is scheduled for June 2020.

d. Universal service

In 2019, Lithuania introduced amendments to the process of designating a universal service provider. As of 2019, such a provider can be designated after RRT has evaluated the criteria that the provider must meet. In October 2019, RRT published a call for expressions of interest for the provision of universal services without compensation. However, no providers expressed interest, so RRT has started the process of designating a provider of universal services according to amended procedures. The regulator conducted a survey of universal service end users, the results of which showed that less than 1% of users still use payphones, due to widely accessible communication alternatives. The survey also showed that the preferred ways of communication would not change if payphones were no longer available. Therefore, the number of payphones will be reduced in 2020 and this service will not be part of universal service provision.

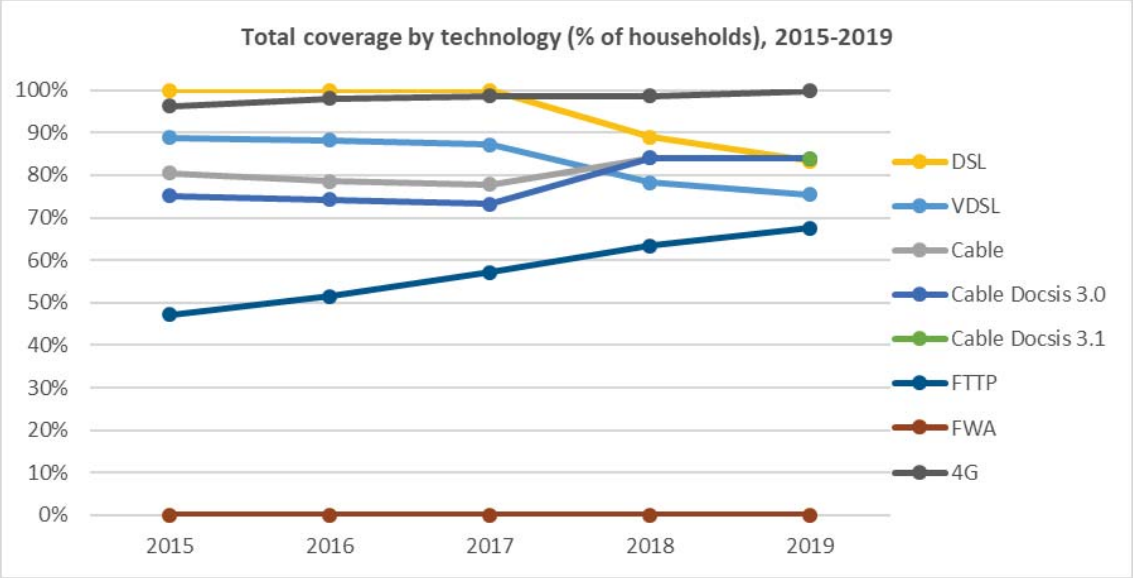
5. Other issues

Following the amendments to the Electronic Communications Law, intended to ensure RRT's independence and impartiality, a new board was appointed in February 2019. According to the information received by the NRA, it consists of experts who have no links to the government or the sector. The NRA's human resources seems to remain an issue, as the new, centralised recruitment system in place for the whole public sector restricts RRT's powers to make own decisions on staff recruitment and management.

6. Conclusion

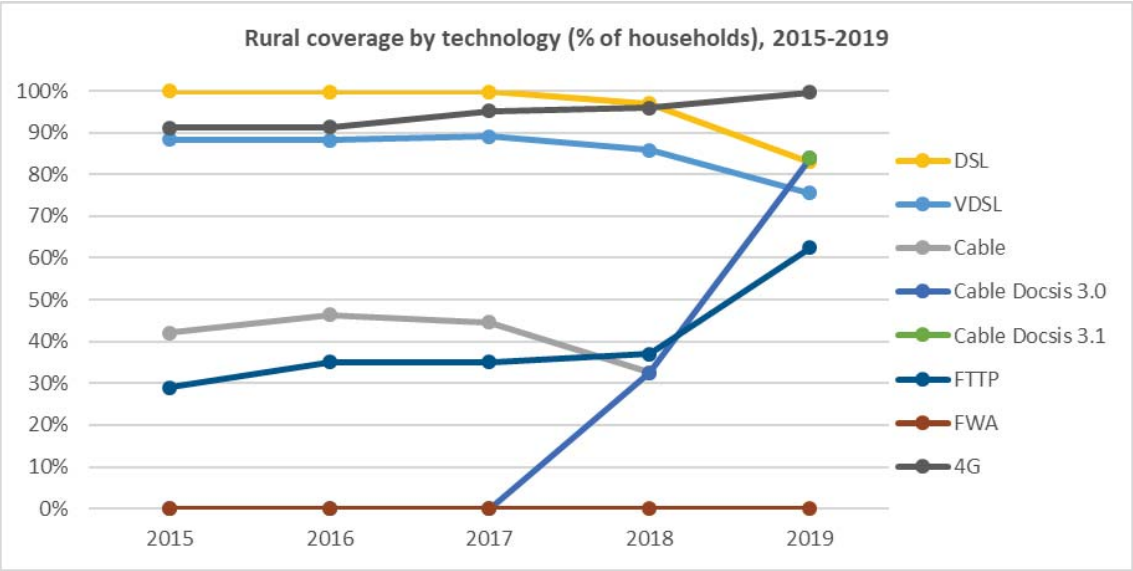
Overall, Lithuania made some progress in 2019 towards meeting the 2020 and Gigabit Society targets as well as 5G objectives, but challenges remain. The roll-out of 5G has been delayed due to the postponed assignment of spectrum in the 700 MHz band until 2022 and the unclear situation of the availability of the 3.6 GHz band. Progress of the RAIN3 project has so far been limited. On the other hand, new provisions on the impartiality of the RRT board should strengthen the national regulator's independence.

Luxembourg



Source IHS and Point Topic, Broadband coverage in Europe studies

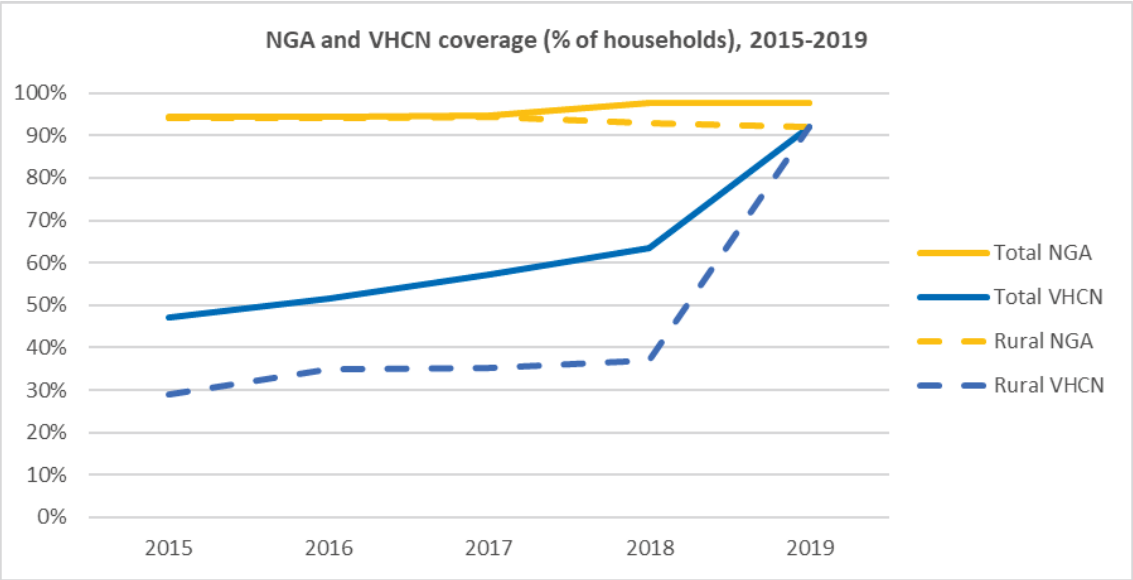
For 4G, cable and very high speed digital subscriber line (VDSL) total coverage is among the best in the EU, at 100%, 84% and 76% of households respectively. VDSL2 vectoring coverage (not included in the chart) stands at 42%, against an EU average of 28%. As fibre roll-out continues, fibre-to-the premises (FTTP) coverage has reached 68%. DSL coverage is decreasing, as connections are replaced by fibre.



Source IHS and Point Topic, Broadband coverage in Europe studies

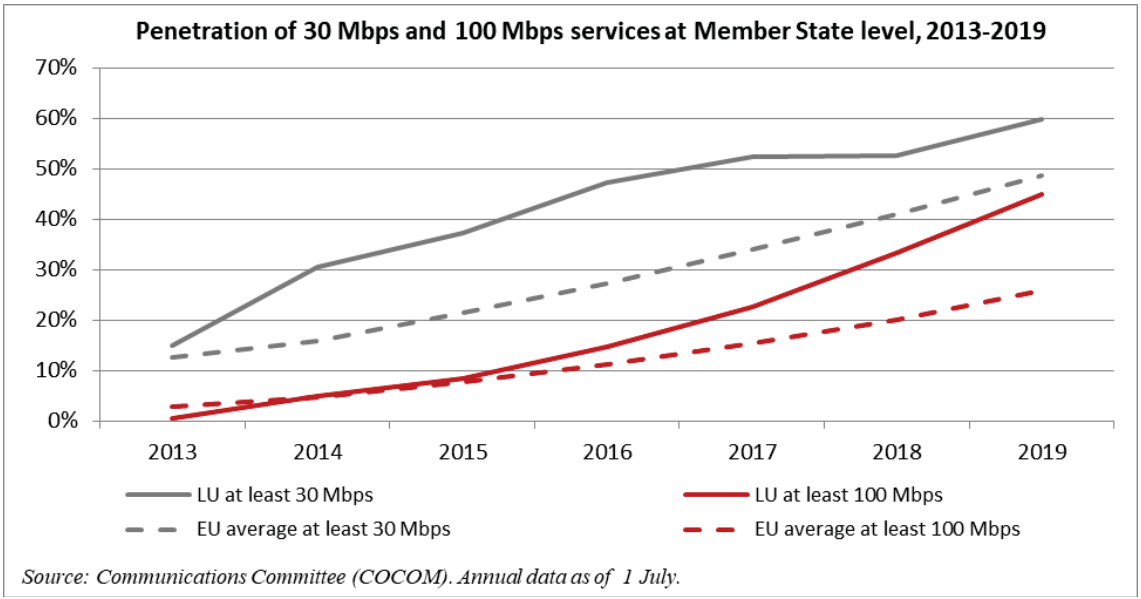
Rural FTTP coverage has improved significantly, standing at 62%. This is only slightly below total coverage of 68%. As coverage for both DSL and VDSL is declining and cable[12] only plays a minor role in take-up, rural fibre roll-out will play a crucial role in closing the small remaining rural-urban divide.

[12] According to the national regulatory authority, the '*Institut Luxembourgeois de Régulation*' (ILR), figures for Docsis 3.0 in 2017 and 2018 cannot be compared with those for 2019 as the data basis for rural cable connections is very small.

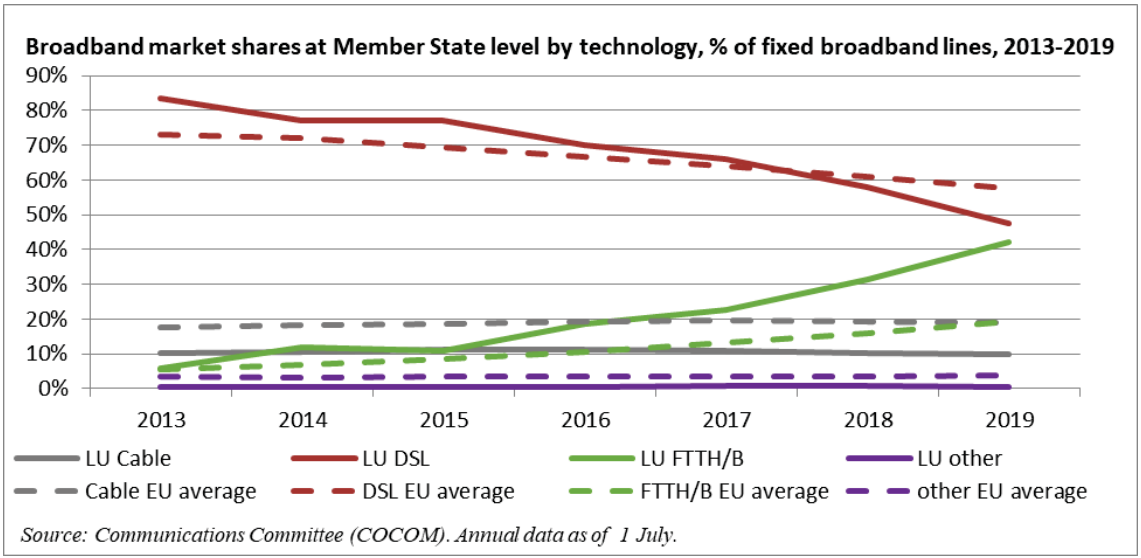


Source IHS and Point Topic, Broadband coverage in Europe studies

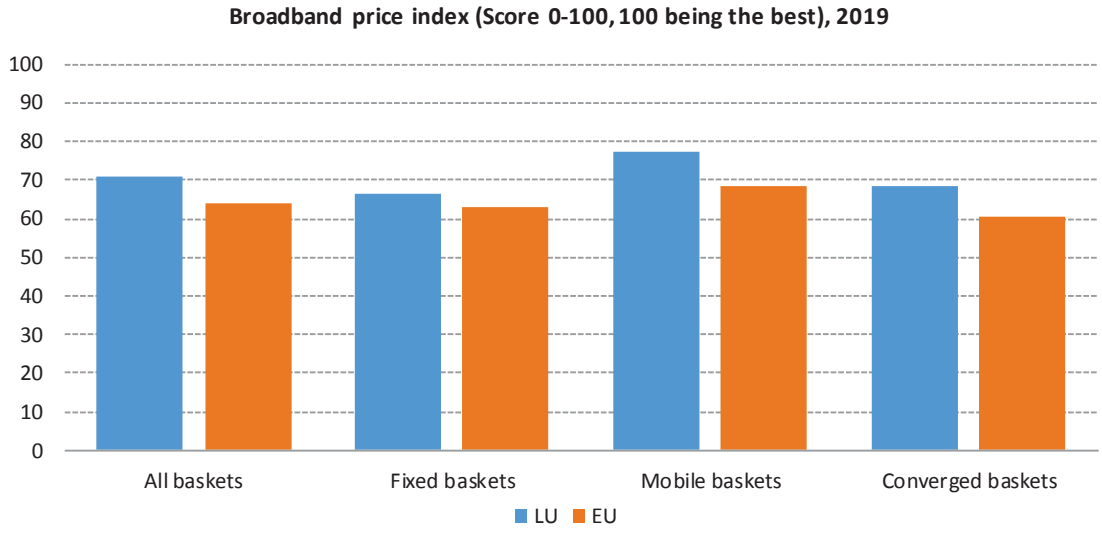
Total coverage of fixed very high capacity networks (VHCN) - including FTTP and DOCSIS 3.1 stands at 92%, higher than the EU average of 44%. Total next generation access (NGA) coverage (98%) also exceeds the EU average (86%). As VHCN figures for 2019 include DOCSIS 3.1 for the first time, they are not directly comparable to figures for previous years.



Broadband take-up, both for capacities of at least 30 Mbps and for capacities of at least 100 Mbps continues to grow and is well above the EU average (60% compared to an EU average of 49% for at least 30 Mbps and 45% compared to an EU average of 26% for capacities of at least 100 Mbps). There were 122 subscriptions to mobile broadband services per 100 people, against an EU average of 100.



The shares of the different technologies in the broadband market show the continued trend of subscribers replacing DSL subscriptions with fibre while the market share of cable remains flat and relatively low, at 10% compared to that of DSL (48%) and fibre (42%). Despite widespread availability of cable, its market share is below the EU average. This is also the case for the DSL market share, while the market share of fibre to the home/building (FTTH/B) is more than double the EU average (42% compared to an EU average of 19%).



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

Price levels (taking account of purchasing power parity) for broadband access (both mobile and fixed) are slightly lower compared to the EU average. In particular, prices are lower for mobile baskets[13], as well as for fixed and converged baskets. Converged baskets include fixed and mobile calls, fixed and mobile data and TV.

[13] The index for mobile baskets aggregates 12 baskets combining packages of 0.5, 1, 2, 5 or 20 GB of data with no, 30, 100 or 300 calls. It is not related to average revenue per user (ARPU) figures.

1. Progress towards a Gigabit Society[14]

Luxembourg continues to be well on track to meeting the EU 2025 broadband targets. Its own revised and more ambitious targets of 1 Gbps downstream and 500 Mbps upstream for every household by 2020 would seem unrealistic and are being reconsidered by the Ministry. 5G is expected to play a significant role for households not connected to the fibre network.

Despite there being no public funding for broadband roll-out, the 100% state owned incumbent operator POST is the only significant contributor to fibre roll-out. At the same time, cable operators are investing in the upgrading of their networks to DOCSIS 3.1 technologies. Given the good FTTP coverage of households in Luxembourg, further roll-out targets households nationwide without fibre connections. POST is relying increasingly on opportunities for co-deployment with other infrastructure providers. It had only a slight decrease in the number of new connections in 2019 compared to those added in 2018, with a reduced investment budget in 2019. This opportunity-based rollout policy, driven by cost-cutting considerations, results in less predictability as to where exactly new fibre lines will be available and by when. At the same time, POST's GPON[15] fibre infrastructure (28% of all fibre connections) is being upgraded to point to point with four fibres linking the sub-loops in the street cabinets with the main distribution frame. The migration concerns 1,200 street cabinets and is scheduled to be finalised over a 10-year period.

The upgrading of the radio access network's existing sites by mobile network operators and the setting up of new sites is challenging as various authorities at municipality level have to be consulted, environmental and town planning requirements have become stricter (e.g. negative visual impacts are a possible issue) and concerns about radiation emitted by electromagnetic fields are picking up in the general public. The various levels of permit granting are not only slowing down the roll-out of mobile radio access networks, but also of fibre, which is particularly important for mobile backhaul and FTTH roll-out.

2. Market developments

In the fixed telephony market, alternative operators increased their retail market share from 32% of subscribers in 2018 to 34% in 2019[16]. For fixed internet access it remains at 37%.

In the mobile market, POST has a retail market share of less than 50%, which had slightly decreased in 2019. The ARPU was €23.5 per month in 2019 (without M2M cards).

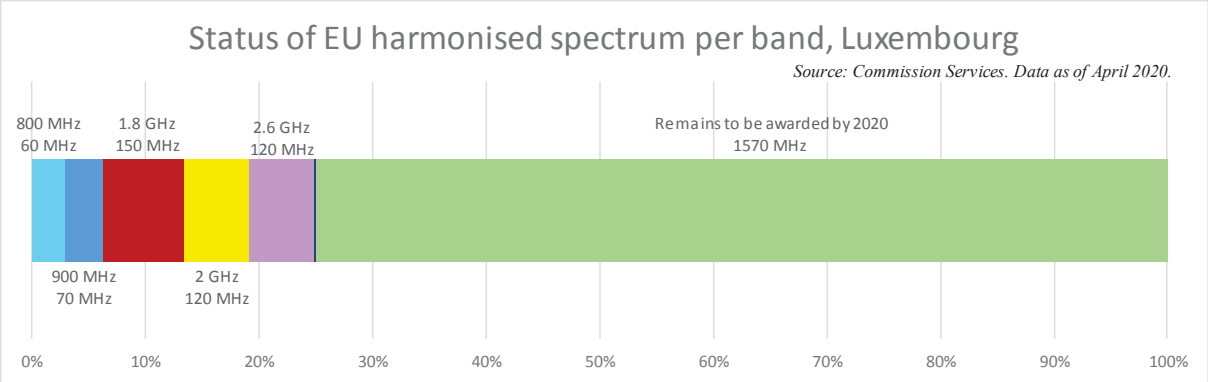
In roaming, there are both inbounders and outbounders among the operators in Luxembourg.

3. Regulatory developments

The Ministry finalised a first legislative draft for the transposition of the European Electronic Communications Code (EECC). National law does not require a public consultation. However, it is envisaged that main stakeholders would be consulted informally. Furthermore, it would be possible to contact the Ministry once the draft has been submitted to Parliament. Adoption is planned for the end of 2020.

[14] 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.
[15] 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.
[16] ILR figures for 2019 will become available by mid-2020.

3.1. Spectrum assignment



In Luxembourg, 25% of the total 2,090 MHz spectrum harmonised at EU level for wireless broadband has been assigned. Luxembourg scores 0 on the 5G readiness indicator[17], as by the end of 2019, no spectrum in the 700 MHz, 3.6 GHz and 26 GHz bands was yet available for 5G use. However, assignments of the 700 MHz and 3.6 GHz wireless broadband bands are planned for mid-2020.

Following a first public consultation, which revealed that demand exceeded supply (six operators showing interest in the 700 MHz band, eight in the 3.6 GHz band), the ILR prepared the auction design and usage requirements on coverage (in the 700 MHz band) and on roll-out (in the 3.6 GHz band) and launched a second public consultation on 13 March 2020. In the 3.6 GHz band, 330 MHz will be made available.

In the guard band in the upper part of the 3.6 GHz band (3750-3800 MHz), some spectrum could be granted in a second step for local use. So far, interest in the 26 GHz spectrum seems to be limited. Luxembourg has to protect other primary services (those already deployed and those expected to be launched in the future), i.e. fixed service links, and the uplink for fixed satellite services. While Luxembourg has not completed its analyses on the exact amount of spectrum to be released, it seems realistic to allow 1 GHz to be used for mobile broadband by the end of 2020. The ILR plans to run a public consultation on the 26 GHz band during the second half of 2020 to assess the market demand for this band.

3.2. Regulated access

In 2019, the ILR reviewed the market for wholesale central and local access (markets 3a and 3b of the 2014 Decision on Relevant Markets). Given the lack of demand for regulated access to ducts and the implementation of the Cost Reduction Directive, the Commission did not object to the withdrawal of regulated access to ducts, but asked ILR to monitor the situation.

The ILR also fixed the methods for the supervision of the equivalence of inputs obligations imposed on POST as well as the methods for applying the economic replicability test (ERT). On this basis the ILR fixed the wholesale prices for copper local loop unbundling (LLU) and sub-loop unbundling. The

[17] 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 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.

European Commission expressed concerns that the proposed ERT assumes there would be an efficient operator with a market share of 15%, which no alternative operator was able to reach when the decision was issued.

The ILR plans to notify the draft decisions on the markets for fixed and mobile termination and for terminating segments of leased lines (markets 1, 2 and 4 of the 2014 Decision on relevant markets) to the European Commission in the second half of 2020.

The operators expect a significant cut in revenue once the European maximum rates for fixed and mobile termination are set[18] by the European Commission.

There is increasing demand for fibre LLU from several operators.

Fibre virtual unbundled local access (VULA) is part of market 3a and is included in POST's reference offer and has been available as of 1 January 2020. Fibre VULA is only available if a fibre access cannot be unbundled due to a lack of sufficient fibre lines between the sub-loop and the main distribution frame or point of presence (in a point-to-multipoint infrastructure). Operators have to ask for an unbundled fibre line and have to change from fibre VULA to full fibre unbundling as soon as the missing fibre links become available, thanks to the roll out by POST. Copper VULA is also envisaged if the sub-loop cannot be unbundled. However, due to a lack of demand such an access product has yet to be specified. Bitstream access is still the most significant wholesale product (39,300 connections[19]), followed by fibre unbundling (17,100 connections, 14.8% more than in the previous year) and copper unbundling (7,700 connections, 13.5% less than in the previous year), while there is no regulation and almost no commercial wholesale access on cable TV networks.

4. End-user matters

a. Complaints

The number of mediations decreased by almost 20% compared to the previous year. By 21 November 2019, the ILR had received 89 requests for mediations. Some 38 cases could be resolved through mediation (43%). In addition, the ILR received 12 other written complaints from consumers. Main sources of consumer complaints in 2019 were pricing & billing (23 complaints), quality of service and installation (17), contract terms and termination (32), premium service numbers, including sms and voice calls (17), and roaming (9). Some 18 complaints concerned bundled services.

b. Open Internet

Zero rating offers were launched by Tango (Proximus) in October 2018. Services included social media, music and videos. POST has also a zero rating offer with streaming and social media content. The ILR assessed the new offer of Tango and monitors its development on a monthly basis. For this purpose, detailed technical and commercial data have to be provided by Tango to the ILR. Evaluating the measurement data from the publicly available broadband speed measurement tool (Checkmynet.lu), the ILR detected that Tango subscribers were limited in mobile broadband speed in roaming because of a technical misconfiguration. The operator rectified the configuration immediately.

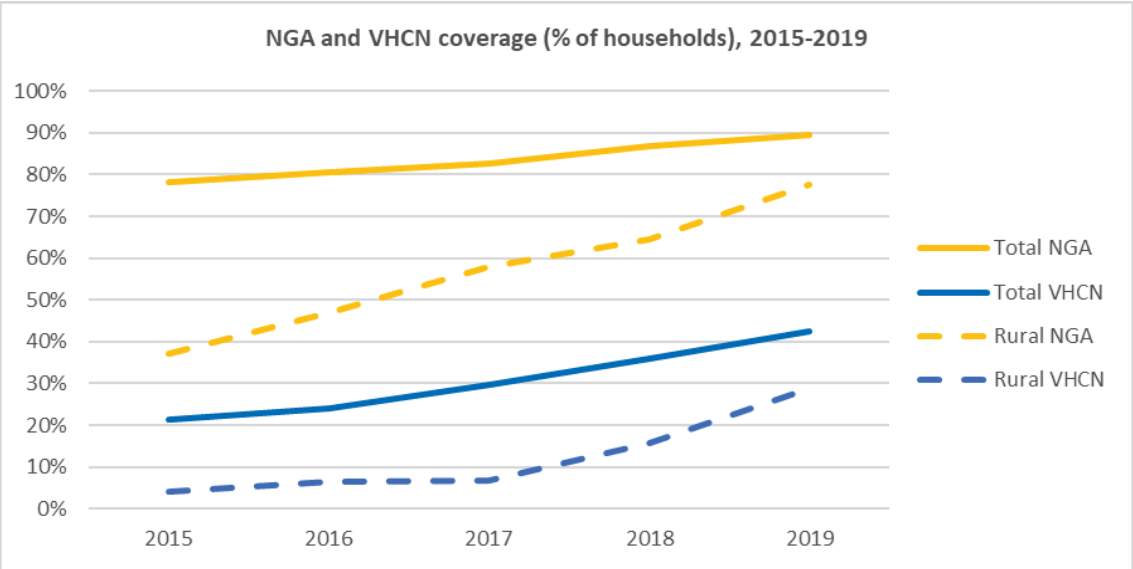
[18] Scheduled for the end of 2020.
[19] ILR data as of end 2019

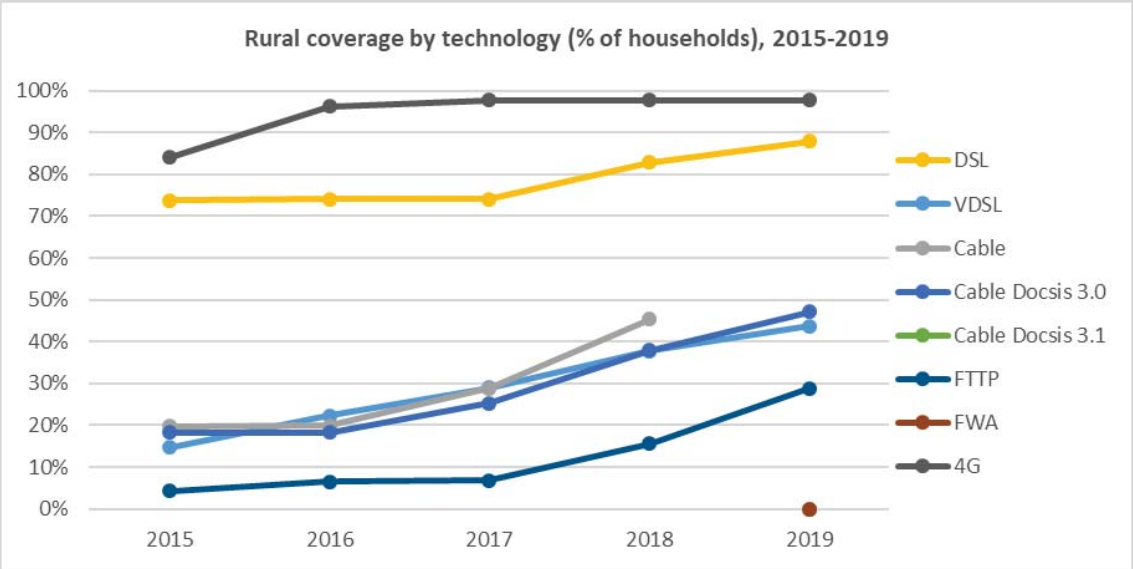
5. Conclusion

Luxembourg's authorities might consider improving the transparency and openness of the legal drafting process to ensure that all interested parties have an equal chance to be heard and to express their views. This would enable the broadening of the information on which decisions, particularly on the EECC transposition, will be taken. Luxembourg's authorities will need to make timely preparations to assign additional spectrum which can be used for 5G services to meet the EU target for 5G. Framing a strategy to streamline permit procedures and to facilitate access to public property to extend and densify mobile networks would further stimulate and accelerate the roll-out of both fixed and mobile infrastructure.

Hungary

In 2019, the coverage of next generation access (NGA) grew to 90%, above the EU average of 86%. Rural NGA coverage increased from 65% to 78%, significantly above the EU average of 60%. Very high capacity network (VHCN) coverage continued to grow from 36% to 43%, close to the EU average of 44% (Hungary ranks 19th in the EU in this respect). The urban-rural digital divide is illustrated by figures for VHCN coverage, despite a significant increase in rural areas from 13% to 29% (above the EU average of 20%). Both urban and rural VHCN coverage corresponds to the fibre to the premises (FTTP) footprint of 43% and 29% respectively.

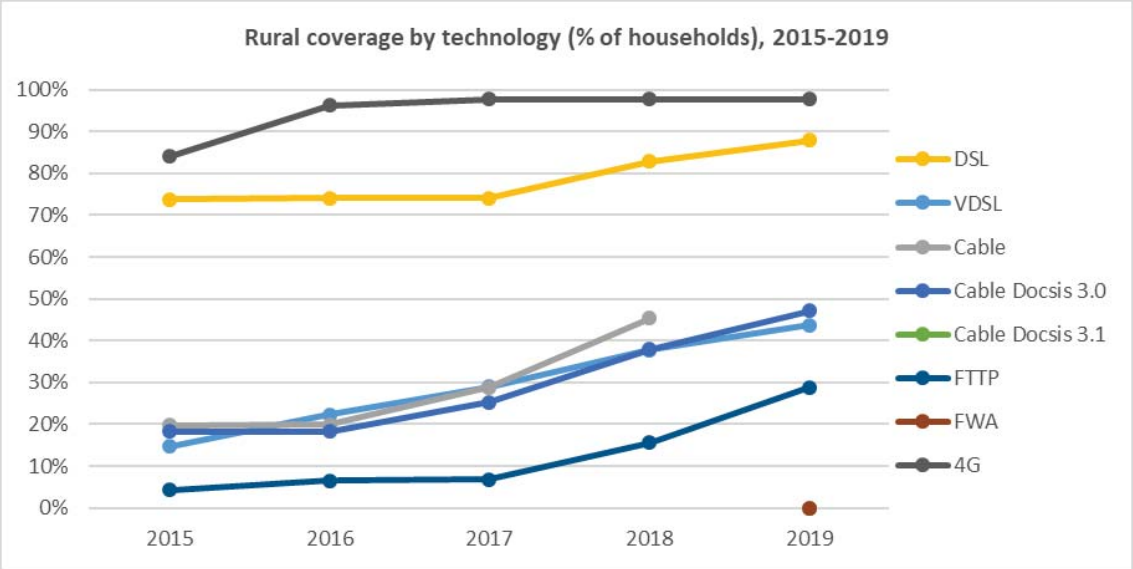




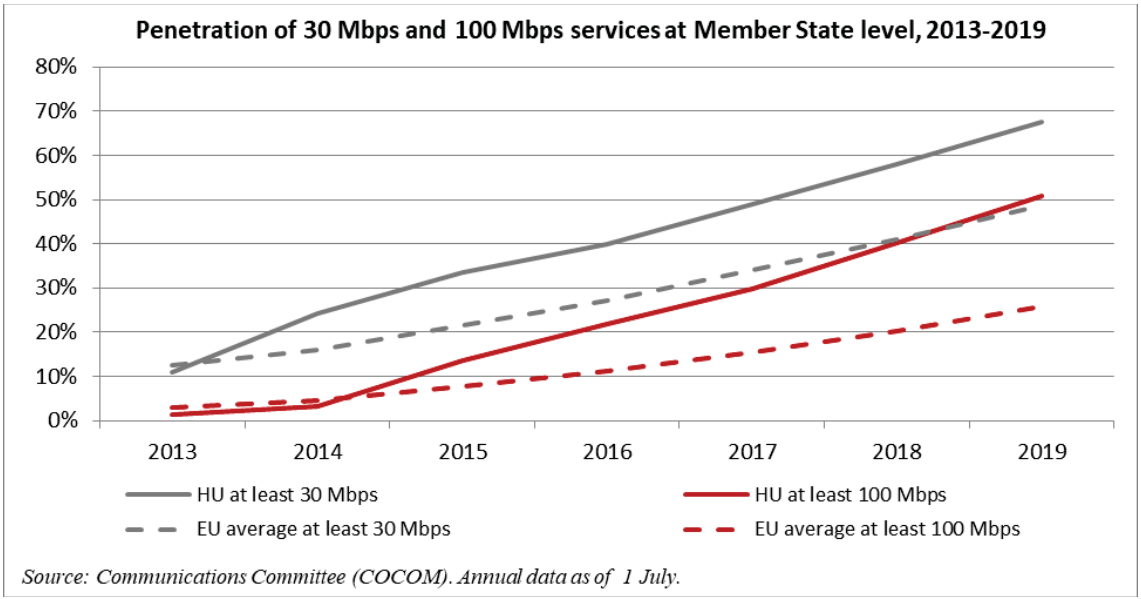
Source: IHS and Point Topic, Broadband coverage in Europe studies

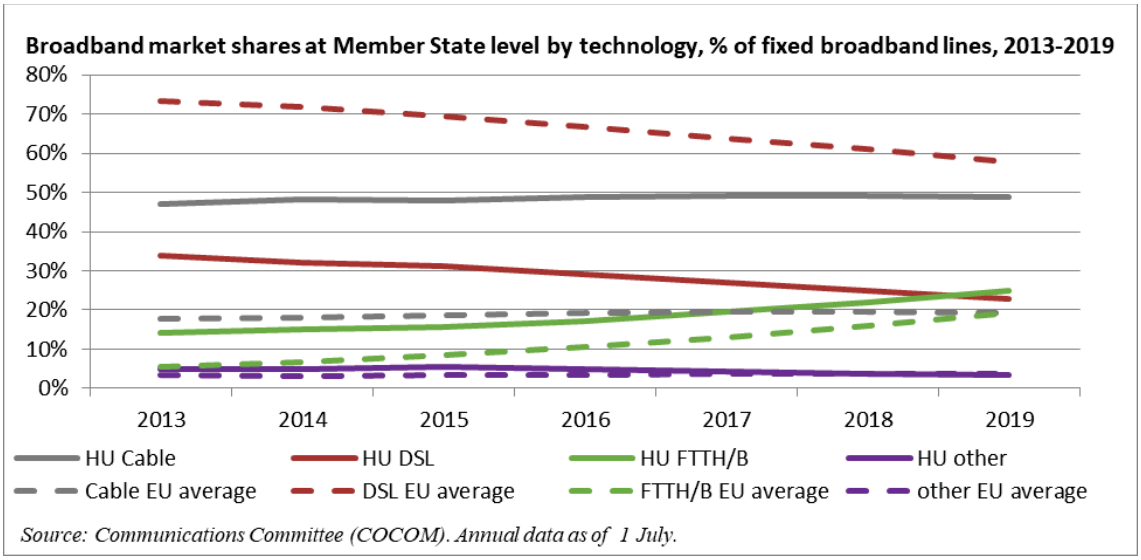
In Hungary, the overall fixed broadband take-up improved to 82% inching above the EU average of 78%. Meanwhile, the take-up of at least 30 Mbps broadband increased significantly from 58% to 68% (better than the EU average of 49%). More importantly, the take-up of at least 100 Mbps broadband grew from 40% to 51% in the last year, almost double of the EU average of 26%. This trend may be explained by the increase in the share of fibre-to-the-home/building (FTTH/B)

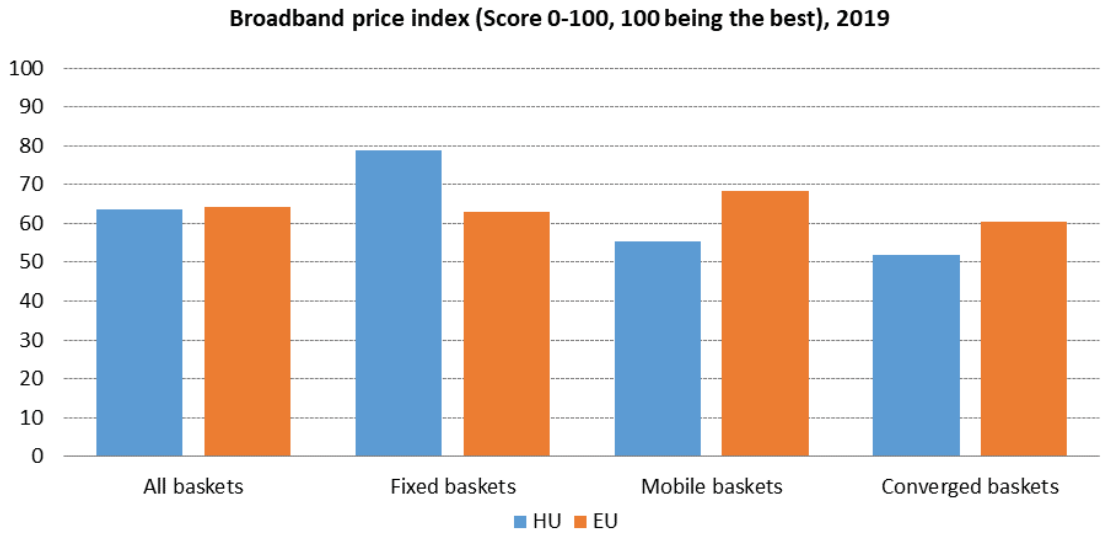
technology of fixed broadband lines from 22% to 25% and the share of cable remaining stable at around 49% over recent years. Meanwhile the share of DSL decreased from 25% to 23%.



Source IHS and Point Topic, Broadband coverage in Europe studies







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

Hungary ranks the 16th in the EU in terms of broadband prices when analysing all product baskets (fixed, mobile, converged). Hungary ranks eighth in terms of fixed broadband prices. However, converged products (19th place) and mobile broadband prices (23rd place) are still higher than the EU average.

1. Progress towards a Gigabit Society[20]

Hungary inched above the EU average for connectivity, and ranks 13th after a sustained relative improvement over the last few years. While fixed broadband coverage has remained stable at around 94% of households, fast broadband coverage has risen to 87%. In addition, Hungary continues to score well on ultrafast connectivity, mainly thanks to its widespread cable networks, which cover 82% of households (60% in the EU).

The development of digital infrastructure is one of the pillars of Hungary's 2014-2020 national info-communication strategy. This strategy was updated at the end of 2015 with the adoption of the digital success programme and the launch of the superfast internet programme (SIP). A new gigabit Hungary strategy was drafted in 2019 and the Government plans to adopt it in 2020, which would, on the one hand, reflect the Gigabit Society targets for 2025 and on the other, establish longer-term targets for 2030 in Hungary.

