EUROPEAN
COMMISSION

Brussels, 11.6.2019
SWD(2019) 206 final

PART 6/6

COMMISSION STAFF WORKING DOCUMENT

Digital Economy and Society Index (DESI) 2019

Digital Economy and Society Index (DESI)

2019 Telecom Country Reports

Part II

Lithuania

	Lithuania				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
1a1 Fixed broadband coverage % households	**81%** 2016	**82%** 2017	**85%** 2018	***27***	**97%** 2018
1a2 Fixed broadband take-up % households	**63%** 2016	**65%** 2017	**64%** 2018	***23***	**77%** 2018
1b1 4G coverage % households (average of operators)	**96%** 2016	**98%** 2017	**98%** 2018	***11***	**94%** 2018
1b2 Mobile broadband take-up Subscriptions per 100 people	**75** 2016	**78** 2017	**89** 2018	***16***	**96** 2018
1b3 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	**NA**	**NA**	**0%** 2018	***10***	**11%** 2018
1c1 Fast broadband (NGA) coverage % households	**50%** 2016	**54%** 2017	**63%** 2018	***27***	**83%** 2018
1c2 Fast broadband take-up % households	**39%** 2016	**45%** 2017	**47%** 2018	***13***	**41%** 2018
1d1 Ultrafast broadband coverage % households	**NA**	**54%** 2017	**61%** 2018	***18***	**60%** 2018
1d2 Ultrafast broadband take-up % households	**12%** 2016	**27%** 2017	**29%** 2018	***10***	**20%** 2017
1e1 Broadband price index Score (0 to 100)	**93** 2016	**92** 2017	**92** 2018	***5***	**87** 2017

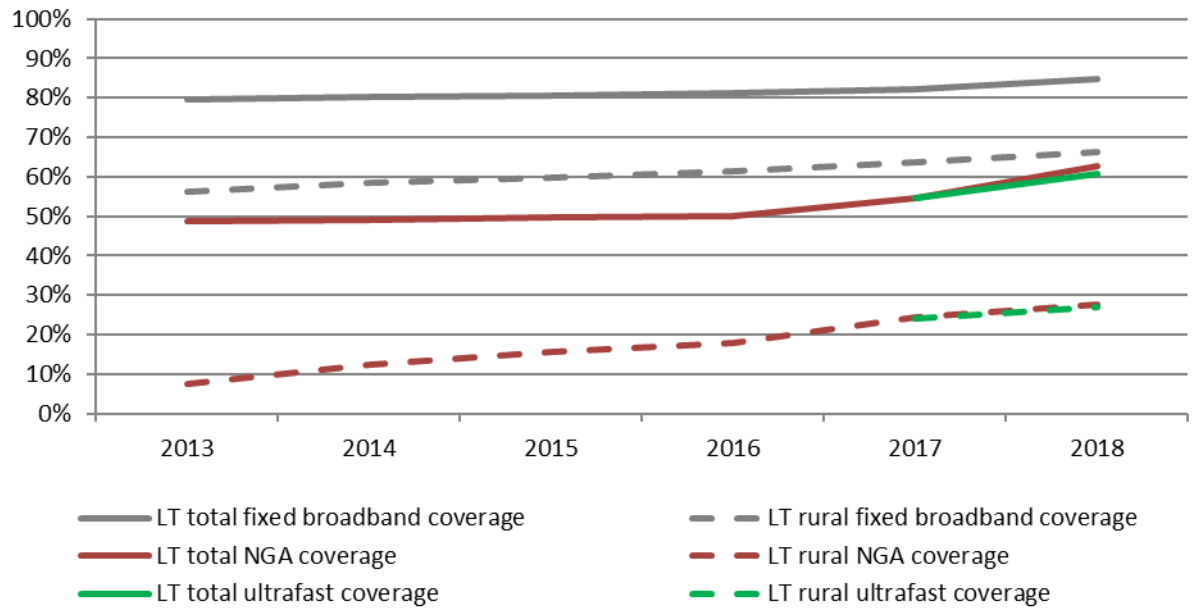
1. Progress towards a gigabit society

In 2018, the European Commission approved the *Development of Next Generation Access Infrastructure - RAIN3* project (a state aid measure). This project aims to ensure that broadband networks in rural areas are further developed during the 2018-2021 period by giving electronic communication operators wishing to connect end users with download speeds above 30 Mbps wholesale access to a newly built fibre backhaul network. This network will consist of active and passive elements, including not only approximately 180 telecommunication towers but also cabinets facilitating the connection of both fixed and fixed-wireless access networks. Like work towards the achievement of EU targets, this measure aims to reduce the divide between the country's urban and rural areas. The state-owned company Plačiajuostis internetas will provide open wholesale access to the subsidised next generation network (NGN) backhaul infrastructure to third party operators, who will then be able to connect their respective next generation access (NGA) infrastructure and provide broadband services to end users. The new backhaul infrastructure will be deployed in areas that are currently not covered by NGA networks, that lack sufficient backhaul infrastructure and for which there are no plans for such coverage in the next 3 years (white spots). After RAIN 3 is implemented, Lithuania's NGA coverage is expected to further increase.

Lithuania achieved better results than the EU average in terms of 4G coverage and ultrafast broadband coverage. Although its overall fixed broadband coverage and NGA coverage are lower than the EU average, most of its NGA coverage is ultrafast (both in rural areas and in general). Also, its ultrafast broadband coverage is growing at a much quicker rate than its fixed broadband coverage below ultrafast speeds[1].

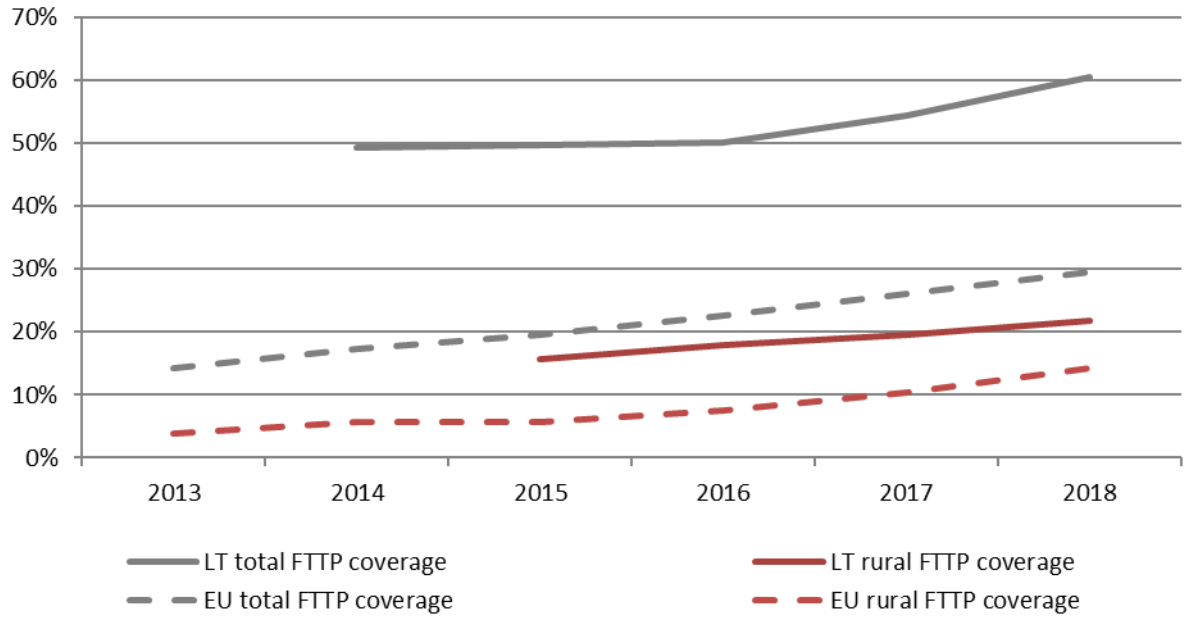
[1] Figures have been substantially updated following a revision of broadband coverage indicators.

Fixed, NGA and ultrafast coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June. Ultrafast coverage metrics are available for 2017 and 2018.

Fibre-to-the-premises (FTTP) coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June.

Total FTTP coverage in Lithuania has been growing steadily over the past 2 years and is well above the EU total. On the other hand, growth of FTTP coverage in Lithuania's rural areas has been slower than the country's total FTTP growth and slower than growth across the EU in 2018. It is much closer to the EU's rural FTTP coverage in terms of percentage of households connected.

In 2018, Telia Lietuva (the incumbent), Tele 2 and state-owned LRTC conducted the first 5G trials. However, Lithuania faces obstacles in preparing for the rollout of 5G, due to restrictions stemming from unresolved cross-border coordination issues with non-EU countries (mainly Russia). Lithuania asked the Commission for assistance concerning this matter in June 2018. Another obstacle is related to the electromagnetic field (EMF) limits, which are lower than the maximum limits set out in the 1999 Council Recommendation[2] and which make it difficult to densify the network in urban areas.

The first 5G-related spectrum auction (covering frequencies in the 3.5 GHz band) is planned for the year 2020. The conditions of the auction will include an obligation to cover one major city by 2020, in line with EU targets. In addition, in 2018 Lithuania signed agreements on cross-border 5G corridors with Poland (letter of intent signed on 5 September 2018), Latvia and Estonia (memorandum of understanding and intent signed on 28 September 2018).

The national regulatory authority (RRT) has started to analyse the European Electronic Communications Code (EECC) and to prepare an initial list of legal acts that will have to be amended or adopted in order to transpose the EECC. This analysis was to be submitted to the European Law Department before 11 January 2019.

2. Market developments

Competitive environment

In general, Lithuania's electronic communications market has been growing over the last year. Retail prices are low and competition on the market remains fierce. The consolidation trend remains, but there were fewer acquisitions in 2018 than the year before. In this context, it is worth mentioning that in 2018 Telia Lietuva tried to acquire UAB Duomenų logistikos centras (a subsidiary of Lietuvos Energija, UAB), and asked merger clearance from the Competition Council. However, Telia Lietuva withdrew its request in the course of the merger evaluation.

In October 2018, RRT conducted a consumer survey about the substitutability of fixed and mobile services and concluded that, for the time being, they are considered complementary to each other. 49.9 % of Lithuanian consumers use both mobile and fixed broadband, 18.2 % use only mobile and 14.8 % use only fixed broadband. According to RRT, 55.4 % of respondents using both mobile and fixed broadband confirm their complementary character (mobile services are chosen for convenience and high availability while fixed broadband for fast and reliable connection).

2.1. Fixed markets

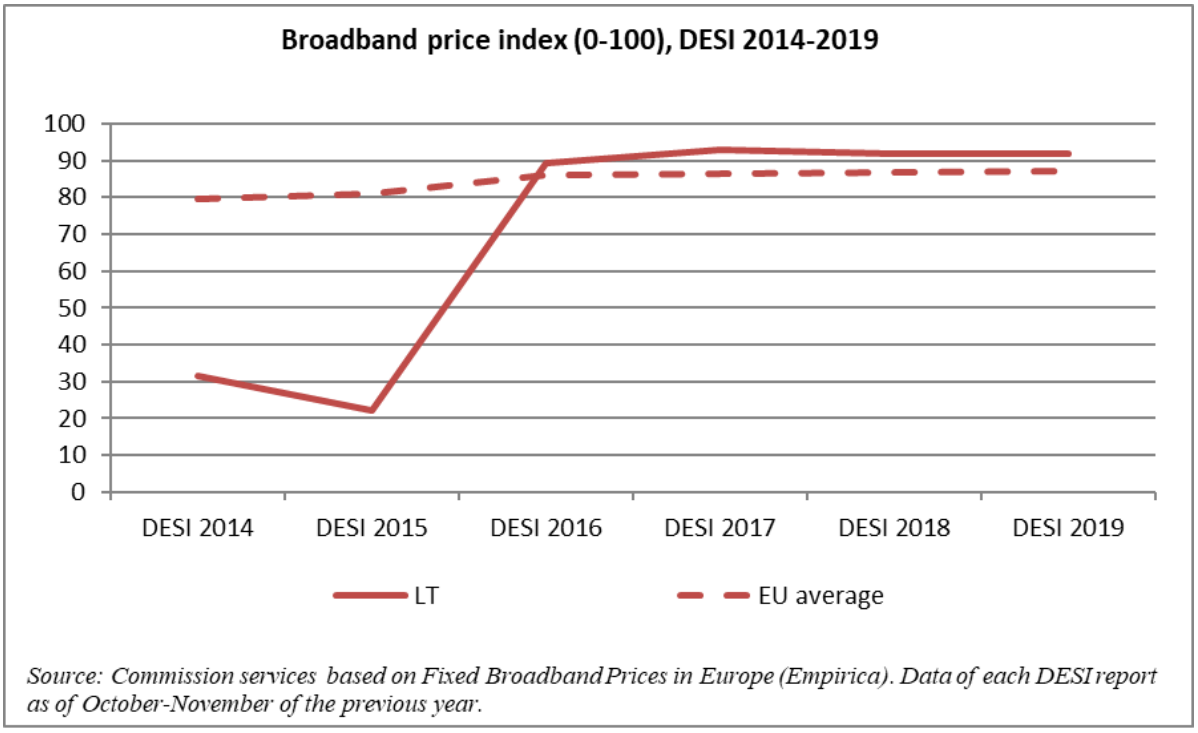
In 2018, Lithuania achieved better results than the EU average in terms of fast and ultrafast broadband take-up and the broadband price index (ranking as the 5th cheapest Member State)[3]. However, its performance is low in terms of general fixed broadband take-up (64 % compared to EU average of 77 %).

As regards internet access, there was a small decrease in the number of subscribers in 2018 (1.1 %) compared to 2017. Over the same period, fixed broadband penetration remained unchanged (28 % of the total population).

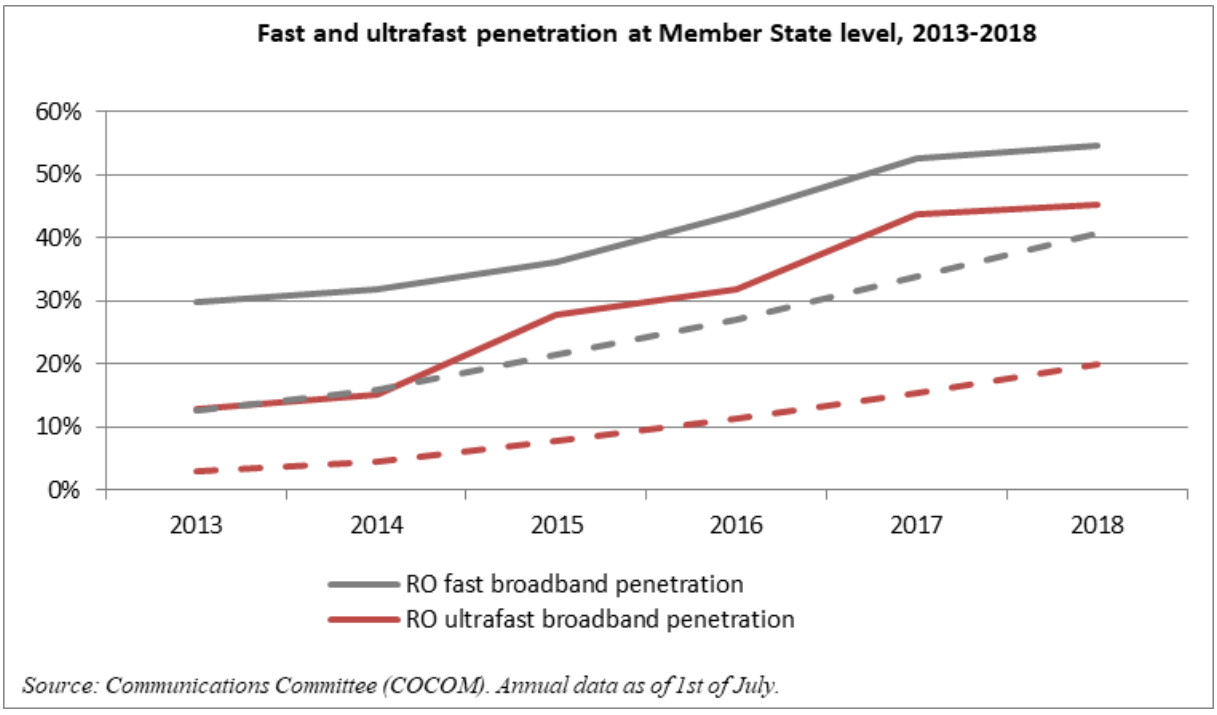
[2] Council Recommendation 1999/519/EC on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz), OJ L 199, 30.7.1999, p. 59–70.

[3] The fixed broadband price index weighs the cheapest retail offers from: standalone, double play (BB + TV, BB + fixed telephony) and triple play (BB+TV+fixed telephony) and three speeds categories - 12-30 Mbps, 30-100 Mbps and +100 Mbps. This indicator presents values from 0 to 100 (which should not be read as prices) and the higher the values, the better the country performs in terms of affordability of prices relative to purchasing power.

As regards market share, the incumbent has 52 % of fixed broadband subscriptions while the remaining 48 % belong to new entrants (the EU average is 40 % and 60 %, respectively).



Source: Commission services based on Fixed Broadband Prices in Europe (Empirica). Data of each DESI report as of October-November of the previous year.



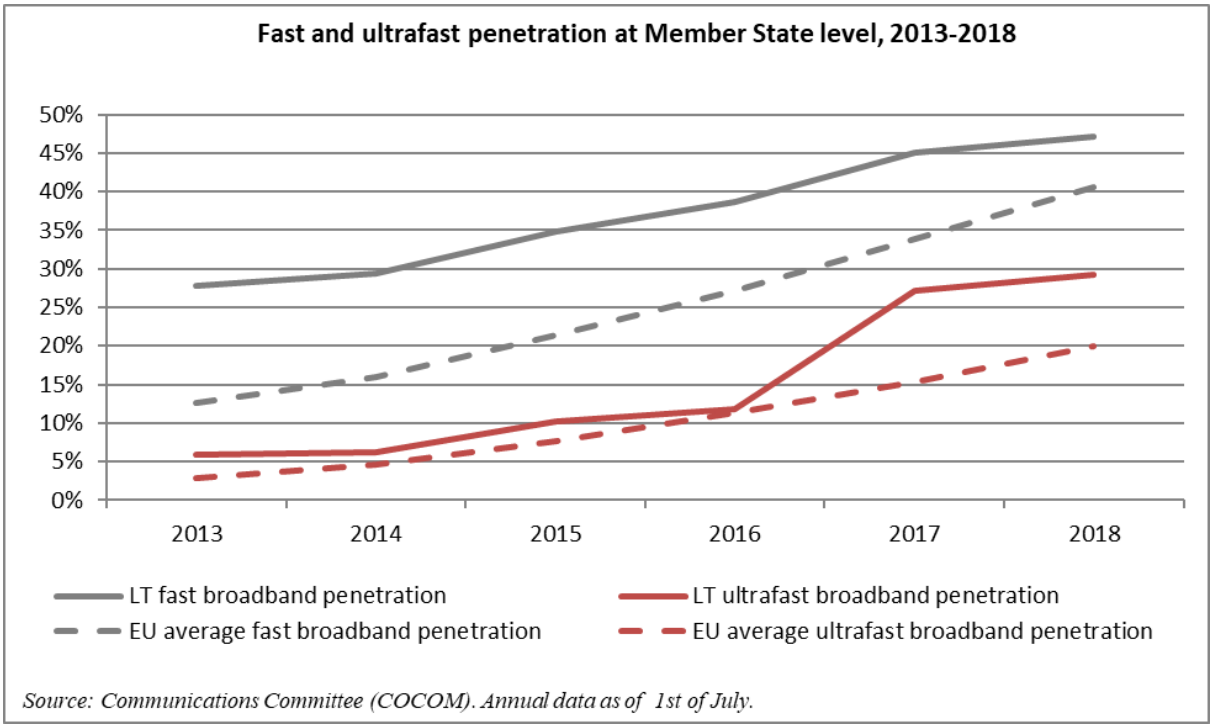
Source: Communications Committee (COCOM). Annual data as of 1st of July.

As regards Digital Agenda speeds, 46 % of Lithuanian internet subscribers used connections of at least 100 Mbps, 28 % used broadband of 30-100 Mbps and 26 % 144kbps–30 Mbps. This puts Lithuania's overall performance in this area above the EU averages of 26 %, 27 % and 47 %.

In 2018, two new ECS providers entered the fixed telephony market and six ECS providers were removed from the register of providers of fixed ECS upon their own request.

In Q2 2018, there were 80 service providers on the Lithuanian market (-3 compared to Q4 2017). The number of FTTx subscribers increased to 572 200 in Q2 2018 (+6 600 compared to Q4 2017). The fixed internet market share of the state-owned company LRTC further decreased, because LRTC switched from fixed WiMax to mobile LTE in 2017 (and therefore its market share is now considered within the mobile market rather than the fixed market).

The market for business users grew from 47 900 users in Q4 2017 to 48 400 in Q2 2018. The incumbent's (Telia Lietuva's) market share (calculated taking into account the number of business users) decreased in Q2 2018 compared to Q4 2017 (from 58.46 % in Q4 2017 to 55.26 % in Q2 2018). The largest alternative ECS provider was UAB Baltnetos komunikacijos, whose market share slightly increased (from 13.47 % in Q4 2017 to 14.12 % in Q2 2018). The third largest ECS provider, LRTC, increased its market share from 4.53 % in Q4 2017 to 4.72 % in Q2 2018. Lastly, the fourth largest ECS provider, UAB CSC Telecom, increased its market share from 2.6 % in Q4 2017 to 5.09 % in Q2 2018.



Source: Communications Committee (COCOM). Annual data as of 1st of July.

FTTH/B take-up in Lithuania is significantly above the EU average and its growth is stable. Accordingly, ECS providers further invested in their own FTTx networks over the last year.

The popularity of cable technology has been decreasing (in terms of number of users), despite the fact that DOCSIS 3.x technology is available for the provision of cable services. VDSL (S-VDSL) technology has been available from Telia Lietuva since 2017, but in Q2 2018 was not widely used. The popularity of other technologies, including DSL, also decreased.

Overall, investment in public network infrastructure increased in Q2 2018 compared to Q4 2017, and amounted to € 25.75 million (+ € 1.21 million compared to Q4 2017). The largest investments were made by the incumbent, Telia Lietuva (more than 50 % of all investments). The incumbent focused on the development of FTTH and alternative operators on FTTB. At the end of Q2 2018, there were 572 200 internet access subscribers who accessed the internet via fibre lines (298 800 via FTTB lines, 273 300 via FTTH lines and 23 300 via cable TV networks).

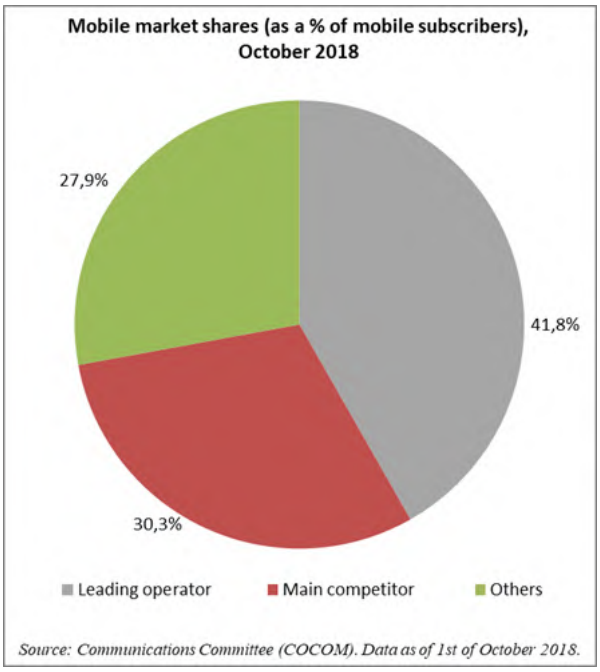
There is no co-investment strategy in place in Lithuania. However, Telia Lietuva ran a co-investment project with an electricity grid operator, which involved coordination of civil works when deploying networks for 63 newly built houses in the Vilnius region.

According to the information provided by the Lithuanian authorities, there are three wholesale-only broadband network operators in Lithuania (UAB Satgate, UAB Skaidula and state-owned company Plačiajuostis internetas). In 2017, UAB Satgate was the leader in terms of wholesale internet access services (45.9 % market share). UAB Skaidula had a 34.53 % market share (lease of dark fibre only). Lastly, in 2017, Plačiajuostis internetas' market share was about 27.97 % for dark fibre lines and 30.9 % for the market of wholesale transmission of other data services, excluding internet access services.

2.2. Mobile markets

In 2018, the leading Lithuanian operator had 41.8 % of the market share while its main competitor – 30.3 % and others – 27.9 %.

Mobile penetration noted a significant increase and reached 89 % compared to 78 % a year before.



Source: Communications Committee (COCOM). Data as of 1st of October 2018.

The price of the least expensive offer for a handset (1 GB + 300 calls basket) increased compared to 2017 (14.6 € compared to 13.8 € in 2017) but remains much lower than the EU average (22.3 € in 2018).

The total number of subscribers who used LTE-technology-based internet access services increased by 14.1 % during Q2 2018 and by 37.1 % over a period of one year, reaching 2 044 100. Over the same periods, the number of LTE base stations increased by 15.7 %, and 42.1 %, respectively. There were 6 652 LTE base stations at the end of Q3 2018. According to the information provided, around 350 base stations do not have fibre backhaul. The state-owned company Plačiajuostis internetas provides wholesale services for base station backhauling: dark fibre services and data transmission services with 300 Mbps up to 1 Gbps speed. These are the most popular services for base-station backhauling among Lithuanian operators.

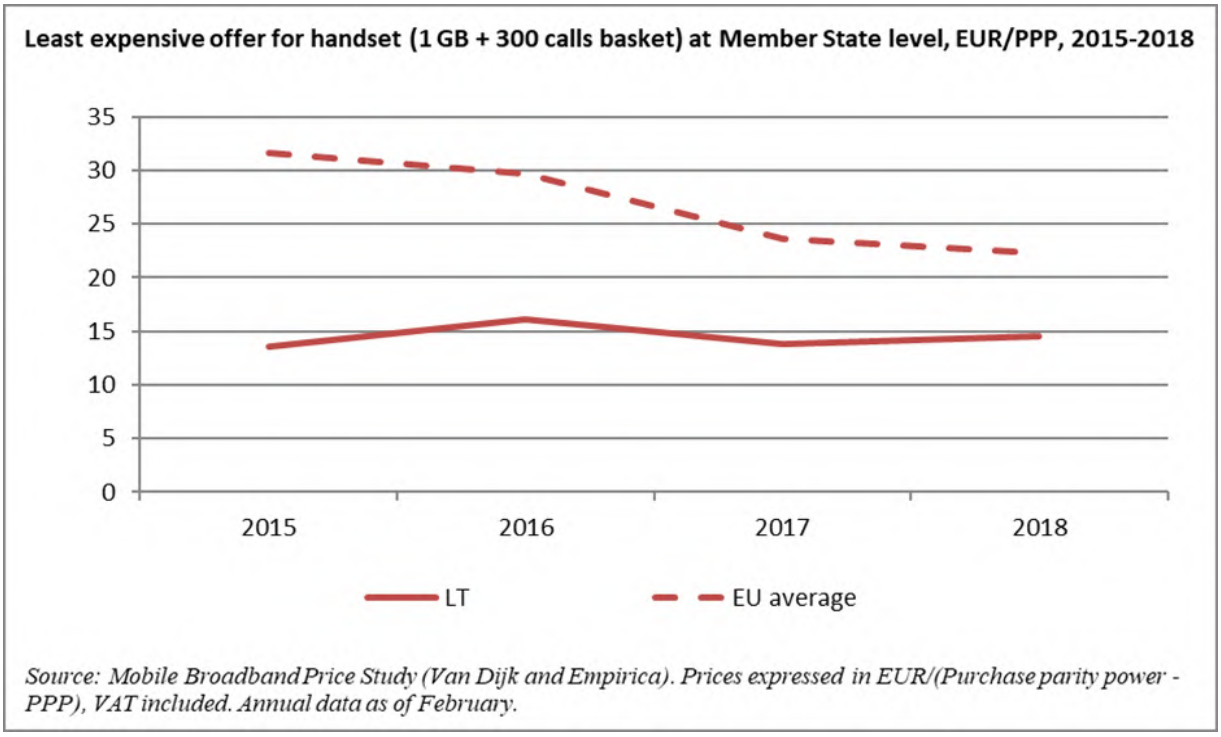
In comparison with Q1 2018, the amount of data sent and received using the GPRS/EDGE, UMTS, UMTS HSDPA, and LTE technologies increased by 6.1 % in Q2 2018, and amounted to approximately 68 694 TB. The increase between Q2 2017 and Q2 2018 amounted to 60.2 %.

Lithuanian operators do not share networks for coverage.

The most popular bundle in the mobile market is mobile voice services, SMS messages and mobile data. However, between Q4 2017 and Q2 2018, the number of subscribers to such bundles slightly decreased.

In Lithuania, there is a large variety of bundles that include not only electronic communications services, but also other services or devices, such as: ECS + a device, ECS + VOD, ECS + trust services, ECS+ premium TV channels, ECS + e-mail boxes, ECS + music streaming, ECS + cloud data storage, etc.

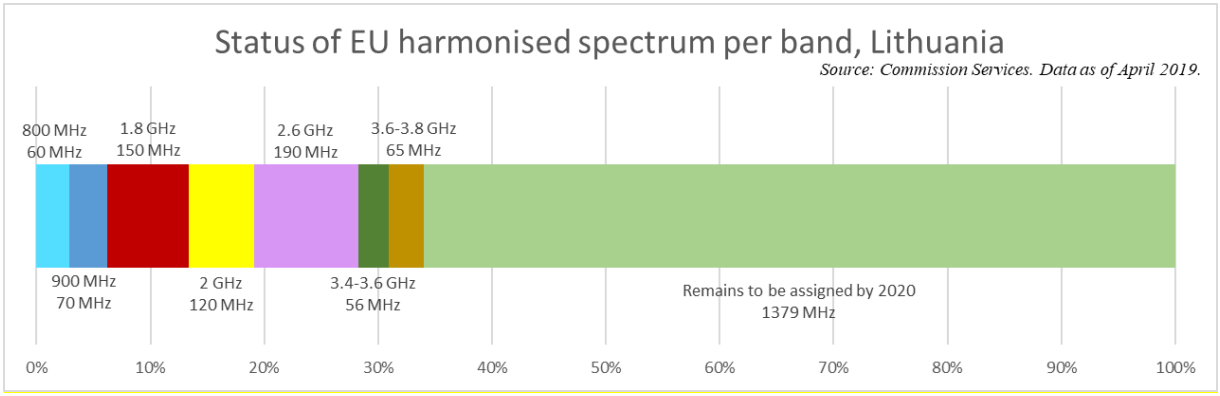
As regards consumption trends, voice call consumption increased in Q2 2018 compared to Q4 2017, while the number of SMS messages decreased.



Source: Mobile Broadband Price Study (Van Dijk and Empirica). Prices expressed in EUR/(Purchase parity power - PPP), VAT included. Annual data as of February.

3. Regulatory developments

3.1. Spectrum



In Lithuania, 34 % of the spectrum harmonised at EU level for wireless broadband has been assigned[4]. The spectrum that remains to be assigned is mainly in the 700 MHz, the 1.5 GHz and the 26 GHz bands. The 3.4 - 3.6 and 3.6 - 3.8 GHz bands are also not fully assigned.

No spectrum allocation was reported for 2018. However, in 2018, the Lithuanian authorities prepared a 5G Roadmap[5] in line with Decision (EU) 2017/899[6].

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

[5] The 5G roadmap is available at: https://www.e-tar.lt/portal/lt/legalAct/bfd006109c7811e8b93ad15b34c9248c

RRT launched a public consultation on the development of 5G services in the 3.4 - 3.8 GHz frequency range. The draft plan presented is still under consideration, but the NRA plans to act in order to grant rights of use in the 3.4 - 3.6 GHz as well as in the 3.7 - 3.8 GHz bands as from the end of 2020. All licences would be valid for the period of 20 years. As regards spectrum caps, the document proposes that one participant and entities linked to it would not be able to get in the possession of more than 100 MHz.

The stakeholders raised concerns regarding this auction, which mainly come from the service obligations and the fact that the state-owned entity LRTC is in the possession of fragments of frequencies in this band that were previously acquired by LRTC through 'a beauty contest'[7]. According to RRT, refarming of these lots is under consideration.

As regards the spectrum auction for frequencies in the 700 MHz band, concrete discussions between RRT and the operators have not yet started. The auction is planned to be held by 31 January 2020 and the licenses are planned to be granted by 30 June 2020. However, the allocation of frequencies in this band depends on successful coordination with neighbouring countries, especially Russia.

The 26 GHz frequency band is not being considered yet. RRT plans to announce an auction for 26 GHz by the end of 2020 at the latest.

3.2. Regulated access

RRT did not report any significant regulatory decisions in 2018. However, both the regulator and the operators reported problems with the wholesale access bitstream (FTTx/ADSL) prices charged by the incumbent – Telia Lietuva. More specifically, RRT and the Competition Council received complaints about Telia's retail service prices, which are allegedly lower than wholesale costs and raise concerns about cross-subsidisation of Telia's services. Additionally, Telia randomly applies discounts to its wholesale prices to prevent a margin squeeze. This results in access seekers not being able to effectively plan their products, as they do not have certainty on wholesale price levels.

Furthermore, in 2018, RRT carried out a public consultation on reviewing 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[8]); it notified the Commission of this on 22 February 2019. By Q3 or Q4 2019, RRT is also planning to notify the Commission of a review of the market for wholesale voice call termination on individual mobile networks (market 2 of the 2014 Recommendation on relevant markets). The new prices will be determined through benchmarking.

The review of the market for wholesale high-quality access provided at a fixed location (Market 4 of the 2014 Recommendation on relevant markets) is expected to start in Q3 2019 and to be notified in Q3 2020. Furthermore, RRT is planning to start the review of the retail market for access to the public telephone network at a fixed location for residential and non-residential customers (market 1 of the 2007 Recommendation on relevant markets[9]) and of the wholesale market for call-origination on the

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[6] Decision (EU) 2017/899 of the European Parliament and of the Council of 17 May 2017 on the use of the 470-790 MHz frequency band in the Union, O.J. L 138, 25.5.2017, p. 131–137.

[7] It appears that beauty contest was the predominant way of assigning frequencies in Lithuania in the past. This is how the 2G and 3G licenses were granted. Auction was introduced only lately for the 4G spectrum.

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

[9] Commission Recommendation of 17 December 2007 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European

public telephone network provided at a fixed location (market 2 of 2007 Recommendation on relevant markets) in Q4 2018 or Q1 2019, and to notify the Commission of them in Q4 2019 or Q1 2020. Lastly, the review of the wholesale market for broadcasting transmission services to deliver broadcast content to end users (market 18 of the 2003 Recommendation on relevant markets[10]) is planned to start in Q2 2019. The expected date for notification of the review is Q2 2020.

Based on its national law, Lithuania maintains a symmetrical access obligation to existing electronic communications infrastructure and/or suitable purpose physical infrastructure.

In the market for wholesale local access provided at a fixed location (market 3a of the 2014 Recommendation on relevant markets), the lease of ducts is the most popular service. The length of ducts to which access was granted reached 8 832 km in Q2 2018 (+ 66 km compared to Q4 2017). Access to dark fibre granted in Q2 2018 increased by 3.32 % (from 2 832 access permits in Q4 2017 to 2 926 in Q2 2018. The number of decisions to access LLU decreased from 41 in Q4 2017 to 29 in Q2 2018. Finally, the number of bitstream access decisions increased from 2 138 in Q4 2017 to 3 604 in Q2 2018 (by 68.57 %). Access products other than those for access to ducts were not very popular, because alternative operators mostly built their own FTTx networks.

In 2018, RRT set up an Information System of Operators' Networks (ISON), a database in which operators can provide information about their existing fixed networks. The first call for information gathering was already launched and is being finalised. ISON is able to automatically provide RRT with the necessary information regarding coverage and duplication of fixed networks, as well as information on operators and their fixed lines in all municipalities or in a particular building. However, ISON does not offer mapping in the strict sense.

As regards the mapping of civil infrastructure, in 2017 the Ministry of Environment and the Ministry of Agriculture started a project aiming to unify and automate the organisation and management of the topography of civil infrastructure and, ultimately, to collect data about all civil infrastructure. In 2017 and 2018, terms of services were negotiated for this project and its completion is expected in 2020.

Lastly, it is worth mentioning that in 2018 RRT finalised a study on the possibility of introducing 'national roaming'[11] in Lithuania; the study was initiated in continuity from a discussion with the Ministry of Transport and Communications and some market players. The study concluded against its introduction.

4. End-user matters

According to the 2018 Consumer Markets Scoreboard, mobile telephone services were assessed very favourably by consumers (5th highest out of 25 services markets assessed), with an increase in the market performance indicator (MPI) of 2.9 percentage points between 2015-2017 (7.8 points above the market's EU average score). Internet provision services rank 12th (+3.1 percentage points between 2015-2017, + 6.9 points above the market's EU average score), whereas fixed telephone services are ranked 14th (6.4 points above the market's EU average score) and TV subscriptions 18th respectively (the last two services markets saw no improvement in consumers' assessments between 2015-2017).

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.

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

[11] National roaming refers to an agreement among operators to use each other's networks to provide services in geographic areas where they have no coverage.

Amongst all 25 services assessed and all MPI components, mobile telephone services market is one of the markets that saw the highest increases for a specific component relative to the EU-28 average (+1.1 on choice). Also, internet provision recorded one of the highest improvements for a specific component between 2015-2017 in Lithuania amongst all 25 services assessed (+0.7 on choice).

a. Net neutrality

An increase in zero-rated offers has been noted in 2018. In mid-2018, all internet service providers (ISPs) operating in Lithuania offered some sort of zero-rating or price differentiation of specific applications or content, mostly music streaming, video streaming/IPTV, social media, voice and short messages, navigation applications, as well as e-book subscription and news applications.

RRT reported a breach of Regulation (EU) 2015/212012 in 2018, related to zero-rating. One of the operators limited internet access when the data cap was reached, except for to zero-rated content. After RRT's intervention, the practice was discontinued and the offer was withdrawn from the market.

RRT provides an online system where end users can measure their fixed internet access speeds and compare them with the values specified in their IAS contracts. RRT did not impose any minimum quality of service requirements on ISPs in 2018[13]. The measurement results obtained via the online system are not legally binding, although end users can use them as a basis for filing a complaint. According to RRT, around 300 000 measurements were registered until the end of 2018 and only a handful complaints were filed.

b. Roaming

According to the data from the 21st International Roaming BEREC Benchmark Report, Lithuania is one of the Member States in which the prices of data-only packages are increasing.

Lithuanian end users have consumed 1.9 times more roaming minutes (calls made) in Q4 2017 (RLAH) than in Q4 2016 (before RLAH). The same increase was noted between Q1 2017 and Q1 2018.

As regards data, Lithuanian end users have consumed 4.1 times more roaming data in Q4 2017 than in Q4 2016. Between Q1 2017 and Q1 2018 data consumption increased 4.8 times.

In 2018, all MNOs and 1 MVNO received second sustainability derogation decisions. The surcharges allowed were lower than in the year before. RRT indicated that it might be difficult for some operators to reach the threshold necessary to be granted further derogations in 2019.

In 2018, RRT received a few complaints concerning the application of roaming rules in Lithuania. In some cases, alternative tariff plans were offered, without RLAH and with relevant domestic consumption included. RRT also faced complaints concerning the absence of relevant information about fair use policy, incorrect billing for roaming services, and the lack of automatic application of RLAH. In addition, it noted complaints arising from a lack of understanding of the difference between intra-EU calls and roaming. According to RRT, operators followed the NRA's recommendations and adjusted their behaviour.

[12] Regulation (EU) 2015/2120 of the European Parliament and of the Council of 25 November 2015 laying down measures concerning open internet access and amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services and Regulation (EU) No 531/2012 on roaming on public mobile communications networks within the Union, OJ L 310, 26.11.2015, p. 1–18.
[13] Data until mid-2018.

c. Emergency communications - 112

Lithuania is among eight Member States where advanced mobile location (AML) is fully deployed. It reports that AML availability stands at 82.5 %. The average time needed to receive a handset-based location is 25 seconds, and up to 10 seconds to receive a network-based caller location.

The Commission is currently looking into the functioning of emergency communications and the 112 number in Lithuania, with a particular focus on finding a solution that gives disabled people equal access to 112 services. According to the Lithuanian authorities, an application that makes this possible will be launched in 2019. This application will make it possible to have video calls with people who use sign language.

It is worth noting that, in 2018, the Regional Administrative Court of Vilnius submitted a request for a preliminary ruling to the European Court of Justice (Case C-417/18) concerning the interpretation of provisions on emergency services and the single European emergency call number (Article 26 of the Universal Service Directive). The ruling should clarify some aspects of the functioning of the 112 number, especially on connecting to 112 from a SIM-less device and on requirements related to caller location.

d. Universal service

In 2018, there were no changes concerning public payphones or directory enquiry services, which fall under the scope of universal service obligations. However, it is worth mention that the number of payphones was reduced in Lithuania in 2018, from no less than 936 to no less than 527.

5. Institutional issues

In addition to the new responsibilities that RRT was entrusted with in 2017 (supervision of trust services, regulation of the rail sector and implementation of cost reduction measures related to broadband deployment), its tasks were further broadened in 2018, beyond the electronic communications and adjacent sectors. As a result, RRT is now responsible for the supervision of tariffs (remuneration) and the provision (including re-use) of data/documents stored in public registers and information systems. From 1 January 2018, RRT's function as Lithuania's national Computer Emergency Response Team (CERT-LT), including all related human and technical resources, was handed over to the Ministry of National Defence as part of the national process of consolidating all cybersecurity-related functions. However, RRT remains in charge of supervising the integrity of public communications networks (the networks' physical security as opposed to data breaches, which have been moved to the Ministry).

Furthermore, in December 2018, amendments to the Law on Electronic Communications entered into force, aiming to ensure the NRA's structural separation and independence. More specifically, the amended law requires that RRT board members be independent from market players and policy makers, and that they fulfil their duties impartially. The new RRT board was appointed in January 2019.

These amendments also gave RRT another responsibility, namely for the evaluation of tariffs on state-developed public wholesale fast broadband services. The Ministry of Transport and Communications is responsible for setting the tariffs and the process of drafting an implementing measure on broadband pricing methodology is ongoing.

In order to manage its new responsibilities, the maximum number of RRT staff (including civil servants and employees) was increased by seven people and salaries were also increased slightly. However, considering the number of new tasks that RRT is responsible for and reported plans to

increase these even further, concerns regarding RRT's administrative capacity and effective functioning remain, and will require monitoring.

In addition, Lithuania adopted new rules concerning the recruitment of civil servants in 2018 in order to centralise the procedure; this might lead to a decrease in RRT's control over recruiting its own staff.

The Lithuanian government's previous plans to set up a new multisector regulator by uniting three separate institutions (RRT, National Commission for Energy Control and Prices and the State Energy Inspectorate under the Ministry of Energy) have changed. The current plan is to unite the two institutions in charge of economic and technical regulation in the energy sector. RRT will therefore remain a separate regulator.

Overall, despite positive developments concerning NRA independence, the effective separation of public functions still needs to be monitored.

In this context, it is worth mentioning that Lithuania became a full member of the OECD in 2018. This required it to establish and start implementing procedures that will increase the independence of the boards of state owned enterprises (SOEs) and to apply international financial reporting standards. It is also undergoing reforms to rationalise sectors with multiple SOEs.

6. Conclusion

In 2018, Lithuania started preparing for 5G rollout by adopting a 5G Roadmap, in line with the Decision (EU) 2017/899[14], launching a public consultation on the development of 5G services in the 3.4 - 3.8 GHz band and signing agreements with Poland and Latvia on cross-border 5G corridors. Additionally, three Lithuanian operators started first 5G trials. However, Lithuania faces obstacles to 5G rollout due to unresolved cross-border coordination issues with non-EU countries (mainly Russia), as well as electromagnetic field limits which are lower than the maximum limits set out in the 1999 Council Recommendation.

The European Commission approved the *Development of Next Generation Access Infrastructure - RAIN3* project in 2018 (a state aid measure). After RAIN 3 is implemented, NGA coverage in Lithuania is expected to further increase, particularly in rural areas, as electronic communication operators wishing to connect end users with download speeds above 30 Mbps will be given wholesale access to a newly built fibre backhaul network.

Despite the adoption of new rules aiming to ensure the NRA's full independence, the effective separation of public functions, including as regards the functioning of state-owned companies, requires further monitoring.

[14] Decision (EU) 2017/899 of the European Parliament and of the Council of 17 May 2017 on the use of the 470-790 MHz frequency band in the Union, O.J. L 138, 25.5.2017, p. 131–137.

Luxembourg

	Luxembourg				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
1a1 Fixed broadband coverage % households	**>99.5%** 2016	**>99.5%** 2017	**100%** 2018	***1***	**97%** 2018
1a2 Fixed broadband take-up % households	**96%** 2016	**94%** 2017	**88%**[15] 2018	***3***	**77%** 2018
1b1 4G coverage % households (average of operators)	**95%** 2016	**98%** 2017	**99%** 2018	***6***	**94%** 2018
1b2 Mobile broadband take-up Subscriptions per 100 people	**116** 2016	**123** 2017	**139** 2018	***4***	**96** 2018
1b3 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	**NA**	**NA**	**0%** 2018	***13***	**14%** 2018
1c1 Fast broadband (NGA) coverage % households	**94%** 2016	**95%** 2017	**98%** 2018	***4***	**83%** 2018
1c2 Fast broadband take-up % households	**47%** 2016	**52%** 2017	**62%** 2018	***4***	**41%** 2018
1d1 Ultrafast broadband coverage % households	**NA**	**87%** 2017	**92%** 2018	***5***	**60%** 2018
1d2 Ultrafast broadband take-up % households	**15%** 2016	**22%** 2017	**33%** 2018	***6***	**20%** 2017
1e1 Broadband price index Score (0 to 100)	**89** 2016	**89** 2017	**90** 2018	***7***	**87** 2017

1. Progress towards a gigabit society

Luxembourg will miss its national policy target of having everyone connected by the end of 2020 with coverage of 1 Gbps. Full coverage is not achievable by 2020 through the fixed network only, but 5G could further improve coverage. So far, the country has relied mainly on market-driven broadband rollout based on competition among operators. In the future, it is intended to address the digital divide by also using national and EU funding. Further details are still to be determined, but co-financing by the State of 5G pilots is planned. Using EU funding for 5G is also an option for the future.

In 2018, new fibre was rolled out to another 3 % of households not previously connected, thanks to infrastructure works by the incumbent operator POST. POST's fibre network now covers 65 % of residential customers, and this figure is expected to increase to at least 75 % by 2023. POST's fibre network already covers all business customers. Competitors increasingly use fibre unbundling, and uptake of fibre has progressed significantly. The largest cable operator, Eltrona, has upgraded its cable network to DOCSIS 3.1.

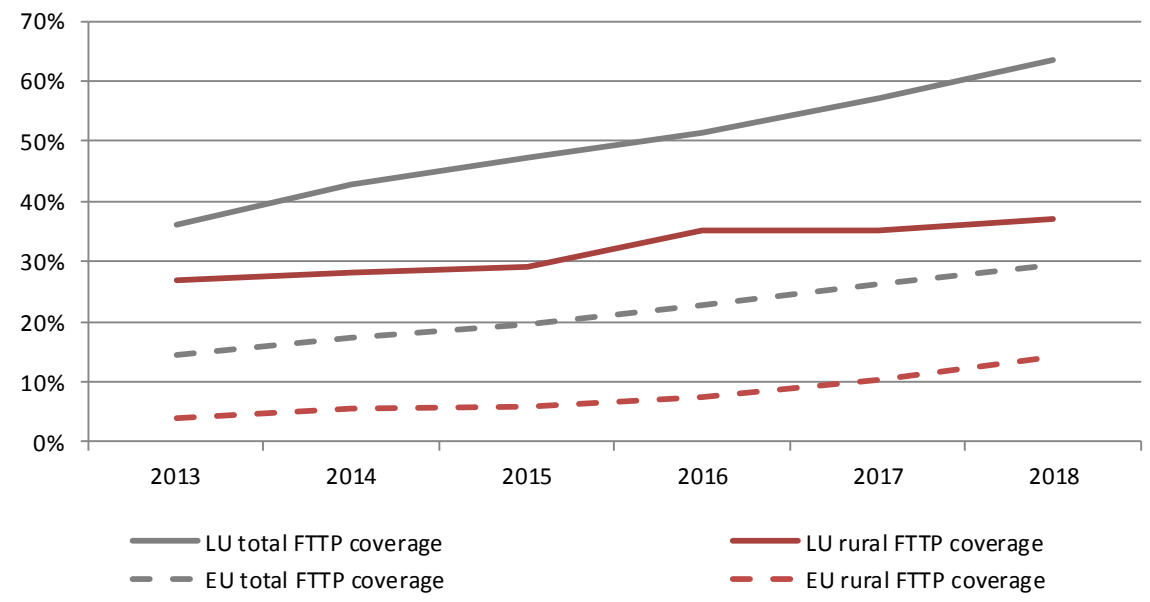
Luxembourg is one of the leaders in the 'Connectivity' dimension of the Digital Economy and Society Index (DESI) and has improved its score almost at the same pace as the EU average. Luxembourg is fully covered by broadband networks, including fixed, mobile and satellite networks. Next generation access (NGA) coverage is 98 %. As fibre rollout continues, fibre to the premises (FTTP) coverage has reached more than 63 %.

While the coverage of fixed broadband networks remains at 100 % of households (both total and rural), above the EU average (97 % total, 87 % rural), next generation access (NGA) fast broadband networks capable of providing at least 30 Mbps are available to 98 % of homes (total, 93 % rural).

[15] Break in series.

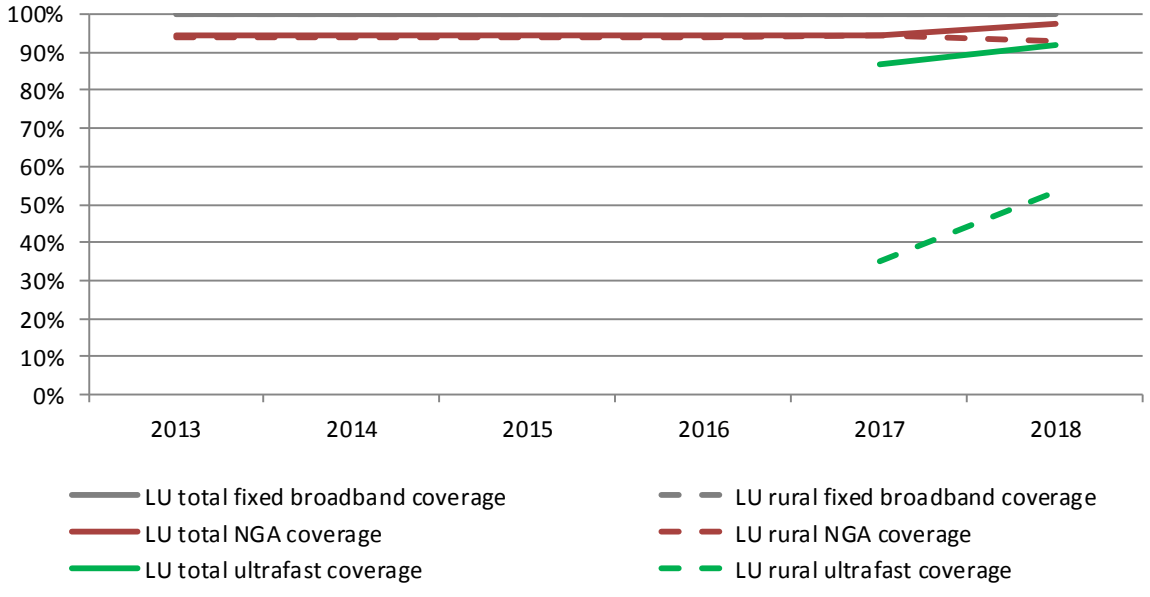
This is significantly above the EU average of 83 % total and 52 % rural. As fibre rollout continues, ultrafast coverage now stands at 92 % (total, rural 53 %). This is significantly above the EU average of 60 % total and 29 % rural. Residential customers increasingly buy products with download speeds of 100 Mbps or more.

Fibre-to-the-premises (FTTP) coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June.

Fixed, NGA and ultrafast coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June. Ultrafast coverage metrics are available for 2017 and 2018.

A trial with participants from Germany, Luxembourg and France is running for automated driving on

the motorway from Merzig (DE) through LU to Metz (FR) using 5G technology. This includes support from the automotive industry (VW and PSA). POST provides the mobile infrastructure on the territory of Luxembourg. Luxembourg City is set to be a 5G-city; the inner city and the main business district on the Kirchberg plateau will be covered by the country's first 5G network. The process of identifying the applications and the verticals involved has started. Launch of commercial service is expected before end 2020.

Work on transposing the European Electronic Communications Code (EECC) started in February 2019. First consultations have already been initiated with operators and with the regulatory authority, the Institut Luxembourgeois de Régulation (ILR).

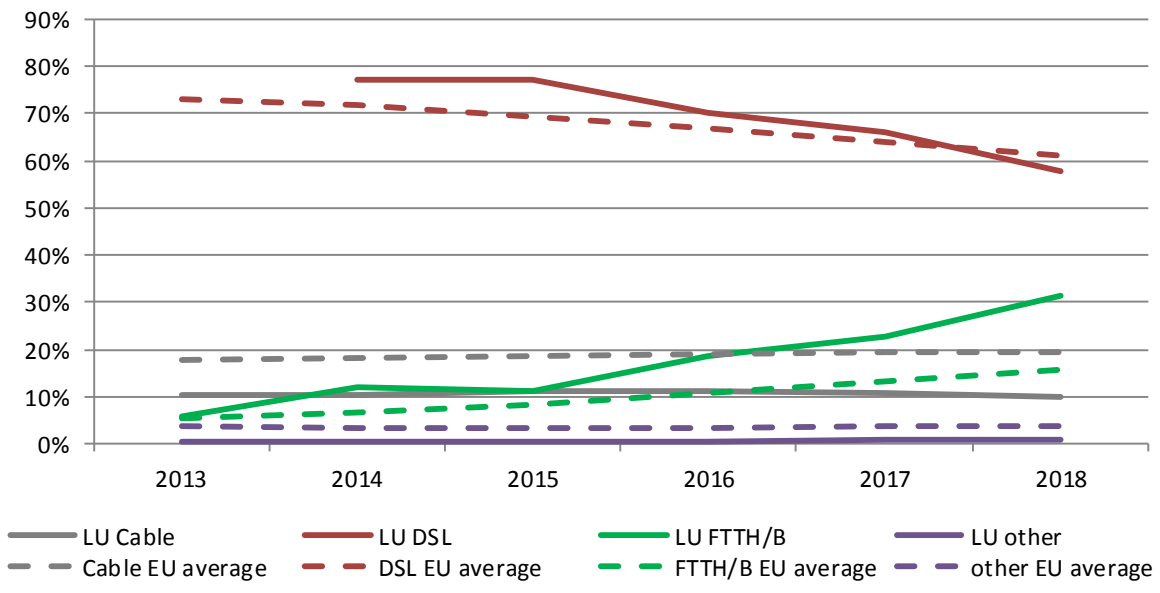
2. Market developments

Competitive environment

The MVNO JOIN Experience has closed down its operations in Belgium where customers had been transferred to Base. Offers with two numbers, a Belgian and a Luxembourgish one, are no longer maintained, and JOIN Wireless has given back its spectrum in the 2.6 GHz band in Luxembourg where also staff and operational equipment have been transferred to POST, which now has full control (100 % of shares).

2.1. Fixed markets

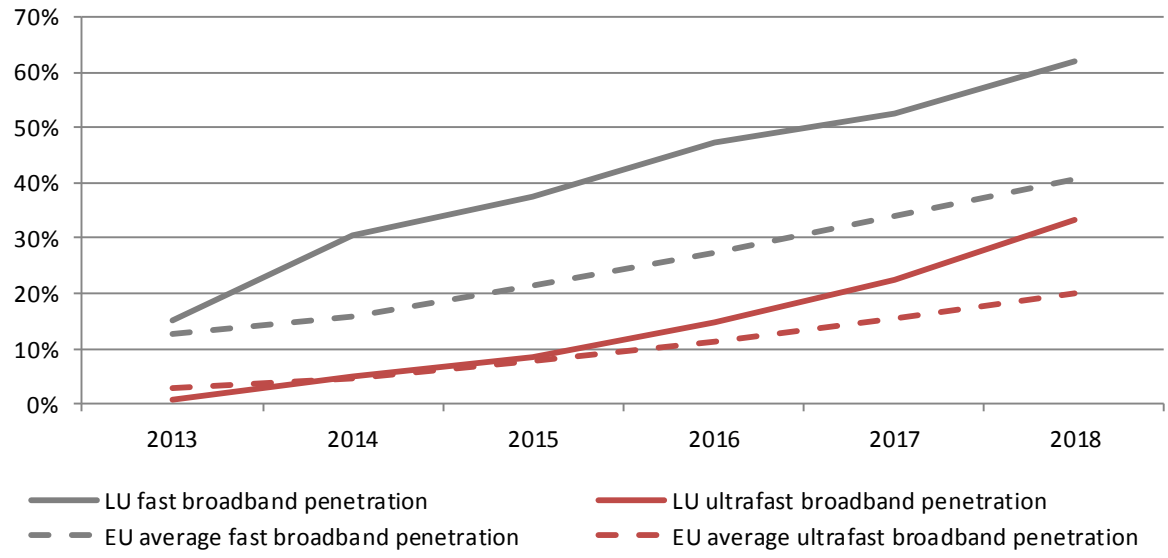
Broadband market shares at Member State level by technology, % of fixed broadband lines, 2013-2018



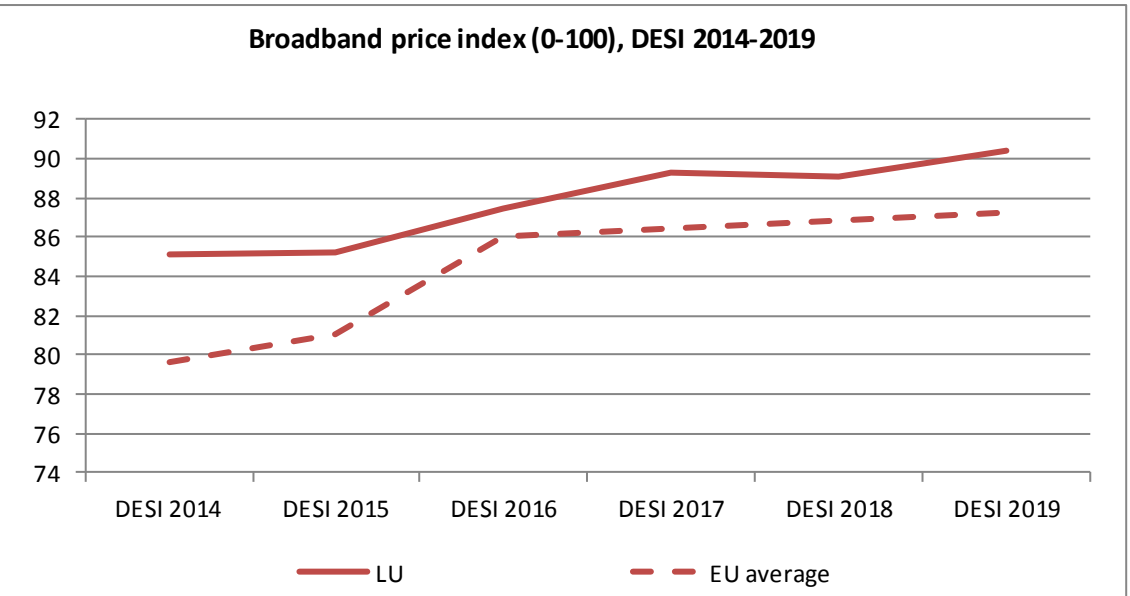
Source: Communications Committee (COCOM). Annual data as of 1st of July.

Between July 2017 and July 2018, fixed broadband subscribers in Luxembourg continued to migrate to higher bandwidths and replace DSL (and to a limited extent also cable subscriptions) by fixed broadband subscriptions based on fibre (+8.7 percentage points of market share). The market share of broadband subscriptions based on coax cable has slightly decreased (-0.7 percentage points of market share). Luxembourg performs very well in the uptake of fast broadband (increased from 52.5 % in July 2017 to 61.8 % in 2018) and ultrafast broadband (increased from 22.5 % to 33.4 % over the same

period). Penetration is significantly above the EU average of 41 % for fast broadband and 20 % for ultrafast broadband. The fixed broadband price index[16] in the DESI increased by 1.3 index points in 2018, meaning that Luxembourg has improved its performance in terms of fixed broadband prices and performs well above the EU average.