The vast majority of projects under the SIP deployed FTTH technology, enabling speeds envisaged in the Gigabit Society targets. The project intends to cover all Hungarian households – broadband coverage for almost 410,000 households is financed from EU Structural Funds – with networks supplying at least 30 Mbps broadband internet service by 2023. For areas that are not economically viable, a €250 million State aid scheme has been developed to ensure broadband roll-out. The project deployment is reflected in the increase of rural FTTP coverage from 4% in 2015 to 7% in 2017, reaching 16% in 2018 and 29% in 2019. By the end of 2019, 213,064 households were covered with 30 Mbps broadband.

The SIP gives preference to future-proof FTTH solutions and most of the participating undertakings are deploying this technology (86% of the coverage area). The programme started in 2016 with a

[20] 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.

mapping exercise to identify areas in which telecom operators are expected to make the full investment on their own. The programme is co-funded by the European Structural Funds and by the Hungarian State, except for Budapest and its suburban area, for which only national resources have been used. In 2019, two new public consultations were launched to identify unserved areas: there was a consultation with operators from 29 October to 15 November and a consultation with end-users from 16 October to 15 November.

In 2019, the 5G strategy produced on the basis of proposals from the 5G Coalition (5GC) was not assumed by the Hungarian Government. The 5GC was established under the digital success programme with the aim of making Hungary a major European centre of 5G developments and leader in the region in the testing of 5G-based applications.

In October 2019, Vodafone launched 5G commercial services in Budapest. In mid-April 2020, Magyar Telekom launched 5G services in parts of Budapest and Zalaegerszeg. Telenor undertook 5G mobile tests in a number of Hungarian cities.

Operators complain about the conditions set by electricity companies to access their infrastructure for the purpose of construction of telecommunication networks. The time and cost implications of these processes constitute a significant difficulty in the development of both the fixed line and mobile networks. This situation is also causing delays for the beneficiaries of the SIP projects in terms of meeting their contractual deadlines. While the transposition of the Broadband Cost Reduction Directive gave operators the legal basis to bring disputes with utility companies to the national regulatory authority, the NMHH, there was no such procedure initiated so far. Actors in the market consider that operators do not want to risk long-term relationships with the utility companies by requesting dispute resolution for local access request to physical infrastructure.

2. Market developments

At the end of 2018, there were 390 registered fixed internet service providers, which had dropped to 373 by 31 December 2019. Over the same period, the number of fixed telephony operators dropped from 164 to 158.

According to data from the regulator, in Q4 2019, in the market for fixed broadband services based on the number of access points, the market shares were 37.5% for Magyar Telekom, 23.6% for the DIGI group and 21.6% for UPC while small operators accounted for 17.3%. In the market for mobile broadband services, market shares based on the number of SIM cards with mobile broadband traffic were 42.61% for Magyar Telekom, 27.63% for Vodafone and 27.5 % for Telenor while other operators represented 1.3 % of the market.

In the market for mobile voice services, market shares based on the number of SIM cards with voice traffic are as follows as of Q4, 2019 (against Q4 2018 – given in brackets): Magyar Telekom 44.8% (44.9%), Telenor 27.2% (28.0%) and Vodafone 26.7% (26.4%), and other operators 1.3% (0.7%).

Digi, one of the largest cable service providers, and provider of audio-visual content through the previous acquisition of ITV, bought Invitel, the second largest fixed incumbent operator. The merger was cleared by the Hungarian competition authority, GVH, in May 2018. In November 2018, the GVH imposed a €280,000 (90 million HUF) fine on Digi for misleading the authority by remaining silent on its wrong calculation of the number of overlapping areas, which was reduced to €45 million by Metropolitan Tribunal Court. GVH also revoked its clearance decision granting DIGI's request for non-separation and allowing it to continue the already initiated steps taken in implementing the merger. The proceedings to reassess the merger continued throughout 2019 and were concluded on 18 March 2020 through the GVH decision which approved the acquisition. During the proceedings,

GVH approved the remedy package proposed by Digi. One of the main items of this package is the sale by Invitel to a third party of its operations in 14 Hungarian settlements that overlapped with Digi Hungary's own network there. The sale became effective on 9 January 2020. In response to the competition concerns raised by GVH in connection with 67 settlements where Invitel has overlapping services with i-TV, Digi HU proposed to ensure that i-TV's rental agreements with the relevant local network operators will not be terminated until December 31, 2023 (but will be discontinued from 1 January 2024)[21].

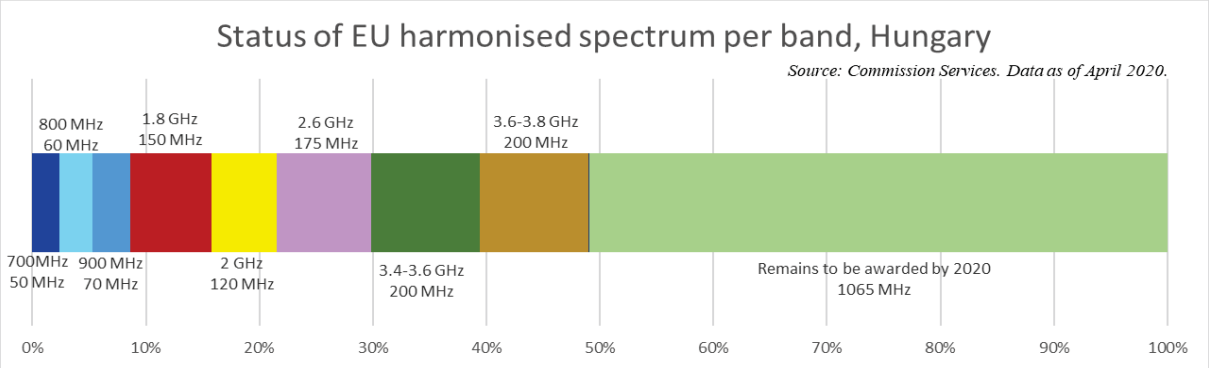
DIGI has started its operation as a mobile network operator (MNO) in the second half of May 2019 raising the number of network based mobile operators to four in the Hungarian market. DIGI had 99,000 mobile customers in 2019[22].

2019 is the first full year in which Telenor was under the full control of the Czech PPF Group after the acquisition was completed in July 2018 in a transaction that included Telenor's wholly owned mobile operations in Hungary, Bulgaria, Montenegro and Serbia. Among the major MNOs, Telenor is the only provider that does not have a fixed access network. On 31 October 2019, PPF Group and Antenna Hungária announced that PPF had sold a 25% stake in its Telenor Hungarian companies (Telenor Hungary and Telenor Real Estate) to the state controlled Antenna Hungária. Antenna Hungária's main field of activity is the national terrestrial television and radio broadcasting services, and wireless business telecommunication services.

On 18 July 2019, the European Commission cleared Vodafone's acquisition of Liberty Global's cable business in Czechia, Germany, Hungary and Romania. In particular, the Commission did not find competition concerns in Hungary. UPC's fixed network footprint ensures that Vodafone Hungary becomes a strong challenger offering bundled fixed and mobile services. This could alter the competition dynamics in Hungary for fixed-mobile converged bundled offers.

3. Regulatory developments

3.1. Spectrum assignment



In Hungary, 49% of the 2090 MHz spectrum harmonised at EU level for wireless broadband has been assigned. A multi-band award process was initially planned to take place in October 2019. The targeted bands include two out of the three 5G pioneer bands, namely the 700 MHz and 3400-3800 MHz bands, and remaining spectrum in the 2100 MHz and 2600 GHz bands. The documentation of the auction procedure was published on 18 July 2019. The NMHH registered three participants, refusing DIGI's participation on account of being fined by the GVH. DIGI contested the NMHH's

[21] https://www.gvh.hu/sajtoszoba/sajtokozlemenyek/2020-as-sajtokozlemenyek/a-gvh-lezarta-a-digi-es-az-invitel-fuziojanak-ismetelt-vizsgalatat

[22] Preliminary financial result for year ended December 31 2019.

decision and asked the Court of appeal for an injunction to prevent the auction from proceeding. On 10 January 2020, the Court rejected DIGI's demand for injunction and stated that NMHH may resume the tendering procedure independently from the ongoing case.

The multi-band award process for the 700 MHz, 3400-3800 MHz bands and remaining spectrum in the 2100 MHz and 2600 MHz bands took place on 26 March 2020. Magyar Telekom, Telenor and Vodafone gained licences for a total amount of 128.5 billion HUF (approximately €360 million).

The 700 MHz band will be available nationwide for wireless broadband services after 6 September 2020, when the administrative contract between Antenna Hungária Zrt. and NMHH on operating five digital television broadcasting multiplexes will expire. The administrative contract was amended in order to gradually switch off broadcasting in the 700 MHz band before 6 September 2020.

In 2019, the NMHH and Antenna Hungária signed the official agreement on operating licences for national terrestrial digital television broadcasting networks as of 18 September 2020. The NMHH started the negotiation with the local broadcasters to reach an agreement for the transition and on switching off broadcasting in the 700 MHz band.

The deployment of public wi-fi networks was boosted by the SIP programme which mandated that a free wi-fi hot spot was to be installed every settlement covered by the project. Some 2,350 settlements in rural and underdeveloped areas were covered under this programme. The rollout and operation costs are borne by the beneficiaries of the supported broadband projects as part of a binding commitment.

Some 154 Hungarian municipalities won vouchers through the WiFi4EU initiative. Every wi-fi hot spot will operate for 3 years.

3.2. Regulated access

In 2019, NMHH did not notify any economic regulation decision to the Commission.

On 18 February 2020, NMHH notified to the European Commission and BEREC the analysis of market 18 under the 2003 Commission Recommendation[23] on broadcasting transmission services. In March 2020, the NMHH adopted its decision to further regulate the market, designating Antenna Hungária as operator with significant market power (SMP).

In 2019, the decision on the remedies concerning the market for wholesale high-quality access provided at a fixed location (market 4 of the 2014 Recommendation on relevant markets[24]) was adopted. The reference unbundling offers containing terms and conditions of the regulated wholesale access products (on markets 3a and 3b of the 2014 Recommendation on relevant markets) were approved in the first half of 2019. The national consultation of Magyar Telekom's reference offer containing virtual unbundled local access (VULA) was concluded in 2019. The reference offer was approved in November 2019. The VULA service - provided by Magyar Telekom – may be used up from 1 June 2020.

NMHH addressed three requests for dispute resolution related to access obligations in 2019. These concerned VULA access, wholesale call termination provided on individual public telephone networks and the obligations incumbent on the legal successor of a designated SMP operator. In the first two cases, the NMHH deemed the behaviour of the SMP operators to be unlawful. In the third case, the NMHH confirmed that the legal successor is bound by its legal predecessor's SMP obligations. None of these decisions were appealed in court.

[23] Commission Recommendation 2003/311/EC.
[24] Commission Recommendation 2014/710/EU.

4. End-user issues

a. Complaints

In the first two quarters of 2019, the NMHH received 120 complaints from end-users compared to 139 in the previous year. Most of the complaints related to contractual terms (41%) in particular insufficient or misleading information received after the contract was concluded. 21% of the complaints concerned the quality of service while 19% concerned billing. A smaller number of complaints concerned number portability (3%) and value added services (2%).

b. Open Internet

In the reporting period, Magyar Telekom's offer of an optional mobile IAS add-on package called "Korlátlan Net" (Unlimited Internet) was investigated. The terms and conditions only permitted the offer to be availed of with a mobile phone, while other types of terminal equipment were not allowed. In addition, Magyar Telekom slowed down peer-to-peer (P2P) and virtual private network (VPN) traffic. The NMHH determined that these terms were in violation of the open internet regulation and ordered the provider to cease these practices. The operator undertook to lift the limitation on terminal equipment as well as the slowing down of VPN traffic. However, it appealed the decision in connection with the handling of P2P traffic, as it believes the slowing down of such traffic is permitted under the open internet rules for protecting the network and other subscribers. The appeals process is ongoing.

Two joint cases C-807/18 and C-39/19 involving Telenor are awaiting preliminary rulings before the European Court of Justice following the request from the Fővárosi Törvényszék (Budapest High Court). In the national court, action was brought by Telenor against the NMHH decision which (i) found that the complementary service offered by Telenor, available for mobile phone subscriptions and which allows limited and unlimited data traffic for certain music streaming platforms (known as the MyMusic reduced tariff), infringed Article 3(3) of Regulation 2015/2120 and (ii) ordered Telenor to eliminate the differences between certain forms of internet traffic.

c. Emergency communications – 112

Hungary is part of the HELP 112 II project financed by the Commission, which aims to deploy the advanced mobile location (AML), the handset-derived location service, by July 2020.

d. Universal service

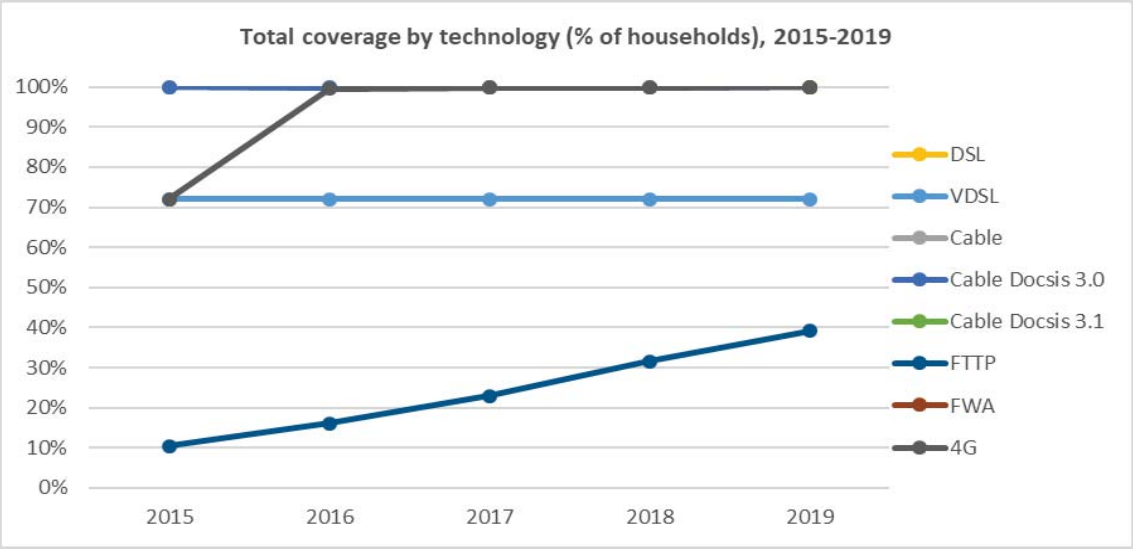
In 2019, the designation of the previous three universal service providers to provide access to publicly available telephone networks at a fixed location, and to operate public pay phones and directory information, was renewed. These operators are the incumbents: Magyar Telekom Nyrt., Invitel Távközlési Zrt., and UPC Magyarország Kft. Since 1 January 2020, TARR Kft. has been designated as a universal service provider for these services in the areas where it has significant market power. Invitel Távközlési Zrt. has been designated as the universal service provider for operating the national telephone enquiry service.

5. Conclusion

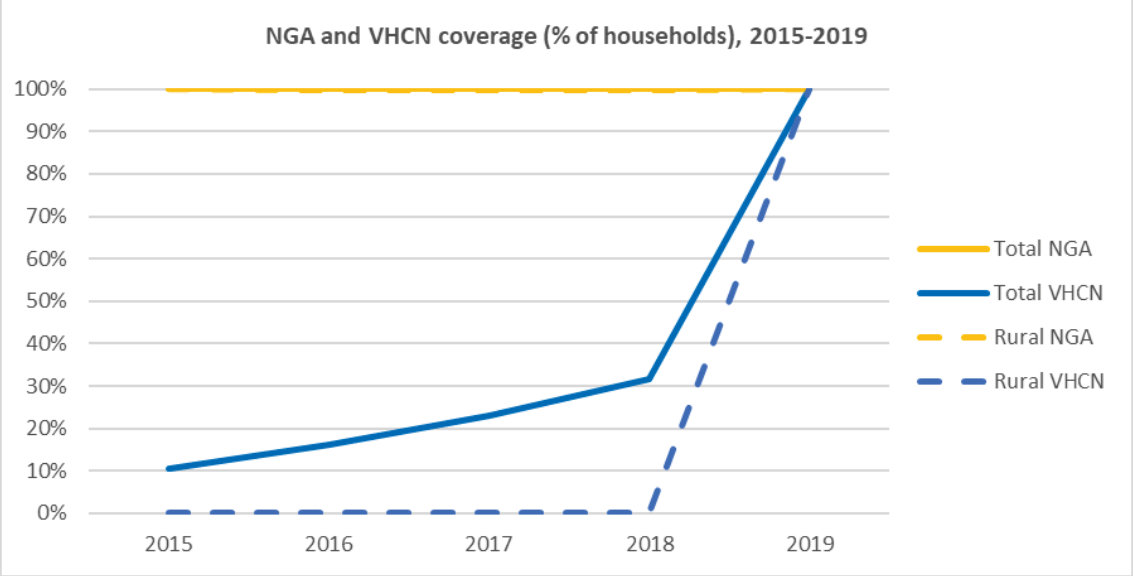
Significant progress has been made in fixed broadband coverage and take-up through the SIP. However, Hungary lags behind its European peers in mobile broadband take-up while prices for mobile phone users are persistently among the highest in Europe. While the 5G multiband auction took place in March 2020, the fourth mobile operator was prevented from taking part in the auction and contested the decision in Court.

Malta

Malta benefits from having three types of infrastructure covering its entire territory with a mix of fixed, mobile, broadband and TV distribution services. In particular, during the past decade, it has performed extremely well in fixed broadband connectivity. While in 2018, fibre-to-the-premises (FTTP) (39%) surpassed the EU average (34%), Malta remains far from being the best performers in this indicator. Very high capacity network (VHCN) coverage reaches 100% of households thanks to the cable network which operates DOCSIS 3.1. The aggregate 4G coverage in Malta reaches 100%[25].

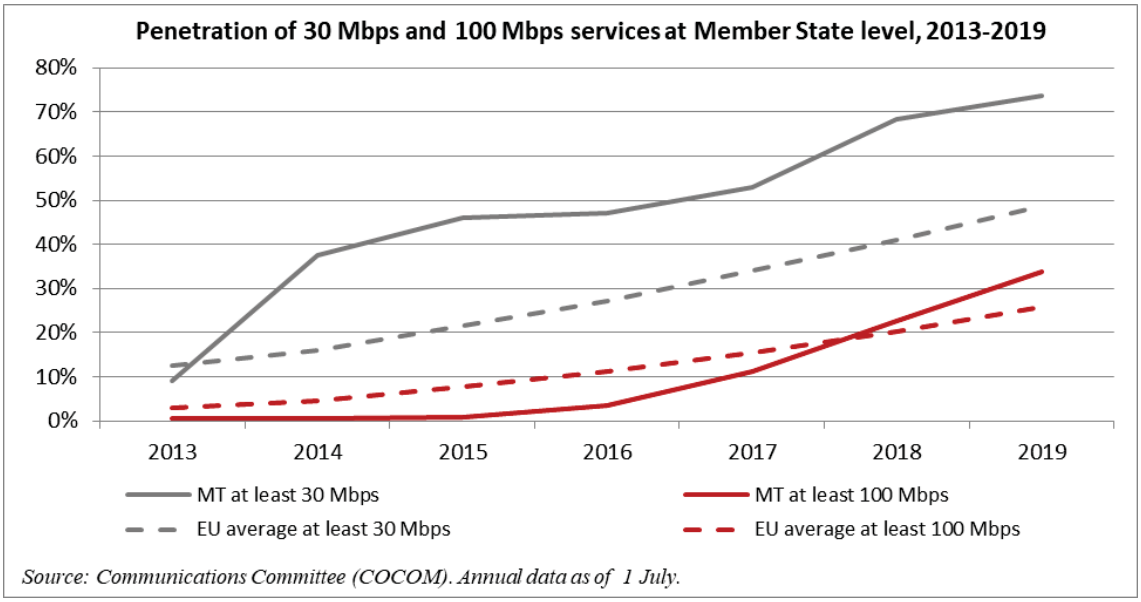


Source: IHS and Point Topic, Broadband coverage in Europe studies



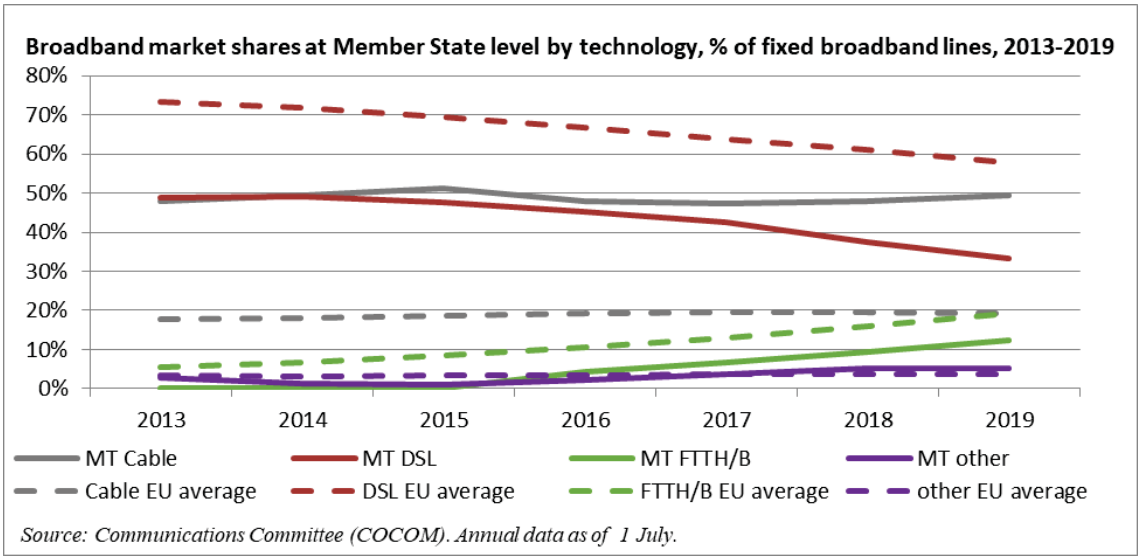
Source: IHS and Point Topic, Broadband coverage in Europe studies

[25] 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.

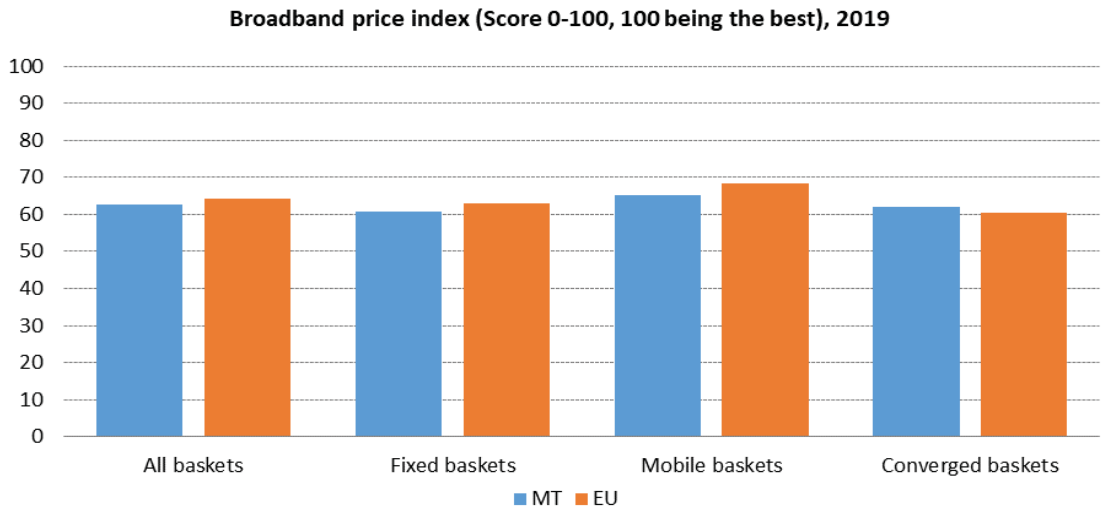


Both fast (73.8%) and ultrafast (33.7%) broadband penetration are above the EU average (respectively 48.7% and 25.9%).

In Malta the different technologies are distributed as follows: 49.3% of cable against an EU average of 19.1%; 33.2% of DSL technologies (characterised by a decreasing trend compared to last year) against an EU average of 57.8%; and the fibre-to-the-home/building (FTTH/B) technology has a share of 12.3% of the market against a EU average of 19.3%. Other technologies amount to 5.2% of the market against an EU average of 3.8%.



With regard to prices, in all the baskets reported in the above table Malta performs slightly worse than the EU average.



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

1. Progress towards a Gigabit Society[26]

The upgrade of the national broadband plan, aimed at factoring in envisaged developments in relation to deploying 5G and the Gigabit Society is planned to be undertaken as part of a wider review of the current national digital strategy (2014-2020). Continuous investment by electronic communications network operators over the years meant that government action to help Malta reach the Digital Agenda targets was not needed as they were reached before the set deadlines through private investments.

In Malta, one of the two main fixed operators has upgraded all street cabinets to fibre to the cabinets (FTTC) and is currently rolling-out an FTTH network. Various locations now being served via this network allowing for speeds of up to 1Gbps. The other main fixed operator's network is based on the cable HFC DOCSIS3.1 standard. This operator has, over recent years, upgraded its network with fibre up to street cabinets and created many additional optical nodes. Thus, it is able to provide nationwide coverage with speeds up to 1Gbps.

In terms of international connectivity, in 2019 one of the main operators announced a multi-million euro investment in a new submarine cable system. Once completed the new system will connect Malta to Marseille and Egypt, thus providing international connectivity from the country to landing points in Europe and Africa adding more options to the existing ones that terminate in Sicily. Malta has therefore put on hold considerations regarding potential state aid via an incentive programme to support investment in submarine cables pending an analysis of recent market developments.

The 430 wi-fi hotspots installed by the Malta Communications Authority (MCA) around the island have been handed over to a newly established agency, Tech.MT, which has plans to increase the number of wi-fi hotspots in the coming years.

One operator also provides its subscribers with access to 75,000 high-speed wi-fi hotspots in main public areas and in the homes.

[26] 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.

Under the WiFi4EU programme, in total 39 out of 68 local councils have been awarded a €15,000 voucher to install wi-fi equipment in public spaces that are not already equipped with a free wi-fi hotspot.

In May 2019, the MCA published a discussion paper and survey on '5G Demand and Future Business Models - Towards a Feasible 5G Deployment'. This paper was part of a wider initiative which includes the establishment of a 5G think tank, engagement with industry and the public sector concerning the benefits of 5G, and the promotion of tests and trials in 5G technology. The MCA is now reportedly planning to publish the framework for the rights of use of the 5G pioneer bands during the second quarter of 2020.

With regard to the Broadband Cost Reduction Directive, the SIP (single information point) function has been assigned to Transport Malta and it is operated through the Road Permit System. As reported in the previous years, the issue of the lack of appointment of the dispute resolution body (DRB) persists.

2. Market developments

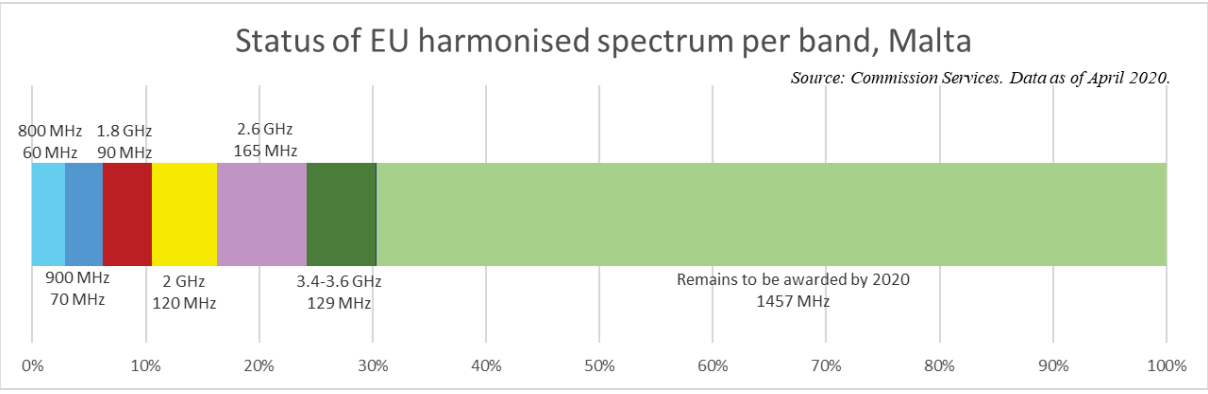
In December 2019, Vodafone announced that it had entered into an agreement to sell 100% of Vodafone Malta to Monaco Telecom. The acquisition was completed in Q1 2020 following regulatory approval.

Malta also continued to see an increase in the take-up of bundled retail packages during 2019, particularly triple play bundles encompassing fixed telephony, fixed broadband and pay TV. For example, there was a total of 66,963 subscriptions to triple-play packages by the end of June 2019, which is up by almost 22% year-on-year. The data below relates to the number of subscriptions, according to the type of electronic communications service, included in a bundle (as of the end of June 2019):

- 90.5% (178,782) of total fixed broadband subscriptions are in a bundle offer;
- 77.4% (188,188) of total fixed telephony subscriptions are in a bundle offer;
- 74.7% (125,200) of total pay-tv subscriptions are in a bundle offer;
- 10.1% (63,667) of total mobile telephony subscriptions are in a bundle offer.

3. Regulatory developments

3.1. Spectrum assignment



Including LTE roll-out, major Wireless BB spectrum assignments; any issues in spectrum management/licensing (including infringements and state aid cases)

In Malta, 30% of the total 2090 MHz spectrum harmonised at EU level for wireless broadband has been assigned.These assignments reflect market demand for the said spectrum.

With regard to the 5G pioneer bands, in June 2018 the MCA adopted a roadmap for the ultra-high frequency band between 470-790 MHz that lays out the key initiatives and milestones concerning the availability of the 700 MHz band for the provision of wireless broadband. According to the roadmap, the 700 MHz band should be made available by 2021. The entire 3.6 GHz and 26 GHz bands are also expected to be assigned subject to market demand, which so far has not been expressed.

Subsequent to the publication of the discussion paper and survey on the '5G Demand and Future Business Models Towards a Feasible 5G Deployment' mentioned above, the MCA concluded the process by publishing an open invitation to any entity that wants to evaluate the potential technical, social or environmental impact of 5G. The survey results highlighted the absence of tangible demand and that Malta's main mobile operators did not have any particular interest in deploying 5G, partly because of the significant investments recently made during the nationwide 4.5G roll-out. The MCA subsequently established a 5G think tank and engaged with relevant stakeholders to highlight the potential benefits of 5G technologies.

With regard to international coordination, agreements were signed with Italy and Greece. Problems persist in the coordination with Libya and Tunisia.

3.2. Regulated access (both asymmetric and symmetric)

Following the publication of its Decisions concerning the fixed and mobile termination markets in 2018[27], the MCA has been assessing the broadband markets (markets 3a and 3b - wholesale local access provided at a fixed location and wholesale central access provided at a fixed location for mass-market product).

4. End-user matters

a. Complaints

Between April 2019 and March 2020, the MCA received 145 complaints related to electronic communications services. The main sources of consumer complaints during this period were quality of service and billing. During the same period the Authority answered 590 enquiries.

b. Emergency communications – 112

Handset based Advance Mobile Location is implemented in Malta but is still not available for IoS users. To overcome this problem the Ministry for Home Affairs, National Security and Law Enforcement is carrying out a scoping study on the use of Global Navigation Satellite System (GNSS) for emergency services.

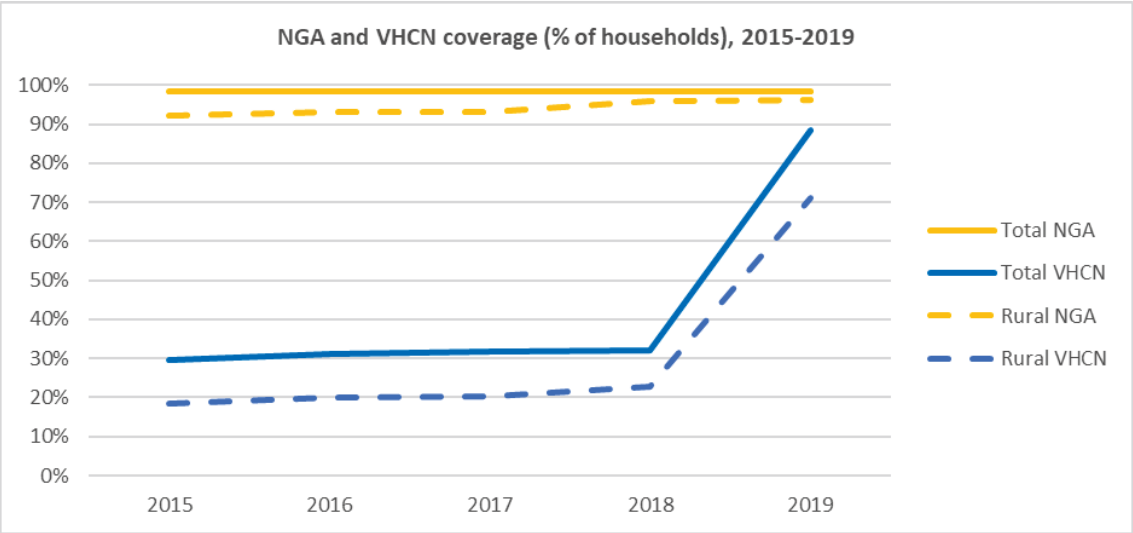
After discussions with the associations for disabled end-users, the current application for emergency services was modified and integrated with other functions that were shaped according to the requests of disabled end-users. The app allows the user to (i) place the call to 112 (ii) send an sms (iii) choose non-vocal communication by using pictograms that indicate different kinds of accidents and the emergency service requested complete with localisation services. The launch of the revamped version of the app took place on '112 day', on 11 February 2020. Awareness campaigns are ongoing through various channels.

[27] See The provision of call termination on individual public telephone networks at a fixed location / Wholesale voice call termination on individual mobile networks in Malta

5. Conclusion

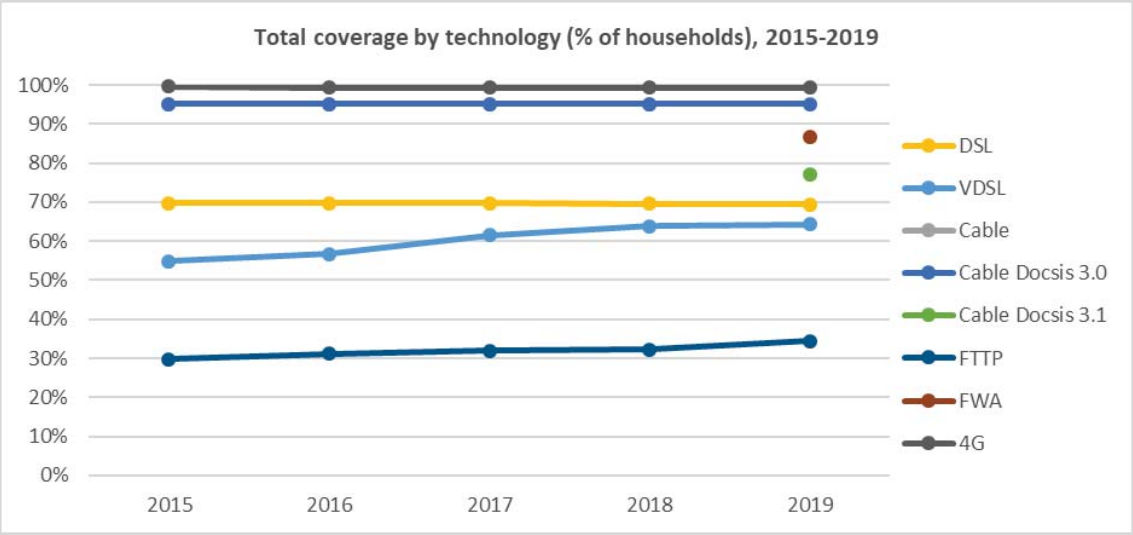
Malta performs extremely well in fixed broadband connectivity. It ranks first in all fixed broadband coverage indicators of the DESI thus achieving the EU broadband coverage objectives. Aside from various initiatives in relation to 5G, Malta would benefit from a consolidated 5G strategy and should take the necessary steps to launch the national consultation procedures required to pave the way for 5G deployment.

The Netherlands



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

The Netherlands is among the top performers in connectivity. Fast broadband (NGA) coverage is above the EU average (98% of households in total and 96% rural). In 2019, very high capacity network (VHCN) coverage increased significantly by 57 percentage points (pps), up from 32% in 2018 to 89% in 2019 (against 44% in the EU), largely reflecting the upgrade of cable networks to DOCSIS 3.1. Rural coverage followed the same increasing trend, up from 23% in 2018 to 71% in 2019 (compared to 14% and 20% respectively in the EU).

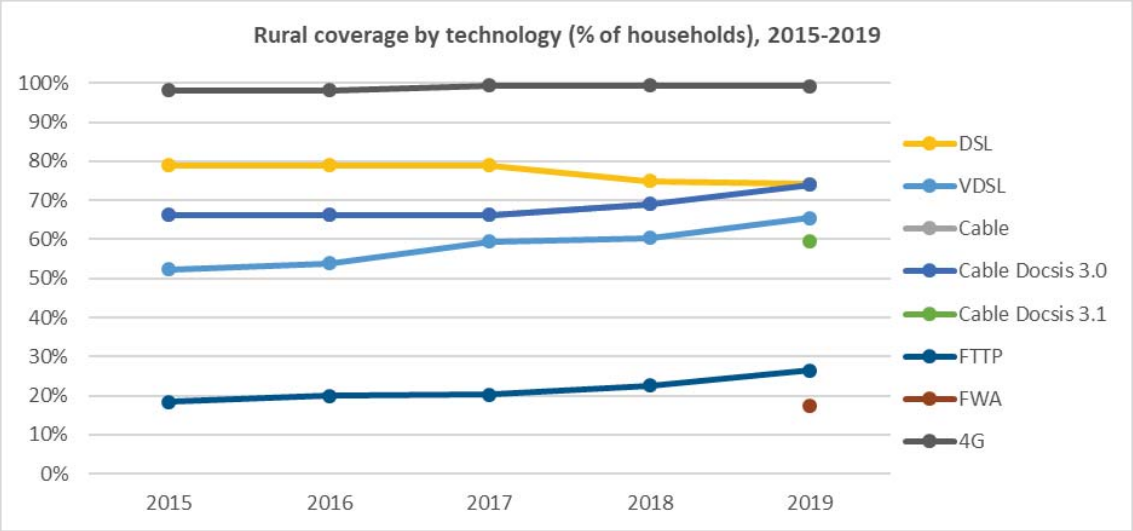


Source: IHS and Point Topic, Broadband coverage in Europe studies

In addition to its near complete aggregate 4G coverage (99%)[28], the country is largely covered by two competing fixed infrastructures, and in some areas three: VDSL coverage is stable at around 64% of households, against 59% in the EU. In parallel, its cable DOCSIS 3.0 coverage is one of the highest, and remained unchanged at 95% in 2019, double the EU average. The Netherlands is unsurprisingly

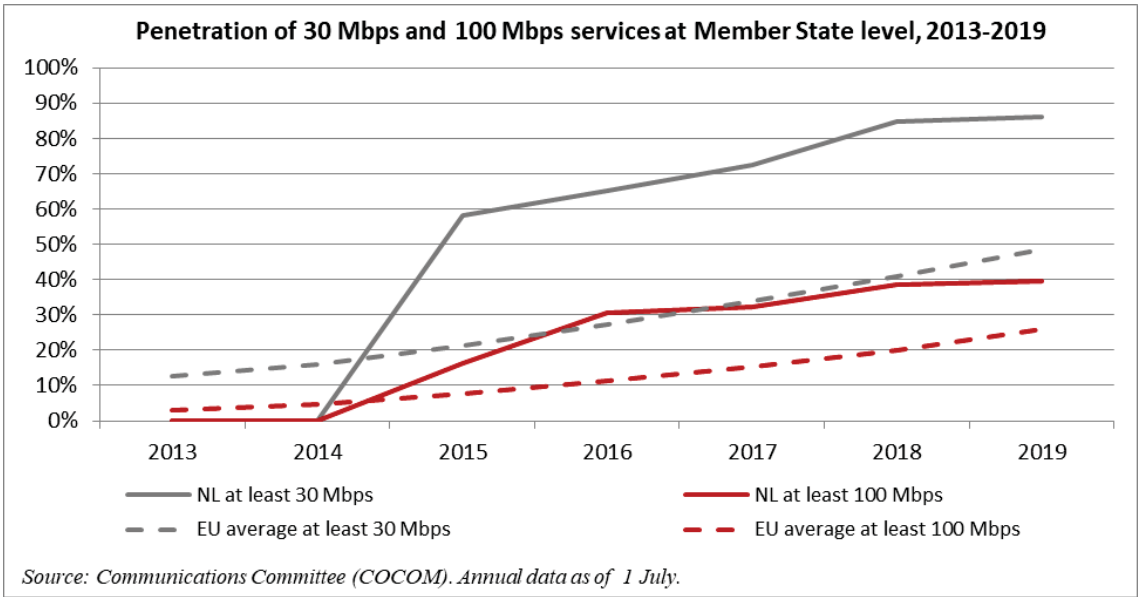
[28] The 4G coverage indicator used in the country chapters differs from the DESI indicator for 4G coverage. The former is an aggregate indicator, i.e. measures the coverage of all operators together. The latter is an average indicator, i.e. the sum of all coverage divided by the number of operators.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

among the first countries where cable networks have migrated to DOCSIS 3.1 (covering 77% of households in 2019 compared to 19% at EU level). Given the availability of legacy networks, the pace of fibre to the premises (FTTP) deployment has stagnated in the last 5 to 6 years, reaching the EU average of 34% of households in 2019.