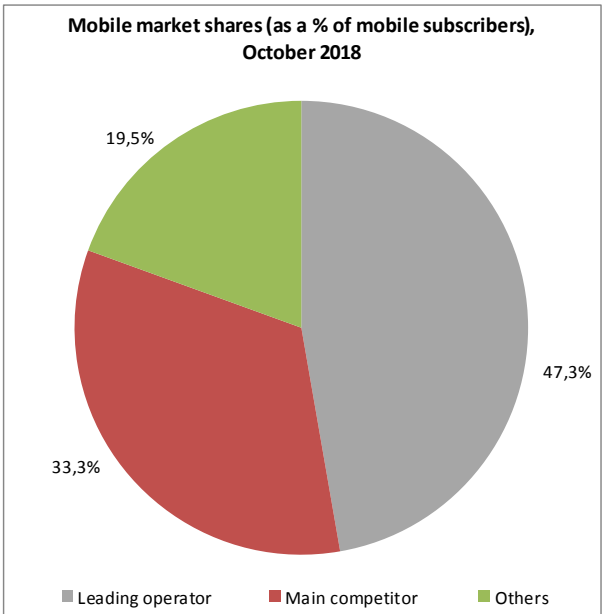
Source: Communications Committee (COCOM). Annual data as of 1st of July.



Source: Commission services based on Fixed Broadband Prices in Europe (Empirica). Data of each DESI report as of October-November of the previous year.

[16] The fixed broadband price index weighs the cheapest retail offers from: standalone, double play (BB + TV, BB + fixed telephony) and triple play (BB+TV+fixed telephony) and three speeds categories - 12-30 Mbps, 30-100 Mbps and +100 Mbps. This indicator presents values from 0 to 100 (which should not be read as prices) and the higher the values, the better the country performs in terms of affordability of prices relative to purchasing power.

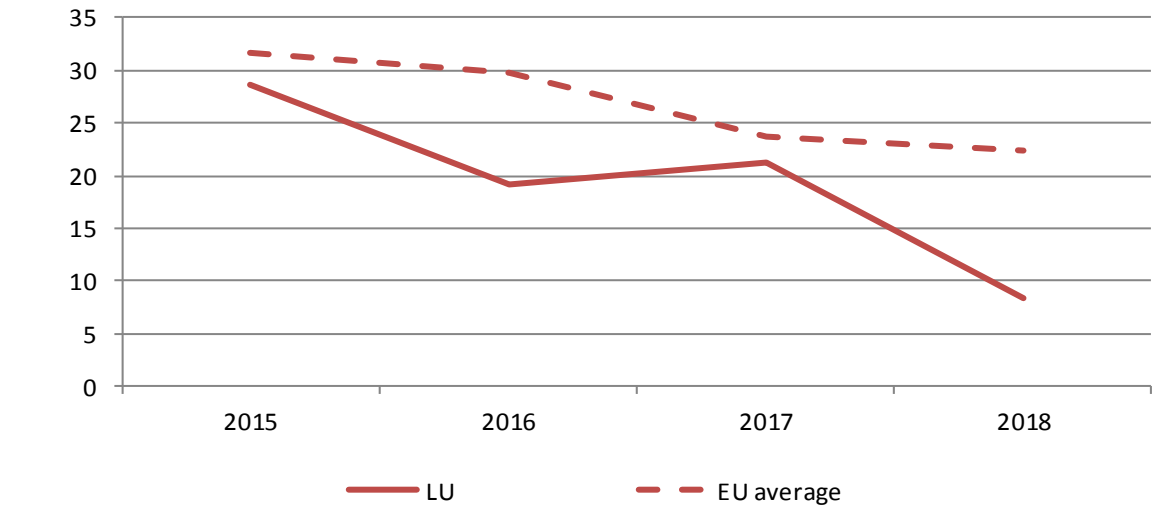
2.2. Mobile markets



Source: Communications Committee (COCOM). Data as of 1st of October 2018.

Coverage of mobile networks is good and individual complaints are addressed swiftly by MNOs with short delays. Nevertheless, congestion can cause interruptions to voice calls and there have been complaints on this. On 1 October 2018, the mobile market share of the leading operator was 47.3 %, the market share of the main competitor was 33.3 % and the market share of all other operators was 19.5 %.

The price index for the least expensive mobile broadband offer including a handset, 1 GB of data and 300 call minutes per month dropped significantly from February 2017 to February 2018 and is significantly below the EU average[17].



Source: Mobile Broadband Price Study (Van Dijk and Empirica). Prices expressed in EUR/(Purchase parity power - PPP), VAT included. Annual data as of February.

3. Regulatory developments

3.1. Spectrum

In Luxembourg, 25 % of the spectrum harmonised at EU level for wireless broadband has been assigned[18]. This low percentage is mainly due to the lack of assignment procedure for the 700 MHz,

[17] This comparison is adjusted for differences in purchasing power across Member States.
[18] The 5G spectrum readiness indicator is based on the amount of spectrum already assigned and available for use for 5G by 2020 within the '5G pioneer bands' in each EU Member State. For the 3.4-3.8 band this means that only licences aligned

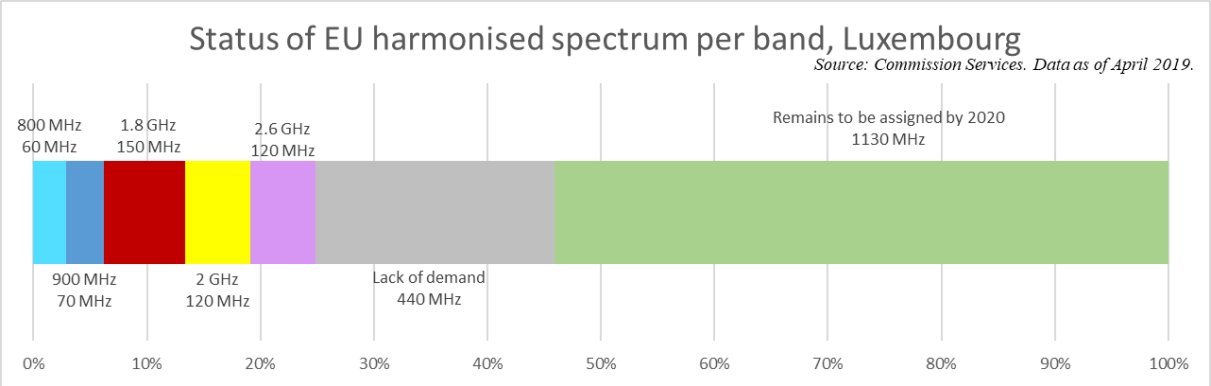
the 3.6 GHz and the 26 GHz bands. The ILR is preparing the award procedures for the 700 MHz and 3.6 GHz bands andthe public consultation has been launched on 7 May 2019;. As the 700 MHz band has never been used for terrestrial digital broadcasting (DVB-T) in Luxembourg, at national level, there is no issue which could delay the process. On the other hand, there could be a delay in deploying parts of the band for one operator once the licence has been granted, as the switch-off date in Belgium for one specific DVB-T channel is not yet set (according to information available to the ILR, switch-off is expected at the latest in mid-2020).

Studies and measurement campaigns are ongoing with regard to the 3.6 GHz band to take into account existing earth stations for fixed satellite services (FSS). The goal is to set conditions of use for future utilisation of this band for both FSS and 5G services.

The public consultation and issuing of the licences in the 26 GHz band is planned for the second half of 2020. Luxembourg has to protect other primary services in this band (i.e. those already deployed and those for future use), mainly some fixed service links and FSS uplink. In general, according to the ILR it should be feasible to make available 1GHz for mobile broadband by the end of 2020.

Join Wireless returned its frequencies in the 2.6 GHz band (2x10 MHz FDD and 40 MHz TDD).

The Commission Implementing Decision (EU) 2018/661 on the harmonisation of the 1 452-1 492 MHz frequency band requires Member States to designate and make available by 1 October 2018 the harmonised 1427-1452 MHz and 1492-1517 MHz extension bands. Designation and availability would be for wireless broadband electronic communication services[19].



The ILR started negotiations with some neighbouring countries in order to define field strengths at the border taking into account the existence of current services in these extension bands[20]. As these limits might impact considerably the deployment of electronic communications services on the territory of Luxembourg, or in worst case, even prevent a reasonable deployment, the ILR currently does not plan to launch a public consultation in this band as long as these negotiations have not been finalised.

The ILR believes that the general interests of mobile operators currently focus on the two bands 700 MHz and 3.6 GHz band.

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with the technical conditions annexed to Commission Decision (EU)2019/235 are considered 5G-ready. However, 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.

[19] If only a portion of these bands is made available, existing services can be continued until end-2022 or longer if there is no national demand for wireless electronic communication services, see Articles 3 and 6 of Decision 243/2012/EU.

[20] The ILR conducted a public consultation in 2016 with regard to the centre part of L-Band (1452-1492 MHz) according to Decision (EU) 2015/750. The main outcome from the operators was that there was no imminent interest/need for this band at that time.

3.2. Regulated access

In 2018, the ILR has fixed the maximum price levels for access to civil engineering infrastructures, local loops and sub-loops of twisted copper lines (Market 4/2007).

February 2019 saw the completion of the analysis of the wholesale markets for local access provided at a fixed location (Market 3a of the 2014 Recommendation on relevant markets[21]) and for central access provided at a fixed location for mass-market products (Market 3b of the 2014 Recommendation on relevant markets). In cases where both copper and FTTP/H access are available to the customer, POST would only be required to provide access on fibre, in order to further encourage the use of fibre. This limitation of access supports the ongoing process of phasing out the copper network. Whether the condition of reaching the customer with FTTP/H is fulfilled depends (besides the connection to the premises) on the quality of in-house cabling. In Markets 3a and 3b, equivalence of input (EoI) considerations have been applied comprehensively and to a high level of detail.

In 2019, the ILR intends to review the market for wholesale high-quality access provided at a fixed location (Market 4 of the 2014 Recommendation on relevant markets).

Luxembourg has rate of about 20 % of intra-EU calls, due to the small size of the country and the large number of multinational companies. The small size of operators in Luxembourg also gives them comparative disadvantages in terms of per unit costs when using the necessary (e.g. numbering) databases and for related processing.

As to the uptake of the regulatory remedies, there had been no demand from the operators for regulated duct access. Dark fibre is not regulated. Fibre local loop unbundling is used more and more by two access seekers. The incumbent has the obligation to provide virtual unbundled local access (VULA) where sub-loop unbundling is not available, but until now there was no need and no demand for it. Bitstream access is still an important wholesale product. There is almost no commercial wholesale access on cable TV networks in place.

ILR has established the technical specifications for VoIP interconnection. (already in 2017, Règlement ILR/T17/9 du 09 août 2017)

4. End-user matters

As to overall market performance from a consumer perspective, in Luxembourg the market for mobile telephony ranks 16th out of the 25 service markets assessed, 7.2 points higher with respect to the market's EU average score[22][1]. The market for Internet provision ranks 12th out of 25 services markets assessed, 8.1 points higher than the EU average score.

In 2018, the ILR received 117 requests for mediation and 47 written complaints. Some 36 cases related to pricing and billing, 38 to the terms of contract and termination of contracts, 31 to availability and quality of service, 3 to roaming and 9 to premium services, while 28 complaints related to bundled services. A total of 45 cases were resolved through mediation and 20 cases may have been resolved outside of the procedure and without the knowledge of the ILR.

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

[22] The market performance index (MPI) is a composite indicator ranging from 0 to 100 which measures how well a given market performs according to consumers. See Consumer Markets Scoreboard 2018, p 12 and p 142, available at https://ec.europa.eu/info/files/consumer-markets-scoreboard-making-markets-work-consumers_en

Information sheets ('Fiches signalétiques') are required for transparency of offers made by operators and service providers to end-users. For fixed and mobile broadband, the ILR's 'CheckMyNet.lu' application provides a survey on quality of service, including a speed test. It is available both as an iOS/Android app and as a browser-based tool.

a. Net neutrality

ILR introduced an internet access quality control mechanism, www.checkmynet.lu, to increase transparency for end-users and to increase compatibility of offers with the legislation. The ILR continuously makes use of its power to send requests for information to internet service providers (ISPs), in particular regarding traffic management practices and certain new commercial offers[23].

b. Roaming

Price increases for mobile services at national level have been exceptional cases subsequent to the introduction of 'roam like at home' (RLAH). Consumers in Luxembourg benefit in general from the new rules. Roaming usage (data and calls) has increased considerably compared to the situation prior to the introduction of RLAH. End-users with subscriptions in Luxembourg consumed 4.3 times more roaming data and 36 % more call minutes in Q4-2017 (under RLAH rules) than in Q4-2016 (before introduction of RLAH). For the subsequent three-month period the figures are largely similar: end-users with subscriptions in Luxembourg consumed 5.3 times more roaming data and 32 % more call minutes in Q1-2018 (under RLAH rules) than in Q1-2017 (before introduction of RLAH) [24].

c. Emergency communications — 112

Between 1 July 2017 and 30 June 2018, 62 % of emergency calls were made to the emergency number 112. A total of 448,449 calls were made to 112. Average response time was 5 seconds, and 68 % of the calls were answered within 10 seconds. For public warnings, an SMS alert system is deployed in Luxembourg[25].

5. Institutional issues

As long as 'over-the-top' providers do not use Luxembourgish numbering resources, they are not required to be notified. Mobile network operators and service providers have returned the second mobile subscriber number previously used for calling the voicemail. There were no appeals against ILR decisions in 2018.

6. Conclusion

Luxembourg is well on track to achieve the EU fixed broadband targets at EU level for 2020, namely to supply every European with access to at least 30 Mbps connectivity and to provide half of EU households with connectivity rates of 100 Mbps. However, it will most probably not meet the more ambitious targets set by national policy by 2020. The ILR's preparations to assign additional spectrum which can be used for 5G services are crucial for meeting the EU target for 5G.

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[23] See Net Neutrality Report by Bird&Bird&Ecorys, 2019, https://ec.europa.eu/digital-single-market/en/news/study-implementation-open-internet.

[24] See 'International Roaming BEREC Benchmark Data Report October 2017 - March 2018' available at https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/8251-international-roaming-berec-benchmark-data-report-october-2017-march-2018.

[25] See Communications Committee, Working Document: 'Implementation of the single European emergency number 112', available at https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=57476 .

Hungary

	Hungary				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
1a1 Fixed broadband coverage % households	**95%** 2016	**95%** 2017	**94%** 2018	***21***	**97%** 2018
1a2 Fixed broadband take-up % households	**72%** 2016	**78%** 2017	**77%** 2018	***11***	**77%** 2018
1b1 4G coverage % households (average of operators)	**92%** 2016	**91%** 2017	**96%** 2018	***14***	**94%** 2018
1b2 Mobile broadband take-up Subscriptions per 100 people	**43** 2016	**49** 2017	**59** 2018	***28***	**96** 2018
1b3 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	**NA**	**NA**	**8%** 2018	***12***	**14%** 2018
1c1 Fast broadband (NGA) coverage % households	**81%** 2016	**83%** 2017	**87%** 2018	***15***	**83 %** 2018
1c2 Fast broadband take-up % households	**40%** 2016	**49%** 2017	**58%** 2018	***6***	**41%** 2018
1d1 Ultrafast broadband coverage % households	**NA**	**76%** 2017	**82%** 2018	***10***	**60%** 2018
1d2 Ultrafast broadband take-up % households	**22%** 2016	**30%** 2017	**40%** 2018	***4***	**20%** 2017
1e1 Broadband price index Score (0 to 100)	**82** 2016	**85** 2017	**87** 2018	***11***	**87** 2017

1. Progress towards a gigabit society

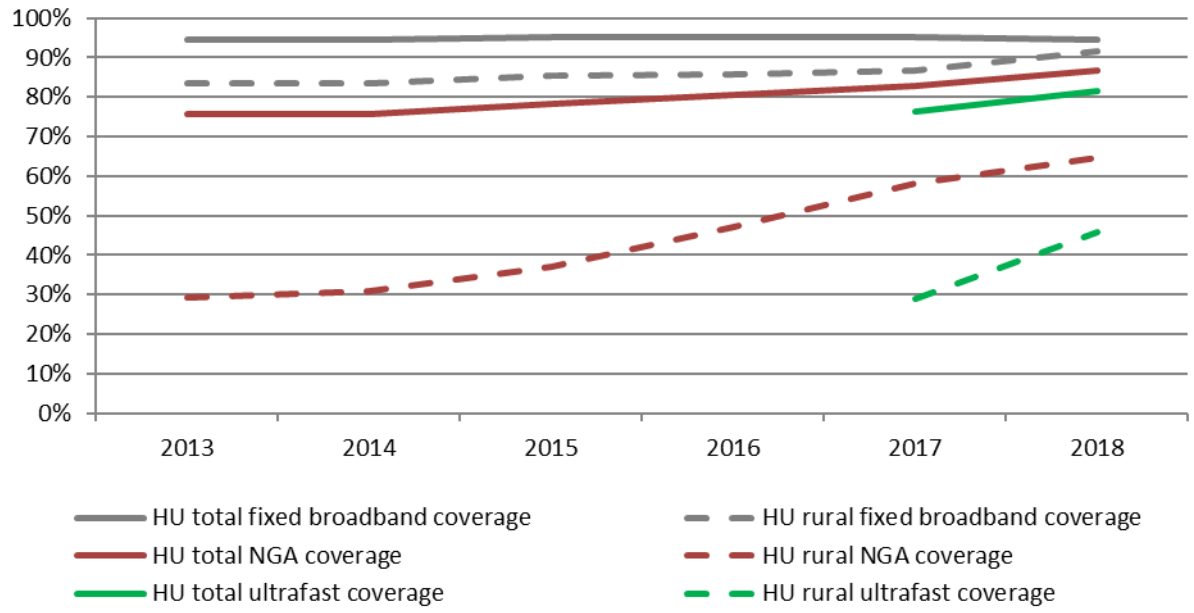
Hungary inched above the EU average for connectivity, and ranks 14th after a sustained relative improvement over the last few years. Although fixed broadband coverage was static at around 94 % of households, fast broadband coverage increased to 87 %. In addition, Hungary continues to score well on ultrafast connectivity, mainly as a result of 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). The vast majority of projects under the SIP deployed FTTH technology, enabling speeds in line with the gigabit society targets. The project intends to cover all Hungarian households – almost 410,000 households are financed from EU Structural Funds while 382,000 households fully from private investments–, with networks supplying at least 30 Mbps broadband internet service by 2023. The project deployment is reflected in the increase of rural FTTP coverage from 4 % in 2015 to 7 % in 2017 and 16 % in 2018. In 2018 from the initially foreseen ambitious coverage of 350,000 households 142,497 was realised. This is reflected in the increase of rural FTTP coverage from 4 % in 2015, 7 % in 2017 to 16 % in 2018.

The SIP aimed to cover the entire country with NGA networks of at least 30 Mbps by the end of 2018. It gives preference to future-proof FTTH solutions and most of the participating undertakings are deploying this technology. The programme started in 2016 with a mapping exercise to identify areas in which telecom operators are expected to make the full investment on their own. For areas that are not economically viable, a €250 million State aid scheme has been developed to ensure broadband rollout. The programme is co-funded by the European Structural Funds and by the Hungarian State, except for

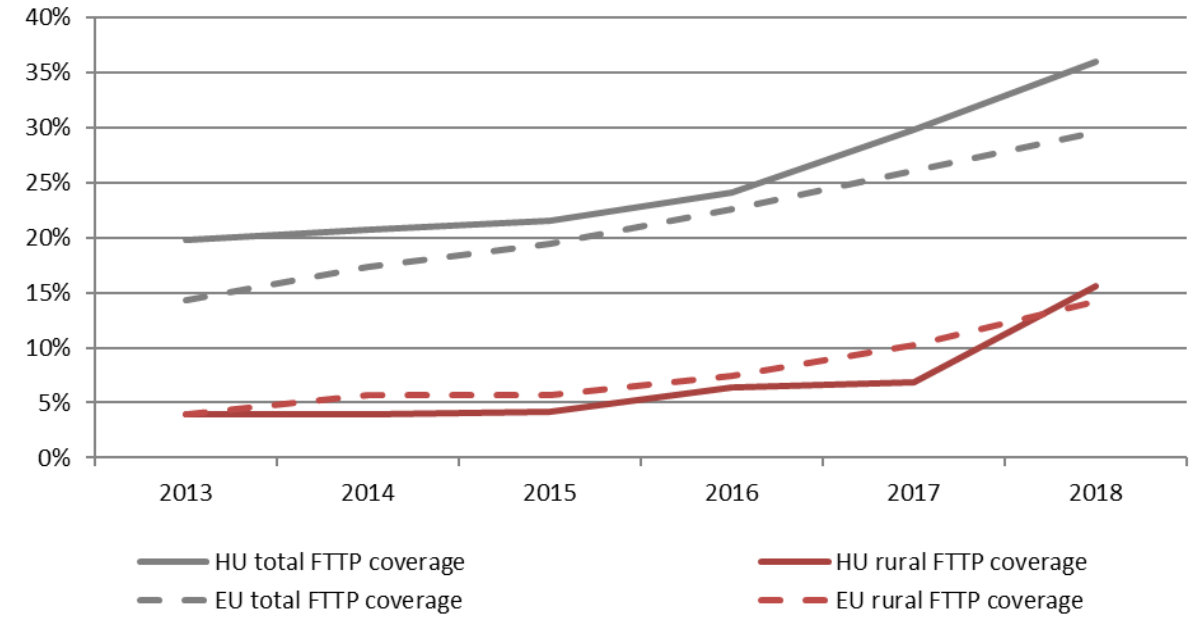
Budapest and its suburban area, for which only national resources will be used.

Fixed, NGA and ultrafast coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June. Ultrafast coverage metrics are available for 2017 and 2018.

Fibre-to-the-premises (FTTP) coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June.

The main difficulties with respect to the deployment of high-speed networks have to do with lack of geographical information on existing infrastructure and lack of human resources in the deployment.

The harmonisation of the applicable regulation for different utility constructions is another issue given the extensive use of electricity pole lines for broadband deployment.

Moreover, Hungary has put in place a new digital education strategy with high requirements as regards connectivity for schools, as well as a number of eGovernment services, such as ePrescription or eID, which are expected to drive demand for high-speed networks.

In Hungary, the penetration of public and private Wi-Fi hotspots is quite high. The WiFi4EU programme is very popular among the municipalities, with 600 having applied for funding. Several municipalities provide free Wi-Fi access in their areas, while in cities and large towns the majority of hotels and catering establishments also provide free or customer Wi-Fi access. Fixed-line operators have also expanded their services to Wi-Fi access. The digital welfare programme, launched by the State at the end of 2015, aims to establish a centrally managed national network of free Wi-Fi hotspots accessible in every settlement, primarily (but not exclusively) to promote the dissemination and use of e-administration services.

The 5G Coalition (5GC), initiated by the digital success programme, was formed with the aim of making Hungary a major European centre of 5G developments and of taking a leading role in the region in testing 5G-based applications. Based on its proposals, the 5G strategy will be adopted in 2019 by the Hungarian Government. A multi-band award process is being prepared for 2019 for the 5G pioneer bands. Hungary's national regulatory authority, the NMHH, organised an RSPG peer review workshop to that end in December 2018. The NMHH announced the tendering process for nationwide digital broadcasting service[26] in line with the National Roadmap. The public consultation on mobile/fixed communications networks (MFCN)[27] showed that for the moment there is no market demand for the 24.25-27.5 GHz band for 5G service because the providers have intensive microwave usage in these bands.

The NMHH has started preparations to implement the European Electronic Communications Code (EECC), even before its publication in the Official Journal. The regulator organised a stakeholder forum on 26 November 2018 to inform interested parties about the new Directive and to initiate a debate on the future legislation. Hungary has started working on the transposing legislation.

2. Market developments

Competitive environment

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, after Digi undertook two main commitments: (i) the divestment by 30 November of overlapping activities in 15 and a half settlements, in which the merger would reduce the number of players from 3 to 2; and (ii) the termination of audio-visual content distribution contracts with competing local cable networks in 25 out of the 89 settlements where both ITV and Invitel were present. However, it appears that Digi and Invitel were both present in other settlements not covered by the divestment obligation, and that in its comments to the draft decision clearing the merger Digi failed to inform the GVH that there were more than 25 settlements where both ITV and Invitel were present.

[26] http://english.nmhh.hu/article/202741/Palyazat_orszagos_foldfelszini_digitalis_televiziomusorszoro_halozatok_uzemeltetesi _jogosultsaganak_megszerzesere__a_PALYAZATI_DOKUMENTACIO

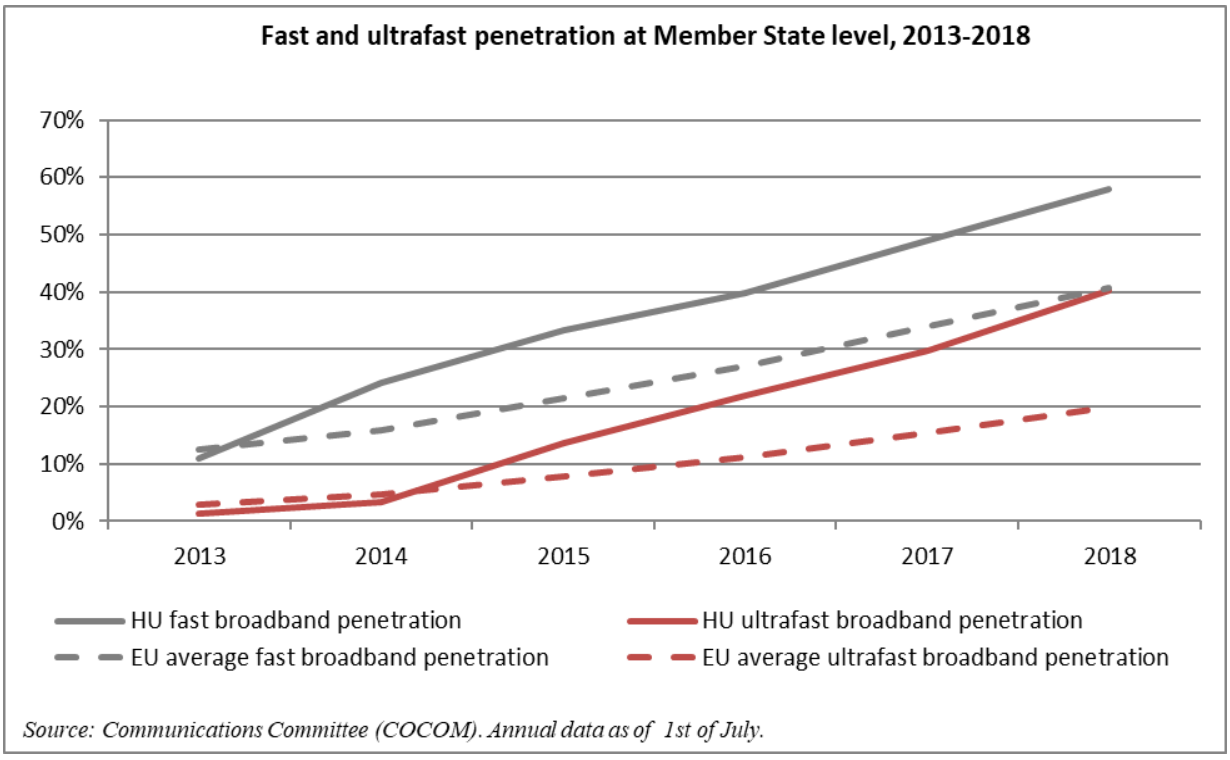
[27] http://english.nmhh.hu/article/190953/Public_hearing_on_plans_regarding_the_frequency_bands_available_for_the_provision_of_wireless_broadband_services_and_the_future_use_of_the_VHF_III_band

The local competitors challenged the clearance decision before its adoption on the grounds that they had not been consulted to ensure that they would maintain the access they had to the audio-visual content. Given the strong position of Digi in the audio-visual content market, the local providers argued that an obligation to provide wholesale access on a non-discriminatory basis would have been more appropriate to allow them to compete with Digi. In November 2018, the GVH imposed on Digi a €280,000 fine for misleading the authority by remaining silent on its wrong calculation of the number of overlapping areas. In the meantime, implementation of the commitment to cease the content distribution contracts has been suspended.

Other acquisitions taking place in 2018 affected only smaller providers. The number of fixed service providers slightly dropped over the past year — going from 395 registered ISPs at the end of 2017 to 389 on 31 October 2018). The figures for registered fixed telephony operators are 168 and 165 respectively. The figures means that there are signs of consolidation, but for the moment, they have not changed the market shares of the main providers, given that the overlap between Digi and Invitel was very limited and the merger was cleared following appropriate divestment conditions.

Vodafone notified the Commission of its plans to acquire certain Liberty Global assets (including UPC Hungary). On 11 December, the Commission opened an in-depth investigation into the proposed acquisition by Vodafone of Liberty Global's business in Czechia, Germany, Hungary and Romania. If the acquisition is cleared, it could influence the competition dynamics in Hungary for fixed-mobile converged bundled offers. In July 2017 4-play services had a penetration of only 2 % of the households (EU average 11 %), against 28 % for triple-play (EU average 25 %).

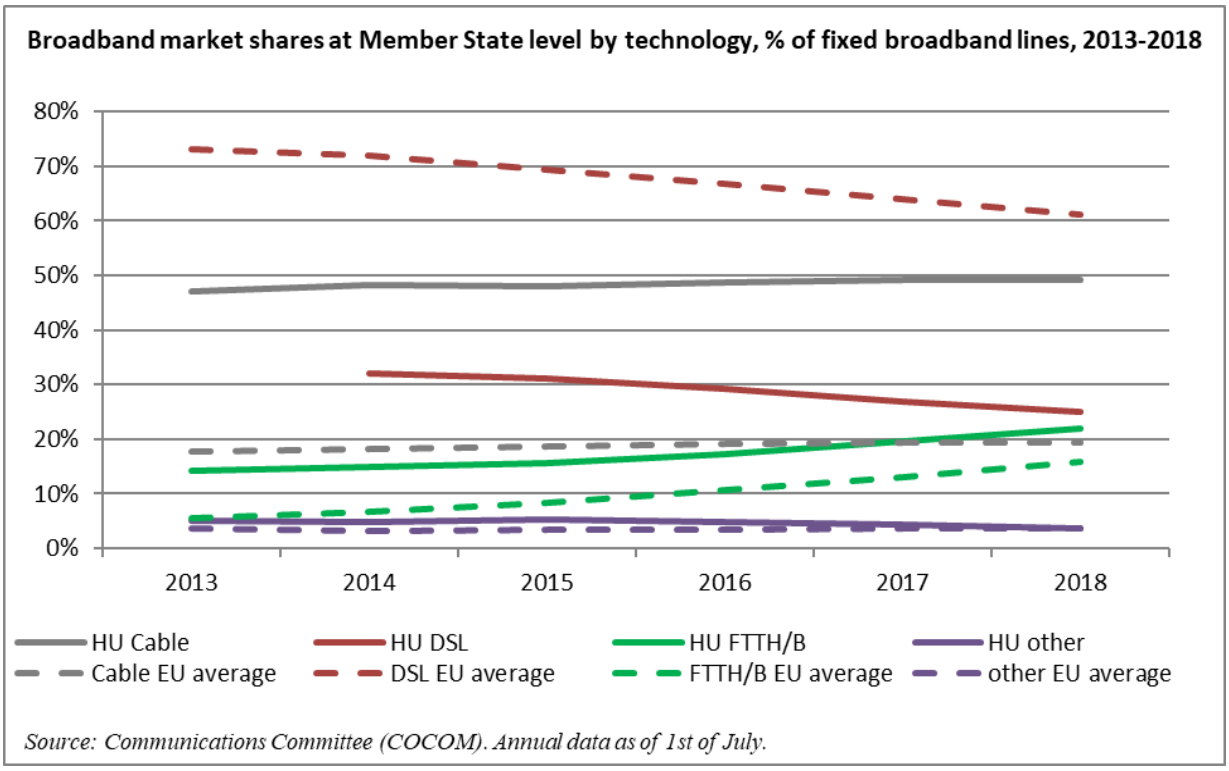
2.1. Fixed markets



While fixed broadband take-up was static (at 77 %), equal with the EU average, the quality of the connection significantly improved. The share of fast broadband subscriptions in all fixed broadband subscriptions rose from 11 % in 2013 (EU average 12.6 %) to 57.9 % in 2018, outscoring the EU average of 40.3 %. Ultrafast broadband penetration also grew faster than the EU average, from 1.4 %

in 2013 (EU 2.9 %) to an impressive 40.3 % in 2018 (EU 19.9 %).

Cable modem subscriptions still continue to dominate, with 49.2 % of all broadband subscriptions, but their growth is very slow year on year since 2013. DSL follows with 25 % but is on a more pronounced downward trend, while fibre to the home/building (FTTH/B) with 22.1 % has made significant progress in 5 years from 14.2 % in 2013. The trends in Hungary broadly follow the EU trends. The reason behind the steady growth of DOCSIS 3.0 technology is that the upgrade of the existing cable modem networks required less investment per end-point. In the same time, Magyar Telekom and Invitel plan to deploy vectoring in the near future. UPC (significant market power in area 29) is rolling out an FTTH (radio frequency over glass - RFOG) network throughout the whole territory, gradually phasing out the former xDSL technology. There is very strong platform-based competition, which is best illustrated by the fact that two of the three local incumbent telephony operators belong to cable operators.



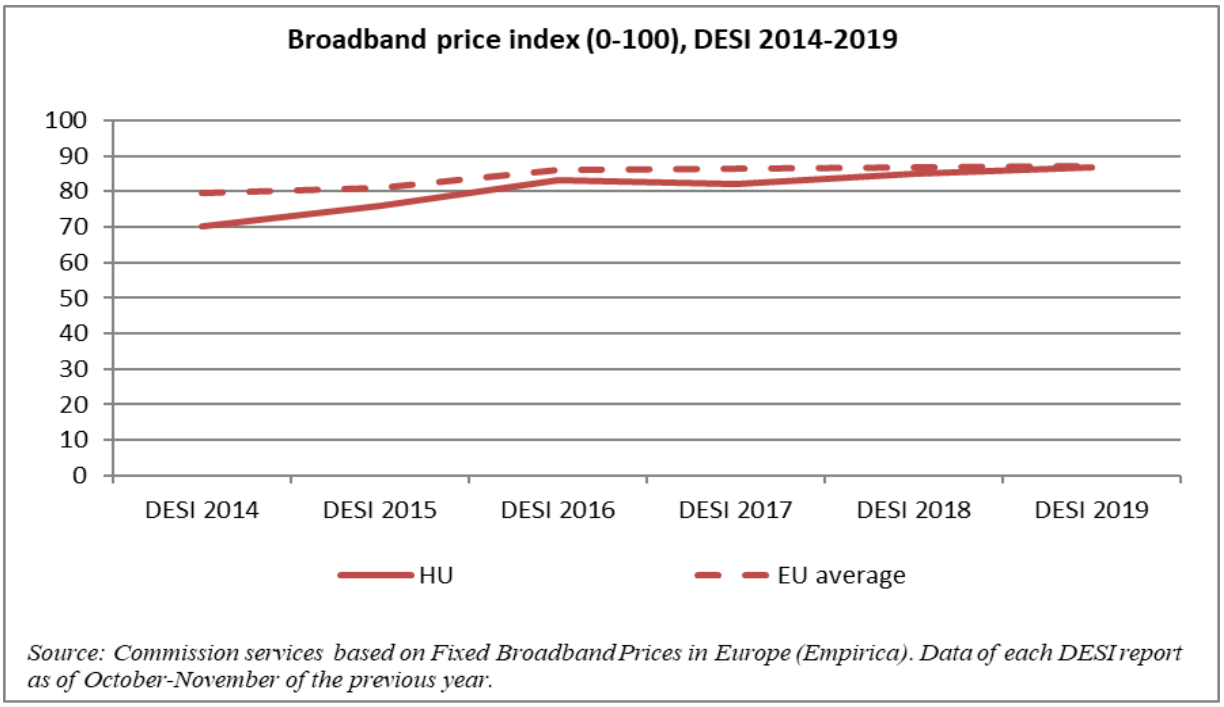
According to the data of the regulator, in the market for fixed broadband services, on 31 August 2018, the market shares based on the number of access points were 35.6 % for Magyar Telekom, 24.7 % for the DIGI group (former DIGI 16.3 % and Invitel 8.8 %) and 21.9 % for UPC (22.1 %), while small operators accounted for 17.8 %. In the business markets, given the slower adaptation of new technologies, the three incumbents have higher market shares than in the residential market.

The broadband price index for Hungary is very close to the EU average[28].

In Hungary, TV is not always bundled with other services. According to data from 2017, 53 % of the households subscribe to pay TV services as part of a bundle. Practically all households have a (pay or

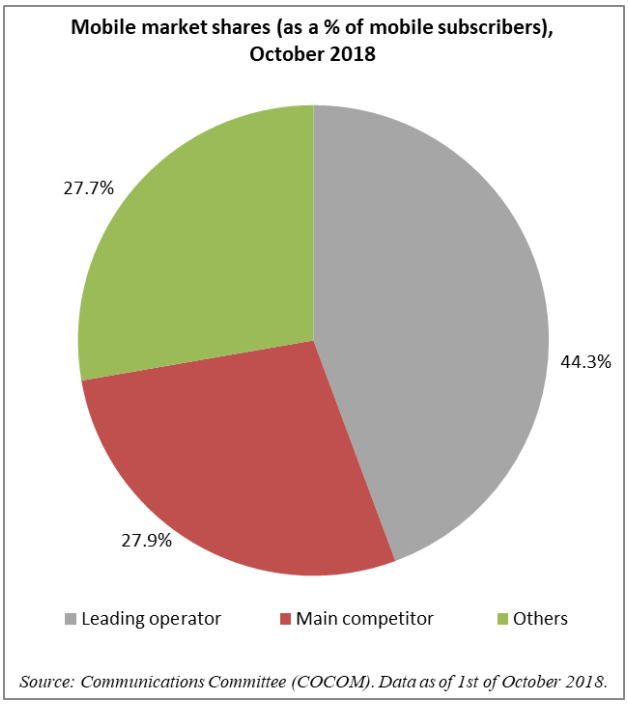
[28] The fixed broadband price index weighs the cheapest retail offers from: standalone, double play (BB + TV, BB + fixed telephony) and triple play (BB+TV+fixed telephony) and three speeds categories - 12-30 Mbps, 30-100 Mbps and +100 Mbps. This indicator presents values from 0 to 100 (which should not be read as prices) and the higher the values, the better the country performs in terms of affordability of prices relative to purchasing power.

free-to-air) TV service, and 9 out of 10 have a pay TV service, while only two thirds have fixed-line internet. Moreover, 25 % of subscribers for pay TV and internet, and 32 % of subscribers for pay TV and fixed phone, are clients of two different operators.



Source: Commission services based on Fixed Broadband Prices in Europe (Empirica). Data of each DESI report as of October-November of the previous year.

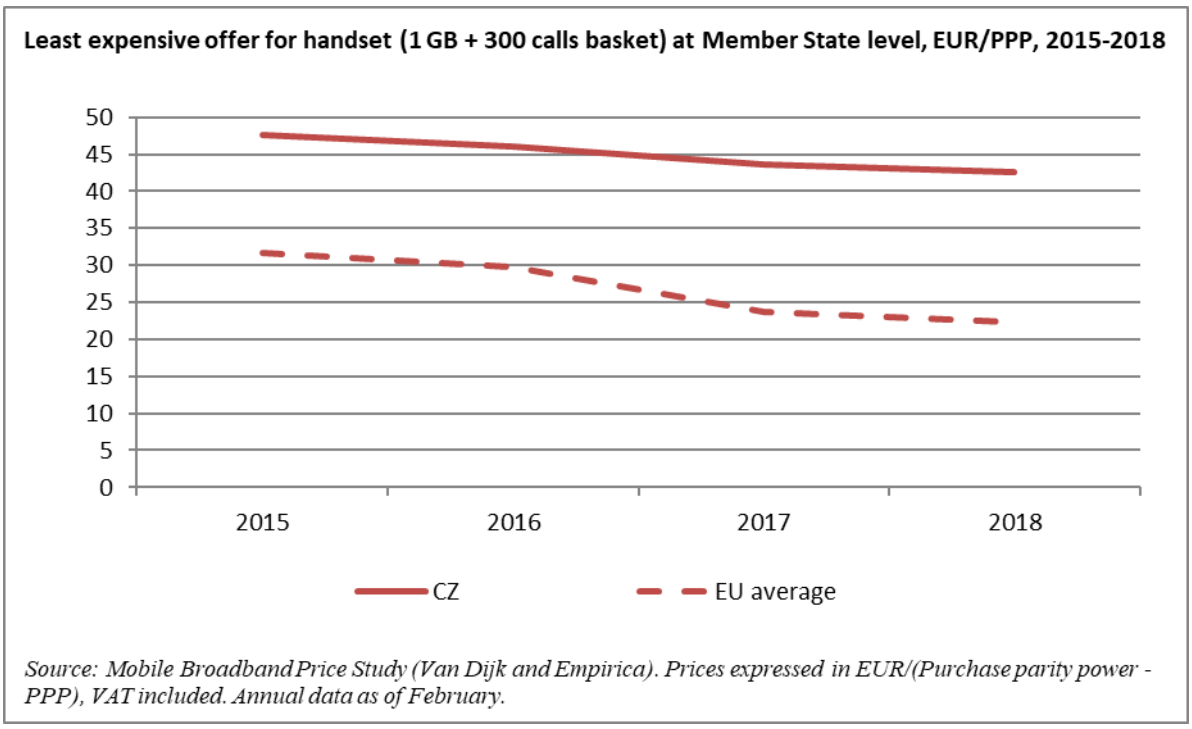
2.2. Mobile markets



Source: Communications Committee (COCOM). Data as of 1st of October 2018.

4G coverage in Hungary stands at 96 %, above the EU average (94 %). However, despite a significant improvement, mobile broadband take-up is still the lowest in the EU (59 subscriptions per 100 people compared with 96 in the EU). This may be because prices for mobile phone users are persistently among the highest in Europe. Despite the drop in mobile broadband prices for handset offers, from €61.80 to €47.40, these are more than double the EU average of €22.30. According to the NMHH in Hungary almost 40 % of the overall sales in the residential market are concluded on the basis of negotiated prices ("fleet offers").

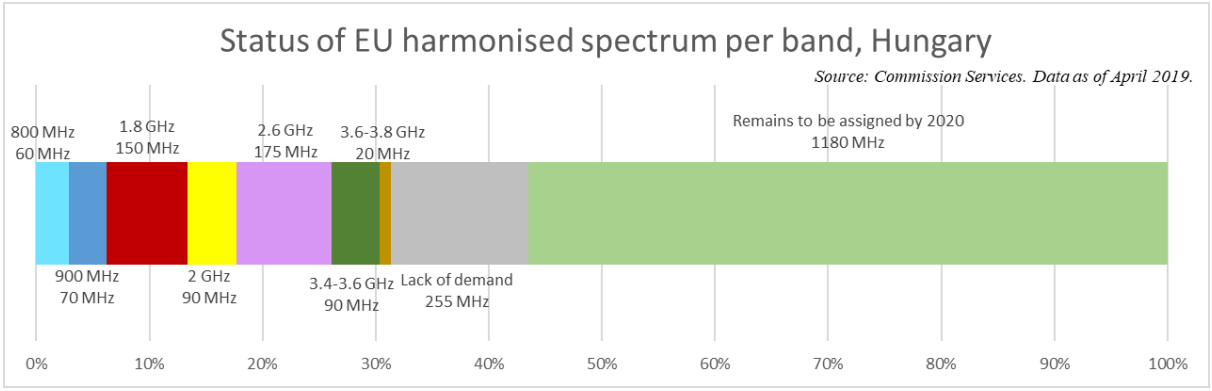
The leading mobile operator in Hungary has a market share of 44.3 %, while its main competitor follows with 27.9 %. The third operator shares with the MVNOs a market share of 27.7 %.



Source: Mobile Broadband Price Study (Van Dijk and Empirica). Prices expressed in EUR/(Purchase parity power - PPP), VAT included. Annual data as of February.

3. Regulatory developments

3.1. Spectrum



In Hungary, 31 % of the spectrum harmonised at EU level for wireless broadband[29] has been assigned[30]. This percentage is mainly due to the lack of an assignment procedure for 700 MHz and 1500 MHz, and partially for the 3400-3800 MHz and 26 GHz bands.

There was no new licence granted for wireless broadband in harmonised bands in 2018. There were two requests for the renewal of licences in the 26 GHz band, but after negotiations only one of the assignees accepted the renewal on the NMHH's conditions. Furthermore, the NMHH concluded the process of extending the current licences for 2100 MHz.

The NMHH is preparing a multi-band award process for the 700 MHz, 2100 MHz, 2600 MHz and

[29] This includes the 5G pioneer bands but not the extension of 1.5 GHz so the total is 2090 MHz.
[30] The 5G spectrum readiness indicator is based on the amount of spectrum already assigned and available for use for 5G by 2020 within the '5G pioneer bands' in each EU Member State. For the 3.4-3.8 band this means that only licences aligned with the technical conditions annexed to Commission Decision (EU) 2019/235 are considered 5G-ready. However, 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.

3400-3800 MHz bands. The tender procedure is scheduled to take place by September 2019. In February 2019, the NMHH launched a public consultation on the draft decree[31] on frequency allocation. The decree entered into force in 30 March 2019.

The 700 MHz band will be available for wireless broadband services after 6 September 2020 the when the administrative contract between Antenna Hungária Zrt. and NMHH on operating five digital television broadcasting multiplexes will expire. Under Hungarian law, the rights of use of frequency for the operation of a national-wide DTT network should be assigned through a tender procedure. The National Roadmap[32] specifies that in order to ensure uninterrupted broadcast service, the tender will have to be carried out sufficiently in advance (at least 1 year before the current contract expires, i.e. by 5 September 2019) for the winning bidder to prepare for the provision of the service. The tendering procedure, excluding the 700 MHz band, was launched on 10 April[33].

3.2. Regulated access

In 2018, the NMHH managed to catch up on its delay to conduct the analysis of relevant markets which had prompted the Commission to send a letter of formal notice in 2017. In August, the NMHH notified the last outstanding analysis of the market for wholesale high-quality access provided at a fixed location (Market 4 of the 2014 Recommendation on relevant markets[34]).

In its draft measure, NMHH significantly redefined the scope of the relevant market. The defined market, besides analogue and TDM leased lines, also included Ethernet leased lines, but excluded both the terminating segments of leased lines used to provide mobile backhaul and the leased lines provided by law by operators MVM NET and NISZ to the government and to the owner of the electricity grid[35]. Further, unlike in its previous market review, NMHH considered that the relevant wholesale market should not be divided according to bandwidths. NMHH proposed to designate MT as the operator with significant market power (SMP) and to impose on it the full set of remedies.

On 17 September 2018, the Commission expressed serious doubts as to the compatibility with EU law of NMHH's draft measure concerning the designation of an operator with SMP and concerning the imposition of remedies on Magyar Telecom.

Regarding the SMP designation, the Commission noted that large parts of the relevant market, on which NMHH designated Magyar Telekom as having SMP, did not meet the three criteria on the occasion of the previous market review. The NMHH did not carry out a three-criteria assessment and did not sufficiently explain the changes in market circumstances that led it to reach a different conclusion. The Commission observed that the evidence presented by the NMHH with regard to the SMP assessment was inconclusive. However, BEREC considered that the Commission's serious doubts about the SMP assessment were not justified. The Commission lifted its reservations as regards

[31] http://nmhh.hu/cikk/201237/Rendelettervezet_az_egyes_frekvenciagazdalkodasi_targyu_NMHH_rendeletek_modositasarol

[32] http://english.nmhh.hu/article/189920/National_Roadmap_for_the_utilisation_of_the_VHF_III_174230_MHz_and_the_UHF_470790_MHz_frequency_bands

[33] http://english.nmhh.hu/article/202743/Announcement_concerning_the_acquisition_of_the_operating_licences_of_national_terrestrial_digital_television_broadcasting_networks

[34] 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.

[35] The two operators are obliged by law to provide leased lines services to the above-mentioned customers, which in turn can only purchase leased lines services from the two operators. Therefore, this exclusive right effectively grants MVM NET and NISZ a legal monopoly in this part of the market.

the designation of the SMP operator.

As for remedies, the Commission considered that the price control mechanism, as proposed for wholesale high quality services, led to the under-recovery of the costs of those services, and was therefore not in accordance with Article 8(2) of the Framework Directive and Article 13(1) and (2) of the Access Directive. The Commission considered that its serious doubts were sufficiently addressed through the discussions with the NMHH and BEREC during the Phase II investigation, and by the NMHH's pledges on how it would address the under-recovery of Magyar Telekom's joint and common costs[36] in its final measure[37]. The Commission therefore, withdrew its serious doubts regarding the recovery of Magyar Telekom's joint and common costs[38].

The Commission also had serious doubts that the level of weighted average cost of capital (WACC) as applied by the NMHH would reflect the currently prevailing competitive conditions, taking into account the risk incurred by the investing undertakings. In its opinion, BEREC shared the Commission's serious doubts on the WACC calculation. Since the NMHH maintained its notified draft measure at the end of the three-month period following the Commission's notification of its serious doubts in accordance with Article 7a(1) of the Framework Directive, the Commission considered that the reservations expressed in its serious doubts letter regarding the NMHH's approach to calculating the WACC remained valid and made a recommendation: the NMHH should amend or withdraw the remedies relating to price regulation of Magyar Telekom's leased lines in Hungary. This would bring its WACC calculations in line with the policy objectives set out in Article 8(2)(a) and 8(5)(d) of the Framework Directive, and therefore comply with Article 13(1) and (2) of the Access Directive[39]. Furthermore, the NMHH should avoid overestimating the cost of equity, in particular by ensuring that the size premium mark-up is not included in the WACC calculation. On 21 December 2018 the NMHH released its WACC calculation with the view to comply with the recommendation of the Commission.

Fixed termination rates (FTRs) are fully symmetrical in Hungary for historical reasons linked to the existence of a significant number of providers. In March 2018, the NMHH notified the Commission of its draft analysis of 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). The NMHH concluded that each of the 144 fixed network operators has SMP on its own market, and proposed to impose the standard regulatory remedies. Based on its bottom-up long-run incremental cost (BU-LRIC) model for cost estimates for the forward looking period, the regulator proposed to reduce the regulated maximum wholesale termination rate from approximately 0.13 euro cent/min to approximately 0.08 euro cent/min (EU average 0.21 euro cent/min[40]). The Commission did not make any comments[41].

In February 2018, the NMHH also provided notification of its draft decision to deregulate the market

[36] BEREC concluded in its opinion (Case HU/2018/2107) that the doubts of the Commission regarding the non-recovery of costs of passive infrastructure were the result of a misunderstanding and was thus not justified. To follow BEREC's advice, NMHH made an effort to clarify its interpretation of direct costs in the final decision .

[37] The final measure was issued on 27th of February, 2019.

[38] Commission case HU/2018/2107, C(2018) 8650. The NMHH committed to clarify in its final measure that MT will be able to recoup the costs of passive infrastructure and that they would be included in the regulated rates. The NMHH also agreed to clarify in its final measure that MT will be able to recover a fair share of relevant joint and common costs through the wholesale charges. Finally, the NMHH proposed to apply a mark-up on the regulated rates to account for a proportion of joint common costs.

[39] Commission case HU/2018/2107, C(2018) 8500.

[40] BoR (18) 218, Berec report on Termination rates at European level, July 2018

[41] Commission case HU/2018/2057, C(2018) 1587.

for wholesale call origination on the public telephone network provided at a fixed location (Market 2 of the 2007 Recommendation on relevant markets[42]). After conducting the three-criteria test, the NMHH found that no operator holds a SMP position anymore and proposed to withdraw regulation in the market. The Commission had no comments[43].

Directive 2014/61/EU (the Broadband Cost Reduction Directive or 'BBCRD') has been transposed in national legislation, designating the NMHH as the dispute resolution body and Lechner Nonprofit Kft. as the single information point. Shared use of infrastructure cross-sector is quite significant in Hungary, as approximately two thirds of the new broadband investment uses existing electricity network poles for one or even more ECS networks. However, in many settlements, local building regulations discourage installation of new cables above ground, and electricity utility companies often ask excessively high prices for infrastructure sharing, so when new ducts are built for ECS[44] networks, empty pipes are also placed underground to account for potential future demand. Mobile service providers also increasingly share the use of masts.

Since the transposition of the Directive, the NMHH resolved four access disputes, two between electronic communications network and/or services (ECNS) providers and two with electricity distribution operators. The disputes between ECNS providers concerned two cases of not responding to a request for access to masts; the disputes were finally settled between the parties. The other two cases concern disputes with network operators providing electricity services. One dispute was closed because the electricity network operator did not own the referred physical infrastructure. The other ended with a binding decision, by which NMHH granted the applicant the right to use the electricity network infrastructure (according to the offer). This decision was challenged in court, with proceedings ongoing.

4. End-user matters

In the first two quarters of 2018, the NMHH received 139 complaints from end-users. Most of the complaints relate to billing, but these are often indicative of other problems with contracts. In general, end-users often complain about insufficient information when contracts are concluded or amended, and also about late and formalistic answers by service providers to complaints. 27 % of complaints related to internet access services, 41 % to mobile services and 18 % to broadcasting services.

According to the 2018 Consumer Markets Scoreboard[45], the market performance indicator for the provision of internet access services in Hungary was 90.5, (13.7 above the EU average), and 89.9 for mobile telephone services (12.8 above the EU average). Both services are above the Hungarian average for all services markets (88.7).

a. Net neutrality

In 2018, the NMHH collected information relating to net neutrality via an annual survey targeting end-users. According to the results of the survey, 14 % of end-users subscribed to zero-rated plans of mobile ISPs; in 2017, 58 % of fixed internet access service (IAS) end-users experienced some problems with their IAS. The most common problem was connection failure, i.e. when it is not

[42] Commission Recommendation of 17 December 2007 on relevant product and service markets within the electronic communications sector susceptible to *ex ante* regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services (notified under document number C(2007) 5406) (Text with EEA relevance), OJ L 344, 28.12.2007, p. 65-69.
[43] Commission Case HU/2018/2058, C(2018) 1594.
[44] Electronic communication services.
[45] 2018 Consumer Market Scoreboard, published on 12 October 2018;
https://ec.europa.eu/info/publications/consumer-markets-scoreboard_en

possible to access the internet at all. Slow internet speeds were also a common problem, with the number of customers satisfied with their internet speeds unchanged on previous years: 75 % of fixed IAS end-users and 66 % of mobile IAS end-users declared that their ISP more or less provided the offered speed. Consumer awareness of net neutrality increased by 22 % compared to the previous reporting period. Based on these findings, the NMHH announced measures to improve awareness e.g. via social media. In its annual net-neutrality report, the NMHH reconfirmed its finding from last year that the average speed of some IASs is often below the advertised speed during peak times.

Following an appeal launched by Telenor against the NMHH decision to cease offers which allowed end-users to continue having full access to zero-rated applications while all other content was throttled once the applicable data-cap was reached, the competent court, Fővárosi Törvényszék, decided to stay the proceedings and submit a preliminary ruling request to the Court of Justice of the European Union. The court is asking whether such practice would infringe Article 3(2) of Regulation (EU) 2015/2120, and whether an assessment of the impact of the practice on the market is required to establish whether and to what extent the measures applied limit the choice of end-users.

b. Roaming

The NMHH found 4 (four) cases of non-compliance with the roam-like-at-home (RLAH) rules. All of the cases involved optional data bundles offered by Magyar Telekom, the additional data volume was only available for domestic consumption but not for roaming. The NMHH formally requested the operator to bring its offers into compliance with the Regulation (EU) 2015/2120. There was no impact of RLAH on domestic prices. Hungarian end-users consumed 1.5 times more roaming minutes (calls made) in Q4-2017 (RLAH) than in Q4-2016 (before RLAH). The same increase was noted between Q1-2017 and Q1-2018. As regards data, end-users consumed 4.9 times more roaming data in Q4-2017 than in Q4-2016. Between Q1-2017 and Q1-2018, consumption increased 5.1 times.

c. Emergency communications — 112

In 2018, the Commission continued to look into the functioning of emergency communications and the 112 number in Hungary, with particular regard to equivalent access to emergency services for end-users with disabilities. As a result of the Commission's investigation in December 2018 the 112 SOS mobile application went live in Hungary, ensuring an appropriate means of communication for end-users with disabilities though two-way interactive communication and user location functions.

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

d. Universal service

In 2018, the NMHH designated four service providers to provide elements of the universal service (connection to a public electronic communications network, operation of public telephone stations, access to directory enquiry service) in different numbering areas of the country, effective from 1 January 2019. Of the four service providers appointed in 2018, only one had not been designated in the previous decisions taken in 2014. The respective decisions were challenged in court by one of the designated service providers, and the cases are still ongoing. The national directory enquiry service was awarded to a single provider, and the contract between the NMHH and this service provider to provide national enquiry service entered into force already in August 2018.

While broadband is not included in the current scope of universal service, internet connection is included at data rates that are sufficient to permit functional internet access, taking into account prevailing technologies used by the majority of subscribers and technological feasibility. The

government introduced special discounted tariffs for new users of broadband to facilitate take-up. This is available to the new subscriber for a limited period only and results in savings of at least 15 % compared to the cheapest market-based offers. Concerning the speed of access, the services packages should provide unlimited data, a nominal download speed of 4 megabits/second and a guaranteed download speed of 1 megabits/second. In the case of mobile internet access, the expectation for the basic package is to include second-fourth generation (2G-4G) and future 5G services and a monthly data allowance of at least 500 megabytes. Additionally, due to the earlier changes in tax law, the VAT rate for broadband internet access services is 5 % in order to increase its affordability. The rate decreased from 27 % to 18 % in 2017, then to 5 % in 2018.

5. Institutional issues

In 2018, most appeals were filed against decisions related to consumer protection. There was one case where the court upheld the NMHH's decision to penalise a provider for, among other things not ensuring termination to certain numbers and appropriate number portability. The decision was appealed in second instance. In another case NMHH's approved the settlement concerning the secondary trading of frequency use rights between two mobile market operators. A third mobile operator appealed to the NMHH against the administrative approval of the settlement (the appeal was filed in 2017, but the decision on second instance was passed in 2018). The appellant third party challenged the final administrative decision before the court. The claim was rejected at the first judicial instance.

Both regulatory decisions adopted for markets 3a and 3b were brought before court by a major provider. The appeals were rejected.

An electricity network operator filed an appeal against the NMHH's decision which awarded the requested rights of use to a service provider. The court annulled the NMHH's decision, the judgment was challenged by the NMHH at the supreme court of Hungary. The case is pending.

6. Conclusion

While significant advancements were achieved in fixed broadband coverage through the superfast internet programme, mobile network coverage and take-up are not improving at the required pace. The multi-band auction planned for this year will play a key role for the deployment of 5G in Hungary.

Malta

	Malta				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
1a1 Fixed broadband coverage % households	**100%** 2016	**100%** 2017	**100%** 2018	***1***	**97%** 2018
1a2 Fixed broadband take-up % households	**79%** 2016	**83%** 2017	**83%** 2018	***7***	**77%** 2018
1b1 4G coverage % households (average of operators)	**99%** 2016	**99%** 2017	**83%**[46] 2018	***26***	**94%** 2018
1b2 Mobile broadband take-up Subscriptions per 100 people	**65** 2016	**88** 2017	**97** 2018	***12***	**96** 2018
1b3 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	**NA**	**NA**	**0%** 2018	***13***	**14%** 2018
1c1 Fast broadband (NGA) coverage % households	**>99.5%** 2016	**>99.5%** 2017	**>99.5%** 2018	***1***	**83%** 2018
1c2 Fast broadband take-up % households	**47%** 2016	**53%** 2017	**69%** 2018	***2***	**41%** 2018
1d1 Ultrafast broadband coverage % households	**NA**	**>99.5%** 2017	**>99.5%** 2018	***1***	**60%** 2018
1d2 Ultrafast broadband take-up % households	**3%** 2016	**11%** 2017	**23%** 2018	***13***	**20%** 2017
1e1 Broadband price index Score (0 to 100)	**NA** 2016	**NA** 2017	**NA** 2018		**87** 2017

1. Progress towards a gigabit society

Thanks to its good performance on fixed, fast and ultrafast broadband coverage, Malta ranks first in the 2019 DESI (Digital Economy and Society Index) connectivity indicator.

There are two nationwide fixed access network infrastructures in Malta that are based on a next-generation network (NGN) setup: GO plc and Melita Ltd.

Total FTTP coverage increased steadily in Malta from mid-2015 to mid-2018, reaching 31.6 % in 2018, thus outperforming the EU average (29.6 %).

In terms of the deployment of next generation access networks, GO and Melita have nationwide coverage. As explained below, Melita has deployed DOCSIS 3.1 on a national scale. GO has a nationwide copper infrastructure in place alongside FTTC/FTTH.