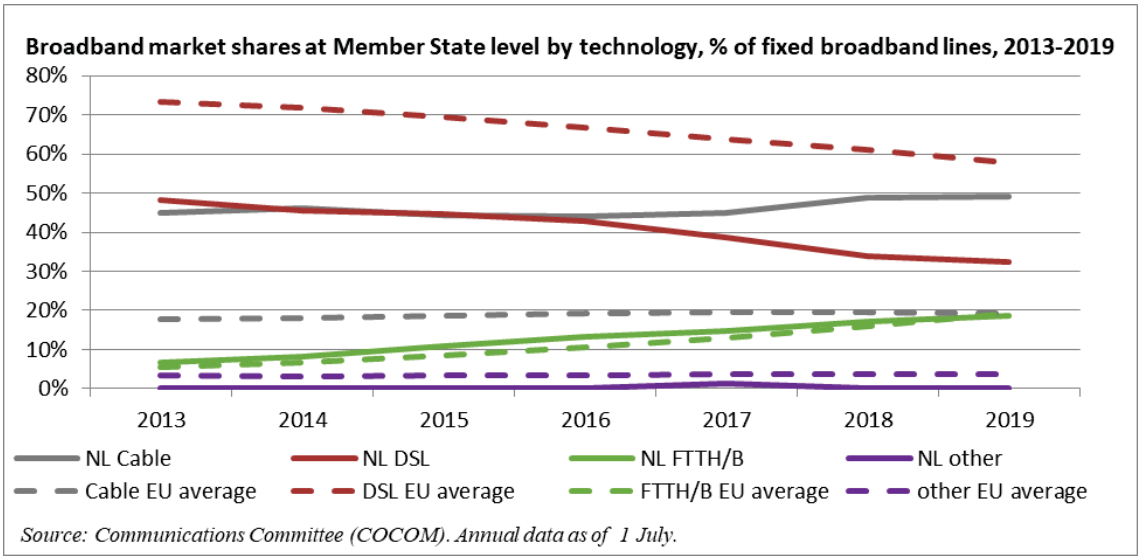
Source: IHS and Point Topic, Broadband coverage in Europe studies

Rural fixed broadband coverage in the Netherlands is mainly attributed to DSL (74% compared to 81% in the EU),DOCSIS 3.0 (74% against 11% in the EU and VDSL (66% against 42% in the EU). While DSL is experiencing a decline, advanced broadband technologies (VDSL, DOCSIS 3.0 and 3.1, FTTP) have been slowly increasing since 2018. Coverage of FTTP in rural areas is above the EU average (26% compared to 18%).

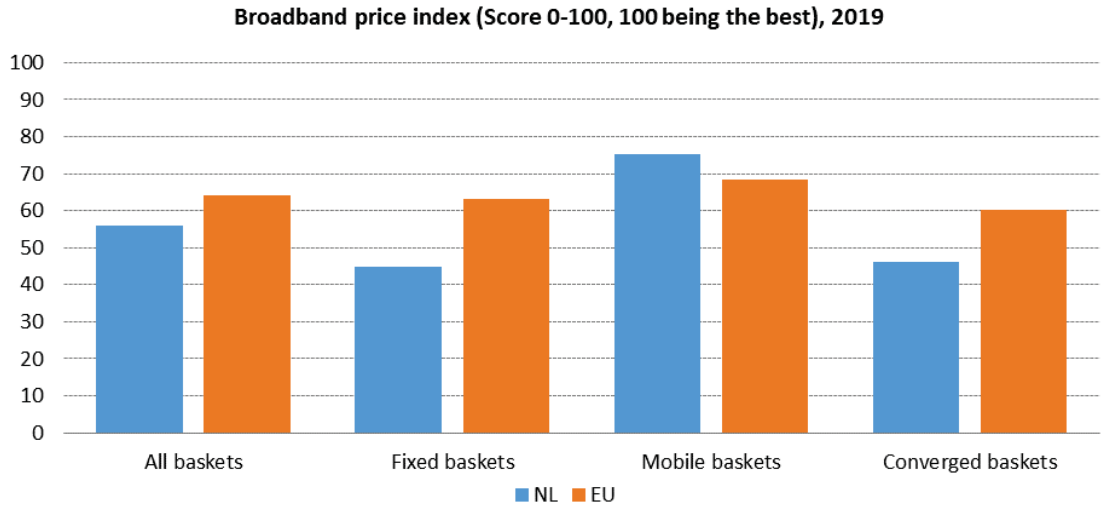


The Netherlands has the highest overall fixed broadband take-up in the EU (98% against 78% in 2019). However, the take-up of high-speed broadband connections is stagnating after having increased steadily since 2015. 100 Mbps speed penetration remains stable, above the EU average of 26%. 30 Mbps broadband penetration also remains relatively stable, reaching 86% in 2019 against an EU average of 49%.

While mobile broadband take-up has increased steadily from 88 subscriptions in 2017, 90 subscriptions in 2018 to 92 subscriptions per 100 people in 2019, it remains below the EU average.



The Dutch market is characterised by a strong uptake of cable networks that has remained relatively stable, reaching a market share of 49% in 2019 compared to the EU average of 19%. The preference for DSL remains below the EU average of 58%, and has followed the declining trend in the EU, seeing a decrease of nearly 10 pps in market share since 2016, reaching almost 33% in 2019). The share of fibre connections is slowly increasing (from 13% in 2016 to nearly 19% in 2019), closely following the steady increase at EU level.



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

Broadband prices in the Netherlands are generally higher than the EU prices, except for mobile broadband prices which are slightly lower (with a price index of 75 compared to 68).Prices in all baskets are above the EU average. The Netherlands has higher prices for fixed broadband than the EU average – its fixed broadband price index comes to 45, against the EU average of 63. Prices for lower speeds are in line with the EU average, but higher speed broadband subscriptions are considerably more expensive than the EU average. This could account for the stagnation in high-speed broadband take-up. Similarly, the converged baskets are above the EU average (46 compared to 60).

1. Progress towards a Gigabit Society[29]

While the country met the Digital Agenda for Europe 2020 goal for fixed broadband coverage, it failed to achieve the 50% take-up of 100 Mbps broadband by households. In July 2018, the Dutch national broadband plan was updated with the connectivity action plan, outlining the government's efforts to remain Europe's digital leader. The action plan targets the provision of fixed broadband connections with speeds of at least 100 Mbps available to everyone by 2023. Dutch authorities predict that coverage will be 99.5% in 2023. For the remaining 0.5% (50,000 households), the target may prove to be more challenging, especially for the 20,000 most remote households. By the same year, most households should be taking advantage of connection speeds of 1 Gbps. Overall fibre to the home (FTTH) penetration is expected to reach 65% by the end of 2023. In addition, the next generation standard, DOCSIS 3.1, enables Gigabit speeds over cable. There is no national broadband funding scheme in the Netherlands. Dutch central authorities help regional and local authorities create the right conditions for market players to roll out fast internet by sharing knowledge and best practices.

Although the Broadband Cost Reduction Directive has been transposed into national law in the Netherlands, its effects have been limited, mainly due to the existing legacy networks. The Dutch telecommunications market is well developed and characterised by a strong fixed infrastructure presence. Before the Directive was implemented, national legislation was in place to cover infrastructure sharing. In general, the roll-out itself has not been an issue, but obtaining the necessary building permits has been an administrative obstacle due to the lack of a uniform approach between local governments. Moreover, the market has experienced reluctance from local governments to issue permits for antennas. This can become a hurdle in the future given that future 5G networks will require more antennas/sites than current mobile networks. To improve coordination between local and central governments as well as to better inform the local governments about their obligations and responsibilities following the European Electronic Communications Code (EECC), the Ministry of Economic Affairs and Climate Policy started a dialogue with the municipalities last year.

The Netherlands scores 0 on the 5G readiness indicator[30], with 0% assigned 5G spectrum, falling behind compared with several Member States that have already awarded 5G spectrum[31]. The national action plan[32] aims to provide uninterrupted 5G wireless broadband coverage in all urban areas, as well as on major roads and railways, by 2025.

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[29] 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.

[30] 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

[31] On 28 April 2020, Vodafone launched its 5G network across half of the Netherlands, with full coverage expected by the end of July 2020. It uses an innovative and dynamic spectrum sharing technology on existing 1800 MHz spectrum bands. All Vodafone customers with a suitable device and subscription will be able to use 5G in the coverage area. https://www.vodafone.nl/daarom-vodafone/netwerk/5g

[32] https://www.government.nl/documents/reports/2018/07/13/connectivity-action-plan

Trial licences for 5G were already granted at national level in 2017. Pilots have started in all major cities at local and regional level in the field of mobility/transport, food/agriculture, health and public services/security. Examples include the 5Groningen Living Lab, the KPN 5G Field Labs in Amsterdam-Zuidoost, the Port of Rotterdam, Drenthe and Helmond, the T-Mobile Living Lab Scheveningen, and the launch of the Ericsson and VodafoneZiggo 5G test environment at the High-Tech Campus Eindhoven. For 2020, the Ministry of Economic Affairs and Climate Policy will further stimulate 5G innovation together with the Smart Industry Network[33]. T-Mobile announced the quick roll-out of a national 5G network in 2020, provided that the operator is awarded 5G spectrum, and is planning to make The Hague the first Dutch 5G city. Next steps for 2020 include international (cross-border) pilots like the 5G blueprint project[34] , which will start between the Netherlands and Belgium. The project will test the economic feasibility of 5G tools in cross-border transport and logistics as well as passenger transport. Other cross-border pilots will be examined in 2020 by the Benelux cooperation group[35].

The Netherlands has seen opposition to 5G developments. A 5G protest movement filed a complaint in court against the Dutch government, claiming that the 5G technology poses potential health risks. The court case is ongoing.

The outbreak of the COVID-19 crisis has seen an increase in misinformation about 5G and about the spread of COVID-19. Of greater concern, however, is the damage caused to communication infrastructure by fire, which threatens the continuity of essential communication services.

2. Market developments

ACM, the national regulatory authority, is monitoring the potential effects on the Dutch market after T-Mobile acquired Tele2 Netherlands, leaving the market with three mobile network operators[36]. The market shares of the major providers remain stable.

Mobile operators have adjusted their offers as data has become the main driver of mobile revenue. T-Mobile and Tele2 have been offering unlimited data bundles since 2017. The general trend is towards larger data bundles and increased use of mobile data (instead of Wi-Fi). Mobile offers often include unlimited calls and text messages due to the increased use of over-the-top services like WhatsApp, Skype, Viber and Messenger. While the number of call minutes is slowly rising, the number of text messages is slowly declining.

Bundled products dominate the fixed market, with an increase of dual play products (mostly TV services and internet access). Subsequently, the market share of stand-alone products is decreasing.

The fixed broadband market has seen an increase in new entrants deploying FTTH in rural areas with lower-quality legacy networks and with a lower risk of competition from one of the larger operators (KPN and VodafoneZiggo). It is likely that most rural areas in the Netherlands will be connected by FTTH in the near future. Following the success of these fibre operators in rural areas, their focus has shifted towards more densely populated areas. The larger operators have responded to this, leading to an upscale of FTTH deployment. Even KPN, which has significantly scaled back its FTTH roll-out since 2018 in favour of fibre to the cabinet investments, has announced plans to connect an additional one million households to fibre, mainly in urban areas, by the end of 2021. VodafoneZiggo has also announced that it will increase the quality of its retail services, offering speeds of up to 1

[33] https://www.smartindustry.nl/english/
[34] Co-funded under Horizon 2020, the EU research and innovation programme.
[35] Dutch Presidency of the BENELUX working party Telecom https://www.benelux.int/nl/publicaties/publicaties-overzicht/jaarplan-2020
[36] The European Commission unconditionally approved the merger in November 2018.

Gbps with its DOCSIS 3.1 coaxial network. The market shares on the fixed broadband market remain stable. KPN and VodafoneZiggo together make up approximately 80-90% of the total market.

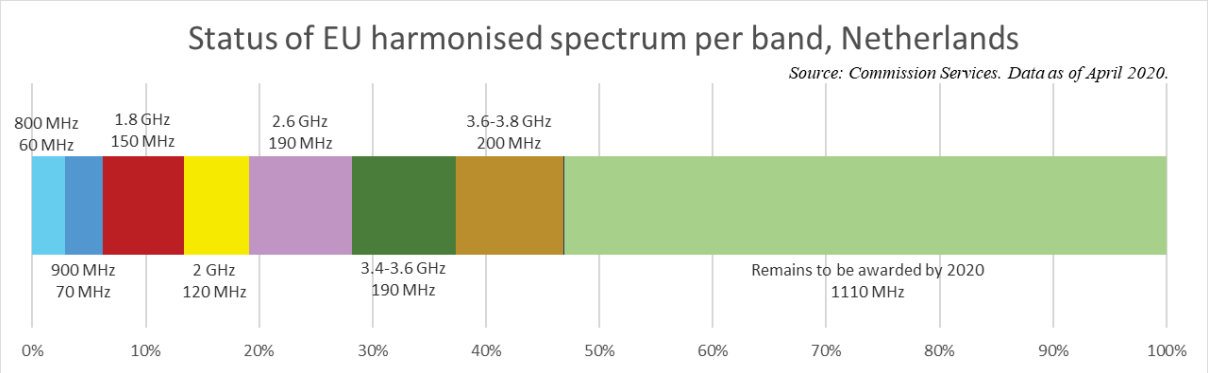
Co-investment in the Netherlands has been limited. Site locations and antennas are passively shared on a regular basis to increase roll-out efficiency and improve coverage in e.g. tunnels.

3. Regulatory developments

The Dutch government has been transposing the EECC into national law since 2019. The Dutch authorities aim to translate some parts of it into national law in advance in a separate draft bill. This concerns Article 22 (geographical surveys of network deployments), Article 61(3) (symmetric access beyond the first concentration or distribution point) and Article 106 (provider switching). The Ministry of Economic Affairs and Climate Policy is set to complete the transposition into national law on time, but acknowledges that meeting the deadline, 21 December 2020, may be difficult.

In December 2019, the Parliament adopted a decree on unwanted control of telecommunications, amending the Dutch Telecommunications Act. The decree introduces measures to allow the Ministry of Economic Affairs to block acquisitions of Dutch telecommunications operators. The market has expressed its doubts as this regulation interferes with private investments. There is a fear that this may hinder future investments in the Dutch market.

3.1. Spectrum assignment



Overall, the Netherlands has assigned 47% of the 2,090 MHz spectrum harmonised at EU level for wireless broadband. Spectrum in the 700 MHz and 26 GHz bands (two of the three 5G pioneer bands) as well as the 1.4 GHz band still needs to be assigned. The spectrum in the 3.4-3.8 GHz band was awarded in 2016, but not with the latest technical conditions suitable for 5G.

In June 2019, the government published a policy note, providing a framework for the authorisation of scarce spectrum over the next 5 to 10 years and a more detailed approach to the 700 MHz, 1.4, 2.1 and 3.4-3.8 GHz bands. The objective is to create predictability and investment certainty for the market. A 5G frequency multiband auction is planned for June 2020[37]. The 700 MHz band will be jointly auctioned with the 1.4 and 2.1 GHz bands for a period of 20 years. The 700 MHz rights of use will have coverage obligations: 2 years after the right has been granted, 98% of the surface area of each Dutch municipality must have coverage, with a minimum speed of 8 Mbps and a high degree of probability at all locations within the defined area for users located outdoors. 6 years after the licence has been granted, the minimum speed must be 10 Mbps, under the same conditions.

One source of concern about 5G deployment was interference in the 3.4-3.8 GHz frequency band with a satellite listening station used by the security service in the north of the country. In December

[37] The application procedure started in March 2020.

2018, the government took a preliminary decision to move the station in order to free up the band for 5G. In March 2019, the Ministry of Economic Affairs and Climate Policy held a consultation on making available the 3.4-3.8 GHz band. However, the auction of spectrum from 3.45 GHz to 3.75 GHz will only take place at the start of 2022, with it becoming available from September 2022. Moreover, spectrum from 3.4 GHz to 3.45 GHz and from 3.75 GHz to 3.8 GHz will be reassigned for local use under technical conditions suitable for 5G and will only be available from 2026, which is much later than the December 2020 EU deadline. On the 26 GHz band, a public consultation was launched in January 2020 to assess the demand[38]. Based on the outcome of the consultation, a more detailed policy approach for the 26 GHz band will be developed in 2020. ACM intends to publish guidelines on network sharing in 2020 in view of upcoming auctions of 5G spectrum[39].

Mobile network operators are making efforts to reorganise the lots of their current spectrum holdings in order to use more spectrum for 4G. Vodafone Netherlands announced that it would be switching off its 3G network on 4 February 2020. KPN announced that it would be switching off its 3G network as of January 2022, but will keep its 2G network, enabling texts and calls from customers that do not have a mobile device compatible with voice over LTE. T-Mobile, on the other hand, intends to phase out its 2G network. ACM hopes that the upcoming network sharing guidelines will also facilitate the sharing of existing networks in view of these phase-outs.

3.2. Regulated access (both asymmetric and symmetric)

On 17 March 2020, the court overturned ACM's 3a[40] and 3b[41] Decision, which KPN and VodafoneZiggo had appealed against. Following the court ruling, there is currently no regulated access to markets 3a and 3b. KPN announced that it will continue to provide access based on existing agreements and will maintain its wholesale offer.

4. End-user matters

a. Complaints

In 2019, ACM received 2,400 calls/complaints from consumers about electronic communications providers compared to 2,474 in 2018. 473 calls concerned mobile telephony services, 127 mobile internet services, 317 fixed internet services and 157 fixed telephony services.

b. Open Internet

ACM launched an investigation into Dutch internet providers' network traffic management. The investigation showed that the providers meet the requirements of equal treatment of internet traffic in accordance with the open internet rules in Regulation (EU) 2015/2120. Furthermore, the investigation resulted in providers clarifying information on traffic management in their terms and conditions.

c. Roaming

ACM assessed the quality of roaming services abroad. It found that while roaming, some customers only have access to 3G rather than 4G services, even when they normally have access to 4G services at home. ACM concluded that providers should ensure that their customers are offered 4G services abroad wherever available, in accordance with the EU's 'Roam-Like-At-Home' rules.

[38] https://www.internetconsultatie.nl/marktconsultatie26ghzband
[39] https://www.acm.nl/en/publications/acm-draw-guidelines-sharing-telecom-infrastructure
[40] Wholesale local access provided at a fixed location/physical network infrastructure access, 2014 Recommendation.
[41] Wholesale central access for mass market products provided at a fixed location/wholesale broadband access, 2014 Recommendation.

d. Emergency communications – 112

The Commission services are looking into the transposition of Article 26 of the Universal Service Directive and whether the national law ensures the provision of equivalent user location in case of emergency communications for disabled users (Article 26(4) Universal Service Directive). The Netherlands aims to launch a new 112 communications platform by 2020. This platform will enable new technologies such as emergency SMS and an emergency app, both of which will make it easier to contact the public safety answering point by text in case of emergency.

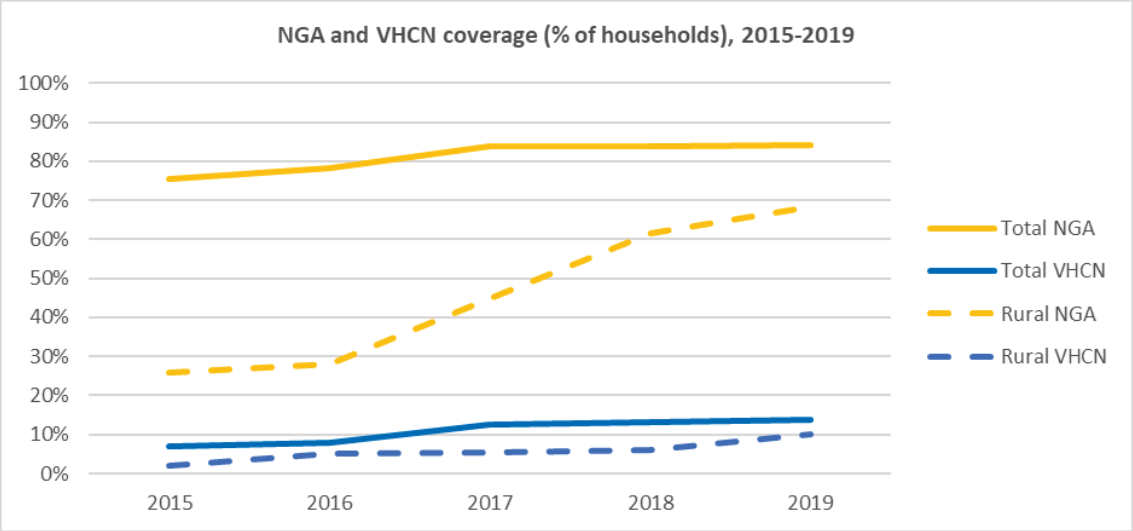
5. Other issues

Following a discussion paper on additional regulatory tools for online platforms written by ACM and the Ministry of Economic Affairs and Climate Policy, ACM announced that access to digital platforms is one of the items on its agenda for 2020.

6. Conclusion

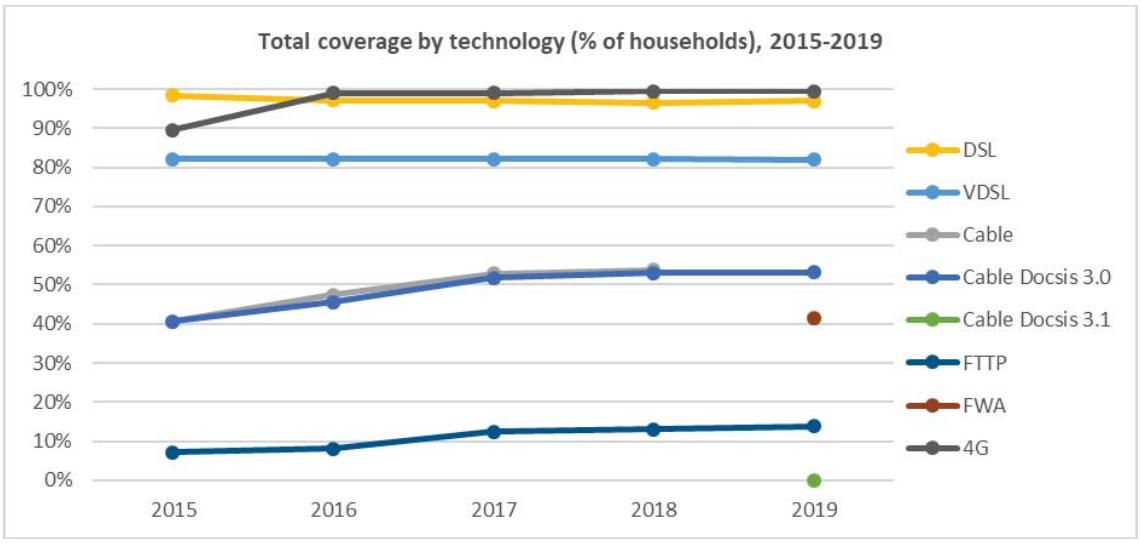
The Netherlands has high-quality infrastructure, with several fixed electronic communications networks (copper, cable and fibre) and three mobile network providers. Public policy initiatives could boost the efficient use of the advanced broadband technologies by promoting the uptake of higher Mbps speeds. Further network roll-out in an already advanced market as well as upcoming 5G deployment can be improved through coordination between central and local governments. Creating the preconditions for 5G roll-out is vital for the further deployment of Gigabit networks. While the Netherlands has not yet assigned any 5G pioneer bands, it has taken steps to lay the groundwork with the upcoming auction of the 700 MHz band. Ensuring timely transposition of the EECC is of the utmost importance if citizens and businesses are to benefit from the law. It will also avoid creating uncertainty as to what rules apply, which would adversely affect the operation of the EU's internal market.

Austria



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

While Austria performs very well on aggregate 4G[42] and fast broadband coverage (NGA) (100% and 84% of households respectively), only 14% of households are covered with to very high-capacity networks (30 percentage points (pps) below the EU average). Rural coverage is above the EU average and has continued to rise, from 28% in 2016 to 68% in 2019 (against an EU average of 59%).

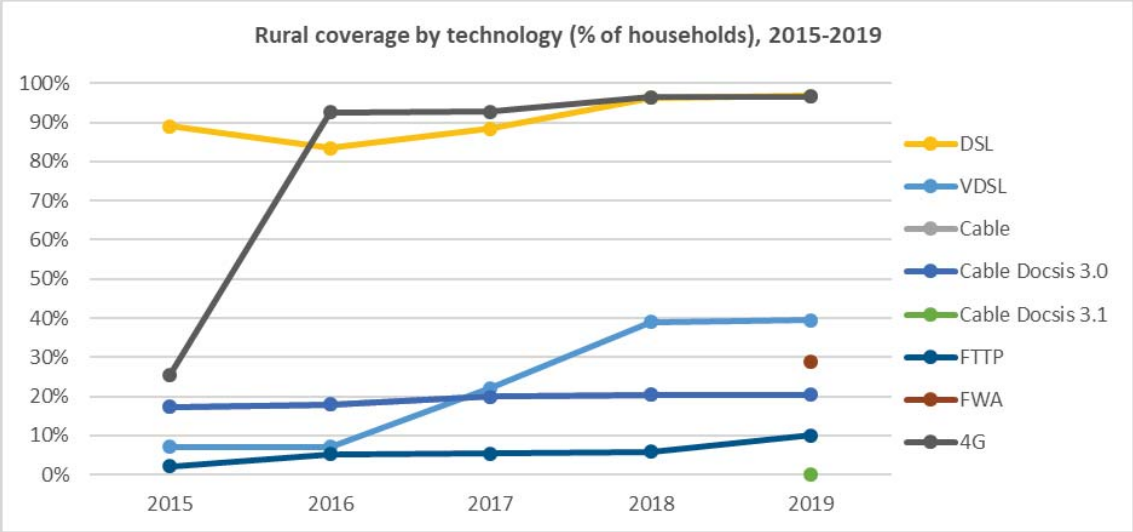


Source: IHS and Point Topic, Broadband coverage in Europe studies

Austria has very good coverage of VDSL networks. The figure has remained unchanged at 82% for the past 4-5 years, significantly above the EU average of 59%. The coverage of cable networks, and in particular DOCSIS 3.0, which has also remained stable for a while, also exceeds the EU average (53% compared to 46%). However, Austria is underperforming as regards coverage of next generation technologies, with an FTTP coverage of only 14% of households (compared to EU average of 34%).

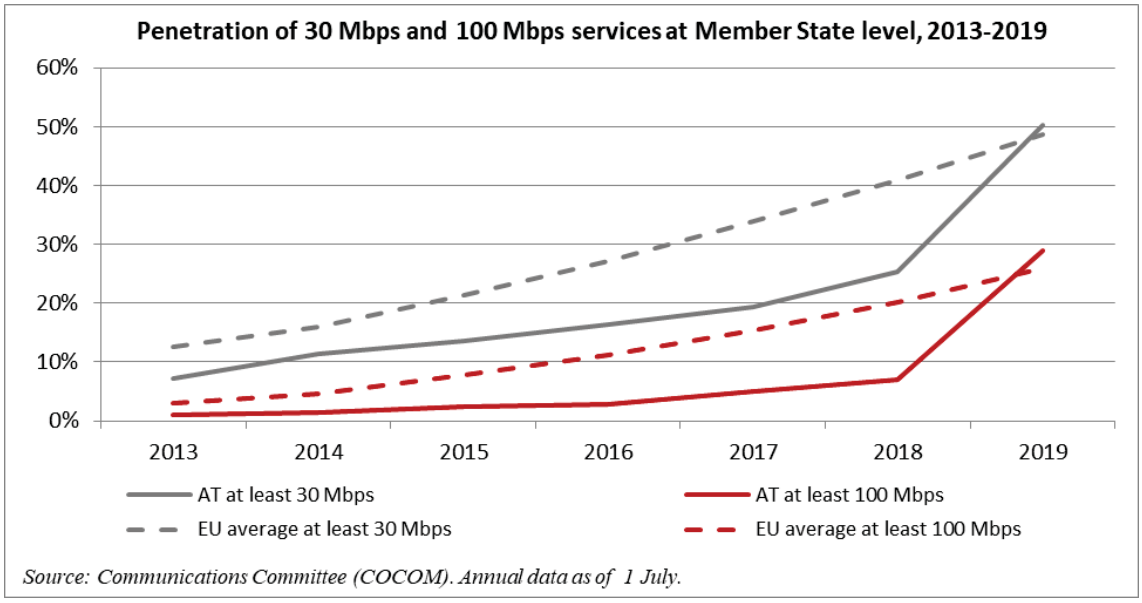
[42] The 4G coverage indicator used in the country chapters differs from the DESI indicator for 4G coverage. The former is an aggregate indicator, i.e. it measures the coverage of all operators together. The latter is an average indicator, i.e. the sum of all coverages divided by the number of operators.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

The future upgrade of the cable networks to DOCSIS 3.1 should improve the coverage of very high-capacity networks (VHCN). Austria's high 4G coverage puts it in a good starting position for deploying 5G.

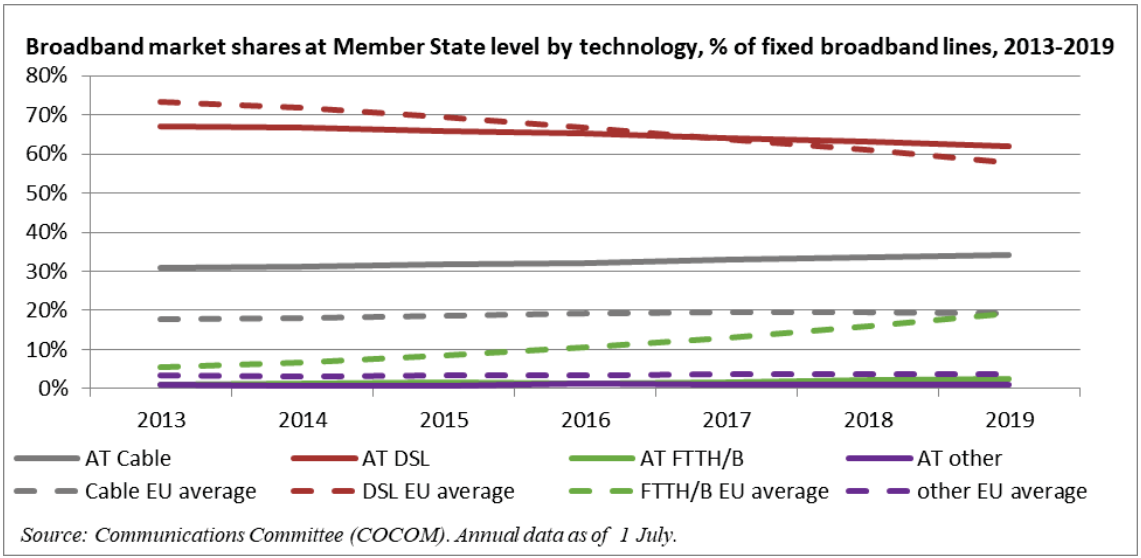


Source: IHS and Point Topic, Broadband coverage in Europe studies

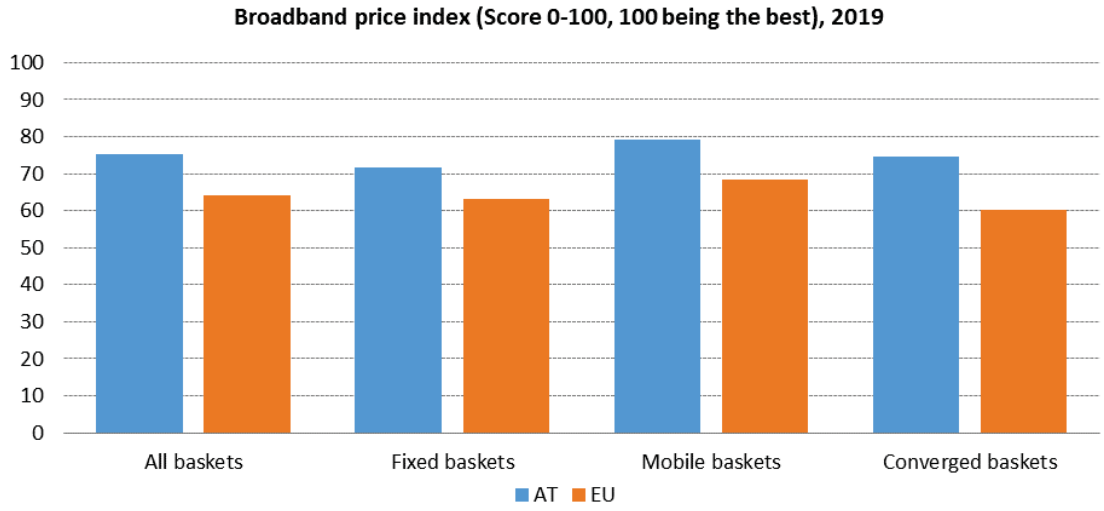
Austria has relatively low FTTP coverage in rural areas (10% against an EU average of 18%), with an increase of 4 pps since 2018. By contrast, rural areas have very good DSL coverage (97% of households against 81% EU-wide). VDSL, however, is showing signs of stagnation, despite a notable spike in 2016-2018. It reached 40% in 2019 (against an EU average of 42%).



With an overall fixed broadband take-up of 72%, Austria is below the EU average of 78%. This can be accounted for by the strong presence of mobile broadband. However, after years of slow development, broadband penetration of at least 30 Mbps saw marked progress in 2019, with take-up reaching 50%, compared with 25% in 2018. The same was true of broadband penetration of at least 100 Mbps (take-up 29%, against 7.% in 2018). Austria now ranks slightly above the EU average on both indicators.



Austria relies primarily on the NGA infrastructure for its connectivity needs, which explains the high share of the DSL connections at 62%, slightly above the EU average of 58%. Cable also has a substantial share (34%), but as its coverage has not expanded much, it has been stagnating for the past 5 to 6 years. Austria has a very low share of FTTH/B at only 2.5% against an EU average of 19%. Investment to increase the number of fibre connections would need to rise substantially to bridge the gap between Austria and the rest of the EU.



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

Broadband prices in Austria are below the EU average. Austria's price index in all baskets is 75, against 64 in the EU as a whole. Fixed broadband prices are below the EU average, with a price index of 72 (against 63). While prices for lower speeds are lower than average EU prices, the difference is less for broadband subscriptions to higher speeds. However, higher fixed broadband speeds are cheaper than the EU average in tariffs combined with mobile services. Mobile prices are lower, as the price index of 79 (against an EU average of 68) shows. In particular, tariffs with higher data volumes are lower than the EU average prices. This could account for the high take-up of mobile in relation to fixed broadband subscriptions. The converged baskets are below the EU average (price index 75, against 60).

1. Progress towards a Gigabit Society[43]

'Broadband Austria 2020', Austria's national broadband plan, aims to achieve 99% coverage of at least 100 Mbps downstream broadband for households by 2020. Although Austria has yet to achieve this goal, it seems to be making good progress, in particular with increasing NGA coverage. This is despite the strong trend towards the replacement of fixed connections by mobile ones, a result of fierce price-driven competition in the mobile market, both for voice and for broadband. As for the Gigabit Society aim of take-up of at least 50% of 100 Mbps speeds, Austria has some way to go to achieve this goal.

Since 2015, €1 billion has been allocated under 'Broadband Austria 2020'; under this initiative, about 400 beneficiaries receive funding in over 1,200 projects. According to the Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology, these projects will directly benefit over one million residents in 1,260 municipalities. The Ministry also estimates that over 18,200 PoP ('point of presence') locations in more than 1,760 municipalities will be built or upgraded with fibre connections. To address Austria's connectivity shortages in the take-up of fibre connections, the BBA2020_Backhaul project (part of the national broadband plan) aims to significantly reduce the cost of establishing fibre connections, especially where this would bring socioeconomic benefits, such as connecting educational institutions and small and medium-sized businesses.

Looking beyond 2020, the Austrian broadband strategy for 2030 is designed to achieve nationwide coverage with Gigabit-capable broadband services (fixed and mobile) by the end of 2030. This is to include nationwide coverage of 5G by the end of 2025. There is also an aim to provide 5G coverage along all main traffic routes by the end of 2023.[44] In addition, Austria aims to launch 5G networks in the capitals of all its federal states by the end of 2020. As regards 5G network deployment, all three mobile network operators (MNOs) have already launched commercial 5G offers in the 3.4-3.8 MHz frequency band, in selected locations.

The Austrian government is working on the development of a new funding model for broadband rollout, with the funds expected to come from the proceeds of the past and upcoming 5G spectrum auctions. As regards private investment, the incumbent operator is investing primarily in FTTC/B, with some FTTH (mainly in new-build areas). There are several small private operators investing in FTTH, but their coverage is very limited. Allianz Capital Partner (an insurance company) announced in 2019 that it was planning to invest €300 million of private funds in the federal state of Niederösterreich (Lower Austria) (together with the state-owned company NöGIG) to roll out fibre to 100,000 households by 2022. This investment is aimed primarily at small communities with under 5,000 inhabitants.

Some operators have reported that high 'rights-of-way' fees for publicly owned land are holding back the deployment of broadband networks. Operators have complained that public owners in some parts of Austria, particularly in the capital, enjoy a dominant market position and impose disproportionate rental fees. They consider this a violation of the ordinance issued by the Austrian

[43] 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.

[44] https://www.commsupdate.com/articles/2019/08/09/austria-unveils-2030-broadband-strategy/

Regulatory Authority for Broadcasting and Telecommunication (RTR) in October 2019, which sets standard rates of compensation for the reduction in value of different sorts of infrastructure.[45]

2. Market developments

In the retail market for residential broadband access (including DSL, cable, FTTH and mobile broadband), the incumbent operator competes mainly with the two other fixed-mobile integrated operators, Magenta (formerly T-Mobile, which acquired the cable network operator UPC in 2018) and Hutchison 3 Austria (H3A, which took over the unbundling-based operator Tele2 in 2017). The three largest operators together hold 85% of market share (Q2/19), with the incumbent A1 holding a market share of 45-50%.