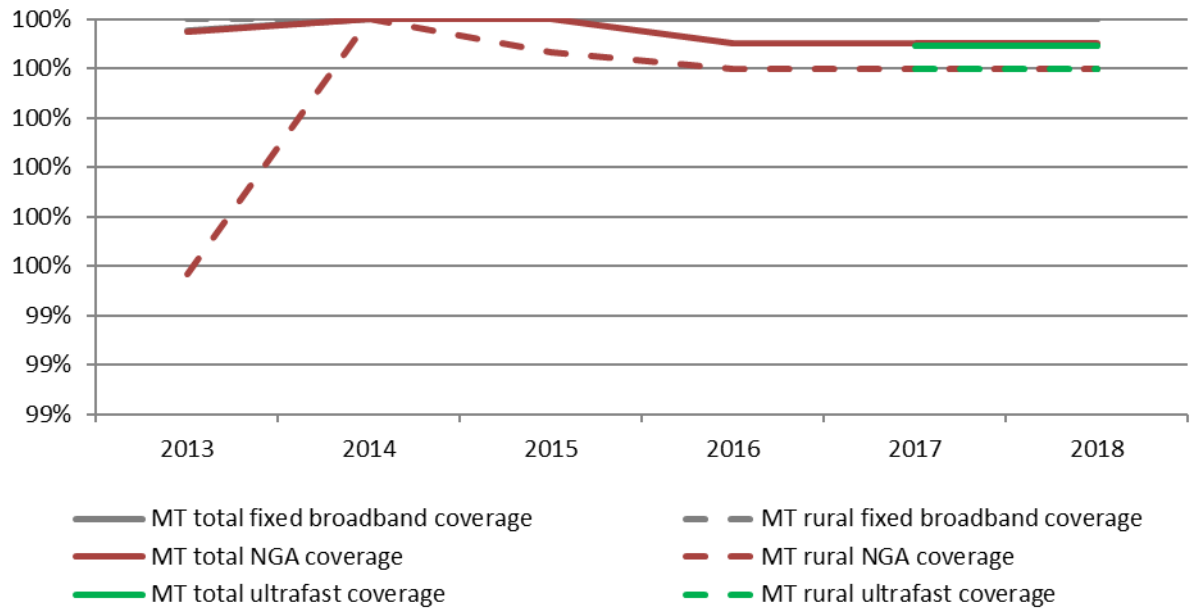
During 2019, the Malta Communications Authority (MCA) expects to launch a consultation on the new national broadband strategy. The strategy should pave the way for the future of fixed and mobile broadband in Malta, including the establishment of the 5G 'path-to-deployment'. The strategy will also take into consideration the use of future 5G infrastructure to improve the performance of electronic communications services used for public safety and security.

The MCA is undertaking a number of demand-driven initiatives. The MCA 'Free Wi-Fi' project aims to make Malta one of the first wifi states in Europe. There are currently more than 420 free wifi hotspots around Malta and Gozo. In addition to the widespread use of the wifi hotspots network, the EU's WiFi4EU initiative has been successful in Malta. 18 municipalities are to receive a voucher as

[46] 4G coverage measures the average coverage of those mobile operators providing 4G services. In Malta, a third operator started 4G services in 2018, which caused a downward change in average 4G coverage.

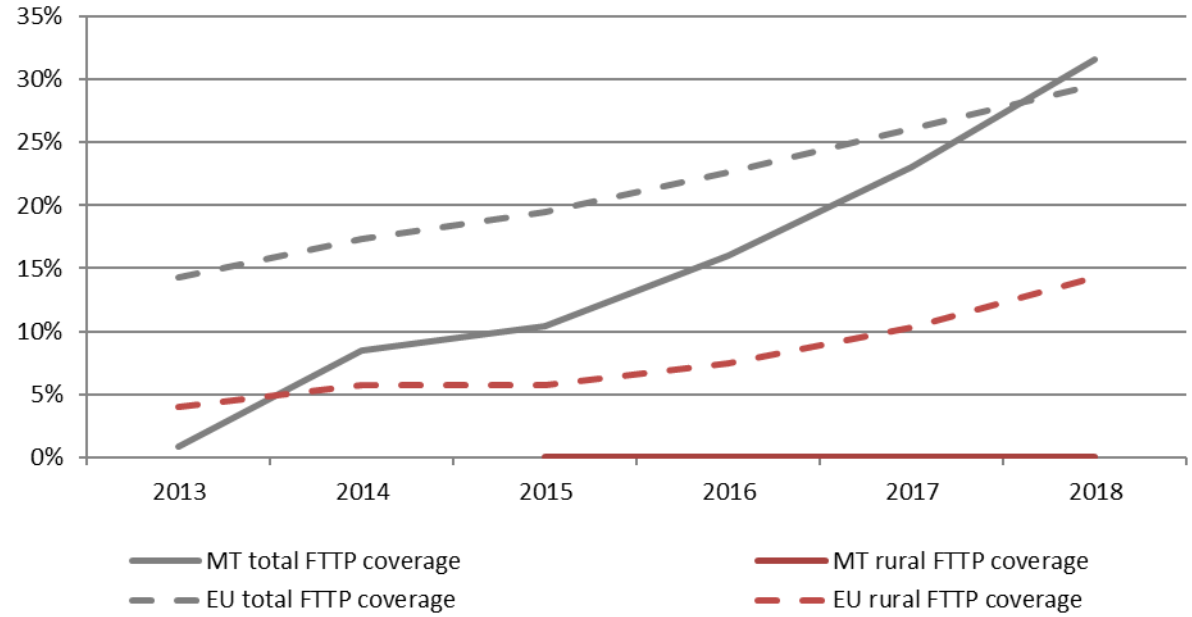
beneficiaries of the first call for applications under the initiative. . The MCA is also promoting the benefits of mobile technology connectivity through its programme named "GetSmarter I and II", where courses are being organised for the general public.

Fixed, NGA and ultrafast coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June. Ultrafast coverage metrics are available for 2017 and 2018.

Fibre-to-the-premises (FTTP) coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June.

As to international connectivity, the MCA initiated at national level a State aid process to establish an incentive programme that would support investment in submarine cables. These incentives aim at improving the economic soundness of the submarine cable project and thus encourage private investment in this area, with minimal intervention from central government.

Following an announcement in November 2017, GO now has a direct connection to Marseille through the Tunisia Telecom Mediterranean submarine cable network, using one of its existing cables in Mazara, Sicily. In practice, this means repositioning the portion of GO's international traffic that used to pass through the Milan IXP, thus eliminating the total dependence on it.

Two operators, namely Melita and Vodafone Malta, reported that they are deploying a 5G-enabled network, prior to MCA having awarded them five licences in the 800MHz and 2600MHz bands. However, for the time being none of the three mobile network operators (MNOs) operating in the market has expressed particular interest in the deployment of 5G; non of the two operators has applied for frequencies for 5G during the reporting period. This might be linked to the fact that following the assignment of spectrum in the 800 MHz and 2.6 GHz bands, all three MNOs made significant investments in 4.5G rollout, which resulted in most the territory being now covered by 4.5G services.

With regard to 5G trials, during 2018, the MCA received an application from Huawei Technologies s.r.l. and granted a trial licence (MCA/L/18-3254). This trial licence enabled Huawei Technologies to carry out a demonstration of their 5G network equipment during a period of 5 days [47].

In June 2018, the MCA adopted a roadmap for the UHF band between 470-790 MHz. The roadmap lays out the key initiative and milestones concerning the availability of the 700 MHz band for the provision of wireless broadband (WBB) applications and other national specific applications such as public protection and disaster relief (PPDR), the internet of things (IoT) and wireless audio programme making and special events, and for the usage of the sub-700 MHz band. Malta subsequently reported that it expects permission for the use of the 700 MHz band for terrestrial systems capable of providing wireless broadband electronic communications services to be postponed by 1 year after 30 June 2020. The obstacles that would justify such a delay are: (i) cross-border coordination restrictions; and (ii) the complexity of the technical migration of the existing digital terrestrial television (DTT) platform to more advanced broadcasting standards[48].

As to the other pioneer bands, the MCA is currently working to develop the relevant spectrum framework for the licensing of radio spectrum in the 3.6 GHz and 26 GHz bands. The MCA expects to publish a proposed framework for public consultation around Q3-2019. With regard to the 3.4-3.8 GHz band and the 24.25-27.5 GHz band, no difficulties are foreseen in making large blocks of radio spectrum available. In particular, the 26 GHz band is currently unused and therefore Malta has no migration or band clearance issues.

he transposition of the European Electronic Communications Code (EECC) will be carried out through amendments to the Malta Communications Authority Act, the Electronic Communications Act and subsidiary legislation included under these laws. The technical analysis is ongoing in MCA. The 24 months available for the transposition process are expected to be fully used.

2. Market developments

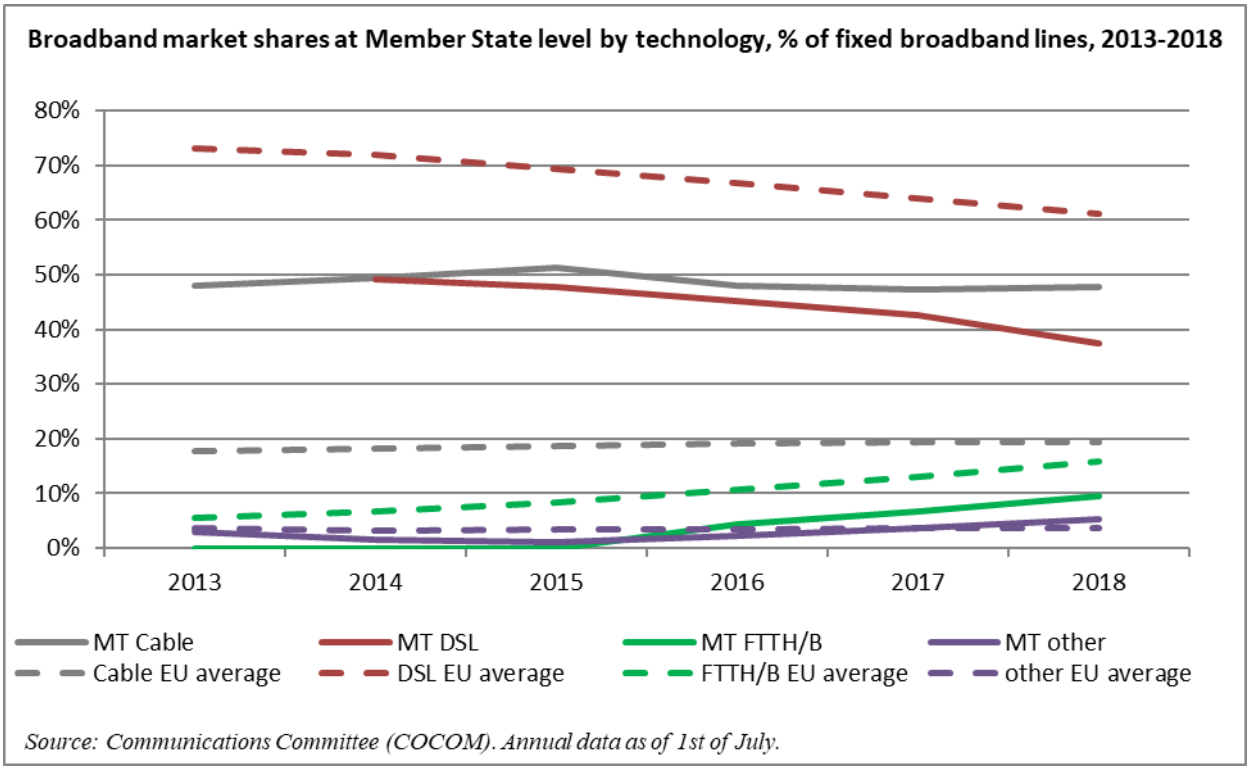
Competitive environment

[47] See: https://mca.org.mt/sites/default/files/List %20of %20T-T %20licences_R11_0.pdf
[48] As laid down in the Annex to Decision (EU) 2017/899

Triple-play subscriptions, specifically those including fixed telephony, fixed broadband and pay TV, are the most common in Malta. As at end of 2018, 72.23 % of total digital Pay TV subscriptions are purchased on a bundle offer. In 2018, Vodafone and Melita officially declared that they have abandoned their merger plans.

Melita and GO signed an agreement , with the intervention of the MCA, aimed at offering a single sport package, ending an ongoing competition to secure rights to top-tier football games.

2.1. Fixed markets



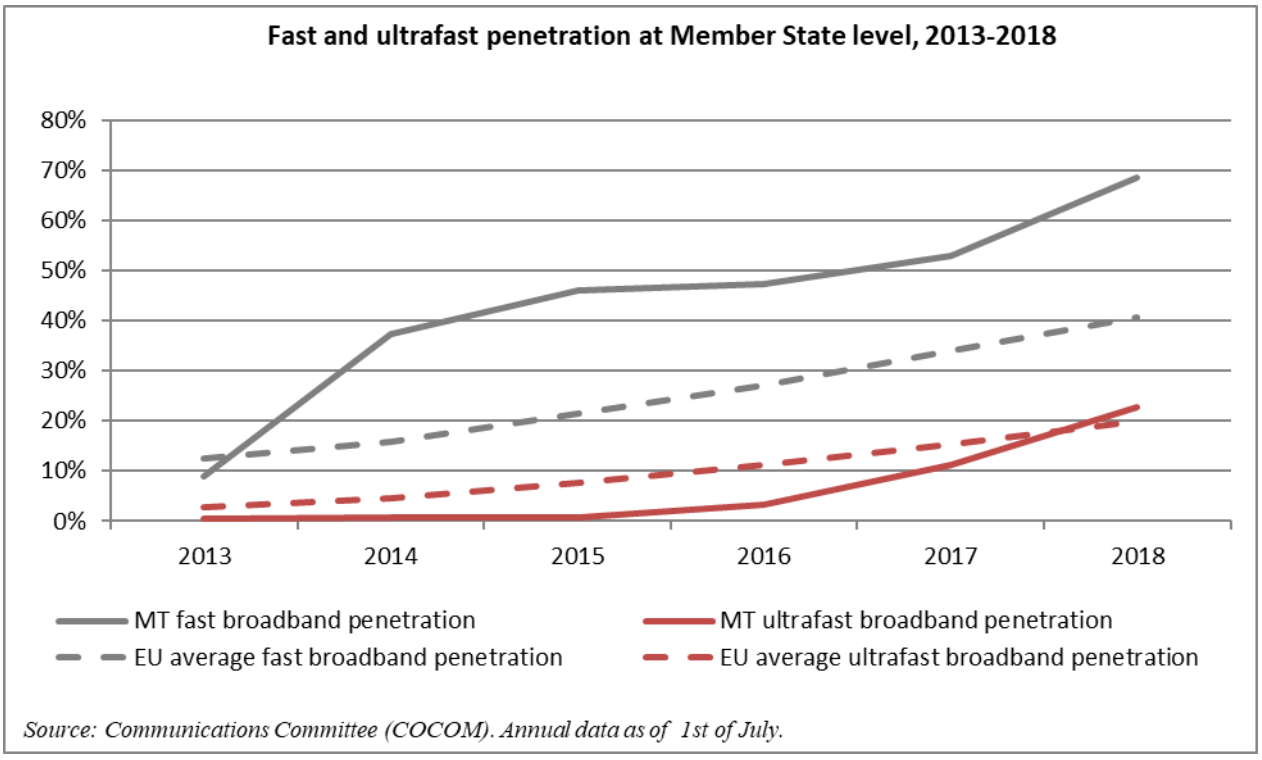
The share of cable on the Maltese market is 47.9 %, significantly higher than the EU average (19.4 %), while the share of DSL (37.5 %) is significantly lower than the EU average (61.1 %). The operator offering DSL is progressively shifting its customers onto fibre, and this explains the drop in DSL subscriptions in favour of fibre. The share of FTTH shows an increasing trend but is still below the EU average (9.4 % versus 15.9 %).

As to penetration, the graph above shows that the take-up of high (>30 Mbps) and very high (>100 Mbps) bandwidths in the fixed line segment has steadily increased in the last few years and in both cases outperforms the EU average (to a more limited extent in the case of ultrafast broadband penetration).

Over its copper DSL infrastructure, GO provides broadband connections with download speeds of up to 70 Mbps. GO is also upgrading its entire network, with street cabinets having been upgraded to fibre (FTTC) in most areas of the national territory. GO's rollout of a FTTH network has made good progress over a number of years, with a third of the national territory being served via the FTTH network, allowing speeds of up to 500 Mbps. As is the case with other mobile network operators, GO supports its LTE mobile broadband network with its fibre deployment, launched in the fourth quarter of 2015.

Melita's network is based on a cable HFC DOCSIS3.1 standard. Melita has upgraded its network over the past few years, with fibre up to street cabinets, and built many additional optical nodes. In 2019 it

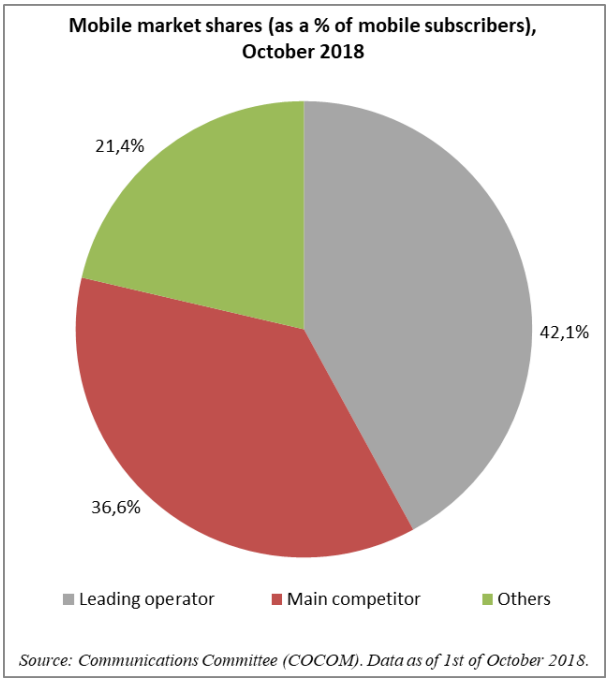
should be able to provide nationwide coverage with speeds up to 500 Mbps. Melita also provides its subscribers with access to around 75,000 high-speed wifi hotspots in main public areas and in home modems that have been re-programmed to also provide mobile data coverage.



Source: Communications Committee (COCOM). Annual data as of 1st of July.

Other ISPs provide electronic communications services using different wireless network infrastructures. These are Vodafone Malta, Ozone Malta and Vanilla Telecoms, which use wireless technologies to offer retail fixed telephony and fixed broadband services on a limited scale, given the technological limitations and footprint constraints associated with their wireless access infrastructures. An important difference relates to Vodafone's wireless network, which operates on licensed spectrum, whilst the wireless networks of Ozone Malta and Vanilla Telecoms operate on unlicensed.

2.2. Mobile markets



Source: Communications Committee (COCOM). Data as of 1st of October 2018.

There are three nationwide mobile network infrastructures, which are owned by GO, Melita and Vodafone Malta. These operators have been upgrading their networks over the years, rolling out 4G+ and using wifi and small cells to improve mobile and data coverage.

The mobile telephony sector witnessed growth in the 12-month period to December 2018, both in terms of the subscriber base and usage levels and particularly for active access to mobile broadband services.

Average revenue per user for mobile telephony was slightly down, which may suggest the onset of a more competitively priced environment, typically involving bigger voice and data

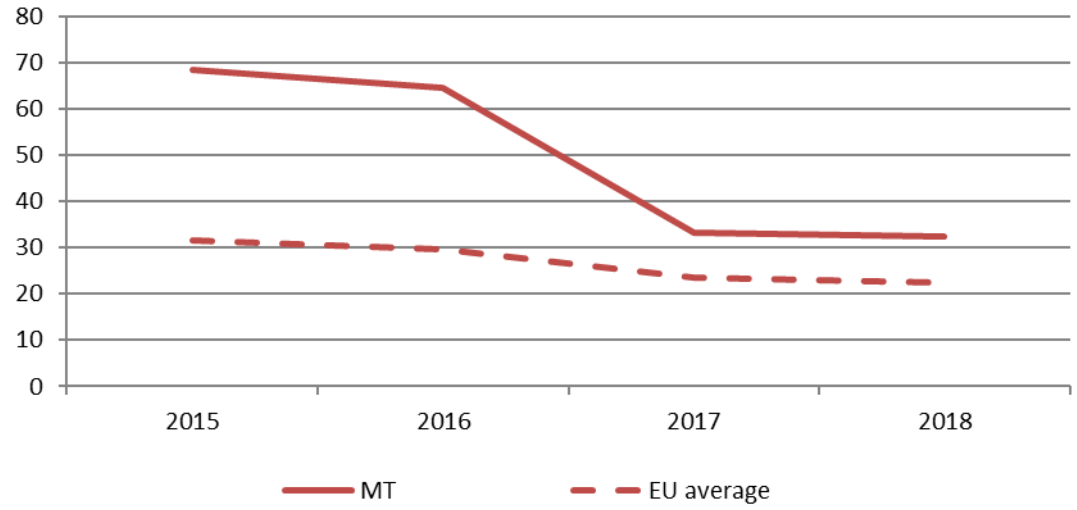
allowances. In fact, apart from rising voice usage levels, the number of end-users actively using mobile broadband services surged markedly, with a 4 % increase in the number of mobile telephony subscriptions actively using these services[49].

Mobile telephony has further consolidated its position as the most commonly used form of voice communication in Malta, with traffic volumes rising rapidly year-on-year. End-users are increasingly making use of mobile voice calling rather than fixed line calling, also considering that people nowadays are increasingly on the move. In Malta, the number of mobile-originated voice call minutes has been exceeding the number of fixed-originated voice call minutes since 2013. The gap between the two continued to widen since 2017. The continued fixed-to-mobile substitution in terms of voice telephony services is underscored by the falling rates per minute of communication for mobile telephony.

As showed by the chart above, in Malta the leading operator in the mobile sector has a market share of 42,1 %, while the main competitor has a market share of 36,6 %.

In Malta, mobile broadband prices are higher than the EU average. This is reflected in the Mobile Broadband Price Study, where Malta is considered among the 'relatively expensive' countries (the price for a 1 GB + 300 minutes is €32.50, versus an EU average of €22.30). However, there are signs of convergence in Malta's mobile broadband prices to the EU average.

Least expensive offer for handset (1 GB + 300 calls basket) at Member State level, EUR/PPP, 2015-2018



Source: Mobile Broadband Price Study (Van Dijk and Empirica). Prices expressed in EUR/(Purchase parity power - PPP), VAT included. Annual data as of February.

3. Regulatory developments

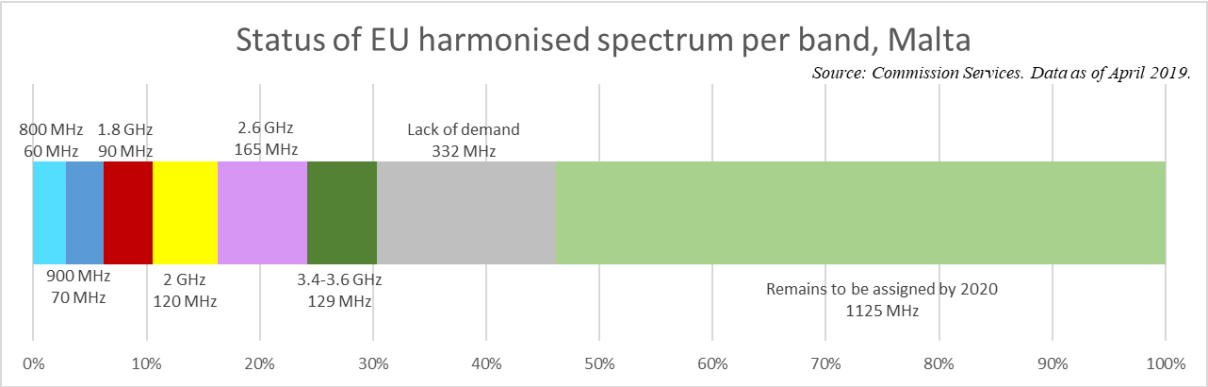
3.1. Spectrum

In Malta, 30 % of the total 2090 MHz of spectrum harmonised at EU level for wireless broadband has been assigned[50]. Radio spectrum in the 700 MHz, 1.5 GHz and 26 GHz bands, as well as part of the

[49] Data provided by the MCA.

[50] The 5G spectrum readiness indicator is based on the amount of spectrum already assigned and available for use for 5G by 2020 within the '5G pioneer bands' in each EU Member State. For the 3.4-3.8 band this means that only licences aligned with the technical conditions annexed to Commission Decision (EU) 2019/235 are considered 5G-ready. However, the

3.4 - 3.8 GHz band, is not as yet assigned for the provision of wireless broadband electronic communications services. According to the Maltese authorities, the assignment of radio spectrum in any of these bands will be subject to market demand.



In September 2018, the MCA revised the radio spectrum licences in the 900 MHz and 1800 MHz band to allow the respective right holders to deploy IoT technologies in these bands (in addition to voice and WBB). The radio spectrum licences are in line with Commission Decision 2009/766/EU as amended by Commission Implementing Decision (EU) 2018/637.

In 2018, the MCA granted new rights of use of radio spectrum for the provision of electronic communications services. These are set out below.

In April 2018, the MCA granted: (i) GO, Melita and Vodafone Malta with 2x10 MHz in the 800 MHz band for a duration of 15 years; (ii) GO with 2x40 MHz in the 2.5 GHz band for 15 years; and (iii) Vodafone with 2x30 MHz FDD[51] in the 2.5-2.6 GHz band and 25 MHz TDD[52] in the 2.5 GHz band. Malta has completed coordination agreements concerning spectrum in the 700 MHz band with with neighbouring EU countries. Greece and Malta agreed that it was not necessary to enter into a bilateral frequency coordination agreement due to the large distance between the two countries.

Italy and Malta signed an agreement on the distribution of radio frequencies, based on the principle of equitable access. In the various bilateral discussions with Italy, it was agreed that such an agreement should also include Tunisia and Libya. Due to the political situation in Libya it has so far been impossible to organise a multilateral meeting. Multilateral meetings between Italy, Tunisia and Malta took place in 2018. Further to a request submitted by Malta for EU assistance, the Commission facilitated multilateral discussions with Tunisia, which were held in May 2018. Nevertheless, only limited progress was registered so far in the frequency coordination process with the Tunisian authorities.

In December 2018, Malta updated its national frequency plan. The plan lists the allocations made for the radio frequency spectrum for Malta[53].

3.2. Regulated access

In Malta, most of the markets included in the 2014 Recommendation on relevant markets[54] are subject to *ex ante* regulation, as is the legacy market related to wholesale trunk segments of leased lines

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.

[51] Frequency Division Duplex

[52] Time Division Duplex

[53] See https://mca.org.mt/sites/default/files/NFP_edition %206.pdf

(Market 14 under the 2003 Recommendation), which remains partially regulated by way of the MCA Decision published in 2017 for Market 4/2014[55]. In 2018, the MCA undertook market reviews for the wholesale call termination market on individual public telephone networks provided at a fixed location (Market 1) as well as on individual mobile networks (Market 2). The conclusions of both market reviews maintained the previously existing remedies rather than review the regulatory remedies or revise or update the cost models to calculate new tariffs.

In particular, the MCA's 2018 review for the fixed call termination market maintained all the regulatory remedies previously in place, such as the obligations of access, transparency, non-discrimination and price control on each SMP operator. The obligation of cost accounting was maintained only on GO and Melita. With regard to price control, the MCA maintained the pre-existing fixed termination rate (FTR) of 0.0443 euro cent/min for the next regulatory period, based on a pure BU-LRIC model adopted in 2012. Similarly, the MCA's 2018 market review for mobile call termination maintained the pre-existing mobile termination rate (MTR) of 0.4045 euro cent/min for the next regulatory period, which was set using a pure BU-LRIC model adopted in 2014.

While acknowledging that both the Maltese FTR and MTR were among the lowest in the EU, the Commission noted that the MCA had not revised or updated the cost models to calculate new tariffs for the next regulatory period. In its comments to the notified draft measures, the Commission explained that it was working on a delegated act aimed at setting single maximum EU-wide fixed and mobile termination rates (Eurorates), based on a pure BU-LRIC model applicable to all operators. The delegated act will be adopted by 31 December 2020. The Commission stressed that during the period of transition to Eurorates, all national regulatory authorities were still encouraged to continue updating their existing BU-LRIC models with the most recent data as they become available (e.g. traffic patterns, volumes of voice and data, financial parameters, etc.), to the extent possible with reasonable effort. Such updates would, not, in the Commission's view, be overly burdensome and may result in more accurate estimates of the termination costs for the relevant review period. In conclusion, the Commission asked the MCA to consider, at a draft stage, updating its proposed models for both FTRs and MTRs using readily available more up-to-date input data (including traffic volumes) and to assess the pertinence of the outcomes to the transition to the Eurorate, which shall take into account the weighted average of efficient costs in the EU.

The MCA is currently working on the review of the markets for wholesale local access provided at a fixed location and for wholesale central access provided at a fixed location for mass-market products (markets 3a and 3b of the 2014 Recommendation on relevant markets[56] respectively). This review had been temporarily postponed in 2017 in light of a notification of concentration registered that same year with the national competition authority (namely, the Malta Competition and Consumer Affairs Authority – the MCCAA), in which Vodafone and Melita stated their interest to merge their commercial electronic communications services activities. However, in 2018, Vodafone and Melita

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[54] These include Market 1 (Wholesale call termination on individual public telephone networks provided at a fixed location), Market 2 (Wholesale voice call termination on individual mobile networks) Market 3a (Wholesale local access provided at a fixed location), Market 3b (Wholesale central access provided at a fixed location for mass-market products), and Market 4 (Wholesale high-quality access provided at a fixed location). Market 3b (Wholesale central access provided at a fixed location for mass-market produces) is not regulated.

[55] See https://mca.org.mt/sites/default/files/mca_decision_market_2-14_24 %2001 %202016.pdf#overlay-context=consultations-decisions/high-quality-access-and-connectivity-services-provided-fixed-location-0

[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. 79-84).

officially stated that they had abandoned their merger plans. Consequently, this overdue market review is now scheduled for Q3-2019, with the publication of the consultation document now envisaged to take place by the end of the year.

In addition, in February 2016 the MCA issued its virtual unbundled local access (VULA) decision[57], in which it imposed non-discrimination obligations on GO through an economic replicability test (ERT) framework, while equivalence of outputs was considered sufficient and efficient to maintain technical replicability. Following this decision, GO updated its VULA reference offer to include wholesale prices, which are subject to the ERT. In October 2018, Vodafone, after several months of negotiations, signed a VULA-based reference offer agreement to start offering fibre-based services. The agreement is expected to be operative by April 2019. Meanwhile, in December 2018, the MCA issued another decision introducing a framework for KPIs, SLAs and SLGs[58] for VULA[59].

Although Directive 2014/61/EU[60] (the BBCRD) has been transposed into Maltese law, problems persist with the concrete functioning of the single information point (SIP) and the dispute resolution body (DRB). According to the information available, a 'coordinating committee' composed of members of Transport Malta, Infrastructure Malta, the MCA, and the water and energy regulator (the most relevant authorities) was reported to be under creation. The committee's aim was to ensure the correct application of the provisions transposing the BBCRD, in particular with regard to the appointment of the members of the DRB and to the internal organisation of the SIP.

In this respect, the SIP function is currently assigned to Transport Malta. The Ministry reported that the SIP is already active, but operators pointed out that it is not duly populated with relevant infrastructure information or available in digital form.

It must be stressed that Malta is currently in the process of implementing the government's €700 million plan to upgrade all the roads within 7 years, meaning that the island is witnessing a huge number of major infrastructural projects in various localities. While this would be a good opportunity for operators to boost infrastructural competition, this would be prevented by the lack of a well-functioning single information point and a complete mapping of the existing infrastructure, caused by the above-mentioned partial implementation of the Cost Reduction Directive.

4. End-user matters

According to the 2018 Consumer Markets Scoreboard, the overall market performance from a consumer perspective decreased considerably between 2015-2017 for 'TV subscriptions' (-7.6 points, market ranks in 24th position out of 25 services assessed), 6.2 points below the market's EU average score. 'Fixed telephone services' equally saw a decrease in the market's MPI[61] score by 2.6 points between 2015-2017 (22nd position), nonetheless the market scores higher compared to the market's average EU score (+2.9 points). Both 'mobile telephone services' and 'internet provision' did not see a statistically significant change in their scores between 2015-2017 (13th and 18th position respectively)

[57] Reference: MCA/D/16-2513. 'Virtual Unbundled Access to Fibre-To-The-Home: Implementing the VULA Remedy Response to Consultation and Decision'. Published: 26 February 2016.
[58] Service Level Guarantees
[59] Reference: MCA/D/18-3403. "Virtual Unbundled Access To Fibre-To-The-Home: Enhancing the Non-Discrimination Obligation - Response to Consultation and Decision". Published: 11 December 2018.
[60] Directive 2014/61/EU of the European Parliament of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L 155, 23.5.2014, p. 1-14).
[61] The market performance index (MPI) is a composite indicator ranging from 0 to 100. It takes into account how easy/difficult it is perceived to compare offers; if consumers trust that retailers/suppliers comply with consumer laws; if they encountered problems and harm (including but not limited to financial loss); if services live up to their expectations and if they are satisfied with the number of providers in the market.

and have scores which are higher than the markets' EU average scores (+5.5 and + 4.2 points respectively).

Between 1 January and 31st December 2018, the MCA received 249 complaints, an increase of 15.8 % compared to the complaints received in 2017. During the period under review, the MCA also received 682 requests for information on different matters it regulates.

More than half (58 %) of the complaints received during 2018 concerning electronic communications services related to quality of service. Billing issues accounted for 27 % of complaints. Other complaints related to termination and switching of services (10 %), contractual issues (2 %) and other matters (2 %).

In 2018, the MCA started publishing monthly reports that include information on the main changes in the product line-up of local service providers, alongside an overview of prices and allowances of new plans[62]. It also published: (i) a table that enables end-users to compare the different fault repair timeframes and compensation schemes implemented by service providers[63]; and (ii) a table that enables end-users to compare the different installation charges applied by service providers[64].

In Q4-2018, the MCA carried out a nationwide educational campaign to raise awareness about what end-users should look out for when subscribing to an electronic communications service, during their use of the service and when terminating a service[65].

a. Net neutrality

MCA reported in its annual report that there were no cases that required regulatory intervention in the reporting period[66]. None of the ISPs engaged in commercial practices restricting end-users' right to choose and transmit the content of their choice[67]. The MCA also investigated two zero-rating cases, but determined that the offers involved did not necessitate actual enforcement measures.

IThe MCA applied the BEREC guidelines in determining whether the relevant zero-rating offers complied with the Regulation. In the case involving the zero-rating of IPTV transmission services, . the MCA concluded that in light of the limited scale and scope, it was unlikely the product could have a negative effect on either subscribers or CAPs[68]. The other case also related to the zero-rated offering of TV services. The MCA concluded that no regulatory intervention was required and found that although the Regulation applied to the internet access service (IAS) over which the product was delivered, the content was restricted to the confines of the provider's network. For that reason it was not considered to be available on the open internet and therefore not subject to the Regulation[69]. However, the MCA did also note that all zero-rating offers currently present in the market shall continue to be monitored and reviewed[70].

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[62] See for example: https://www.mca.org.mt/sites/default/files/Price %20developments %20for %20Publication %20October.pdf

[63] https://www.mca.org.mt/articles/ %E2 %80 %98service-providers %E2 %80 %99-repair-timeframes-and-compensation %E2 %80 %99

[64] https://www.mca.org.mt/articles/installation-services-what-you-need-know

[65] In this respect, the MCA published a set of guidelines on its website. See the Consumer Tips' section on the MCA's website: https://www.mca.org.mt/consumertips.

[66] MCA (2018), Report of the Malta Communications Authority on its monitoring and findings in accordance with Article 5 of Regulation (EU) 2015/2190 concerning the European net neutrality Rules (NN-report MCA), p. 6.

[67] NN-report MCA 2018, p. 7.

[68] Content and application providers. NN-report MCA 2018, p. 6-8.

[69] NN-report MCA 2018, p. 8-9.

[70] More information available in the 'Study on the implementation of the net neutrality provisions of the Telecoms Single Market Regulation' (SMART 2017/0011).

Between 1 May 2017 and 30 April 2018, the MCA received 14 complaints regarding discrepancies between the contractual speed and the actual speed of the IAS. One other complaint related to traffic management practices[71]. All complaints referred to in the annual reports have been settled.

b. Roaming

Maltese end-users consumed 1.5 times more roaming minutes (calls made) in Q1-2018 than in Q1-2017.

ata published by the MCA in early 2019 found that total mobile data downloads by Maltese individuals while abroad rose by 124 % from 2017 to 2018, reaching a total of 393.2 million MB. Domestic use also rose, reaching 6,206 million MB . These increases are reportedly due to the EU's abolition of roaming charges. During 2018, the MCA continued to monitor local operators' tariff plans. The MCA is publishing a monthly update on new and / or updated tariff plans launched by local operators[72]

c. Emergency communications — 112

In Malta, calls to the single European emergency call number 112 are received at the first level public-safety answering point (PSAP) and redirected to emergency response organisations (EROs). Dispatch of the intervention resources is done by the ERO operators. Two or more EROs may be dispatched on the same mission, using the same backend platform. Average answer time is 4.76 seconds.

E-Call is available at first level PSAP, with localisation of car with minimum set of data (MSD) is provisioned as soon as a major accident occurs, or otherwise triggered manually. Advanced mobile location (AML) is available only for Android phones for the time being, providing additional accuracy of cell based localisation services.

he 112mt mobile app has been upgraded with an additional feature, namely the registration of the mobile app for localisation services. The 112mt mobile app already included direct call, SMS, reports, emergency response addresses, and telephone details as well as news. The new feature provides users with the possibility to send a SMS by which a location service is established through the Global Navigation Satellite System (GNSS) coordinates, thus enabling first-level PSAP call takers to interact with the caller via return text or through web chat services.

5. Institutional issues

The MCA is currently establishing a national framework to encompass aspects related to numbering resources for non-interpersonal communications services which include M2M/IoT services.

Until the national numbering plan in Malta is updated to cater for M2M/IoT services, the MCA has adopted a temporary solution by allowing numbering resources to be used for the provision of M2M/IoT services specifically to end-users in Malta from publicly available telephony service (PATS) number ranges currently allocated to authorised providers. This is conditional on the provider in question keeping a record of any sub-ranges allocated specifically for M2M/IoT services and adhering to the condition that these numbering resources are not used on an extra-territorial basis.

To be exempted from adhering to all PATS obligations, service providers may inform the MCA of the sub-ranges they have allocated specifically for M2M/IoT services. In turn, the MCA indicates the sub-

[71] NN-report MCA 2018, p. 8.
[72] See https://mca.org.mt/articles/pricing-developments-february-2019

ranges allocated specifically for M2M/IoT services in its national numbering allocations plan matrix on the MCA website.

Meanwhile, the MCA is undertaking a public consultation to update the National Numbering Plan.

6. Conclusion

Malta performs well in broadband connectivity, ranking first in the DESI indicators fixed, fast and ultrafast broadband coverage, and thus achieving the European broadband coverage objectives. Malta should now focus on paving the way for 5G deployment by proceeding as soon as possible with the expected update of the national broadband plan and by making available the pioneer bands for effective use by 2020. To ensure full implementation of the Broadband Cost Reduction Directive, the persisting problems with creating the SIP and establishing the DRB should be swiftly solved by the Maltese Government.

Netherlands

	Netherlands				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
1a1 Fixed broadband coverage	**>99.5%**	**>99.5%**	**100%**	***1***	**97%**
% households	2016	2017	2018		2018
1a2 Fixed broadband take-up	**95%**	**98%**	**97%**	***1***	**77%**
% households	2016	2017	2018		2018
1b1 4G coverage	**91%**	**>99.5%**	**>99.5%**	***1***	**94%**
% households (average of operators)	2016	2017	2018		2018
1b2 Mobile broadband take-up	**85**	**88**	**94**	***14***	**96**
Subscriptions per 100 people	2016	2017	2018		2018
1b3 5G readiness	**NA**	**NA**	**0%**	***13***	**14%**
Assigned spectrum as a % of total harmonised 5G spectrum			2018		2018
1c1 Fast broadband (NGA) coverage	**98%**	**98%**	**>99.5%**	***2***	**83%**
% households	2016	2017	2018		2018
1c2 Fast broadband take-up	**65%**	**73%**	**76%**	***1***	**41%**
% households	2016	2017	2018		2018
1d1 Ultrafast broadband coverage	**NA**	**97%**	**97%**	***2***	**60%**
% households		2017	2018		2018
1d2 Ultrafast broadband take-up	**31%**	**32%**	**33%**	***7***	**20%**
% households	2016	2017	2018		2017
1e1 Broadband price index	**88**	**88**	**87**	***12***	**87**
Score (0 to 100)	2016	2017	2018		2017

1. Progress towards a gigabit society

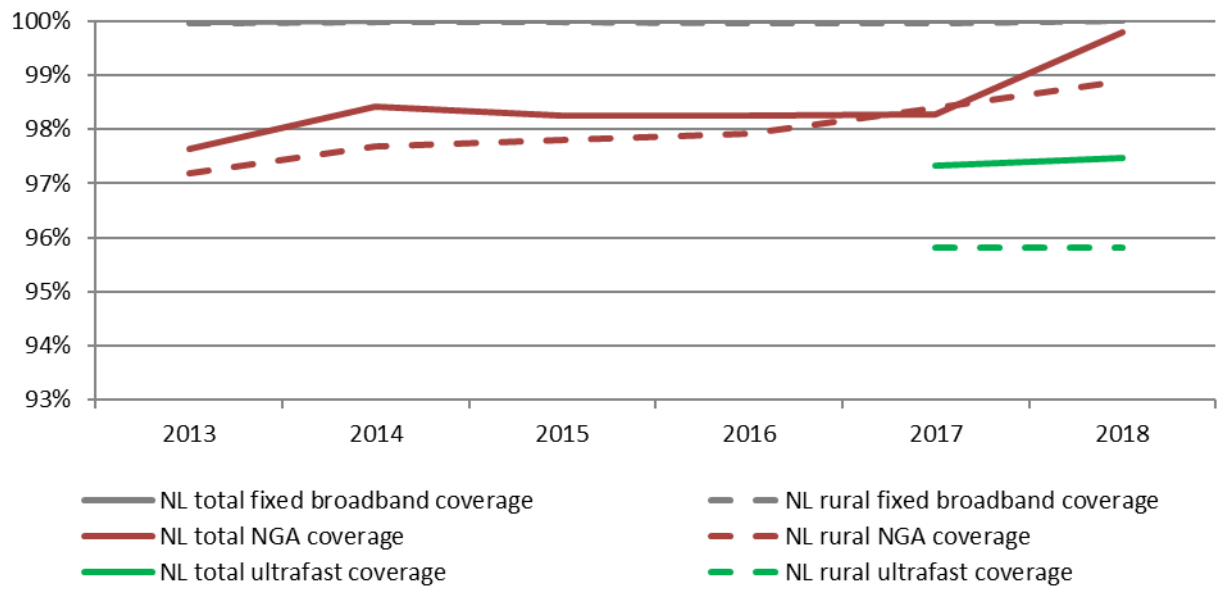
The Netherlands is among the top performers in the area of connectivity, ranking first in fixed broadband coverage, fixed broadband take-up, 4G coverage, and fast broadband take-up. It performs also very well in fast and ultrafast broadband coverage. It has full fixed and 4G mobile broadband coverage and fixed take-up is very high (97 % of households). Ultrafast broadband coverage is also very high (97 %) while the take-up is at one third of households.

The Netherlands has mostly already achieved the Digital Agenda Europe goals. In July 2018, the national broadband plan was updated with the publication of the connectivity action plan[73]. This plan shows the actions the government will take to keep the Dutch digital infrastructure at the cutting edge and to ensure that all people of the Netherlands will have access to fast fixed-connection broadband internet (at speeds of at least 100 Mbps) by 2023. By the same year, the vast majority should have connection speeds of 1 Gbps.

In this context, the Netherlands does not have a funding scheme for broadband networks. This is because regional and local authorities have the responsibility for ensuring sufficient funding if there is a lack of private investment. At an initial stage, the government plays a facilitation role, creating the right conditions for the rollout of fast internet without public funding, by sharing knowledge and best practices (e.g. Broadband Expertise Platform, or web portal[74]). If this does not succeed, then public funding can be considered; to facilitate the task of local authorities, the State aid framework may be used.

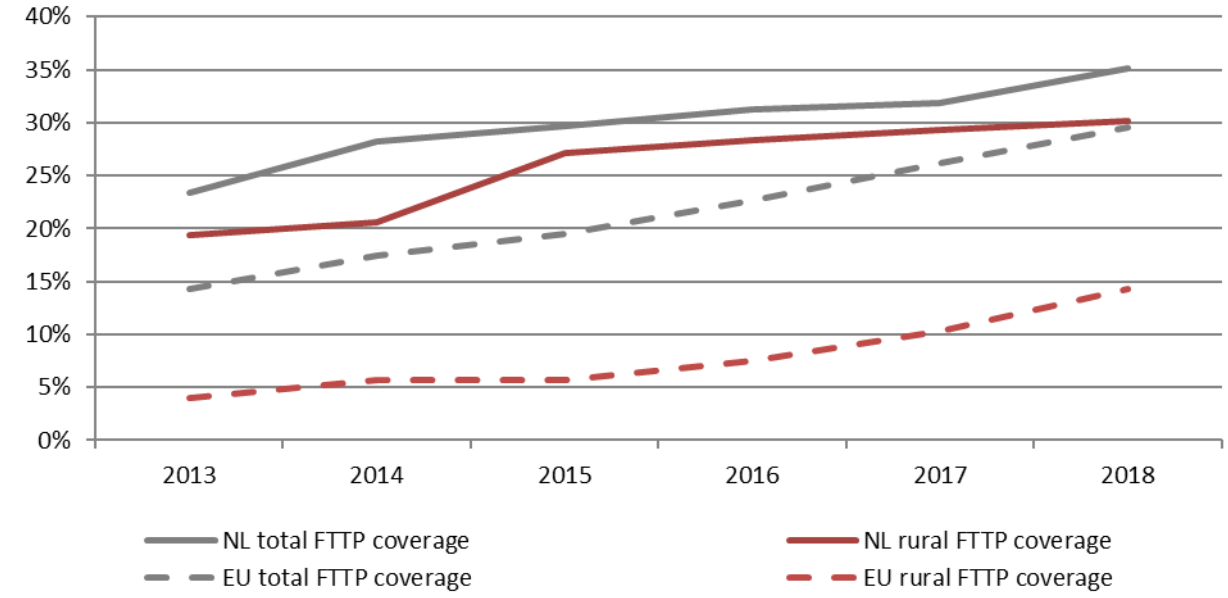
[73]https://www.government.nl/binaries/government/documents/reports/2018/07/13/connectivity-action-plan/Connectivity+Action+Plan.pdf
[74]www.samensnelinternet.nl

Fixed, NGA and ultrafast coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as

Fibre-to-the-premises (FTTP) coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of

The Netherlands has high-quality infrastructure, with several fixed telecom networks (copper, cable, and fibre) and three mobile network providers, with high availability of both fixed and mobile high-speed internet. Currently, 99.8 % of the households have access to at least 30 Mbps and 97.5 % already have access to 100 Mbps. Coverage of Dutch households with FTTP is with 35.1 % also higher than the EU average of 29.6 %, with recent deployment of FTTP focusing mainly on rural

areas.

The Ministry of Economic Affairs and Climate policy has commissioned a study on cost elements in the rollout of 5G networks in the Netherlands. The study was published on April 2018[75]. In the light of the increased impact of electronic communications on numerous sectors of society, the Dutch government is aware of the necessity to improve the digital security. Some preliminary steps have been taken in this area, for example through the information overview on the security of network elements, which is expected to be published by mid-2019.

On 5G, a multiband frequency auction is scheduled to take place early 2020. The 700 MHz band will be jointly auctioned with the 1400 and 2100 MHz bands for a period of 20 years. The auction for the 3.4 3.8 GHz band is, however, planned for 2021 or early 2022, i.e. after the deadline provided in the European Electronic Communications Code. There are no plans yet for the auctioning of the 26 GHz band.

At the moment, several innovative 5G tests are ongoing or planned, focusing on 5G applications in vertical industries such as mobility/automotive, industry, entertainment, smart cities, agriculture and health. This could help ensure that 5G services are quickly available in one or more cities. In this context, the most advanced is 5Groningen Living lab, which includes pilot projects on precision agriculture, remote care, autonomous transport, smart energy networks and smart industry. In November 2018, the Dutch authorities launched a 5G innovation network, where stakeholders from telecom operators, businesses, start-ups, vendors and regional and local communities meet to share best practices.

he national action plan aims for uninterrupted 5G wireless broadband coverage in all urban areas as well as major roads and railways by 2025. Moreover, in November 2018, the Dutch authorities launched a 5G innovation network, where stakeholders from telecom operators, businesses, start-ups, academia, vendors and regional and local communities meet to share best practices. In March 2019, the 5G Manifesto was launched[76] and signed by more than 23 market parties, Ministries and regional and local communities with the ambition for the Netherlands to remain Europe's leader on connectivity. Furthermore, 5G (and IoT) will be an important infrastructure for many innovative solutions for Artificial intelligence. In this context, the Netherlands is planning to launch before Summer 2019 a national strategy for Artificial Intelligence.

2. Market developments

In January 2018, TINC invested €20 million in fibre rollout. Moreover, the Swedish investor EQT Fiber acquired GlasvezelBuitenaf, which invests in fibre rollout in rural areas. In May 2018, Arcus Infrastructure Partners acquired a majority stake in E-Fiber. In spring 2018, the company e-Quest announced that it will roll out fibre in the municipality of Helmond. In July 2018, Scottish billionaire Irvine Laidlay invested €200 million in optical fibre in Rotterdam by acquiring a position in the L2Fiber. In the summer of 2018, Delta Rijssen Fiber Optic Investments and KPN announced that they were going to jointly invest in the rollout of fibre. In September 2018, the British investor Ancala acquired a majority stake in FORE Freedom. In October 2018, the company Eising Kempen indicated that it has an investor who wants to invest €350 million in fibre in Limburg.

However, the most significant market development is the completion of T-Mobile's absorption of

[75]https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/rapporten/2018/04/05/onderzoek-naar-de-kosten-van-5g-uitrol-english/Onderzoek+naar+de+kosten+van+5G-uitrol+ %28English %29.pdf

[76]5G Manifesto https://www.eurofiber.nl/nieuws-pers/mona-keijzer-ontvangt-handvest-5g-samenwerken-om-koppositie-nederland-in-digitale-toekomst-te-behouden/

Tele2 Netherlands. The merger was unconditionally approved by the Commission on 27 November 2018. Following the completion of the merger, Tele2 owns 25 % of the enlarged T-Mobile NL, while Deutsche Telekom owns 75 %. Tele2 also received a cash payment of €190 million. In 2018 there were no new market entrants and market shares for the major market players on the different wholesale/retail markets remain stable.

The competitive market situation is ensuring that there is sufficient interest in investing and rolling out high-speed broadband networks. This makes investment of public funds in network rollout less necessary. Moreover, in the view of the Authority for Consumers and Markets (ACM), there is no need for a fourth mobile player on the Dutch market since the three current players sufficiently ensure competition.

In September 2018, the ACM issued a Decision that both KPN and VodafoneZiggo must open up their fixed networks; related to that, VodafoneZiggo later published its wholesale reference offer for wholesale fixed access.

The fixed operator CAIW has voluntarily opened its network to other providers. CAIW is the third Dutch fixed-network operator, with a fibre network connecting nearly 400,000 households. CAIW offers its network to business and residential users, with focus primarily on less densely urbanised areas of the Netherlands.

The general trend in the Netherlands is towards a decline in fixed telephone usage and in stand-alone TV subscriptions. Electronic communications services are predominantly purchased in bundles (triple-play or quad-play), and the market is slowly dividing between quad-play (internet, TV, fixed telephony and mobile) and internet-only subscriptions, which appeal mainly to the younger population. The key driver on the market seems to be network speed, with users often choosing faster networks, while the other comparative differentiator seems to be exclusive content. In this context, it is noticeable that the prices of TV content have risen significantly in recent years.

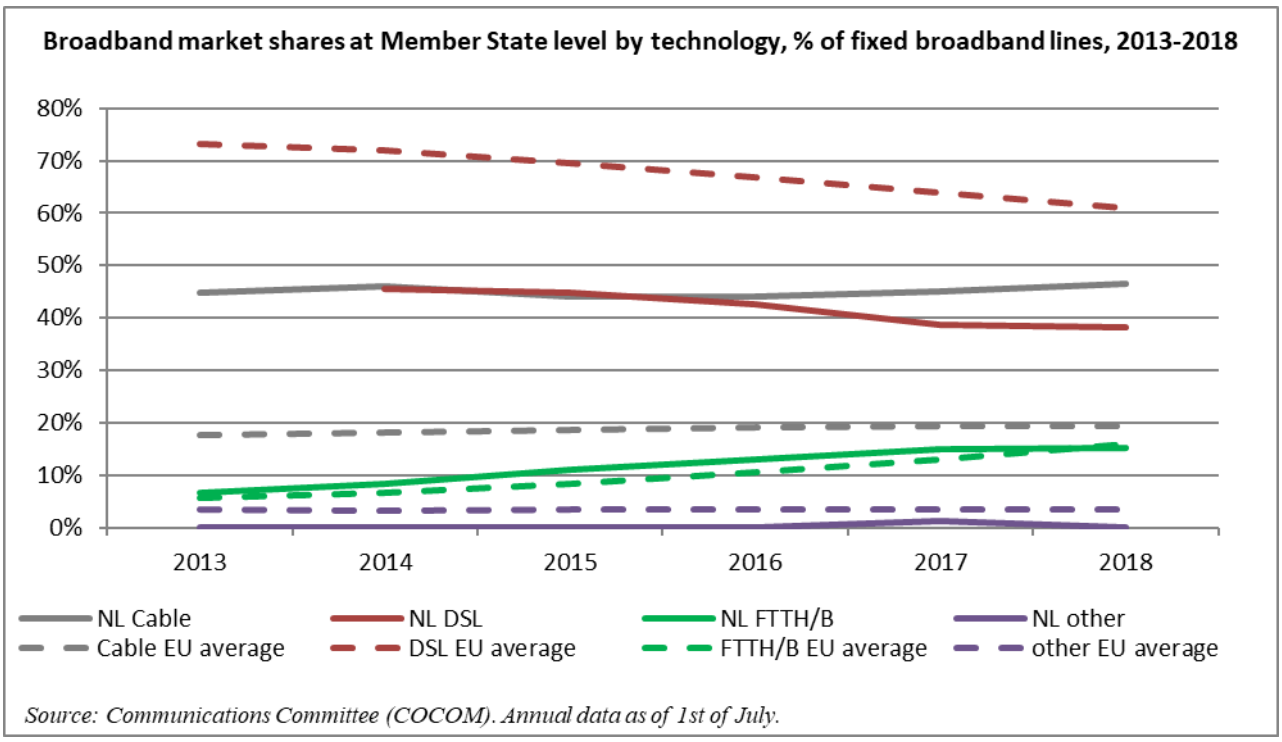
Regarding wholesale offers for mobile networks there are currently no 'unlimited' data offers on the wholesale market. This makes it difficult for mobile operators to compete with owners of mobile networks.

2.1. Fixed markets

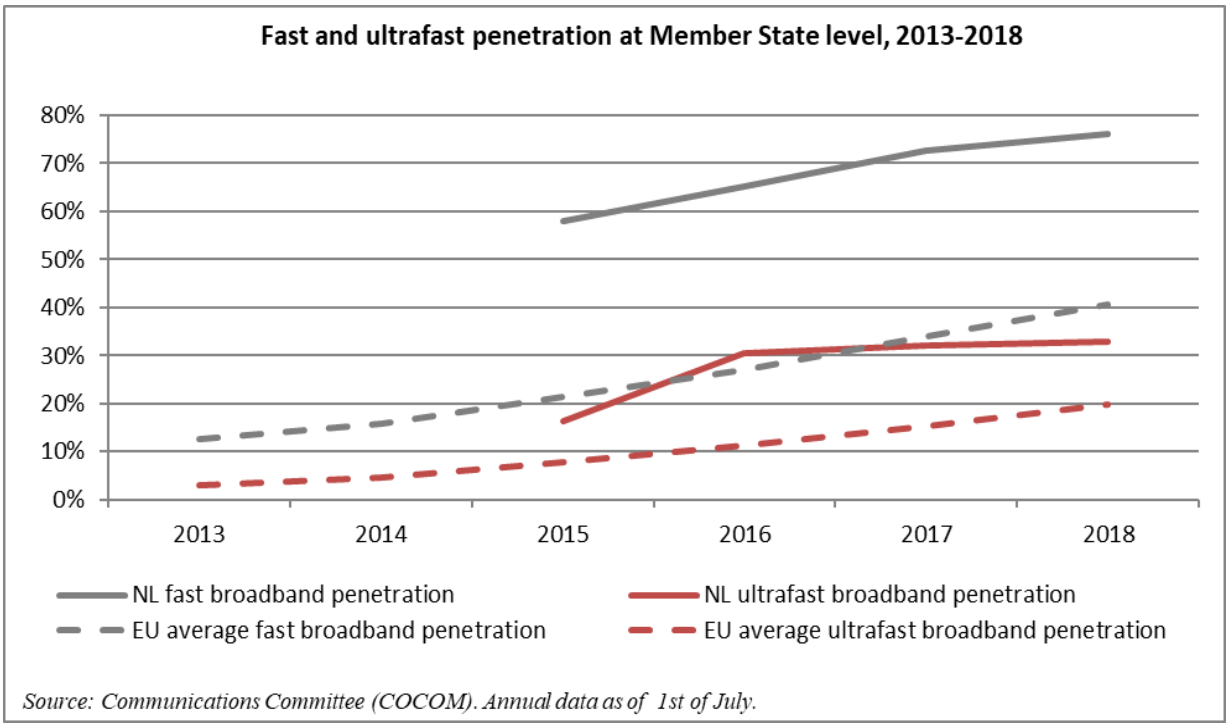
Ultrafast penetration in the Netherlands is growing but slower than the EU average, particularly in rural areas, even though prices are close to the EU average, as evidenced by the scoring on the broadband price index[77]. The wide availability of ultrafast networks in the Netherlands (93 % coverage), which results in high take-up of DSL (38.3 %) and cable networks (46.5 %), seems to have been to the detriment of the deployment (35.1 % coverage) and take-up (15.2 %) of the more future-proof fibre to the home/building (FTTH/B) network.

Whereas a year ago FTTH/B deployment in rural areas in the Netherlands was often resulting from local initiatives, private investment in rural areas by various market parties has increased markedly over the last year. Indeed, market parties sometimes compete in the same area for demand aggregation. In April 2019, the ACM has launched a market study of the fibre market to explore how this may affect the rollout of fibre networks.

[77] The fixed broadband price index weighs the cheapest retail offers from: standalone, double play (BB + TV, BB + fixed telephony) and triple play (BB+TV+fixed telephony) and three speeds categories - 12-30 Mbps, 30-100 Mbps and +100 Mbps. This indicator presents values from 0 to 100 (which should not be read as prices) and the higher the values, the better the country performs in terms of affordability of prices relative to purchasing power.



At the moment there are around 8.4 million households and business locations in the Netherlands. In rural areas, most of the new network is FTTP, while in urban areas VodafoneZiggo is upgrading its coax network to DOCSIS 3.1, while KPN is rolling out fibre to the curb (FTTC) and using DSL vectoring for the last mile. Use of DSL vectoring is specifically assisted by the fact that in the Netherlands traditional copper wires contain a double twisted pair.



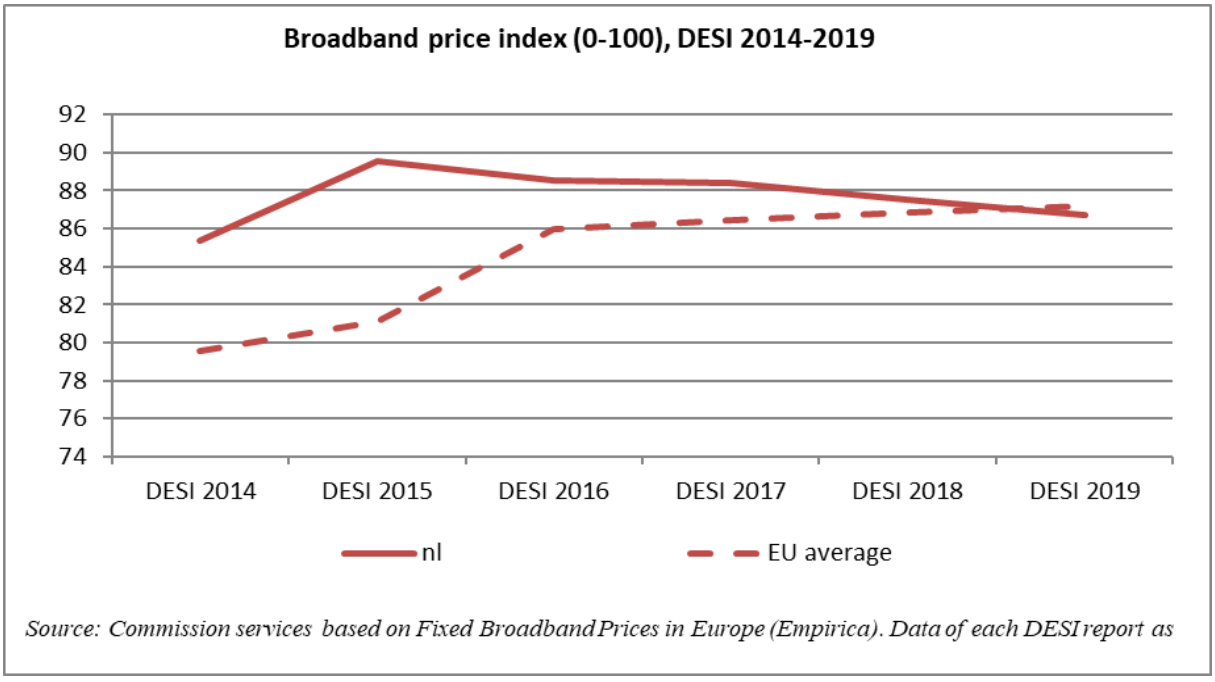
In the last 4 years, the incumbent (KPN) decreased the pace of rollout of its fibre to the home network (FTTH), while at the same time privileging the rollout of FTTC for delivering (vectored) VDSL to end-users. In January 2019, KPN announced it will increase its FTTH rollout with 1 million homes

planned to be connected to FTTH by 2021. The cable companies (VodafoneZiggo, COGAS and Delta) cover households and businesses with DOCSIS 3.0 or higher. Other operators rolled out FTTH network to approximately 300,000 households in 2018. At the end of 2018, T-Mobile announced its plan to roll out fibre to 33,000 mostly residential addresses in The Hague.

In the course of 3 years, investments in fixed networks dropped from around €1.70 billion in 2014 to €1.04 billion in 2017 (the 2016 figure was €1.15 billion). The main reason is the decrease of the rollout of FTTH by KPN (rollout costs for FTTC are lower than FTTH) and the merger of Ziggo, Vodafone and UPC, where investment went into integration rather than fixed networks)[78].

Operators building fixed infrastructure still see the main obstacles as being obtaining the necessary building permit and the rather high fees for rights of way. There seems to be no uniform approach towards rights of way fees, which differ greatly between municipalities. This can become a hurdle in the future considering that 5G network will require approximately 5 times more antennas/sites than current mobile networks. Another issue is that the procedures relating to the way in which civil works for the deployment of networks must be carried out (timing, coordination etc. but not the right to deploy cables itself), often differ between local authorities and this could be a hindrance for a swift rollout of fibre networks.

Transparency has increased by the publication of the study by Kwink on local policy for the rollout of fixed and mobile networks[79]. The dissemination of best practices for local policy is part of the national connectivity action plan. For more information, the report on the state of play with regard to the rollout of fibre networks is published on the internet by Stratix[80].



Source: Commission services based on Fixed Broadband Prices in Europe (Empirica). Data of each DESI report as

[78] In this context, on 23 May 2019 the CJEU has by its judgement in Case T- 370/17 upheld the Decision of the Commission C(2016) 5165 final of 3 August 2016 declaring the concentration involving the acquisition by Vodafone and Liberty Global of joint control of a full-function joint venture to be compatible with the internal market and the EEA Agreement (Case COMP/M.7978 — Vodafone — Liberty Global — Dutch JV).

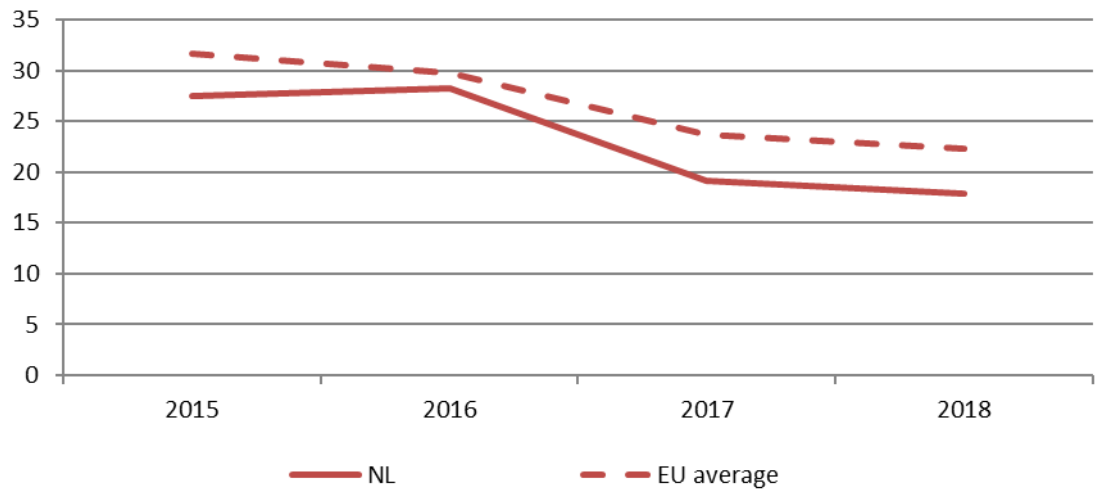
[79] https://www.rijksoverheid.nl/documenten/rapporten/2018/03/09/inventarisatie-gemeentelijk-beleid-telecomnetwerken

[80] https://www.stratix.nl/3-miljoen-nederlandse-huishoudens-kunnen-voor-eind-2018-gebruik-maken-van-glasvezel/

2.2. Mobile markets

While mobile broadband take-up has improved (94 subscriptions per 100 people), it is still relatively low due to wide availability and use of public wifi networks. The general trend in mobile services is moving towards larger data allowances in bundles and increased use of the mobile network (instead of wifi) for mobile data transfer. However, due to their wide availability, wifi networks are still frequently used for data transfer. T-Mobile and Tele2 have been offering unlimited data bundles since 2017.

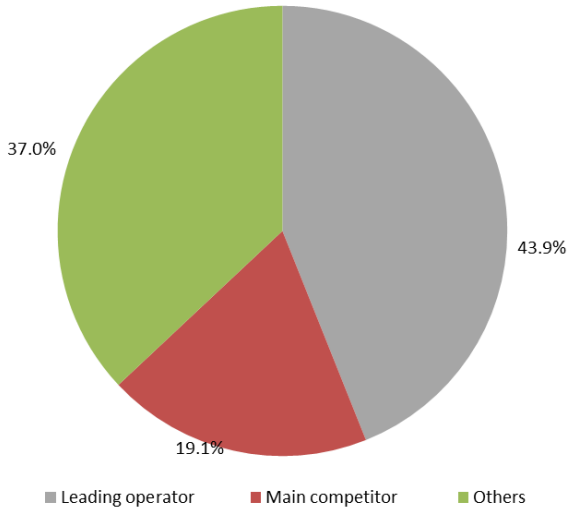
Least expensive offer for handset (1 GB + 300 calls basket) at Member State level, EUR/PPP, 2015-2018



Source: Mobile Broadband Price Study (Van Dijk and Empirica). Prices expressed in EUR/(Purchase parity power - PPP), VAT included. Annual data as of February.

In recent years, it appears that services like WhatsApp, Skype, Viber, Facebook and Messenger have had an impact on the number of call minutes and text messages (SMS). Mobile operators have adjusted their mobile offers to this (often with unlimited calls and SMS), while data has become the main driver of mobile revenue. The number of call minutes is only slowly rising and the number of text messages is slowly declining. The leading operator and the main competitor together hold 63 % of the mobile market (43 % and 19.1 % respectively) while other operators jointly hold 37 % of the market share.

Mobile market shares (as a % of mobile subscribers), October 2018



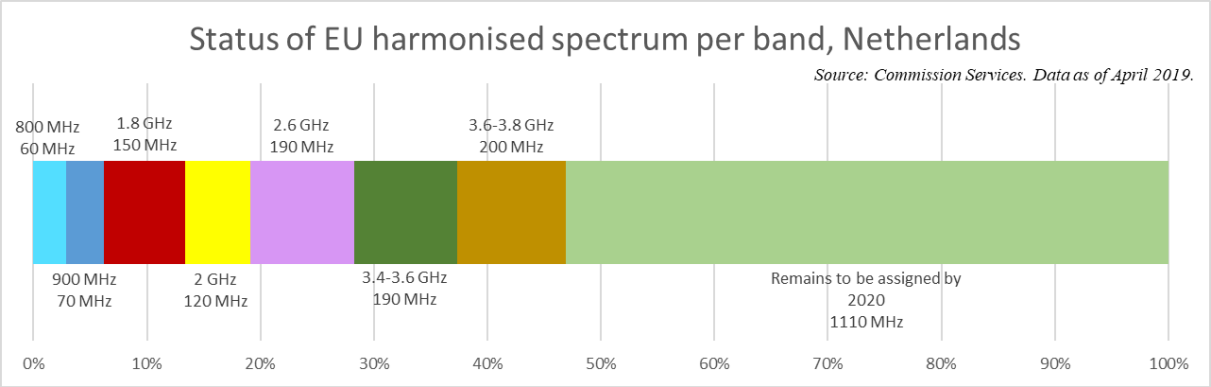
Source: Communications Committee (COCOM). Data as of 1st of October 2018.

VodafoneZiggo and KPN publicly announced the switch-off of their 3G networks in 2020 and 2022 respectively. Operators are refarming their spectrum in order to have more spectrum for 4G at the expense of 3G and 2G. Passive sharing of site locations and antennas is regularly applied in order to increase rollout efficiency and improve

coverage in places like tunnels. In this context, research shows that 86 % of Dutch people are (very) satisfied with the quality of the coverage in their home of the network of their mobile provider[81].

3. Regulatory developments

3.1. Spectrum



Overall, 47 % of the 2090 MHz spectrum harmonised at EU level for wireless broadband has been assigned in the Netherlands[82]. The spectrum that remains to be assigned is mainly in the 700 MHz, 1.5 GHz and 26 GHz bands.

On 8 November 2018, the Commission sent to the Netherlands a letter of formal notice requesting full implementation of the European radio spectrum rules on the assignment of the 700 MHz band (Decision (EU) 2017/899). Under EU rules, Member States are obliged to adopt and make public their roadmap, including detailed steps for allowing the use of the 694-790 MHz ('700 MHz') frequency band for mobile broadband, by 30 June 2020. The due date for adopting and publishing these roadmaps was the end of June 2018. The Netherlands has neither adopted nor published such a roadmap so far; instead it provided notification of a document which does not fulfil all the key requirements for a roadmap. Roadmaps serve to pave the way to 5G and the absence of roadmap could negatively affect the timely development of 5G in the Netherlands and its surrounding countries.

In the upcoming 700 MHz band auction (scheduled for the beginning of 2020), the Dutch authorities expect that 2x30 MHz will be available for commercial use. The rights of use will be accompanied by an obligation to cover 98 % of the surface area of each municipality and will have a minimum connection speed. In addition to the coverage requirement, for the 700 MHz licences there will be a 'commissioning' obligation: for every 2 x 5 MHz that a licence holder owns 2 years after licensing, it must cover an area of 751 km², and after 5 years, it must cover an area of 7 512 km². The obligation provision also requires that a public electronic communications service is actually provided.

One source of concern for the deployment of 5G was the potential interference in the 3.4-3.6 GHz frequency band in the north of the country from the satellite listening station currently used by the military services. In December 2018, the government took a preliminary decision to move the station in order to free up the band for 5G. At the beginning of March, the Dutch Ministry of Economic

[81] https://www.telecompaper.com/nieuws/86-procent-nederlanders-tevreden-over-indoor-kwaliteit-mobiele-netwerk--1292987?utm_source=telecom_vandaag&utm_medium=email&utm_campaign=16-05-2019&utm_content=textlink

[82] The 5G spectrum readiness indicator is based on the amount of spectrum already assigned and available for use for 5G by 2020 within the '5G pioneer bands' in each EU Member State. For the 3.4-3.8 band this means that only licences aligned with the technical conditions annexed to Commission Decision (EU)2019/235 are considered 5G-ready. However, 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.

Affairs started a consultation on its plans for the 3.4-3.8 GHz band. By end-2019, the government aims to announce the plans for auctioning this spectrum in 2021. Moreover, in February 2018, the ACM has launched the public consultation on their draft opinion (on competition safeguards) for the upcoming 5G auction and in April 2019, the ACM published its advice[83]. In addition, end of 2018 ACM released a paper on 5G, which covers regulation and the regulator's role with regard to 5G[84].

3.2. Regulated access

In July 2018, the ACM notified the Commission of its fixed access market review, which the Commission assessed under Case NL/2018/2099-2100. The ACM expects to publish a new draft decision on Market 4 in the first half of 2019. Other market reviews are not expected.

The Dutch market is characterised by the almost ubiquitous coverage of, xDSL, FTTx, and coax cable. The ACM concluded that there is no longer a justification for separation of a local and a central access market due to the converging technical characteristics of the available bitstream products. Moreover, the ACM concluded that the incumbent operator KPN and the cable operator VodafoneZiggo are jointly dominant on the fixed wholesale access market and therefore imposed regulatory remedies on both companies, including the obligation to provide wholesale access and price control. In its comments, the Commission acknowledged the possibility of a merged market for fixed wholesale access but insisted on the need for virtual unbundled local access (VULA) and other access products included in the market definition to meet and continue to meet the requirement of functional equivalence with physical local access. The Commission did not object to the Dutch regulator's finding that KPN and VodafoneZiggo had joint SMP. However, the Commission pointed out that regulatory obligations should be limited to those that are necessary to disrupt the identified collusive equilibrium and thus restore competitive supply on the wholesale market. The Commission therefore asked ACM to further justify extending access remedies currently imposed on KPN also to VodafoneZiggo and to consider whether a more flexible price control remedy (economic replicability test rather than strict cost orientation) related to VULA as well as all fibre and cable products could better address the retail market failure of excessive pricing identified by the regulator. As a result of the newly imposed cable regulation, Vodafone Ziggo published a reference offer at the end of 2018, and later in March 2019 published wholesale fixed access prices[85].

In 2018, the ACM was called on to resolve three disputes. The first dispute was between Private Mobility and KPN and concerned tariffs for the porting of numbers. The second was between KPN on the one hand and Vodafone Tele2 and BT on the other and concerned wholesale tariffs for calling non-geographical numbers (related to Article 28 of the Directive on universal service and users' rights). The decisions in this disputes are expected to be taken early 2019. The third, also on hold, was between Art of Automation and Exploitatiemaatschappij Zevenhuis and related to network access to area covered by Exploitatiemaatschappij Zevenhuis.

4. End-user matters

In 2018, the ACM received a total of 2,474 calls/complaints from consumers about electronic communications providers. Because the ACM is not only the national regulatory authority in the Netherlands but also the authority for consumer rights, there is no division of competences necessary. In this context, 650 calls were about mobile telephony services, 270 about fixed internet services and 188 about fixed telephony services. A further breakdown of the number of complaints regarding

[83] https://www.acm.nl/en/publications/acm-ministry-economic-affairs-set-caps-mobile-frequencies-maintain-competition
[84] https://www.acm.nl/sites/default/files/documents/2018-12/5g-and-acm.pdf
[85] https://www.vodafoneziggo.nl/wholesale

mobile services (650) shows that the most of them were about data use (423), the termination of contracts (98) and new contracts (41).

According to the 2018 Consumer Markets Scoreboard, of the 25 services markets assessed by consumers in the Netherlands 'internet provision', 'TV-subscriptions', and 'mobile telephone' rank quite poorly (21st, 19th and 18th respectively), without featuring any significant change between 2015 and 2017. The 'fixed telephone services' market is the only electronic communications market progressing substantially (+1.9 points) in the same period of time and the only one outperforming the EU average.[86].

Furthermore, data from the Dutch consumer association Consumentenbond shows that the number of consumers complaints to their specific provider have stabilised in recent years, and that there has been an overall decline in the number of complaints received via the online complaints-platform. Moreover, Consumentenbond organises four times a year a satisfaction survey about consumer experiences with their operator. The results show that the total scores of the operators are good; the minimum score is 7.3 out of 10. Ratings on the quality of the service are also quite good, and lower ratings appear to be related to bad terms and conditions. These concern, for example, the rounding up of the length of phone calls to minutes instead of seconds. Free of charge comparison tools on communications services have been available in the Netherlands since 1998. These tools work well and are privately owned.

Some stakeholders explained that for many electronic services, the user is provided with the email address. However, when user later terminates his/her subscription the email address is equally terminated and for some users (e.g. elderly people) such a change might represent a disruption of their communication. In this context, some users stay with a certain provider just in order to keep their email address. For this reason, it was suggested that in the case of service termination, the operator should be obliged to forward emails free of charge for a period of 6 month to a specified email address.

In 2018, the ACM issued a guidance document on essential information to be published on the websites of service providers. This is mandatory information about the subscription offer, the service, tariffs, etc.

a. Net neutrality

On 24 January 2019, the District Court of Rotterdam ruled on appeal in the case brought by Dutch digital rights organisation Bits of Freedom against the ACM's decision of 29 January 2018. According to Bits of Freedom, the data-free music service (in Dutch: *Datavrije Muziek*) of telecom provider T-Mobile resulted in a limitation of end-users' rights as provided for Article 3(2) and (3) of the Net Neutrality Regulation. The music-streaming services affiliated with the data-free music service were zero-rated, which means that data consumption when using those services did not count against the end-user's data plan. Bits of Freedom argued that end-users were influenced in their consumption behaviour regarding streaming services.

The same district court had earlier ruled (on 20 April 2017) that Dutch law, which contained a categorical ban on zero-rating, conflicted with the EU Net Neutrality Regulation. According to the court, the Net Neutrality Regulation allows zero-rated offers under certain circumstances. Bits of

[86] The market performance index (MPI) is a composite indicator ranging from 0 to 100 which measures how well a given market performs according to consumers on the basis of the 5 components: Comparability, Trust, Problems & detriment, Expectations, Choice.

Freedom subsequently filed a request for enforcement with the ACM. The ACM turned down this request in the first instance as well as appeal, arguing that it could not be established that end-users were harmed by the data-free music service.

In its most recent ruling of 24 January 2019 on the appeal, the court confirmed the 20 April 2017 ruling on procedural grounds. In addition, the court upheld the ACM's assessment on the basis of Article 3(2) of the Regulation and agreed with the ACM's arguments, which had assessed T-Mobile's different conditions and come to the conclusion that these do not act as unreasonable barriers to entry.

b. Roaming

Implementation of the Roaming Regulation[87] in the Netherlands caused no particular issue. Dutch consumers greatly benefit from the new rules, with approximately four times more mobile data being consumed than before 'roam like at home' was adopted.

According to the study 'International Roaming BEREC Benchmark Data Report October 2017-March 2018, BoR[88]', there is a definite upward trend in consumption of roaming services in Netherlands. The reported data indicate that traffic for calls made grew by 1.3 % in Q1-2018 compared with Q1-2017, while data traffic increased by 3.8 % in Q1-2018 compared with Q1-2017.

As far as prices are concerned, the average wholesale price per minute for roaming voice calls in the Netherlands decreased from 2.44 euro cent in Q-2017 to 2.32 euro cent in Q1-2018, while the EU average price for Q1-2018 was 2.06 euro cent. The average wholesale data price per MB also went down from 0.50 euro cent in Q4-2017 to 0.33 euro cent in Q1-2018, while the EU average price for Q1-2018 was 0.27 euro cent.

c. Emergency communications - 112

Thanks to the implementation of a 'push' system or the automatic 'pull' system, near instant times (up to 10 seconds) were reported for network-based caller location by the Netherlands, with an average answer time of 3 seconds. In 2018 steps were taken to introduce handset-derived location information (advanced mobile location – AML) on a voluntary basis. AML for Android systems was introduced in March 2019, while deployment for Apple systems is planned for later in the same year.

5. Conclusion

The Netherlands maintained its position among the EU leaders in the area of connectivity. While it has taken some steps to prepare the ground for 5G, the roadmap for the auctioning of the 700 MHz spectrum is still not in place. However, it is expected that the multiband auction including 700 MHz, 1400 MHz and 2100 MHz bands will be held early in 2020, while the 3.6 GHz band auction is due for 2021. The Cost Reduction Directive was implemented fully but so far its effects on the Dutch market are limited. Networks in the Netherlands are predominantly built by private companies, with limited public funding. By creating conditions for more a uniform approach to rights of way fees and by speeding up building permits authorisation, a further boost in network rollout could be achieved on an already very advanced and mature market.

[87] Regulation (EU) No 531/2012 of the European Parliament and of the Council of 13 June 2012 on roaming on public mobile communications networks within the Union, OJ L 172, 30.6.2012, p. 10, as last amended by Regulation (EU) 2017/920.

[88] International Roaming BEREC Benchmark Data Report October 2017 - March 2018, BoR (18) 160, Date of registration: 10.10.2018, https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/8251-international-roaming-berec-benchmark-data-report-october-2017-march-2018.

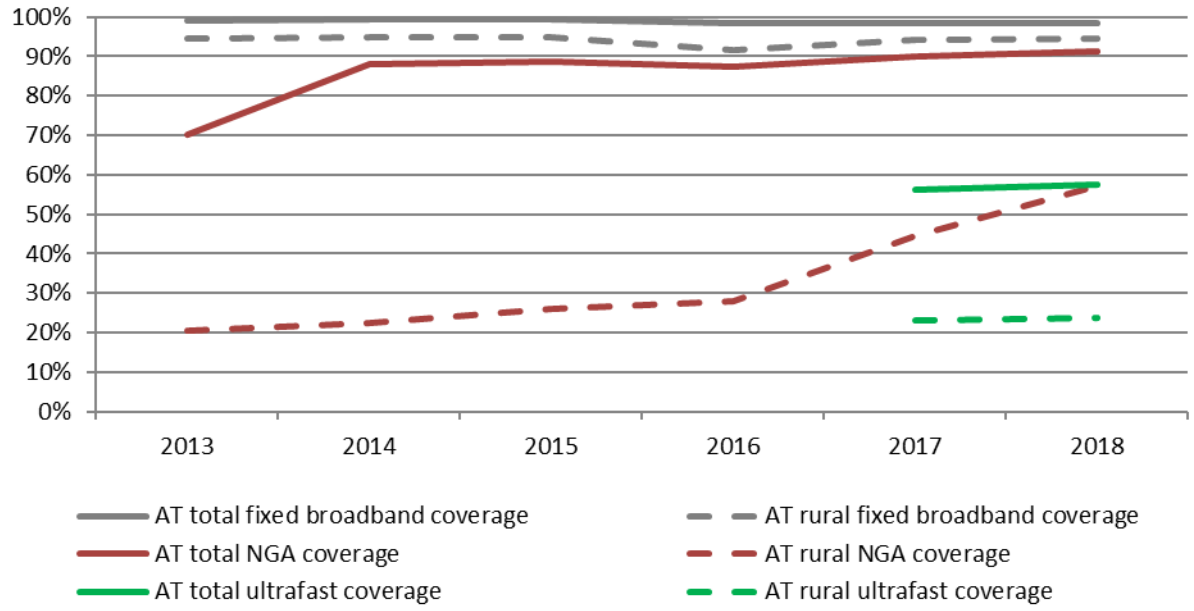
Austria

	Austria				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
1a1 Fixed broadband coverage % households	**98%** 2016	**98%** 2017	**98%** 2018	***11***	**97%** 2018
1a2 Fixed broadband take-up % households	**68%** 2016	**71%** 2017	**69%** 2018	***21***	**77%** 2018
1b1 4G coverage % households (average of operators)	**89%** 2016	**97%** 2017	**98%** 2018	***8***	**94%** 2018
1b2 Mobile broadband take-up Subscriptions per 100 people	**77** 2016	**83** 2017	**87** 2018	***19***	**96** 2018
1b3 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	**NA**	**NA**	**33%** 2018	***7***	**14%** 2018
1c1 Fast broadband (NGA) coverage % households	**87%** 2016	**90%** 2017	**91%** 2018	***9***	**83%** 2018
1c2 Fast broadband take-up % households	**16%** 2016	**19%** 2017	**23%** 2018	***24***	**41%** 2018
1d1 Ultrafast broadband coverage % households	**NA**	**56%** 2017	**58%** 2018	***20***	**60%** 2018
1d2 Ultrafast broadband take-up % households	**3%** 2016	**5%** 2017	**7%** 2018	***25***	**20%** 2017
1e1 Broadband price index Score (0 to 100)	**91** 2016	**91** 2017	**93** 2018	***4***	**87** 2017

1. Progress towards a gigabit society

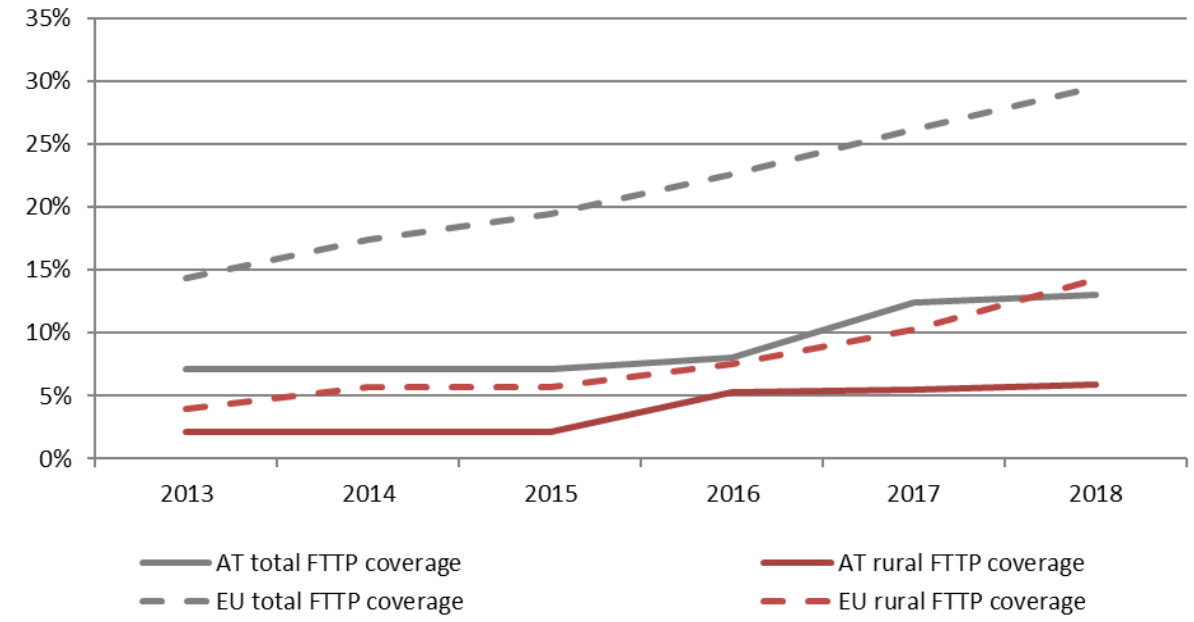
Austria's broadband strategy 2020 was adopted in November 2012. It aims to achieve 70 % coverage of ultrafast-broadband (defined as 100 Mbps downstream) in metropolitan areas by 2018, coupled with a 99 % coverage of ultrafast-broadband for all households in Austria by 2020. Counting fixed network coverage only, the strategy's first target has yet to be achieved. Nevertheless, major telecom providers (A1 and T-Mobile) offer hybrid home broadband products (combining for example DSL and 4G in a single CPE/Modem), a factor increasing in practice the percentage of the population coverage in the country. Austria continues pursuing the second more ambitious aim of nation-wide coverage by 2020, but there is still a lot left to be done. Indeed, while its performance in total fixed and fast broadband (NGA) coverage (98 % and 91 % respectively) was above the EU average in 2018, its ultrafast coverage is only 58 %, 2 percentage points below the EU average. The situation is better for rural coverage as Austria outperforms the EU average for fixed (94.6 % against 87.4 %) and fast (NGA) (57.1 % against 52.3 %) coverage. The rural ultrafast broadband coverage (23.7 %) remains very close to the EU average (29.2 %). However, Austria lags significantly behind its peers in terms of Fibre-to-the-premises (FTTP) coverage, achieving a poor 13 % in 2018, against 29.6 % at EU level, only slightly improving on its 2017 figure (of 12.4 %). In rural FTTP coverage, the gap with the EU average is bigger, as only 5.9 % of rural households are covered, against 14.2 % at EU level. Austria is losing ground very fast as it extended the FTTP footprint to only 0.5 % of rural households in the past year, against 3.8 % at EU level. It therefore remains to be seen whether the ambition of its broadband strategy can be achieved.

Fixed, NGA and ultrafast coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June. Ultrafast coverage metrics are available for 2017 and 2018.

Fibre-to-the-premises (FTTP) coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June.

Austria's Ministry for Transport, Innovation and Technology is currently preparing a new 2030 broadband strategy, which was published for consultation in February 2019. As part of the "Broadband Austria 2020" broadband initiative, the Ministry for Transport, Innovation and Technology has provided by the end of 2018 €470.0 m of funds for the rollout of broadband infrastructure. Additional

public tenders making more than €400 m available, are either underway or planned until 2020. This funding programme covers four areas: access, backhaul, connect and ducts. The Access programme aims at the expansion of the geographical coverage of high-performance broadband networks, while the backhaul programme is focused on modernising existing backhaul facilities in order to provide existing or future NGA networks with sufficient capacity. The Connect programme aims to significantly reduce the costs of establishing fibre optic connections for SMEs and schools and the Ducts programme is mainly addressed at municipalities with the aim of facilitating the shared use of ducts for high-speed communications networks in the context of civil engineering works.

The funds mainly derive from the proceeds of the 2012 spectrum auction often cited as "the broadband billion". In the context of this initiative, 174 beneficiaries have already received funding for 694 projects. 838,000 residents will directly benefit from these projects in 1 341 municipalities. In addition, more than 11,000 PoP ("point of presence") locations in more than 1,644 municipalities were connected with fibre. Furthermore, 42 SMEs and 137 schools participated in the Connect programme so far.

Austria's aim is to become a 5G pioneer in the EU, which is not unrealistic when looking at its strong track record in mobile networks. In this context, Austria published a 5G strategy in April 2018, with the following milestones:

- Phase 1: implement the first pre-commercial 5G trial installations by mid-2018.
- Phase 2: near-nationwide availability of ultra-fast broadband (100 Mbps), as basis for a nationwide 5G expansion as well as rollout of 5G in all provincial capitals by the end of 2020.
- Phase 3: 5G service availability to main traffic routes by the end of 2023; accomplish virtually nationwide 5G availability by the end of 2025.

An amendment to the Austrian Telecommunications Act, adopted in November 2018, created the appropriate regulatory framework paving the way for 5G implementation. One of the main points of the amendment was to add small cells to the wayleave rights. The regulatory authority is now working on a model calculating the impairment properties that operators will have to compensate for using the infrastructure. Furthermore, rules concerning the frequency usage plan and frequency allocation were adapted.

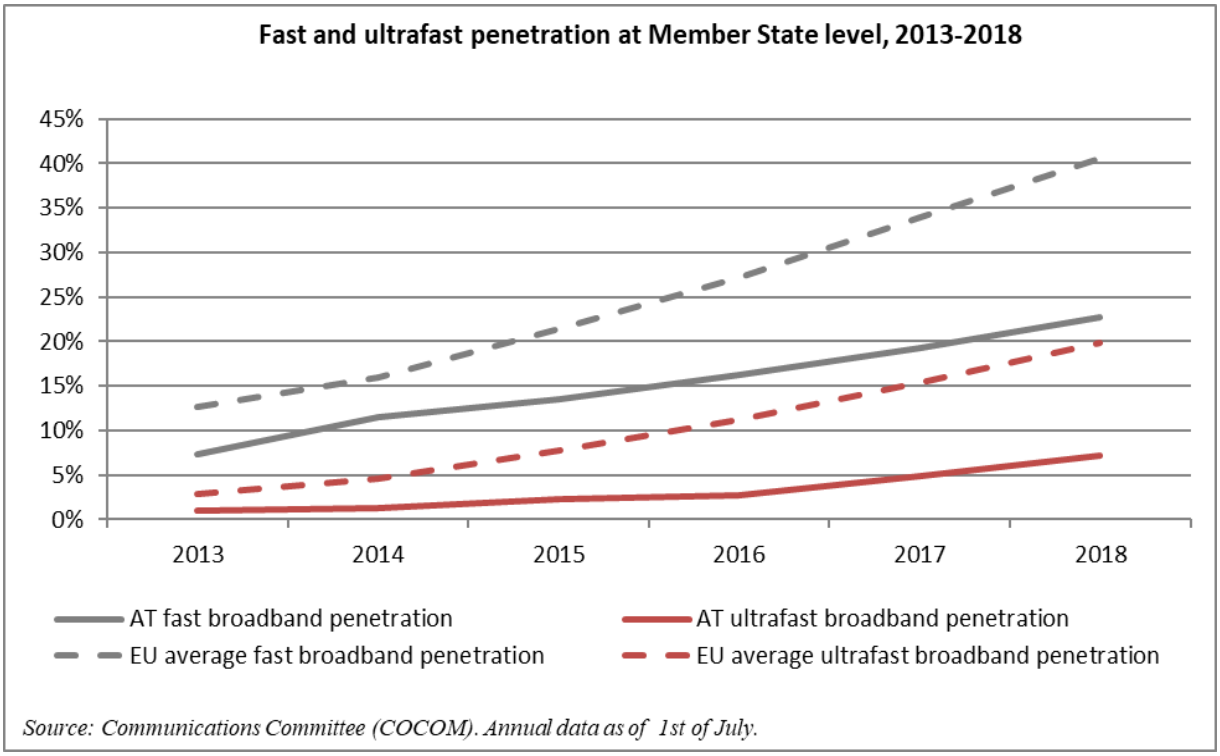
Operators are committed to implement 5G swiftly and are already taking preparatory actions and intend to start the 5G rollout as soon as the frequencies are allocated. Operators see 5G as a possible substitute for FTTH in rural areas. Indeed, all operators have already carried out 5G tests. A 5G test region exists in Carinthia, the "5G Playground Carinthia"at the Lakeside Science & Technology Park, funded by the Ministry for Transport, Innovation and Technology.

The law transposing the European Electronic Communications Code is planned to be drafted over the summer with a first draft to be available at the end of 2019.

2. Market development

In August 2018, T-Mobile, the second largest MNO, took over UPC, the largest cable network operator. This led to a significant increase in concentration for residential broadband services, where FTTH, DSL, cable and flat-rate mobile offers compete in the same market. The three large operators, A1, T-Mobile and Hutchison 3 Austria (which took over the fixed network operator Tele2 in 2017) now hold almost 90 % of the residential broadband market. By acquiring UPC, T-Mobile became more independent of the fixed network wholesale services of A1 (in particular virtual unbundling) but still uses these services outside the UPC footprint.

2.1. Fixed markets



Source: Communications Committee (COCOM). Annual data as of 1st of July.

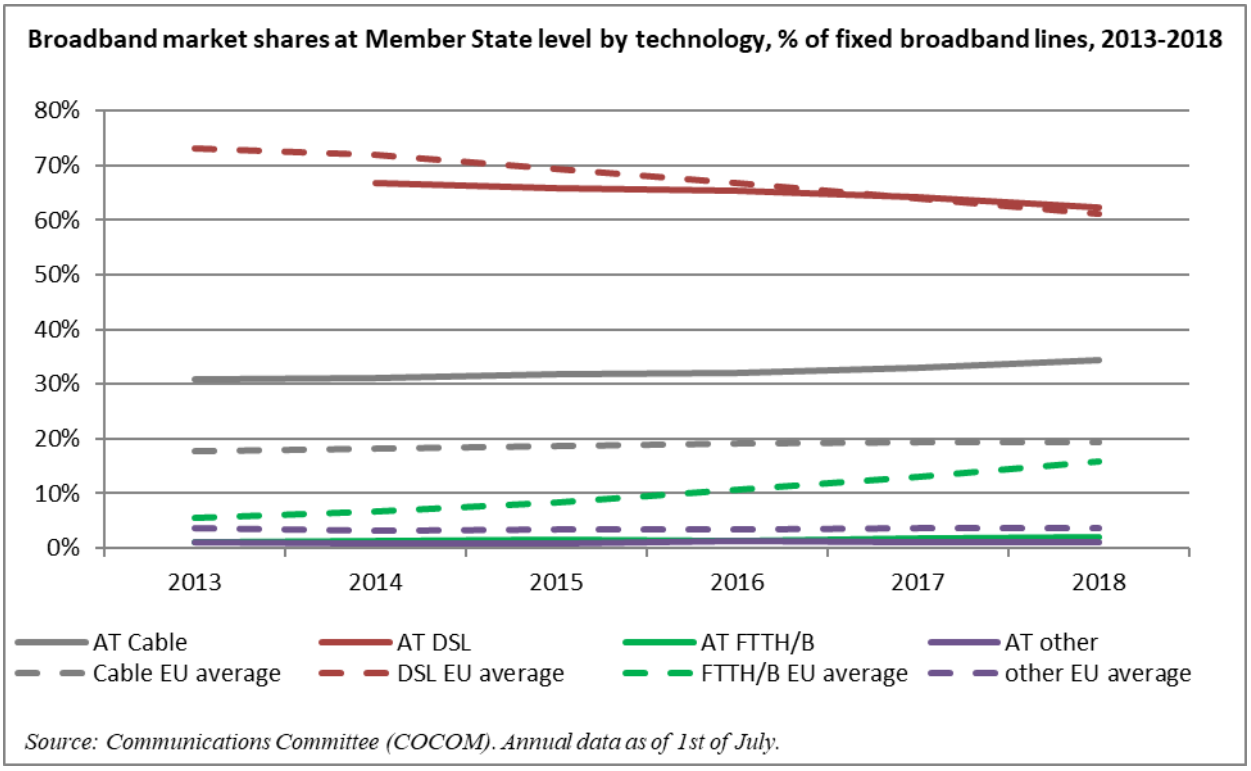
Fixed broadband access has low growth rates, reaching a total of 2.5 million lines in 2018. The take-up of high (>30 Mbps) and very high (>100 Mbps) bandwidths in the fixed line segment increased in 2018, but remains low with the majority of fixed lines (approximately 59 % in Q2/2018) still under 10 Mbps.

Austria's fast broadband take-up of 23 % is very low and at 7 % its ultrafast broadband take-up is even lower, putting it %among the EU's poorest performers in this respect. This low performance might be attributed to a considerable trend of substitution of fixed by mobile services, due to fierce price-driven competition in the mobile market, both for voice and broadband.

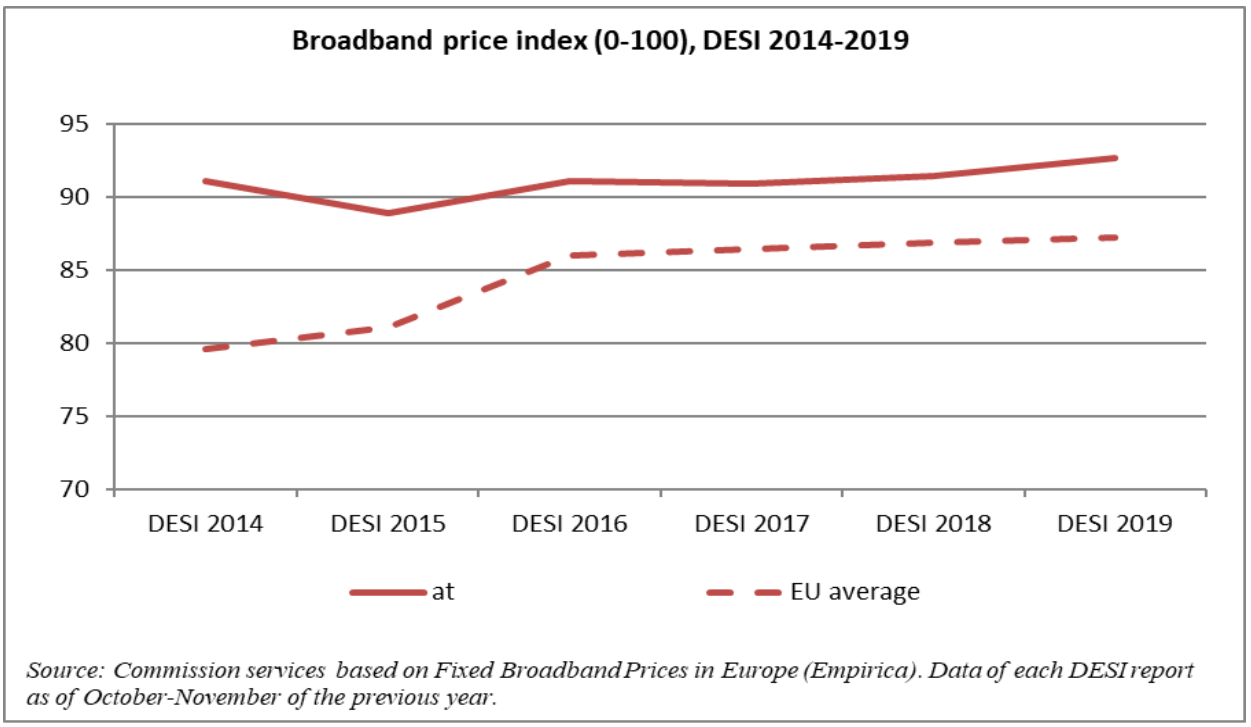
FTTH continues to play only a minor role in Austria, compared to xDSL and cable, with 46,000 connections . The focus on FTTC in Austria can be partially explained by low retail price levels and a low willingness to pay for higher bandwidths coupled with expensive fibre rollout due to low availability of ducts. With over 80 % of revenues in the market for fixed voice access and over 50 % of retail broadband access lines in the fixed segment including DSL, cable, and FTTH, the incumbent operator retains high market shares. Cable networks cover around half of the population. All large cable networks have upgraded to DOCSIS 3.0 and offer bandwidths up to 300 Mbps. Unbundling operators did not invest in FTTC/B to a significant extent mainly due to low economies of scale at local level. They are rather likely to migrate to virtual unbundling (VULA), the uptake of which rose to 49,000 lines in Q4/2018.

The share of cable on the Austrian market is with 34.4 % significantly higher than the EU average (of 19.4 %), while the share of DSL is only slightly higher (62.4 % versus 61.1 %). The share of FTTH remains very low (2.1 %) compared to the EU average (15.9 %).

Fixed broadband prices are far below the EU average, placing Austria fourth in the broadband price index[89].



Source: Communications Committee (COCOM). Annual data as of 1st of July.



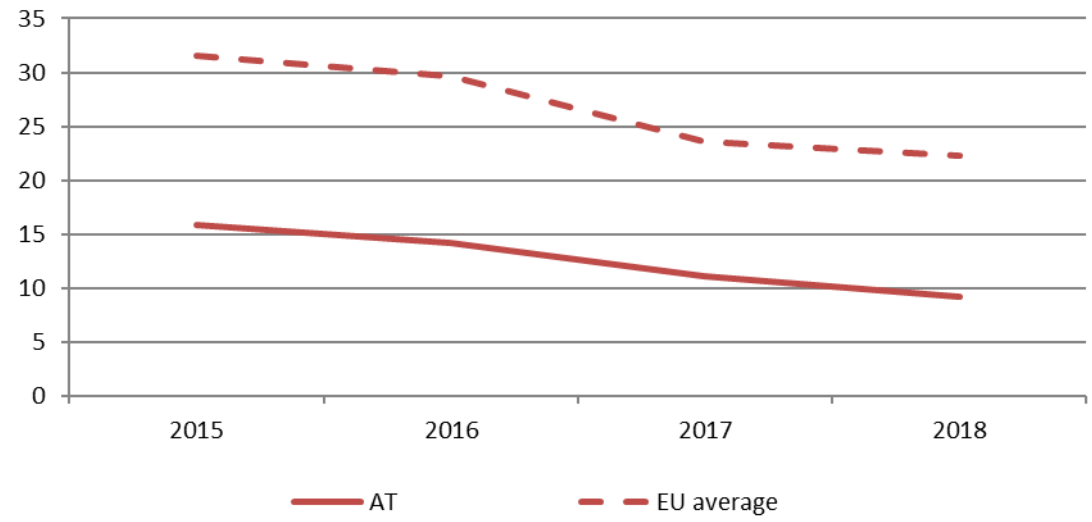
Source: Commission services based on Fixed Broadband Prices in Europe (Empirica). Data of each DESI report as of October-November of the previous year.

[89] The fixed broadband price index weighs the cheapest retail offers from: standalone, double play (BB + TV, BB + fixed telephony) and triple play (BB+TV+fixed telephony) and three speeds categories - 12-30 Mbps, 30-100 Mbps and +100 Mbps. This indicator presents values from 0 to 100 (which should not be read as prices) and the higher the values, the better the country performs in terms of affordability of prices relative to purchasing power

2.2. Mobile markets

All mobile operators have a high 4G coverage (98 %) and are providing mobile broadband services with bandwidths of up to 300 Mbit/s for business customers. Mobile broadband remains an important driver of competition in the residential segment. In fact, mobile broadband has been considered a substitute to fixed broadband in the residential segment in Austria already for several years. MNOs offer their flat rate mobile tariffs for stationary use at home with wireless modems, so called ”cubes”. As the bandwidths which can be achieved in the 4G network are often higher than those in the fixed network and since installation is simple and fast, these offers are very popular. A1 and T-Mobile also offer hybrid home broadband products (combining DSL and 4G in a single CPE/modem). However, despite the mobile substitution trend, mobile broadband take-up in total (including smartphone tariffs) is not particularly high in Austria (87 subscriptions per 100 people, compared to 96 at EU level).

Least expensive offer for handset (1 GB + 300 calls basket) at Member State level, EUR/PPP, 2015-2018

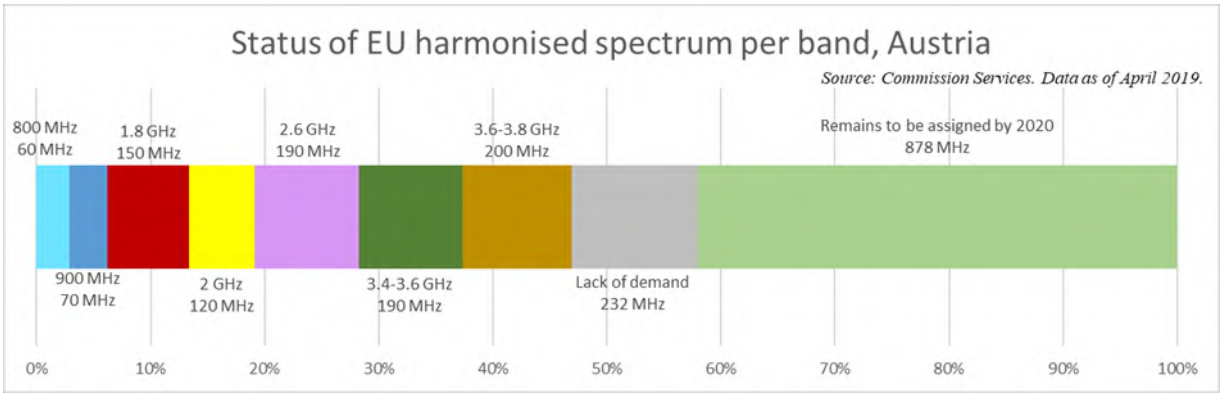


Source: Mobile Broadband Price Study (Van Dijk and Empirica). Prices expressed in EUR/(Purchase parity power - PPP), VAT included. Annual data as of February.

Austria is known for its low mobile prices. This is reflected in the Mobile Broadband Price Study comparing prices for a 1 GB + 300 calls basket, which puts Austria’s prices at below half of the EU average (€/PPP 9.20 versus €/PPP 22.30).

3. Regulatory developments

3.1. Spectrum



In Austria, 47 % of the spectrum harmonised at EU level for wireless broadband has been assigned[90]. This percentage is mainly due to the lack of an assignment procedure for the 700 MHz and the 26 GHz bands.

The auction of the 3.4-3.8 GHz band ended on 5 March 2019 and enabled the acquisition of large blocks of spectrum facilitating the provision of gigabit 5G services, at reasonable prices (€6 euro cents/MHz/pop). The three mobile network operators, A1, T-Mobile and Drei, acquired nation-wide rights of use for sufficiently large blocks of at least 100, 110 and 100 MHz respectively, and four other providers acquired smaller blocks of rights of use at a regional level. A1 also won some additional spectrum (20 and 40 MHz) in some of the regions. All licences in the upper part of the band (3.6 - 3.8 GHz) will start on the date of legal effect of the individual authorisation decisions and will end by 31 December 2039.The licences for the lower part of the band (3.4 – 3.6 GHz) are awarded from 1 January 2020 to 31 December 2039.

The national roadmap on the 700 MHz frequency band was published in August 2018. A public consultation on the product and auction design for the 700/1500/2100 MHz award procedure was carried out between December 2018 and the end of February 2019. The tender is expected to be published in autumn 2019 and the auction to take place in the first quarter of 2020.

A legal compensation mechanism in case of eviction of the broadcasters before mid-2020 was put in place in December 2018. However, the question of the eviction of the 700 MHz band by a broadcasting company has not been fully clarified yet.

Concerning the 26 GHz band, an amendment of the frequency utilization plan is planned in 2019, as well as a public consultation.

3.2. Regulated access

On 18 April 2018, the Austrian national regulatory authority, Telekom-Control-Kommission (TKK) notified the Commission of a new analysis concerning the market for wholesale high-quality access provided at a fixed location (corresponding to Market 4 in the 2014 Recommendation on relevant markets)[91].

TKK defined the following two markets:

Market 1: including terminating segments of Ethernet leased lines with guaranteed bandwidths above 10 Mbps as well as dark fibre in the area comprising the 355 municipalities (Area 1) indicated in Annex 1 of the notified draft measure;

Market 2: including (a) terminating segments of Ethernet leased lines with guaranteed bandwidths up to and including 10 Mbps in the entire territory of Austria; and (b) terminating segments of Ethernet leased lines with guaranteed bandwidths above 10 Mbps as well as dark fibre outside the 355 municipalities in Area 1 (Area 2).

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

[91] 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.

TKK stated that for the market of terminating segments of leased lines with traditional interfaces no competition concerns could be identified which would warrant ex-ante regulatory intervention. It therefore proposed to withdraw all regulatory obligations previously in force under Article 16(3) of the Framework Directive.

With regard to competitive conditions on the relevant Market 1, TKK observed that this market is characterised by a tendency towards effective competition, which lead it to conclude that ex-ante regulation is no longer warranted for this market.

In contrast, for Market 2, TKK observed that not only the three criteria test has been met but that market conditions are such that A1 Telekom Austria should also be designated as having significant market power (SMP). TKK consequently proposed to impose the following set of regulatory remedies on A1 Telekom Austria:

i. an obligation to provide access to terminating segments of Ethernet leased lines and dark fibre (with specific limitations), including access to colocation and ancillary services;

ii. a price-cap regulation concerning access to terminating segments of Ethernet leased lines and cost-oriented tariffs for access to dark fibre ends;

iii. a non-discrimination obligation, including in particular the obligation to publish detailed reference offers concerning the provision of terminating segments of Ethernet leased lines and dark fibre;

iv. an obligation to publish quarterly certain key performance indicators;

v. an accounting separation.

TKK proposed to withdraw all other remedies previously imposed, including the transparency obligation.

The Commission criticized the proposed product market definition and argued that the wholesale market for high-quality access should normally include a wider range of access products necessary to fulfil the needs of business service providers. The Commission did however not open a phase II investigation because of the gradual phase out of traditional interface leased lines and a low likelihood of competitive concerns in that segment. With regard to the approach concerning traditional interface leased lines, the Commission urged TKK to include additional economic evidence in its final measure to strengthen its conclusions on the competitive assessment of traditional interface leased lines.

With regard to the inclusion of dark fibre in the product market definition, the Commission invited TKK to present additional evidence in its final measure to support its assertion of dark fibre being a substitute for traditional leased lines, including in particular a more robust analysis of price constraints and switching behaviour taking into account the total costs of dark fibre and Ethernet services, respectively.

Finally, the Commission stressed the need for updated market data.

TKK adopted the measures on 11 June 2018, addressing the Commission’s comments.

On 19 June 2018, the Austrian national regulatory authority Kommunikationsbehörde Austria (KommAustria) notified the Commission of an analysis concerning the wholesale market for the

transmission of analogue terrestrial (FM) radio broadcasting signals to end users (corresponding to market 18 of the 2003 Recommendation on relevant markets[92]).

The Commission had previously opened a phase II investigation under Article 7 and 7a of the Framework Directive and concluded the phase II investigation with a decision[93] under Article 7(5) of the Framework Directive, requiring KommAustria to withdraw its draft measure. The Commission, supported by BEREC, found that the exclusion of self-supply from the relevant market was not compatible with EU law and would create barriers to the internal market.

As in the previous review, KommAustria proposed to define a wholesale market for the "transmission of analogue terrestrial (FM) radio broadcasting signals to end-users". KommAustria finds that alternative platforms, such as cable and satellite, are not exerting sufficient competitive constraints on the analogue terrestrial platform. Consumer usage is dominated by stationary analogue terrestrial receivers and car radios, in contrast the use of alternative platforms is very limited.

The relevant market now includes self-supply of broadcasters and their subsidiaries. This self-supply includes in particular transmission services provided by ORS to its parent company ORF in the context of the fulfilment of ORF's statutory public service coverage obligation.

As regards a potential switch to digital transmission of FM radio broadcasting signals, KommAustria expects no significant developments in the short to medium term, in particular within the expected timeframe of the current draft measure. Regular digital radio broadcasting, using the DAB+ standard, was permitted by KommAustria for the first time in December 2017 in the wider area of Vienna. Due to the limited number of DAB+ receivers and the limited local scope of digital radio broadcasting, KommAustria does not consider DAB+ to be a substitute product for analogue FM radio and expects a relatively long period of simultaneous broadcasting of both analogue and digital FM radio signals. KommAustria also considers that the DVB-T2 standard cannot be regarded as a substitute to analogue, because the reception of radio programmes requires a DVB-T2 receiver, normally used only in TVs.

KommAustria proposed to designate ORS as having SMP in the wholesale market for the "transmission of analogue terrestrial (FM) radio broadcasting signals to end users". ORS has a very high market share of more than 90 % and is the only operator with a countrywide network, which cannot easily be duplicated.

KommAustria described the following potential competition problems that might arise on the relevant market: (i) creation of entry barriers to the market; (ii) discrimination of access seekers; (iii) requiring access seekers to buy products as part of bundles which are not required for service provision; and (iv) excessive prices.

To resolve the identified competition problems and taking into account the very stable market situation, KommAustria proposed to impose again a full set of remedies without substantial changes to the regulatory obligations imposed in 2013.

In its comments on the notification, the Commission urged KommAustria to closely monitor market developments and to ensure that private radio broadcasters are in a position to compete with ORF based on the non-discrimination indicators identified in the draft measure.

[92] 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 (Text with EEA relevance) (notified under document number C(2003) 497), OJ L 114, 8.5.2003, p. 45–49..
[93] Decision of 12 January 2018, C(2018) 63 final.

Furthermore, the Commission urged KommAustria to monitor the use of DAB+ and its impact on infrastructure competition and consumer choice, and to review the relevant market even before the end of the regulatory review period, if deemed appropriate in view of material changes to market structure and state of competition.

Finally, the Commission invited KommAustria to promote and encourage the possibilities for shared use of broadcasting sites under § 8 of the ORF-Act in order to allow private radio broadcasters to self-supply transmission services under favourable conditions.

KommAustria adopted the measure on 1 August 2018.

4. End-user matters

RTR (Rundfunk und Telekom Regulierungs-GmbH) and KommAustria support customers of communication services through conciliation bodies in accordance with the Directive on alternative dispute resolution[94]. RTR is the conciliation body for telecommunications services, while KommAustria is the conciliation body for media services. The settlement rate is over 80 % and more than 90 % of all procedures have been completed within 90 days. Most of the disputes relate to contractual issues. With around 2,000 dispute resolution procedures in 2018, the number remained constant compared with the previous year.

a. Net neutrality

With the amendment of the Telecommunications Act in 2018[95], penalties for infringements of net neutrality provisions were codified and the regulator can now impose penalties of up to €58,000.

In addition, if the regulatory authority establishes that an undertaking has gained economic advantage due to an unlawful act in violation of the respective regulation, the regulatory authority may apply to the Cartel Court to fix an amount to be absorbed. That amount shall depend on the extent of the economic advantage and may be set by the Cartel Court to beat up to 10 % of the undertaking's turnover of the preceding year.

In 2018, the regulator conducted several net neutrality investigations, most of which could be solved informally. These investigations concerned amongst others port blockings, allocation of public IP addresses, website-blocking traffic management measures because of copyright infringements by ISPs and disconnecting customers' IP connections every 24 hours.

In November 2018, RTR closed proceedings initiated under Article 5 of Regulation (EU) 2015/2120 against seven ISPs. The investigation dealt with the compatibility of website-blocking traffic management measures because of copyright infringements by ISPs under the third indent of Article 3(3) of Regulation (EU) 2015/2120. The regulator did not detect any violations of the Net Neutrality provisions.

Two cases decided in December 2017 are still pending before the Austrian Administrative Court. Both concerning A1 and relate to traffic shaping and specialised services.

[94] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex %3A32013L0011

[95] BGBl_I_Nr_78_2018, Änderung des Telekommunikationsgesetzes 2003, des FunkanlagenMarktüberwachungs-Gesetzes, des Funker-Zeugnisgesetzes 1998, des Gebäude- und Wohnungsregister-Gesetzes und des KommAustria-Gesetzes (NR: GP XXVI RV 257 AB 315 S. 43. BR: AB 10045 S. 885.).

b. Roaming

Austria is one of two Member States, in which the share of domestic-only subscribers has substantially increased (from 4 % to 9 % between summer 2017 and the first quarter 2018, mainly MVNO subscribers)[96]. It was reported that this increase would not affect contracts already in place.

The Roaming calls made traffic index indicated an increase from 144.9 to 235.7 between Q1 2017 and Q1 2018, showing that Austrian end-users consumed 1.6 times more roaming minutes (calls made) in Q1 2018 ("roam like at home"/RLAH) than in Q1 2017 (before RLAH). As for the data roaming services, the retail data traffic index pointed to a 4.4 times increase from 910.27 to 4,019,76 between Q1 2017 and Q1 2018.

According to the NRA, only few infringements of the Roaming Regulation were detected in 2018 and all cases could be solved informally, without formal proceedings being initiated.

The NRA granted an extension of the two sustainability derogations which were already in place, namely for the two MVNOs mtel and spusu.

c. Emergency communications - 112

The rules governing caller location accuracy and reliability criteria for the European emergency number 112 were not amended in 2018. One Public Safety Answering Point (PSAP), responsible for ambulance and fire brigade in the region of Lower Austria, deployed an AML server (for handset-based caller location). Disabled end-users can reach the emergency services via SMS or fax. An app called "DEC112" which hearing and speech impaired people can use to contact the emergency services was developed in late 2018 and is being tested in several regions.

d. Universal service

Following an amendment of the Austrian "Universal Service Decree" at the end of 2016, the scope of the Universal Service Obligation has been reduced to public payphones and the number of obligatory public payphones decreased to 6,000.

5. Conclusion

Austria is characterised by top mobile coverage and uptake, but scores far below the EU average for fixed high-speed broadband, mainly due to the high costs of fibre rollout (lack of ducts) combined with a low retail price levels and a low willingness to pay for higher bandwidths. Austria has strong ambitions to become a pioneer in the rollout of 5G, and the achievement of this goal is facilitated by the results of the 3.4-3.8 GHz frequency auction. Austria's new 2030 broadband strategy, currently under development, could play a role creating the right conditions and incentives for more investments in fixed networks.

[96] See Report from the Commission to the European Parliament and the Council on the implementation of Regulation (EU) 531/2012 of the European Parliament and of the Council of 13 June 2012 on roaming on public mobile communications networks within the Union, as amended by Regulation (EU) 2015/2120 and Regulation (EU) 2017/920.

Poland

	Poland				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
1a1 Fixed broadband coverage % households	**81%** 2016	**81%** 2017	**79%** 2018	***28***	**97%** 2018
1a2 Fixed broadband take-up % households	**59%** 2016	**61%** 2017	**60%** 2018	***26***	**77%** 2018
1b1 4G coverage % households (average of operators)	**91%** 2016	**91%** 2017	**93%** 2018	***22***	**94%** 2018
1b2 Mobile broadband take-up Subscriptions per 100 people	**115** 2016	**144** 2017	**163** 2018	***1***	**96** 2018
1b3 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	**NA**	**NA**	**0%** 2018	***13***	**14%** 2018
1c1 Fast broadband (NGA) coverage % households	**61%** 2016	**65%** 2017	**66%** 2018	***25***	**83%** 2018
1c2 Fast broadband take-up % households	**26%** 2016	**32%** 2017	**36%** 2018	***19***	**41%** 2018
1d1 Ultrafast broadband coverage % households	**NA**	**49%** 2017	**54%** 2018	***22***	**60%** 2018
1d2 Ultrafast broadband take-up % households	**8%** 2016	**13%** 2017	**23%** 2018	***12***	**20%** 2017
1e1 Broadband price index Score (0 to 100)	**88** 2016	**88** 2017	**86** 2018	***14***	**87** 2017

1. Progress towards a gigabit society

In 2018, Poland's Ministry of Digital Affairs started preparing an update to the national broadband plan to implement the goals of the gigabit society strategy and include an assessment of the funding gaps and the funds needed to address them. It is expected that the updated national broadband plan will be adopted in 2019.

At the end of 2018, the Ministry tabled a legislative proposal to set up a new broadband fund that would be financed from electronic communication fees (general authorisation charges), numbering fees, 30 % of licence fees for the use of frequencies, and fines paid by the operators. According to the operators, the exact objectives and beneficiaries of the proposed fund are not yet clear and the market expressed some concerns regarding its partial funding from fines.