In the retail market for business broadband access, which only includes DSL and FTTH, the incumbent enjoys a market share of >70%. The main competitors are Magenta and H3A, with market shares below 10%.

There are some wholesale-only operators in Lower Austria. The infrastructure is built by the state-owned company NöGIG, usually with State aid, and operated by an open-access provider. However, the coverage is still quite limited, and the market effects are only local. The federal state of Tirol has several community-built networks, also usually built with State aid, that offer fibre unbundling. However, the communities themselves are not active on the retail market.

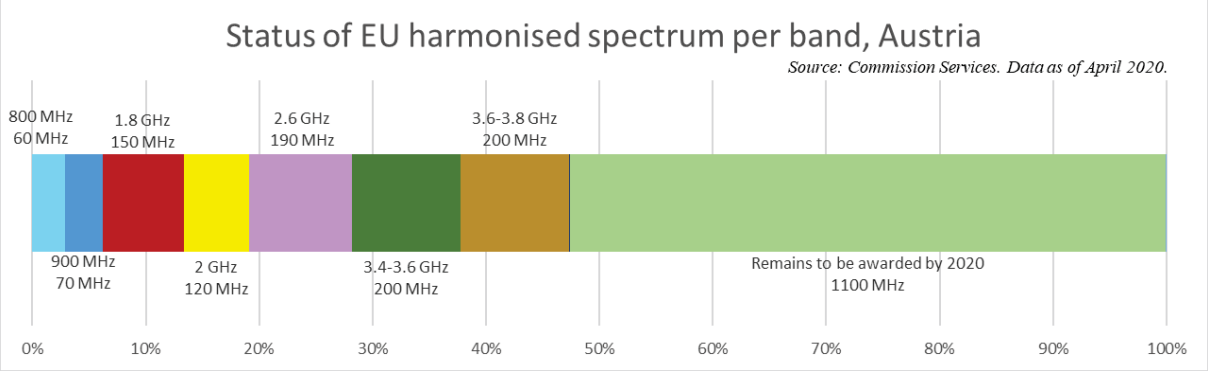
Competition in voice access markets including smartphone tariffs (with included minutes, text messages and data) is strong, particularly among mobile operators. Mobile services constitute the key driver of competition in Austrian telecommunications. There is evidence that mobile services are replacing fixed ones in the voice minutes segment (residential and non-residential to all destinations), as well as in voice access for residential users and residential broadband.

3. Regulatory developments

The timetable for incorporating the European Electronic Communications Code (EECC) into national law seems quite tight, and it will be challenging to meet. The Ministry for of Climate Action, Environment, Energy, Mobility, Innovation and Technology was expected to finalise an internal draft of a new Telecommunications Act by the beginning of May 2020. The draft will be followed by inter-ministerial and informal stakeholder consultations, with a formal public consultation to run from June to August 2020. The Council of Ministers should then issue a decision to put the proposal before Parliament, which is expected to finalise the Act by December 2020.

Following a reshuffle of responsibilities among government departments, the telecommunications portfolio was reassigned to the Ministry for Agriculture, Regions and Tourism as of February 2020.

3.1 Spectrum assignment



[45] Wertminderungs-Richtsätze-Verordnung 2019 - WR-V 2019; https://www.rtr.at/en/tk/WR-V2019

Austria has assigned 47% of the total 2,090 MHz spectrum harmonised at EU level for wireless broadband. Of this spectrum, the 3.4-3.8 GHz band was auctioned on 5 March 2019 on technical conditions suitable for 5G. This enabled the three MNOs to acquire at least 100 MHz contiguous nationwide spectrum facilitating the provision of 5G services at reasonable prices. Four regional operators (Salzburg AG, Holding Graz, Liwest and Mass Response) acquired spectrum of up to 80 MHz each.

The auction of the 700 MHz, 1.5 and 2.1 GHz, for 5G use, was expected to take place in the first half of 2020, but owing to the Covid-19 pandemic the process has been delayed to the second half of 2020. The authorities do not foresee any problems with the migration of existing users from the 700 MHz band by the deadline of 30 June 2020.

The Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology and RTR held a joint consultation on the 26 GHz band. They concluded that there was a lack of demand for the band and that it would be used only if the other bands (700 MHz, 1.5 and 3.4-3.8 GHz) are heavily utilised. The authorities have therefore decided to award that spectrum after 2020.

3.2 Regulated access (both asymmetric and symmetric)

The only retail market which is still regulated is the market for what are known as 'plain old telephone services' (POTS) and for integrated services digital network (ISDN) access for business users.

The Telecom-Control-Commission (TKK) launched new market analysis procedures of two markets in March 2020: 3a (wholesale local access provided at a fixed location) and 3b (wholesale central access provided at a fixed location for mass-market products).

The incumbent, A1, points out that the market review should carefully reflect significant differences of competition in different areas. Moreover, A1 argues that it no longer holds a position of SMP in the market and should be released from the SMP regulation in the wholesale local and central access market, especially as regards fixed-to-mobile substitution for broadband.

4. End-user matters

a. Complaints

RTR is the dispute resolution body for consumers. RTR reported 1,900 consumer complaints in 2019, against 1,765 in 2018. The data for 2019 provided by the Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology showed that the outcome in 77% of cases was satisfactory to both parties. Contractual issues were the main reason for complaints in 2019, followed by roaming, particularly in non-EU/EEA-countries.

b. Open Internet

Regarding zero-rated services, as of November 2019, 23 different tariffs including zero-rating offers were marketed by four mobile service providers (A1, Kurier mobil, Krone mobile and H3A). The incumbent, A1, has been offering its zero-rated product since November 2017. The share of A1 subscribers with zero-rating tariffs amounts to less than 10% and A1 has less than a 50% market share in the private customer segment.

In June 2016, RTR published an international comparative econometric study examining the effects of zero-rating on prices, and included data volumes. The study does not identify any general effects on mobile prices or tariff characteristics resulting from zero-rating offers. RTR therefore concludes that zero-rating offers have not curtailed end users' choice to an extent that would raise concerns under the open internet rules set out in Regulation (EU) 2015/2120.

In 2019, RTR initiated 11 new requests for information proceedings a of technical and commercial practices of internet service providers in the context of their internet access products. The main issues were availability of public IPv4 addresses and ISP-forced disconnects.

c. Roaming

Three MVNOs currently enjoy sustainability derogations in Austria under the Roaming Regulation (EU) 531/2012. These are MTEL[46] (until June 2020), Mass Response[47] (until October 2020) and HOT Telekom[48] (until December 2020). The MVNOs justified their sustainability requests by citing significant roaming costs driven up by high wholesale rates. According to RTR, the surcharges apply to a small portion of traffic (voice, text message and data).

d. Emergency communications – 112

The Austrian police are in the process of deploying a new more centralised public safety answering point (PSAP) system that should address the failure to make information about caller location instantly available to the PSAP. Disabled end-users could access emergency services by sending a text message to a long number free of charge. A legal procedure to mandate interoperability was initiated at the end of 2019 to address this issue. In addition, the Ministry of the Interior is working on an accessible app-based emergency communication solution.

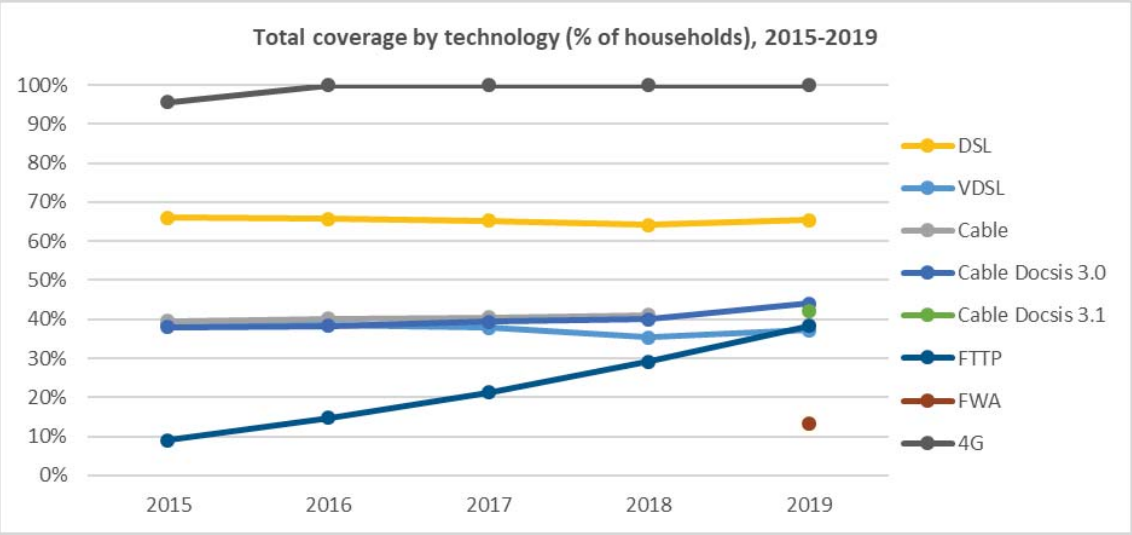
5. Conclusion

Austria has strong ambitions to become a pioneer in the roll-out of 5G, and consumers already have access to limited commercial 5G offers. Although the country has a very high level of mobile coverage, it scores below the EU average for fixed very high-speed broadband coverage and take-up. Public policy initiatives, as well as addressing rights-of-way matters, may therefore play an important role in further improving connectivity in Austria. The 2030 broadband strategy includes ambitious targets to address the high costs of fibre rollout and to incentivise the take-up of higher bandwidths. Timely transposition of the EECC is of the utmost importance if citizens and businesses are to benefit from the law. It will also avoid creating uncertainty as to what rules apply, which would adversely affect the operation of the EU's internal market.

[46] https://www.rtr.at/de/tk/S29_18_Bescheid110618/110618_BescheidMTEL.pdf
[47] https://www.rtr.at/de/tk/S32_18_Bescheid_170918/S_32_18_Bescheid_Mass_Response_Web.pdf
[48] https://www.rtr.at/de/tk/S_20_19/S_20_19_Bescheid_HoT_181219.pdf

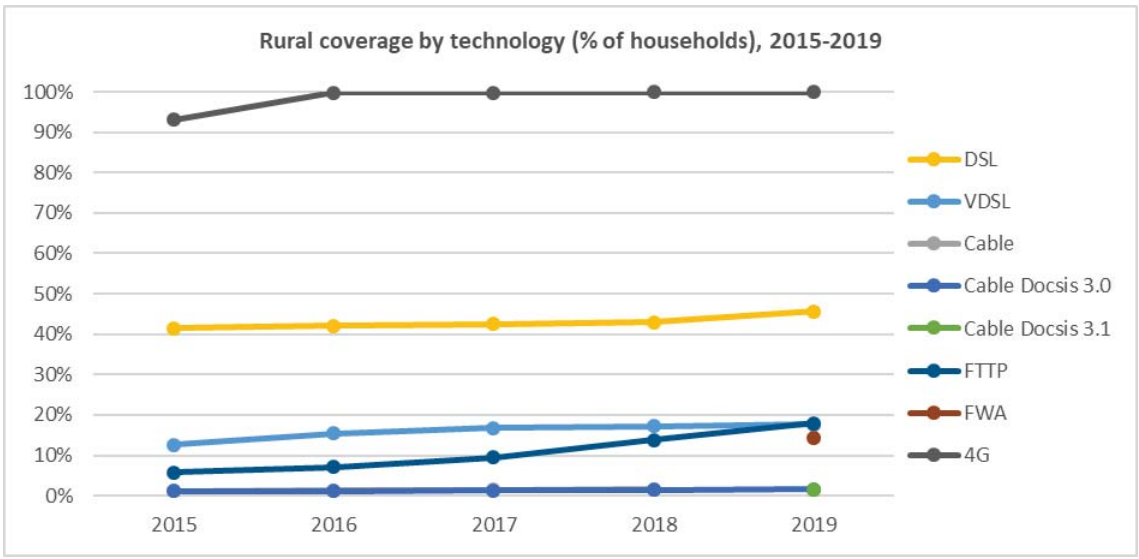
Poland

Despite its low ranking for fast broadband NGA coverage (25th among all EU Member States), Poland has been steadily progressing in its deployment of VHC networks, reaching a coverage of 60% of households (against 44% at EU level). More specifically, in 2019, its FTTP coverage totalled 38% of households, above the EU average of 34%. Poland's DOCSIS 3.1 coverage of 42% of households is also above the EU average of 19%. In rural areas of Poland, DOCSIS 3.1 coverage of 1% of households

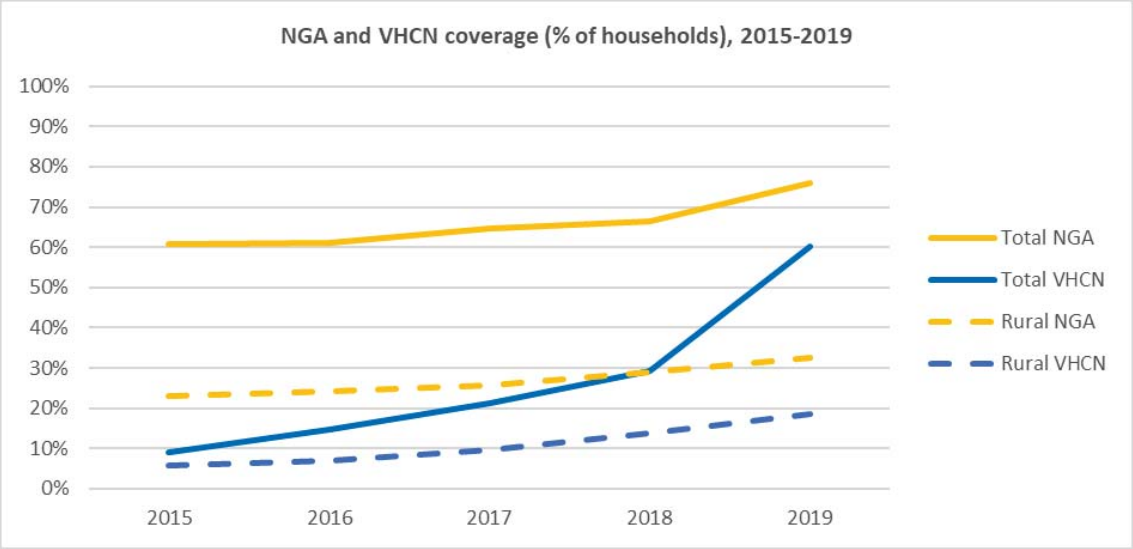


and VDSL coverage of 18% are below the EU average for rural areas of 4% and 42% respectively.

Source IHS and Point Topic, Broadband coverage in Europe studies

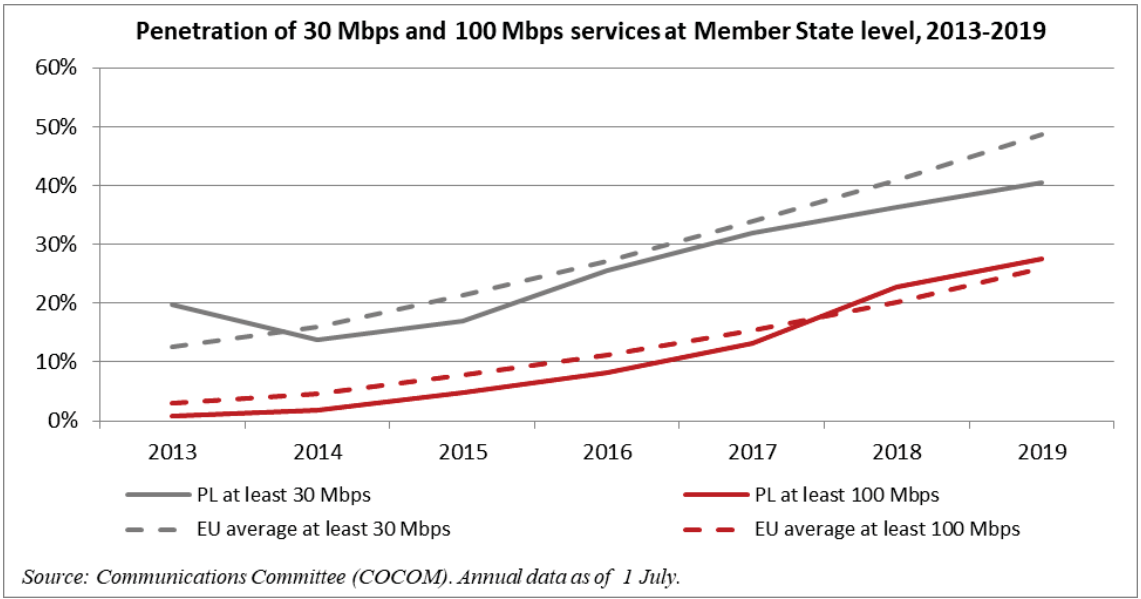


Source IHS and Point Topic, Broadband coverage in Europe studies

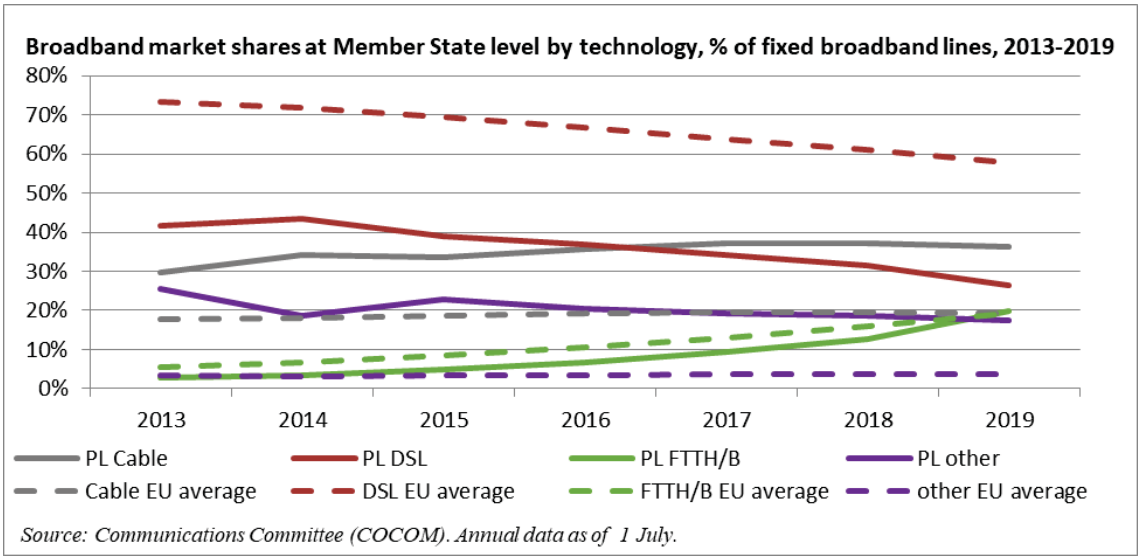


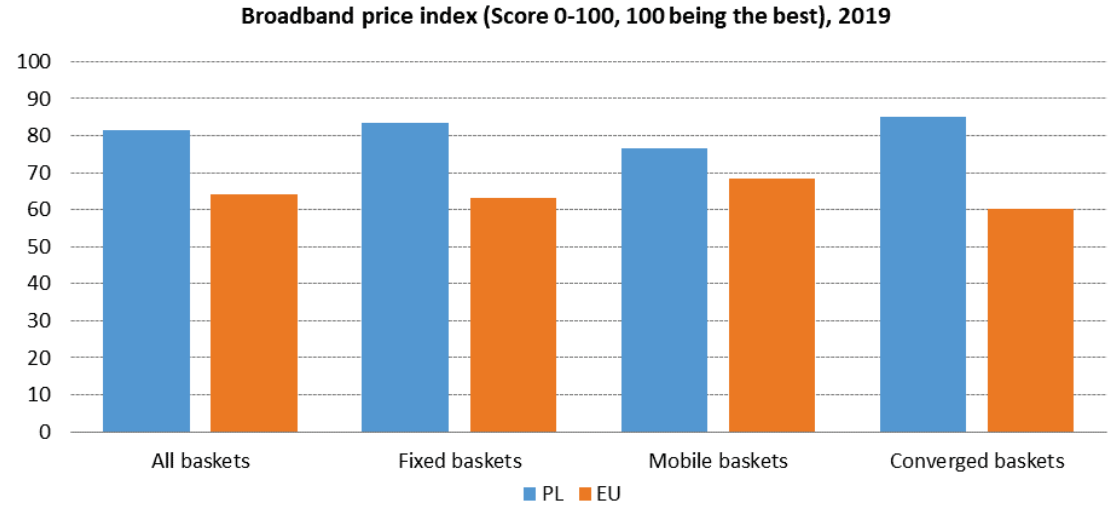
Source IHS and Point Topic, Broadband coverage in Europe studies

Poland performs well when it comes to broadband penetration of at least 100 Mbps (27.6%), exceeding the EU average (25.9%) by 1.7 percentage points. Performance is less satisfactory when it comes to broadband penetration of 30 Mbps – 40.5% compared with the EU average of 48.7%. Both indicators, however, have shown a steadily increasing trend over the last 5 years. For mobile broadband take-up, Poland ranks first in the EU, with 176 subscriptions per 100 people.



Poland remains close to the EU average for its share of FTTH/B (19.9%) and has shown a steady increase in the use of this technology since 2013. The share of cable connections, however, remains well above the EU average, at 36.2% without any sign of decline. The share of DSL has been decreasing markedly since 2014 and now stands at 26.4%, well below the EU average of 57.8%.





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

Retail prices in Poland are low. Poland scores second in the EU in the converged baskets segment - the country achieved a score of 85 compared to the EU average of 60. Prices are equally competitive in the fixed baskets segment (index of 84 compared to the EU average of 63). The prices in the mobile baskets segment are comparatively closer to the EU average but still lower – Poland scores 77 compared to the EU average of 68. The low prices in this segment could justify Poland's ranking as the leading market in the EU for mobile broadband take-up.

1. Progress towards a Gigabit Society[49]

Poland still faces difficulties in achieving the 2020 connectivity goals. According to data provided by the Polish authorities, the average penetration of residential apartments with fixed-line internet coverage of at least 30 Mbps reached 71.7% at the end of 2018, and the use of internet access services with the capacity of at least 100 Mbps reached 19.3%. In order to address the difficulties

[49] 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.

with broadband roll-out, a number of amendments to the so-called '*Megaustawa'*[50] ('Mega-law') were adopted in 2019. These amendments include provisions creating a new Broadband Fund (budget of PLN 140 million, or approximately €33 million) to provide parallel or complementary support, from 2021, for actions financed under the country's operational programme Digital Poland (POPC)[51]. Following the successful roll-out of POPC-funded projects, the Ministry of Digital Affairs would like to extend POPC beyond 2020 (POPC 2). The Ministry expects a number of projects to be implemented in 2020 (for contracts signed in 2017). Other amendments to the *Megaustawa* address the bottlenecks that have been preventing application of the Broadband Cost Reduction Directive (BB CRD). Those amendments include: better mapping of the existing infrastructure (including fibre and other cable networks; data will have to be provided twice a year starting in 2022), facilitation of permits (significantly lower fees applicable to all local authorities) and amended rules for access to buildings. The Ministry also proposed a number of amendments to facilitate investments (e.g. through investment contracts signed with the President of UKE or with local authorities) which were also adopted.

In 2020, the national regulator, UKE, plans to issue decisions to energy operators, since access to energy poles is considered one of the bottlenecks for investments. However, UKE is required to issue such decisions in cooperation with the energy regulator, URE. Legislative amendments to facilitate UKE's work (through consultation with URE) did not pass the legislative process in 2019 despite the Ministry's efforts.

The Polish government adopted an updated national broadband plan on 10 March 2020[52]. The objectives of the new national broadband strategy are aligned with those of the Gigabit Society. Poland aims to free and assign spectrum in the 700 MHz band by 30 June 2022; this deadline stems from long-lasting negotiations with non-EU neighbours and conceptual work on the possibility of developing one nationwide 5G network in the 700 MHz band. 13 5G tests are ongoing, in addition to the 8 that have already been completed.

2. Market developments

The Polish market observed an increase in both broadband and mobile prices in 2019. In the case of mobile prices, almost all MNOs increased prices around the same time (around PLN 5 PLN/€1.17 per subscription, in the *'more-for-more'* model). Considering that the average revenue per user is low in the Polish market, this change did not seem to surprise the regulator and it was not analysed by the competition authority, UOKiK. The market is experiencing further convergence of the electronic communications, media and information technology sectors. After acquiring Netia in 2018, Grupa Cyfrowy Polsat and Discovery announced the creation of a joint OTT TV platform, which still needs UOKiK's approval. Meanwhile, cable operators reported that earlier in 2019 content providers (Grupa Cyfrowy Polsat and Discovery) had significantly increased wholesale prices for access to programming, leaving little choice over the composition of programme packages and making the offers of cable operators less attractive. This issue was reported to UOKiK, which has not reached any conclusion yet. Vectra is still in the process of acquiring Multimedia (ongoing since September

[50] Ustawa z dnia 7 maja 2010 r. o wspieraniu rozwoju usług i sieci telekomunikacyjnych, Dz.U. 2010 nr 106 poz. 675 (Act of 7 May 2010 on the support of the development of telecommunications services and networks, O.J. 2010 No 106, 675).

[51] The programme is financed through the European Regional Development Fund (€2.17 billion) as well as national funds (€394.4 million).

[52] The plan was adopted by the Council of Ministers on 10 March 2020.

2018)[53]. In a move to expand their portfolios, mobile operators are showing a growing interest in fibre networks, as evidenced by acquisitions, the establishment of associated enterprises and their cooperation with wholesale operators. In one of the biggest acquisitions, P4 (mobile operator) acquired 100% of the 3S Group, managing almost 4,000 km of fibre-optic lines (mostly in the south of Poland).

Overall, the fixed telephony market continued to observe a downward trend (16% fall in value between the end of 2017 and the end of 2018), as did the business segment, whose revenues fell by 7.4%. In line with this trend, the total duration of voice calls decreased significantly (by almost 24% between the end of 2017 and the end of 2018). In the mobile market, there was a significant increase in the number of operators providing mobile telephony services (85 at the end of 2018 compared to 31 at the end of 2017), mainly because of a change in the model of cooperation with MNOs and intermediaries. The volume of voice calls rose by 9% between 2017 and 2018, with a 32% increase in the duration of voice calls made from abroad (roam-like-at-home effect). The value of mobile telephony services fell by 8% between 2017 and 2018, but in 2019 the market noted an increase in prices and decreasing RLAH-related imbalances, which will affect this trend. The fastest changes are visible in data services, up 47% between 2017 and 2018. In 2018 the most popular bundles remained double play (mobile telephony + mobile internet and fixed internet + TV). However, there was a decrease in these bundles, while the demand increased for triple play offers (mobile telephony + mobile internet + TV). The value of the bundled services increased by 56% between 2017 and 2018. Concerning substitution trends, according to the consumer survey UKE conducted in 2019, Polish consumers still prefer 'traditional' services, with over 51% not using any OTT services. On the other hand, UKE notes a high substitution of mobile and fixed internet access.

3. Regulatory developments

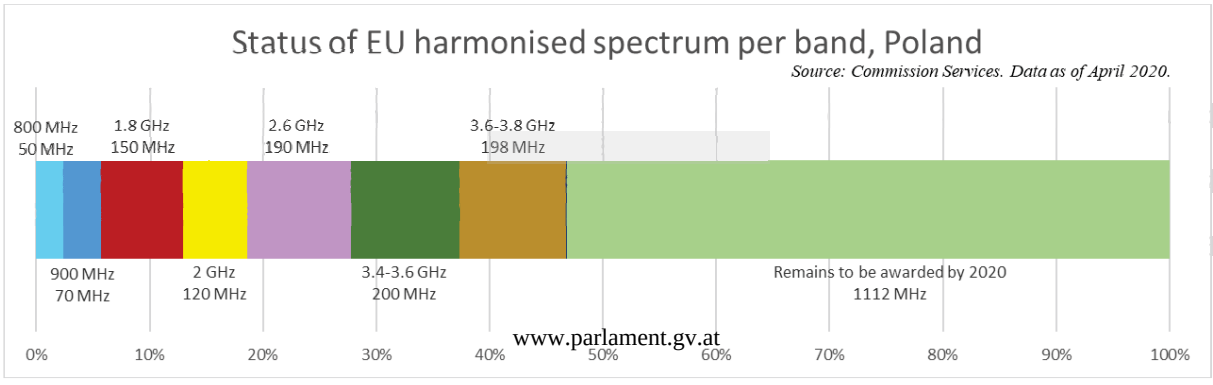
In 2019 Poland adopted new rules for spectrum auctions. New secondary legislation on the limits of electromagnetic fields (EMF) was adopted in December 2019, aligning these limits with the 1999 Council Recommendation[54]. The revised EMF monitoring methodology was introduced on 17 February 2020. The Ministry of Digital Affairs is preparing the transposition of the European Electronic Communications Code (EECC). A completely new law is being drafted, with possible changes to the current Telecommunications Act going beyond the EECC transposition. The draft is expected to be submitted for public consultation in June 2020.

3.1 Spectrum assignment

At the end of 2018, Sferia's spectrum licence in the 800 MHz band expired, and in March 2019, the operator withdrew its request for prolongation following a disagreement with UKE over the prolongation fee. UKE intends to assign this part of the spectrum in 2021.

In view of the 5G roll-out, UKE launched the 3.6 GHz band auction on 6 March 2020; however, the auction was subsequently suspended on 16 April 2020 in light of the Covid-19 pandemic. The auction had since been annulled by virtue of the so-called "Anti-covid shield 3.0"[55], which entered into force on 16 May 2020. The new auction had not yet been announced at the time of drafting the report.

In 2019, a technical agreement was finally reached with Russia concerning spectrum utilisation in the



470 – 694 MHz band. This makes it possible to rearrange nationwide DVB-T networks in Poland to free spectrum in the 700 MHz band by mid-2022 for IMT purposes, as envisaged in the derogation notification to the European Commission sent in 2018. However, until now Russia, Belarus and Ukraine have not indicated the date for releasing the 700 MHz band from TV transmission. This is the prerequisite before assigning the 700 MHz spectrum band for IMT purposes in Poland. As for the assignment of this band, Poland is exploring the idea of establishing one national 5G network in the 700 MHz band. All MNOs, a state-owned company Exatel and the Polish Development Fund signed a Memorandum of Understanding to reflect on the feasibility of having such a network, which raises a number of legal and practical questions.

3.2 Regulated access

As regards asymmetric access, in October 2019, UKE issued regulatory decisions for the market of wholesale local access provided at a fixed location (market 3a in the 2014 Recommendation on relevant markets[56]) and the market of wholesale central access provided at a fixed location for mass-market products (market 3b/2014 in the 2014 Recommendation on relevant markets), partially deregulating Orange in some municipalities. After a very significant delay in the periodic review of market 1 in the 2014 Recommendation on relevant markets (i.e. market for voice call termination in fixed networks), UKE issued regulatory decisions to 191 operators in December 2019, leaving the high levels of FTRs unchanged[57]. The review of the market of wholesale high-quality access provided at a fixed location (market 4 in the 2014 Recommendation on relevant markets) is planned for 2020. Concerning market 2 (wholesale voice call termination on individual mobile networks), there are delays in the market review, but no review is planned in view of the upcoming Delegated Act on Eurorates. UKE's historic MTR decisions, which have been annulled by the court, are also reason for market players to experience significant uncertainty, giving grounds for multi-million euro claims between operators (estimated by the industry to amount to at least PLN 0.5 billion/€120 million). UKE is also considering looking into the market for transit (related to fixed and mobile termination rates). The market of wholesale broadcasting transmission services (market 18 in the 2003 Recommendation on relevant markets[58]) is still regulated[59].

Concerning symmetric access, UKE issued regulatory decisions on access to in-house cabling, applicable to the six biggest cable operators and to Orange Polska, which triggered complaints at national and European level. In procedural terms, UKE is currently revising the decisions, following appeals. The 2018 decisions on access to ducts with respect to cable operators and Orange have already been challenged, with three decisions being suspended (Orange requested annulment of the suspension; Vectra and Netia did not request it, while the multimedia decision was revised by the court and has not been suspended). Therefore, there is currently asymmetry, with some operators providing regulated access and others not.

4. End-user matters

[56] 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).

[57] See case PL/2019/2156 closed by Recommendation in Phase II.

[58] 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 , 08.05.2003 p. 45.

[59] The last market review was notified to the European Commission on 17 January 2018.

a. Complaints

The number of consumer complaints significantly dropped over the past year (alternative dispute resolution requests dropped from 1,400 in 2018 to less than 950 in 2019 and interventions from 3,200 in 2018 to 2,200 in 2019). The competition authority noted a similar trend.

b. Roaming

In 2019, for the first time, UKE refused to allow one of the 4 MNOs (Polkomtel) to levy roaming surcharges. In early 2020, the application of P4 was also rejected. The operators claim that UKE's approach to the applications for a derogation has changed, in particular as regards the methodology used to calculate the net loss. However, UKE considers that roaming-related imbalances are decreasing, and the first negative decisions reflect this trend.

c. Emergency communications – 112

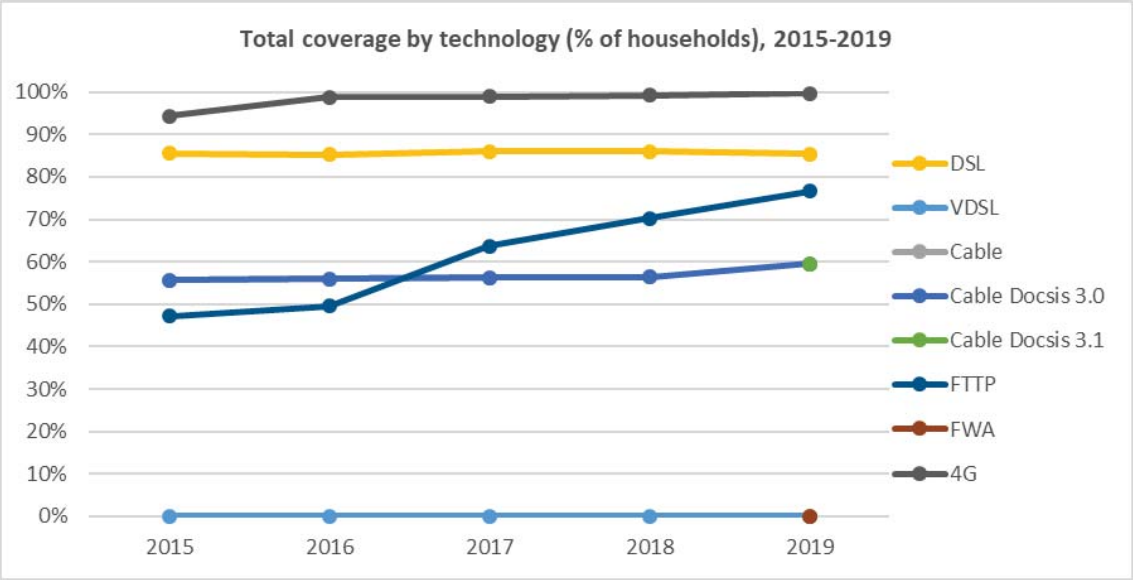
In 2019 Poland continued preparations for the Alarm 112 application, which was fully deployed in January 2020. The application ensures accessibility to emergency services for all users, but its main purpose is to provide effective access for people with disabilities. The application allows reporting an incident using pictograms, directly through a call as well as through a two-way communication via SMS. The Alarm 112 application is available for Android and iOS operating systems.

5. Conclusion

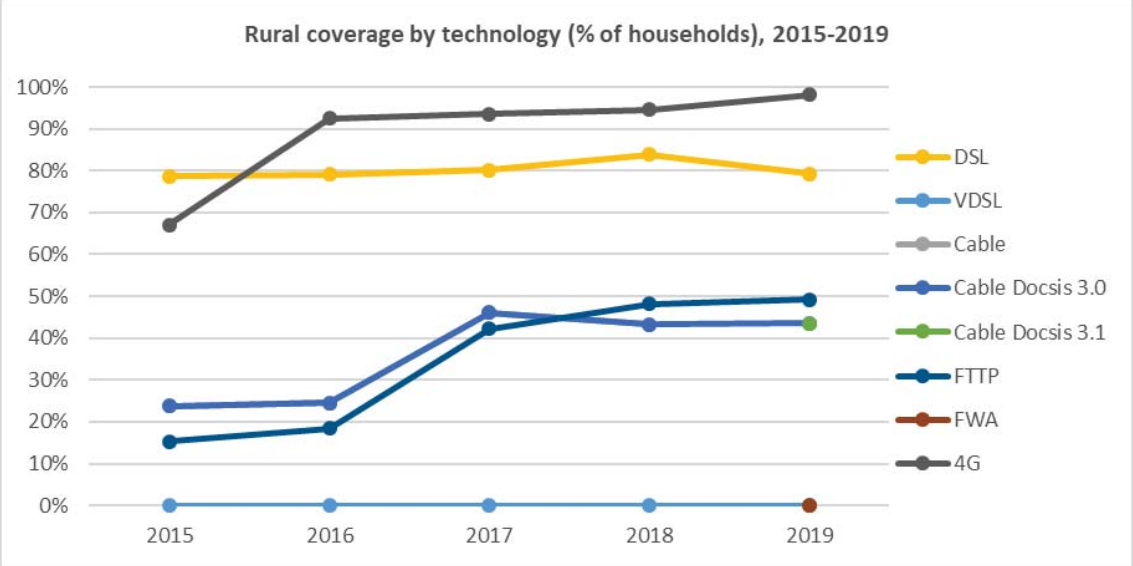
Overall, Poland adopted a number of regulatory measures in 2019 to facilitate broadband roll-out and to prepare for spectrum assignment in view of deploying 5G networks. Nevertheless, 5G deployment may be delayed in non-urban areas, mainly due to postponed assignment of spectrum in the 700 MHz band and the overall uncertain future of its use. Poland continues to face difficulties in achieving the 2020 EU objectives despite the efforts it has made. The Polish market would benefit from more regulatory certainty, especially for 5G planning, ensuring timely market reviews and resolving long-standing issues related to a number of regulatory decisions.

Portugal

Portugal has very good VHCN broadband coverage of 83% (against an EU average of 44%) and good fast broadband (NGA) coverage (83%), which is close to the EU average. FTTP continues to improve at the same pace as in previous years. Total FTTP coverage increased by 7 percentage points (pps), from 70% in 2018 to 77% in 2019, well above the EU average of 34%. Rural FTTP coverage also increased, from 48% to 49%, also well above the EU average (19%). Aggregate 4G coverage[60] has reached 100% (98% in rural areas).