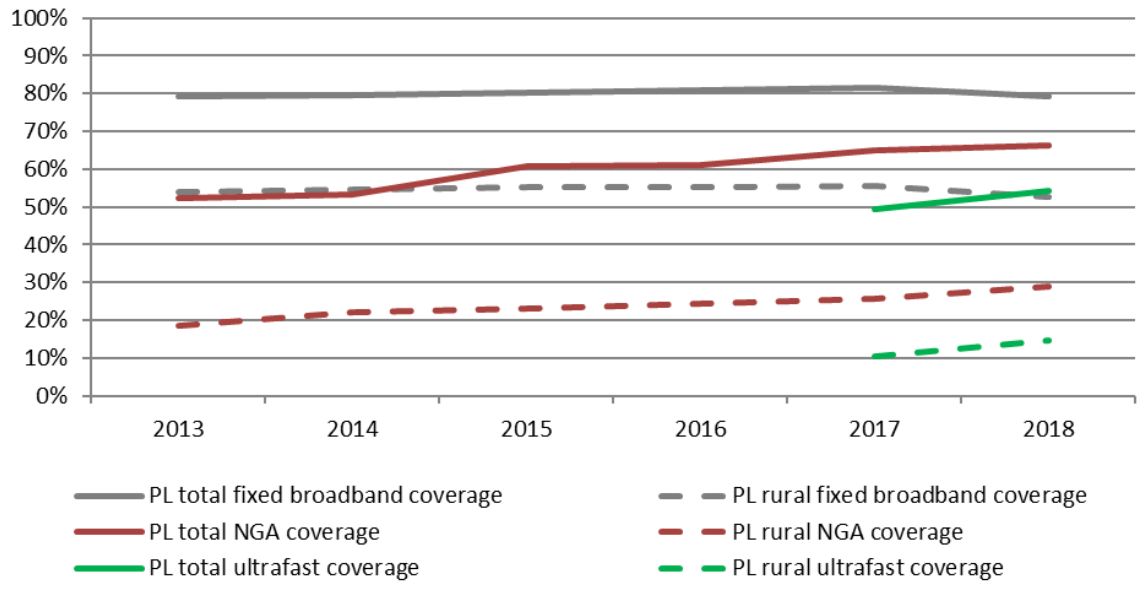
In 2018, 66.3 % of households in Poland had access to a network offering speeds of 30 Mbps or higher. Also, 22.9 % use internet access services of 100 Mbps or higher, and 54.1 % are in the range of internet access with a bandwidth of at least 100 Mbps, with the possibility of increasing it to gigabit speeds.

Poland remains slightly below the EU average in terms of ultrafast broadband coverage (54 %, as compared with 60 % in the EU as a whole). Its fixed broadband coverage and next-generation access (NGA) coverage are also lower than the EU average (79 % and 66 %, as compared with 97 % and 83 % respectively).

As regards socio-economic drivers, Poland started to implement the *National education network* project aimed at connecting all Polish schools (around 30,500) to broadband networks with speeds of at least 100 Mbps. According to the Ministry of Digital Affairs, over 2,000 schools have already joined this project by signing a contract with NASK, the network operator. The first schools were able to benefit from the project as of 1 September 2018.

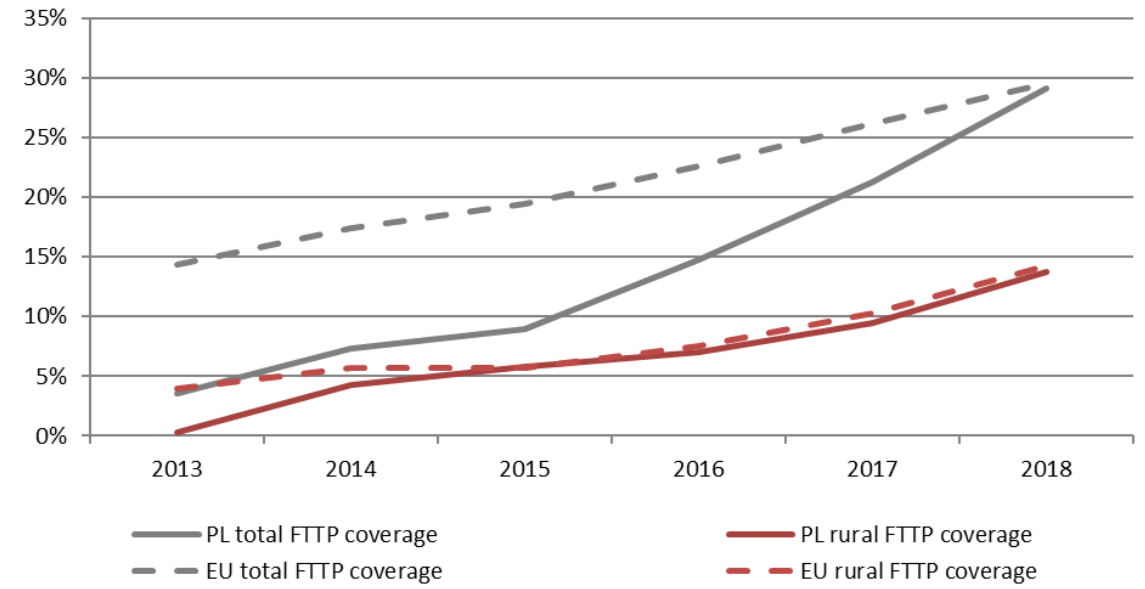
The 2014-2020 Operational Programme Digital Poland (*Projekt Operacyjny Polska Cyfrowa – POPC*) remains the main source of funding currently dedicated to supporting the objectives of the national broadband plan. The funds from POPC should be spent by 2023. The new financial tools for network deployment (relying on national resources) are under preparation as part of the update of the national broadband plan.

Fixed, NGA and ultrafast coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June. Ultrafast coverage metrics are available for 2017 and 2018.

Fibre-to-the-premises (FTTP) coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June.

To date, Poland has contracted projects in the first priority axis of the POPC (universal access to fast broadband) for a total of PLN 6.57 billion (around €1.54 billion), of which PLN 3.78 billion (around €0.89 billion) is from EU funds. According to the Ministry of Digital Affairs, the implementation of EU funding for broadband is going smoothly. The beneficiaries of POPC have undertaken to deliver 261 % of the target value of the POPC (726,517 households) and to cover 1.86 million households and 12,378 schools, over 68 % of which are in low population areas (fewer than 5,000 inhabitants).

Nevertheless, Poland is still far from achieving goal 2 of the Digital Agenda for Europe (connectivity of 30 Mbps or more for all citizens by 2020). The main difficulties still relate to the geographical conditions, which raise the cost of network deployment.

Under the third priority axis of the POPC, the planned actions target groups with different levels of digital competence, with a particular focus on digital inclusion. In addition, activities aimed at strengthening and exploiting the potential of IT developers are designed to make use of their skills in addressing important social or economic needs.

2018 was also a 5G-oriented year. At the beginning of the year, Poland published its draft *5G strategy for Poland*[97], which outlines the legislative changes needed to facilitate 5G rollout in Poland, as well as milestones and general objectives.

Also in 2018, the national regulatory authority (the Office of Electronic Communications (UKE)) issued first decisions authorising 5G trials in 14 Polish cities. The decisions were issued to Nokia and Orange Polska, T-Mobile Polska and the Łódź Technical University in collaboration with Ericsson.

T-Mobile Polska and Orange Polska were the first operators to start 5G trials. Nevertheless, all stakeholders agree that the development of 5G networks in Poland will not be possible without raising the electromagnetic field (EMF) limits in Poland. The Ministry of Digital Affairs seems committed to take essential steps to create a 5G-friendly environment. To this end, it published proposals for amendments to several legislative acts that are overall welcomed by the market.

Besides EMF limits, the obstacles to 5G deployment include a lack of spectrum coordination with non-EU countries. Without adequate cooperation and timely removal of interferences, the use of the 700 MHz band for 5G will be compromised. Poland requested the Commission's assistance in addressing this issue. In addition, at the beginning of 2019 it notified the Commission of its intention to delay allocation of frequencies in the 700 MHz band until 30 June 2022. At the same time, Poland remains very active in 5G planning, taking into account, for example, the agreement on cross-border coordination in 3.4-3.8 GHz range signed with Lithuania in December.

Due to the high fragmentation of frequencies in the 3.4-3.8 GHz band, UKE needs legal tools to be able to ensure effective management of the spectrum. These new powers are included in the proposal to amend the Telecommunications Act, which is pending in the Parliament. The first decisions allocating frequencies in this band were issued in 2004. The latest licences in the 3.6-3.8 GHz part expire on 31 December 2022 and in the 3.4-3.6 GHz part on 27 July 2031. Also in this band, remaining coordination issues with non-EU countries will affect the use of frequencies in border regions. As regards the 24.25-26.5 GHz band, frequencies are also allocated, particularly in big cities, where the demand for 5G is expected to be greatest. Overall, despite the considerable efforts of the Polish authorities, delays in the commercial rollout are expected.

[97] https://www.gov.pl/web/cyfryzacja/strategia-5g-dla-polski

It is also worth mentioning that 5G deployment has recently received considerable attention at the highest political level. The Prime Minister invited the CEOs of all infrastructure operators to discuss the possibility of rolling out one joint 5G network. The exact arrangements for such an approach are not yet clear to the operators.

The proposed 5G-tailored changes to several Polish acts already take into account some provisions of the European Electronic Communications Code (EECC), namely the implementation and operation of small-area wireless access points (Article 57(1) and (4) EECC) and the possibility for a subscriber to sign a contract solely for the instalment of a physical connection with a provider of publicly available electronic communications services that can exceed 24 months (Article 105(1) EECC). For the remaining provisions, preparation of the transposition will start in 2019.

2. Market developments

Generally, the electronic communications market in Poland has been stagnating. Retail prices are very low and competition on the market remains fierce.

In 2018, the consolidation trend in the market continued, in particular in respect of cable and mobile operators for convergence purposes. The overall number of electronic communication undertakings fell from around 5,900 active operators in 2017 to about 5,500. This change is also a result of changes in Polish law that enabled UKE to delete undertakings which have been removed from the national registers from the registry of electronic communication undertakings.

On 11 May 2018, the Office of Competition and Consumer Protection (UOKiK) issued a decision approving the acquisition of Netia by Cyfrowy Polsat Group. The purpose of the acquisition was to extend the range of services provided by the Cyfrowy Polsat Group to broadband internet services. On the other hand, an intended takeover of Multimedia by UPC failed. However, after the failed merger, Vectra S.A. took over the idea and UOKiK is currently assessing the potential acquisition of Multimedia Polska S.A. by Vectra S.A.

Bundled services are one of the most dynamic segments of the electronic communications market. Over the past 4 years, the number of users has increased from 3.75 million to 10.15 million[98]. In 2017, the 'mobile telephony + mobile internet' bundle was still the most popular. Its market share, in terms of number of users, amounted to over 60 %. The 'fixed-line internet service + TV' bundle was the second most popular (11 %) and 'fixed-line telephony + fixed-line internet + TV' (7.2 %) was third.

Due to constant developments and progress in fixed and mobile technology, UKE is currently re-evaluating fixed-to-mobile substitution. The outcome of the re-evaluation is expected in 2019.

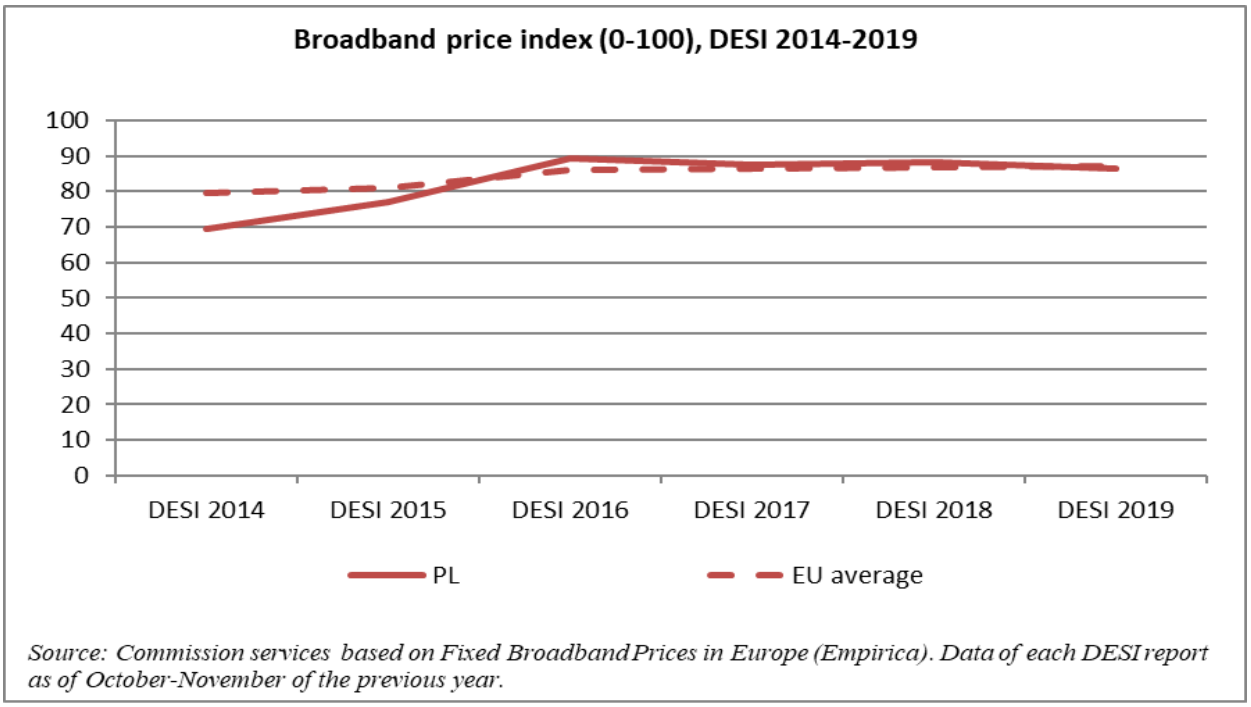
2.1. Fixed markets

In 2018, Poland made good progress on ultrafast broadband take-up, achieving better results than the EU average. It remains close to the EU average in terms of the broadband price index (86 out of 100, as compared with 87 out of 100 in the EU as a whole)[99] and fast broadband take-up (36 %, as compared with 41 % in the EU as a whole). Its performance is still being undermined by low fixed broadband take-up (60 %, against an EU average of 77 %).

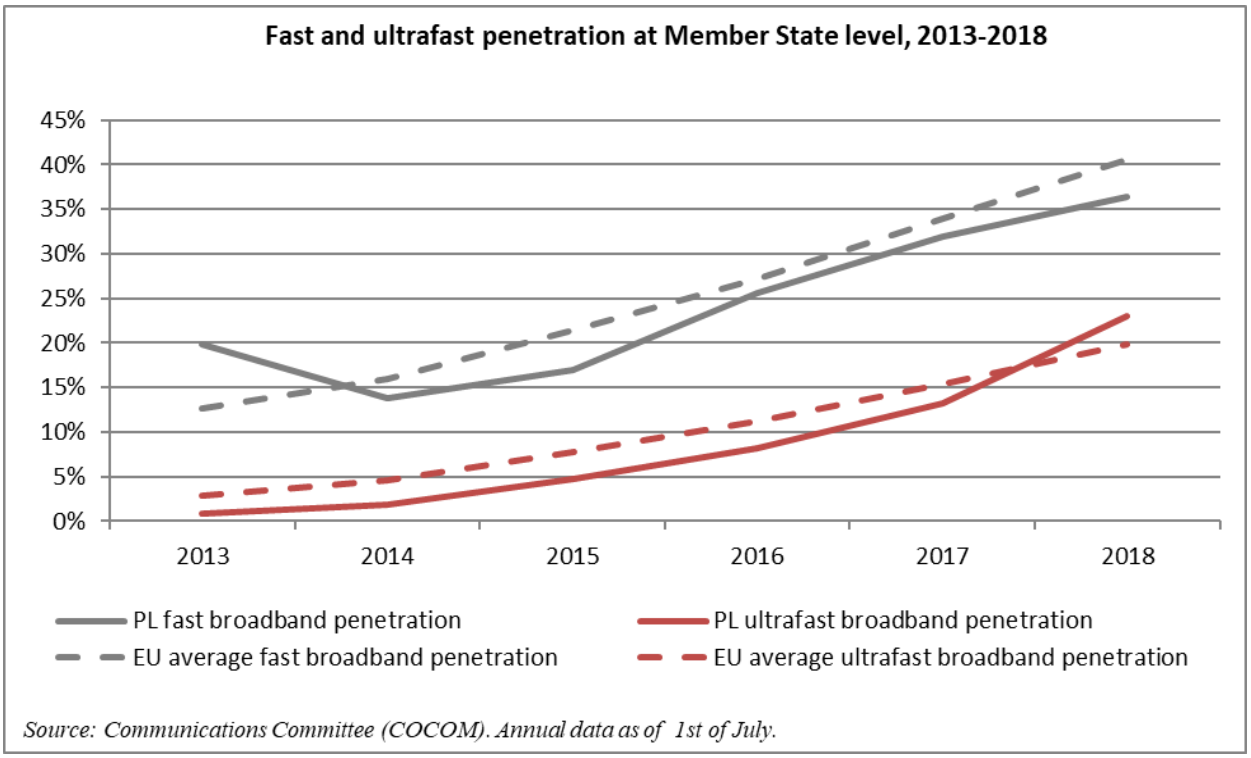
[98] Data for 2013-2017.

[99] The fixed broadband price index weighs the cheapest retail offers from: standalone, double play (BB + TV, BB + fixed telephony) and triple play (BB+TV+fixed telephony) and three speeds categories - 12-30 Mbps, 30-100 Mbps and +100 Mbps. This indicator presents values from 0 to 100 (which should not be read as prices) and the higher the values, the better the country performs in terms of affordability of prices relative to purchasing power.

Concerning internet access, the number of subscribers in 2018 noted a small increase (1.45 %) compared to 2017[100]. Over the same period, fixed broadband penetration increased by 1pp (from 18 to 19 % of the total population).



Source: Commission services based on Fixed Broadband Prices in Europe (Empirica). Data of each DESI report as of October-November of the previous year.



Source: Communications Committee (COCOM). Annual data as of 1st of July.

In terms of market shares, the incumbent has 28 % of fixed broadband subscriptions, while the remaining 72 % belong to new entrants (the EU averages are 40 % and 60 % respectively).

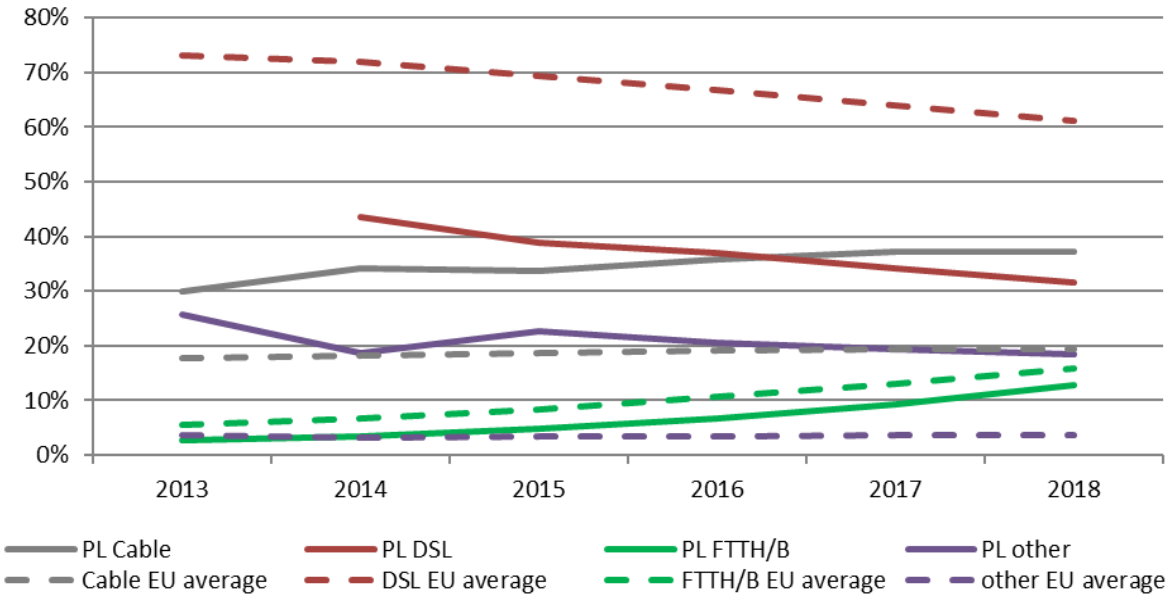
[100] Comparison between July 2017 and July 2018; https://ec.europa.eu/digital-single-market/en/connectivity

The share of NGA (FTTH, FTTB, VDSL, DOCSIS 3.0 and other NGA) subscriptions as a proportion of all fixed broadband subscriptions increased from 52 % to 57 % between July 2017 and July 2018.

In 2018, DSL (including VDSL) lines had a 32 % market share, cable modem (including DOCSIS 3.0) 37 %, FTTH/B 13 % and 'other' 18 %.

As regards digital agenda speeds, in 2018 38 % of Polish subscribers used connections of at least 100 Mbps, 23 % used broadband of 30-100 Mbps and 39 % 144 kbps-30 Mbps. Poland is therefore overall above the EU averages of 26 %, 27 % and 47 %.

Broadband market shares at Member State level by technology, % of fixed broadband lines, 2013-2018



Source: Communications Committee (COCOM). Annual data as of 1st of July.

For the time being, electronic operators in Poland do not have a single strategy for commercial co-investment agreements. In response to this need, UKE stated in the *Strategic lines of actions of the President of UKE for 2017-2021* that it would endeavour to create an enabling environment in this area by developing a position on the regulation of a network built in a co-investment model. Following the entry into force of the EECC, UKE plans to take action in 2019 to reach a position on such regulation that will be taken into account when reviewing the relevant markets.

Regarding wholesale-only access, 11 regional broadband networks have been created as a result of the previous (2007-2013) financial perspective and the implementation of the POPC. The network operators are obliged, *inter alia*, to provide wholesale access on non-discriminatory terms. The wholesale charges are approved and monitored by UKE.

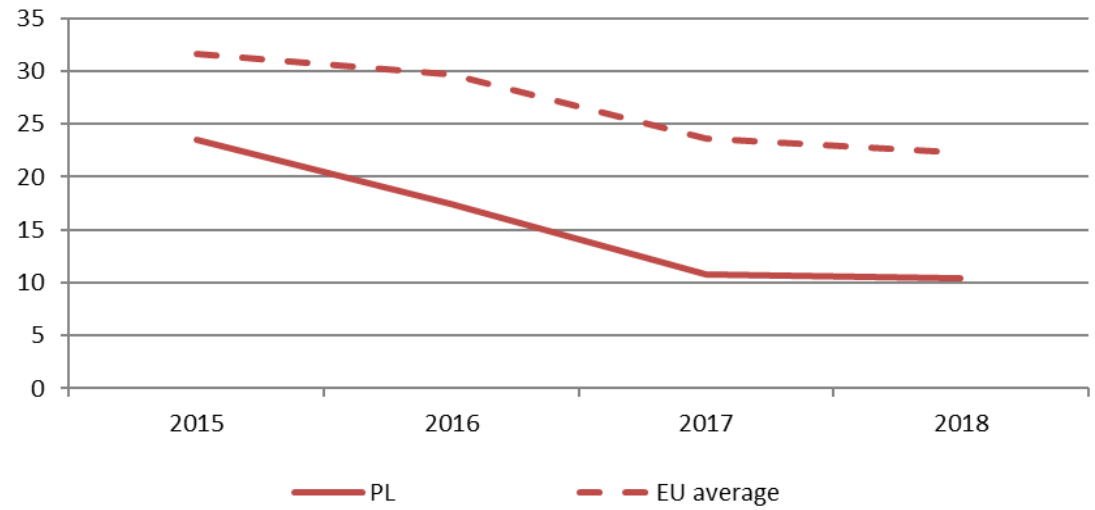
In 2018, a new entrant – Nexera – began to implement POPC projects as the wholesale-only operator offering services in the GPON FTTH standard, including bitstream access and local loop unbundling. Nexera intends to connect 450,000 households and 2,600 schools in 4 out of 16 voivodships (provinces) in Poland.

Lastly, concerning the provision of free-of-charge wireless connectivity by local public authorities, it is important to mention that legislative amendments entered into force on 12 December 2018 with a view to simplifying administrative procedures. Individual administrative decisions required for the provision of free wifi by local authorities were replaced by simple notifications. The conditions for the

provision of internet access services also changed radically and these services must now have a minimum speed of 30 Mbps. Moreover, the duration of a single session and monthly data transfer volumes are no longer limited.

2.2. Mobile markets[101]

Least expensive offer for handset (1 GB + 300 calls basket) at Member State level, EUR/PPP, 2015-2018



Source: Mobile Broadband Price Study (Van Dijk and Empirica). Prices expressed in EUR/(Purchase parity power - PPP), VAT included. Annual data as of February.

In 2018, Poland continued to make progress on mobile broadband take-up, ranking first in the EU. Its 4G coverage (93 %) is very close to the EU average of 94 %.

Poland's mobile penetration was also the highest of all EU Member States' in 2018, reaching 163 % (as compared with 144 % a year earlier).

The price of the least expensive offer for handset (1GB + 300 calls basket) fell further (from €10.80 to €10.40) and remains much lower than the EU average (€22.30).

In mid-2018, P4 (the fourth entrant in the mobile market) upheld its position from the end of 2017 and had the highest number of active SIM cards.

There are over 90,000 base transceiver stations in Poland, of which 7,000 are connected with fibre backhaul[102].

According to UKE, a significant number of customers still use devices operating in 2G networks, so a phasing-out of 2G is not planned for the time being.

Orange Polska and T-Mobile remain the only players that share their networks for coverage purposes. In 2018, they signed an agreement aiming to increase the capacity of their long-term evolution (LTE) network by around 40 % by 2020. The 1.8 GHz and 900 MHz bands will be optimised, i.e. the two 15 MHz bands currently used jointly will be changed to two separate 10 MHz blocks in the 1.8 GHz band (by 2019-2020) and the two 4.2 MHz bands used jointly for 3G will be changed to two separate blocks of 4.2 MHz in the 900 MHz band (by the end of 2018).

[101] Market share data are confidential.
[102] Data for 2017.

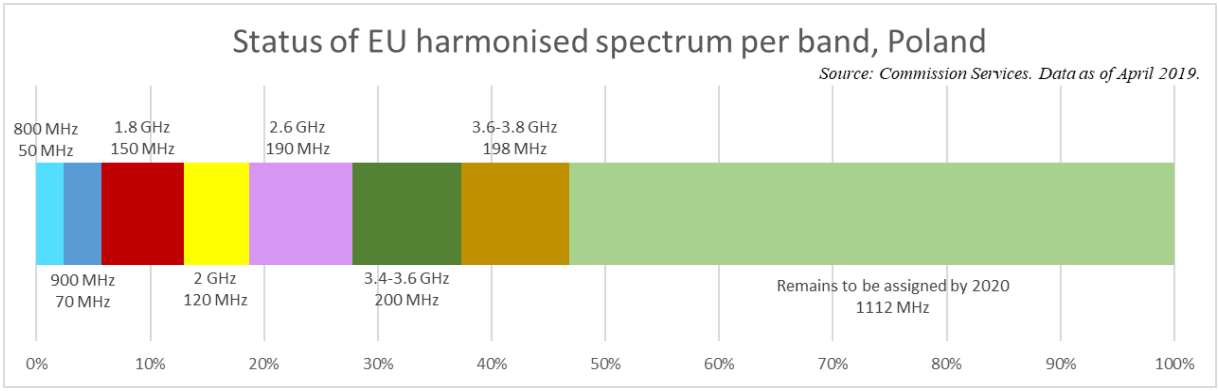
According to UKE, the duration of outgoing calls has increased in recent years. Nevertheless, the growth rate has slowed significantly (from 10.5 % in 2015 to 4.7 % in 2017).

In 2017, a slight decrease was recorded in the number of SMS messages sent. However, the rate of decline was lower than the year before. Text messaging is increasingly replaced by other communication substitutes, such as instant messaging, social networks, e-mail and other 'over-the-top' options. On the other hand, MMS messages are still very attractive for Polish customers, who sent 1.4 billion in 2017, i.e. almost 39 % more than in 2016.

Data transmission has been the fastest developing service in the mobile networks for many years. An increasing number of large data packages offered by operators has certainly had a significant impact, together with a growing range of high-speed networks. In 2017, customers transferred 62.5 % more data than in 2016 (53.6 GB of data per person, as compared with 33.8 GB).

3. Regulatory developments

3.1. Spectrum



In Poland, 47 % of the spectrum harmonised at EU level for wireless broadband has been assigned[103] (however, spectrum in 3.4-3.8 GHz should be subject to refarming in order to fully comply with technical conditions established in EU harmonisation decisions). The spectrum that remains to be assigned is mainly in the 700 MHz, the 1.5 GHz and the 26 GHz bands. One block in the 800 MHz band remains not assigned and the 3.6 – 3.8 GHz range is also not fully assigned due to refarming issues.

No open spectrum assignment procedure was carried out in Poland in 2018.

As regards spectrum assignment without open selection procedure, a licence in the 450 MHz band was granted to PGE Systemy S.A. (a state-owned energy company) on the basis of an amendment to the Telecommunications Act adopted specifically for this purpose.

In addition, UKE issued a decision modifying a regional spectrum licence in the 3.7 GHz band in order to transfer rights of use from Powszechna Agencja Informacyjna to P4 sp. z o.o. upon agreement of the parties.

Frequencies in the 1.8 GHz band were subject to a lease from T-Mobile Polska to Orange Polska.

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

Under an agreement between UKE and the Ministry of National Defence, spectrum in the 26.5-26.9 GHz range ~~band~~ will be used for civilian purposes and in the 26.9-27.1 GHz range ~~band~~ for civilian and governmental purposes.

In 2018, UKE changed frequency licences in the 800 MHz, 900 MHz, 1.8 GHz and 2.1 GHz bands. The changes concerned:

- the conditions of spectrum use;
- the introduction of an exemption from the obligation to apply for a radio licence;
- the possibility to use frequencies for fixed (next to mobile) services; and
- the updating of references to international agreements.

UKE extended spectrum licences in the 420 MHz band for the Polish Power Transmission and Distribution Association and in the 800 MHz band for Sferia S.A. The latter extension attracted significant attention from stakeholders, since it is related to ongoing infringement proceedings against Poland. Sferia S.A. disagreed with the fee and requested that the case be reviewed and that UKE divide the one-off payment into 15 instalments (UKE refused). Eventually, Sferia has renounced prolongation of 800 MHz frequency licence.

In July 2018, UKE launched a public consultation on the plan to manage spectrum for 5G rollout, which included presentation of the current and future use of 5G-dedicated bands.

3.2. **Regulated access**

Infringement proceedings launched in 2017 concerning market review delays[104] are still ongoing. While most of the grievances raised in the Commission's letter of formal notice were addressed in the course of 2018, Poland has not given notification of a review of the market for wholesale call termination on the individual public telephone network provided at a fixed location (Market 1 in the 2014 Recommendation on relevant markets[105]). UKE reported that the relevant work started in 2018 and that the regulatory decisions are scheduled for 2019. The review of fixed termination rates (FTRs) proved very difficult in 2018, due to strong opposition of the market in Poland. UKE conducted a national consultation of its draft decisions in the fixed termination market at the beginning of 2019, and notified them to the Commission in March 2019.

For Market 2/2014 (wholesale voice call termination on individual mobile networks), the review is planned for 2020 and for markets 3a/2014 (wholesale local access provided at a fixed location) and 3b/2014 (wholesale central access provided at a fixed location for mass-market products) for 2019. UKE plans further deregulation of the incumbent (Orange Polska) in 51 communes (wholesale local

[104] The proceedings concerned the retail market for access to the public telephone network at a fixed location for residential and non-residential customers, the wholesale market for call origination on the public telephone network provided at a fixed location and wholesale call termination on the individual public telephone network of PTC provided at a fixed location (markets 1, 2 and 3 in the 2007 Commission Recommendation on relevant product and service markets within the electronic communications sector susceptible to *ex ante* regulation in accordance with Directive 2002/21/EC (OJ L 344, 28.12.2007, p. 65)) and the broadcasting transmission services market (market 18 in the 2003 Recommendation (OJ L 114, 8.5.2003, p. 45)). Poland notified this market on 15 November 2017.

[105] 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).

access provided at a fixed location - market 3a/2014) and 151 communes (wholesale central access provided at a fixed location for mass-market products - market 3b/2014)[106].

As regards symmetrical access, UKE issued administrative decisions regulating access to ducts in September 2018 on the basis of national provisions transposing the Broadband Cost Reduction Directive[107]. The decisions are addressed to the seven largest duct owners and set out general conditions for providing access to physical infrastructure.

As regards cross-sector symmetrical regulation, UKE issued one decision in 2018 on the basis of provisions transposing the Broadband Cost Reduction Directive. UKE also issued over 30 decisions concerning access to in-building physical infrastructure which were not any operator's property.

UKE plans to issue six additional decisions addressed to the largest cable operators in order to regulate access to in-house cabling through individual decisions laying down access conditions. These measures have provoked controversy in the Polish market and raised an issue of potential non-compliance with EU law. The Commission is looking into the matter.

Operators often use access to power poles to build electronic communication networks. According to UKE, 400,000 poles are currently used for this purpose. The operators expressed an interest in over 1.1 million low-voltage poles in the next 5 years. On the other hand, medium-voltage poles are being used to a negligible extent (around 400 poles), with demand for around 50,000 poles expected in the next 5 years. UKE is also carrying out work on determining the conditions of access to electricity network operators' poles. For now, access issues are subject to dispute resolution decisions.

The single information point (SIP), which was launched on 1 January 2017, was upgraded in April 2019 to provide more information and better user support. Also, UKE proposed a number of legislative amendments concerning the SIP, including:

- a new obligation to provide the system with exact location data;
- the route of electronic communication network elements; and
- an obligation to update data immediately after making changes to the status of any network or any of its elements.

These proposed amendments, especially the third, raised concerns among operators as to additional administrative burden.

The main disputes regarding access to infrastructure that have been referred for dispute resolution relate to:

- technical issues (e.g. the need to work on electrified masts to install telecommunication cables);
- economic factors (excessive fees for access to masts); and
- process (lack of harmonised conditions, lengthy negotiations).

4. End-user matters

Between 1 January and 22 November 2018, UKE received 2,996 requests for intervention, 1,974 requests for consultation and 1,243 requests for alternative dispute resolution. The main sources of

[106] Public consultation on draft measures for markets 3a/2014 and 3b/2014 started on 10 January 2019.
[107] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L 155, 23.5.2014, p. 1).

consumer complaints in 2018 included pricing and billing, service failure/non-performance of the contract, contract termination, contract modification and number portability.

Overall, UKE noted fewer complaints and fewer calls to its consumer helpline (down from around 19,000 to 14,000). It suggested that this trend stems from better legal protection and from information campaigns.

UOKiK also noted a drop in complaints. The competition authority mainly noted problems with misleading advertising ('*fast connection with no limits*'). The complaints it received concerning 'roam like at home' (RLAH) services were usually not justified and were attributed to a lack of understanding of the differences between roaming and international calls, and a general lack of understanding/misinformation concerning fair use policy (FUP) and sustainability surcharges.

According to the 2018 Consumer Markets Scoreboard, mobile telephone services in Poland were assessed very favourably by consumers[108] (4th position out of 25 markets assessed, with the market performance indicator (MPI) score standing 4.8 points higher than the market's EU average and recording an increase of 7.5 percentage points between 2015-2017). Internet provision services rank 13th (recording an increase of 2.4 percentage points between 2015-2017), whereas fixed telephone services (no improvement in the last 2 years) and TV subscriptions (a decrease by 3.1 points since 2015) rank at the 18th and 20th position respectively, both below the respective markets' EU average scores.

Amongst all 25 services assessed, mobile telephone services is the market that saw the highest increase for a specific MPI component relative to the EU-28 average (+0.8 on choice and +0.7 on trust). This market also improved the most for a specific MPI component between 2015-2017 in Poland amongst all 25 services assessed (+1.7 on trust).

December 2018 saw the entry into force of a number of amendments to the Polish Telecommunications Act to improve consumer protection. The amendments target, *inter alia*, premium-rate services that cause many problems for customers. Premium-rate service providers are now obliged to provide the price and the name of the service provider together with the premium rate number and to obtain the subscriber's consent prior to the commencement of the service. The providers are obliged to set a threshold for premium rate services for each period and, once the threshold is reached, to inform the subscriber immediately. Moreover, they are obliged to block the possibility of making/receiving further premium-rate calls until the subscriber establishes a higher threshold and to offer subscribers at least four threshold amounts (PLN 0, 35, 100 and 200), with a default threshold of PLN 35. Before billing starts, they must provide information about price per service unit or price for the entire service and enable the blocking of premium-rate services free of charge. Lastly, premium-rate service providers are obliged to notify UKE of their details and the premium-rate service they offer.

a. Net neutrality

In 2018, UKE started investigating the practice of an internet service provider, which in the event of network congestion gives priority to traffic from business end-users using a particular service. According to UKE, this traffic management practice may violate the principle of net neutrality, but no final decision has been taken yet.

On 6 April 2018, UKE announced that V-Speed had won the competition for a certified mechanism

[108] Consumer Market Scoreboard, 2018 Edition, available at: https://ec.europa.eu/info/publications/consumer-markets-scoreboard_en

monitoring the quality of internet access. After the testing period and as of 1 December 2018, the certified monitoring mechanism for the quality of internet access is in place, allowing users of fixed connections to rely on its measurements vis-à-vis the operators in order to file complaints. The system is free of charge and consists of a website, an application for PCs, a web application and a mobile application (for Android and iOS). Due to legal and technical concerns, measurements performed using the web and mobile applications may serve information purposes only.

b. Roaming

According to data from the *21st international roaming BEREC benchmark report*, Poland is among the Member States in which prices for packages that include voice and data, and for data-only packages are on a downward trend[109].

Polish end-users consumed 3.4 times more roaming minutes (calls made) in Q4 2017 (RLAH) than in Q4 2016 (before RLAH). Between Q1 2017 and Q1 2018, consumption increased 3.1 times.

As regards data, Polish end-users consumed 13.3 times more roaming data in Q4 2017 than in Q4 2016. Between Q1 2017 and Q1 2018, consumption increased 11.9 times.

Due to the very low data price, high roaming imbalances and low revenue per user, Polish operators were granted additional sustainability derogations: all four MNOs already received second sustainability derogation decisions. UKE indicated that it might be difficult for some operators to reach the necessary threshold to be granted further derogations.

c. Emergency communications — 112

Due to the implementation of the 'push' system or the automatic 'pull' system, Poland reported near-instant times (up to 10 seconds) for the provision of network-based caller location. Poland is among the Member States with the higher rates of failure to provide caller location (21 % of calls).

The Commission is currently looking into the functioning of emergency communications and the 112 number in Poland, particularly as regards the implementation of a solution ensuring equivalent access to 112 for disabled end-users. According to the Polish authorities, an application was tested as of end of 2018 in order to be fully implemented in 2019. The Ministry of the Interior signalled that more precise caller location would be desirable in Poland, but legislative changes are needed in order to force operators to implement the necessary solutions.

5. Institutional issues

In 2018, the Ministry of Digital Affairs tabled a set of amendments to the Polish Telecommunications Act, aiming to improve the organisation and conduct of spectrum auctions. The new proposal also aims to broaden UKE's competences in order to empower the regulator to refuse extensions of spectrum licences in a given band in specific circumstances. Moreover, the proposed changes would allow UKE to organise a spectrum auction/tender on its own initiative, including for frequencies that are not yet available. The changes are intended to facilitate the efficient management and assignment of spectrum.

The proposed amendments are also intended to ensure correct transposition of EU law in the context of the ongoing infringement proceedings concerning modifications made to Sferia S.A.'s spectrum

[109] Report from the Commission to the European Parliament and the Council on the implementation of Regulation (EU) 531/2012 of the European Parliament and of the Council of 13 June 2012 on roaming on public mobile communications networks within the Union, as amended by Regulation (EU) 2015/2120 and Regulation (EU) 2017/920 (COM(2018) 822 final).

licence in 2013, whereby Sferia was granted frequencies in the 800 MHz band that differed from those in the initial licence without market consultations or a selection procedure and appropriate payment.

On 2 February 2018, the Regional Administrative Court rejected a complaint filed in 2014 by the French Chamber of Industry and Commerce against the President of UKE concerning changes to Sferia's spectrum licence. It ruled that Article 123(1) of the Polish Telecommunications Law served as an individual legal basis for changing the licence and that such a regulatory decision did not have to be preceded by an auction or tender.

Other important rulings in 2018 included a judgment of the Supreme Court on 6 February, whereby the Court rejected cassation from Polkomtel against UKE's 2009 decision on mobile termination rates. The ruling follows the European Court of Justice judgment of 20 December 2017 in Case C-277/16 whereby the Court concluded that, in order to promote efficiency and sustainable competition, national regulatory authorities can set the prices of the services covered by an obligation in regard to cost orientation of prices imposed on an operator with significant market power (SMP) on a specific market which would be below the level of the costs incurred by that operator to provide them, if those costs are higher than the costs of an efficient operator. Moreover, a national regulatory authority may require an SMP operator under an obligation in regard to cost orientation of prices to set its prices annually on the basis of the most up-to-date data and to submit those prices to it for verification together with justification before they become applicable, provided that such obligations are based on the nature of the problem identified, are proportionate and are justified in the light of the objectives laid down in Article 8 of the Framework Directive. Such operators may be required to adjust their prices before or after they have started to apply them.

Lastly, on 2 August the Regional Administrative Court upheld UKE's decision concerning the spectrum auction for broadcasting purposes (spectrum in the 174-230 MHz band). It ruled that the auction conditions were objective and that gross violation of the law, leading to annulment of the auction, could not be established.

6. Conclusion

Poland took a number of steps towards 5G rollout in 2018, including preparation of the 5G strategy for Poland, preparation of amendments to improve spectrum auction rules and to facilitate 5G rollout and international activities, such as cross-border 5G corridors. Nevertheless, 5G rollout will probably be delayed due to strict EMF limits, high fragmentation of spectrum intended for 5G use and problems with cross-border spectrum coordination with Russia.

Poland started to implement the *National education network* project aimed at connecting all Polish schools (around 30,500) to broadband networks with speeds of at least 100 Mbps. The authorities proposed setting up a new broadband fund in order to support demand and supply for fast networks. An update to the national broadband plan is also planned for 2019.

In 2018, Poland made most progress on ultrafast broadband take-up and mobile broadband take-up, achieving better results than the EU average. On the latter, it ranks first in the EU. It remains close or equal to the EU average in terms of 4G coverage and broadband price, and slightly below it on ultrafast broadband coverage and fast broadband take-up. Nevertheless, its performance is still being undermined by low fixed broadband coverage, fixed broadband take-up and NGA coverage.

The Polish market would benefit from more regulatory certainty, which could be improved by addressing market delays, finalising robust rules for future spectrum auctions and solving longstanding spectrum assignment issues. Also, equivalent access to the 112 number for disabled end-users should be ensured without further delay.

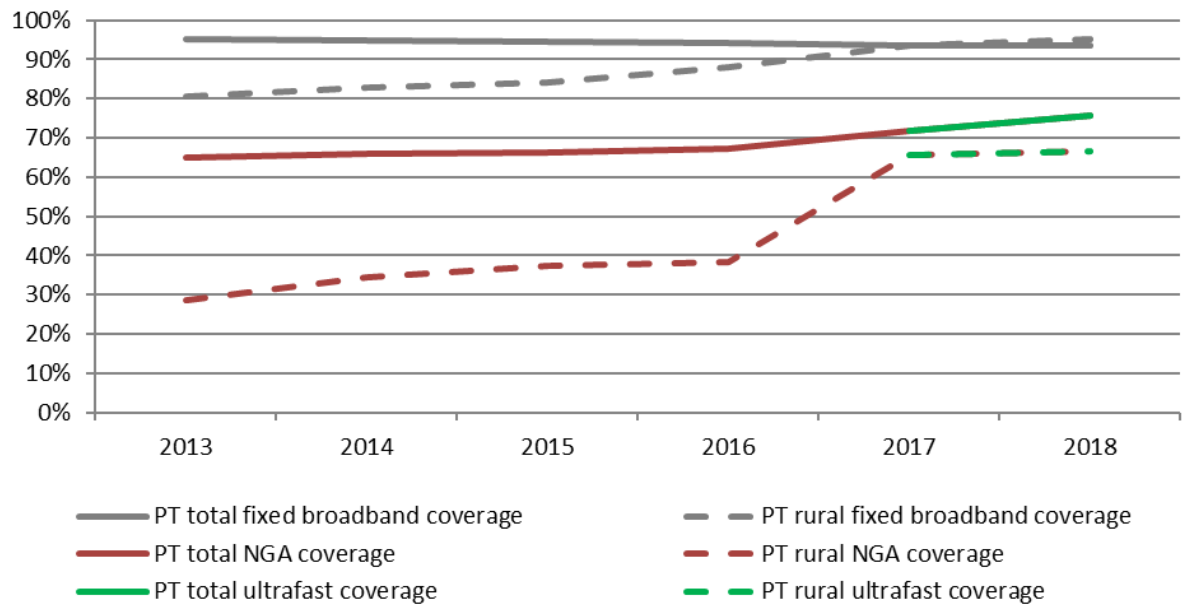
Portugal

	Portugal				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
1a1 Fixed broadband coverage % households	**94%** 2016	**93%** 2017	**94%** 2018	***23***	**97%** 2018
1a2 Fixed broadband take-up % households	**68%** 2016	**72%** 2017	**74%** 2018	***16***	**77%** 2018
1b1 4G coverage % households (average of operators)	**93%** 2016	**94%** 2017	**96%** 2018	***16***	**94%** 2018
1b2 Mobile broadband take-up Subscriptions per 100 people	**55** 2016	**65** 2017	**70** 2018	***27***	**96** 2018
1b3 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	**NA**	**NA**	**0%** 2018	***13***	**14%** 2018
1c1 Fast broadband (NGA) coverage % households	**67%** 2016	**72%** 2017	**76%** 2018	***22***	**83%** 2018
1c2 Fast broadband take-up % households	**43%** 2016	**51%** 2017	**56%** 2018	***7***	**41%** 2018
1d1 Ultrafast broadband coverage % households	**NA**	**72%** 2017	**76%** 2018	***13***	**60%** 2018
1d2 Ultrafast broadband take-up % households	**25%** 2016	**35%** 2017	**50%** 2018	***2***	**20%** 2017
1e1 Broadband price index Score (0 to 100)	**69** 2016	**72** 2017	**78** 2018	***21***	**87** 2017

1. Progress towards a gigabit society

The coverage and take-up of ultrafast broadband in Portugal is well above the EU average. Investment and competition between private operators continues to drive its expansion.

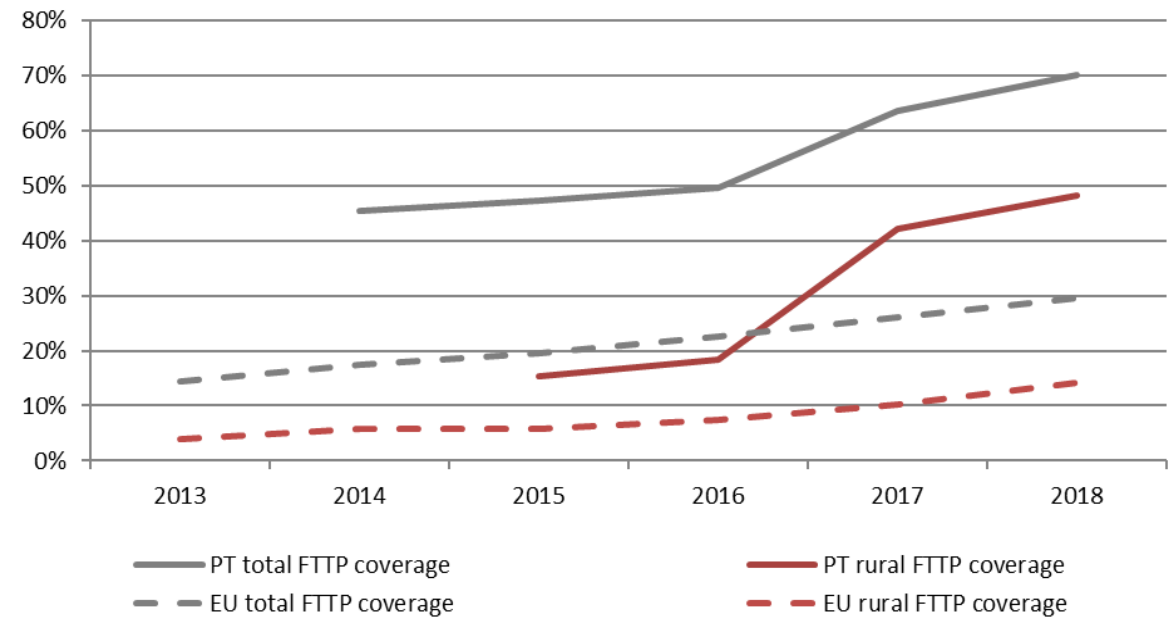
Fixed, NGA and ultrafast coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June. Ultrafast coverage metrics are available for 2017 and 2018.

Fixed broadband is available to 94 % of households, slightly below the EU average of 97 %. Fast broadband coverage reached 76 % in 2018 increasing by 4 p.p., but still below the EU average of 83 %. Ultrafast broadband networks are available to 76 % of households (a 3 p.p. increase in the last year), well above the EU average of 60 %.

Fibre-to-the-premises (FTTP) coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June.

Total FTTP coverage increased by 7 p.p., from 63.6 % in 2017 to 70.2 % in 2018, well above the EU average of 29.6 %. Rural FTTP coverage also increased, from 42.2 % to 48.2 %, also above the EU average (14.2 %).

In 2011, the Commission declared the compatibility with state aid rules of a measure supporting the deployment in five rural areas of next generation networks (SA. 30317)[110]. In 2 May 2018, Autoridade Nacional de Comunicações (ANACOM) reviewed the wholesale tariffs for access to those networks and proposed to the government that Fibroglobal's prices be reduced by 30-66 %. In addition, it proposed that Fibroglobal's bitstream offer be extended to 200 Mbps, 400 Mbps or 1 Gbps speeds and include a multicast functionality. The proposal was analysed by the government and a final decision was issued in April 2019, implementing the proposed changes[111].

The Commission Decision provided for a claw-back mechanism whereby, if the profit generated on the subsidised network exceeds the industry average, the extra profit has to be paid back to the granting authority. ANACOM assisted the government in this matter and identified the existence of over-financing, for the first five years of Fibroglobal's contracts relating to the Central and Azores

[110] Three of them (Center, Madeira and Azores) were awarded to Viatel -Communications Technology SA (Fibroglobal) and the remaining two (North and Alentejo/Algarve) to DS Telecom SA. The networks deployed cover more than 50 % of the population of 138 municipalities, representing 6 % all Portuguese households.
[111] Including the introduction of (i) reference monthly price-caps (for both PON and bitstream offers); (ii) different debit category options in the bitstream offer scheme; and (iii) multicast functionality.

areas [112]. It established that a reimbursement of €3.1 million was due. Accordingly, ANACOM proposed the government to forward the results of the analysis to the funds management authorities. A final decision is still pending.

Investment by commercial operators continued in 2018. In particular, MEO announced investments in the Autonomous Region of Azores in fibre optics, renewal of the mobile network and submarine cables. According to the plan, by the end of 2019, about 100,000 homes across the nine islands will have access to MEO's fibre optics. In February, MEO disclosed an investment of €4 million in its data centre in Covilhã (claimed to be the largest in Portugal), to implement, *inter alia*, the migration of the entire support infrastructure to the SAPO portal.

DSTelecom and Fibroglobal also announced investment plans in mainland Portugal, and the Azores. In 2018, NOS concluded their DOCSIS3.1 network upgrade, enabling the provision of speeds up to 1Gbps on its entire network.

As submarine cables connecting mainland Portugal, the Azores and Madeira are expected to reach the end of their useful life in 2024/2025 (Columbus III in 2024 and Atlantis-2 in 2025), the 2019 state budget (as approved in October 2018 by the Portuguese parliament) provides for the government to take the necessary measures to ensure connectivity between Mainland Portugal and the Autonomous regions (Madeira and Azores) and between the Islands of such regions.

According to ANACOM's Multi-Annual Activities Plan, , a draft for the transposition of Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code113 (EECC) will be presented to the Ministry in 2019.

For a long time, Portugal has given priority to access to civil infrastructure as a driver for investment by alternative operators on their own networks. Subject to regulation by ANACOM, operators had access to ducts and associated infrastructure (e.g. manholes, chambers) of the incumbent operator (MEO) under the reference offer of access to ducts (known as ORAC) since 2006.

2. Market developments

In 2018, there were neither new entrants on the Portuguese market nor any consolidation. There are four major operators - MEO (former incumbent), Grupo NOS, Vodafone and Grupo Cabolink (ONI and Nowo) – but a total of 51 active operators. In September 2018, KKR & Co. Inc. (a US company of global investment) notified the acquisition of indirect exclusive control over the holding company Cabolink, owned by Grupo Apax. In November 2018, the Portuguese competition authority issued a decision of non-opposition to this concentration.

In January 2018, the Portuguese competition authority was notified of the acquisition by Cube II Communications S.A.R.L. (company controlled by Cube Infrastructure Fund II, which is managed by the European infrastructure fund "Cube Infrastructure Managers") and by DST SGPS, S.A. of the joint control of DST Telecomunicações, SGPS, S.A, which previously was solely controlled by DST SGPS, S.A. This acquisition occurred during 2108. DSTelecom Group announced that its objective was to invest another € 50 million in the country's fibre optic coverage, so as to reach 500 000 homes within 2 years.

[112] The contracts stipulate that an over-financing assessment should occur every five years of the contract. Notwithstanding the periodic analyses, a final global assessment must take place at the end of the contract duration of 20 years).
[113] OJ L 321, 17.12.2018, p. 36–214.

In June 2018, Altice Europe announced that its Portuguese branch had entered into an agreement with a consortium, including Morgan Stanley Infrastructure Partners and Horizon Equity Partners, to sell 75 % of a company, 'Torres de Portugal' or 'ToP', to which it would transfer the 2,961 sites it used to operate. The transaction valued ToP at €660 million. In addition, an agreement between Altice Portugal and ToP for the construction of 400 new sites was expected to generate around 60 million Euros in additional revenues for Altice Portugal in the next 4 years. The transaction was based on a long-term partnership between Altice Portugal and ToP, and Altice Portugal will reinvest part of the revenue to acquire a 25 % financial interest in partnership with the consortium. The transaction was completed in the third quarter of 2018.

Following ANACOM's March 2017 decision not to regulate access to MEOs fibre network, Vodafone and NOS signed an agreement to develop and share infrastructure nationwide, enabling both operators to extend their commercial offers over the shared network. The agreement, which entered in force in early 2018 and has 25-years lifetime, involves the operators investing equal amounts and sharing dark fibre to around 2.6 million homes. The partnership also applies to mobile infrastructure, with a minimum of 200 mobile towers to be shared.

The demand for bundles is the main driver for the development of communications networks and services in Portugal. In fact, there is almost no consumption of standalone services. This is particularly relevant for the fixed broadband mass market. At least 88 % of subscriptions for residential bundles include a pay TV service. Of the operators' publicly available offers at the end of 2017, 72 % included a pay-TV service. The digital terrestrial television (DTT) service is provided on a standalone basis (in July 2018, around 15 % of households received TV services exclusively on DTT).

2.1. Fixed markets

The share of cable in total broadband access decreased (from 33 % to 31.8 %) as did that of DSL (from 23.9 % to 18.5 %). The decrease was to the benefit of fibre to the home/building (FTTH/B) technology, which has seen a strong upward trend (from 35.4 % to 41.9 %).

Fixed broadband take-up improved but still remains a challenge. It increased by 2 p.p. (from 72 % in 2017 to 74 % in 2018), narrowing the gap with the EU average (77 %). Fast and overall ultrafast broadband take-up are one of main sources of improvement in the DESI. While fast broadband take-up increased by 5 p.p. (from 51 % to 56 %, above the EU average of 41 %), ultrafast broadband take-up increased by 15 p.p. (from 35 % to 50 %), well above the EU average of 20 %.

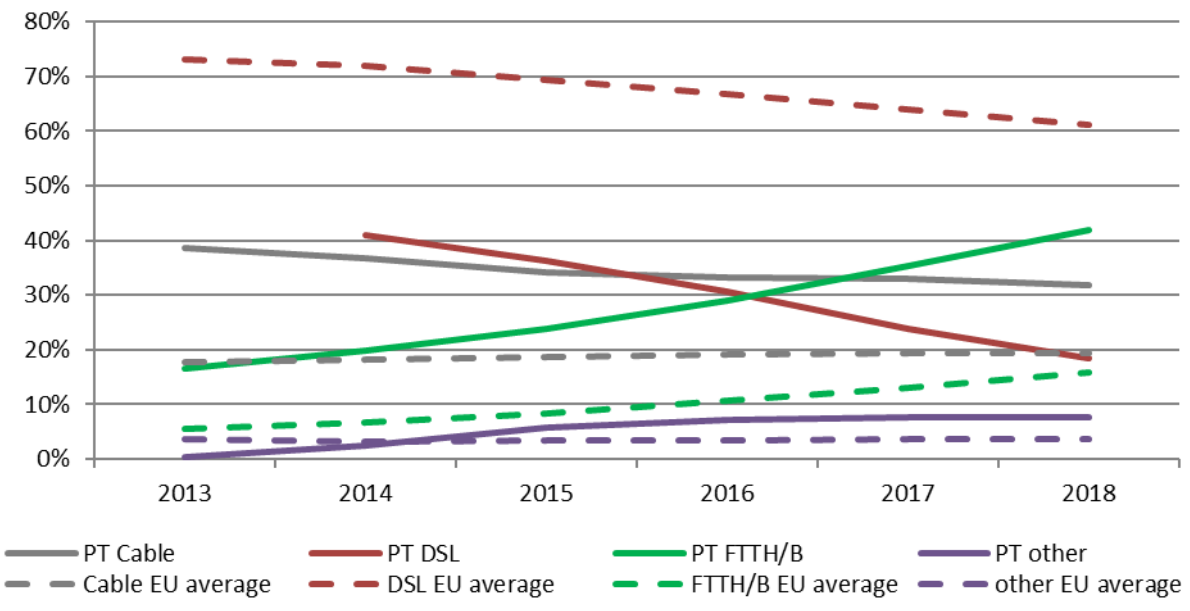
Following data provided by ANACOM, in the case of fixed services, MEO managed to keep or even slightly increase its market shares (its fixed voice line share rose by 0.3 p.p. and its pay TV subscribers' share by 0.6 p.p. between 1S 2017 and 1S 2018). Vodafone's shares also grew (fixed voice line share by 0.8 p.p. and pay TV subscribers' share by 1.2 p.p.) but NOS experienced a losses (fixed voice line share down by 1.1 p.p. and pay TV subscribers' share by 1.4 p.p.). In absolute numbers, MEO has been able to attract the largest number of new customers since it started to expand its FTTH network. Looking at residential next-generation access (NGA) subscribers only, it saw a significant increase in its market shares (4.8 p.p. from 1S 2017 to 1S 2018).

ANACOM reports that there were 3.7 million fixed broadband lines the first half of 2018, an increase of 5.9 % over the previous 12 months. About 68 % of fixed broadband lines have a (theoretical) download speed of 100 Mbps or faster. Over 98 % of fixed broadband lines were part of a bundle with other electronic communication services. The growth in the number of fixed broadband lines is mostly from FTTH lines, which increased by 25.5 % from the first half of 2017. Cable modem and fixed wireless access increased by 1.9 % and 5.7 % respectively and ADSL decreased by 18.3 %.

As a result of these trends, FTTH became the main broadband access technology in Portugal (42 % of broadband lines), followed by cable modem (31.9 %) and ADSL (18.4 %).

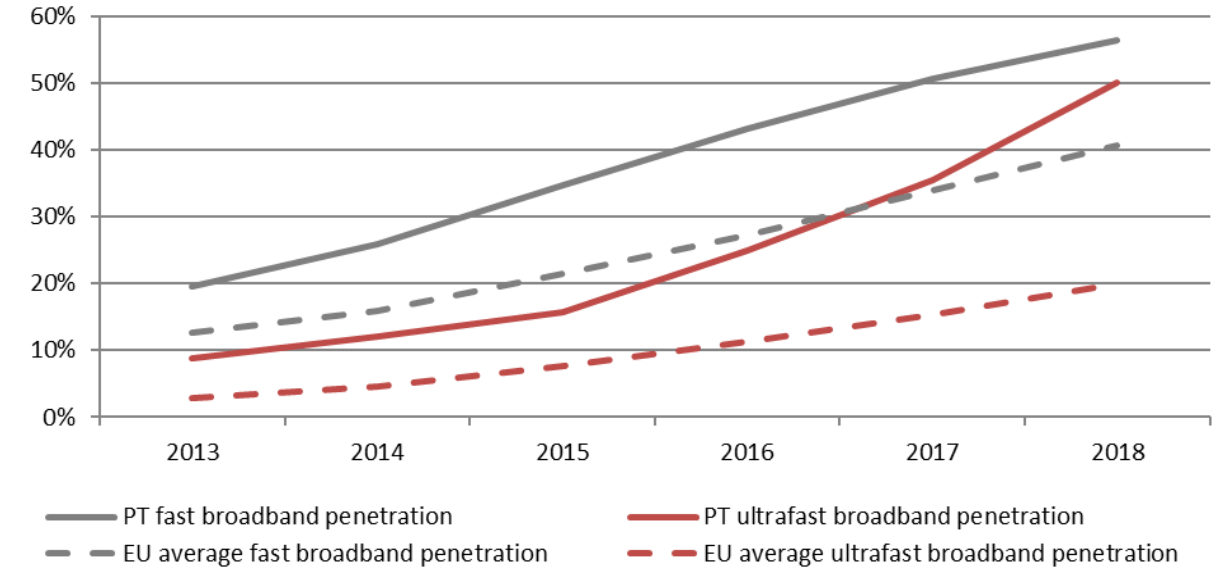
Average traffic has been climbing steadily, surpassing the 100 GB/line/month mark in Q3 2018.

Broadband market shares at Member State level by technology, % of fixed broadband lines, 2013-2018



Source: Communications Committee (COCOM). Annual data as of 1st of July.

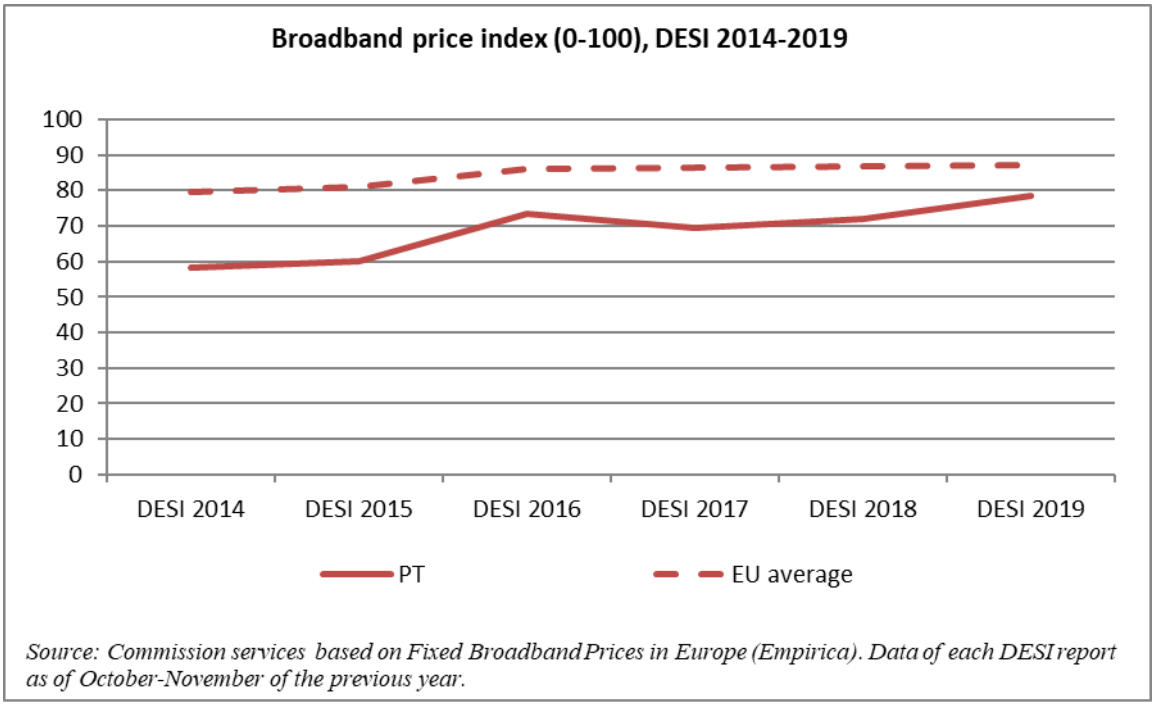
Fast and ultrafast penetration at Member State level, 2013-2018



Source: Communications Committee (COCOM). Annual data as of 1st of July.

Despite an improvement in the broadband price index in 2018, Portugal still ranks 21st. However, concerning this ranking, convergent bundling (i.e. including fixed and mobile internet and voice

services) is the most representative method used by operators to sell electronic communications services in the country[114].



Source: Commission services based on Fixed Broadband Prices in Europe (Empirica). Data of each DESI report as of October-November of the previous year.

2.2. Mobile markets

4G coverage also improved in the DESI in 2018, from 94 % to 96 %, 2 p.p. above the EU average of 94 %. While mobile broadband take-up improved substantially (from 65 % in 2017 to 70 % in 2018), it is still behind the EU average (96 %).

At the beginning of 2018, eight entities currently provide mobile services in Portugal. In addition to the three network operators (MEO, Vodafone and NOS) five mobile virtual network operators (MVNOs) are active in the market (CTT-Phone-ix[115], Lycamobile NOWO, Onitelecom and Vectone[116]).

Starting with UMTS back in 2004, the mobile operators are sharing some elements of the network infrastructure. They have also implemented various 4G network-sharing practices.

There are no plans to phase out 2G or 3G networks or refarm the relevant spectrum. Mobile operators are allowed to implement technologies other than 2G or 3G, on the basis of technology-neutrality.

ANACOM reports that, about 96 % of residents in Portugal subscribe to a mobile service. The number of mobile subscribers grew by 0.9 % in the last 12 months. There were about 1 million M2M subscribers (about 6 % of the total) at the end of the first half of 2018. The number of mobile broadband subscribers reached 7.2 million and is growing at a rate of 6.9 % a year. Smartphone penetration reached 77 %. The growth in the number of subscribers is associated with bundles. In total, 42 % of residential mobile subscribers have a bundle that includes both fixed and mobile

[114] The fixed broadband price index weighs the cheapest retail offers from: standalone, double play (BB + TV, BB + fixed telephony) and triple play (BB+TV+fixed telephony) and three speeds categories - 12-30 Mbps, 30-100 Mbps and +100 Mbps. This indicator presents values from 0 to 100 (which should not be read as prices) and the higher the values, the better the country performs in terms of affordability of prices relative to purchasing power.

[115] CTT-Phone-ix ceased its activity in early 2019.

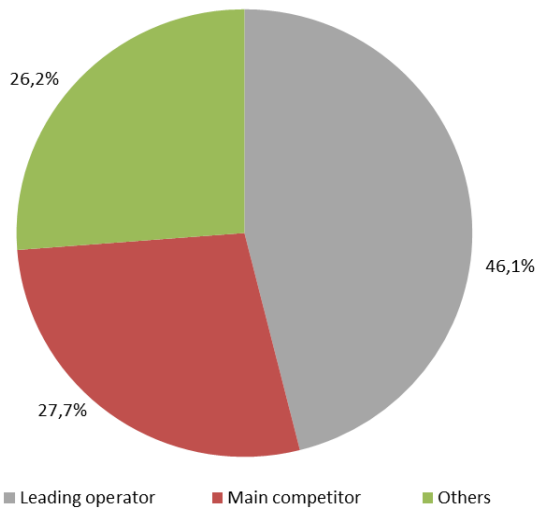
[116] On 4 July 2018 Vectone ceased providing services in Portugal.

services. On the other hand, these 'convergent' bundles now represent 57 % of subscribers' bundles. This is also leading to an increase in the proportion of post-paid subscribers, to 55 % of the total.

Total and average voice traffic is still increasing at a rate of 6-7 % a year and average call duration is also increasing (ANACOM). The growth stems from off-net calls, which now represent 39 % of the volume and, to a lesser extent, from mobile-fixed calls. This is due to the fact that bundles include unlimited national traffic and no on-net/off-net price difference.

ANACOM reports that SMS traffic has been decreasing since 2012 because of alternative messaging services. The average number of SMSs per month is now 114 (4 years ago it was 172). Data traffic increased 30 % in the last year. Average data traffic reached a peak of 3.3 GB/month. In July 2018, about 1.4 million mobile users (13 % of the total), subscribed to a zero-rated-type offer.

Mobile market shares (as a % of mobile subscribers), October 2018

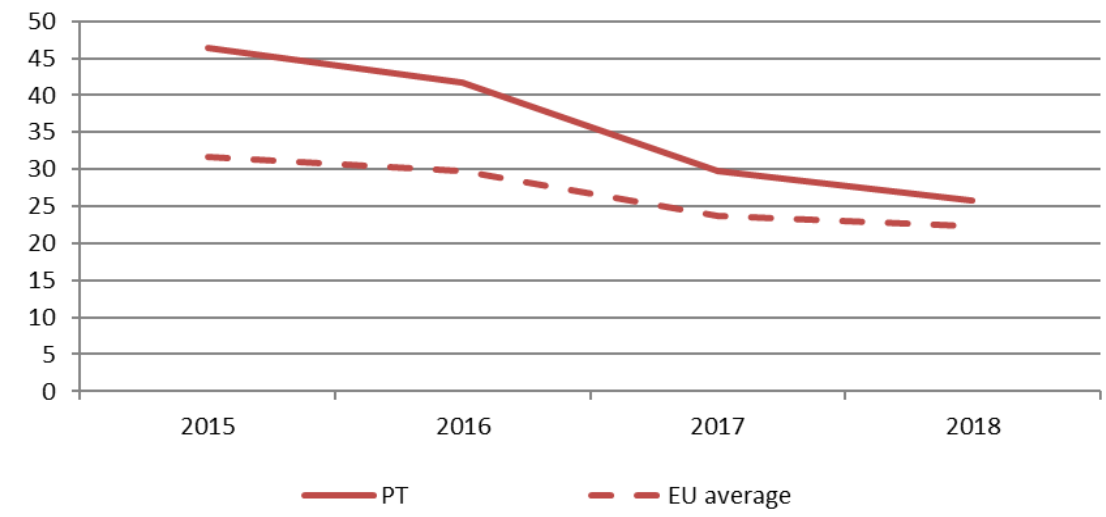


Source: Communications Committee (COCOM). Data as of 1st of October 2018.

In Portugal the mobile market shares of the leading operator are equal to 46.1 % while mobile market shares of the main competitor are 27.7 %.

Concerning the impact of over-the-top services on consumer choices, in the beginning of 2018 46 % of internet users made voice and video calls over the internet, up 2 p.p. from 2017. At the end of 2018 instant messaging was used by 60 % of mobile users. About 11 % of individuals subscribed to a paid video-streaming service (e.g. Netflix, NPlay, FOXPlay, Amazon Prime Video).

Least expensive offer for handset (1 GB + 300 calls basket) at Member State level, EUR/PPP, 2015-2018



Source: Mobile Broadband Price Study (Van Dijk and Empirica). Prices expressed in EUR/(Purchase parity power - PPP), VAT included. Annual data as of February.

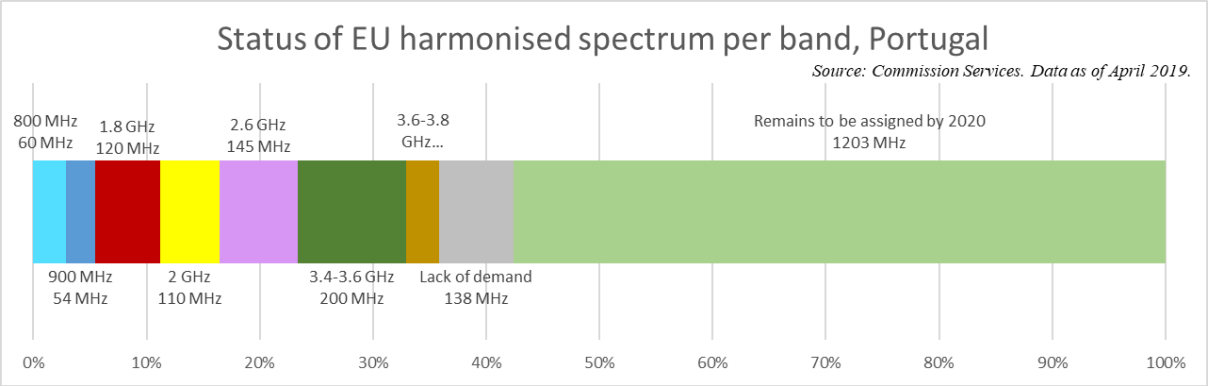
Other online services have a high penetration rate: social networking (82 % of mobile users), maps (73 %), video streaming (67 %), audiostreaming (48 %), online gaming (25 %). Some operators have included third-party or their own video-streaming services in their telecom bundles, along with other services (e.g. home security, location, M2M-type applications, etc.).

Stand-alone mobile broadband prices for handset offers decreased (from €/PPP 29.8 to EUR/PPP 25.70); but continue to exceed the EU average (€/PPP 22.30).

3. Regulatory developments

3.1. Spectrum

In Portugal, 35.8 % of the spectrum harmonised at EU level for wireless broadband is assigned[117]. The spectrum that remains to be assigned is mainly in the 700 MHz, 1.5 GHz and 26 GHz bands and some in the 3.6-3.8 GHz bands,. No new spectrum rights were granted in 2018 but the rights of use on the 2.1 GHz have been renewed for 15 additional years(until 2033). The last spectrum award took place in 2012. While Portugal has assigned 200 MHz in the lower part and 60 MHz in the upper part of the 3.4-3.6 GHz band, the technical conditions are not in line with Commission Decision (EU) 2019/235[118] leading to a scoring of 0 in the DESI 5G readiness indicator.



Coordination with Spain on the 700 MHz band has been concluded and work is being finalised with the Moroccan regulator. In March 2018, ANACOM launched a public consultation on the assignment of the 700 MHz band[119]. In July, it issued the national roadmap for the release of the 700 MHz band, which is to commence in the last quarter of 2019 and be completed by the end of May 2020. This will requires the migration of DTT to a new frequency band. The roadmap provides for the adoption of the simplest migration scenario, through the maintenance of current technology and without the need for a period of simultaneous transmission.

The March 2018 public consultation on 700 MHz assignment also covered the assignment of the 3.4-3.8 and 26 GHz bands[120]. Two operators have rights of use in this band until 2024/2025. Portugal is

[117] The 5G spectrum readiness' indicator is based on the amount of spectrum already assigned and available for use for 5G by 2020 within the '5G pioneer bands' in each EU Member State. For the 3.4-3.8 GHz band, this means that only licences aligned with the technical conditions annexed to Commission Decision (EU)2019/235, are considered 5G-ready. However, 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.

[118] Commission Implementing Decision (EU) 2019/235 of 24 January 2019 on amending Decision 2008/411/EC as regards an update of relevant technical conditions applicable to the 3400-3800 MHz frequency band (*OJ L 37, 8.2.2019, p. 135)*

[119] https://www.anacom.pt/render.jsp?contentId=1430582

[120] https://www.anacom.pt/render.jsp?contentId=1430582

studying the possible scenarios for reorganising and allowing the use of sufficiently large blocks in the band by 31 December 2020, as required by Article 54 EECC.

Coordination of civil/military use of spectrum is part of existing practices. Some of the latest EU spectrum harmonisation measures (e.g. 800 MHz) required detailed coordination with the military counterpart.

A licensed share access agreement (LSA) trial was developed in the band 2300-2400 MHz. Depending on the conclusions reached, LSA could be considered as a possibility to be implemented. The band currently accommodates services ancillary to programme making / services ancillary to broadcasting (SAP/SAB) applications. Spectrum trading takes place in a few sectors, such as sound broadcasting and private mobile radio.

In terms of mobile networks and coverage in rural areas, ANACOM imposed coverage obligations on mobile operators following the acquisition of 2 x 5 MHz of 800 MHz in the multi-band auction and in the framework of the renewal of rights of use of frequencies in the 2.1 GHz band. The first to benefit were 480 mostly rural parishes. This obligation was intended to strengthen mobile data coverage in areas where it did not exist or it was deficient, therefore mainly in remote areas or the country's interior. The reference speeds associated with the obligations to which each operator is subject in the 800 MHz frequency band are currently of 43.2 Mbps for MEO, 4.0 Mbps for NOS and 7.2 Mbps for Vodafone. The new obligations imposed within the framework of the renewal of rights of use of frequencies of the 2.1 GHz benefit 588 additional parishes, 75 % of the population of which is to be covered by a mobile broadband service that allows data transmission speed of 30 Mbps (maximum download speed), and will be applied in full in 2019.

3.2. Regulated access

On 28 September 2018[121], ANACOM approved final decisions on the wholesale market for call termination on the public telephone network at a fixed location (Market 1 in the 2014 Recommendation on relevant markets[122]). All providers of voice-call termination services on individual public telephone networks at a fixed location were designated as having significant market power (SMP) in this market; this group includes all providers with geographical and nomadic numbering resources (30 numbering range). Based on a review of ANACOM's pure BU-LRIC model, the new price cap for fixed call termination was set at 0.047 euro-cents per minute. ANACOM proposed to set the price caps for 2019 and 2020 by updating the fixed termination rate (FTR) model in line with inflation. On 5 January 2018, it approved the final decision on IP interconnection (also Market 1/2014[123]), which covered the technical characteristics for the IP interconnection and the migration plan.

On 21 June 2018, ANACOM approved the final decisions[124] on the wholesale markets for voice- call termination on individual mobile networks (Market 2/2014). All operators active in the market providing mobile termination services are identified as having SMP in this market, and are subject to the same set of obligations. Based on a review of ANACOM's pure BU-LRIC model, it is proposed that the new price cap for mobile call termination be set at 0.42 eurocents per minute. ANACOM also

[121] https://www.anacom.pt/streaming/Decisao_M1_VF.pdf?contentId=1460266&field=ATTACHED_FILE

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

[123] https://www.anacom.pt/render.jsp?categoryId=393319.

[124] https://www.anacom.pt/render.jsp?contentId=1455978.

proposed to set the price caps for 2019 and 2020 by updating the mobile termination rate (MTR) model in line with inflation.

In October[125], ANACOM approved the final decision on the wholesale market for call origination on the public telephone network provided at a fixed location for the provision of retail telephone services (Market 2 in the 2007 Recommendation on relevant markets[126]) which deregulated that market. As MEO was previously the SMP operator, all the obligations to which it was subject were removed. Nevertheless, the wholesale line rental (WLR) offer and the prices charged for wholesale origination must be maintained for 18 months. Only then, will MEO be allowed to change prices or remove the offer

In May, ANACOM launched a public consultation on a draft decision on changes to the reference duct access offer (ORAC) and the reference poles access offer (ORAP). The approved measures are aimed at facilitating other operators' access to MEO's ducts and poles by simplifying procedures or lowering prices. They are also aimed at improving competition by allowing faster and more flexible service installation and thus streamlining the service offered to users.

On 7 November, ANACOM approved a draft decision requiring MEO to reduce the maximum prices applied to circuits connecting the mainland, the Azores and Madeira (CAM) and inter-island circuits (in Azores). The decision was taken in the context of the leased lines reference offer (ORCA) and the reference Ethernet leased lines offer (ORCE) and applies until the next annual review of these prices. The final decision was approved in March 2019.

Under the 2018-2020 multi-annual activities plan analysis of markets 3a, 3b and 4 in the 2014 Recommendation on relevant markets were to begin in 2018 and be concluded in the course of 2019.

In August, ANACOM adopted a final decision on a request to resolve a dispute between MEO and Vodafone over non-compliance with procedures set out in the reference poles access offer (ORAP). It ordered Vodafone to cease its current practice and comply immediately with the rules in version 3.1 of the ORAP as regards the procedures governing the installation of customer drops. However, following Vodafon's appeal on 9 October, ANACOM revoked its decision and suspended the dispute resolution procedure pending adoption of a decision to amend the ORAP.

In October, ANACOM resolved a dispute between Vodafone and MEO regarding the payment of penalties under the reference duct access offer (ORAC). The dispute concerned MEO's obligation to pay penalties for erroneous responses to feasibility analysis requests submitted by Vodafone.

There is no take-up data for access to ducts and poles. Take-up of copper local loop unbundling is decreasing steadily. In the second quarter of 2018, it accounted for less than 2 % of all broadband accesses. Take-up of bitstream over copper is also decreasing steadily. In the second quarter of 2018, it accounted for less than 0.3 % of all broadband accesses. There is no data for take-up of high-quality services, but demand for traditional leased lines is decreasing steadily (in the second quarter of 2018 there were around 1,500 leased lines) and demand for high-quality Ethernet services is decreasing slowly (in the second quarter of 2018 there were fewer than 1,000 Ethernet leased lines).

[125] https://www.anacom.pt/streaming/DecisaoFinal4out2018exM2.pdf?contentId=1460546&field=ATTACHED_FILE

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

In Portugal, there are no remedies applied to the SMP operator's NGA network. There is regulated access to the SMP operator's civil infrastructure and symmetrical access to in-house infrastructure and to ducts and poles that can be used to install NGA networks.

In practice, the energy operator's (Energias de Portugal) poles are used extensively and the transport utility's (Infraestruturas de Portugal) ducts to a degree. The relevant local authorities determine the methodology for establishing of the value of, or remuneration in exchange for access to and use of, suitable infrastructures that they hold or manage. Fragmentation in municipality legislation creates uncertainty in the sector, which may hamper 5G deployment and achievement of the 2020 and 2025 digital targets. ANACOM and the Ministry of Infrastructure and Housing (*Ministério das Infraestruturas e da Habitação*) agreed to set up forum with all municipalities to discuss and address these issues.

Finally, in July, ANACOM approved a draft decision requiring MEO to implement a reduction of 15.16 % in the annual price per Mbps that it charges to television operators (RTP, SIC and TVI) for the provision of the DTT service[127].

4. End-user matters

According to the 2018 consumer markets scoreboard[128], 'TV subscriptions' and 'Mobile telephone services' are in the bottom two of the MPI[129] score, being the markets that shows the greatest discrepancies with the EU-28 average (-10.7 'TV subscriptions' and -8.0 'Mobile telephone services') and with largest drops (-7.8, Mobile telephone services' and -5.9, 'TV subscriptions'). 'Internet provision services' is the fifth worst positioned in the ranking, being also below the EU-28 average (-5.7). Fixed telephone service, although best positioned (the 12th of 26 services analysed) is still slightly below the EU-28 average (-0.4).

In the first half of 2018, consumers made 41,500 complaints relating to electronic communications (in hard copy or filed electronically in the Portuguese Complaints Book or sent directly to ANACOM). The issues giving rise to most complaints entered in complaint books were billing (15 %), service faults (15 %) and service cancellations (10 %).

ANACOM launched COM.escolha (a tariff comparison and simulation tool) in 2011 and has since upgraded/adapted it several times. In October 2018, it introduced a specific field for the data transmission speeds provided for in Regulation (EU) 2015/2120 (TSM Regulation[130]) in the page for details of internet service providers' (ISPs') tariff plans. The ISPs have been entered the relevant figures.

In February 2017, ANACOM decided to initiate the regulatory procedure to amend the Regulation 829/2016 on pre-contractual and contractual information, which required its temporary suspension and stakeholder consultation. It approved the draft amending Regulation and the launch of a public consultation on 5 June 2017. The consultation ended on 28 August 2017 and the final decision

[127] ANACOM's analysis of pricing concluded that the prices currently in force, agreed between MEO and the television operators, do not comply with one of the principles introduced by Law no. 33/2016 of 24 August, insofar as they exceed the price limit presented in the proposal that won the public tender for allocation of the Mux A licence (€885,000 per annum and per Mbps).
[128] Consumer Markets Scoreboard, 2018 Edition, Justice and Consumers, European Commission.
[129] The MPI is a composite indicator ranging from 0 to 100 which measures how well a given market performs according to consumers.
[130] Regulation (EU) 2015/2120 of the European Parliament and of the Council of 25 November 2015 laying down measures concerning open internet access and amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services and Regulation (EU) No 531/2012 on roaming on public mobile communications networks within the Union (OJ L 310, 26.11.2015, p. 1).

is under preparation[131]. The amendment of the regulation allows for more flexibility as regards the media to be used in providing end-users with the simplified information sheet (FIS) in pre-contractual and contractual situations and to adapt the FIS template to the existing offers.

In June 2018, ANACOM issued a decision laying down requirements to be fulfilled by operators in their responses to customers' complaints through (physical or electronic) complaint books, as from 1 July 2018. The aim is to improve responses to complaints and thus enhance consumer rights.

On 27 March 2018, ANACOM approved a recommendation, requiring providers of electronic communications services, not to charge any amount for issuing non-itemized invoices or invoices with a minimal level of detail, regardless of the medium used. .By final Decision of 5 September 2018, ANACOM approved the definition of the minimum level of detail and information in bills provided to subscribers without charge.

a. Net neutrality

The inclusion in the Portuguese regulatory framework of the system of penalties for non-compliance with the TSM Regulation still requires amendment of the Electronic Communications Law. The legislative process in ongoing.

Monitoring of ISPs' compliance with the transparency obligations in Article 4 of the TSM Regulation focused on information on data transmission speeds and the impact of traffic management on the quality of services. Although transparency seems to be improving, ANACOM continues to monitor the situation in order to intervene if necessary.

On 3 July 2018, ANACOM issued a decision prohibiting zero-rating and similar commercial and traffic management practices that differentiate between general and specific traffic allowances or applications not subject to traffic limits, once the data cap was reached, in violation of net neutrality rules. Internet service providers implemented ANACOM's decision. It is still monitoring the market.

ANACOM provides users with a tool for monitoring speed and other quality of service parameters[132]. In 2017 and 2018, consumer satisfaction with fixed and mobile broadband speed did not change to any statistically significant degree. On a scale of 1 to 10, satisfaction with fixed broadband speed was 7.6 throughout 2018, while satisfaction with mobile broadband speed varied between 7.3 and 7.6.

b. Roaming

Portuguese end-users consumed twice as many roaming minutes (calls made) and 4.6 times more roaming data in Q1 2018 than in Q1 2017[133]. According to "Mobile broadband prices in Europe 2018[134], prices in Portugal for packages that include voice and data are on a downward trend.

In its decision of 3 July 2018 (see previous section), ANACOM found that, contrary to the 'roam like at home' (RLAH) principle enshrined in Regulation n° 531/2012[135], some tariff plans, in particular some add-ons including data traffic to certain applications/contents, could only be used in the Portuguese territory. Customers travelling in the European Economic Area (EEA) could not use those

[131] https://www.anacom.pt/render.jsp?contentId=1414717&languageId=1=
[132] https://netmede.pt
[133] International roaming BEREC benchmark data report (October 2017- March 2018), published on 4 October 2018.
[134] Mobile broadband prices in Europe in 2018, Empirica, a study conducted for the European Commission.
[135] Regulation (EU) No 531/2012 of the European Parliament and of the Council of 13 June 2012 on roaming on public mobile communications networks within the Union (OJ L 172, 30.6.2012, p. 10), as amended by Regulation (EU) 2015/2120 and Regulation (EU) 2017/920.

add-ons. Following that decision, internet service providers amended zero-rating and similar commercial practices in accordance with RLAH rules.

According to ANACOM, most roaming complaints concern misleading or deficient of information on tariffs and billing.

c. Emergency communications - 112

In Portugal, 112 is the single emergency number, so no alternative emergency numbers are available. According to responses to the 2018 Communications Committee (COCOM) 112 questionnaire, 112 calls are answered within 6 seconds and users with disabilities can use SMS to a National Guard long number as an alternative means of access. However, the Portuguese authorities have indicated that an application allowing end-users with disabilities to make 112 data and video calls, with simultaneous translation into Portuguese sign language, is in its final stage of implementation.

According to responses to the 2018 COCOM 112 questionnaire, caller location information is provided for every emergency call, with a rate of 5 % of calls when network-based location information is not available. All end-users of all mobile and mobile virtual networks are located instantly. The Commission services are currently looking into the functioning of emergency communications and the 112 number in Portugal, with particular regard to caller location information.

Portugal is promoting the creation of a public warning system for emergencies as part of its civil protection arrangements. At a meeting in February 2018, the relevant authorities and stakeholders (ANACOM, the Ministry of Internal Administration, the National Civil Protection Authority, and electronic communication and radio operators) agreed to put this project into operation.

d. Universal service

In October 2018, the Commission decided to refer Portugal to the Court of Justice. compensation mechanism for the financing of universal service obligations obliges operators to compensate retroactively for the net cost incurred, a long time after the services were provided and prior to the universal service being entrusted to an operator by way of a competitive tender.

As reported in the 2018 DESI Report, a public consultation closed in summer 2017. In April 2018, ANACOM recommended to the government that, due to the low usage levels of universal service it should no longer designate universal service provider. ANACOM also underlined the need to amend the current Electronic Communications Law in line with its recommendation.

5. Institutional issues

The competences referred to in Article 5 EECC rest mostly with ANACOM, whose independence (within the meaning of Article 8 EECC) is guaranteed. In particular, ANACOM has sole competence for: (i) ex ante market regulation; (ii) resolution of disputes between undertakings; (iii) general authorisation; (iv) spectrum; (v) net neutrality; (vi) dispute resolution and the single information point under the Broadband Cost Reduction Directive[136]; (vii) numbering (granting numbering resources and managing the numbering plan) and (viii) assessing the unfair burden and calculating the net cost of providing the universal service and approving the specifications of the universal service provision.

On matters relating to the application of the legal framework for competition in the electronic communications sector, ANACOM and the competition Authority (*Autoridade da Concorrência*)

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

cooperate in line with their respective powers[137]. The Electronic Communications Law and the Competition Law provide for cooperation on issues relating to transfer and lease of rights of use for frequencies, market review, antitrust, mergers and acquisitions, sector studies and enquiries.

In May 2018, ANACOM approved an amendment to the Portability Regulation, in order to streamline the process of numbering regulation. In addition, it was decided that the on line voice message disclosed on mobile-to-mobile calls to ported numbers should no longer be disclosed by default and should be made available to the customer on request.

6. Conclusion

Portugal performs well in the deployment of fast and ultrafast broadband connectivity. An additional effort is still required to ensure that fast and ultrafast broadband reach all households, including rural areas, by 2020 and 2025 respectively. Price levels present a challenge for wider take-up. The authorities are preparing the ground for the deployment of 5G.

[137] Decree-Law 39/2015, of 16 of March - By-laws of ANACOM - and Decree-Law 125/2014, of 18 August - By-laws of Autoridade da Concorrência.

Romania

	Romania				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
1a1 Fixed broadband coverage % households	**89%** 2016	**88%** 2017	**87%** 2018	***26***	**97%** 2018
1a2 Fixed broadband take-up % households	**63%** 2016	**67%** 2017	**66%** 2018	***22***	**77%** 2018
1b1 4G coverage[138] % households (average of operators)	**45%** 2016	**72%** 2017	**77%** 2018	***28***	**94%** 2018
1b2 Mobile broadband take-up Subscriptions per 100 people	**71** 2016	**82** 2017	**85** 2018	***20***	**96** 2018
1b3 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	**NA**	**NA**	**0%** 2018	***13***	**14%** 2018
1c1 Fast broadband (NGA) coverage % households	**72%** 2016	**74%** 2017	**76%** 2018	***21***	**83%** 2018
1c2 Fast broadband take-up % households	**44%** 2016	**53%** 2017	**55%** 2018	***9***	**41%** 2018
1d1 Ultrafast broadband coverage % households	**NA**	**73%** 2017	**75%** 2018	***14***	**60%** 2018
1d2 Ultrafast broadband take-up % households	**32%** 2016	**44%** 2017	**45%** 2018	***3***	**20%** 2017
1e1 Broadband price index Score (0 to 100)	**85** 2016	**87** 2017	**86** 2018	***16***	**87** 2017

1. Progress towards a gigabit society

In 2018, the trend of improvement in recent years in Romania came to a halt. In particular, fixed broadband coverage stagnated at around 87 % and still lags behind most Member States (Romania ranks 26th in this respect). Romania's urban-rural digital divide is illustrated by the figures for fibre to the premises (FTTP) coverage: under 30 % of rural areas are covered (although double the EU average of 14 %), as compared with an aggregate coverage of 63 %.

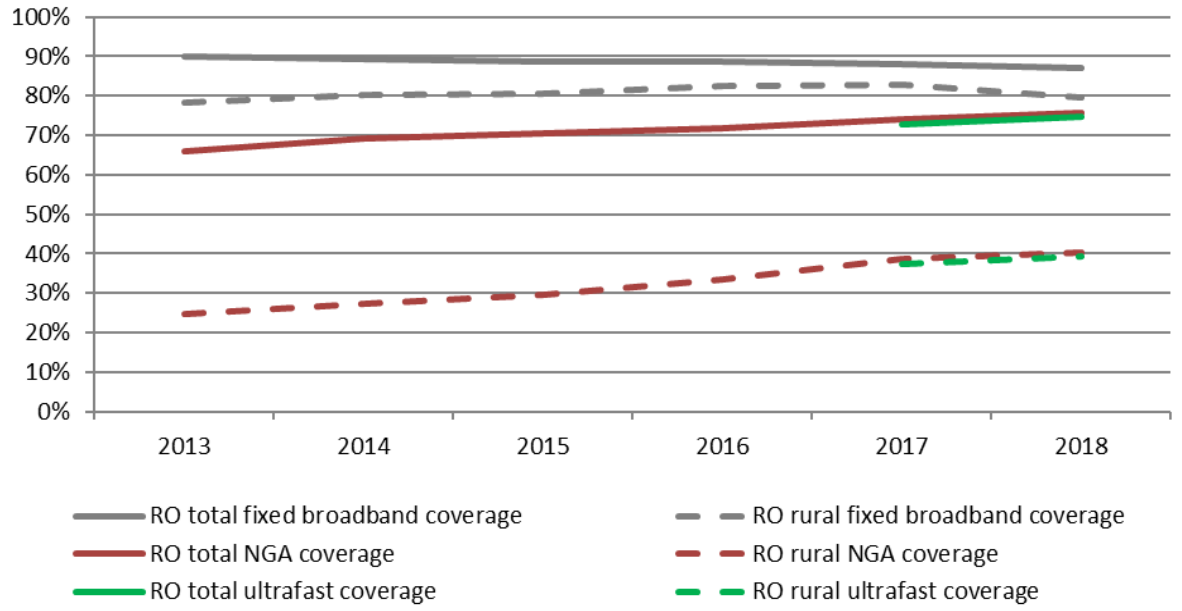
National and EU investment in broadband

In the 2014-2020 financial framework, the Romanian Operational Programme for Competitiveness has earmarked €100 million from the European Regional Development Fund (ERDF) to address the urban-rural divide, while the 2014-2020 rural development operational programme has initially foreseen an indicative amount of €25 million from the European Agricultural Fund for Rural Development (EAFRD) under LEADER[139], of which less than €2 million has actually been spent on broadband infrastructure measures.

The RoNet project to support deployment of backhaul networks in white areas" was granted ERDF financing of €45 million, from a total of €54 million, in order to ensure broadband backhaul infrastructure for up to 721 localities. At the end of September 2018, the national authorities reported the reception of works in 607 localities, while in 484 localities the works have been finalised and accepted.

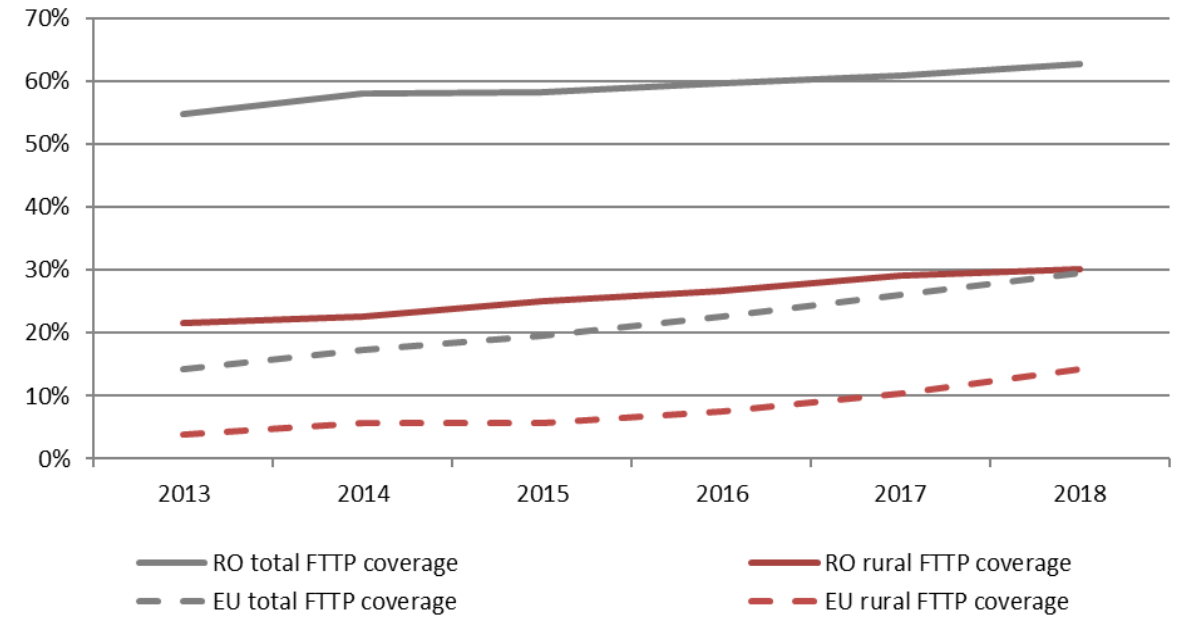
[138] Figures refer to population coverage.
[139] The term 'LEADER' is the French acronym for "Liaison Entre Actions de Développement de l'Économie Rurale", meaning 'Links between the rural economy and development actions'.

Fixed, NGA and ultrafast coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June. Ultrafast coverage metrics are available for 2017 and 2018.

Fibre-to-the-premises (FTTP) coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June.

A new grant scheme for next-generation networks (NGN) deployment, with a total estimated budget of €64 million, was set up to support private operators deploying backhaul and last-mile access infrastructure for additional localities in white areas. The first call for tenders was launched in October

and projects are now under evaluation. A second call, which was submitted to public consultation until the beginning of January 2019, is expected to be launched in 2019.

In 2018, the Ministry of Communications and Information Society (MCSI) launched a project funded by the European Social Fund (ESF) through the administrative capacity operational programme (ACOP) to assess the legislation in force and the impact on private operators' investments in the development of the NGN. A second ESF-financed project designed by the Ministry will aim to adapt the national broadband plan to the objectives of the gigabit society by the end of 2020.

5G: November saw the launch of a public consultation on the national strategy for the implementation of 5G. The strategy had been drawn up following wide inter-institutional consultation, including with local authority stakeholders who will play an important role in the deployment of the new 5G networks. It is due to be adopted by Governmental Decision before the organisation of the spectrum auction in the 700 MHz, remaining 800 MHz, 1500 MHz, 2600 MHz and 3400-3600 MHz bands. However, the Decision seems to have been influenced by the adoption of Emergency Ordinance 114/2018, which set a high reserve price for future licences and increased the minimum fees for the renewal of existing licences.

One of the objectives of the draft strategy is the timely launch, in 2020, of 5G services 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; and
- stimulating the deployment of 5G networks, through simplified regulations for building new physical infrastructure, transposing parts of the European Electronic Communications Code (EECC), promoting novel use cases and fostering cooperation.

The draft strategy confirms the organisation by ANCOM of the selection procedure for awarding the 5G spectrum usage rights in the second half of 2019.

As reported in the previous years the lack of streamlined administrative procedures at local level for construction permit granting is hampering investment in high-speed broadband networks. Improvement in this area is crucial for the future deployment of 5G networks. In this vein, on 7 November 2018, ANCOM adopted a decision on maximum tariffs that electronic communications network operators may be charged for exercising their right of access on, above, in, or under public property. In many cases the tariffs for access to public property will go down to zero, lowering the cost of deployment of communications networks.

2. Market developments

The national regulatory authority found evidence of increasing fixed-to mobile substitution in the retail market for access to fixed telephony services. In terms of average monthly internet traffic per capita, the period between the first half of 2017 and 2018, saw a 24 % increase in fixed internet consumption and a doubling of mobile broadband consumption.

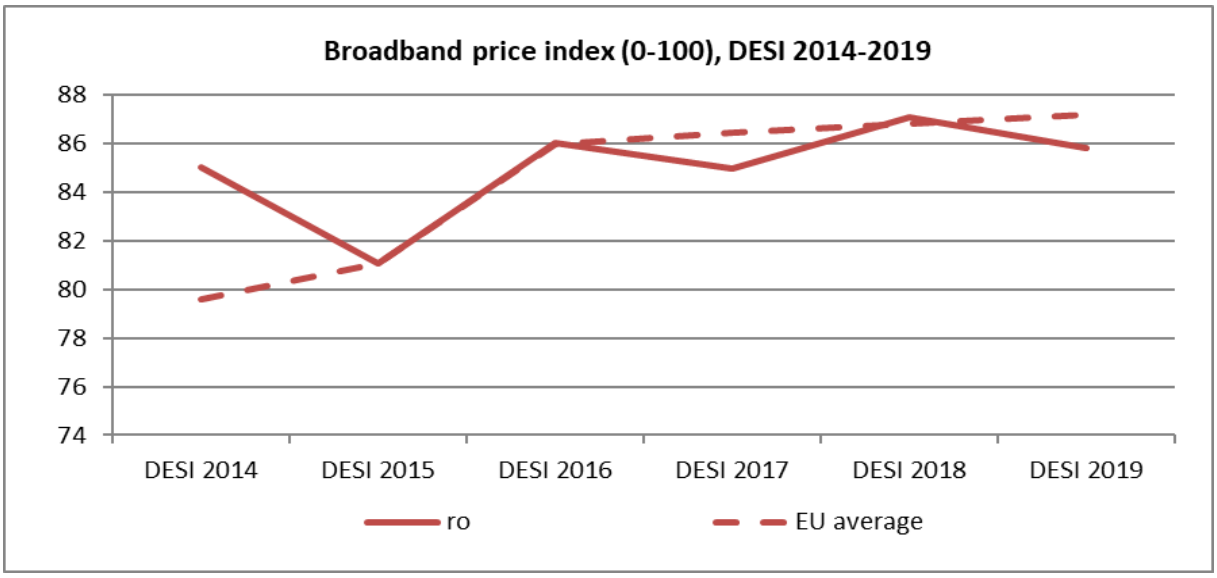
In the first half of 2018, six new entrants offered services using fixed networks, two of which two offered fixed voice transit services only, with no fixed telephony services on the retail market, two others offered retail broadband services for residential users and the last two offered such services for business users.

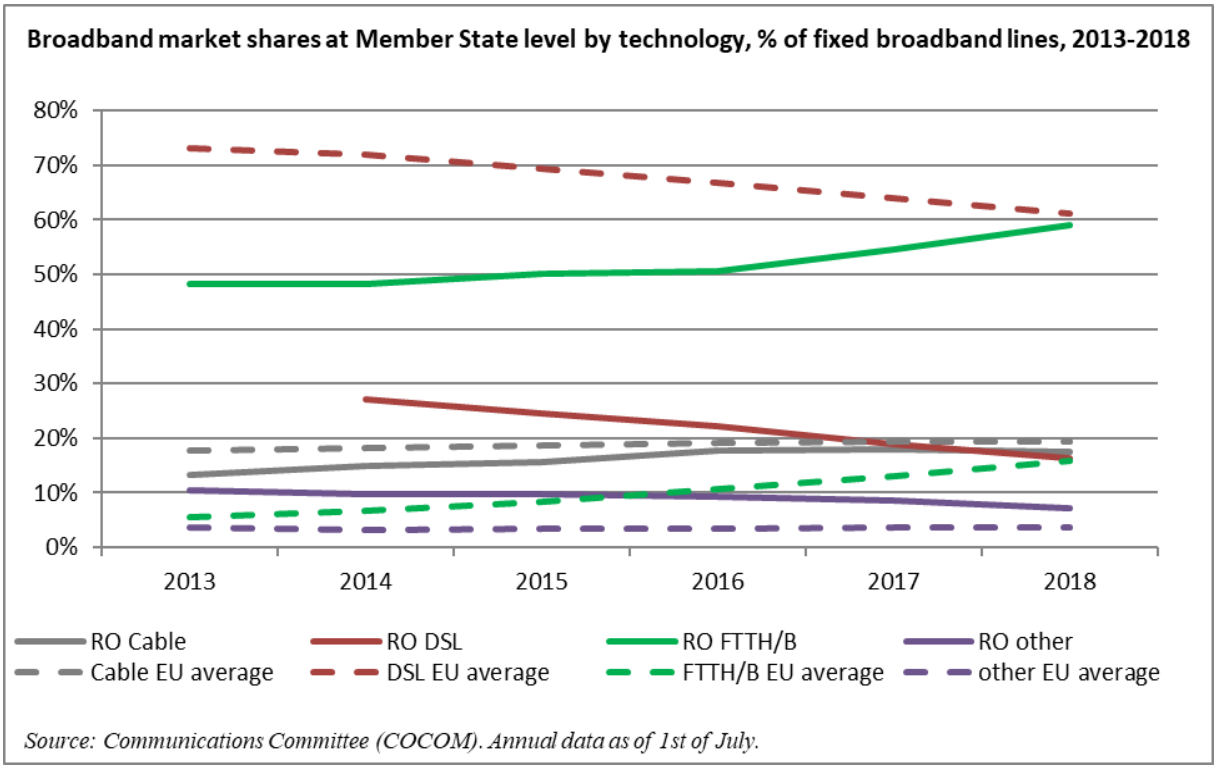
Vodafone notified the Commission of its plans to acquire certain Liberty Global assets (including UPC Romania). On 11 December, the Commission opened an in-depth investigation into the proposed acquisition by Vodafone of Liberty Global's business in Czechia, Germany, Hungary and Romania. If

the acquisition is cleared, it could influence the competition dynamics in Romania for fixed-mobile converged bundled offers. In July 2017 4-play services had a penetration of 9 % (below the EU average 11 %), against 23 % for triple-play (EU average 25 %).

2.1. **Fixed Markets**

The strong infrastructure-based competition in Romania, mainly in urban areas, is reflected in the indicators on which Romania performs very well, e.g. fast broadband take-up. This is due to the high degree of fibre deployment in the market. In the fixed broadband market, an alternative operator has secured the biggest market share by relying on FTTx infrastructure and this market share increased further in 2018.



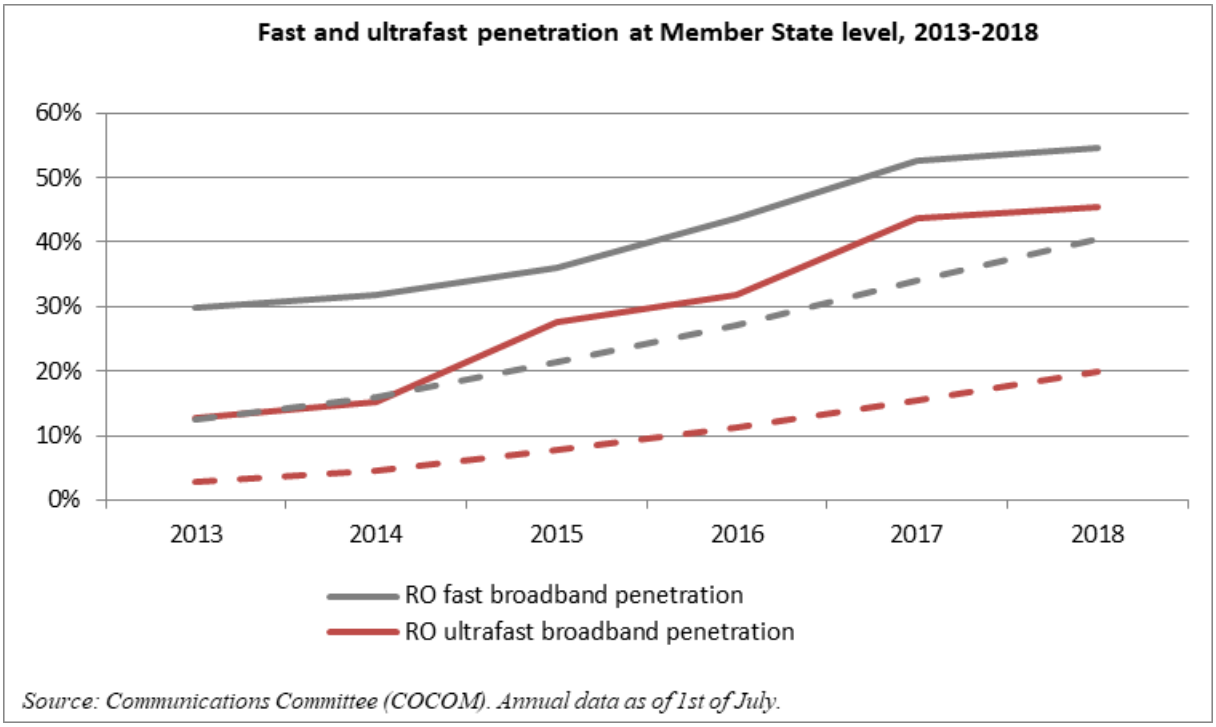


Source: Communications Committee (COCOM). Annual data as of 1st of July.

In terms of fixed broadband prices, Romania scores 86 on the indicator for fixed broadband prices (the EU average is 87) [140].

Despite a +6 % annual increase of the number of connections broadband take-up has stalled at 66 % of households, well below the EU average of 77 %. Meanwhile, the proportion homes subscribing to fast broadband (>=30 Mbps) is significantly higher than the EU average (55 % against 41 %), although in the last year average growth in the EU as a whole (8 percentage points) outperformed growth in Romania (2 percentage points). Similarly, while still clearly outperforming the EU average of 20 % ultra-fast broadband take-up, Romania's take-up 45 % was slower (1 percentage points) after an impressive rise of 12 percentage points the year before. The good performance on this indicator is due to the high degree of fibre deployment in the market. Six wholesale-only infrastructure operators are running metropolitan fibre optic networks in Bucharest and five other municipalities.

As the technologies' market shares suggest, the broadband market is characterised by platform-based competition, while there is marginal uptake of DSL subscriptions by new entrants. As of 31 December 2018, only nine unbundled local loops were reported. With the incumbent's market share of DSL lines close to 100 %, the share of DSL subscriptions' in the fixed broadband market by technology slid to 16 % in 2018.

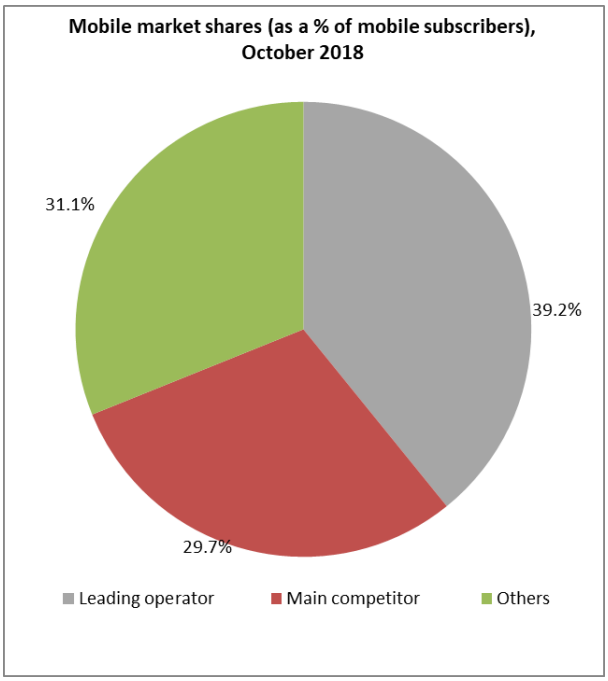


Source: Communications Committee (COCOM). Annual data as of 1st of July.

2.2. Mobile markets

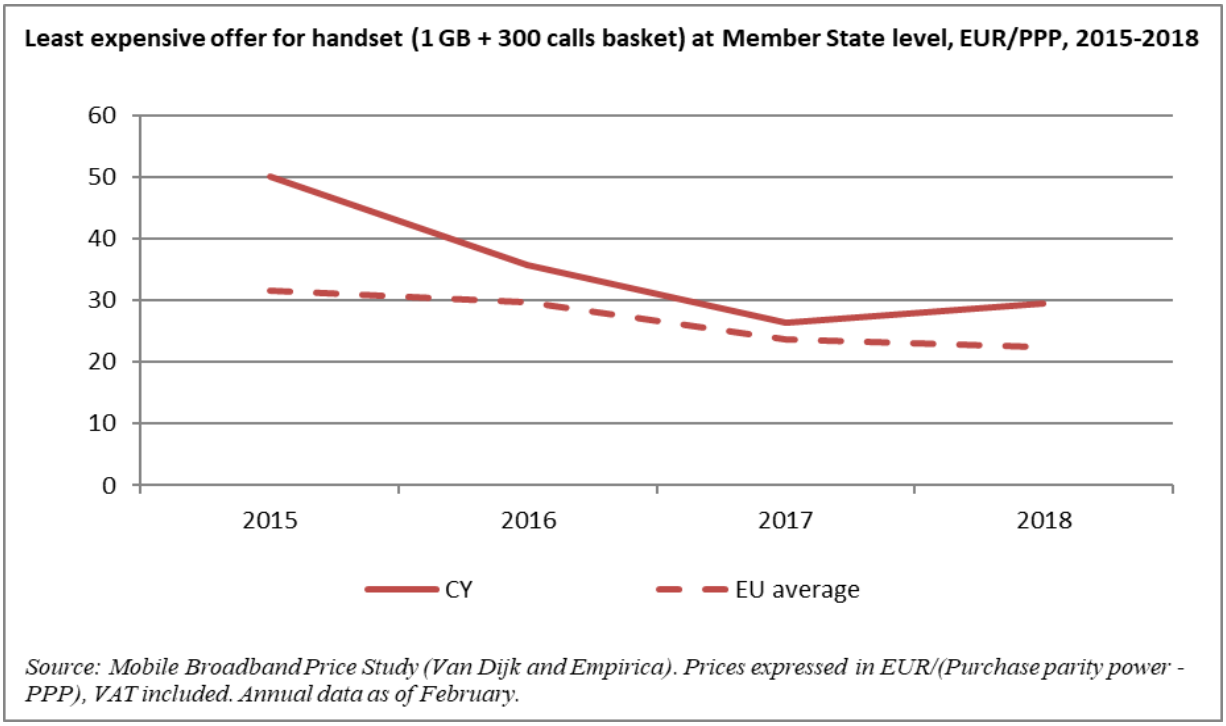
Romania lags behind in mobile 4G broadband coverage (77 % well below the EU's 94 %), despite a year-on-year increase of 5 p.p. Similarly, the mobile broadband take-up indicator places Romania among the worst-performing Member States, despite the significant drop (from €21 to €10) of mobile broadband prices for handset offers (Offers including 1 GB, 300 calls and 225 SMS), well below the EU average (€24).

[140] The fixed broadband price index weighs the cheapest retail offers from: standalone, double play (BB + TV, BB + fixed telephony) and triple play (BB+TV+fixed telephony) and three speeds categories - 12-30 Mbps, 30-100 Mbps and +100 Mbps. This indicator presents values from 0 to 100 (which should not be read as prices) and the higher the values, the better the country performs in terms of affordability of prices relative to purchasing power.



Total traffic volumes on the mobile public networks in the retail market, excluding international roaming, show a doubling of data traffic between June 2017 and June 2018, whereas voice traffic dropped by 5.7 % and SMS traffic by 14.9 %.

The national regulatory authority reduced the mobile termination rates (MTRs) on the basis of a pure 'long-run incremental cost' (LRIC) rates benchmark, resulting in a rate of 0.84 euro cent/min.



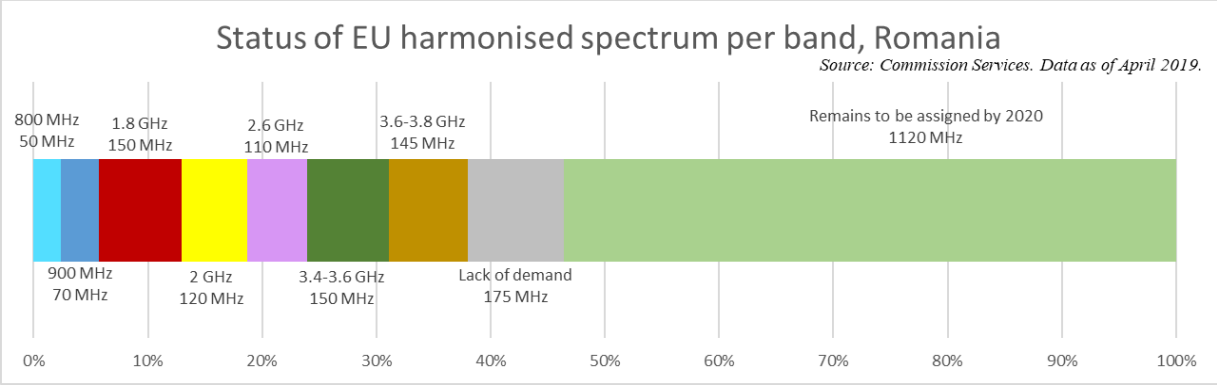
Source: Mobile Broadband Price Study (Van Dijk and Empirica). Prices expressed in EUR/(Purchase parity power - PPP), VAT included. Annual data as of February.

3. Regulatory developments

3.1. Spectrum

In July 2018, ANCOM published a national roadmap for the allocation and future use of the 470-790 MHz frequency band. It will make available:

-2 x 30 MHz (six blocks of 2 x 5 MHz) in the 700 MHz band (the paired frequency bands 703-733 MHz and 758-788 MHz), for the provision of mobile/fixed communications networks (MFCNs) in frequency division duplex (FDD) operation mode; and
-15 MHz, i.e. the 738-753 MHz sub-band, for supplemental downlink MFCNs.



For this purpose, it will run a competitive selection procedure providing for the use of these frequency bands by technology-neutral MFCNs from 30 June 2020.

ANCOM also intends also to allocate 2 x 8 MHz in the 700 MHz band — the paired sub-bands 698-703 MHz and 753-758 MHz (2 x 5 MHz) and the paired sub-bands 733-736 MHz and 788-791 MHz (2 x 3 MHz) — for the deployment of a dedicated broadband public protection and disaster relief (BB-PPDR) communications network, in addition to the 2 x 30 MHz available for MFCNs in the 700 MHz band, which can partly be used to provide BB-PPDR services through the public electronic communications network infrastructure.

Following consultations with the industry, the roadmap also provides for 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. In order to prepare the 5G auction, Romania is to conclude coordination agreements with neighbouring countries by 30 June 2019. While neighbouring countries are using digital terrestrial television (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 (WBB) in those countries. Romania has finished coordinating the new DTT plan (below 694 MHz) with Bulgaria, Hungary and Serbia. Coordination with Moldova and Ukraine (non-EU neighbouring countries) is ongoing.

In Romania, 38 % of the spectrum harmonised at EU level for wireless broadband has been assigned[141]. This low percentage is mainly due to the lack of an assignment procedure for the 700 MHz, 1.5 GHz and 26 GHz bands.

It is expected that the multi-band 5G auction will be launched in the second half of 2019. In 2020, ANCOM plans to organise a procedure for awarding spectrum usage rights for wireless broadband communications in the 26 GHz band (24.25-27.5 GHz) and in other, higher-frequency bands, depending on the outcome of the 2019 World Radiocommunication Conference (WRC-19).

In 2018, ANCOM implemented the relevant EU Decisions under the Radio Equipment Directive[142], in particular in relation to Article 8 ('Notification of radio interface specifications and assignment of radio equipment classes'):

[141] The '5G spectrum readiness' indicator is based on the amount of spectrum already assigned and available for use for 5G by 2020 within the '5G pioneer bands' in each EU Member State. For the 3.4-3.8 GHz band, this means that only licences aligned with the technical conditions annexed to Commission Decision (EU) 2019/235 are considered 5G-ready. However, the percentage of harmonised spectrum takes into account all assignments in all harmonised bands for electronic communication services (including 5G pioneer bands), even if this does not meet the conditions of the 5G readiness indicator.
[142] Directive 2014/53/EU.

-Decision (EU) 2017/1483 of 8 August 2017 amending Decision 2006/771/EC on harmonisation of the radio spectrum for use by short-range devices and repealing Decision 2006/804/EC; and

-Decision (EU) 2017/1438 of 4 August 2017 amending Decision 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community.

The radio interfaces pertaining to the categories of equipment and of radio applications, which are the object of these Decisions, were updated accordingly in 2018.

Commercial operators conducted two 5G field trials in 2018, both consisting of radio transmissions to test 5G radio access technology for fixed access points.

3.2. Regulated access

Between 22 December 2017 and 31 January 2018, ANCOM ran a national consultation on a transitional measure governing the level of MTRs until the new BU-LRIC model is finalised. The proposed tariff of 0.84 euro cent/min (EU weighted average: 0.85 euro cent/min)[143] was determined on the basis of an EU benchmark of pure average LRIC and will be applied from 1 May 2018. ANCOM notified the Commission of the measure on 7 March 2018 (case RO/2018/2065)[144].

ANCOM notified its analysis of the market for wholesale high-quality access provided at a fixed location (Market 4 of the 2014 Recommendation on relevant markets) on 20 June 2018. This market was an outstanding grievance raised in the infringement procedure launched on 5 October 2017 by the European Commission for significant delays, of more than five years. ANCOM proposed[145] to remove all ex ante regulatory remedies, imposed on Telekom Romania Communications SA, one year from the date of publication of its final decision. It adopted the final decision (No 686/2018) on 20 August. Following the notification of this decision the Commission closed the case.

On 13 November, ANCOM notified the details of IP interconnection services and tariffs on the market for wholesale call termination on individual public telephone networks provided at a fixed location and the market for wholesale voice call termination on individual mobile networks. It imposed on all operators with significant market power (SMP) — on both the fixed and the mobile termination markets — a requirement to provide IP interconnection (including transparency and non-discrimination obligations). The requirement will enter into force on 1 May 2019. Accordingly, the obligation to publish the required information on IP interconnection will enter into force on 1 April 2019. The maximum tariffs for collocation became applicable on 1 January 2019 irrespective of the interconnection technology, while the new maximum tariffs for ancillary IP-based interconnection services apply from 1 May 2019.

On 27 February 2019, ANCOM notified the review of the market for transit services in the fixed public telephone network (Market 10/2003). ANCOM proposed to deregulate the market since, according to ANCOM, it tended towards effective competition. The European Commission issued no comments. On 29 March 2019, ANCOM adopted the final decision No. 300/2019 on the withdrawal of obligations imposed on the wholesale market for national switched transit services in the public telephone networks.

[143] BoR (18) 218, BEREC report on *Termination rates at European level* (July 2018).
[144] The Commission examined the notification and had no comments (Decision C(2018) 1981 final of 26 March 2018).
[145] The draft measure has been notified to the Commission (case RO/2018/2093). The Commission examined the notification and had no comments. See Decision C(2018) 4895 final of 19 July 2018.