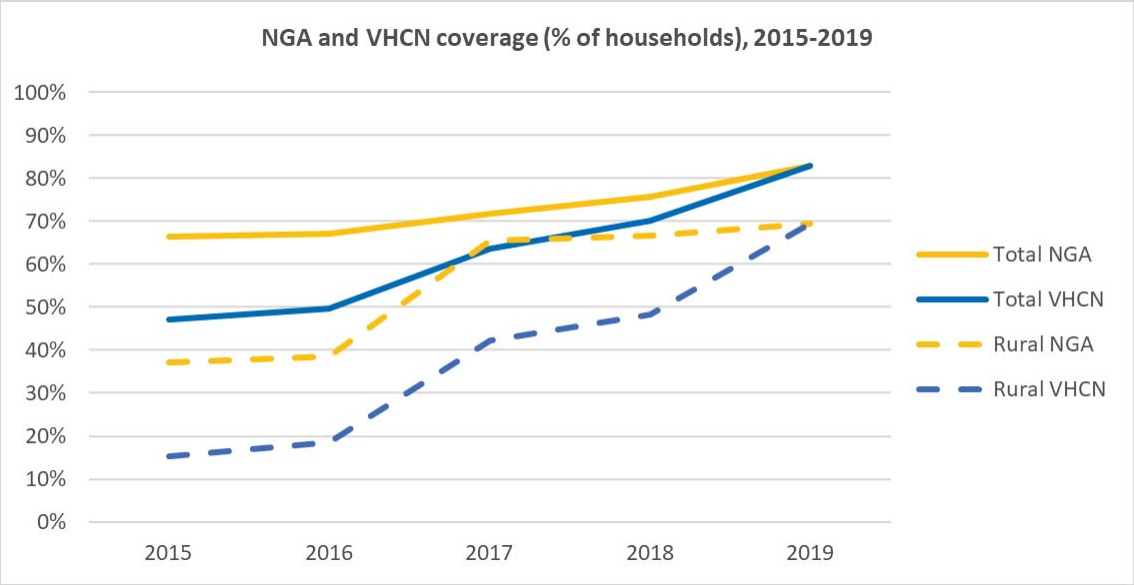


Source: IHS and Point Topic, Broadband coverage in Europe studies



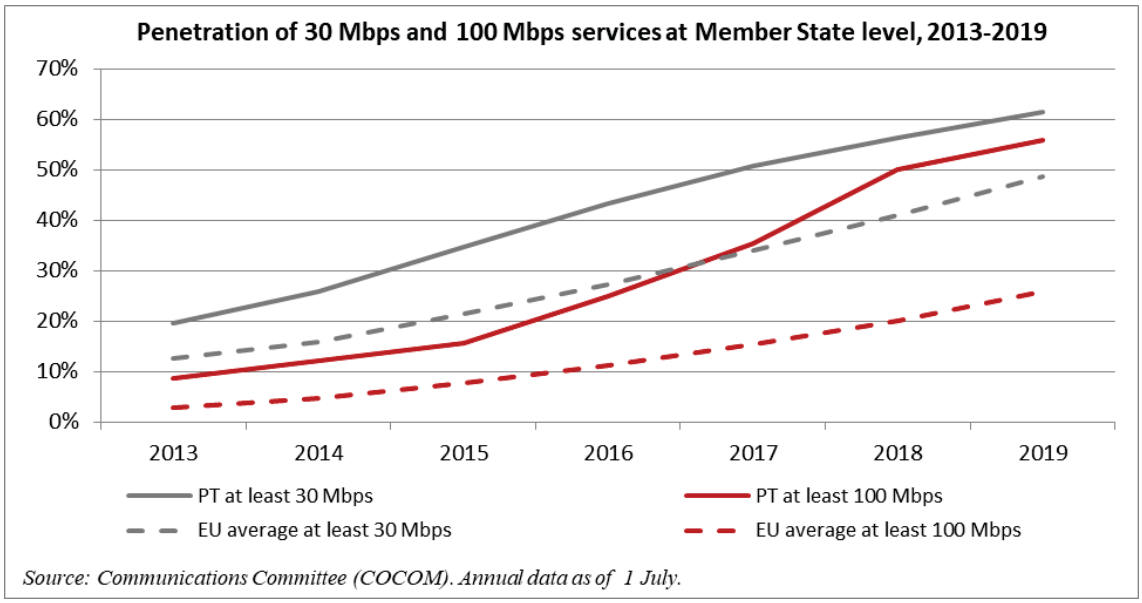
Source: IHS and Point Topic, Broadband coverage in Europe studies

[60] 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.



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

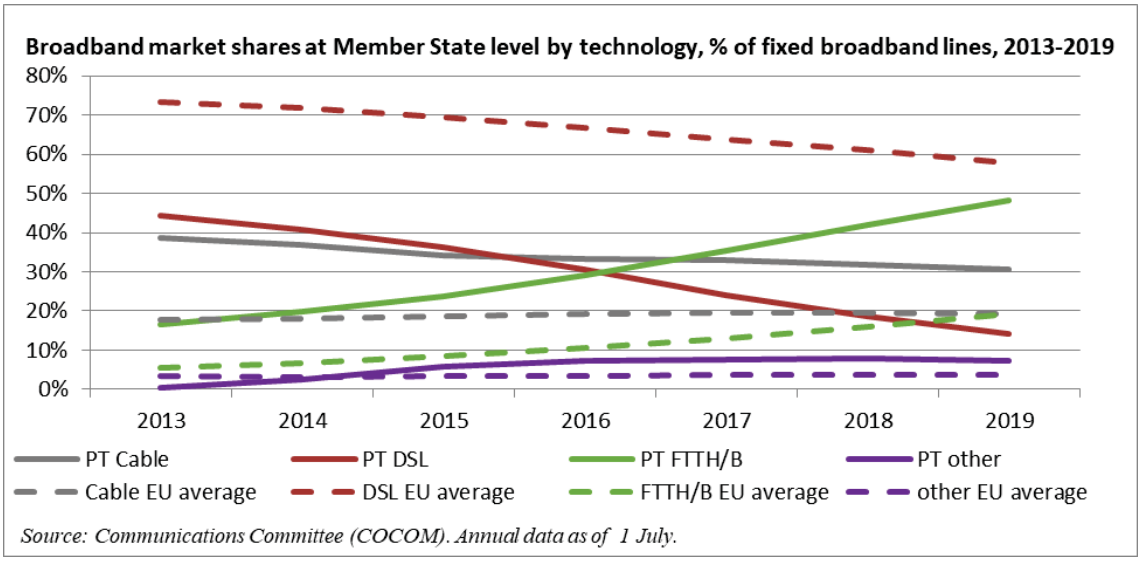
Take-up of broadband of at least 30 Mbps increased by 5 pps (from 56.4% in 2018 to 61.4%, above the EU average of 48.7%, in 2019). Over the same period, take-up of broadband of at least 100 Mbps increased by 6 pps (from 50% in 2018 to 56%, well above the EU average of 26%, in 2019). According to information from ANACOM (*Autoridade Nacional de Comunicações*), the number of high capacity lines increased by 12% between 2018 and 2019, and by the end of 2019 71.6% of internet lines had a theoretical download speed of 100 Mbps or higher.



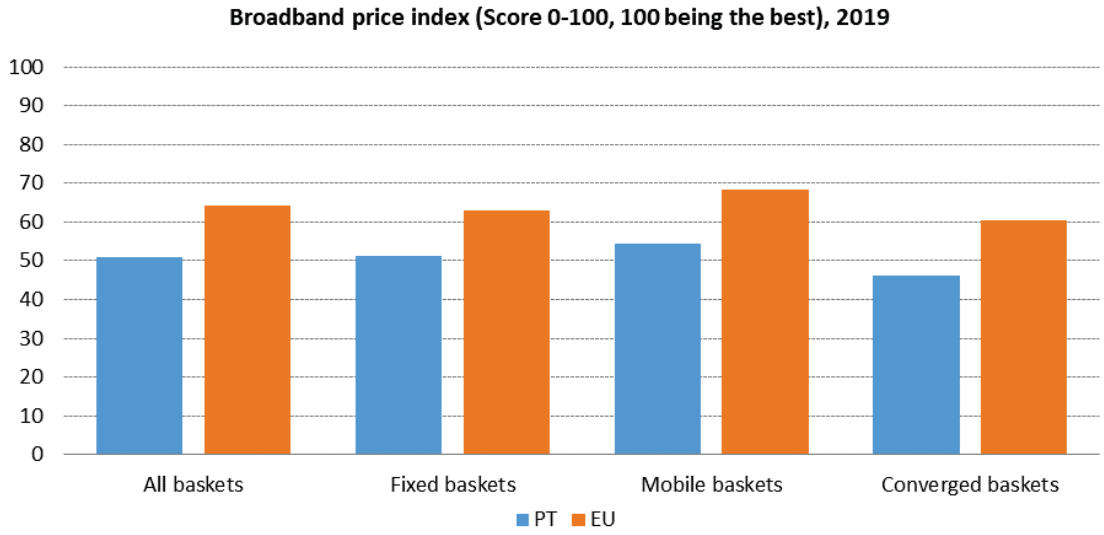
The share of cable in total broadband access continued to fall (from 31.8% to 30.6%), as did that of DSL (from 18.5% to 14.1%). In parallel, there was an upswing in fibre to the home/building (FTTH/B) technology. This saw a strong upward trend (from 41.9% to 48.1%) and has been the primary means of accessing broadband since 2017.

ANACOM reported that, at the end of Q2 2019, 86% of households subscribed to pay-TV services; 44% of subscribers had access via FTTH networks, which replaced cable TV as the main support network in early 2018. In fact, most of the growth in pay-TV comes from FTTH networks, and even the largest cable TV operator is now deploying FTTH. The number of FTTH TV subscribers has grown

by 20% in the last 12 months. Conversely, cable TV, satellite and DSL have decreasing shares of pay-TV subscribers of 33%, 12% and 10%, respectively.



Convergent bundles prices, the most representative method used by operators to sell electronic communications services in Portugal, are 14 pps higher than the EU average. However, there seems to be no correlation between prices and take-up. While prices in Portugal are higher than the EU average, ranking 24 in DESI, Portugal has high take-up of broadband of at least 30 Mbps, and especially of broadband of at least 100 Mbps. Mobile prices are also 13 pps above the EU average, and mobile broadband take-up in Portugal is significantly lower than the EU average.



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

1. Progress towards a Gigabit Society[61]

Public investment and competition between private operators are the two factors driving the expansion of broadband in Portugal. The authorities continue to monitor projects in rural areas that benefited from state aid in the past. In April 2019, the Portuguese Government decided to reduce

[61] 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.

the wholesale tariffs for access to Fibroglobal's network[62] (managing fibre networks in rural areas in the centre of the country and the Azores, built with public support), extend Fibroglobal's bitstream offer to 200 Mbps, 400 Mbps or 1 Gbps speeds, and introduce a multicast functionality for operators to deploy their own IPTV. Despite these measures, there is still no interest in accessing Fibroglobal's network, and MEO is the only provider to make extensive use of Fibroglobal's offer. The final decision on Fibroglobal's over-financing and the subsequent reimbursement of €3.1 million is still awaiting the Government's final approval[63].

For the next programming period, Portugal's priority is to replace the Atlantic submarine cable ring linking the mainland with Madeira and the Azores (CAM submarine cables), which is reaching the end of its life. In May 2019, a working group on the future of submarine cables for CAM communications, chaired by ANACOM, was set up. In December 2019, the working group submitted a report including 12 recommendations to the Government, to fit in with the start of operations for the new CAM ring within the deadline (2023) and lasting 25 years[64]. Portugal is also interested in linking Lisbon to Marseille through a new submarine cable. EllaLink, a submarine cable system connecting Fortaleza (Brazil) to Sines in Portugal, is expected to enter into service in Q1 2021.

A further challenge to network deployment is the fragmentation of the rules on the authorisations necessary to access infrastructure at municipal level and the lack of coordination between them. Moreover, operators are required to pay different types of taxes to local authorities for network deployment.

In January 2020, ANACOM launched a consultation on the draft regulation on the methodology to set remuneration for access to and use of infrastructure suitable for accommodating communications networks[65]. This regulation will not be applicable to municipalities[66]. However, it does not prevent municipalities from choosing to apply ANACOM's regulation. The comments received during the consultation procedure are now being analysed.

In July 2019, DST Telecom, NOS and Vodafone signed an agreement defining the main terms for the construction and use of a new fibre optic network to cover between 900,000 and 1.2 million homes. The new network will cover areas currently not covered by these operators. MEO continues to invest in FTTH, expanding its coverage in some parishes to reach 100% fibre optic coverage of households. These investments are in line with its strategy of covering the entire country with fibre optic network by 2020. Despite the investment plans announced by MEO, DST Telecom, NOS and Vodafone, there are still some white areas. Further use of public funds has not been ruled out.

Portugal is currently working on the spectrum award procedure to meet the target for uninterrupted 5G wireless broadband coverage in all urban areas, as well as on major roads and railways, by 2025. Several 5G trials are underway. The city of Aveiro has committed to becoming a 5G city by

[62] http://www.fibroglobal.com/

[63] In 2018 ANACOM reported that it had identified over-financing with regard to the first five years of Fibroglobal's contracts concerning the Central and Azores areas. The contracts stipulate that an over-financing assessment should take place at five-year intervals for the duration of the contract. Notwithstanding the periodic analyses, a final global assessment must take place once the contract reaches the end of its 20-year duration.

[64] https://www.anacom.pt/render.jsp?contentId=1499946&languageId=1

[65] https://www.anacom.pt/render.jsp?contentId=1499901&languageId=1

[66] For more detailed information, please see Article 19, n. 3, of the consolidated version of Decree-Law No 123/2009, of 21 May 2009, English version available at: https://www.anacom.pt/render.jsp?contentId=1418606&languageId=1

2020[67].The Spain-Portugal cross-border corridor connecting the cities of Vigo and Porto was launched in 2018 in the context of an EU project known as 5GMOBIX. The process continued during 2019, with first trials on roads planned for 2020.

In November 2019[68], ANACOM approved the new reference speeds[69] to meet the coverage obligations in the 800 MHz frequency band applicable to each operator in the 160 parishes.

2. Market developments

Másmóvil Group has recently acquired Cabonitel, the company that owns NOWO and ONI. It is the fourth largest fixed operator, with a subscribers' market share of 3-4%, which also operates a MVNO service (1.3% market share). In January 2019, CTT, Portugal's universal postal service provider, closed its MVNO operation, which had a subscribers' share of less than 1%.

ANACOM reported that at the end of Q2 2019, there were four operators with significant market shares in Portugal: MEO, the NOS group, Vodafone and the NOWO/Onitelecom group. Overall, MEO was the largest player in all market segments except pay-TV (in which it was the second-largest operator), with subscribers' shares of between 39.6% and 44.8%. MEO was also the largest multiple-play operator (40.4%). The NOS group was the largest pay-TV operator (40.5%), the second-largest fixed voice operator (34%) and fixed broadband operator (36%), and the third-largest mobile operator (25%). Vodafone is the second-largest mobile operator (30.3%) and the third-largest fixed operator, with subscribers' shares of between 15.8% and 19.7%. NOWO/Oni is the fourth-largest fixed operator, with subscribers' shares of 3-4%. In general, MEO and Vodafone have increased their fixed broadband and pay-TV subscribers' shares by leveraging their respective FTTH networks, while NOS has managed to increase its mobile market shares by cross-selling mobile services to its cable-TV subscribers.

ANACOM reported that in the first quarter of 2019, MEO overtook NOS (38.5%) to become the largest residential fixed broadband provider (38.8%). MEO has been increasing its overall fixed broadband market share since the beginning of 2018, benefiting from the expansion of its FTTH network in areas where it was not previously present. Its FTTH subscribers' share is now 55.4%, an increase of 5.1 pps in 2 years. MEO has also been upgrading its ADSL customer base.

According to ANACOM´s data, bundles grew by 45%, one of the lowest growth rates recorded to date. 4P/5P bundles, however, grew by 13.4% thanks to upgrades of existing clients, reaching 49.2% of the total number of multiple play subscribers. Operators also include in their bundles access to OTT video-streaming services. In 2019, all three MNOs started offering single-play and bundled mobile offers which include 'unlimited' mobile traffic for monthly rates ranging from €40 to €45 for single play offers, and €70-80 for 4P offers.

As ANACOM reported, fixed broadband traffic is growing at a decreasing rate of more than 20% a year, and average traffic per line reached 121 GB/month during the period in question. Fixed voice traffic is decreasing by 16.2% a year, despite the generous fixed traffic allowances included in bundles. However, active mobile service subscribers have remained stable at around 12 million. Nevertheless, the proportion of mobile subscriptions included in convergent bundles and, consequently, the proportion of post-paid subscriptions, continues to increase. Mobile broadband subscribers grew by 8.6%, reaching 64% of all active mobile subscriptions. In 2019, mobile voice

[67] http://5gobservatory.eu/wp-content/uploads/2019/10/90013-5G-Observatory-Quarterly-report-5_final.pdf

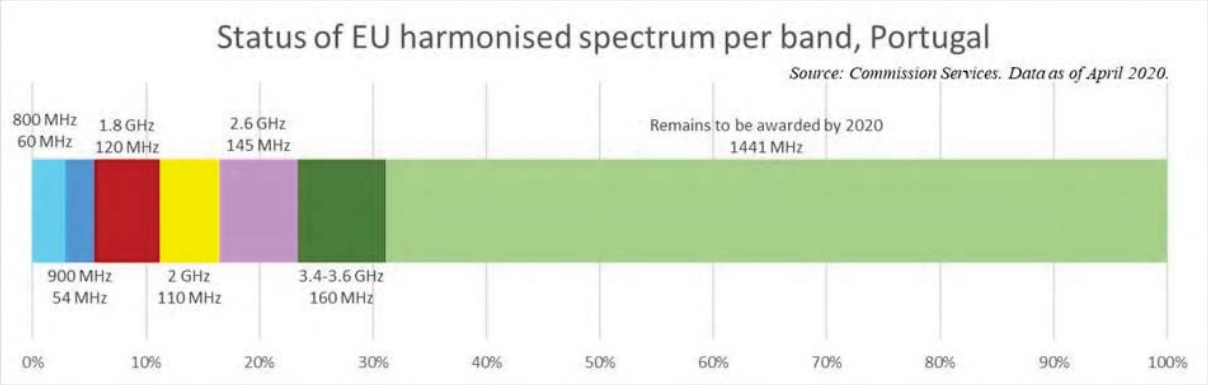
[68] https://www.anacom.pt/streaming/FinalDec21nov2019speed800MHz.pdf?contentId=1498080&field=ATTACHED_FILE

[69] The data speeds are now the following: 43.2 Mbps for MEO, 4 Mbps for NOS and 7.2 Mbps for Vodafone.

traffic increased by 1.9%. Mobile-fixed calls are only 5% of the total. In comparison with the previous year, mobile internet traffic grew by 36%.

3. Regulatory developments

3.1. Spectrum assignment



On 22 October 2019, ANACOM launched a public consultation[70] concerning the upcoming multi-band auction of the 700, 900, 1800, 2100, 2600 and 3600 MHz bands, then scheduled for April 2020[71], but now suspended on account of the COVID-19 crisis. A new public consultation on the specific terms of the auction was carried out in February 2020. One operator (Dense Air) holds the rights of use of 56-100 MHz[72] in the 3.4 - 3.8 GHz band until 2025. This may pose some difficulties in the reorganisation and/or the amount of spectrum of the band available before the deadline of December 2020. Additionally, ANACOM has authorised operators to use the 3.6 GHz band, as well as the 1800 MHz and 2.6 GHz bands, for trials. Its aim is to develop technical tests and scientific studies using various technologies (namely 5G, in conjunction with 4G), to test the various features and capabilities of these technologies, as well as refine their theoretical models, before moving on to the implementation of future 5G networks. The process of releasing the 700 MHz band is ongoing. On 4 October 2019[73], ANACOM issued a Decision approving the migration plan for digital terrestrial television (DTT)[74]. However, the migration process has been suspended on account of the COVID-19 crisis [75].

By its Decision of 27 March 2020, ANACOM approved an addendum to the national roadmap for the release of the 700 MHz band. In this context, the process of migrating the DTT network to the sub-700 MHz band has been suspended until suitable conditions are created to allow the resumption of the work concerned on all fronts, with a new timetable to be established at that time, in consultation with the operator of the DTT network (MEO) [76].

[70] https://www.anacom.pt/streaming/SPD_Atribuica700outrasFaixas22102019.pdf?contentId=1488322&field=ATTACHED_FILE

[71] https://www.anacom.pt/streaming/dec23122019Atribuiao700_outrasfaixas.pdf?contentId=1498324&field=ATTACHED_FILE

[72] 100 MGHz in the Lisbon area, 100 MGz in the Porto area, and another 56 MHz in the other regions (see ANACOM's Decision of 23 December 2019, https://www.anacom.pt/render.jsp?contentId=1498292

[73] https://www.anacom.pt/streaming/FinalDec4Oct10.2019DTT700MHzband.pdf?contentId=1495863&field=ATTACHED_FILE

[74] After conducting a pilot test in the city centre of Odivelas on 27 November 2019, the process of releasing the 700 MHz band continued on February 2020, as determined by ANACOM´s above-mentioned decision.

[75] Decision taken by ANACOM on 12 March 2020. For more details, please see: https://www.anacom.pt/render.jsp?contentId=1520230&languageId=1

[76] The addendum is available here: https://www.anacom.pt/streaming/AdendaRoteirodecisao_EN.pdf?contentId=1521641&field=ATTACHED_FILE

On 6 September 2019[77], the Government defined the conditions for providing compensation for the costs that occurred with the first digital dividend.

According to ANACOM, the March 2018 public consultation showed a current lack of market interest in the 26 GHz band. ANACOM stated that part of the band is still reserved for military use. Accordingly, ANACOM is to auction the other bands first and defer its decision on the 26 GHz band.

By the first quarter of 2019, Portugal had assigned 36% of the total 2090 MHz spectrum harmonised at EU level for wireless broadband. However, none of the pioneer bands have been assigned, so Portugal ranks 16 in the 5G readiness indicator.

3.2. Regulated access

As regards markets 3a and 3b in the 2014 Recommendation on Relevant Markets[78], on 12 September 2019 ANACOM approved the final decision on the changes to the reference offer for access to ducts (ORAC) and for access to poles (ORAP), simplifying and streamlining the procedures designed to facilitate use of this infrastructure and, ultimately, network rollout. On 25 July 2019, ANACOM approved a draft decision on other changes to ORAC and ORAP that were not included in the decision approved on 12 September. In the context of this draft decision it was decided, among other things, simplification of the customer drop installation procedure, revision of the Extranet access prices, definition of an annual maximum limit for follow-ups to be invoiced by MEO, and a maximum limit to the amount payable in non-compliance penalties.

As regards market 4 in the 2014 Recommendation on Relevant Markets[79] and market 14 in the 2003 Recommendation on Relevant Markets (trunk segments of leased lines), by Decision of 1 March 2019, ANACOM approved a 10% reduction in the maximum prices of Ethernet circuits connecting mainland Portugal with the autonomous regions of the Azores and Madeira (CAM circuits) and a 6% reduction in the prices of Ethernet circuits connecting various islands in the Azores (inter-island circuits). These circuits, supported over submarine cables owned by MEO, operate within the framework of the Reference Ethernet Leased Lines Offer (ORCE).

Moreover, as ANACOM reviews such prices annually, in January 2020 it notified the Commission of further reductions in price caps on CAM Ethernet circuits and inter-island Ethernet circuits. By Decision of 13 February 2020, ANACOM approved a 10% reduction in the maximum prices of Ethernet circuits connecting mainland Portugal with the autonomous regions of the Azores and Madeira (CAM circuits) and a 4% reduction in the prices of Ethernet circuits connecting various islands in the Azores (inter-island circuits).

The main purpose of these decisions is to improve competition conditions in the autonomous regions, benefiting both operators offering alternatives to MEO that need to lease these connections to develop their businesses, and consumers.

Finally, in 2019 ANACOM updated the parameters of the weighted average cost of capital (WACC) for the incumbent MEO, to be used in setting future prices for wholesale access products. In doing so, it used the same methods as in the past.

[77] Administrative Rule No 587/2019 of 6 September 2019.
[78] 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.
[79] Market 4 Wholesale high-quality access provided at a fixed location.

4. End-user matters

a. Complaint

ANACOM received around 100,600 complaints in 2019, about 4% more than in the previous year. Around 4% of these complaints were submitted through the 'complaints book', available at all service providers' establishments that are open to the public, and electronically. Only 6% of complaints received were submitted via ANACOM's own channels for complaints.

The main areas of complaints are billing, contract transparency and management, technical assistance with malfunctioning services, the handling of complaints, contract termination, and customer support.

b. Open internet

The incorporation into Portuguese law of the system of penalties for non-compliance with Regulation (EU) 2015/2120 of 25 November 2015 (Open Internet Regulation) requires the approval of a new law, which is still pending. According to information from the Secretary of State for Telecommunications, the new law has been approved by the Government and has been in the legislative circuit since February 2020.

As reported in ANACOM's net neutrality report of June 2019[80], internet service providers (ISPs) are not following ANACOM's 2018 recommendation[81] to foster end-users' freedom of choice by providing the same traffic volumes in the general data allowances and in the specific data allowances.

In May 2019, ANACOM asked the largest ISPs to ensure transparency as regards data transmission speeds. ISPs have modified information in contracts and on their webpages to ensure that all the values of the different speeds (download and upload) associated with fixed or mobile internet offers, as provided for by the Open Internet Regulation, are specified. They have also made sure to include clear and understandable explanations about these parameters.

c. Roaming

ANACOM reported looking into the way that operators ensure transparency, especially on their websites, as regards the value and/or the calculation method of the intra-EEA roaming data, with regard to some tariff plans.

d. Emergency communications

Handset-based advanced mobile location was deployed through the HELP 112 II project financed by the European Commission. Portugal has deployed an application called MAI 112[82] that enables end-users with disabilities to make 112 data and video calls, with simultaneous translation into Portuguese sign language.

e. Universal service

The contract with NOS for the provision of fixed telephony ended on 1 June 2019. Since then there has been no US provider for fixed telephony.

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80 https://www.anacom.pt/streaming/ReportNetNeurality2018May2019April.pdf?contentId=1479582&field=ATTACHED_FILE

81 https://www.anacom.pt/render.jsp?contentId=1456674

82 Link to Google Store - https://play.google.com/store/apps/details?id=io.cordova.mai112pt, link to App Store - https://apps.apple.com/pt/app/mai112/id1486324916?l=pt&ls=1, available also at www.112.pt

The contract for directory enquiry services and directories ended in September 2018. The Government asked MEO to retain the directory enquiry number (118). It also established that ANACOM should provide a service with all the telephone numbers of public and private entities and all the telephone numbers of end-users for six months (as of 15 April 2019). The analysis provided by ANACOM is still pending Government approval. The phone book service no longer exists.

The contract with MEO for the provision of public payphones expired in early April 2019. On 7 April 2019 the Government decided to extend it for an additional year and asked ANACOM to prepare to launch a new tender. The Court of Auditors challenged the contract's validity as regards the extension decision. The final decision (the Government appeal the decision of the Court of Auditors) is still pending. According to ANACOM, very little use is made of this service.

5. Other issues

Portugal amended its national Portability Regulation[83] to change the date of entry into force of the regime applicable to the new mechanism to validate electronic portability requests, performed by a portability validation code (CVP). The mechanism using CVP has already been in use since 11 May 2019[84].

To prevent potential depletion of the National Numbering Plan (PNN - *Plano Nacional de Numeração*), to safeguard the current use of the '9' range for the mobile telephone service, and to address other issues arising in the near future in relation to provision of services of this kind, specifically the extraterritorial use of numbering resources and the possibility of assignment to companies other than providers of electronic communications services, ANACOM decided in June 2019 to start a regulatory procedure for the creation of a specific numbering range in the National Numbering Plan for machine-to-machine (M2M) services[85].

In October 2019, ANACOM decided to start a regulatory procedure for defining the conditions applicable to the sub-assignment of E.164 numbering resources of the national numbering plan[86].

On 28 November 2019, ANACOM approved the final decision on the definition of the maximum retail prices for calls to '707' and '708' (universal access services) and '808' and '809' (shared cost services) numbering ranges.

As reported by ANACOM, one MNO was warned for apparent non-compliance with intra-EU communications rules by disclosing wrong/misleading information on its website and customer support, information that has been clarified by the MNO.

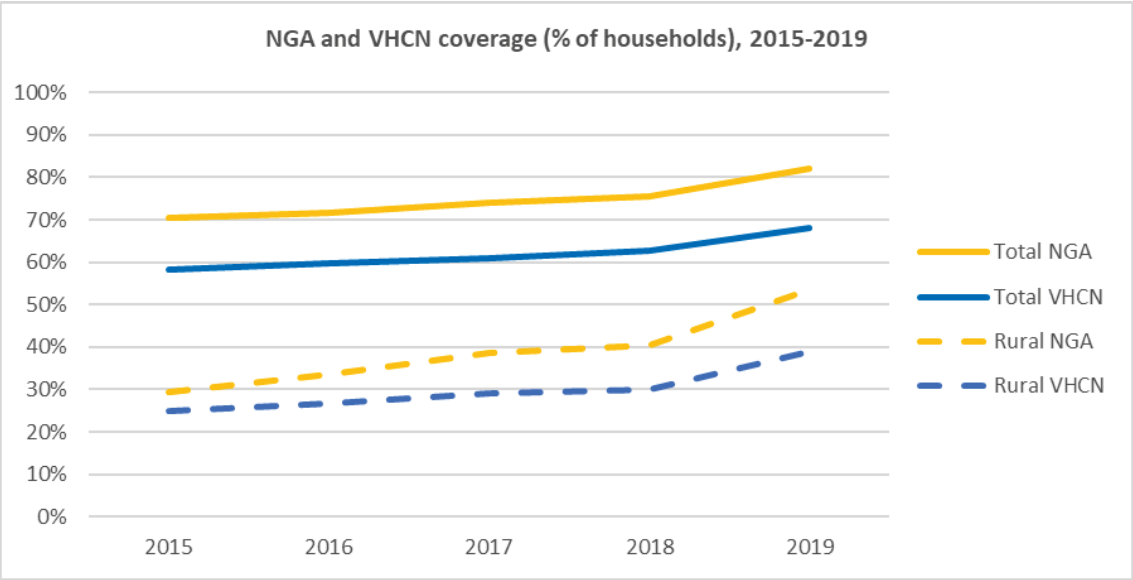
6. Conclusion

Portugal performs well on the deployment of very high-capacity networks and on the take-up of broadband connections of at least 100 Mbps. An additional effort is still required to ensure that very high-capacity network coverage and mobile broadband take-up reach all households, including those in rural areas. Broadband prices remain a challenge. The rollout of 5G will depend on the implementation of the 5G strategy and on the prompt completion of the 700 MHz award procedure.

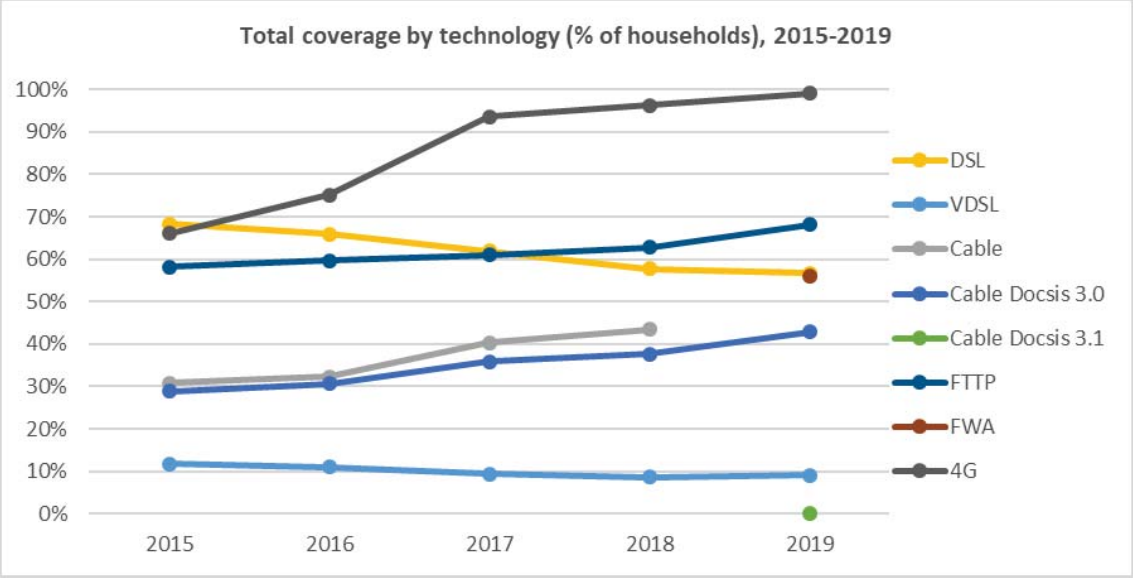
[83] Regulation No 257/2018 of 8 May 2018, establishing the principles and rules governing portability on public communications networks, https://www.anacom.pt/render.jsp?contentId=1435216
[84] Decision of 09.01.2019, https://www.anacom.pt/render.jsp?contentId=1466734
[85] https://www.anacom.pt/render.jsp?contentId=1474746
[86] https://www.anacom.pt/render.jsp?contentId=1487102

Romania

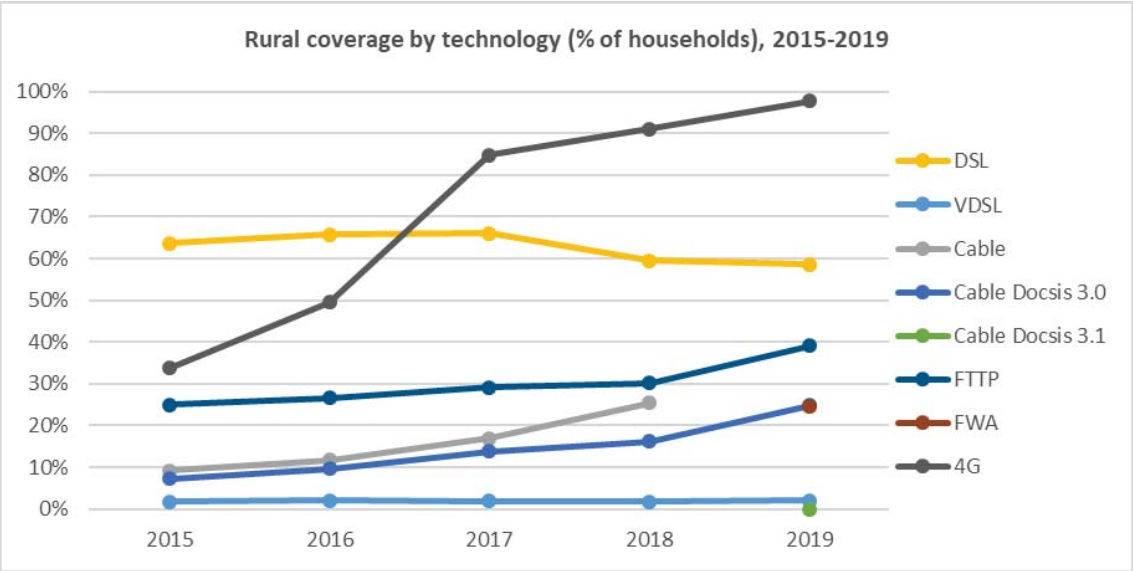
In 2019, next generation access (NGA) coverage grew to 82%, moving closer to the EU average of 86%. Rural NGA coverage increased sharply from 40% to 53% but it is still below the EU average of 59%. Very high capacity network (VHCN) coverage continued to grow from 63% to 68%, above the EU average of 44% (in this respect Romania ranks ninth in the EU). The urban-rural digital divide is highlighted by figures for VHCN coverage, despite a significant increase in rural areas of 9% to 39% (albeit almost double the EU average of 20%). Both urban and rural VHCN coverage correspond to the fibre to the premises (FTTP) footprint of 68% and 39% respectively.



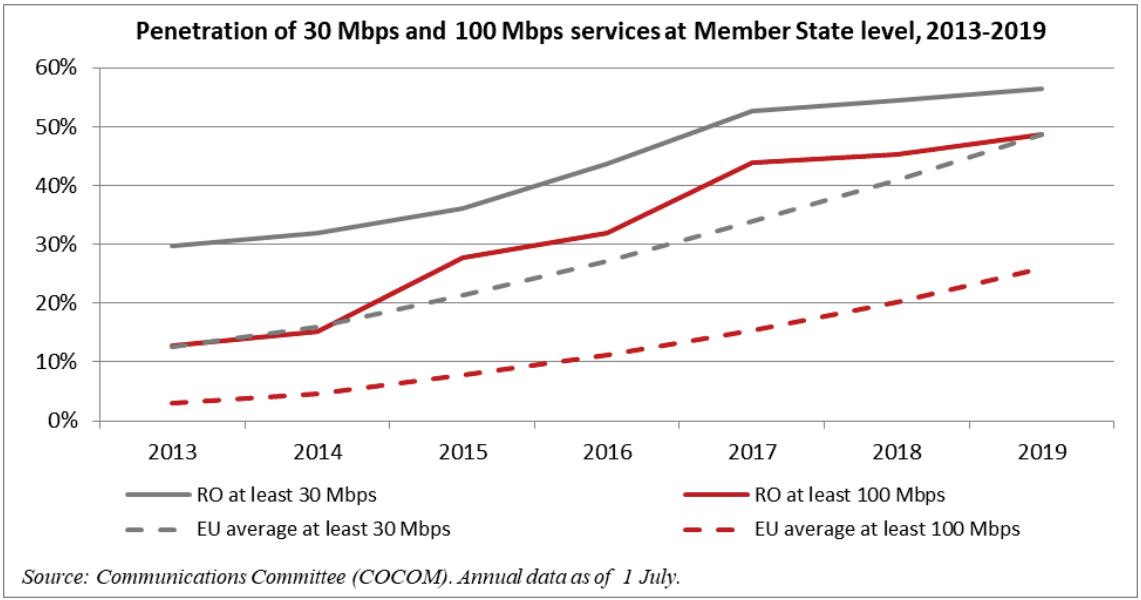
Source: IHS and Point Topic, Broadband coverage in Europe studies



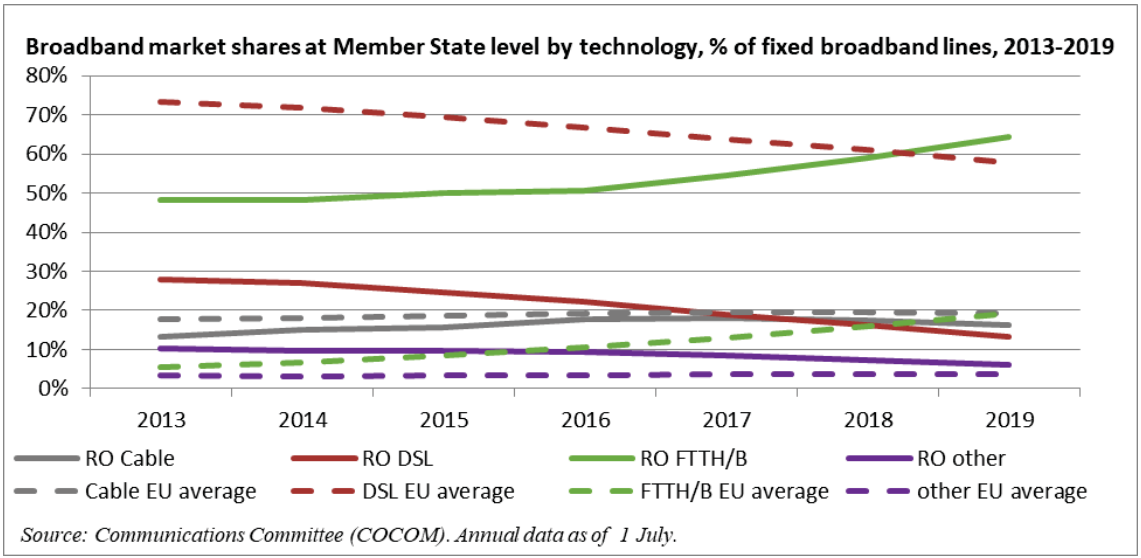
Source: IHS and Point Topic, Broadband coverage in Europe studies

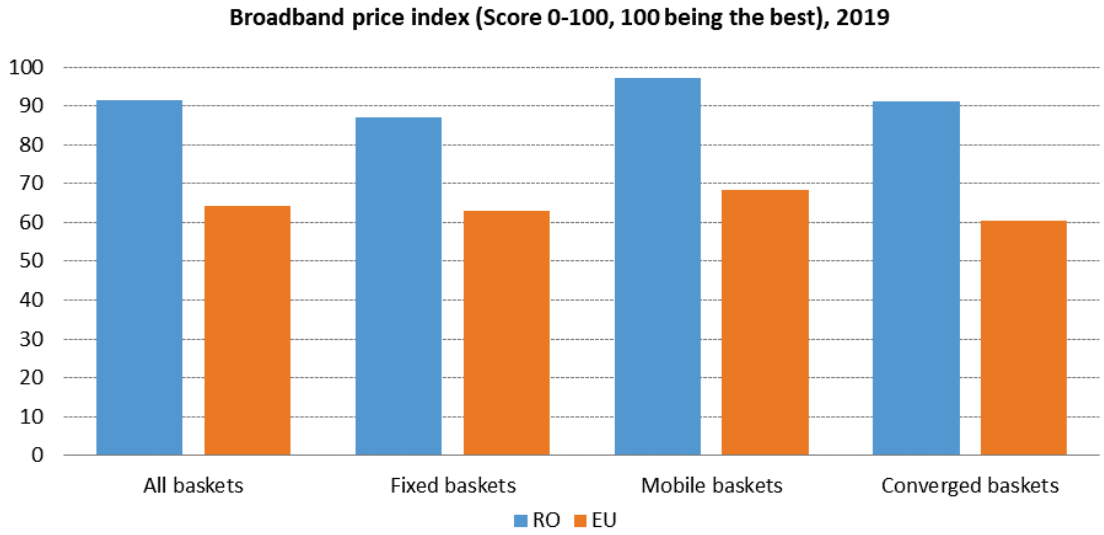


Source: IHS and Point Topic, Broadband coverage in Europe studies



In Romania, the overall fixed broadband take-up stagnated the third year in a row at 66% compared to 78% in the EU. Meanwhile, the take-up of at least 30 Mbps broadband increased slightly from 55% to 56% (better than the EU average of 49%). More importantly, the take-up of at least 100 Mbps broadband grew from 45% to 49% in the last year, almost double of the EU average of 26%. This trend may be explained by the increase in the share of fibre-to-the-home/building (FTTH/B) technology of fixed broadband lines from 59% to 64%. Meanwhile the share of cable and DSL decreased from 18% to 16% and from 16% to 13% respectively.