Law 159/2016 on the physical infrastructure for electronic communications networks and laying down measures to reduce the cost of deploying those networks (Infrastructure Law)[146] requires ANCOM to establish the technical and economic conditions for access to passive infrastructure built with the participation or support (e.g. through a concession agreement) of central or local authorities or funded, in part or in full, with public funds. Accordingly, ANCOM adopted Decision 785/2018, regarding the technical and economic conditions for access to the duct infrastructure built by RCS & RDS in Oradea. Exercising the same authority, ANCOM adopted the Decision 40/2019 on technical and economic conditions for access to the physical infrastructure realized by "NETCITY TELECOM" S.R.L. on the basis of the concession contract no. 4390 / 02.06.2008, concluded with Bucharest. In the latter case the physical infrastructure is built and operated by a wholesale-only infrastructure operator. Requests to approve the access conditions on underground infrastructure developed with public funds by the Municipalities of Sibiu, Târgu Mureș and Sebeș are under evaluation.

The Infrastructure Law also requires ANCOM to set maximum tariffs for access to public property, based on the principle of justification and proportionality to the damage incurred, and taking into account the tangible and intangible benefits. Tariffs will cover only compensation for direct and definite damage caused by work and the existence and functioning of electronic communications networks and associated infrastructure elements. In November 2018, ANCOM adopted a Decision[147] setting most of the tariffs for access to public property at zero (except some tariffs for cables and boxes). Within 60 days of the date of entry into force of the Decision, the public entities concerned were to publish, amend or complete the conditions (including the maximum tariffs) under which the right of access to public property is exercised, as well as the documents that requesters must submit to demonstrate compliance with the conditions. The tariffs for access to public property cannot exceed the limit set in the Decision. This measure could help remove the bottleneck caused by the difficult permitting process for physical infrastructure rollout.

Under the Infrastructure Law, two single information points (SIPs) are to be set up at national level. One, to be managed by ANCOM, is to provide information on location, route, type and current use of the infrastructure and a contact point provided by network operators. The other, to be set up by the Agency for the Digital Agenda Romania (AADR), is to deal with transparency and the coordination of civil works. Although the legal framework is in place, the second SIP has not yet been set up. The first is functioning in line with ANCOM Decision 1113/2017 on establishing the single information point. The Decision entered into force on 1 March 2018 and was amended on 15 May.

In 2018, ANCOM was asked to solve several disputes related to access tariff to the physical infrastructure belonging to certain energy distribution companies. The disputes are still pending.

Another provision welcomed by the industry at the time of the adoption of the Infrastructure Law was the mandate given to ANCOM, MCSI and the Ministry of Regional Development and Public Administration (MDRAP) to establish, through a joint decision:

-technical norms for the design and development of physical infrastructures and electronic communications networks; and

-technical regulations on the design and development of constructions on which they are deployed.

[146] Law 159/2016 transposes Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L 155, 23.5.2014, p. 1).
[147] Decision no. 997/2018, published on 29.11.2018

This measure, intended to streamline the cumbersome authorisation procedures at local level, was to be adopted by July 2017 (Article 29.3 of the Infrastructure Law). However, there is still no foreseeable date for the adoption of the technical norms.

The Infrastructure Law also requires ANCOM to establish recommended tariffs for access to various categories of physical infrastructure (to serve as a reference in the negotiation of contracts to exercise the right of access to infrastructure). There is no indication as to when these will be published.

4. End-user matters

Of the 25 services markets surveyed in Romania for the Eurobarometer consumer markets scoreboard only six score higher than the EU average in terms of the market performance indicators (MPIs)[148]. The best-performing markets are fixed telephone services (+6.7), mobile telephone services (+4.6) and internet provision (+3.8)[149].

By the end of November, ANCOM had received 3,350 complaints from end-users. These mainly concerned non-observance of contractual terms, minimum contract information, contract termination, modification etc.) – 26 %; portability – 19 %; roaming – 12 %; pricing and billing – 11 %; availability/ coverage – 7 %; distance contracts – 7 %; technical problems – 7 %. Most complaints concerned bundled services.

ANCOM runs two web-based tools to support end-users. Netograf.ro tests and monitors the quality of the available internet-access service. The Veritel.ro interactive tariff comparison tool is an online price calculator that uses the user's options to produce comparative analyses of the standard tariff plans available on the market with regard to fixed telephony, mobile telephony, internet access and bundles.

a. Net neutrality

ANCOM imposed[150] requirements on all ISPs in relation to internet access service (IAS) contracts and end-users' information. The decision had, inter alia, as legal basis, the provisions of article 5(1) of the EU Regulation 2015/2120 (the Regulation). ISPs are required to comply with additional transparency obligations, i.e. provide information in the contracts and on their website on the IAS speeds and use the certified monitoring mechanism *Netograf* in order for end-users to monitor whether the IAS performance is in conformity with the IAS performance stipulated in the contract and make remedies available to the end-user and in the contracts in case of a discrepancy between the actual and contractual IAS performance. Decision no. 1112/2017 was taken after a monitoring campaign in 2016 which resulted in 71 warnings.

In August 2018, ANCOM issued a sanctioning decision in which it established that Telekom Romania Mobile infringed Article 3(3) paragraphs 1 and 3 of the Regulation by discriminating video traffic on its mobile network. Telekom Romania Mobile applied a speed limitation to the video traffic on its mobile network when the subscriber activated a certain bonus called "unlimited internet". After activating this offering, video traffic was throttled, while other types of traffic could still be used at the maximum traffic speed of the end-users' contract. The provider brought two actions before the courts and asked both for the suspension and the annulment of ANCOM's decision. The two cases are ongoing before the courts.

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[148] 2018 Consumer Market Scoreboard, published on 12 October 2018; https://ec.europa.eu/info/publications/consumer-markets-scoreboard_en

[149] The market performance index (MPI) is a composite indicator ranging from 0 to 100 which measures how well a given market performs according to consumers See Eurobarometer Consumer Markets Scoreboard 2018, p 12 and p 100, available at https://ec.europa.eu/info/files/consumer-markets-scoreboard-making-markets-work-consumers_en

[150] ANCOM's Decision no. 1112/2017 amending Decision no. 158/2015 on the obligation to inform the end-users

ANCOM introduced additional transparency requirements to those included in the Regulation. From 1 May 2018[151], in the first description of each tariff plan containing an internet access service (IAS), providers of electronic communications services are required to publish on their websites the values of each type of speed established by the Regulation. In case of contracts concluded in the presence of the two parties in the ECS providers' shops, they must also communicate this information to end-users, before the conclusion of an IAS contract. In addition, the providers' website has to display information on the speeds measurement procedure that allows a consumer to identify any significant, continuous or regularly recurring discrepancy between the IAS's actual performance as regards speed or other quality of service parameters and the performance indicated by the provider in the contract. From 1 May 2018, the providers also have to publish on their website the remedies available to the consumer in accordance with national law if such discrepancies are found using the Netograf.ro certified quality measurement mechanism.

b. Roaming

ANCOM granted[152] a new sustainability derogation to RCS & RDS S.A., authorising the operator to levy surcharges from their own customers, in addition to the domestic tariffs, for a 12-month term from 1 July 2018, as follows: €0.0208/min for outgoing calls, €0.0091/min for incoming calls and €2.97/GB. According to the interim roaming report[153], Romanian operators have observed particularly high increases in customers' EU/EEA roaming consumption of voice calls (fourfold increase) and data (10-fold increase). Since the introduction of 'roam like at home' (RLAH), over 45 % %of the users have taken up domestic-only offers, and this was an increasing trend since summer 2017.

c. Emergency communications – 112

Caller location information requirements are set out in ANCOM Decision 1023/2008, as amended. Caller location accuracy is based on the cell ID provided by the mobile network operator or on the installation address if calls are placed via fixed networks. From 18 November 2016, ANCOM extended the scope of operators' obligations to implementing handset-based caller location. However, advanced mobile location (AML) is not yet deployed in the Romanian public safety answering point (PSAP) system. The AML feature and an emergency application platform will be part of the upgrade of the system by the Special Telecommunications Service through the tender launched in September 2018 for an estimated €39 million.

End users with disabilities may access emergency services through SMS to the 113 number while location is ensured for users of this service.

A public warning system, RO-ALERT, has been established nationwide, and is gradually developed under the coordination of the Ministry of Internal Affairs through the General Inspectorate for Emergency Situations and the Department for Emergency Situations. The system provides allows to send cell broadcast messages to the mobile handsets in a designated area.

[151] According to Decision no. 158/2015 on the obligation to inform the end-users.
[152] Decision no. 571/2018 of 29 June 2018
[153] Report from the Commission to the European Parliament and the Council on the implementation of Regulation (EU) 531/2012 of the European Parliament and of the Council of 13 June 2012 on roaming on public mobile communications networks within the Union, as amended by Regulation (EU) 2015/2120 and Regulation (EU) 2017/920 (COM(2018) 822 final);
https://ec.europa.eu/digital-single-market/en/news/report-implementation-regulation-roaming-public-mobile-communications-networks-within-union

d. Universal service

On the basis of studies on users' studies and an Internal Report assessing the needs of Romanian users, ANCOM will launch a public consultation in 2019 on the scope of the universal service (US) obligations. This will focus mainly on removing the access to public payphones, directory enquiry services and directories of subscribers from the scope of US and setting the best-effort speed for defining the functional internet access as a USO broadband connection.

ANCOM recommends a system of special tariffs to ensure equivalence of access to electronic communication services for end-users with disabilities. These tariff packages are to be reassessed in 2019.

e. Numbering

In 2018, on the basis of a European benchmarking exercise, ANCOM amended[154] the wholesale tariffs that the recipient provider pays to the donor provider. Another ANCOM decision[155], in November 2018, made it possible to use geographical numbers outside the geographical area for which they were allocated

5. Institutional issues

The Romanian Parliament amended Emergency Ordinance 33 of 27 April 2017 several times in the course of 2018 as regards the procedure for nominating and dismissing the leadership of ANCOM. In particular, in the version adopted on 18 December 2017 and sent to the President for promulgation, the head and vice-presidents of ANCOM could be dismissed, without any judicial control, if the Parliament rejected ANCOM's annual report. On 15 January 2018 the President contested the Law of approval of Emergency Ordinance 33 before the Constitutional Court. Following the Court's decision, the President retransmitted the law to the Parliament. On 31 May 2018, the law was transmitted again to the President for promulgation. The President contested it again before the Constitutional Court on 7 June. The Court found that some of the provisions of the law are not constitutional. A new version of the law was transmitted to the President on 24 October 2018, in which the rejection of the yearly report did not constitute anymore a ground for dismissal of ANCOM's leadership. The emergency ordinance was then signed into law (Law 245/2018). The Commission services are looking into the outstanding issue of the lack of judicial control over dismissal decisions taken by Parliament in the new legislative framework.

On 29 December 2018, in order to avoid an excessive deficit procedure, the government adopted Emergency Ordinance 114/2018, which introduced a broad range of fiscal consolidation measures affecting various sectors. The Emergency Ordinance sets an extremely high reserve price for future licences (4 % of the 2018 turnover of the telecom sector per year of the licence) and significantly increases the minimum fees for the renewal of existing licences. In addition, it sets out a new method for ANCOM to apply in calculating the annual fee levied by providers to cover the cost cost of performing the regulatory tasks. This involves a radical increase from a maximum 0.4 % of the operator's annual turnover to 3 %, regardless of actual monitoring costs. The Commission services are looking into the matter with concern.

[154] Decision 381/2018, published on 15 May 2018.
[155] Decision 1069/2018, published on 13 December 2018.

6. Conclusion

Although the upward trend of previous years slowed somewhat in 2018, Romania is well positioned as regards the gigabit society targets, in particular ultrafast broadband coverage and take-up. However, it lags behind on both fixed and 4G coverage. Its legislative framework, in particular the Infrastructure Law, allows for the removal of bottlenecks for broadband network deployment, such as the cumbersome authorisation and permit process at local level. Better coordination between national ministries, ANCOM and local authorities is needed to deliver outstanding secondary legislation that would ensure the provision of streamlined assistance to operators interested in investing in broadband.

ANCOM is preparing the 5G auction planned for the second half of 2019. The process seems however to be endangered with the adoption of the Emergency Ordinance n° 114/2018 which sets a very high reserve price that seems to go beyond European benchmark levels for future licences as well as similarly increased minimum fees for the renewal of existing licences. Excessive licence prices could endanger the success of the auction and adversely affect the rollout of 5G networks, as could, more generally, the uncertainty created through the adoption, at short notice and without prior consultation, of highly significant regulatory changes in the sector. In perspective, the excessive pricing of 5G licences could negatively impact the competitive pricing of electronic communication services, which are key for the digitalisation of the entire Romanian economy. In addition, the Emergency Ordinance is substantially raising the yearly monitoring tariff levied on the sector to the level of 3 % of the annual turnover.

Slovenia

	Slovenia				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
1a1 Fixed broadband coverage % households	**98%** 2016	**98%** 2017	**98%** 2018	***12***	**97%** 2018
1a2 Fixed broadband take-up % households	**77%** 2016	**77%** 2017	**85%** 2018	***5***	**77%** 2018
1b1 4G coverage % households (average of operators)	**90%** 2016	**96%** 2017	**98%** 2018	***10***	**94%** 2018
1b2 Mobile broadband take-up Subscriptions per 100 people	**54** 2016	**66** 2017	**74** 2018	***26***	**96** 2018
1b3 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	**NA**	**NA**	**0%** 2018	***13***	**14%** 2018
1c1 Fast broadband (NGA) coverage % households	**82%** 2016	**83%** 2017	**86%** 2018	***18***	**83%** 2018
1c2 Fast broadband take-up % households	**19%** 2016	**24%** 2017	**38%** 2018	***17***	**41%** 2018
1d1 Ultrafast broadband coverage % households	**NA**	**75%** 2017	**80%** 2018	***12***	**60%** 2018
1d2 Ultrafast broadband take-up % households	**9%** 2016	**13%** 2017	**16%** 2018	***17***	**20%** 2017
1e1 Broadband price index Score (0 to 100)	**75** 2016	**73** 2017	**75** 2018	***25***	**87** 2017

1. Progress towards a gigabit society

Slovenia ranks 12th among the EU Member States on standard fixed broadband coverage and is slightly above the EU average on next-generation access (NGA) coverage. It also ranks 12th (in both relative and absolute terms) on ultrafast coverage. While its total ultrafast coverage is almost 20 p.p. above the EU average, in rural areas it reached 49.1 % as compared with an EU average of 29.2 %. The underlying reasons are geographical characteristics and a dispersed population.

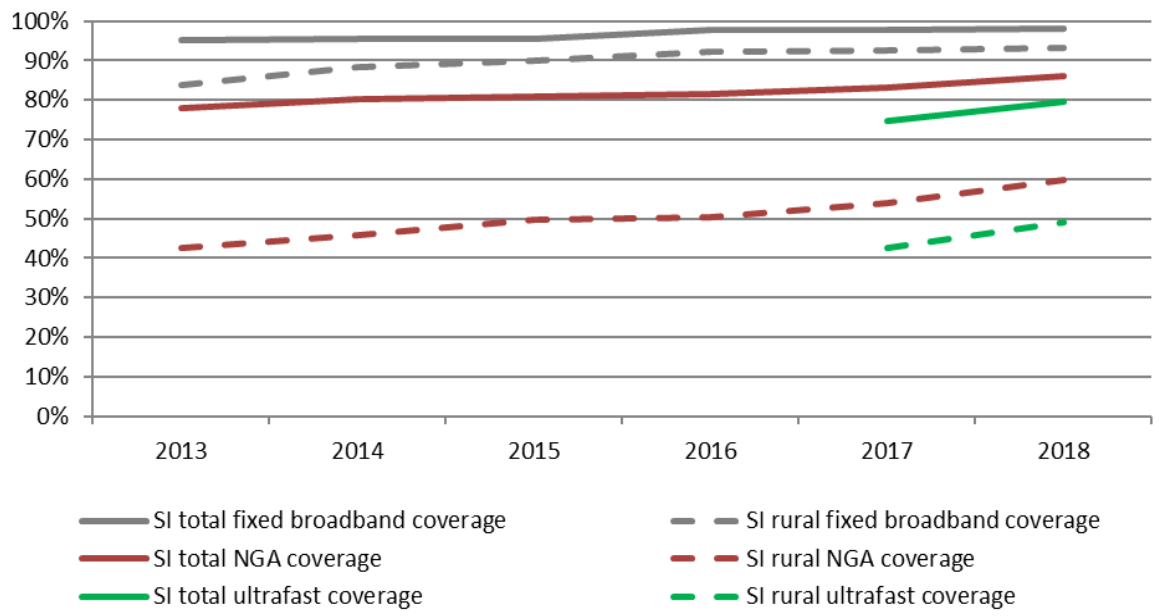
The deployment of fibre to the premises (FTTP) continued in 2018. Slovenia's overall FTTP coverage is 31.5 p.p. above the EU average. Rural coverage is 34.3 %, as compared with an EU average of 14.2 %.

As the objectives of the current 2020 next-generation network (NGN) plan are not aligned with the targets of the gigabit society, in March 2018 the authorities conducted a public consultation on an addendum to the plan that was more geared to the latter. The government adopted the addendum in July. In March 2019, the government adopted the national roadmap for the use of 700 MHZ frequency band, which sets 30 June 2020 as the deadline to assign the band. In April and May 2018, Slovenia awarded trial licences for 5G testing frequencies in the 700 MHz and 3.5 GHz spectrum to BTC, AMZS, Elektro Gorenjska, Internet Institute and Telekom Slovenije. The licences were granted until January 2019 for the 700 MHz frequency band and May 2021 for the 3.4-3.8 GHz band[156].

[156] 5G observatory report 2 (up to December 2018), European 5G Observatory, prepared by IDATE: http://5gobservatory.eu/wp-content/uploads/2019/01/80082-5G-Observatory-Quarterly-report-2-V2.pdf

The 2020 NGN plan is in the process of implementation. On the basis of the list of white spots[157], the Ministry of Public Administration published a call for tenders for the construction of open broadband networks (GOŠO 3) in January 2018, but there were no applications. Given the lack of response, the Ministry identified potential applicants and invited them for individual consultations. The operators explained the issues that had prevented them from applying and proposed alternative conditions and improvements. In July, the Ministry published a second invitation to tender for the co-financing of the construction of the networks (GOŠO 3A). The new tender split the territory into two regions: GOŠO 3A EAST and GOŠO 3A WEST. It closed on 19 October. The Ministry received four applications. All applications were rejected as they did not meet the conditions.

Fixed, NGA and ultrafast coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June. Ultrafast coverage metrics are available for 2017 and 2018.

In September 2018, the Ministry called on operators to submit statements of commercial interest in the construction of broadband networks in areas where commercial interest had not previously been tested for the construction of network connection points with a bandwidth of at least 30 Mbps. The process of gathering commercial interest was originally open until the end of January 2019. However, on 18 December, the Ministry published a new list of households for the construction of network connection points with a bandwidth of at least 100 Mbps, withdrew the previous list and extended the deadline to 11 February 2019. The data on commercial interest will form the basis of the list of remaining white spots and be used to prepare the next call for the co-financing of the construction of networks in those areas.

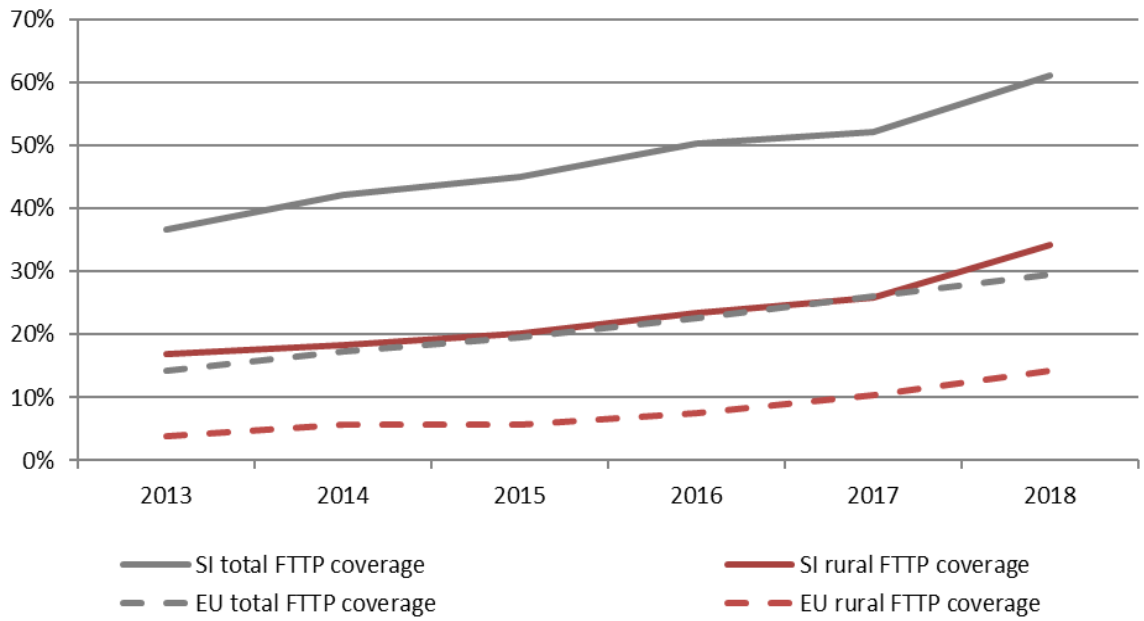
All major operators are actively investing in ultra-high speed networks. The number of broadband access connections continued to rise in 2018. Broadband access penetration is 32.3 % by population

[157] In order to identify the white spots, the Ministry carried out two rounds of enquiry as to commercial interest in May and October 2016.

and 81.1 % by households. Fibre to the home (FTTH) technology was on the rise and accounted for almost 210,000 connections.

The incumbent plans to migrate users from the copper to the fibre access network. The process is regulated so as to secure the rights of alternative operators. For instance, the migration will not apply for lines and colocation that an alternative operator uses unless alternative operator in present on that specific colocation for more than 5 years. Affected operators must be informed 6 months in advance about the lines and 2 years in advance about colocation which will be abandoned.

Fibre-to-the-premises (FTTP) coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June.

Current regulation sets a limit for electromagnetic field (EMF) exposure that is 10 times stricter than the International Commission on Non-ionizing Radiation Protection (ICINRP) standard. Some operators have noted that this could hinder the deployment of 5G. In addition, most operators consider that other relevant legislation (e.g. environment, construction law) restricts NGN rollout. For instance, the Triglav national park should be covered, but construction is not allowed.

Preparations for the implementation of the European Electronic Communications Code (EECC) are under way. The Ministry is preparing a comparative analysis between the EECC and the Electronic Communications Act (ZEKom-1). Slovenia will implement the EECC by means of a new Electronic Communications Act. Some provisions in the current Act have been notified as national provisions and are now part of the EECC; these cover *inter alia* subsidised terminal equipment after termination of contract[158]; options for the monitoring and control of consumption of data services[159]; a public warning system[160]; and geographical surveys of network deployments[161].

[158] Article 105(6) EECC / Article 129(4) ZEKom-1.
[159] Article 102(6) EECC / Article 132.a ZEKom-1.
[160] Article 110 EECC / Article 134(6) ZEKom-1.
[161] Article 22 EECC / Article 11.a ZEKom-1.

2. Market developments

The acquisition of Teleing by Telemach in April 2018 was the latest step towards the consolidation of the Slovenian market[162]. Telekom Slovenije remains the incumbent.

It was reported that some operators started to supply electricity Some operators are considering the possibilities of offering insurance services.

In July 2017, Slovenia Broadband S.á r.l., Luksemburg (an investment vehicle of the United Group, which already owns Telemach) announced plans to acquire Pro Plus d.o.o. in Slovenia and Nova TV d.d. in Croatia[163]. As the owner of Slovenia's most popular commercial TV stations (POP TV and Kanal A), Pro Plus is a dominant broadcaster, with 70-80 % market share in commercial TV (previously free to air). The estimated cash purchase price was €230 million. Competition concerns arose regarding the potential benefit the acquisition of Pro Plus would bring to Telemach. Telemach became a strong alternative operator, with 21 % share in mobile broadband access and around 180,000 subscribers to TV channel packages. The Slovenian Competition Protection Agency (CPA) started an investigation in March 2018. The national Agency for Communication Networks and Services (AKOS) provided its opinion and market data. On 30 October, the CPA issued a statement of objections[164], 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). On 18 January 2019, Central European Media Enterprises Ltd., which has full ownership of Pro Plus, announced that it had pulled out of the agreement to sell it.

Bundled services are on a constant upward trend. One of the key factors in their growth is the provision of TV/content services in the bundles, which results in pure broadband access accounting for less than 10 %.

The market share of '4-play' bundles is growing by around 1 p.p. every quarter and currently stands at 36.2 %. This is due to competitive pricing: '4-play' bundles are more cost effective than '3-play' and '2-play'. However, '3-play' bundles still have the biggest market share (43 %).

In 2017, Pro Plus and Planet TV (the main TV programme providers) started to charge operators for the right to distribute their content on the network. Realistically, in order to compete in this market, bundles have to include their channels. Cable TV providers started to include them in their basic channel scheme from the beginning of 2018. This increased the cost of basic cable TV bundles for the end consumers. Some stakeholders claimed that acquiring Pro Plus would enable Telemach (as the cable TV provider) to offer Pro Plus programmes at a better price in bundles.

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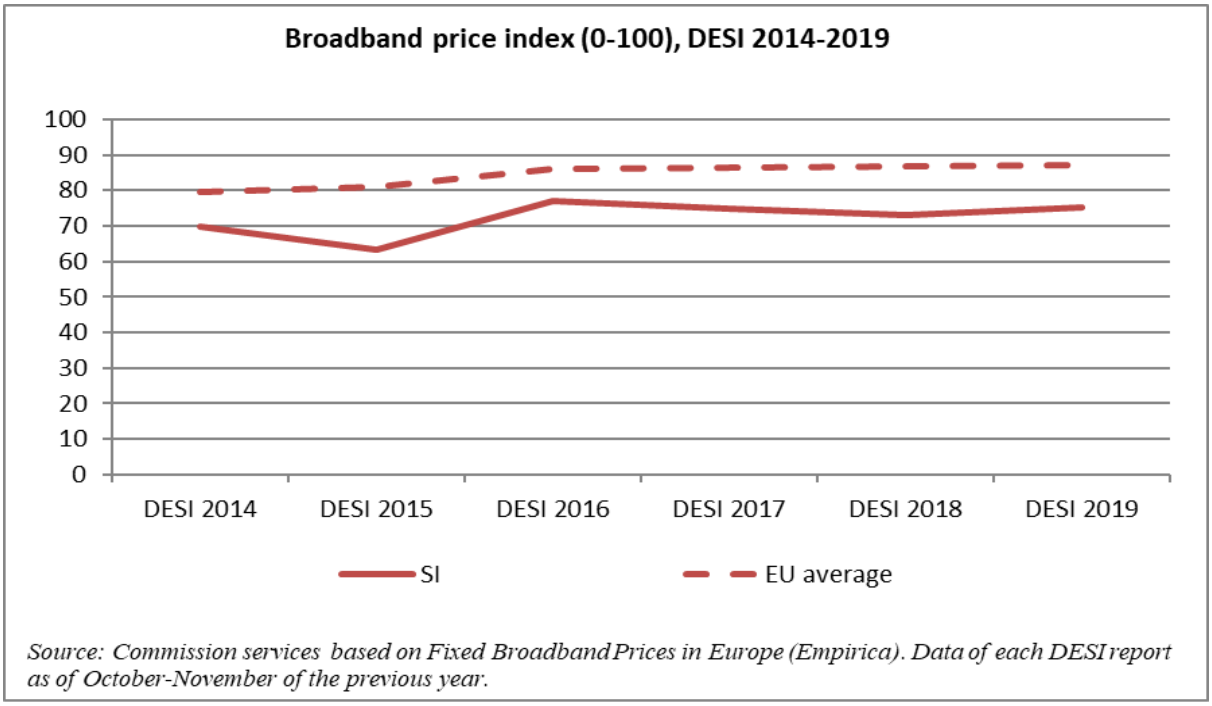
[162] Telemach acquired MNO Tušmobil and on 14 September 2015 changed its name to Telemach Mobil. Telemach took over Telemach Mobil on 3 February 2016. Si.mobil d.d. took over Amis on 1 April 2016 and TA mreža on 12 April 2016. Si.mobil changed its name to A1 Slovenija in April 2017. BBTEL acquired IKT on 23 October 2017. In December 2017, several small operators with small or non-significant impact (IT TEL, RM Sistemi and JATEL) ceased to operate. Telekom Slovenije acquired Izi mobil on 31 December 2017.

[163] Croatia's competition agency cleared the merger between Slovenia Broadband and Nova TV after the electronic media agency assessed it as 'admissible' in the light of the special provisions of the Electronic Media Act on 26 March 2018.

[164] The notifying party has the opportunity to reply within 45 days and indicate the facts and evidence in its favour, and may also propose appropriate and corresponding commitments. The CPA may only accept commitments that are comprehensive, effective and sufficient to eliminate a significant impediment to effective competition. Upon receipt and examination of the notifying party's reply, the CPA is to issue an appropriate decision in accordance with the Competition Act. In Slovenian competition law, the sending of a statement of objections does not prejudice the outcome of the proceedings in question. The statement of objections is available at: http://www.varstvo-konkurence.si/en/information-centre/news/competition-protection-agency-has-sent-statement-of-objections-in-case-of-merger-between-s-179/

The trend of stable but above-EU-average fixed broadband prices continued throughout 2018[165].



Source: Commission services based on Fixed Broadband Prices in Europe (Empirica). Data of each DESI report as of October-November of the previous year.

2.1. Fixed Markets

Despite gradual losses, Telekom Slovenije still holds the highest market share of fixed broadband connections (almost 34 %). Most households in Slovenia are covered by copper network infrastructure, but the number covered by FTTH is increasing rapidly (growth of almost 10 p.p. since 2017). Coverage of households in rural areas increased slightly for all other technologies in 2018.

The Electronic Communication Act sets out a strategy to incentivise co-investment that involves requirements to notify: (i) all planned construction works, including investments in electronic communications networks (this applies to the undertaking with significant market power (SMP) and to alternative operators); and (ii) investments in utility infrastructure (this applies to all network operators).

In 2018, AKOS established a new web portal on which the notifications are published[166]. Some operators claim that the efforts to encourage co-investment approach are not working.

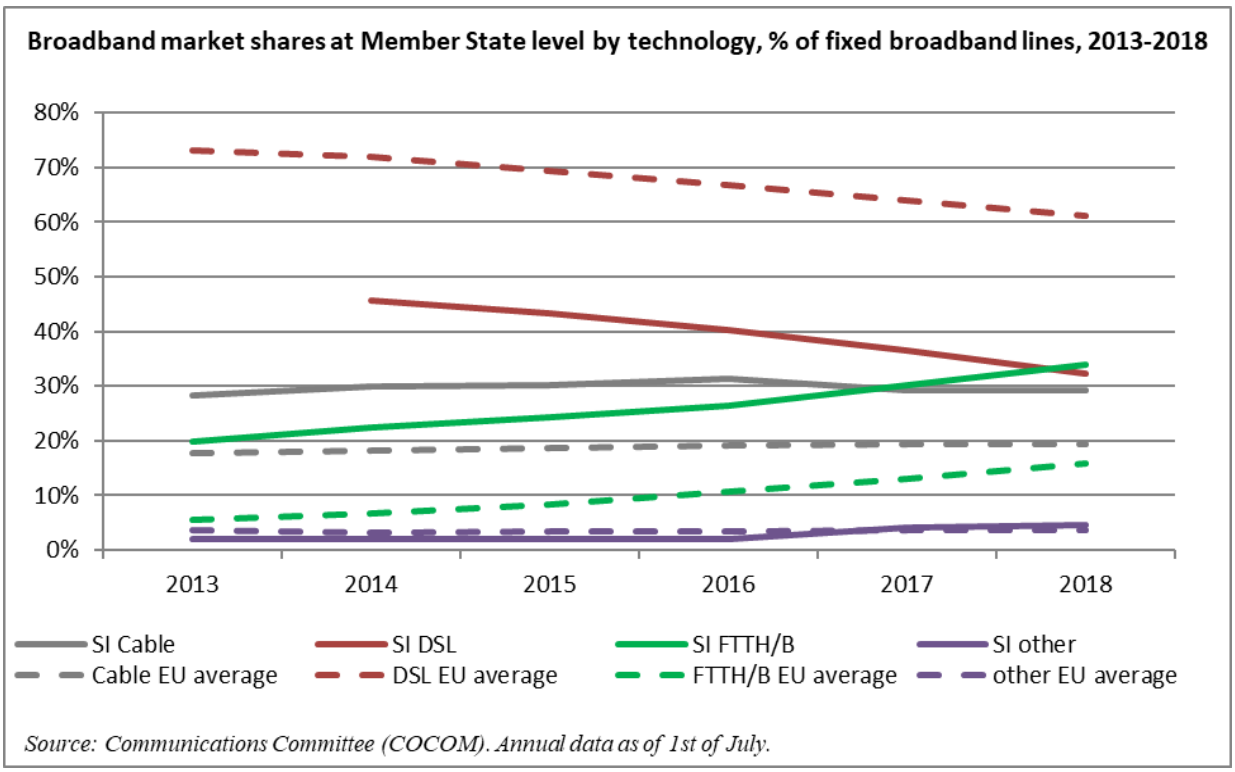
No self-funded broadband networks have been deployed.

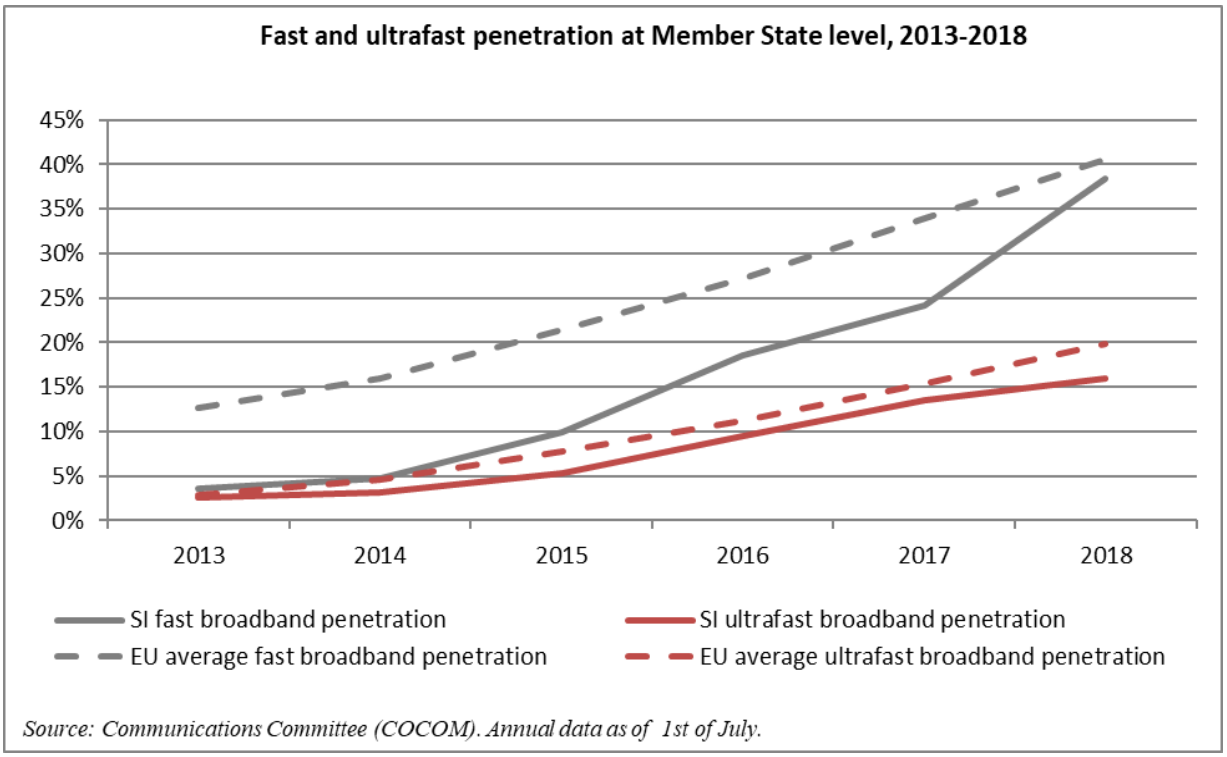
For the first time, fibre to the home/building (FTTH/B) technology was the dominant technology for the delivery of broadband access services in Slovenia, with its 34 % market share surpassing that of DLS technology by almost 2 p.p. The market share of DSL declined from 36.4 % to 32.2 % and that of cable remained unchanged in comparison to 2017, at 29.2 %.

Fast penetration continued its sharp increase, from 24.2 % in July 2017 to 38.4 % in July 2018, almost reaching the EU average. Although ultrafast penetration is starting to pick up and in 2018 surpassed 15 %, it is lagging behind the EU average of 19.9 %.

[165] The fixed broadband price index weighs the cheapest retail offers from: standalone, double play (BB + TV, BB + fixed telephony) and triple play (BB+TV+fixed telephony) and three speeds categories - 12-30 Mbps, 30-100 Mbps and +100 Mbps. This indicator presents values from 0 to 100 (which should not be read as prices) and the higher the values, the better the country performs in terms of affordability of prices relative to purchasing power.

[166] http://investicije.akos-rs.si/.

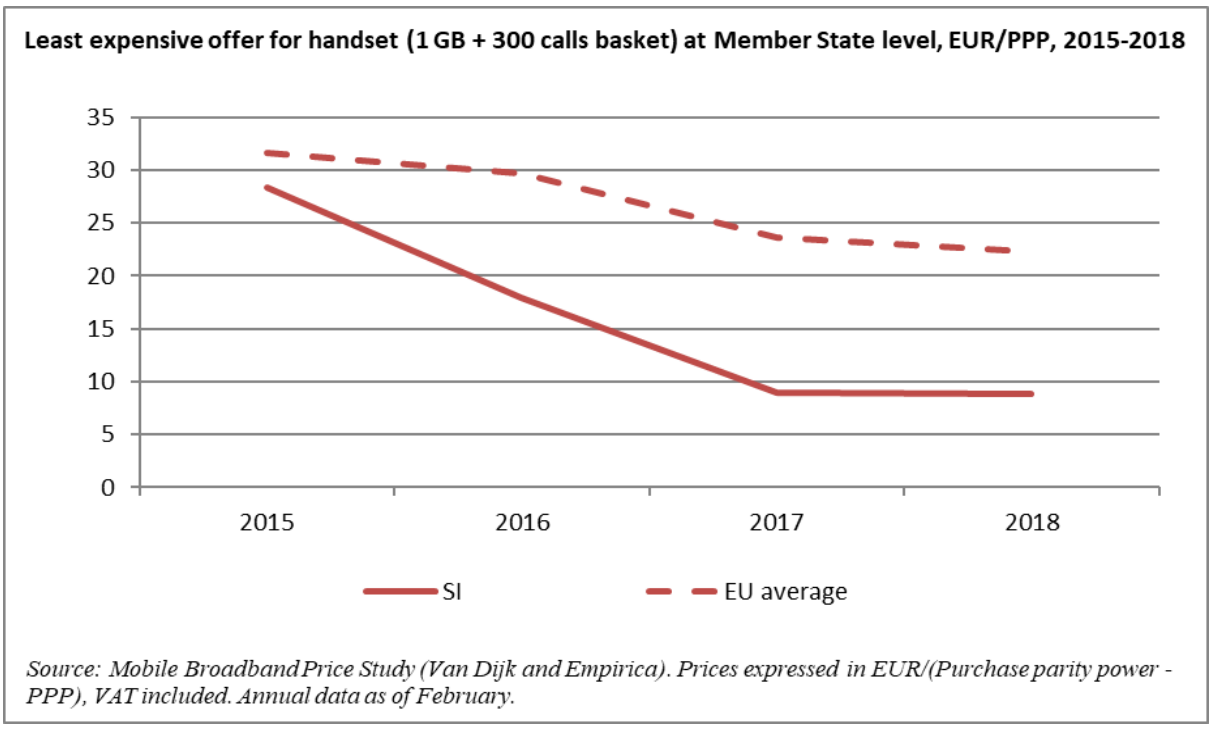




2.2. Mobile markets

Telekom Slovenije still has the biggest share of the mobile telephony market[167]. On 31 December 2017, it acquired Izi mobil, a mobile virtual network operator (MVNO) on its network. There are now five MNVOs on the Slovenian market.

[167] Market share data are confidential and hence not reported.



Source: Mobile Broadband Price Study (Van Dijk and Empirica). Prices expressed in EUR/(Purchase parity power - PPP), VAT included. Annual data as of February.

Slovenia continued to improve its 4G performance. 4G coverage reached 98 %, above the EU average of 94 %. Despite a 12 p.p. increase, mobile broadband take-up is only 74 subscriptions per 100 people, well below the EU average of 96.

There is no obligation to phase out any specific technology: operators are free to choose when to phase out any outdated technology. Telekom Slovenije has started to phase out its 3G network, but does not plan to phase out its 2G network in the near future.

The price for the least expensive handset offer (1 GB + 300 calls) did not change in 2018 and remains much lower than the EU average.

Slovenia's current electronic communications legislation does not cover 'over-the-top' (OTT) players (Skype, WhatsApp, Viber, etc.), who are not obliged to report to AKOS. OTT services are having an impact on the national market, as can be observed in higher broadband data traffic consumption. However, AKOS did not register any drop in the usage of operator services due to the availability of OTT services.

3. Regulatory developments

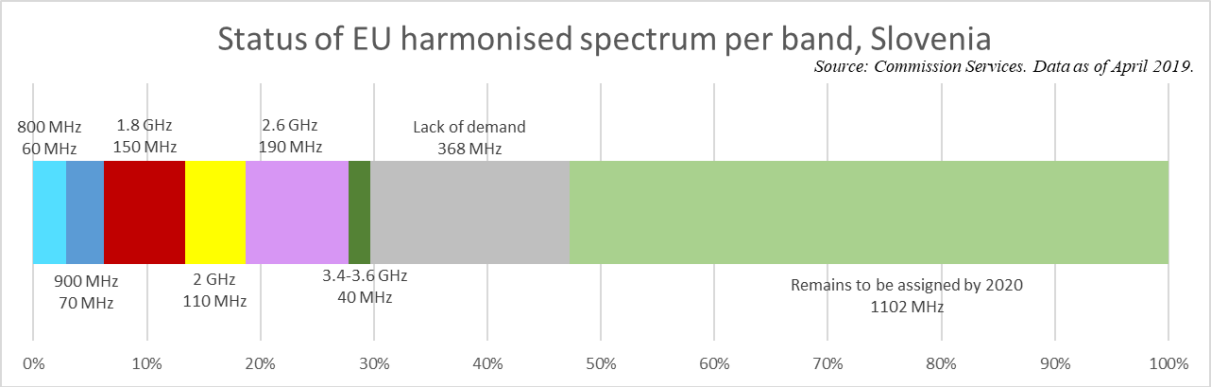
3.1. Spectrum

Slovenia has assigned 620 MHz, i.e. only 30 % of the spectrum harmonised at EU level for wireless broadband[168]. This low percentage is mainly due to the lack of assignment procedures for the 700 MHz, 3.6-3.8 GHz and the 26 GHz bands.

Slovenia has still not adopted its strategy for the management of the radiofrequency spectrum. The draft strategy has undergone two rounds of public consultation, the most recent of which was in

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

September 2018. It included intention to put obligations in relation to public protection and disaster relief (PPDR) and a public warning system for awarded spectrum in 700 MHz band. Operators have mostly reacted negatively to these obligations and prefer to have a separate strategy on the latter. In February 2019, the government established a working group for the preparation of a separate PPDR strategy.



The draft strategy also included a national plan for the start and completion of the assignment process for the 700 MHz band for wireless broadband electronic communications services in compliance with the deadline set by Decision (EU) 2017/899[169]. However, the Commission sent a political letter to Slovenia, due to its failure to adopt a roadmap.

n March 2019, the government adopted the Plan for the use of the 470-700 MHz frequency band which includes the national roadmap for the assignment of the 700 MHz frequency band. The draft strategy will be adjusted. Slovenia plans to award available spectrum (700 MHz, 1400 MHz-A, B, C (1427 – 1517 MHz), 2100 MHz, 2300 MHz, 3500 – 3800 MHz and 26 GHz) together with frequencies in band 2100 MHz (for which licences expire in 2021) in a multiband auction to be carried out by 30 June 2020. Parts of the bands 2300 MHz and 3600 MHz would be auctioned separately for local usage. AKOS anticipates possible delays in the assignment of the 700 MHz band due to its use for digital terrestrial television (DTT) in neighbouring countries.

Overall, operators consider that the delay and the lack of transparency are having a negative impact on their business planning. All operators call for greater transparency and regulatory predictability from AKOS and the MPA.

AKOS awarded several temporary licences for 5G testing frequencies in 2018 and also in the beginning of 2019.

AKOS completed negotiations with the Ministry of Defence on changes to the national allocation of the 26.5-27.5 GHz band and reallocated governmental usage in the lower part of 26 GHz band.

3.2. Regulated access

Decisions on the market for wholesale local access provided at a fixed location (Market 3a in the 2014 Recommendation on relevant markets[170]) and the market for wholesale central access provided at a fixed location for mass-market products (Market 3b/2014) had been published on 5 December 2017

[169] Decision (EU) 2017/899 of the European Parliament and of the Council of 17 May 2017 on the use of the 470-790 MHz frequency band in the Union (*OJ L 138, 25.5.2017, p. 131).*

[170] 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).

and both entered into force on 5 January 2018. On 4 February, Telekom Slovenije issued its reference offer for wholesale central access. On 22 February, T-2 asked AKOS to initiate a supervisory procedure regarding the offer, due to alleged steep price increases for bitstream access. T-2 refused to pay the disputed parts of the invoices from April and lodged objections. Telekom Slovenije rejected its objections and it brought the dispute before AKOS on 26 June. The case is still pending.

AKOS reported that 10 operators are active only on wholesale markets 3a/2014 and 3b/2014. They have limited geographic coverage and are not active on the retail level.

In January 2018, AKOS notified the Commission of its analysis of the market for wholesale high-quality access provided at a fixed location (Market 4/2014). On 9 February, the Commission opened an in-depth investigation into AKOS' proposal to make adjustments to the standard weighted average cost of capital (WACC) formula that would raise the prices of wholesale high-quality broadband access services. AKOS then separately notified an amended WACC calculation in August. It amended its analysis and notified it on 6 February 2019[171].

A public consultation on wholesale call termination on individual public telephone networks provided at a fixed location market (Market 1/2014) was opened from 21 February 2019 to 25 March 2019. A public consultation on wholesale voice call termination on individual mobile networks market (Market 2/2014) was planned for December 2018 but has yet to be published.

The analysis of the market for access to the public telephone network at a fixed location for residential and non-residential customers (retail market) (Market 1 in the 2007 Commission Recommendation[172]) was published on 30 May. Following public consultation and the administrative procedures, a Decision on the deregulation of Market 1/2007 was published on 26 November and entered into force on 11 December.

In August, AKOS launched a public consultation on its strategy for the regulation of the electronic communications market for the promotion of regulatory predictability. After assessing comments and suggestions, it published the final version of the strategy on 20 December[173].

On 5 June, AKOS adopted a General Act on minimal requirements for planning and implementation of access and distribution points, which entered into force on 9 July. The Act provides for:

- minimum requirements for single access points, enabling access-seekers to attach their own cable or equipment without additional civil works and enabling access to the end-users connection point. The requirements apply only where 100 or more network connection points are covered from an access point;
- minimal requirements for distribution points, enabling the reconnection of end-users without additional civil works;
- the possibility to access power lines supply for equipment;
- minimal requirements for in-house wiring providing at least 100 Mbps symmetrical upload and download speeds; and

[171] https://www.akos-rs.si/popravki-analize-upostevnega-trga-4- %C2 %BBveleprodajni-visokokakovostni-dostop-na-fiksni-lokaciji %C2 %AB-.

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

[173] https://www.akos-rs.si/files/Javna_posvetovanja/2018/20_12/Strategija-regulacije-EK.pdf.

– regulation of the cost of access to the access point (taking into account only the costs of an efficient operator). This is technology-neutral, limited to passive infrastructure (cables are excluded) and valid for newly constructed or upgraded networks only.

The function of the single information point (SIP) under Directive 2014/61/EU[174] is assigned and divided between three competent authorities: (1) the State Geodetic Administration (for Article 4 on transparency concerning physical infrastructure); (2) AKOS (for Article 6(1) on transparency concerning planned civil works); and (3) the Ministry of Public Administration (for Article 7 regarding the permit procedure).

Examples of joint deployment in 2018 include deployment of fibre optics together with the water supply system and construction of the sewage system together with an optical network.

Disputes were initiated as regards access to in-house physical infrastructure (Telemach d.o.o. versus Malteški dvori d.o.o.) and access to existing physical infrastructure (A1 Slovenija d.o.o. versus T-2 d.o.o.). In both cases, a decision has yet to be taken.

Some operators complain of a lack of transparency and incomplete data in the cadastre for existing network infrastructure. Some have called for tougher supervision by AKOS and the Ministry of Public Administration.

n April 2016, AKOS addressed additional decisions to all SMP operators in the relevant call termination markets (markets 3 and 7), changing the price obligations imposed on them.

4. End-user matters

In 2018, AKOS received 704 complaints which represents a slight decrease from the previous year. The two main causes of complaint are unjustified charges and payment of the invoice.

The total number of disputes resolved in 2018 was 709. The majority (436) were settled by mediation. AKOS issued a binding decision in 123 cases, rejected 143 complaints due to lack of competence or the fact that the complaint was incomplete and the applicant had not remedied the deficiencies. In seven cases, AKOS referred the complaint to a competent authority.

A consumer association reported an increase in the number of changes to contractual conditions. According to the 2018 Consumer Markets Scoreboard, the Slovenian's market for internet provision improved in its market performance indicator score between 2015-2017 and stands at 1.2 points above the markets' respective EU average score. Of the 23 services markets surveyed in both 2015 and 2017, only the 'TV-subscriptions' and 'Mobile telephone services' markets have failed to record an increase since 2015, and have remained stable instead[175].

a. Net neutrality

AKOS launched a public consultation on its draft General Act on internet access services. It plans to establish a minimum speed of at least 50 % of the maximum speed on fix access lines and at least 25 % of the maximum speed for fixed wireless broadband access. Normally available maximum and minimum speeds on fixed wireless broadband access solutions promoted as substitutes for fixed access should be defined in the contract. The contract should contain a defined maximum, normally available and minimum download and upload speed calculated on IP packet payload or higher. Additionally

[174] Directive 2014/61/EU of the European Parliament of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L 155, 23.5.2014, p. 1).
[175] Consumer Markets Scoreboard 2018 Edition, p. 126.

providers of internet access services should ensure that every contract includes a clear and comprehensible explanation about any limitations and remedies available to the consumer in the event of any continuous or regularly reoccurring discrepancy between the actual speed and speed defined by contract. The provider should also offer to the potential customer a testing period in case of a fixed wireless broadband access solution. Furthermore, the draft foresees a methodology which the user would use to check minimal and normal available speed.

AKOS carried out a formal assessment as to whether A1's 'Play offer' tariff option was a violation of Article 3(3) of the Net Neutrality Regulation[176]. The offer consisted of zero-rating options for different categories of traffic (chat, social, music, video and mix) for an additional fee (in Slovenia and in compliance with the fair use policy when roaming): €1.99 for A1 Play Chat, €4.99 for A1 Play Social, €4.99 for A1 Play Music, €7.99 for A1 Play Video and €9.99 for A1 Play Mix (Chat+Social+Music+Video). A1 also offered 12 months' free trial for new subscribers and those who concluded or renewed their subscription for 24 months with one of the valid mobile packages by 31 December. At AKOS' request, A1 adjusted the offer in such a way that the option complies to fair use policy without mark-ups for all users in all mobile packages (data used in EU/EEA is not deducted from the domestic volume of the mobile services package) and posted a notice on it on its website with a commitment to take into account all complaints in this regard. Consequently AKOS stopped the supervisory procedure.

b. Roaming

AKOS dealt with several disputes regarding non-compliance with the roaming rules; these concerned the lack of a welcome SMS, failure to activate the cut-off limit for data; and failure to inform end-users of charges applicable outside the EEA.

End-users were also confused between roaming and intra-EU communications and were not aware that a call or SMS from Slovenia to elsewhere in the EU or EEA is charged at international rates.

Some operators and AKOS reported fraudulent use of 'roam like at home' (RLAH), such as unregulated EU numbers with the higher price. Telekom Slovenije suggested that action should be taken at EU level. Proposals include establishing: (i) numbering ranges in the EU (regulated numbering ranges, premium numbers, free-of-charge numbers); (ii) the process of information exchange on those ranges; and (iii) the process and conditions for the non-payment of the traffic between operators in the event of fraud.

AKOS commissioned a survey among end-users regarding mobile roaming services after 15 June 2017 to obtain information on end-user awareness of the new roaming rules. Some of the key findings were presented in March 2018[177]. For instance, 73 % of the respondents answered that they were aware of the data transmission volumes from which they can benefit free of charge when roaming in the EU/EEA, regardless of their package. 80 % were satisfied with the allocated volumes. 55 % answered that they use mobile data while roaming abroad and 81 % said that, when crossing the border, they were made aware of EU/EEA roaming charges in a comprehensible way.

[176] Regulation (EU) 2015/2120 of the European Parliament and of the Council of 25 November 2015 laying down measures concerning open internet access and amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services and Regulation (EU) No 531/2012 on roaming on public mobile communications networks within the Union, *OJ L 310, 26.11.2015, p. 1–18.*

[177] https://www.akos-rs.si/raziskava-med-koncnimi-uporabniki-v-zvezi-s-storitvami-mobilnega-gostovanja-po-15-juniju-2017

AKOS reported that no significant price increases of domestic mobile prices had been recorded in 2018.

c. Emergency communications - 112

New rules on the quality of service for the single European emergency number 112 and police number 113 were adopted on 1 March 2018 and entered into force on 31 March[178]. In fixed networks, caller location data (i.e. street and house number) should be sent to the public safety answering point (PSAP) immediately over dedicated data connection. . In the case of a multi-dwelling building, the caller location data also includes the number of the apartment and the floor number (data is based on the national real-estate register). In mobile networks, it consists of the caller's mobile station international subscriber directory number (MSISDN) and international mobile subscriber identity (IMSI) number, a time stamp and a map of the coverage of the base station from which call is made.

Operators must enable end-users with disabilities to make emergency calls using speech, sign languages and other forms of non-verbal language in order to ensure equivalent access. This solution is based on SMS or WAP112.

According to the Communications Committee 112 implementation report for 2018[179], 112 calls are answered within 2.8 seconds; 100 % of calls are answered within 10 seconds.

d. Universal service

Universal service consists of (1) provision of access at a fixed location and provision of telephone services and access to internet, (2) directory enquiry and directories and (3) public pay phones and other public voice telephony access points. The incumbent is responsible for the provision of access at fixed location and public pay phones, and the provision of directory enquiry and directories is entrusted to the incumbent's subsidiary, both until 2 December 2019. Preparations for the tender for the designation of a new universal service provider started in February 2019.

In the first half of 2018, in order to include broadband in the obligation for the provision of access at a fixed location and the provision of telephone services from 20 June 2018, AKOS amended the General Acts determining the speed of internet connection[180], the quality of universal service[181] and the calculation of net cost of the universal service calculation[182]. It originally proposed an obligation to ensure a minimum download speed of 10 Mbps, but after public consultation a speed of 4 Mbps was imposed. The USO broadband obligation is technology-neutral. In practice, this means that a few thousand households are potential beneficiaries. Households need to meet two criteria: not having alternative broadband coverage; and not being in areas where the incumbent is interested in constructing optical networks in the near future.

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[178] Pravilnik o kakovosti storitve za enotno evropsko telefonsko številko za klice v sili 112 in številko policije 113: http://www.pisrs.si/Pis.web/pregledPredpisa?id=PRAV13213

[179] https://ec.europa.eu/digital-single-market/en/news/2018-report-implementation-european-emergency-number-112

[180] *Splošni akt o prenosni hitrosti, primerni za funkcionalni dostop do internet*; https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/2018-01-1155/splosni-akt-o-prenosni-hitrosti-primerni-za-funkcionalen-dostop-do-interneta

[181] *Splošni akt o kakovosti univerzalne storitve*; https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/2018-01-1154/splosni-akt-o-kakovosti-univerzalne-storitve

[182] *Splošni akt o načinu izračuna neto stroškov univerzalne storitve;* https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/2018-01-1156/splosni-akt-o-nacinu-izracuna-neto-stroskov-univerzalne-storitve

Each household should apply for broadband universal service to the universal service provider, which will consult AKOS if the conditions are fulfilled. Until now, there have been only two applications, neither of which met the conditions.

e. Institutional issues

In 2018, AKOS adopted new statutes reflecting changes introduced in 2017 in the Electronic communications Act and in the Decision on its establishment: (1) the transfer of the power to appoint its Director from the Council to the competent minister; (2) the empowerment of the Director to propose the annual financial and working plan and the annual report; (3) the Council's adoption of the annual report and of the annual financial and working plan; (4) the government's confirmation of the financial plan (working plan submitted to the government for information only); (5) non-interference by the Council with tasks and concrete procedures for AKOS's adoption of other General Acts and Decisions; and (6) dismissal of members of the Council by governmental decision upon a proposal from the Council or the government itself.

On 19 October 2018, the Commission was informed of a proposal from the AKOS Council to the Slovenian Government to dismiss the Director of AKOS. The Commission sent a political letter emphasising the importance of the independence of national regulatory agencies (national regulatory authorities) and due process. On 29 November, the government returned the proposal to the AKOS Council.

Operators reported that AKOS and the relevant Ministry were under greater political pressure following the elections and the entry into office of the new Government.

In 2018, AKOS published four General Acts[183] establishing the rules and conditions relating to the allocation of numbers for M2M/IoT services. The general rule, in accordance with the ECA, is that applicants for these numbers must have the status of operator in the country.

In the first quarter of 2018, on the initiative of operators and the number portability provider in Slovenia, AKOS simplified the portability procedure. It also terminated the obligation to give the user prior notice, before the call is set up, when the user calls a number ported to an operator other than that to which it was initially assigned. AKOS continues to monitor the market and in the event of a large number of user complaints would intervene again with stricter regulation[184].

Slovenia has not yet authorised numbering resources with extraterritorial use in the Union.

5. Conclusion

Slovenia has improved its connectivity ranking by one position. It is encouraged to continue its efforts to improve regulatory conditions, ensure stable competition to improve private investments in network rollout and make the steps necessary to complete the announced 5G spectrum auctioning. The independence of the national regulatory authority is key for regulatory predictability, which is necessary to attract investment in enhanced networks.

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[183] General Acts on:
- the numbering plan (Official Gazette RS nos 62/13, 107/13 and 41/18);
- the content and format of the application for issuing a decision on the assignment of numbering elements (OG nos 62/13 and 72/18);
- the size of numbering blocks for the acquisition of which a project is required (OG nos 62/13 and 72/18); and
- the method of calculating the charges for use of numbering (OG nos 31/13, 21/16, 15/17 and 72/18).

[184] These changes were introduced through amendments to the General Act on number portability (OG nos 62/13 and 23/18).

Slovakia

	Slovakia				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
1a1 Fixed broadband coverage % households	**88%** 2016	**89%** 2017	**88%** 2018	***25***	**97%** 2018
1a2 Fixed broadband take-up % households	**72%** 2016	**70%** 2017	**70%** 2018	***20***	**77%** 2018
1b1 4G coverage % households (average of operators)	**71%** 2016	**82%** 2017	**87%** 2018	***25***	**94%** 2018
1b2 Mobile broadband take-up Subscriptions per 100 people	**73** 2016	**84** 2017	**88** 2018	***18***	**96** 2018
1b3 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	**NA**	**NA**	**0%** 2018	***13***	**14%** 2018
1c1 Fast broadband (NGA) coverage % households	**75%** 2016	**79%** 2017	**86%** 2018	***17***	**83%** 2018
1c2 Fast broadband take-up % households	**23%** 2016	**29%** 2017	**34%** 2018	***20***	**41%** 2018
1d1 Ultrafast broadband coverage % households	**NA**	**68%** 2017	**80%** 2018	***11***	**60%** 2018
1d2 Ultrafast broadband take-up % households	**8%** 2016	**10%** 2017	**13%** 2018	***21***	**20%** 2017
1e1 Broadband price index Score (0 to 100)	**88** 2016	**88** 2017	**90** 2018	***8***	**87** 2017

1. Progress towards a gigabit society

The national broadband strategy, which is still in place, dates from 2011. With regard to the common EU broadband targets for 2025 as part of the gigabit society communication on coverage of all EU households — rural or urban — by networks allowing speeds of 100 Mbps upgradeable to gigabit speed, no such official plan has been adopted yet at government level. As regards mobile connectivity ambitions, the Ministry of Transport and Construction plans to create a 5G action plan in 2019.

With regard to use of EU funds, €68 million from the European Regional Development Fund and European Agricultural Fund for Rural Development still needs to be used as part of the operational programme integrated infrastructure for backhaul and access networks. Under the rural development programme, €27 million was allocated for last mile access in villages with under 500 inhabitants. The relevant ministry plans to reallocate part of that amount to projects other than those related to connectivity.