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

Romania ranks first in the EU in terms of broadband prices when analysing all product baskets (fixed, mobile, converged). Romania is leading in terms of mobile and converged baskets with an index of 97 and 91 respectively. In terms of fixed broadband Romania ranks second in the EU.

1. Progress towards a Gigabit Society[87]

The national broadband plan was adopted in 2015 and the Romanian authorities intend to update it in 2020 to reflect the Gigabit Society targets.

To address the urban-rural digital divide, under the 2014-2020 financial framework, the Romanian operational programme for competitiveness has earmarked €100 million from the European Regional Development Fund (ERDF). Furthermore, the 2014-2020 rural development operational programme had initially allocated €25 million from the European Agricultural Fund for Rural Development (EAFRD), out of which less than €2 million was effectively allocated to broadband infrastructure measures.

[87] 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.

Under the ERDF, the RoNet project to support deployment of backhaul networks in white spots was granted ERDF financing of €45 million, in order to ensure broadband backhaul infrastructure for a target of 696 localities. At the end of September 2019, the national authorities reported works were completed in 606 localities, while an additional 82 localities are in an advanced stage of completion.

In addition, a grant scheme for next-generation network (NGN) deployment, with a total contracted budget of €59 million, provides support to private operators to deploy backhaul and last-mile access infrastructure to additional localities in white spots. The project aims to cover 160,000 households in the white spots.

The national strategy for the implementation of 5G in Romania was adopted on 20 June 2019. The strategy envisages 250,000 jobs being created and €4.7 billion in revenues. The drafting of the strategy involved a large inter-institutional consultation which included stakeholders from local authorities who will play a significant role in the deployment of the new 5G networks.

The national strategy envisages the organisation of the spectrum multi-band auction in the 700 MHz, 800 MHz, 1500 MHz, 2600 MHz and 3400-3600 MHz bands. The auction process was delayed until the second quarter of 2020 due to: i) the adoption of Emergency Ordinance No 114/2018[88] setting high reserve prices beyond European benchmark levels, as well as increased minimum fees for renewing existing licences; and ii) the transposition into national legislation of a Memorandum signed between Romania and the United States on the security of 5G infrastructure. The terms of reference of the 5G auction will reflect the national implementation of the Memorandum.

One of the strategy's objectives is the timely launch of services, in 2020, in several representative Romanian cities, by ensuring 5G coverage in all functional urban centres, modernised motorways and railways, international ports and airports and industrial parks across the country. The strategy aims to stimulate the deployment of 5G networks, through simplified regulations for building new physical infrastructure, transposing the European Communications Code, promoting novel use cases and fostering cooperation.

Three operators launched 5G services in 2019 in the 3.4-3.8 GHz band in a total of six localities (Bucharest, Cluj-Napoca, Iasi, Constanta, Oradea, and Voluntari). Since March 2020, 5G services have been available in Bucharest and in nine other big cities (Brașov, Cluj-Napoca, Constanța, Craiova, Iași, Ploiești, Sibiu, Oradea, and Timișoara) as well as in four towns (Bușteni, Otopeni, Predeal, and Voluntari) and four villages.

As reported in previous years, the lack of streamlined administrative procedures[89] at local level for granting construction permits is hampering investment in high-speed broadband networks. Improvement in this area is crucial for deploying 5G networks in future. In this vein, the former

[88] Published in the Official Journal of Romania on 29 December 2018. The Government Emergency Ordinance No 114/2018 set a very high reserve price that went beyond European benchmark levels for future licences. It also increased minimum fees for renewing existing licences. In addition, it mandated the monitoring tariff to be levied on the sector on yearly basis setting its amount at 3% of yearly total turnover or of yearly total revenues from provision of electronic communications networks and services registered by any provider which exceeded a turnover of EUR 100,000. These provisions were amended through the Government Emergency Ordinance No 54/2019 of 4 July 2019.

[89] Amendments to the Construction Law no. 50/1991, allow the urbanism certificate to be issued in digital form, via email, in case the petitioner has given their consent. In addition, county councils and county capitals are obligated to set up a commission in charge with the sole permit issuance. Upon the petitioner's request filed in electronic format, the commission must provide, at a cost, services for obtaining the approvals/agreements required for authorising the construction works.

Ministry for Communications and Information Society[90] ran a public consultation[91] of a draft Government Emergency Ordinance on simplifying the procedure for authorising the civil works undertaken for deploying electronic communications networks. A second round of public consultation is ongoing.

The Infrastructure Law[92] transposing Directive 2014/61/EU, provides for two single information points (SIPs) to be set up at national level. One is managed by the national regulatory authority, ANCOM, providing information on location, route, type and current use of the physical infrastructure and a contact point provided by network operators. This has been in operation since 1 March 2018. However, the other SIP has yet to be set up in practice, despite the legal framework being in place. It was envisaged that the former Agency for the Digital Agenda of Romania (AADR)[93] would set it up, and that it would deal with transparency concerning planned civil works.

Several disputes for access to physical infrastructure between electronic communications providers and utilities providers are pending, the longest lasting over a year (four launched in 2018 and one in 2019). All disputes were initiated by telecom providers against energy distribution companies related to the increase in tariffs for access to poles. In March 2020, ANCOM's President, in his capacity as head of the designated dispute settlement body under the Infrastructure Law, issued a decision[94] in one of these disputes. Under this decision, ANCOM calculated the tariff for access to physical infrastructure, i.e. energy poles, and partially accepted the operator's request to maintain the tariffs at the level agreed in the contract between the parties.

Another provision welcomed by the industry, when the Infrastructure law was adopted, was the mandate given to ANCOM, the Ministry of Communications and Information Society (MCSI) and the Ministry of Regional Development and Public Administration (MDRAP) to establish, through a joint decision, technical norms for designing and developing physical infrastructure and electronic communications networks. Under the same mandate, they were also to establish the technical regulations on the design and development of constructions on which they are deployed. This mandate was one of the measures intended to streamline the cumbersome authorisation procedures at local level. It was supposed to be adopted by July 2017 at the latest, under Article 29.3 of the Infrastructure law. There is still no foreseeable date for the adoption of the technical norms[95]. Failing to adopt these norms increases operators' concerns that a significant bottleneck is not promptly removed to allow timely compliance with the coverage obligations imposed by the future 5G auction.

[90] The Ministry of Communications and Information Society was merged with the Ministry of Transport, becoming the Ministry of Transport, Infrastructure and Communications in November 2019.
[91] https://www.comunicatii.gov.ro/precizari-de-presa-2/
[92] Law 159/2016 on the regime of physical infrastructure for electronic communications networks and laying down measures to reduce the cost of deploying electronic communications networks, with the subsequent completions.
[93] Currently the Authority for the Digitalization of Romania (ADR), established in November 2019, which absorbed the former AADR.
[94] https://www.ancom.ro/uploads/articles/file/Legea%20infrastructurii%202016/DECIZIE%20solutionare%20litigiu%20Digital%20Catv_SDEE.pdf
[95] According to its action plan for 2020, this year ANCOM intends to produce and communicate to the partner institutions a technical proposal, upon consulting the communications market stakeholders.

Under the Infrastructure Law, ANCOM is empowered to set recommended tariffs for access to various categories of physical infrastructure. These will serve as a reference in contract negotiations on the right to access infrastructure[96].

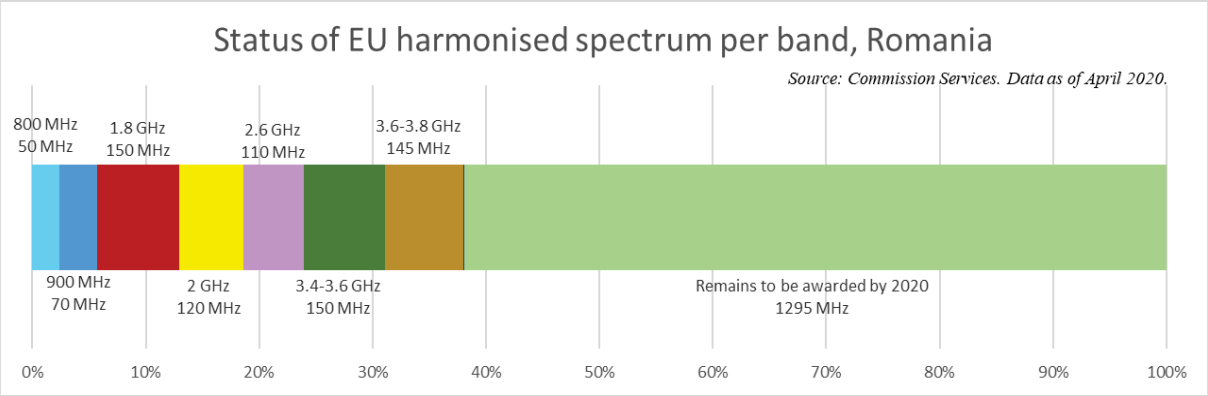
2. Market developments

In 2019, 47 new public electronic communications network or services providers entered the Romanian telecom market. However, 120 providers left the market.

On 18 July 2019, the Commission cleared Vodafone's acquisition of Liberty Global's cable business in Czechia, Germany, Hungary and Romania. In particular, the Commission did not find competition concerns in Romania. UPC's fixed network footprint ensures that Vodafone Romania becomes a strong challenger offering bundled fixed and mobile services. This is expected to alter the competition dynamics in Romania for fixed-mobile converged bundled offers.

3. Regulatory developments

3.1. Spectrum assignment



In Romania, 38% of the spectrum harmonised at EU level for wireless broadband has been assigned. This percentage is mainly due to the lack of assignment procedure for the 700 MHz, 1.5 GHz and 26 GHz bands.

According to the National Roadmap for the allotment and future use of the 470-790 MHz frequency band, adopted in 2018, ANCOM will make available 2 x 30 MHz (6 blocks of 2x5 MHz) in the 700 MHz band, as well as 15 MHz, i.e. the 738-753 MHz gap, for supplemental downlink through a competitive selection procedure. The new licences will make possible the use of these frequency bands, in a technologically neutral manner in the mobile/fixed communications networks (MFCN) starting from January 2021. In addition to the 2x30 MHz available for MFCN networks in the 700 MHz band, ANCOM also intends to allot 2x8 MHz in additional portions of the 700 MHz band, to deploy a dedicated BB-PPDR communications network.

The assignment and future use of radio frequencies available in the 800 MHz, 1500 MHz, 2600 MHz, 3400-3600 MHz and 26 GHz frequency bands for broadband wireless electronic communications systems is also envisaged in a strategy document, on which the industry was consulted during 2019. In order to prepare the '5G auction', coordination agreements with the neighbouring countries were expected to be concluded by 30 June 2019. While some neighbouring countries are using DTT in the 700 MHz band (694 – 790 MHz), it is necessary to coordinate the use of DTT in the 470-694 MHz band in order to release the 700 MHz band for wireless broadband in these countries. Romania has

[96] According to its action plan for 2020, ANCOM will establish indicative tariffs for access to the network operator's poles in the first quarter of 2021.

finished coordinating the new DTT Plan (below 694 MHz) with Bulgaria, Hungary and Serbia. The coordination agreements with the Republic of Moldova were also finalised and are to be signed in the near future, probably by correspondence. As regards Ukraine, the process of international coordination is hindered due to the specific circumstances in that country. Romania has requested the European Commission's support through the RSPG Good Offices group in order to reach an agreement on the release by Ukraine of the spectrum in the 700 MHz band.

3.2. Regulated access (both asymmetric and symmetric)

On 27 February 2019, ANCOM notified the European Commission of its review of the market for transit services in the fixed public telephone network (market 10 of the 2003 Recommendation) in which it proposed to deregulate the market. The Commission issued no comments.

On 16 October 2019, ANCOM notified the European Commission about a decrease of mobile termination rates from €0.84 per minute to €0.76 per min corresponding to the EU average mobile termination rate for all countries applying a BU-LRIC methodology[97]. The termination rates were imposed in the ANCOM Decisions, numbers 1306 to 1310 on 26 November 2019.

Under the Infrastructure law, ANCOM is tasked with setting the technical and economic conditions for access to the passive infrastructure built with the participation or support (for example, a concession agreement) of the central or local public administration authorities, or funded, totally or partially, with public funds. In delivering on its tasks, ANCOM adopted a Decision establishing and imposing technical and economic conditions for access to the physical infrastructure provided by 'NETCITY TELECOM' S.R.L., a wholesale-only broadband network operator that is deploying passive physical infrastructure. ANCOM imposed non-discrimination principles and minimum tariffs that could be charged by the operator of the passive broadband infrastructure.

In August 2019, ANCOM adopted, by virtue of its tasks described above, Decision no. 862/2019 regarding the technical and economic conditions for the access of the public electronic communications networks providers to the Municipal passive infrastructure in Sibiu.

4. End-user issues

a. Complaints

In 2019, ANCOM received 3,200 complaints from end users compared to 3,350 the year before. The main sources of end users' complaints were linked to: i) contract termination – 14%; ii) pricing and billing – 11%; iii) portability – 10%; iv) EMF complaints – 11%; v) quality of service – 9%; vi) availability/coverage – 9%; vii) non-observance of contractual terms – 6%; viii) amendments of contractual conditions – 6%; ix) roaming – 6%; and x) distance contracts – 6%.

ANCOM is running two web-based tools for the benefit of end-users. Netograf.ro has been developed to test and monitor the quality of the available access to the internet access service. Veritel.ro – an interactive tariff comparison tool – is an online 'price calculator' that conducts, based on the user's options, comparative analyses of the standard tariff plans available on the market as regards fixed telephony, mobile telephony, internet access and bundles.

b. Net neutrality

[97] ANCOM explained that its decision to notify mobile termination rates based on an EU benchmarking has to be seen in the new context. On one hand, the decision of the Romanian Court of Accounts prevents ANCOM from contracting external consultancy services needed to develop the cost efficient model, and on the other, the European Commission is to adopt a delegated act setting EU-wide maximum mobile termination rates under Article 75 of the Code. The Commission has examined the notifications and the additional information provided by ANCOM and had no comments.

Over the period covering the end of 2018 and the beginning of 2019, ANCOM carried out an inspection to verify if the top six providers of electronic communication services were complying with the obligation imposed under Article 4(1) Regulation (EU) 2015/2120 on transparency measures to ensure open internet access. Following the inspection, ANCOM issued six warning sanctions and imposed additional measures to be implemented by the operators according to the established non-conformities.

c. Roaming

ANCOM granted a new sustainability derogation to RCS & RDS S.A. Decision 679/2019 authorises the operator to levy surcharges on their own customers, in addition to the domestic tariffs, for 12 months term, as of 1 July 2019: these amount to €0.0187 per min for outgoing calls; €0.0085 per min for incoming calls; and €2,20 per GB.

d. Emergency communications – 112

In February 2019, the administrator of the public-safety answering point system launched an application called 'Apel 112' for Android/iOS mobile phones which sends the location information to the 112 system. In July 2019, under Decision of the Prime Minister no.166/2019, an Inter-ministerial Committee on the 112 emergency calls system was set up. The Committee established a series of measures, for example, speeding up the implementation of the advanced mobile location (AML) ensuring it was fully deployed in Romania by 1 April 2020.

Another (mid-term) measure provided for the setting-up of a mechanism to periodically verify the accuracy and reliability of the location information obtained at 112 system level. In order to implement the AML in Romania, in August 2019, the country adopted a Government Emergency Ordinance (GEO) 62/2019, with a view to improving the operation of the 112 system. This normative document aims, in principle, to i) clarify some aspects related to the ways the caller is located through using location data generated at the mobile terminal level, and ii) impose on pre-paid mobile providers the obligation to provide the service, only after collecting data identifying the SIM card user, beginning 1 January 2020. For the operators this obligation was deferred to March 2020. The legislative process regarding the approval of GEO 62/2019 is still ongoing, while in parallel, the Constitutional Court found on 18 February 2020 that some provisions of the GEO were unconstitutional.

e. Universal service

Based on the results of the studies on users' needs and the conclusions of the Internal Report on assessing users' needs, ANCOM will launch a public consultation in 2020 on the scope of the universal service obligations (USO). The consultation will focus mainly on removing from the universal service's scope the access to public payphones, directory enquiry services and directories of subscribers and setting the best-effort speed for defining the 'functional internet access' as a USO broadband connection.

5. Other issues

On 29 December 2018, in order to avoid an excessive deficit procedure, the Romanian Government adopted a broad range of fiscal consolidation measures spanning across different sectors, through the Emergency Ordinance 114/2018. The Emergency Ordinance set the reserve price for future licences at a very high level (4% of the 2018 turnover of the telecom sector per year of the licence) and significantly increased the minimum fees for renewing existing licences. In addition, it sets out a new method that ANCOM should apply to calculate the annual fee levied by the providers and destined to cover the cost of monitoring the spectrum usage, which would amount to a radical

increase from a maximum 0.4% of the operator's annual turnover to 3%, without regard to actual monitoring costs. The Emergency Ordinance provides for fines amounting to 10% of the operator's turnover for building telecom infrastructure without permit or any intervention without a permit on telecom network infrastructure that is legally built.

In March 2019, a political letter was sent by the Commission services to the Romanian authorities expressing concerns regarding the efficient assignment and optimal use of the radio spectrum and the legality of setting the monitoring fee at 3% of the operator's turnover under EU law. In July 2019, the Emergency Government Ordinance no. 54/2019 amended the provisions above. The annual monitoring fee was capped at a maximum of 2% of the operator's annual turnover and limited to the administrative costs incurred by ANCOM which could not be financed from other sources or from ANCOM's budgetary balance. Another amendment eliminated the minimum licence fees established by GEO 114/2018 and empowered the Government to set the level of the spectrum licence fees on the basis of a proposal made by ANCOM, taking into account the effective allocation and optimal utilisation of the rights of use of spectrum.

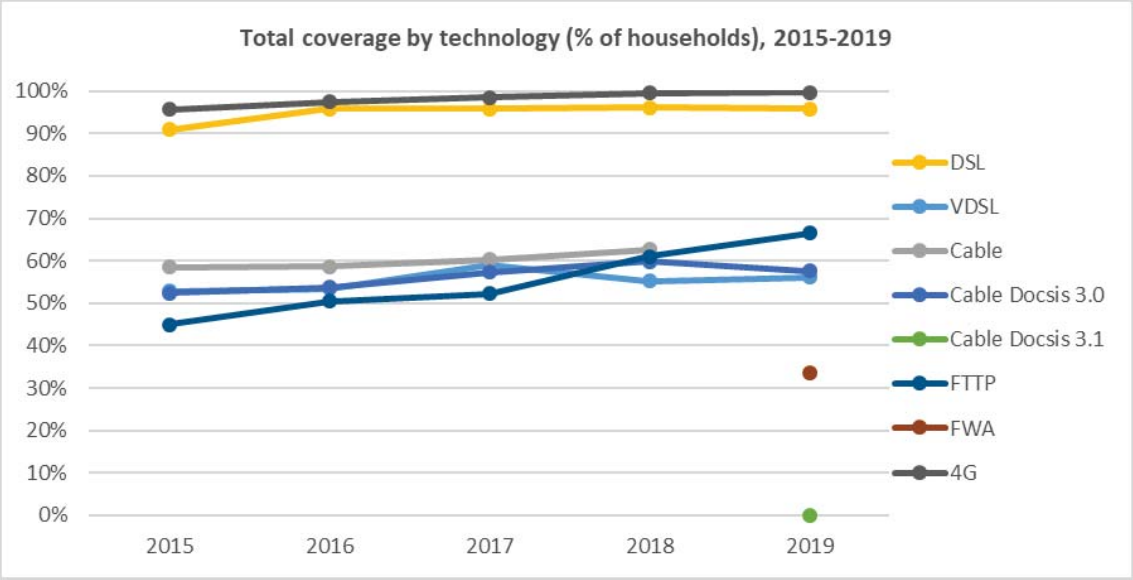
6. Conclusion

While the national strategy for the implementation of 5G in Romania was adopted, the auction process for the 700 MHz, 800 MHz, 1500 MHz, 2600 MHz and 3400-3600 MHz bands was delayed to the second quarter of 2020.

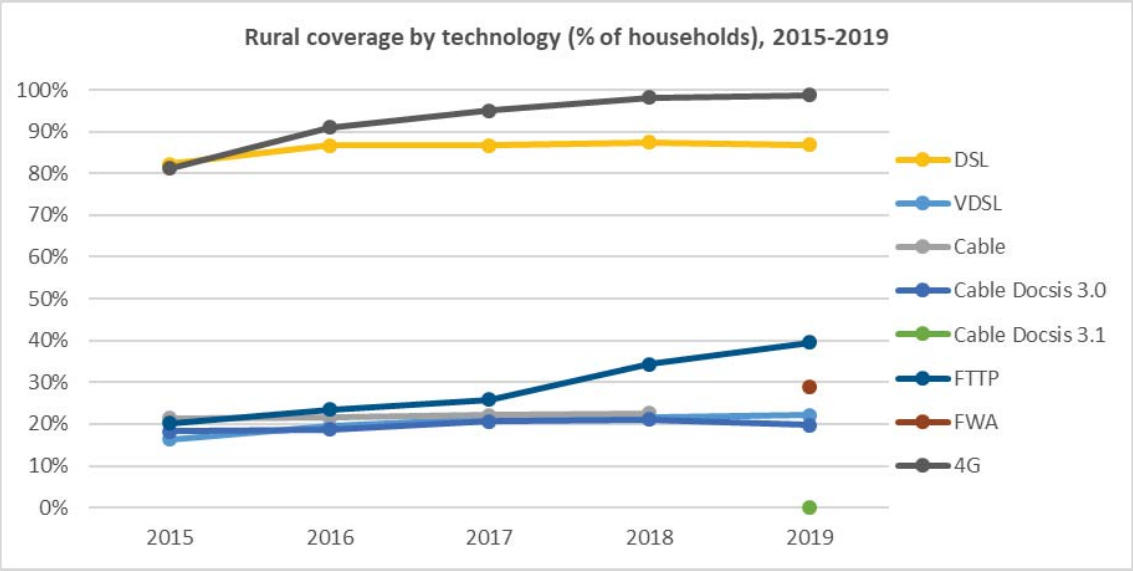
While the 5G licencing seems to be on track, the cumbersome authorisation process could prove to be a serious bottleneck that could affect the deployment of 5G infrastructure.

Slovenia

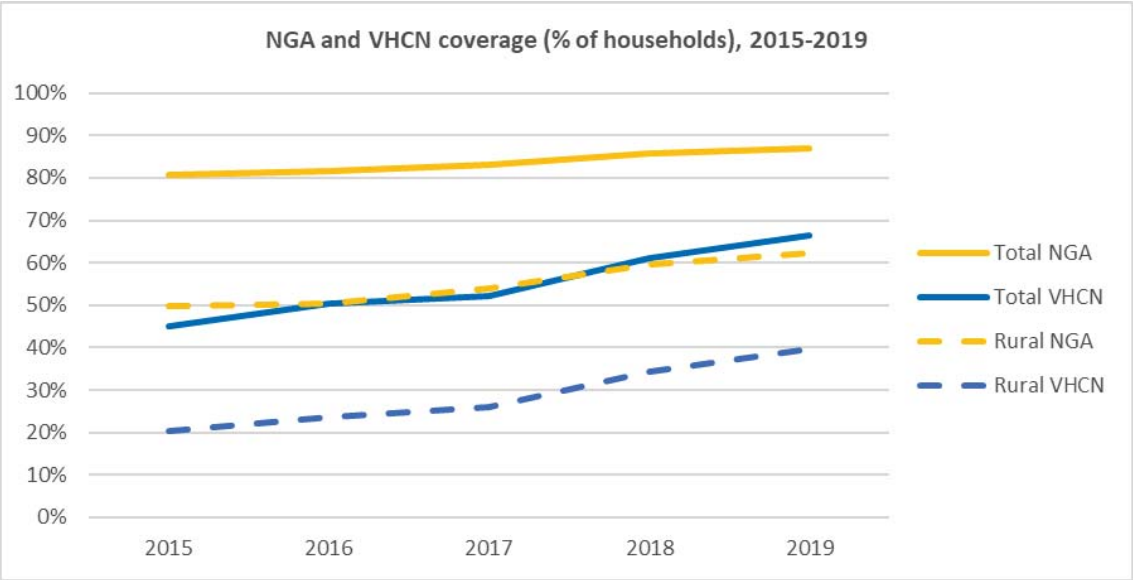
Slovenia ranks 15th among the Member States on fixed broadband NGA coverage. Continuous investment by the country's operators translated into significantly improved fibre to the premises (FTTP) and fixed wireless access (FWA) coverage. For FTTP, Slovenia improved its total coverage by 5 percentage points (pps) and its rural coverage by 6 pps, to 66% and 40%, respectively, way ahead of the EU averages of 34% and 18%. FWA coverage reached now 34% in total and 29% in rural areas. Slovenia's total and rural very high capacity network (VHCN) coverage both surpass average EU values, by 22 pps in total and 14 pps in rural areas, even though this only includes FTTP coverage. DOCSIS 3.1 coverage data is not yet available, as the biggest cable operator only started to offer this technology in August 2019.



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



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

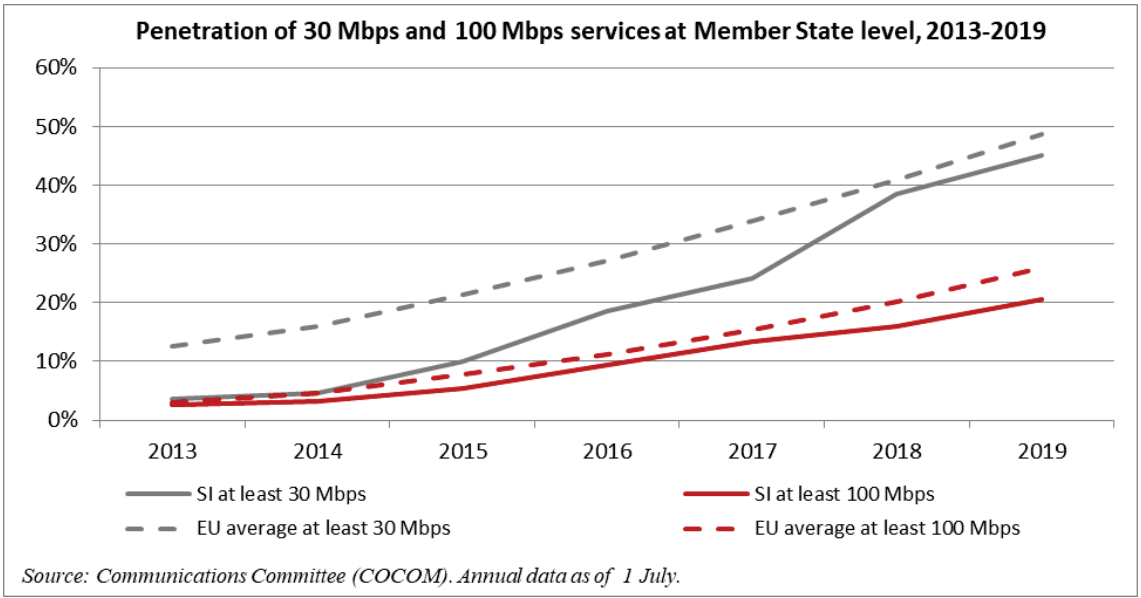


Source: IHS and Point Topic, Broadband coverage in Europe studies

In the fixed market, Slovenia slightly underperforms on broadband penetration per household (33% compared to the EU average of 36%). Fibre remains the predominant technology for delivering broadband access services (37% as at July 2019, compared to 34% a year before). The main competition comes from cable, which accounts for around 28% of the market, a figure that has remained practically stable over the past 3 years. Fibre to the home/business (FTTH/B) is only now picking up, and accounts for 37%.

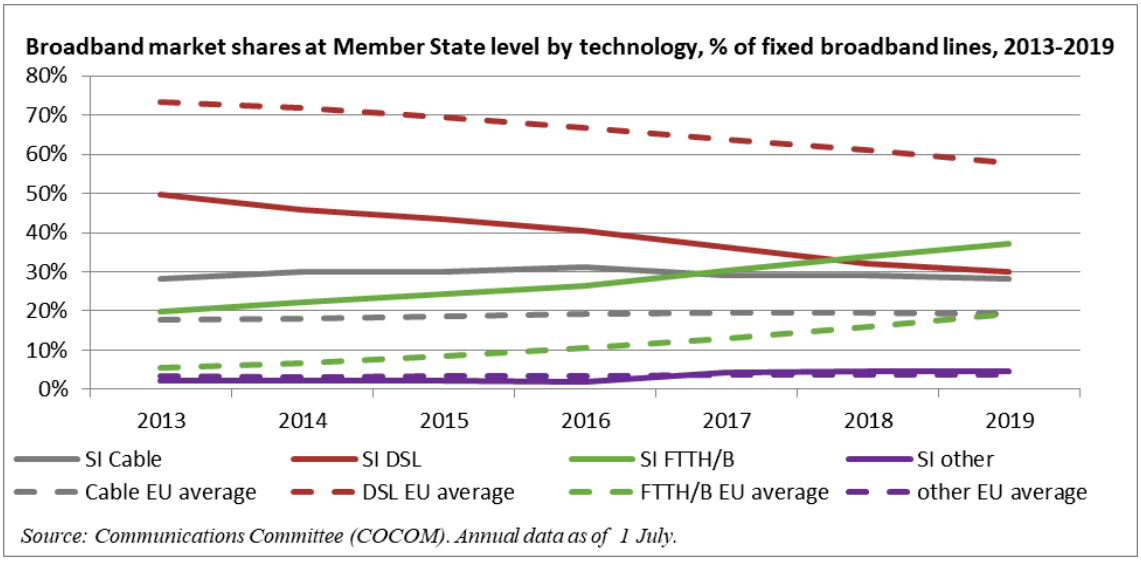
On the one hand, Slovenia's pace of fast penetration (above 30 Mbps) continued reaching 45%, although it was slower than in previous years (from 2017 to 2018 fast penetration jumped by 14 pps, whereas from 2018 to 2019 it increased by 7 pps). On the other hand, broadband penetration of at least 100 Mbps accelerated, reaching 20.5% (an improvement of almost 4.6 pps compared to the 2.5 pps increase a year before). In both categories, Slovenia continues to lag behind the EU average (48% and 25%, respectively).

Mobile broadband penetration increased by 7 pps in 2019, and has now reached 81% of subscribers.

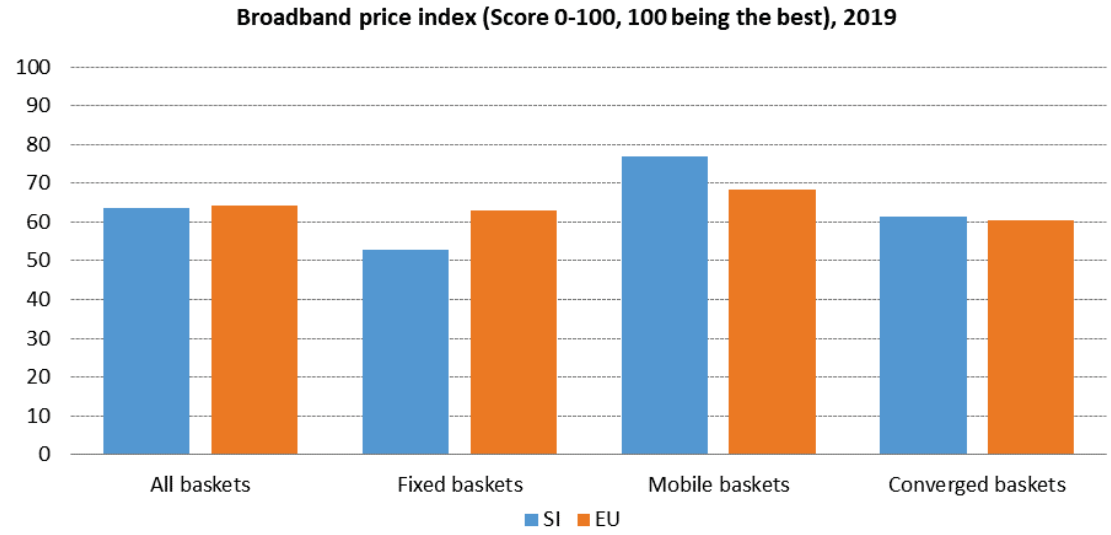


Since last year, FTTH/B technology has been the dominant way of delivering broadband access services in Slovenia, with its 37% market share now surpassing that of DSL technology by 7 pps. This

is almost 20 pps ahead of the EU average. The market share of DSL continued to decline, falling from 32.2% to 30%, and that of cable declined by one percentage point and now stands at 28.2%.



Overall, prices on Slovenia's electronic communications market are slightly more expensive that the EU average; the country ranks 14th out of all Member States. When comparing fixed, mobile and converged broadband baskets, the fixed basket is the most expensive[98], and is 16% more expensive that the EU average. The price of converged baskets has levelled with the EU average. Strong competition on the mobile market lowered the price of mobile baskets, which is now 13% cheaper than the EU average.



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

[98] According to the AKOS (Slovenian national regulatory agency) opinion, Slovenia's broadband baskets usually include more free calls and more TV channels in comparison with the rest of the EU.

1. Progress towards a Gigabit Society[99]

Even though the objectives of Slovenia's next-generation network (NGN) 2020 plan were aligned with the targets of the Gigabit Society[100], the EU 2020 goals for gigabit coverage are unlikely to be achieved. In terms of fixed NGA coverage, Slovenia continues to face a digital divide between urban and rural areas, and the proportion of fibre connections varies significantly across the country. The publicly funded project for the construction of the NGN 2020, with a budget of approximately €29.5 million (of which €23.5 million comes from the ERDF), has been long delayed. Following two unsuccessful calls for tender in 2018, Slovenia has made the conditions of a new call for tender more attractive. This new call for tender was published at the end of February 2020.

In May 2019, the Connecting Europe Broadband Fund finalised a deal to invest into FTTH in Slovenia and build an open-access network that passes through 246,000 locations in the country's rural areas in 163 out of its 212 municipalities.

In 2019, all major operators actively continued to invest in very high capacity networks. The number of NGA broadband connections is consequently increasing. Between 2016 and 2019, operators expressed commercial interest in covering about 250,000 households with networks capable of providing speeds of 100 Mbps by 2022.

Slovenia is preparing a national broadband plan with goals to be reached by 2025, in alignment with the 2025 gigabit objectives to be adopted in 2020. It plans to include: 5G coverage for urban areas and the main terrestrial transport routes; gigabit connectivity for schools, transport hubs, public service providers and digitally intensive companies, and; the upgrading of networks of at least 100 Mbps to 1 Gbps coverage nationwide.

In 2018 and 2019, AKOS (national regulatory agency) awarded trial licences in 5G pioneer bands, until the deadlines for public tenders for auction expire: 31 December 2020 for the 3400-3800 MHz band, in the 700 MHz band until 30 June 2020, in the 26 GHz band until 31 December 2019[101].

2. Market developments

Slovenia's fixed market remains dominated by the incumbent, although the incumbent's market share continues to decrease.

On 18 January 2019, Central European Media Enterprises Ltd., owner of commercial TV station Pro Plus, announced that it had pulled out of the agreement to sell Pro Plus to Slovenia Broadband S.á r.l., Luxembourg (an investment vehicle of the United Group, which already owns Telemach)[102].

The provision of television programmes as part of bundles is becoming increasingly important. Most access to television programmes is provided as internet protocol television (IPTV) services, followed by cable television; both are included in bundled offers. Operators continue to add new TV channels

[99] 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.

[100] Via an addendum to the NGN plan for 2020 aiming to set the Gigabit Society targets adopted in July 2018.

[101] According to the sixth 5G observatory report (covering up to December 2019), European 5G Observatory, prepared by IDATE: http://5gobservatory.eu/wp-content/uploads/2020/01/90013-5G-Observatory-Quarterly-report6_v16-01-2020.pdf

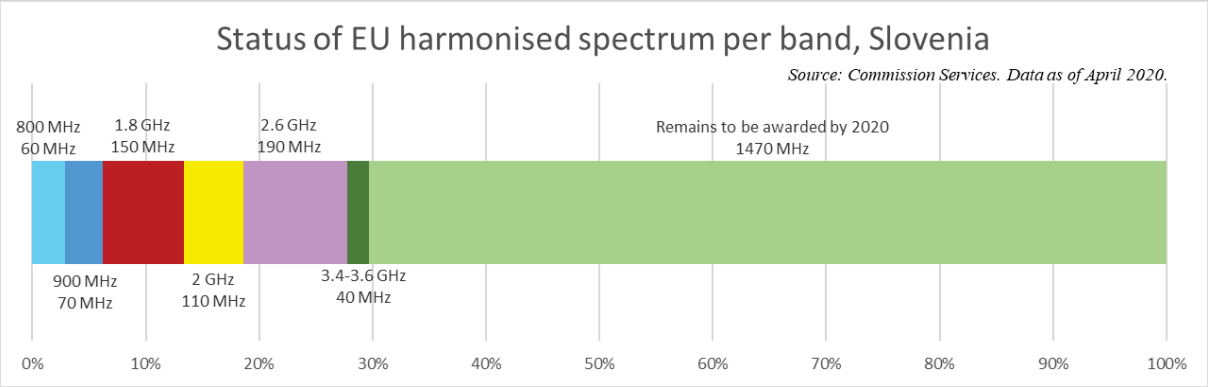
[102] Following the statement of objections of Slovenian Competition Protection Agency (CPA) citing facts and evidence that show that the transaction would lead to horizontal overlaps and links that could restrict competition in closely related markets (vertical and conglomerate links on the Slovenian telecommunications and media market).

and expanded content. In 2019, quadruple-play accounted for more than 40% of all bundles, and this figure continues to grow in 2020. The overall number of bundled offers increased for Slovenia's four biggest operators.

The Slovenian mobile market is vibrant, with four mobile network operators and three active mobile virtual network operators.

3. Regulatory developments

3.1. Spectrum assignment



Slovenia has only assigned the 620 MHz spectrum for wireless broadband, which is 30% of the spectrum harmonised at EU level.[103] This is below the EU average of 39%.

The government has again temporarily suspended the adoption of the third draft spectrum strategy, which provided the basis for holding a multi-frequency auction by 30 June 2020. The draft strategy has undergone three rounds of public consultation, the most recent of which was in spring 2019. The draft laid out a possibility to make spectrum available for local wireless broadband networks in a portion of the 3.4-3.8 GHz band and the 2.3 GHz band, as well as critical M2M services in a 2 x 3 MHz block of spectrum within the 700 MHz band. According to the planned amendment of the national plan for the use of 700 MHz, Slovenia intends to postpone using the 700 MHz band for wireless broadband electronic communications services until 31 December 2021, due to unresolved cross-border coordination issues resulting in harmful interference. It will also delay the assignment of one of the 5G pioneer spectrum bands; its 5G readiness indicator therefore stands at 0% [104].Operators reacted negatively to any further delay as it could affect their business and investment planning.

3.2. Regulated access

On 6 February 2019, the Commission registered Slovenia's notification concerning the market for wholesale high-quality access provided at a fixed location (market 4 in Recommendation 2014). In its notification, AKOS addressed the Commission's comment on the price control obligation, which was included in the decision opening the Phase II investigation in case SI/2018/2050. The Commission did not make any further comments and AKOS adopted the final measures on 30 September 2019.

[103] The Time Division Duplex (TDD) part of this band (in total 35 MHz [1900-1920 MHz & 2010-2025 MHz]) are not included in the 2090 MHz of total EU harmonised spectrum.

[104] 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 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.

On 28 May 2019, the Commission registered Slovenia's notification concerning the wholesale market for call termination on individual public telephone networks provided at a fixed location (market 1 in Recommendation 2014). It issued a comment urging AKOS to reconsider its approach and to consider using weighted average cost of capital (WACC) calculated for legacy networks to set the fixed termination rates, instead of that for NGA. The Commission pointed out that any cost related to fixed voice call termination would fall outside the scope of the services to which an NGA weighted average cost of capital (WACC) could be applied. AKOS adopted the final measures on 19 December 2019.

4. End-user matters

a. Net neutrality

In August 2019, AKOS adopted the General Act on internet access services and related end-users' rights imposing certain obligations on providers of internet access services and regulating contractual relations with end-users, while at the same time strengthening the protection of the latter in the event of breaches of the contract. General Act sets further speeds definitions (minimal, normally available and maximal), a methodology for measuring the technical quality, procedures for accessing the compliance of contractual speed provisions. Additionally, General Act contains rules to ensure equal and non-discriminatory treatment of internet traffic and transparency in the provision of internet access services in terms of volume, restrictions, type and quality, contracting arrangements and related user-rights, as well as rules for managing and restricting traffic.

b. Roaming

In 2019, AKOS fined one operator for failing to send an appropriate notification to a roaming customer's mobile device (SMS message) when the customer's data roaming services reached 80% of the agreed financial or volume limit, to inform them that the financial or volume limit had been exceeded.

One operator applied for a derogation from the requirement to provide intra-EU call services, and this was granted for the period from 25 May 2019 to 25 May 2020. The operator was allowed to continue charging retail premiums on roaming services to the users of three different tariff plans.

c. Emergency communications – 112

Slovenia deployed a handset-based advanced mobile location (AML) caller location solution that relies on GNSS and Wi-Fi signals. Disabled people are able to access emergency services by sending an SMS to 112.

d. Universal service

As of December 2019, the universal service obligation no longer includes the provision of public payphones or other access points for public voice telephony. In its analysis, AKOS concluded that the use of such services had declined to a level at which they are no longer necessary. Broadband (4Mbit/s download, 512 kbit/s upload) is included in the provision of access at a fixed location and provision of telephone services since June 2018.

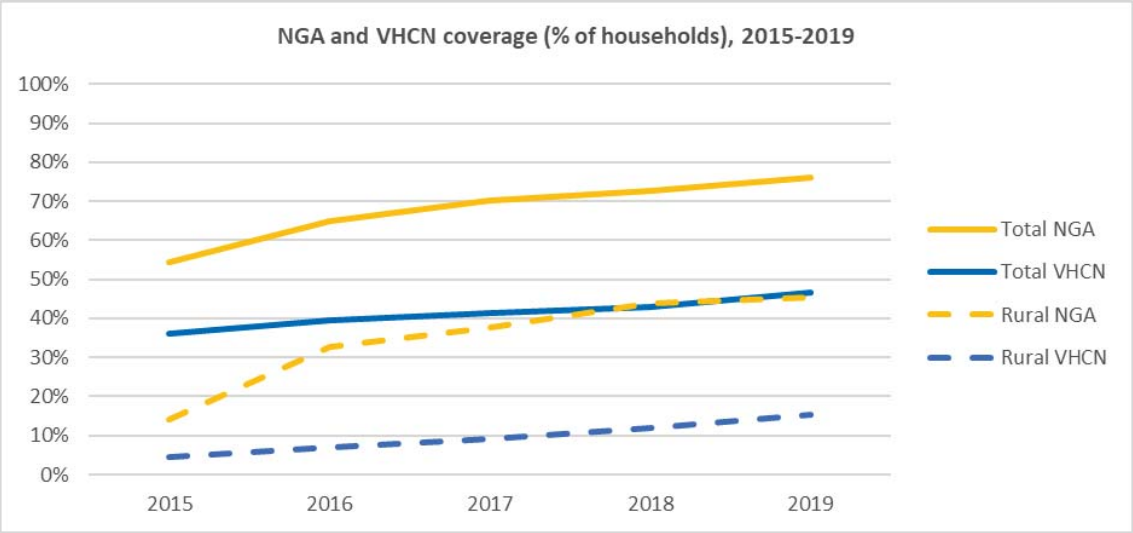
5. Other

In spring 2019, the Slovenian government mandated six ministries to carry out a review of the legality of AKOS' operations according to the ZEKom-1 provisions, the results of which may serve as a basis for deciding whether it is appropriate to propose the dismissal of AKOS' Director. Operators were concerned that tensions between the responsible ministry and the regulator would negatively affect the regulator's work. No illegal conduct of AKOS' operations was identified.

6. Conclusion

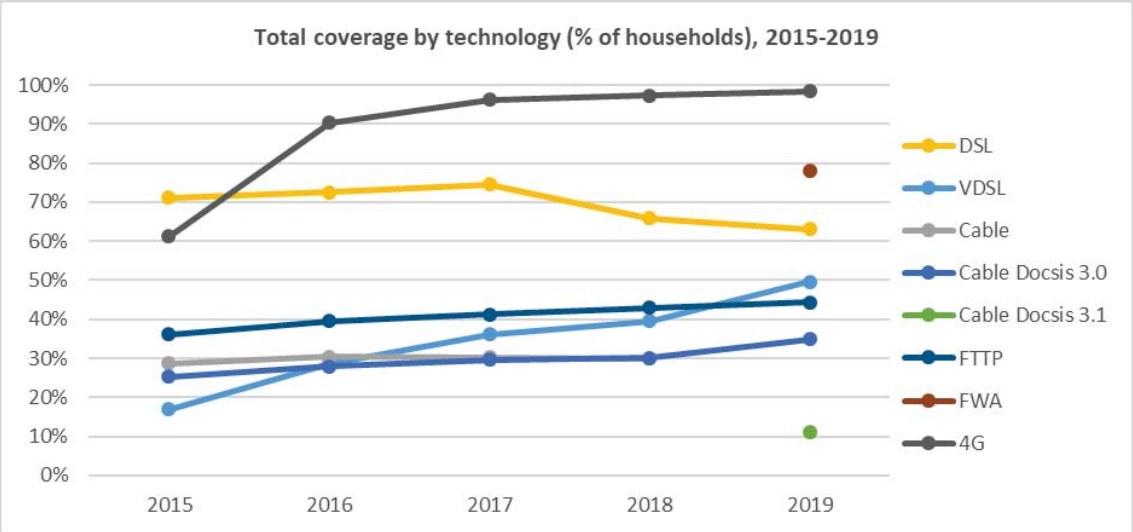
Slovenia's lack of radio frequency management strategy negatively affects the conditions for and success of the tender for the 5G bands. If its adoption is further delayed, the timely deployment of 5G networks could be at stake. The Ministry of Public Administration adopted strategic guidelines according to which radio frequency allocation procedures can continue, subject to applicable national and EU regulation. The adoption of the radio spectrum management strategy is still very important for the Slovenian market, which would benefit from closer collaboration between public stakeholders, especially in creating an appropriate regulatory environment that supports further private investment and competition.

Slovakia



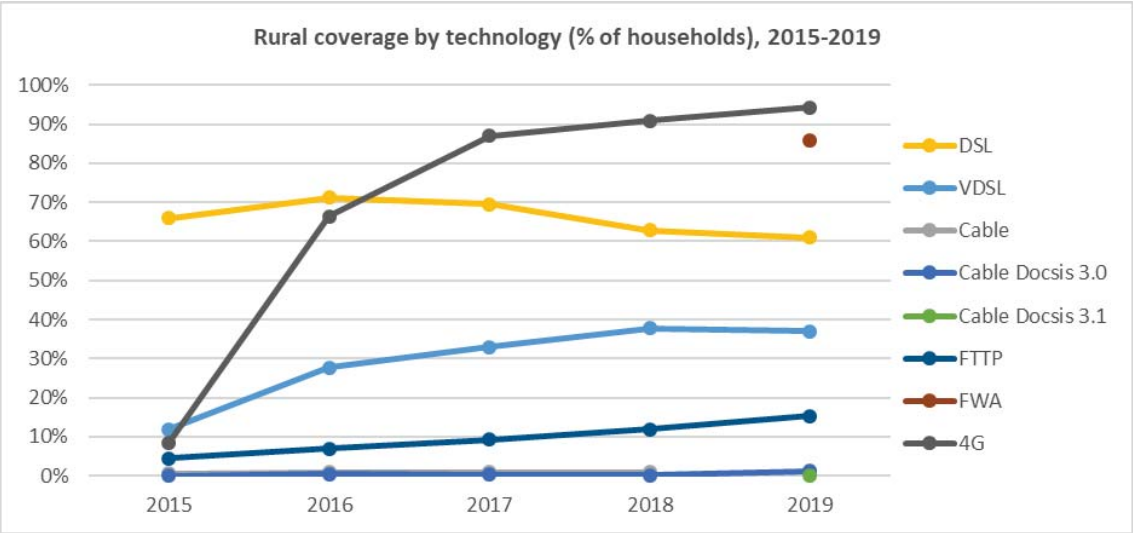
Source IHS and Point Topic, Broadband coverage in Europe studies

Slovakia ranks above the EU average on total VHCN coverage (47% against 44%). It ranks low on fast broadband NGA coverage (coming in 24th out of all EU Member States), but has made good progress on VDSL coverage, improving by 10 percentage points compared to 2018 and reaching 50% of all households in 2019; this is however still below the EU average of 59%. Slovakia performs well on FTTP coverage – 44% of households have access to this technology, which is above the EU average of 34%. The country's rural areas are not being left behind: 37% of rural households have access to VDSL, against an EU average of 42%, and 15% have access to FTTP, against an EU average of 18%.

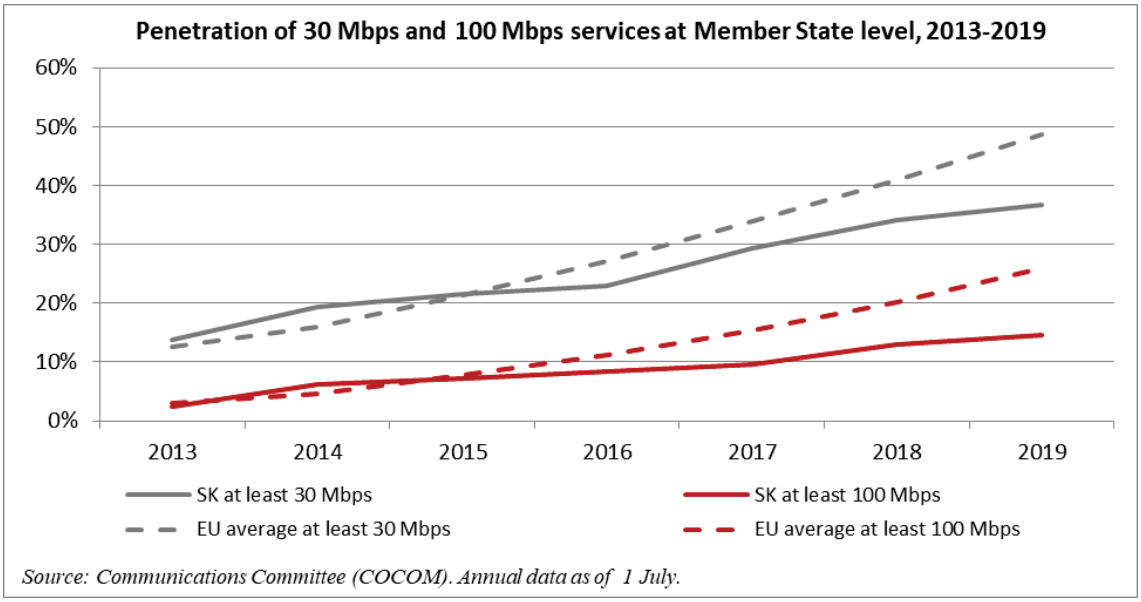


Source IHS and Point Topic, Broadband coverage in Europe studies

Slovakia performs below the EU average on broadband penetration with speeds of at least 30 Mbps (36.8%), as well as on broadband penetration with speeds of at least 100 Mbps (14.6%). Both indicators have shown only a limited increase compared to 2018. The new national broadband strategy will therefore need to address broadband demand in addition to focusing on infrastructure development.



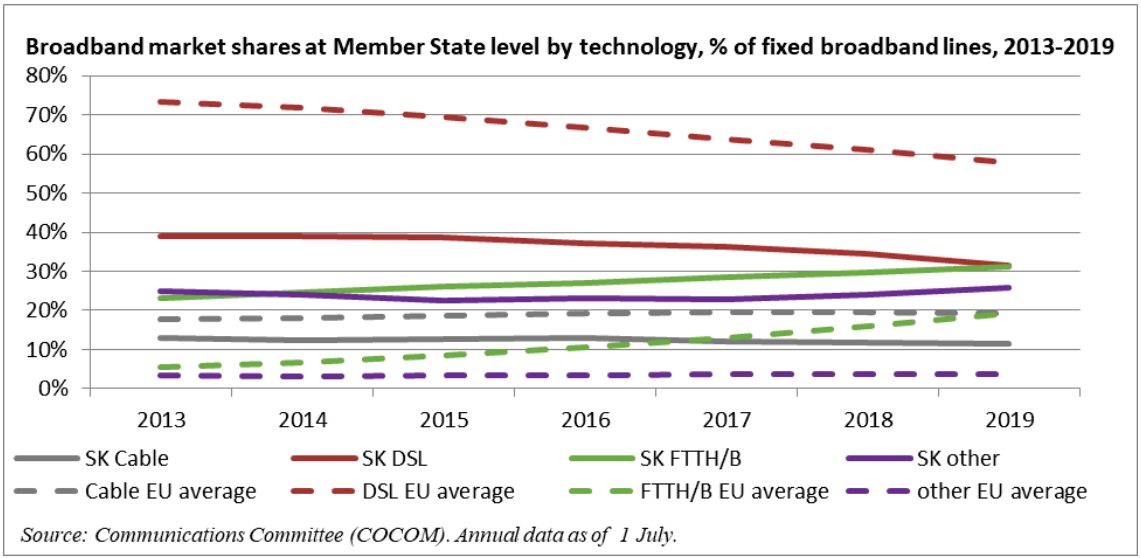
Source IHS and Point Topic, Broadband coverage in Europe studies

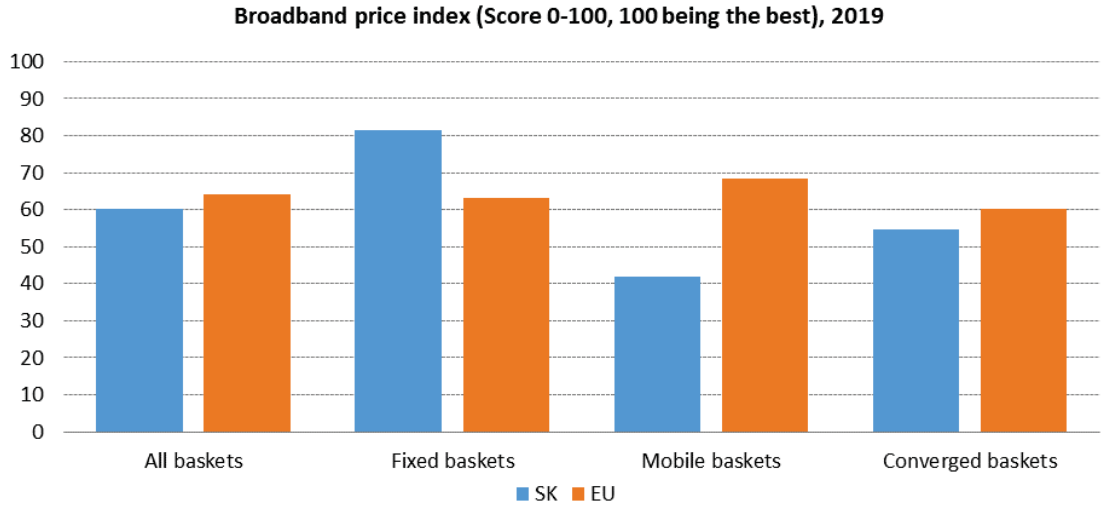


The market share of broadband technologies in Slovakia remained almost unchanged in 2019 compared to 2018. The Slovak broadband market is dominated by access via DSL (31.6 %), followed closely by FTTH/B (31.1% of all broadband lines). Slovakia also relies heavily on other technologies (WiFi/FWA, 25.7%). Cable networks account for only 11.5% of all broadband lines.

Slovakia has relatively low prices for fixed broadband compared to the EU average – its fixed broadband price index stands at 81, compared to an EU average of 63. However, its mobile basket prices are the second most expensive in the EU. Customers can expect to pay a minimum of €40.62 (adjusted for purchasing power parity) for 5GB mobile data with 300 minutes of calls, which is almost twice the EU average price.

The broadband price index in the converged baskets segment is also below the EU average (55 compared to 60). The comparatively high prices could explain the below average take-up in both fixed and mobile segments, particularly considering the widespread availability of fast and ultrafast networks in the country.





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

1. Progress towards a Gigabit Society[105]

While the 2011 national broadband strategy is still in place, the Deputy Prime Minister's Office for Investments and Informatisation is currently finalising the new national broadband plan for 2021-2025. The new plan is expected to align Slovakia's broadband strategy with the 2025 Gigabit Society targets. It will be based on the priorities of the European structural and investment fund (ESIF 2021-2027).

In 2020, a new broadband mapping project was launched at the household/address level, as a basis for preparing the national broadband plan. To replace the cancelled 'Atlas for passive infrastructure' project, the Ministry of Environment will start a new project with a different approach.

One of Slovakia's long-term connectivity issues is the provision of high-speed broadband coverage for 'white spots' (i.e. municipalities covered by speeds of less than 30 Mbps). Slovakia intends to address its remaining few dozen white spots by the end of 2020, thanks to private investment by

[105] 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.

market players who declared their intention to give the majority of people in each municipality access to speeds of at least 30 Mbit/s.

On mobile connectivity, the Ministry of Transport and Construction is currently finalising a new document on 'Support for the development of 5G networks in Slovakia for the years 2020–2025'. One of Slovakia's mobile operators started a 5G trial in Banská Bystrica in July 2019, enabling customers with 5G-enabled handsets to access services via two base stations in the city.

The Ministry of Transport and Construction plans to propose a new (recast) law to transpose the European Electronic Communications Code; the first draft was sent for public consultation in the first quarter of 2020.

2. Market developments

There are four mobile network operators in Slovakia. Orange Slovensko, a subsidiary of the Orange Group, is the mobile market leader in terms of the number of customers/SIM cards and mobile revenue. It operates a second brand, FunFón. The incumbent Slovak Telekom, a subsidiary of the Deutsche Telekom Group, comes in second on the mobile market in terms of mobile revenue and number of customers/SIM cards. It operates a second brand, Juro. O2 Slovakia, a former subsidiary of the Telefonica Group, now member of the Czech PPF Group, ranks third in terms of mobile revenue and number of customers/SIM cards. It operates a reseller, Tesco Mobile. The most recent fourth mobile market entrant, SWAN Mobile, a subsidiary of the SWAN/DanubiaTel Group, operates under the brand 4ka.

There are no wholesale-only broadband network operators in Slovakia. The Slovak market is strongly oriented towards the deployment of own-access infrastructure. Wholesale access is sought on the market only in cases where there is no other technical or economic solution available.

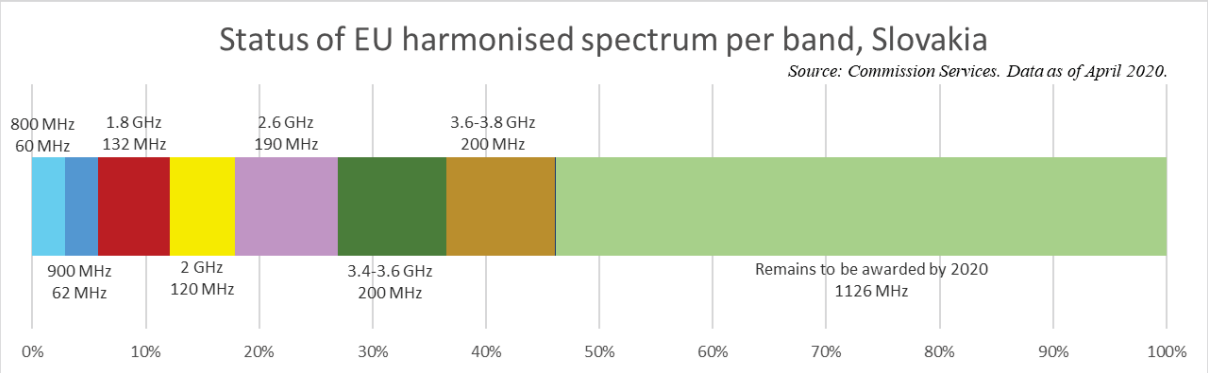
Electronic communications services are offered mainly as bundled offers of various services, including multimedia services. In recent years, the most significant growth was seen in offers containing broadband service IPTV in the form of double-play, triple-play and quadruple-play. There are no commercial agreements giving ECNS players wholesale access to content.

The merger between two Slovak fixed operators, SWAN and BENESTRA, took effect in January 2019. It aimed to create the largest domestically-owned alternative operator in Slovakia. The merged firm concentrated on combining their two respective networks before investing in infrastructure. While SWAN concentrates on residential users in the fixed line sector, BENESTRA’s focus is on the business market.

The 2017 amendment to the law on electronic communications continues to raise concerns among some operators. The amendment changed the law with regard to the identification of public interest, which is a prerequisite for a telecoms company to gain access to immovable property owned by a third party. The Slovak legislator introduced a legally binding guideline in the form of an open-ended enumeration of potential situations where the aim to serve the public interest is presumed. The law stipulates that public interest is presupposed in the case of a telecoms company operating a nationwide network. According to some stakeholders, however, the presumption discriminates against operators who do not operate a nationwide network, e.g. local operators.

3. Regulatory developments

3.1. Spectrum assignment



In Slovakia, 46% of the spectrum harmonised at EU level for wireless broadband has been assigned. The Slovak national regulatory authority for electronic communications (Regulatory Authority for Electronic Communications and Postal Services, RÚ) published a call for tender in the form of a national consultation for the award of frequencies in the 700, 900, and 1800 MHz bands on 31 March 2020. However, there is one nationwide DTT network operator on the Slovak market holding the rights to use the 700 MHz spectrum beyond 2020; the Slovak authorities presume that the process of releasing the 700 MHz frequency band will be finalised by the end of May 2020. Slovakia plans to compensate the previous holder (the nationwide network operator). The 694-790 MHz frequency band (the 700 MHz band) is largely used for digital terrestrial television broadcasting. It is still unclear if the process of releasing the 700 MHz band can be finalised before the 30 June 2020 deadline for allowing the use of the band[106].

Three out of four nationwide terrestrial DVB-T/DVB-T2 multiplexes are operated using the 700 MHz frequencies (almost 50% of operated transmitters use the frequency from the 700 MHz band). Frequencies to operate these multiplexes have been assigned to network operators through individual licences that are valid until 9 September 2029 except for multiplex 1, where frequencies are assigned until 31 May 2021. Currently, more than 50% of frequencies from the 700 MHz frequency band have been released, and it is expected that the rest will be released before the end of May 2020.

The assignment of frequencies in the 3.4-3.6 GHz band was completed in 2016 and nationwide licences were assigned to four operators (O2 Slovakia, SWAN, Orange, Slovanet) until August 2025, with different frequency block sizes. However, for rights to using frequencies in the upper part of the 3.6-3.8 GHz band, the selection procedures took place in 2017 and rights were granted at local (district) level until the end of 2024. This could make it difficult to make it possible for all operators to use sufficiently large frequency blocks in the band by 31 December 2020, the target date for 5G deployment.

Slovakia is working on allowing the use of the 26 GHz frequency band for 5G networks. The band is currently used for fixed services, with 1 GHz of the spectrum allocated for military use. The Regulatory Authority for Electronic Communications and Postal Services (RÚ) is negotiating the release of part of the frequencies allocated to the military with the Slovak Ministry of Defence. Another portion of this band (about 840 MHz) is allocated for FWA, with validity until July 2021. RÚ therefore considers that it is not realistic to allocate the 1 GHz for 5G by the end of 2020.

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

3.2. Regulated access (both asymmetric and symmetric)

In February 2019, the NRA announced a new review of the market for wholesale voice call termination on individual mobile networks. In May 2019, it notified the Commission of new symmetrical mobile termination rates for all four Slovak MNOs, with a decrease from the regulated price imposed since 2013 (1.226 eurocent/min excluding VAT) to a new regulated MTR, which amounts to 00.855 eurocent/min excluding VAT.

In October 2019, the NRA notified the Commission of its new review of the market for wholesale high quality access provided at a fixed location. It arrived at the same conclusion as in its 2016 market review, when it concluded, that no undertaking had significant market power and that the market was effectively competitive. The Commission examined the notification and had no comments.

The NRA is expected to come up with new analyses of markets 3a and 3b in year 2020.

4. End-user matters

a. Complaints

In 2019, RÚ received only 121 consumer complaints, a sharp decline compared to 2018, when it received 235 such complaints. Most complaints concerned pricing and billing, terms of contract and unsolicited communication. No specific complaints on bundled services were received. To address some of the concerns, RÚ created a search engine and comparison website, which consumers can use to compare offers of fixed broadband access.

b. Net neutrality

RÚ reported no deviation from the BEREC guidelines on the implementation of European net neutrality rules by national regulators.

Three out of four MNOs on the Slovak market have been offering zero-rated products since 2018. However, RÚ is only investigating one zero-rated product offered by one MNO.

c. Roaming

The NRA registered in particular complaints related to the application of fair use policy and data volume in another EU country. It found one case of non-compliance with RLAH rules and imposed a sanction.

There was no case in which a roaming retail derogation was granted.

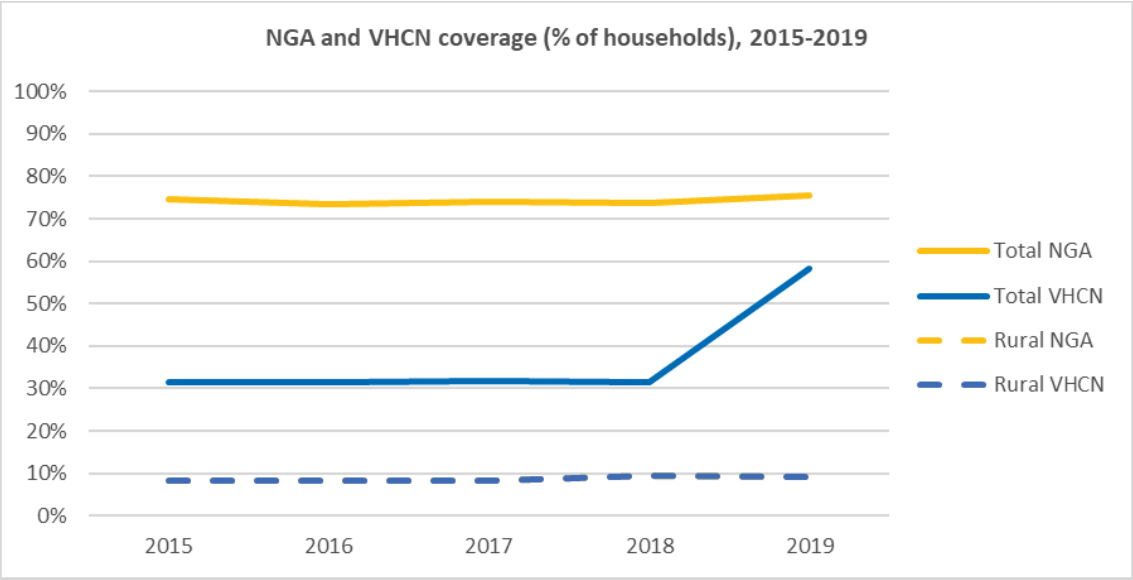
d. Emergency communications – 112

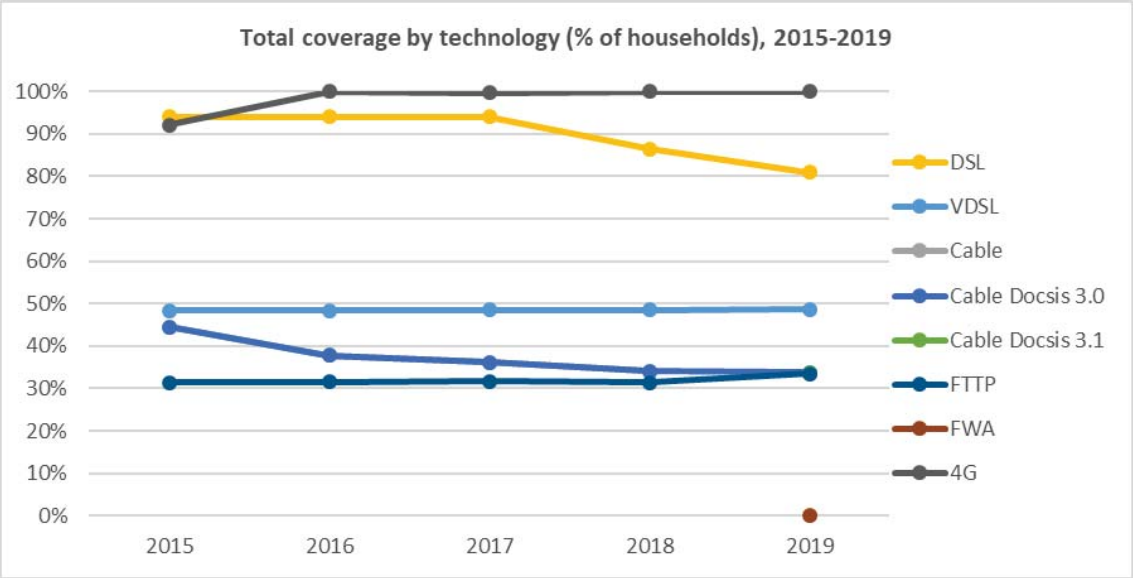
Access to emergency services for disabled people is ensured through the free-of-charge 112 SMS service. Caller location for 112 calls is based on Cell ID.

5. Conclusion

The finalisation of an update to the national broadband strategy will be a significant step towards delivering on the Gigabit Society targets. The effective implementation of the integrated infrastructure operational programme, built on close coordination between public and private stakeholders, could help make efficient use of EU funds, also with a view to ensuring coverage in Slovakia's 'white spots'. Slovakia could improve its prospect of timely 5G deployment by finalising the process of releasing the 700 MHz frequency in time and allowing the use of sufficiently large frequency blocks in the 3.6 GHz for all operators by the end of 2020.

Finland





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

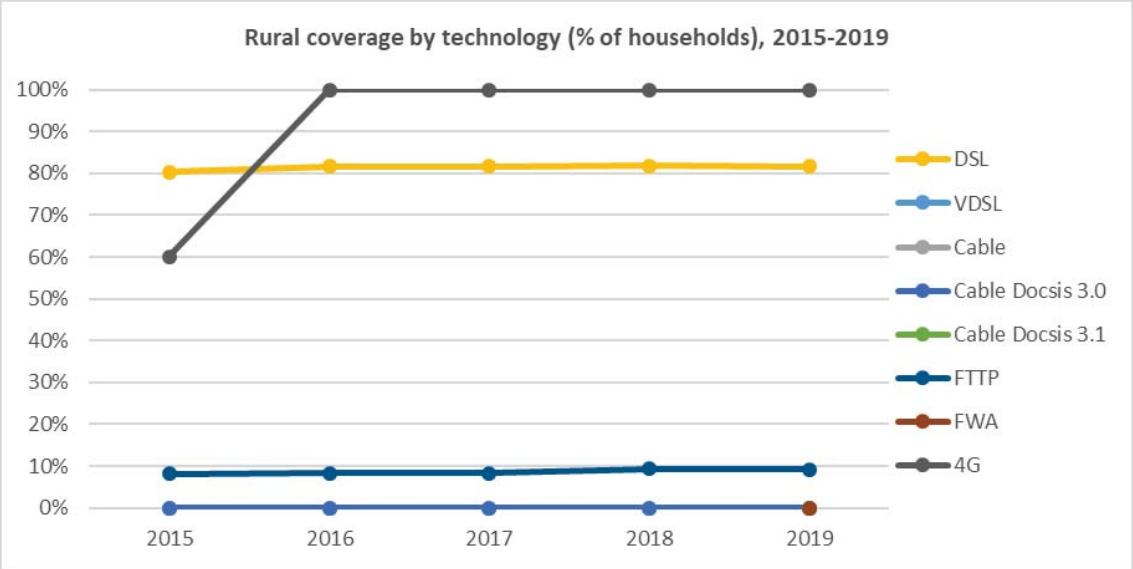
At the end of June 2019, there were more than 1.7 million fixed broadband subscriptions in Finland, out of which 1.5 million were household subscriptions[107]. Next generation access (NGA) coverage stood at 75%, below the EU average of 86%. Total coverage of very high capacity networks (VHCN) stood at 58% of the households, above the EU average of 44%. Rural VHCN coverage, made up exclusively of FTTP, remained stable but was only available to 9% of households (both in 2019 and 2018). Aggregate 4G coverage is ubiquitous in both urban and rural areas (standing at 100% in both instances against 99% in both instances for the EU).

However, a decrease in DSL coverage was recorded, falling from 87% in 2018 to 81% in 2019. This decrease may be linked to a gradual decommission of copper lines, which seemingly are being replaced by fibre technology or alternatively by mobile broadband technology. At the end of 2018,

[107] Source: Traficom.

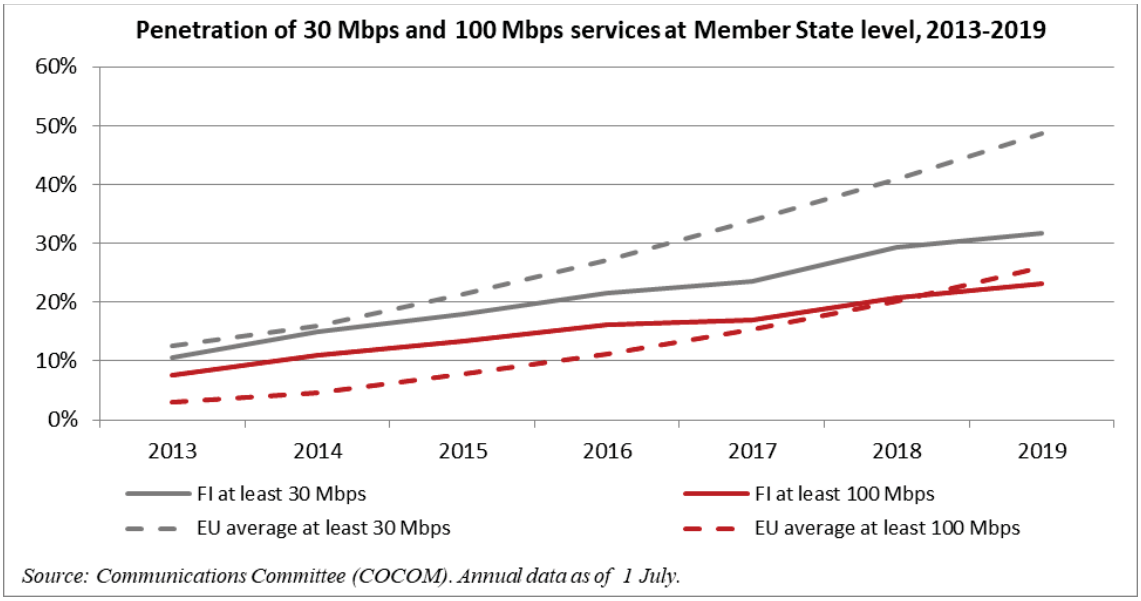
more than half of all fixed broadband subscriptions were fibre subscriptions.

Furthermore, the country's coverage in VDSL technology remains marginal. It stood at 49% in 2019 against 59% for the EU.

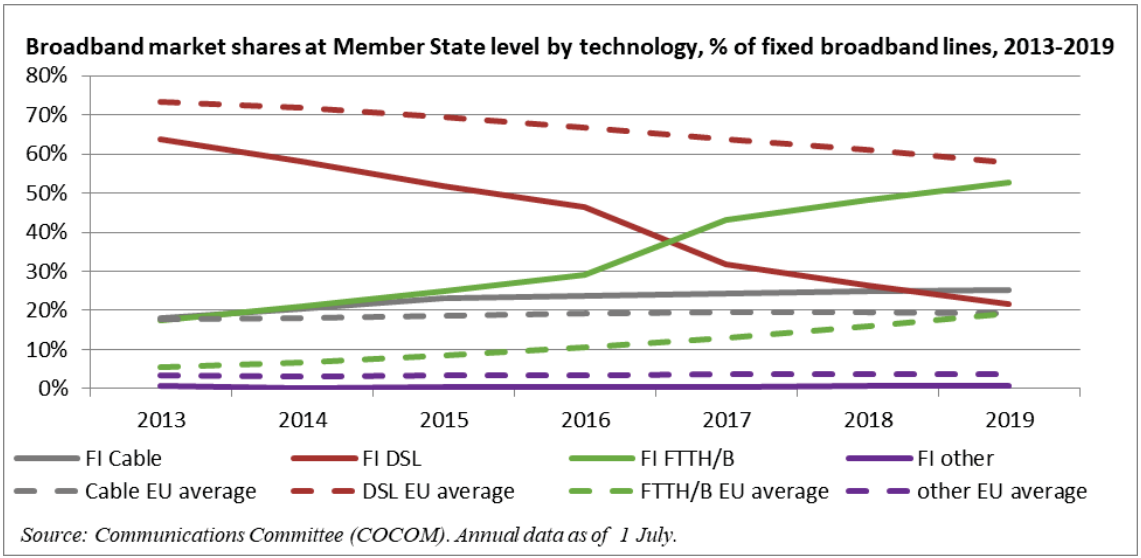


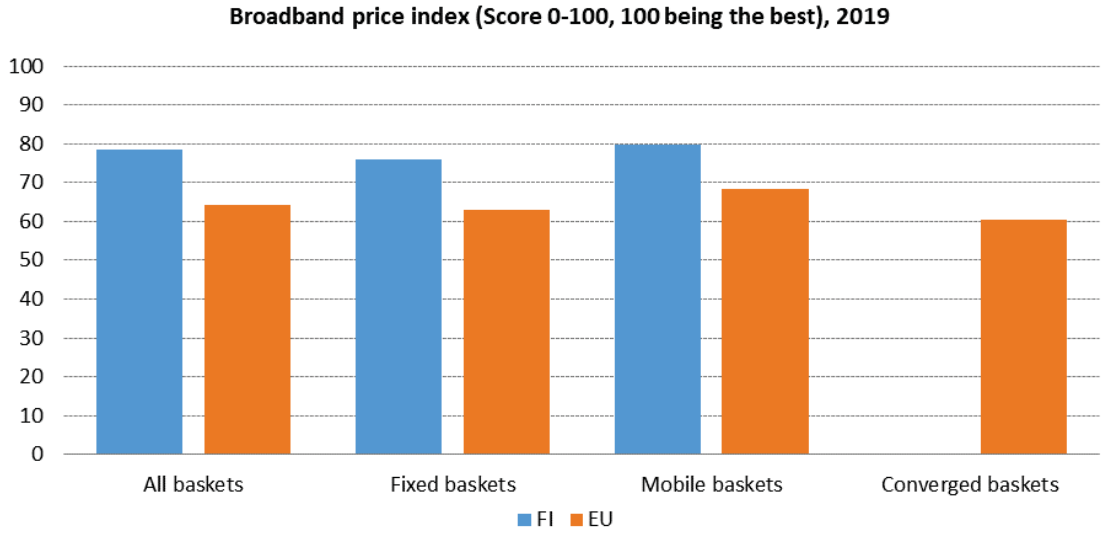
Source: IHS and Point Topic, Broadband coverage in Europe studies

52.7% of fixed broadband lines were composed of fibre-to-the-home/building (FFTH/B), far above the EU average of 19.3%. Some 25.1% are cable lines, while DSL still makes up a shrinking 21.5% share of these lines. Other technologies amounted to 0.6% of those specific technologies used on the relevant market for providing broadband services.



In Finland, the penetration rate of 30 Mbps services stood at 31.7 %, significantly below the EU average of 48.7%. The penetration rate of 100 Mbps services stood at 23.1%, slightly below the EU average of 25.9%.





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

Finland scores among the top five EU Member States in the mobile broadband price index. Indeed, it stood at 79 against an EU average of 64. On the other hand, when it comes to fixed baskets, Finland ranks 11th with 76 against an EU average of 63.

1. Progress towards a Gigabit Society[108]

The Finnish digital infrastructure strategy is ongoing. Under this strategy, Finland aims to achieve at least the minimum gigabit connectivity objectives set by the Commission. By 2025, all Finnish households should have access to a connection of at least 100 Mbps, and it should be possible to increase the connection speed to 1 Gbps.

The deployment of gigabit networks in Finland depends almost exclusively on private companies. Telia has created a joint venture with the infrastructure investor CapMan. This joint venture will own, and intends to heavily invest in, Telia's fibre-to-the-home (FTTH) infrastructure and provide the

[108] 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.

connection to end users in an 'open fibre' business model. This is a new set-up in Finland. The proposed joint venture was notified to the European Commission on 11 February 2020.

Another new joint venture is Adola company, composed of a fully state-owned fibre company and private investors. The company operates as a software company and is active in fibre roll-out.

Furthermore, as regards Finland's national broadband plan, the period in which to submit applications under the high-speed broadband aid scheme ended in 2018 but payments are estimated to continue until 2021. A total of €130 million in public aid has been made available to broadband projects. Of the total funding, €66 million come from the Government, approximately €25 million is from the EU rural development programme for mainland Finland and approximately €40 million is from Finnish municipalities. The authorities are now planning to make arrangements so that it would be possible to apply for and be granted aid again from the beginning of 2021. It is envisaged that aid will be granted for broadband roll-out in areas where no commercial broadband would be introduced before 2025[109].

As to 5G, companies have started deploying networks in the 3.4-3.8 GHz spectrum band in mainland Finland[110].

Some 5G services are already commercially available in the biggest cities of mainland Finland. Indeed, mobile services (for phones) and fixed wireless services (for home broadband) are on offer.

As to 5G road coverage, uninterrupted mobile network coverage (LTE) already exists in urban areas and major roads and railways. It is expected that the operators will use the 700 MHz band (auctioned in 2016) to provide 5G coverage to rural and suburban areas and all major roads and railways. The 3.4-3.8 GHz band is expected to be used for 5G in urban areas.

2. Market developments

The Finnish telecommunications market features fixed to mobile substitution: in 2019, the number of mobile subscriptions stood at 9.3 million whereas there are only 290,000 fixed telephone lines left in the country.

In the mobile market, there were no significant changes in 2019 in the market shares of the three main operators. Elisa is the market leader with a 38% share of the market. Telia Company's market share is 32% and the mobile and fixed network operator DNA had a 29% share. The market share of other operators amounted to 1%[111].

In January 2019, DNA announced that it had acquired Moi Mobiili Ltd, a virtual mobile network operator that had been operating on DNA's network since 2016. This acquisition reportedly did not have any major impact on the mobile market in terms of competition dynamics.

In April 2019, the Telenor Group acquired the majority stake in DNA.

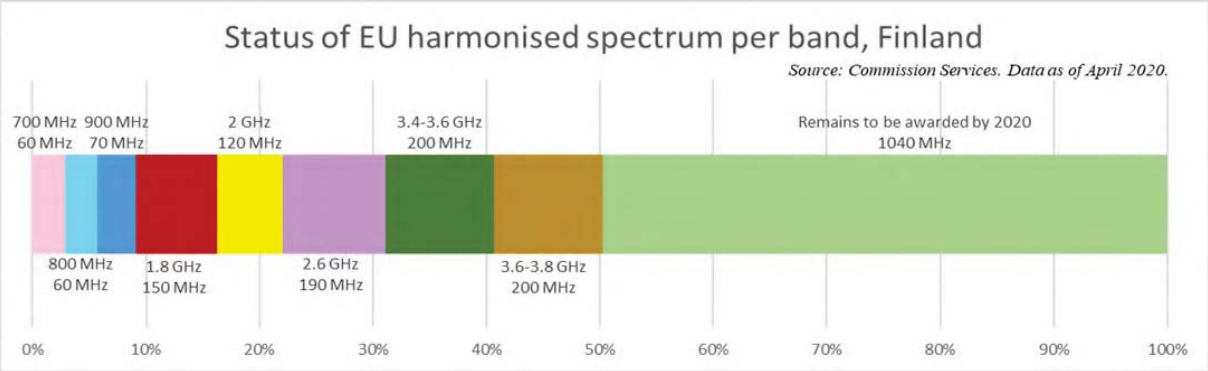
As to the fixed market, the joint venture Adola Oy entered the market on 19 November 2019. It is owned by both DIF Capital Partners and Cinia Oy. The joint venture is planning to build FTTH networks in Finland. In particular, it is reportedly planning to offer 100,000 FTTH connections to both public and private customers.

[109] According to the general government fiscal plan, for 2021, a total of €5 million will be reserved for implementing the national broadband project.
[110] The licences for mainland Finland in the 3.4-3.8 GHz band were granted in autumn 2018 through an auction procedure to DNA, Elisa and Telia. They are valid until 31 December 2033.
[111] Source: Traficom.

There are 21 operators with significant market power (SMP), most of whom operate at local level, on the fixed broadband market. The three major SMP operators that account for some 90% of retail and wholesale broadband markets are DNA Oyj, Elisa Oyj and Telia Finland Oyj. Depending on the region, competitiveness may vary according to the availability of alternative offers. There is more competition in the Helsinki area where an alternative cable modem network is available.

3. Regulatory developments

3.1. Spectrum assignment



In Finland, 50% of the spectrum harmonised at EU level for wireless broadband has been assigned. The spectrum that still needs to be assigned is mainly in the 1.5 GHz and the 26 GHz bands[112].

As to 5G spectrum in the Åland Islands, in February 2020, the government granted, through a call for applications, network licences for 5G in the 3.4-3.8 GHz band to three operators: Elisa Oyj, Telia Finland Oyj and Ålands Telekommunikation ab. The aim of these network licences is to facilitate the construction of the first 5G networks in Åland[113].

In addition, the auction of the 26 GHz spectrum band in mainland Finland is scheduled for the summer of 2020. It is anticipated that it will be used for 5G.

3.2. Regulated access

Finland's Transport and Communications Agency, Traficom, is planning to notify a new SMP decision for market 18 (television and radio transmission services) to the European Commission in the first half of 2020.

Also in 2020, Traficom is planning to start a new analysis round for i) the market for wholesale local access provided at a fixed location (market 3a of the 2014 Recommendation on relevant markets), ii) the market for wholesale central access provided at a fixed location for mass-market products (market 3b of the 2014 Recommendation on relevant markets), and iii) the market for wholesale high-quality access provided at a fixed location (market 4 of the 2014 Recommendation on relevant markets).

Furthermore, Traficom adopted a decision on access to in-house networks and published a press release on 31 May 2019 on the obligations on housing companies to enable users to choose their

[112] As regards the 26 GHz spectrum band, the frequencies of 25.1-27.5 GHz would be auctioned for national use as three 800 MHz frequency bands. The proposed starting price in the auction would be €7 million for each 800 MHz frequency band. In February 2020, the Ministry of Transport and Communications requested opinions on a number of draft documents related to the auction.

[113] The licences were granted for the period running from 1 March 2020 to 31 December 2033 and each applicant received the same amount of frequency capacity.

broadband operator[114].

4. End-user issues

a. Complaints

Traficom received approximately 330 written customer complaints, which were reportedly resolved through counselling. The main source of consumer complaints concerned the availability of fast broadband services and the pricing of fibre networks. Some complaints were related to the pricing of nationwide customer services. However, Traficom is not responsible for dealing with complaints related to contractual terms concluded between operators and private individuals. The Finnish Consumer Ombudsman is responsible for such issues.

b. Open internet

Traficom has launched a project to develop an application for measuring the speed and quality of internet connections. The work is based on a BEREC project to develop a European measurement tool. Traficom aims to provide users with a measurement application with which they can verify the quality of their internet connection. Traficom intends to involve stakeholders in designing and developing the application from the outset through dedicated workshops.

c. Roaming

In May 2019, Traficom granted Elisa a renewed license to apply surcharges to consumers for data roaming in EU and EEA countries. The new license became valid when the previous license expired on 15 June 2019, and is valid until 14 June 2020. Furthermore, DNA and Telia had also been granted authorisations to apply surcharges in 2019[115].

d. Emergency communications – 112*

Advanced Mobile Location, a handset-based caller location that relies on global navigation satellite systemsand wi-fi signals, is available in Finland. Disabled end users can contact 112 via SMS.

e. Universal service

No changes were made in 2019.

5. Other issues

A merger between authorities took place on 1 January 2019[116].The Finnish Communications Regulatory Authority (FICORA) became part of Traficom, which also handles transport issues. Indeed, Traficom is a merger of FICORA, the Transport Safety Agency (Trafi), as well as the Transport Agency for which it carries out certain functions. As of 1 January 2020, Traficom's communications market division will be merged with its spectrum division in order to form a digital connections division.

6. Conclusion

Finland is a front-runner in the EU when it comes to providing commercial 5G, as the 5G service are already available commercially in the centres of big cities. More spectrum capacity for 5G is expected to be auctioned in 2020 with the 26 GHz band.

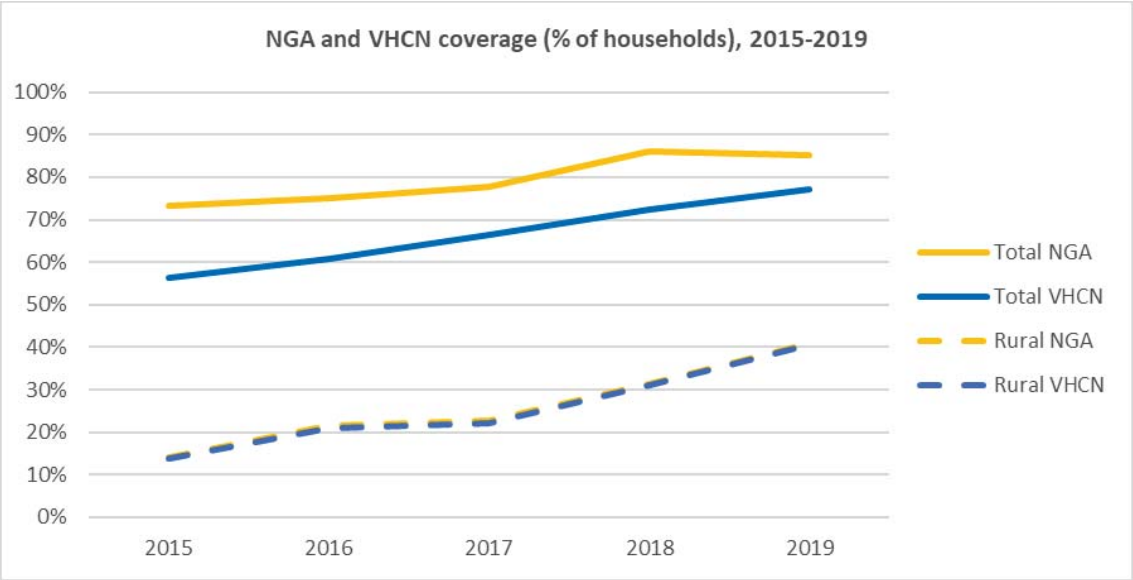
[114] https://www.traficom.fi/fi/ajankohtaista/taloyhtioiden-pitaa-mahdollistaa-asukkaiden-aito-valinnanvapaus-nopeiden

[115] DNA's authorisation expired on 14 April 2020. Telia's authorisation is to expire on 14 June 2020.

[116] The Law (23.11.2018/935) on the Transport and Communications Authority ('Laki Liikenne- ja viestintävirastosta') came into force on 1 January 2019.

Finland has good fixed broadband and 4G coverage overall. Nevertheless, fixed coverage in rural areas could be further improved. The main problem encountered has been the lack of incentive for market players to invest in sparsely populated areas of the country. Finland has adopted State aid measures and has further adjusted them to tackle this issue, resulting in more projects being carried out.

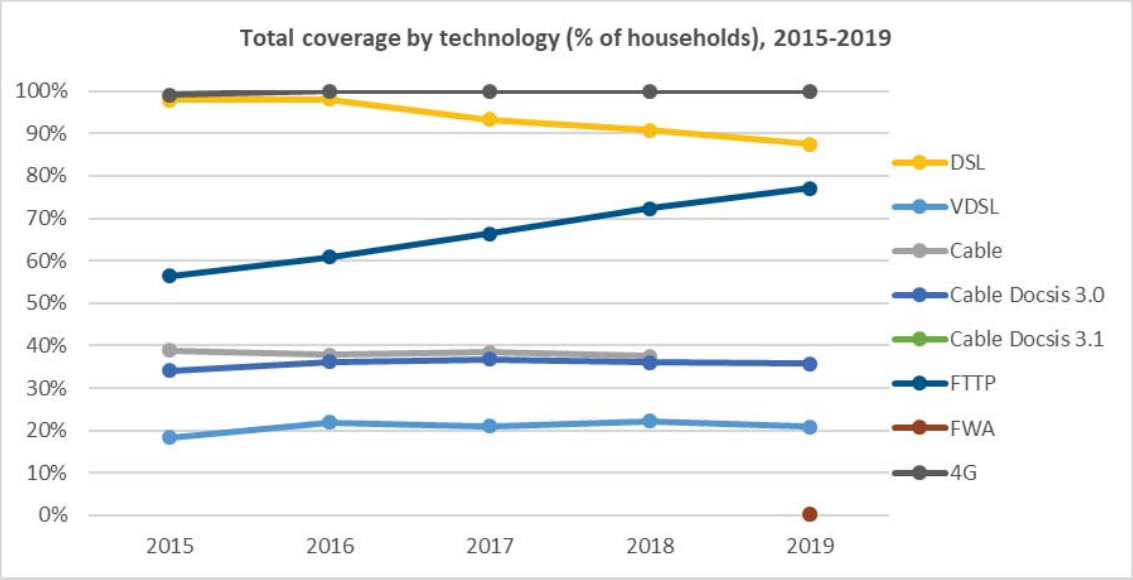
Sweden



[117]

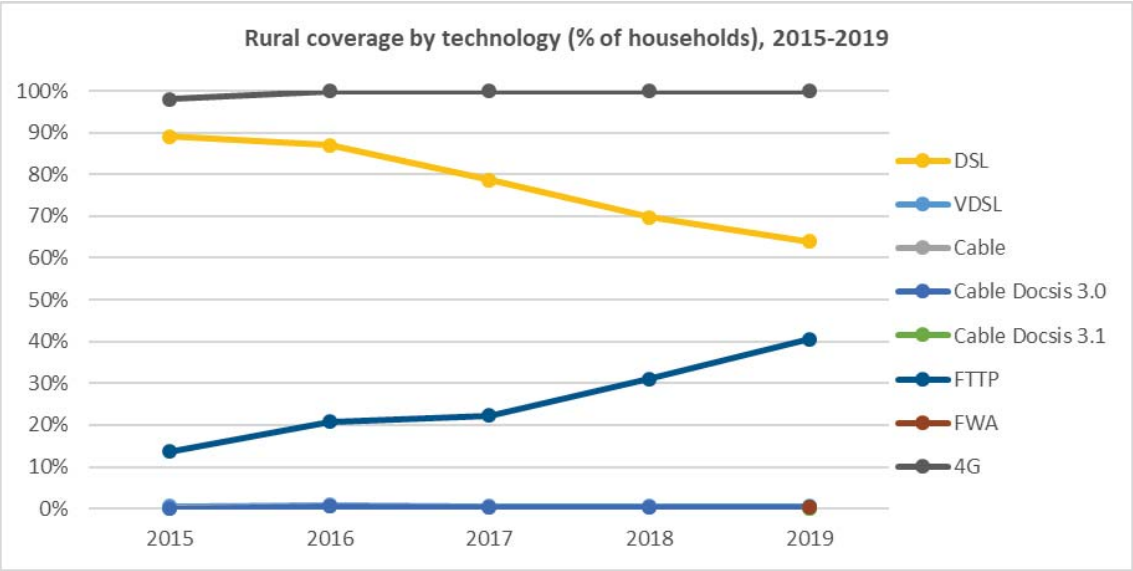
Source IHS and Point Topic, Broadband coverage in Europe studies

Fibre to the premises (FTTP) networks are widely available in Sweden (77% of households), more than double the EU average (34%). While there is an urban/rural divide, Sweden's rural FTTP coverage stands at 41%, more than double the EU average (18%). Moreover, rural FTTP coverage increased by 10 percentage points for 2 consecutive years (22% in 2017, 31% in 2018 and 41% in 2019). The upgrade of cable networks to DOCSIS 3.1 is expected to further increase its very-high-capacity network (VHCN) coverage (currently at 77%) to the levels of its next generation access (NGA) coverage (85%). Aggregate 4G coverage stands at 100%, while the EU average is 99%.

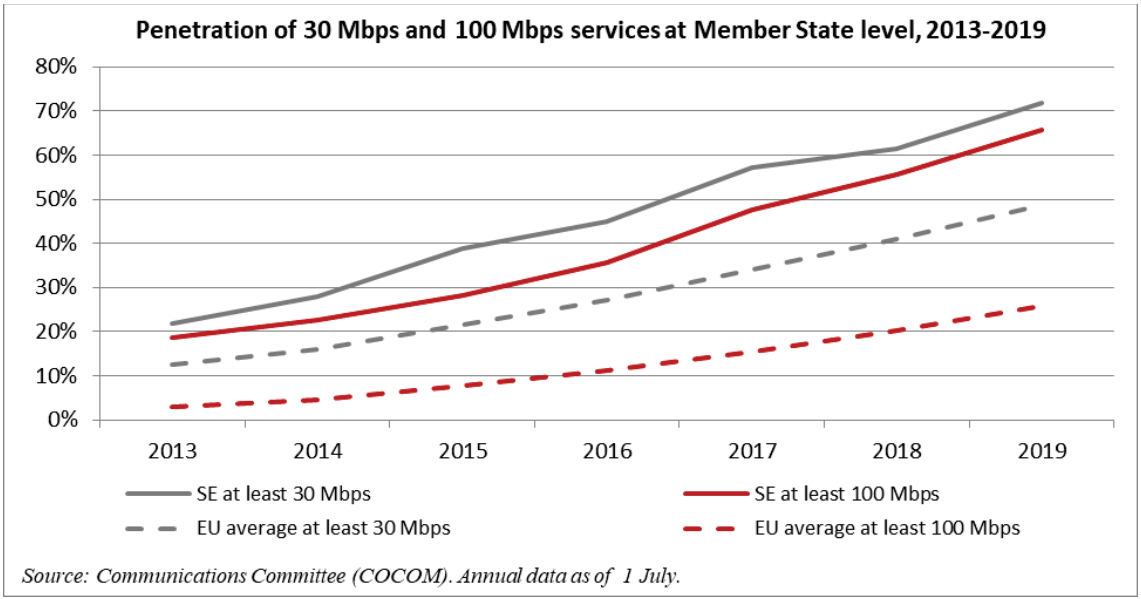


Source IHS and Point Topic, Broadband coverage in Europe studies

[117] All the data for fixed and mobile broadband presented in the graphs was collected by Sweden per 1 October 2018 (compared to other Member States where the same data was collected in July 2019).



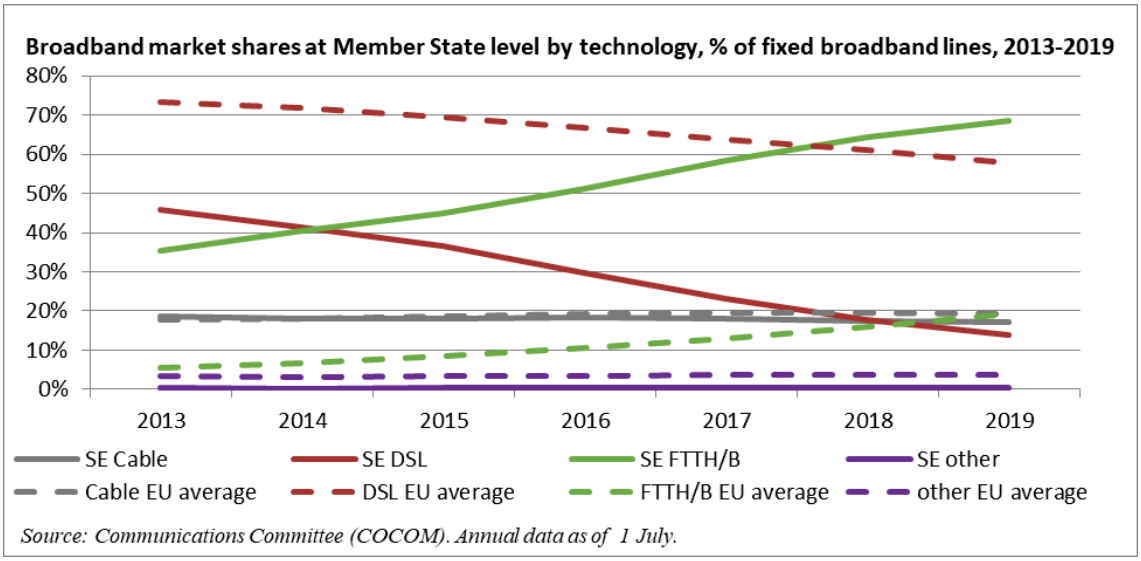
Source IHS and Point Topic, Broadband coverage in Europe studies



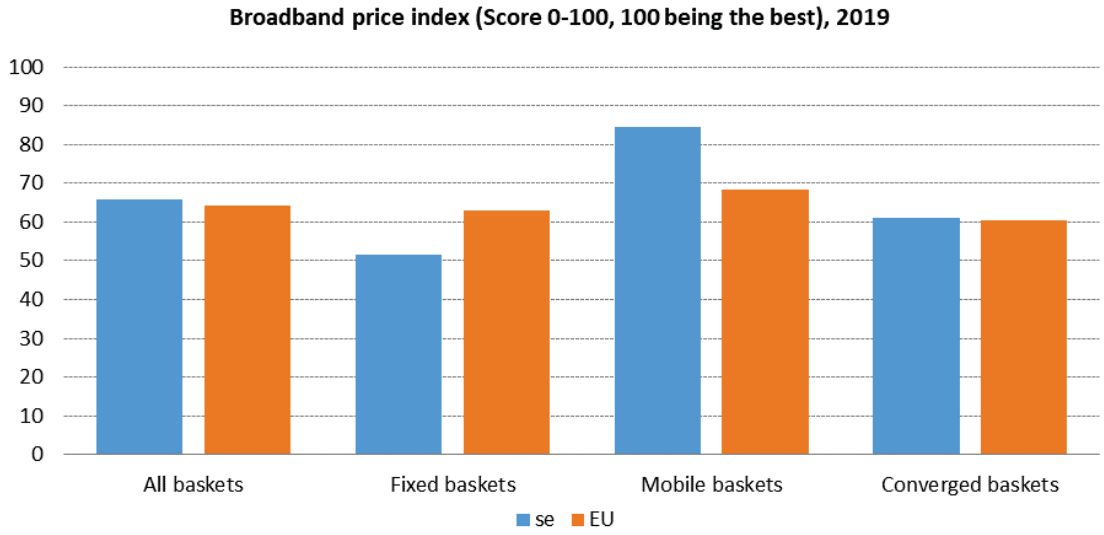
Overall, take-up of fixed broadband increased from 78% in 2018 to 86% in 2019, which is higher than the EU average (78%). Sweden is at a very advanced stage of fibre deployment, and end-users increasingly demand high-speed broadband connections. In parallel, the importance of the legacy copper network is dropping significantly, and the copper network is increasingly being phased out in favour of more advanced technologies. There is overlap between the coverage of different technologies: approximately 60% of end-users connected with copper are also connected to fibre, and approximately 29% of those end-users connected with copper are also connected to cable. In 2019, the market share of FTTH/P fixed broadband lines increased slightly to 68.7% from 64.3%, while the share of DSL decreased slightly from 17.9% in 2018 to 13.8% in 2019. Cable networks are mostly present in multi-dwelling units (MDUs) in urban areas, with only limited presence in rural areas. The number of fibre subscriptions has increased significantly in recent years, while the number of copper subscriptions has fallen significantly.

Fibre is currently by far the most widely used type of broadband subscription in Sweden. The municipalities have played a key role in the deployment of local fibre networks. In this situation, the

fibre network reach of the incumbent operator, Telia, differs significantly across Sweden, where it competes with more than 180 local municipal fibre networks.



Prices in Sweden, adjusted for price purchase parity, are close to the EU average. Prices for mobile are significantly lower than the EU average. This could explain the fact that the take-up of mobile broadband has reached 124 subscriptions per 100 people and is one of the highest in Europe. Fixed and converged baskets are more expensive than the EU average, but this does not affect the high take-up of fibre or prevent Sweden having the highest penetration of offers of at least 100 Mbps. In 2019, Sweden scored 66 on the broadband price index, compared with the EU average of 64.



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

1. Progress towards a Gigabit Society[118]

Sweden is a front-runner in very-high capacity connectivity in Europe, but it needs to address coverage in remote areas in order to reach its ambitious national broadband targets. 84% of Swedish households already had access to 100 Mbps speeds in 2018. The goal is by 2020 to reach 95%

[118] 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.

coverage of 100 Mbps, and by 2025, 99.9% coverage of 100 Mbps and 98% coverage of 1 Gbps (homes passed). To reach these targets, roll-out in remaining sparsely populated areas needs to speed up. For the next 3 years, the Swedish government has allocated SEK 650 million (€61.16 million) for broadband development. Sweden is preparing a new national State aid scheme to distribute this funding to ensure the effective deployment of broadband. Approximately SEK 150 million (€14.11 million) will already be made available in 2020. The Swedish Post and Telecom Authority (PTS) estimates that in addition to this funding and commercial investments, further private investment of SEK 22 billion (€2.07 billion) is required in the next 3 years to reach all the targets set for 2025 in the national broadband strategy.

In June 2019, the Swedish government asked PTS to evaluate how future support for broadband could be designed effectively based on PTS' earlier report from 2017 with suggestions for future measures to support broadband. PTS' proposal was submitted to the government in January 2020 and concerns a state-subsidised scheme. The new State aid scheme aims to promote the support of long-term sustainable and high-performing infrastructure enabling access to 1 Gbps speeds, as well as a cost-effective expansion that will help achieve to the goals of the 2020-2025 national broadband strategy. The support scheme sets regional priorities and covers the non-urban areas, which are not connected to next-generation access (NGA) networks.

Private investments in broadband are still ongoing, but the pace of fibre roll-out has slowed since its peak in 2016. The main reason for this is market saturation and the fact that it is mostly rural/difficult/rocky areas that have yet to be covered with fibre. Telia, the largest private investor, announced an investment slow-down and is examining other business scenarios such as fixed wireless access for rolling out fibre in the difficult/rural areas. For this reason, reaching the national broadband targets by 2025 will likely depend on investment and increasing fixed wireless access in the difficult/rural areas. Local networks continue to invest, and the private wholesale operator IP-only has announced it will increase its fibre investments in the coming years.

Following an ordinance from the Swedish government, the Swedish Transport Agency made the permit granting procedure shorter and more efficient. This helped tackle the delays in deployment in sparsely populated areas caused by the permit granting procedures.

A total of 60 licences for 5G test trials have been issued since PTS released its spectrum plan for 5G test licences in March 2017. Of the 60 issued, 38 are in the 3.4 – 3.8 GHz band, 8 in the 2.3 GHz band and 4 in the 26 GHz band at 27 different locations. Umeå will be the first 5G-ready city in Sweden. Five public stakeholders in Umeå worked together throughout 2018 and 2019 to build an infrastructure that will include the first 5G hospital and 5G university in Europe. This creates a test environment for developing new digital solutions, products and services that provide community benefits and a better everyday life for residents. An important step towards the commercial launch of 5G in Sweden in 2020 is the creation of Sweden's first 5G network at KTH Royal Institute of Technology in Stockholm. The aim is to create an innovation arena where the Institute can test various applications of 5G with the support of industry actors.

2. Market developments

On 12 November 2019, the European Commission approved, under the EU Merger Regulation, the proposed acquisition of Bonnier Broadcasting by Telia. The approval is conditional on full compliance with commitments. To address the Commission's competition concerns, Telia committed among others to grant access to free-to-air and basic pay-TV channels, as well as to premium sports pay-TV. Some market players expressed concerns over the implementation of the commitments by Telia,

which is their main competitor in the broadband market and now the distributor of Sweden's most-watched commercial TV channels.

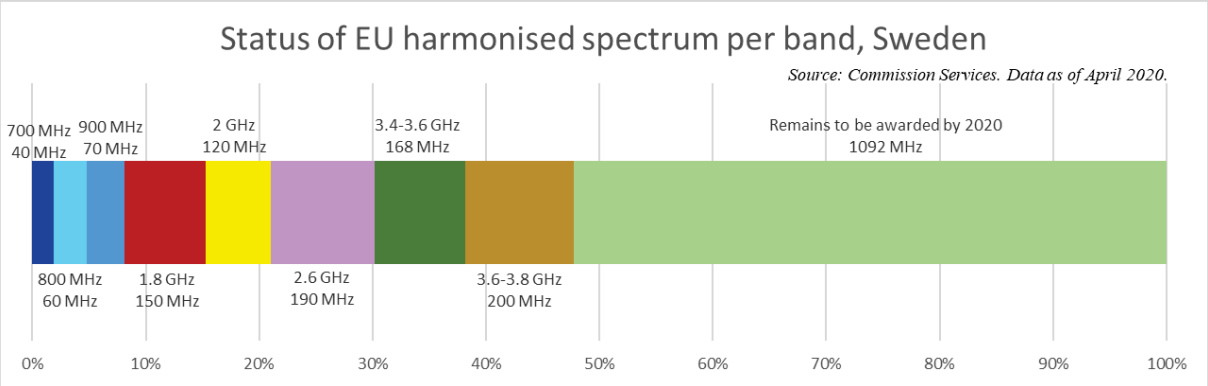
The Swedish mobile market is a competitive market dominated by five mobile network operators: Telia, Tele2, Telenor, 3 Sweden and Net1 (an operator offering only mobile broadband services at a fixed location in the 450 MHz band). There are also several mobile virtual network operators (MVNO) with very small market shares. The incumbent, Telia, continues to have the largest market share.

The number and composition of subscriptions of bundled services has been stable in recent years, without any significant change since PTS last adopted measures in 2015. The only increase concerns IP-TV over fibre. The trend in voice communication continues, with mobile increasing and fixed service decreasing. The mobile operators have adopted a clear strategy offering data packages, which include unlimited voice and message services. This lowers consumers' incentive to use number-independent interpersonal communications services (NI-ICS), at least on a domestic level. NI-ICS continue to be used for international communications.

3. Regulatory developments

Implementation of the European Electronic Communications Code (EECC) has taken a step forward in Sweden, with the publication on 4 September 2019 of a memorandum by the Swedish Government. According to this memorandum, the aim is to implement the EECC in Sweden by means of a new Electronic Communications Act and to amend all relevant legislation accordingly. The public consultation on the draft proposal was completed in December 2019. The next step is to submit the draft bill to the Council on Legislation and then to the Swedish Parliament for voting in May/June 2020.

3.1. Spectrum assignment



In Sweden, 48% of the spectrum harmonised at EU level for wireless broadband has been assigned. Part of the 700 MHz band was auctioned and awarded in December 2018, and the licences are valid from the beginning of 2019 until the end of 2040. However, so far the band has been used by mobile network operators (MNOs) for providing 4G services, due to the lack of capacity in rural Sweden. Also, there has not been any decision from the Ministry on the use of the reserved 2×10 MHz FDD spectrum in the 700 MHz band and no decision regarding the 20 MHz SDL spectrum that remained unsold. Despite the Ministry's decision that this spectrum is available for digital terrestrial television (DTT) until the end of 2020, both the Ministry and PTS confirmed that the entire 700 MHz band is no longer used for terrestrial TV broadcasting. In addition, Sweden appealed against the result of the auction and prompted the national Court to request a preliminary ruling by the European Court of Justice. No decision has yet been taken, and an oral hearing was planned for spring 2020. The

auction for the 3.4-3.8 GHz band was initially planned for March 2020 but has been postponed until October 2020 to take into consideration national security issues concerning 5G roll-out. PTS ran a public consultation for the 26 GHz band in January 2020.

3.2. Regulated access (both asymmetric and symmetric)

Operators were consulted in Q2 2019 on the markets for wholesale call termination on individual public telephone networks provided at a fixed location (market 1 of the 2014 Recommendation on relevant markets[119]) and for wholesale voice call termination on individual mobile networks (market 2 of the 2014 Recommendation on relevant markets[120]). The market analyses were then notified to the Commission in October 2019. The Commission issued its decision[121] on the notification in November 2019. The market players expressed concerns about PTS' analysis resulting in the lowest mobile termination rate (MTR) in the EU, which could potentially lead to a temporary increase in the termination rate if the mobile Euro-rate is above the current very low rate. According to market players, the termination rates proposed by PTS, which are very low compared to other Member States, will have a considerable negative impact on the Swedish market. PTS adopted its final decisions on 12 December 2019, under which 19 undertakings in market 1 and 12 undertakings in market 2 were designated as having significant market power (SMP).

In November 2019, PTS notified to the Commission its decision for the market for wholesale local access provided at a fixed location (market 3a of the 2014 Recommendation on relevant markets[122]) and for the market for wholesale central access provided at a fixed location for mass-market products (market 3b of the 2014 Recommendation on relevant markets[123]). Based on the fact that FTTH has become by far the dominant technology in Sweden and that subscriptions to the copper network have dropped very significantly, PTS concluded that copper and fibre are no longer part of the same market and consequently defined a separate market for wholesale local access to fibre networks. In a call for input regarding a first hypothesis, PTS indicated a geographical segmentation and found that local fibre networks should have significant market power (SMP) obligations, as they constitute local monopolies. However, PTS eventually changed its position, and in its draft decision for formal consultation defined a national market for wholesale local access to fibre networks, in which only Telia had significant market power. All operators (except for the association representing the municipal fibre companies[124]) expressed concerns over this finding and its implications. Some overall disagreement on the access to these municipality networks surfaced, with most operators calling for further, uniform (access) regulation of the municipal networks. Specifically, the operators argued that the wholesale products currently offered to access seekers on a commercial basis are simple rebranding solutions, with very limited scope for the access seeker to customise the end-product.

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[119] 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.

[120] Ibid.

[121] C(2019) 8116 final, Brussels, 8.11.2019.

[122] 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.

[123] Ibid.

[124] This association represents around 200 operators with more than 50% of the market.

The Commission has examined the notification and issued a veto decision[125], expressing serious doubts on the definition of the geographic scope of the fibre local access market. Following this decision, PTS had to withdraw its draft decision. PTS defined the geographic market as being national despite observed differences in the connections of operators in different municipalities, and variations of the actual reach of historical operator Telia's fibre access network across local municipalities. On the national market, PTS found that Telia holds significant market power (SMP) based on factors including its market share at national level and the significant gap in terms of national market share between Telia and its competitors. However, the Commission assessed that the variations of competition between municipalities were too significant to conclude that the market is indeed national, and it found that a more granular approach to the geographic market definition is needed.

4. End-user matters

a. Complaints

The Swedish Quality Index's[126] latest survey of customer experiences in the mobile industry shows that customer satisfaction with mobile operators and services is increasing. In broadband services, the trend for private and corporate customers looks quite different, showing a continuous decline for corporate customers and a positive upturn for private customers[127]. From 1 January 2019 to 30 November 2019, PTS received a total of 1 972 consumer complaints, compared to 2 202 complaints in 2018. The most common consumer complaints in 2019 concerned a) number and call-related issues such as loss of number when switching provider as well as unwanted and unsolicited sales calls and attempted frauds; b) disruption of services; and c) availability and accessibility of services, such as customer service and access to broadband when moving.

b. Open internet access

On 15 December 2018, PTS initiated supervision against the internet service provider Bahnhof for possible violation of the open internet rules. Specifically, Bahnhof had blocked several piracy-related domains for file-sharing content subject to copyright, and blocked the site of the copyright holder after the copyright holder submitted a lawsuit at the Swedish court ordering Bahnhof to block the piracy-related domains. PTS dismissed the case in March 2020 after having found that a court decision makes it necessary for Bahnhof to block the content subject to copyright and that Bahnhof no longer blocks the site of the copyright holder.

Telia's mobile offer 'Free surf on social media', which was allowing subscribers to use a number of social media applications and services without deducting data, was subject to supervision to check whether the commercial practice of zero-rating is compatible with Article 3(2) of the Open Internet Regulation (EU) 2015/2120. PTS dismissed the case in June 2019 after having found that the offer was open to all suppliers of content and that the offer did not limit end-users' rights by means stipulated under the Telecoms Single Market Regulation.

PTS initiated supervision in January 2019 regarding a possible traffic management policy published on Telia's website. The policy seemed to limit both the speed of file sharing and its capacity, which seemed to be reduced during most of the day. Furthermore, simultaneous sessions of file sharing seemed to be reduced to a maximum of five. PTS dismissed the case after Telia confirmed that such traffic management was not practised.

[125] C(2020) 619 final of 7 February 2020.
[126] http://www.kvalitetsindex.se/branschundersokningar/telekom/ .
[127] Ibid.

c. Roaming

In 2019, there were complaints concerning calls while 'roaming like at home' (RLAH) to special numbers (i.e. toll-free numbers or numbers with shared costs such as numbers for companies, authorities and organisations), leading to bill shock.

d. Emergency communications – 112

Telenor's IP telephony subscribers were unable to call the emergency number 112 for 5 days in December 2019. Following this incident, PTS is supervising the operational disruptions. Since the interruptions affected a large number of subscribers' ability to call the emergency number 112 for several days, PTS will examine the cause of the incident, how Telenor addressed the problem and what the company is doing to prevent it from happening again.

Sweden implemented AML handset-based localisation for emergency calls through the HELP 112 II project financed by the European Commission. Disabled end-users may access emergency services by sending an SMS to 112 or using an emergency application.

5. Conclusion

Sweden is a front-runner for ultrafast connectivity in Europe. The biggest challenge for achieving the goals of its ambitious national broadband strategy by 2020 is to address the difficulties of ensuring roll-out and coverage of the remaining sparsely populated areas. In this respect, a spectrum policy consistent with its investment needs will be key. The successful deployment of 5G in Sweden depends on the timely availability and assignment of the 5G pioneer bands. The Ministry is working together with PTS and the other relevant authorities to solve the delays with the permit granting procedures and to allocate funding more efficiently.