The Slovak office of the Deputy Prime Minister for Investments and Informatization plans to launch a new broadband mapping project in 2019 to map broadband at lower levels, i.e. at household level. This new project aims to relaunch mapping at whole country level and is expected to replace the previously cancelled 'Atlas for passive infrastructure' project managed by the Ministry of Transport and Construction. Its purpose was to not only map fixed and mobile telecoms infrastructure needed for broadband deployment, but also to map road and energy infrastructure.

One of the long-term issues is the provision of high-speed broadband coverage for 'white spots' (i.e. municipalities covered by speeds of less than 30 Mbps). The new definition of white spots now applied in Slovakia is based on actual coverage rather than 'planned' coverage. The new definition recognises the latter as a group of addresses at individual street level and identifies those individual locations where the broadband speed is lower than 30 Mbps. According to this definition, there were

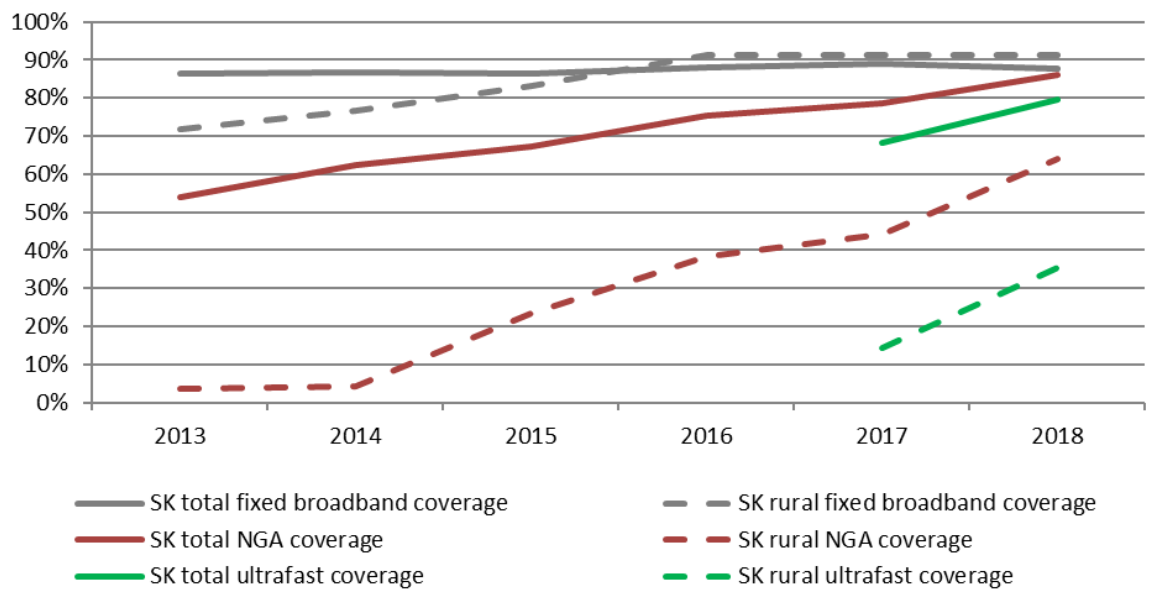
between 400 and 500 white spots in 2017. This fell to around 300 white spots in 2018, which would indicate slight progress. The plan is to eliminate white spots in Slovakia by 2020.

Slovak authorities identified 207 white spots in early November 2017. Following public hearings to assess current broadband coverage and ascertain market players' future plans to achieve broadband coverage of 30 Mbps in all municipalities by 2020, in 2017 Orange Slovensko and O2 Slovakia declared their intention to cover all 207 remaining white spot municipalities in Slovakia. As these declarations are not binding, another public consultation was launched in 2017 to obtain official commitments by the market players to cover all such white spots in Slovakia by the end of 2020. However, no binding commitments have been made yet. In February 2018, a non-binding memorandum was signed between the relevant governmental department office of the Deputy Prime Minister for Investment and Informatization and three major Slovak market players (Slovak Telekom, Orange Slovensko and O2 Slovakia).

The governmental department has prepared a feasibility study for an intended demand-oriented measure to provide free wifi coverage at municipal level, 'WiFi for You', also called 'WiFi4SK', which is supposed to be based on the principles of the WiFi4EU initiative. The call was launched in late July 2018 and only municipalities can benefit from the aid, which is granted via the *de minimis* scheme. The project is financed from the operational programme integrated infrastructure and conditions are supposed to be identical to WiFi4EU.

The Ministry of Transport and Construction intends to start drafting its proposal for new legislation to transpose the European Electronic Communications Code in mid-2019 and expects to launch the legislative procedure at the end of 2019. It intends to prepare a new law on electronic communications as a recast, replacing the current law on electronic communications.

Fixed, NGA and ultrafast coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June. Ultrafast coverage metrics are available for 2017 and 2018.

Against this background, Slovakia did not make progress on fixed broadband coverage, with 88 % of households covered (89 % previously). It is therefore still below the EU average (97 %). Fixed broadband take-up remained at 70 % of households (stable), which is below the EU average (77 %).

4G coverage increased to 87 % (82 % previously) and is still below the EU average (94 %). Slovakia made good progress on fast broadband NGA coverage, with 86 % of households covered. This is above the EU average (83 %). Slovakia performed very well on ultrafast broadband coverage, a more future-proof technology, with 80 % of households covered (68 % previously) outperforming the EU average by 20 percentage points.

Fixed, NGA and ultrafast coverage trends in Slovakia indicate relatively good ultrafast coverage except in rural areas. The difference between total coverage and coverage in rural areas is also visible with regard to NGA coverage. By contrast, Slovak FTTP coverage, even in rural areas, clearly exceeds the EU trends.

2. Market developments

Competitive environment

According to the Slovak national regulatory authority (NRA), there is evidence of fixed-to-mobile substitution in Slovakia, borne out by the fact that there are operators that still offer fixed connection via mobile networks. Electronic communications services are offered mainly as bundled offers of various services, including multimedia services. In recent years, the most significant growth can be seen in offers that contain broadband service IPTV in the form of double-play, triple-play and quad-play. There are no commercial agreements for wholesale access to content for electronic communications network and/or services players.

Two Slovak fixed operators, SWAN and BENESTRA, finalised their merger in 2018. The merger aimed to create the largest domestically-owned alternative operator in Slovakia. The merged firm plans to concentrate at first on combining the two respective networks before investing in infrastructure. While SWAN focuses mainly on residential users in the fixed line sector, BENESTRA focuses on the business market. The mobile arm of SWAN, SWAN Mobile, which trades under the '4ka' brand, is not included in the merged firm. The Slovak NCA cleared the merger in April 2018.

In 2017, the Slovak legislator amended the law on electronic communications with effect from January 2018 with regard to the identification of public interest, which is a prerequisite for a telecoms company to gain access to immovable property owned by third parties. As a result, 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 present. It now stipulates that public interest is present also in case of a telecoms company operating a nationwide network; according to stakeholders, it seems to discriminate those operators who do not operate a nationwide network, e.g. local operators.

Slovakia has prolonged the applicability of the special levy on regulated sectors, including electronic communications, despite the fact that it was originally designed as a measure to tackle the impact of the global financial crisis on the national budget.

2.1. Fixed markets

As regards market shares by technology, DSL technology is still out in front with a continuously decreasing share of 34.4 % narrowly followed by fibre to the home/building (FTTH/B) with a 29.7 % share, which continues to rise at the expense of DSL and partially at the expense of wifi/fixed wireless access. Cable technology holds a stable fourth position with around 11.9 %.

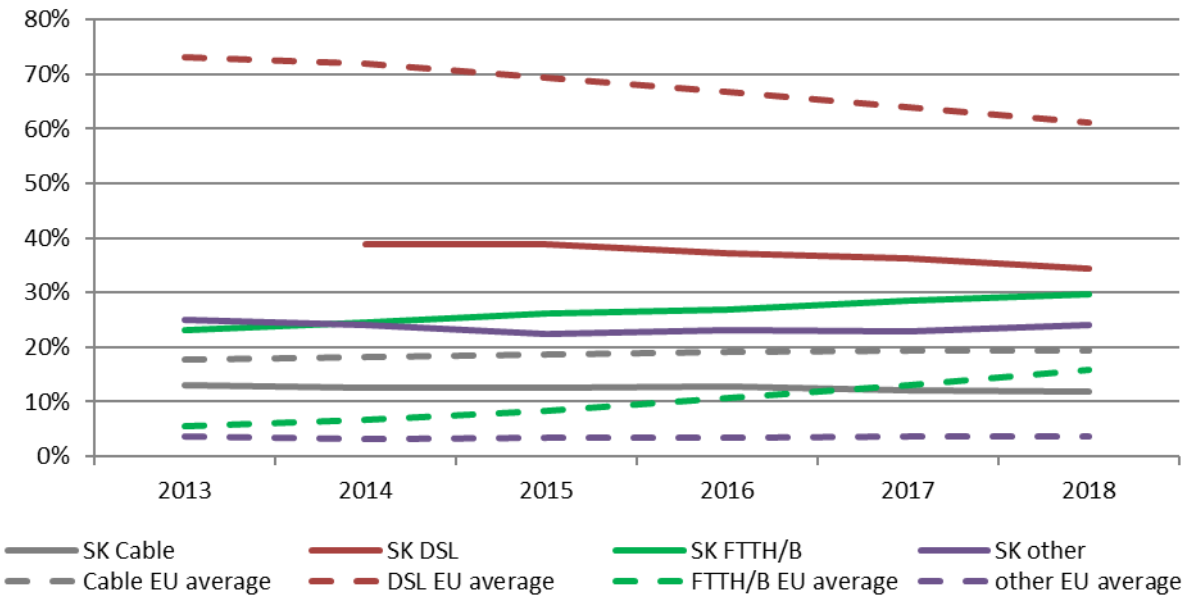
With regard to market shares of technologies according to speed, '2Mbps but less than 10 Mbps' holds the highest share followed by '30Mbps but less than 100 Mbps' and '10 Mbps but less than 30 Mbps'.

With regard to overall trends in the proportion of market shares (incumbent versus alternative operators), the number of subscriptions has increased over time for both the incumbent and for

alternative operators. However, the incumbent's market share is declining very slightly. The overall broadband market is therefore growing in size, with a higher share of new subscriptions gained by alternative operators.

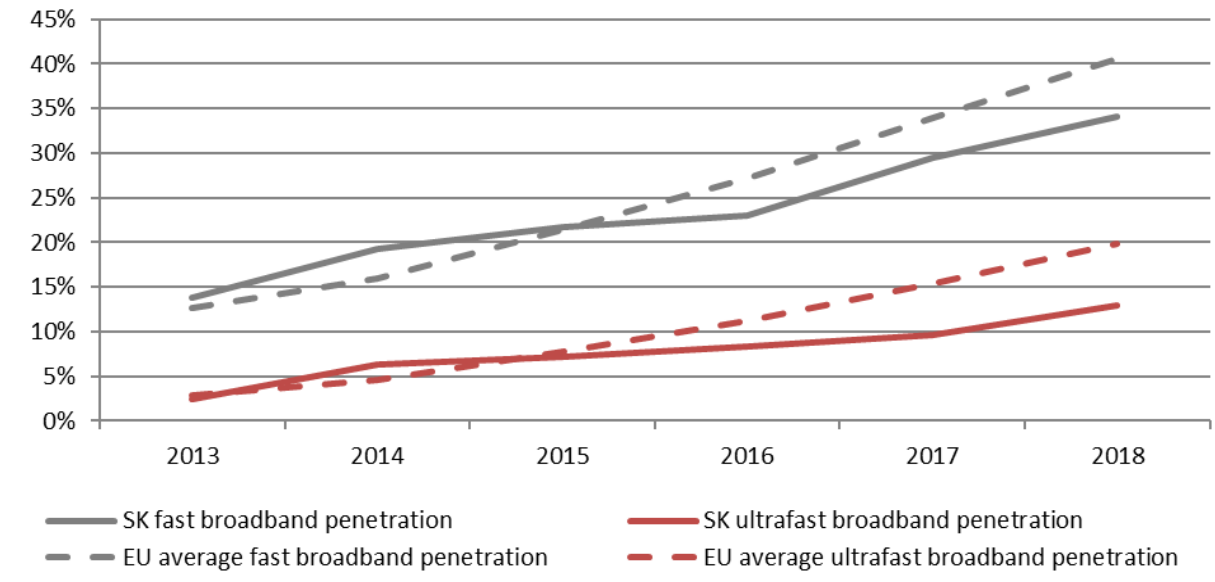
There were no major changes in market shares on the Slovak fixed voice market. Slovak Telekom held approximately 83 % market share in the volume of voice call minutes from the fixed network as of mid-2018.

Broadband market shares at Member State level by technology, % of fixed broadband lines, 2013-2018



Source: Communications Committee (COCOM). Annual data as of 1st of July.

Fast and ultrafast penetration at Member State level, 2013-2018



Source: Communications Committee (COCOM). Annual data as of 1st of July.

The NGA market segment is more competitive than the DSL segment. It is highly fragmented, with tens of local NGA service providers and several nationwide operators.

There are no wholesale-only broadband network operators. The Slovak market has characteristics of strong orientation on 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.

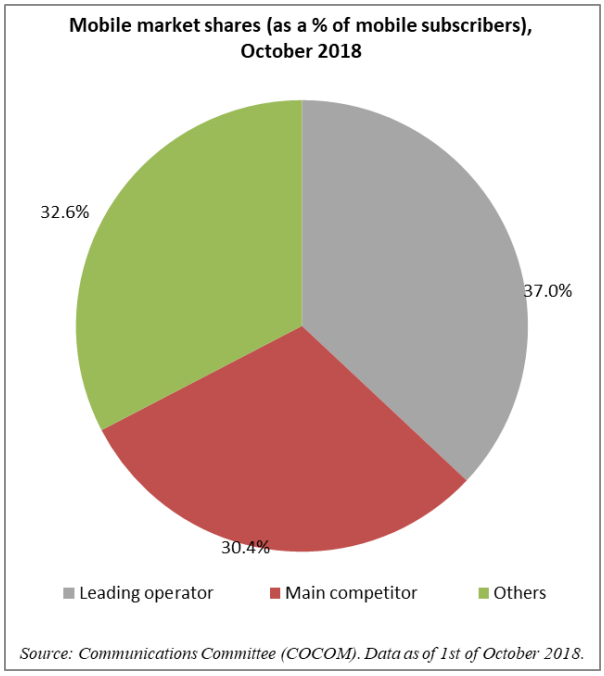
The Slovak broadband market is dominated by access via DSL[185], followed by FTTH/B and WiFi/FWA, with cable access[186] in fourth position.

Slovakia progressed on fast broadband take-up, with 34 % of households subscribed (29 % in 2017), but remains below the EU average (41 %). Slight progress was also made on ultrafast broadband take-up, with 13 % of households subscribing (10 % in 2017), still below the EU average (20 % in 2017).

The broadband price index[187] in Slovakia scored 90, which is above the EU average, with very good performance in retail prices.

2.2. Mobile markets

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/SIMs and mobile revenues. It operates a second brand, FunFón. The incumbent Slovak Telekom, a subsidiary of the Deutsche Telekom Group operating under T-Mobile, holds second place on the mobile market in terms of mobile revenues and number of customers/SIMs. It operates a second brand, Juro. O2 Slovakia, a former subsidiary of the Telefonica Group, now a member of the Czech PPF Group, ranks third in terms of mobile revenues and number of customers/SIMs. 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.



Source: Communications Committee (COCOM). Data as of 1st of October 2018.

According to data available from the NRA, the four Slovak mobile network operators' (MNO) 4G network territorial coverage as of 30 June 2018 was: 69.8 %; 60.4 %; 58.5 % and 23.2 % respectively. These figures corresponded at the same time to population coverage of 93.3 %; 90.5 %; 94.1 % and 69.0 % respectively.

Mobile broadband take-up increased to 88 subscriptions per 100 people (84 subscriptions per 100 people in 2017), although it is still below the EU average (96 subscriptions per 100 people).

[185] VDSL included.
[186] Docsis and cable modem.
[187] The fixed broadband price index weighs the cheapest retail offers from: standalone, double play (BB + TV, BB + fixed telephony) and triple play (BB+TV+fixed telephony) and three speeds categories - 12-30 Mbps, 30-100 Mbps and +100 Mbps. This indicator presents values from 0 to 100 (which should not be read as prices) and the higher the values, the better the country performs in terms of affordability of prices relative to purchasing power.

The NRA has not yet disclosed its detailed plans for 5G trials or deployments.

The least expensive offer in Slovakia for a basket of 1GB and 300 calls is significantly above the EU average of €46.30 compared with €22.30.

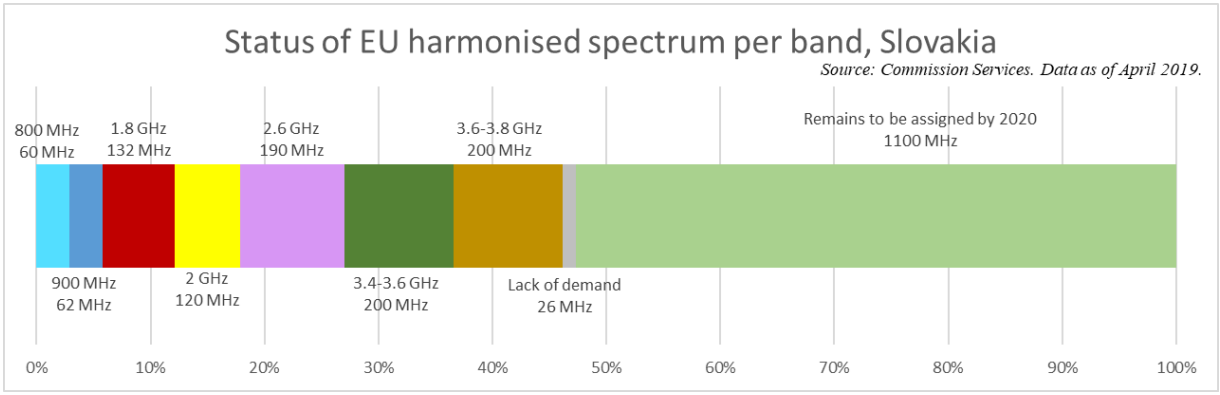
3. Regulatory developments

3.1. Spectrum

In Slovakia, 46 % of the spectrum harmonised at EU level for wireless broadband has been assigned. This percentage is mainly due to the lack of an assignment procedure for the 700 MHz band.

The assignment of frequencies in the lower part of the 3.4-3.8 GHz band (3400-3600 MHz) was already completed in 2016 when frequency licences were assigned on a nationwide basis to three operators (O2 Slovakia, SWAN and Slovanet). These licences will run until August 2025. The 3.6 GHz frequency band is allocated for mobile/fixed communications networks in lots of 40 MHz, and three operators acquired rights of use of spectrum for 80 MHz or more. On that basis, there might possibly occur difficulties with allowing the use of sufficiently large blocks of frequencies by all operators by 31 December 2020. In 2017, it conducted the selection procedures for issuing rights to use frequencies in the upper part of the band (3600-3800 MHz) at local (district) level in order to grant licences until the end of 2024. This process was finalised in June 2017, with all frequencies from both 3.4-3.6 GHz and 3.6-3.8 GHz frequency bands assigned.

With regard to the implementation of Decision (EU) 2017/899 on the use of the 470-790 MHz frequency band (the UHF band) in the EU, there are issues that need to be addressed. There is one nationwide network operator (Towercom) on the Slovak market that holds the rights to use the 700 MHz spectrum beyond 2020. The 694-790 MHz frequency band (the 700 MHz band) is largely used for digital terrestrial television broadcasting.



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 the network operator through individual licences that are valid until 9 September 2029 except for multiplex 1, where frequencies are assigned until 31 May 2021.

The Slovak authorities are negotiating with the network operator about the possibility of changing the individual licences issued for the 700 MHz band before they expire in 2029 and 2021. This substitution would ensure continuity for digital terrestrial television broadcasting in terms of maintaining the existing coverage of the territory and inhabitants in Slovakia. According to the Ministry, these new frequencies would not constitute any added value for the network operator. The Ministry prepared a new law, which was then adopted by the Slovak legislator in March 2019, with

the aim of enabling a compensation for the provider who currently holds the right to use frequencies in the 700 MHz band. .

In December 2017, the NRA concluded cross-border coordination agreements with the national regulatory authorities of the neighbouring countries on the new digital terrestrial television (DTT) frequency plans for the 470-694 MHz frequency band.

The NRA intends to ensure the availability of the sub-700 MHz frequency band (470-694 MHz) for DTT and for use by wireless audio programme making and special events at least until 2030.

The use of the 700 MHz band in Slovakia is envisaged for mobile broadband electronic communications services. The NRA envisages that frequencies from the 700 MHz band will be allocated by means of an electronic auction and it anticipates that such auction will take place in the second half of 2019.

According to the NRA, frequencies from the 26 GHz and 43 GHz bands could possibly be taken into account as available for 5G services on the Slovak market. The NRA relies mainly on usage of the 26 GHz frequency band for 5G networks.

In May 2018, the NRA launched a new auction process to allocate the 1800 MHz band. In reaction to this, O2 Slovakia announced its intention to transfer a small portion of its 1800 MHz spectrum to another operator (Slovanet) before the 1800 MHz auction so that it could bid itself in the auction for 2×9MHz, which is more suitable for long-term evolution (LTE). In response to this, the NRA cancelled the auction and the 20 MHz spectrum cap in summer 2018 as it believes that the Slovak mobile market is saturated and competition exists. Following this development, the fourth market entrant SWAN Mobile sued the NRA for its decision to cancel the 20 MHz spectrum cap. The NRA will not relaunch the auction for 1800 MHz until the court decides.

Slovakia does not apply stricter electro-magnetic emission limits than those set by Council Recommendation 1999/519/EC.

As of the end of 2018, the NRA had received four notifications on the lease of rights to use spectrum and one notification on the intention to trade rights to use spectrum. All four notifications on the lease of rights to use spectrum relate to the operation of local DVB-T transmitters in the UHF band. The notification on the intention to trade rights to use spectrum linked to the operation of wireless mobile broadband in the 1800 MHz band has been subsequently withdrawn.

3.2. Regulated access

2018 started with Phase II investigation discussions involving the NRA, the Commission and BEREC with regard to the NRA's notification of price control remedies on the markets for wholesale voice call termination on individual mobile networks[188] (Market 2 of the 2014 Recommendation on relevant markets[189]). The NRA proposed imposing asymmetric mobile termination rates (MTRs) on the fourth mobile network operator and adding a 'size premium' to the standard WACC[190] formula, leading to inflated costs of capital used for MTR calculations. BEREC found that the Commission's serious doubts were justified. In February 2018, the Commission issued a Recommendation under Article 7a

[188] The draft measure was notified to the Commission in September 2017, under case SK/2017/2010.
[189] 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.
[190] Weighted average cost of capital.

of the Framework Directive to amend or withdraw the remedies relating to price caps for mobile call termination services in Slovakia. As a result, the NRA withdrew its draft measure.

In February 2019, the NRA announced a new review of the markets for wholesale voice call termination on individual mobile networks. The Commission pointed out that the currently applicable MTRs in Slovakia, although based on a pure BU-LRIC methodology, are amongst the highest in the EU as they have been calculated based on pre-2013 market data. The Commission therefore urged the NRA to introduce symmetric cost-oriented MTRs based on the BU-LRIC model as soon as possible and, as communicated by the NRA, no later than the first quarter of 2019. In May 2019, the NRA notified[191] new symmetrical mobile termination rates for all four Slovak MNOs, with decrease from the regulated price imposed since 2013 (the current regulated MTR amounts to 1.226 euro cent/min excluding VAT) to a new regulated MTR which amounts to 0.855 euro cent/min excluding VAT.

In January 2018, the NRA notified the Commission of a proposal for price remedies 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). It proposed to set a maximum price for fixed termination rates (FTRs) of 0.0976 euro cent/min, based on a pure BU-LRIC methodology and applied symmetrically to all operators with significant market power (SMP). As in the market for wholesale voice call termination on mobile networks, the NRA intended to add a 'size premium' to the standard WACC formula. This mark-up would reflect the risk of the variability in the return of the operators' shares in the long run depending on the size of undertakings. In line with its approach on mobile termination markets, the Commission therefore opened a Phase II investigation pursuant to Article 7a of the Framework Directive. BEREC again backed the Commission's serious doubts, and in June 2018 the Commission adopted an Article 7a Recommendation asking the NRA to amend or withdraw the proposed remedy. In July 2018, it informed the Commission of its decision not to amend or withdraw the draft measure and adopted the originally notified FTRs of 0.0976 euro cent/min.

In July 2018, the NRA adopted decisions on SMP designations. Subsequently, the NRA adopted a decision on FTR price regulation addressed to all SMP operators and in the same period the adopted decisions were communicated to the Commission.

Regarding the markets for wholesale local access at a fixed location and central access at a fixed location[192], the NRA adopted decisions in January 2018 on the designation of Slovak Telekom as SMP operator and imposed remedies on both markets. Against this background, it adopted a decision on the methodology for calculating the price of collocation based on the long-run average incremental cost (LRAIC) methodology as well as a decision on the methodology for calculating the price of duct and infrastructure access based on LRIC+. The previous price obligations for the products on markets 3a and 3b were replaced by an economic replicability test; these were communicated to the Commission as adopted measures under Article 7(7) of the Framework Directive in March 2018.

On 20 March 2018, the NRA communicated to the Commission the SMP designation and price calculation method for collocation, for ducts, high-density polyethylene (HDPE) pipes and tubes on the market for wholesale local access provided at a fixed location (Market 3a). It also communicated to the Commission the SMP designation and price calculation method for collocation on the market for wholesale central access provided at a fixed location (Market 3b).

On 31 July 2018, the NRA communicated to the Commission a preliminary measure on the price

[191] The draft measure was notified to the Commission under case SK/2019/2167.
[192] Markets 3a and 3b of the 2014 Recommendation on relevant markets.

calculation method for ducts, HDPE pipes and tubes on the market for wholesale local access at a fixed location (Market 3a).

The NRA is expected to come up with new analyses of markets 3a, 3b and 4 by the end of 2019.

Slovakia notified its new transposition of the Broadband Cost Reduction Directive (BBCRD) provisions related to the establishment and operation of the single information point (SIP) by way of an amendment to the Slovak law on electronic communications. The amendment entered into force on 1 January 2018. The responsibility for operating the SIP is entrusted to the NRA.

The NRA established the SIP in June 2018. The SIP gathers information on existing physical infrastructure and planned civil works. Information on existing physical infrastructure is provided by central and local administration bodies and by regional and local self-governing authorities. Information on planned physical infrastructure is provided by network operators (including those active in electronic communications, public utilities and transport sectors). Information from the SIP is provided exclusively to the electronic communications industry.

The NRA has not yet been asked to resolve disputes under the BBCRD. It adopted an implementing measure on SIP with legal effect from 1 August 2018.

4. End-user matters

In 2018, the NRA received 235 consumer complaints. The main sources of complaints were related to how contractual penalties were applied, to pricing and billing, to availability and quality of service, terms and conditions related to contracts including their duration, roaming, price increases, number portability, rights of way and unsolicited communication. As regards transparency and publication of information, the NRA relies on a web search engine and comparison website. Consumers can compare offers from individual companies that provide broadband access, including additional services at the level of individual location to be specified by the consumer[193]. There is also a price comparison tool where users can compare prices of fixed broadband access, in particular based on address, price, type of connection, transmission speed, data limit and bundle type.

According to the 2018 consumer markets scoreboard, from a consumer perspective of the markets surveyed in Slovakia, the performance of the internet provision service market did not present any statistically appreciable change between 2015-2017; it scores 80.2 at the market performance index (MPI), 3.4 points above the EU-28 average[194]. The performance of the mobile telephone services market decreased in 2018 by 1.5 points compared to the same period; it scores 78.7 at the MPI, 1.7 points above the EU-28 average. The fixed telephone services market did not present any statistically significant change compared to the same period; it scores 82.9 at the MPI, 5.7 points above the EU-28 average. Of the 25 services markets surveyed in Slovakia, fixed telephone services market and internet provision service market are both among the five markets scoring the highest (+5.7 and +3.4 compared to the EU average, respectively).

a. Net neutrality

There are no self-regulatory initiatives in Slovakia. The NRA reported no deviation from the BEREC guidelines on the implementation by national regulators of European net neutrality rules. There were no additional requirements imposed by the NRA except its recommendation for ISPs related to Article 4(1)(d) of Regulation (EU) 2015/2120. The recommendation comprises the definition of particular

[193] Such comparison tool is available on: http://porovnavacinternetu.sk/
[194] The MPI is a composite indicator ranging from 0 to 100 which measures how well a given market performs according to consumers.

transmission speeds to be included in contracts for both fixed and mobile operators. It envisages harmonising the publishing of information of internet access service speeds; the normally available speed should be at least 90 % of the maximum speed and available at least 90 % of the time during each continuous 4-hour interval. The minimum speed should be at least 40 % of the maximum speed. There appear to be no major signs of dissatisfaction with the implementation of net neutrality rules on the Slovak market. Net neutrality rules are not among the main sources of consumer complaints. According to the results of the request for information from the NRA addressed to major market players, no dissatisfaction about the quality of service was addressed from the 'consumer versus operator' perspective. The NRA therefore sees no incompliance and no need for intervention. There is no reason to impose requirements on technical characteristics or on a minimum quality of service related to Article 5 of Regulation (EU) 2015/2120.

b. Roaming

The NRA opened investigations into two cases of potential incompliance. It observed no increase in domestic prices as a result of 'roam like at home' rules in 2018. It also did not receive any complaints about data speed and 3G or 4G connectivity in relation to inbound or outbound roaming. It did not receive any applications for derogation in 2018. As a result, no retail derogation has yet been granted.

Slovak end-users consumed 4.2 times more roaming data in Q4-2017 than in Q4-2016. Between Q1-2017 and Q1-2018, such an increase in usage was represented by 4.9 times increase.

Slovak end-users consumed 1.9 times more roaming minutes (calls made) data in Q4-2017 than in Q4 2016. Between Q1-2017 and Q1-2018, such increase in usage was represented by 1.8 times increase.

The Slovak market belongs to those with a negative balance for roaming calls as the volume of roaming use carried out by Slovak customers abroad is higher than the volume of calls carried out by foreign customers in Slovakia. The Roaming Regulation[195] therefore impacted mainly smaller operators and operators that are not a part of a large multinational group.

The NRA has the power to impose penalties ranging from €200 up to 5 % of the undertaking's turnover from the previous accounting period if an undertaking has not fulfilled or has violated obligations stipulated in the Roaming Regulation.

c. Emergency communications — 112

The relevant governmental department reports that free access to 112 by SMS, which is a functionality relevant for equivalent access to emergency services for disabled end-users, is operational. Access to 112 by free text message is excluded for users of foreign SIM cards.

Caller location is sector ID based. Handset-based caller location (advanced mobile location) has not yet been deployed. Calls to emergency services are answered within 6.9 seconds on average.

5. Institutional issues

NRA concerns about the level of salaries of its staff might be addressed, to a certain extent, by a general increase in the basic part of the salary in state administration in Slovakia (which includes the NRA) of 10 % from January 2019 and then by an additional 10 % from January 2020 (these salary increases do not apply to the total salary in the levels mentioned).

[195] Regulation (EU) No 531/2012 of the European Parliament and of the Council of 13 June 2012 on roaming on public mobile communications networks within the Union, OJ L 172, 30.6.2012, p. 10, as last amended by Regulation (EU) 2017/920.

6. Conclusion

The Slovak market confirmed some positive trends with regard to ultrafast broadband coverage, which exceeds the EU average. However, issues remain with regard to low total fixed broadband coverage and low coverage of population by 4G networks[196]. Moreover, ultrafast broadband take-up is very low relative to network availability. An early definition of a comprehensive 5G strategy might address some of the market needs and propose solutions to issues in 5G pioneer bands that are observed in the 3400-3800 MHz band and in the 700 MHz band. Effective implementation of the operational programme integrated infrastructure could be a good opportunity for the market, while close coordination between public and private stakeholders could help make efficient use of EU funds to improve the coverage of 'white spots' (i.e. municipalities covered by speeds of less than 30 Mbps). The recently established single information point under the Broadband Cost Reduction Directive could be among future opportunities and factors expected to support the market. Implementation of remedies on broadband markets with the focus on detailed practical implementation might catalyse their positive regulatory goals. The entry by the fourth mobile market entrant, which appears to have started the process of building its market position, might be one of the positive signs from the market.

[196]Average of operators.

Finland

	Finland				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
1a1 Fixed broadband coverage % households	**97%** 2016	**97%** 2017	**94%** 2018	***20***	**97%** 2018
1a2 Fixed broadband take-up % households	**61%** 2016	**57%** 2017	**58%** 2018	***27***	**77%** 2018
1b1 4G coverage % households (average of operators)	**97%** 2016	**98%** 2017	**99%** 2018	***4***	**94%** 2018
1b2 Mobile broadband take-up Subscriptions per 100 people	**147** 2016	**146** 2017	**156** 2018	***2***	**96** 2018
1b3 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	**NA**	**NA**	**67%** 2018	***1***	**14%** 2018
1c1 Fast broadband (NGA) coverage % households	**75%** 2016	**75%** 2017	**75%** 2018	***24***	**83%** 2018
1c2 Fast broadband take-up % households	**22%** 2016	**23%** 2017	**29%** 2018	***22***	**41%** 2018
1d1 Ultrafast broadband coverage % households	**NA**	**59%** 2017	**58%** 2018	***19***	**60%** 2018
1d2 Ultrafast broadband take-up % households	**16%** 2016	**17%** 2017	**21%** 2018	***14***	**20%** 2017
1e1 Broadband price index Score (0 to 100)	**94** 2016	**94** 2017	**94** 2018	***1***	**87** 2017

1. Progress towards a gigabit society

In October 2018, the Ministry of Transport and Communications published a digital infrastructure strategy. The strategy applies to both wireless and fixed connections and contains measures for promoting the implementation of 5G and supporting optical fibre construction.

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 at least 100 Mbps connections, and it should be possible to increase the connection speed to 1 Gbps.

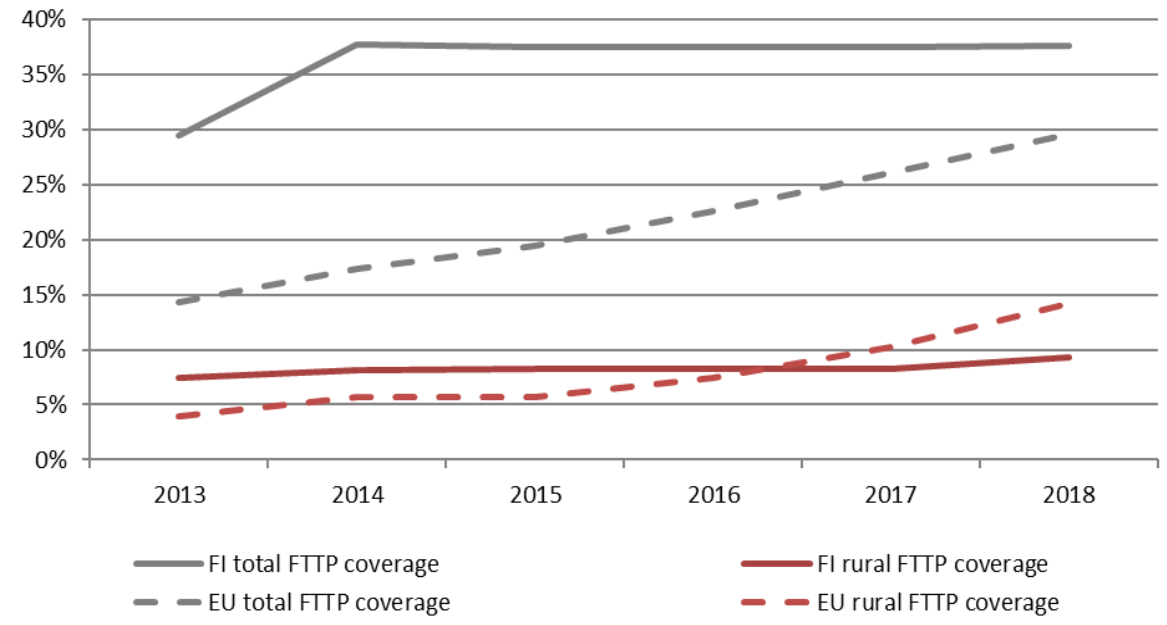
The measures proposed in the strategy include the construction of 5G networks and spectrum policy and streamlining network permit and construction procedures. As far as spectrum is concerned, the strategy provides that the entire 3.4-3.8 GHz band will be used for wireless broadband from the beginning of 2019. To this end, the entire 3410-3800 MHz GHz spectrum was auctioned in September 2018[197]. The strategy also provides that the 26 GHz band will be used for wireless broadband so that the user rights for the entire spectrum will be issued in spring 2020.

In parallel to the digital infrastructure strategy, it is worth noting that 5G testing is being carried out across various parts of the country. In September 2018, the market player TeliaCompany also announced that it was launching a pre-commercial 5G network in the centre of Helsinki where its first base stations would be operational.

[197] See point 3.1 below.

inland's total fibre to the premises (FTTP) coverage is above the EU average, namely 37.5 % against 29.6 % for the EU. On the other hand, Finland's rural FTTP coverage is lower than the EU average, namely 9.3 % against 14.2 % for the EU.

Fibre-to-the-premises (FTTP) coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June.

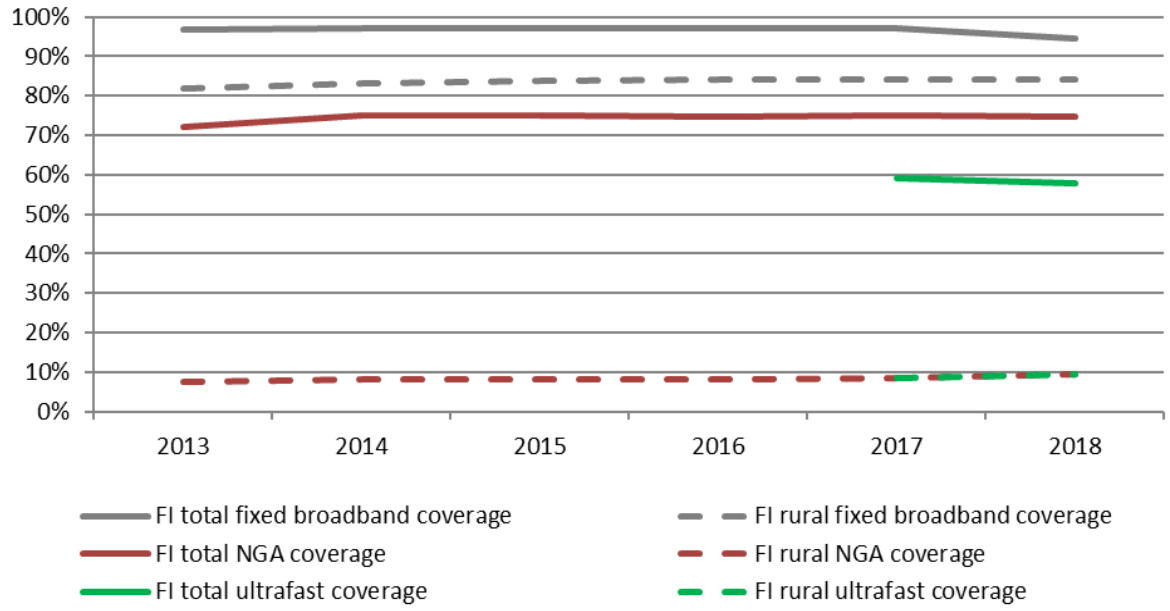
As to broadband rollout in general, Finland's national broadband plan called the 'fast broadband project' runs until the end of 2019. The project aims to provide an optical fibre or cable network to enable connections of 100 Mbps within 2 kilometres of 99 % of all permanent residences and offices in Finland. State aid is available under the project to finance high-speed broadband networks. The amendment of the relevant State aid rules in 2017 has had a positive impact and there are now many ongoing broadband rollout projects.

It is worth noting that broadband access and take-up are still lower in rural areas. There are two programmes to support the rollout of fibre networks in those areas, namely the national State aid scheme for sparsely populated areas and EU funding through the European Agricultural Fund for Rural Development. As of January 2019, the combined use of these sources of funding has allowed Finland to roll out some 24,000 km of fibre network, which amounts to 95,000 dwellings.

Fixed broadband coverage is very high in Finland (94.4 %), including in rural areas (84.3 %). Fixed next generation access coverage (74.6 %), including in rural areas (9.3 %), is below the EU averages of 83.1 % and 52.3 % respectively. As indicated above, all ultrafast rural broadband in Finland is FTTP.

Preparatory work is underway to implement the European Electronic Communications Code. Amendments will be made to the Act on electronic communications services (formerly known as the Information Society Code) The whole Act is being reviewed along a timetable that runs until early autumn 2019, when a public consultation of the draft amending acts will be organised. This is against the overall objective to submit the implementing act to Parliament by spring 2020 and have the Code implemented into Finnish law by autumn 2020.

Fixed, NGA and ultrafast coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June. Ultrafast coverage metrics are available for 2017 and 2018.

2. Market developments

Competitive environment

The Finnish telecommunications market features fixed-to-mobile substitution for voice calls. There are only 352,000 landlines left in Finland, while the number of mobile subscriptions is 9.5 million. Fixed call minutes amount to only 3 % of the calls made on fixed and mobile networks[198]. In addition, TeliaCompany announced in January 2019 that they would stop providing new fixed telephone subscriptions and gradually discontinue their existing fixed services.

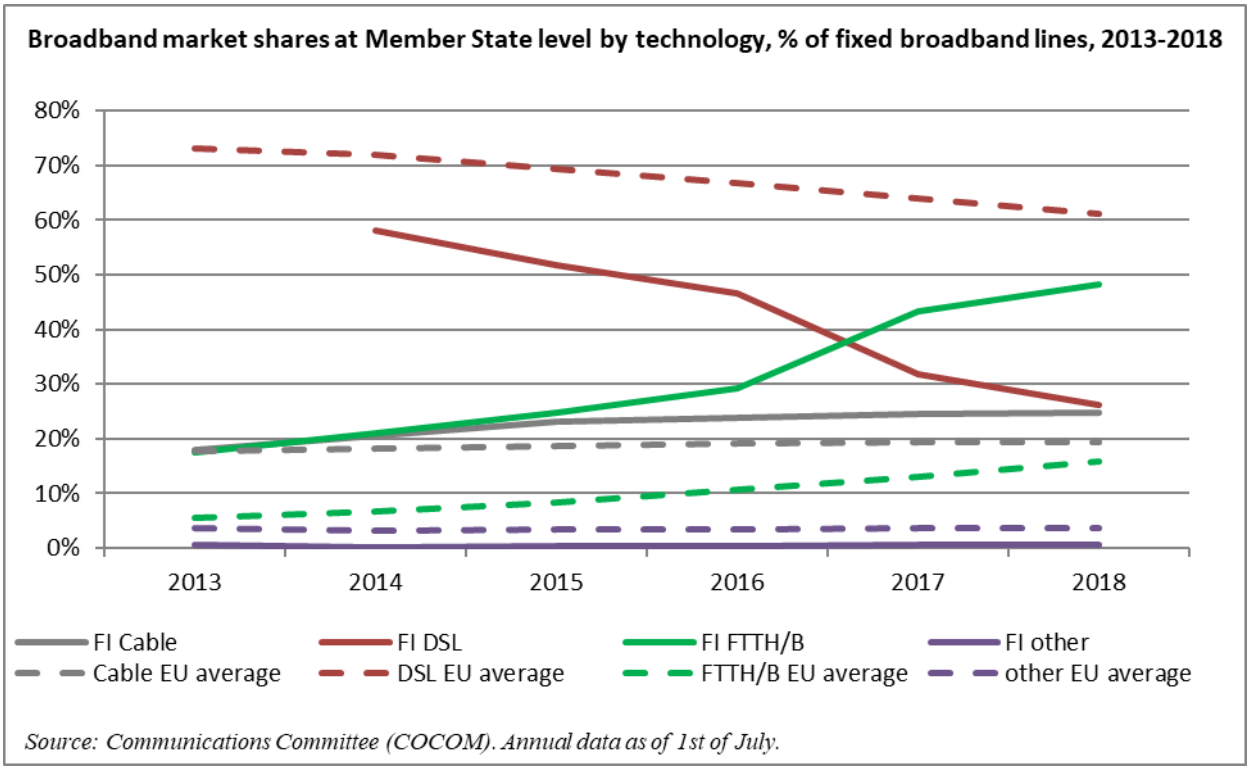
Elisa, Telia and DNA are increasingly investing in TV and content services. All of them have their own TV service concepts. In July 2018, Telia announced that they had acquired Bonnier Broadcasting, including a number of TV channel brands. Finnish operators are therefore taking measures to strengthen their positions in video content.

2.1 Fixed markets

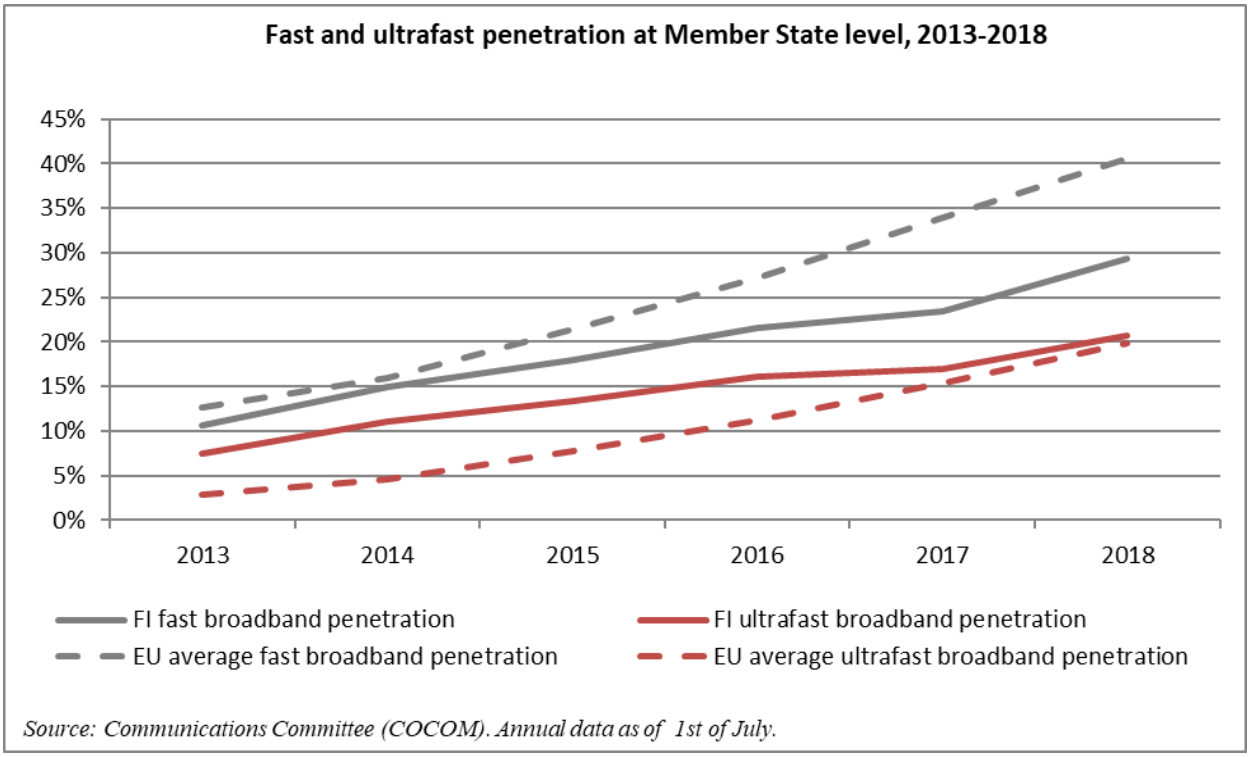
While cable growth has been rather flat year-over-year, almost half of the subscriptions in 2018 were fibre to the home/building (FTTH/B, 48.3 %). Fibre has replaced DSL, which decreased from 63.8 % in 2013 to 26.3 % in 2018.

Some small companies entered the fixed broadband market in 2018: Cinia Plc. purchased Netplaza (ISP and wholesale operator) in June 2018. Market shares have been quite stable over the reporting period.

[198] Source: Traficom.



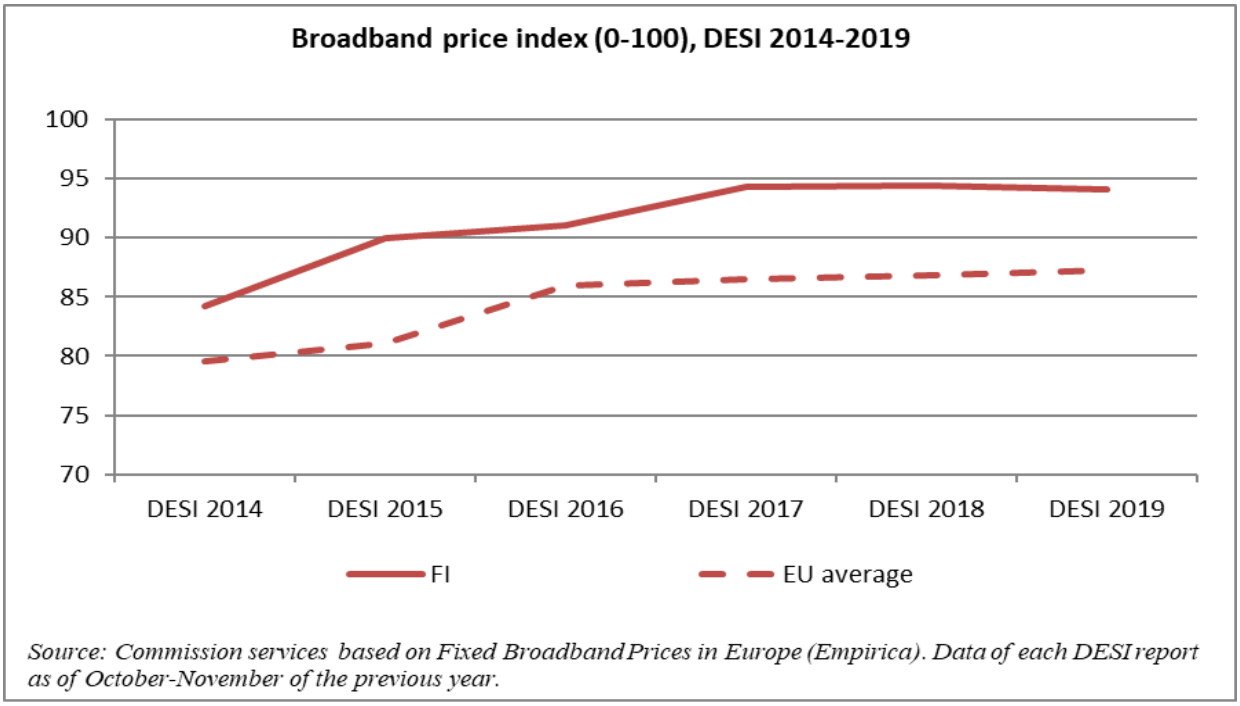
Access to a fast broadband connection has increased in recent years. Fixed broadband take-up at 58 % lags behind the EU average of 77 %. Only 29 % of households with fixed broadband chose to subscribe to fast broadband (at 30 Mbps or above), which is much below than the EU average of 41 %. One of the reasons for the relatively low take-up of fixed broadband connectivity can be seen in Finland's excellent performance in mobile broadband. The relevant pattern is also not price-related insofar as Finland leads the ranks in terms of the broadband price index (94.1 out of 100 against 87.2 out of 100 for the EU as a whole), which pertains only to fixed technology.



As of June 2018, the market shares by operator for fixed network broadband subscriptions were as follows: Elisa 35 %, TeliaCompany 27 %, DNA 27 %, Finnet Association 8 %[199], others 3 %[200].

While Finland's fast broadband penetration (29.3 %) is below the EU average (40.6 %) in spite of an increasing trend over the last 2 years (from 21.6 % to 29.3 %), its penetration of more future-proof ultrafast networks (20.8 % in 2018) has consistently been above the EU average over the last 5 years (19.9 % in 2018).

Finland's broadband price index is above the EU average: in 2018, it stood at 94.1 against 87.2 for the EU as a whole respectively[201]



Source: Commission services based on Fixed Broadband Prices in Europe (Empirica). Data of each DESI report as of October-November of the previous year.

2.2 Mobile markets

In 2018, there were no significant changes in the market shares of the mobile operators. Elisa is the market leader with a market share of 38 %. TeliaCompany's market share is 34 % and DNA's 27 %[202]. The market share of other operators amounts to 1 %[203].

In January 2019, DNA[204] announced that it had just acquired Moi Mobiili Ltd, a virtual mobile network operator that has operated on DNA's mobile network since 2016.

The number of mobile subscriptions has been around 9.5 million over the last 5 years. The total amount of subscriptions has therefore been very stable. With mobile broadband penetration of 156 %, Finland is second in the EU (EU average 96 %). 8.5 million of the subscriptions have unlimited or

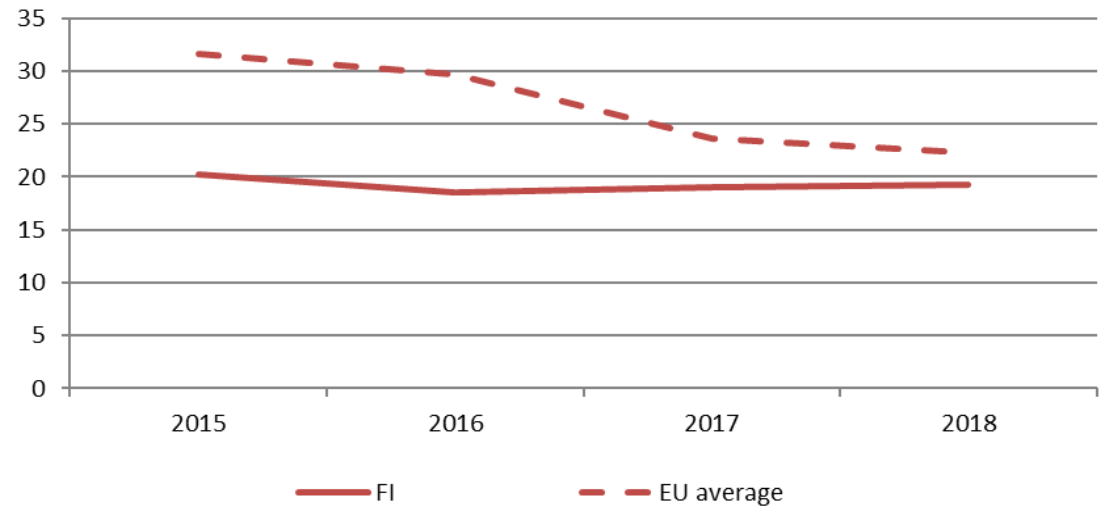
[199] Finnet Association is a central organisation and co-operative forum of local ICT companies. It consists of 23 companies together with their subsidiaries and affiliates.
[200] Source: Traficom
[201] The fixed broadband price index weighs the cheapest retail offers from: standalone, double play (BB + TV, BB + fixed telephony) and triple play (BB+TV+fixed telephony) and three speeds categories - 12-30 Mbps, 30-100 Mbps and +100 Mbps. This indicator presents values from 0 to 100 (which should not be read as prices) and the higher the values, the better the country performs in terms of affordability of prices relative to purchasing power
[202] Source: Traficom
[203] Source: Traficom
[204] In April 2019, Telenor announced that they would acquire 54 % of DNA's stake through separate agreements with DNA's two largest shareholders, Finda Telecoms Oy and PHP Holding Oy. The process is expected to be concluded in Q3 2019.

limited monthly data plans. The number of subscriptions with an unlimited data plan is 6.2 million (around 65 %), and the figure is growing steadily.

Over 2018, mobile network operators continued to upgrade and increase the coverage of their LTE networks, which now reach 100 % of households. At the end of July 2018, 89 % of households had access to one or several 100 Mbps (theoretical maximum speed) mobile networks. Similarly, up to 98 % were covered by a 30 Mbps network. As LTE construction projects have largely followed residential patterns, geographical coverage is significantly lower: 100 Mbps mobile networks cover 10 % of Finnish territory, and 30 Mbps networks 45 %[205].

Finland's least expensive offer for a handset is lower than the EU average (€/PPP 19.30 against €/PPP 22.30 for the EU respectively).

Least expensive offer for handset (1 GB + 300 calls basket) at Member State level, EUR/PPP, 2015-2018

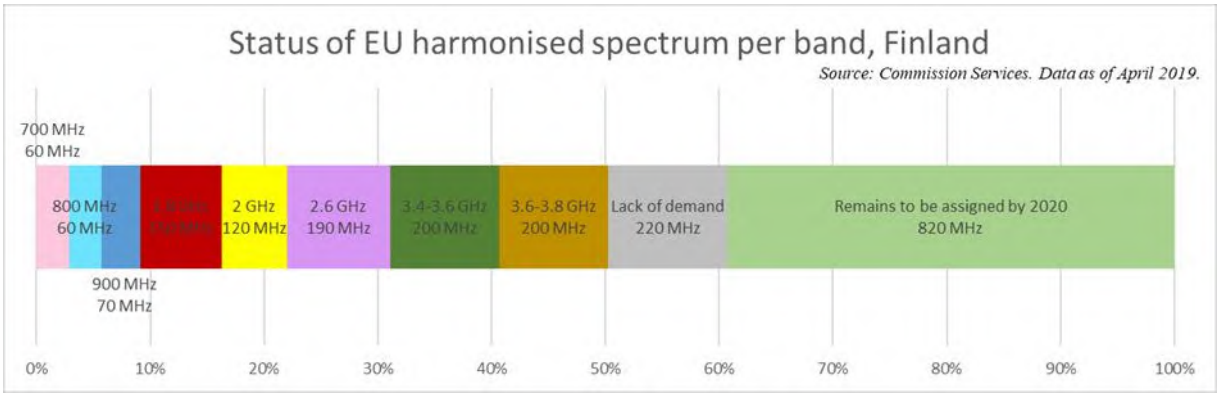


Source: Mobile Broadband Price Study (Van Dijk and Empirica). Prices expressed in EUR/(Purchase parity power - PPP), VAT included. Annual data as of February.

The market shares of mobile operators in Finland are confidential.

3. Regulatory developments

3.1 Spectrum



[205] Source: Traficom

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[206].

In November 2018, the first licences in the 3.4-3.8 GHz band were granted and the corresponding rights of use may already be used for 5G networks from the beginning of 2019. Frequency3410–3540 MHz was auctioned to Telia Finland for €30.2 million, frequency 3540–3670 MHz was auctioned to Elisa for €26.3 million, and frequency 3670–3800 MHz was auctioned to DNA for €21 million. The assignment process has therefore enabled the acquisition of large blocks of spectrum, facilitating the provision of gigabit 5G services at reasonable prices (4 euro cent/MHz/pop). The licences are valid until 31 December 2033 and do not contain any coverage obligation. Networks will be built on a commercial basis. However, due to the limitation caused by a non-EU neighbouring country, the use of the 3.6-3.8 GHz band is currently restricted.

As far as spectrum trading is concerned, Elisa purchased band 2570-2620 MHz from Ukkoverkot Oy in June 2018 and agreed to rent the capacity to Ukkoverkot Oy for business use in a few geographical areas. Elisa is using the spectrum to increase capacity in the mobile network. As part of the transaction, Elisa acquired Ukkonet Oy's share capital from Ukkoverkot[207].

3.2 Regulated access

On 26 January 2018, the Commission received notifications from the Finnish communications regulatory authority FICORA concerning the market for wholesale local access provided at a fixed location (Market 3a of the 2014 Recommendation on relevant markets[208]) and the market for wholesale central access provided at a fixed location for mass-market products (Market 3b of the 2014 Recommendation on relevant markets) in Finland. In its draft decisions, FICORA designated 21 operators as having significant market power (SMP) on the relevant markets and offered to impose remedies on them.

On the basis of the market analyses, FICORA planned to impose stricter remedies on the three major SMP operators that account for some 90 % of retail and wholesale broadband markets: DNA Oyj, Elisa Oyj and Telia Finland Oyj. The remedies at hand include obligations to lease out network capacity and equipment facilities. On the other hand, FICORA planned to impose lighter remedies on the 18 smaller SMP operators. Those remedies include obligations to apply non-discriminatory prices to the relevant products and services.

On 21 February 2018, the Commission adopted a Decision on the notified measures[209]. It contained the following key points: the Commission invited FICORA to closely follow the evolution of the wholesale central access market and, in particular, the level of investments by operators outside their network footprint. If the stricter regulation imposed on the wholesale local access market and the non-discrimination obligation imposed on the wholesale central access market fails to provide a sufficient constraint on prices charged by operators for their bitstream services, the Commission urged FICORA

[206] The 5G spectrum readiness indicator is based on the amount of spectrum already assigned and available for use for 5G by 2020 within the '5G pioneer bands' in each EU Member State. For the 3.4-3.8 GHz band, this means that only licences aligned with the technical conditions annexed to Commission Decision (EU)2019/235 are considered 5G-ready. However, 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.

[207] Source: Elisa.

[208] 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.

[209] C(2018) 1211 final.

to already review its approach before the end of the market review period and to apply stricter remedies, at least to the three larger operators, on the wholesale central access market.

TFICORA adopted the relevant decisions in March 2018. On the one hand, FICORA has imposed the following remedies in Market 3a on DNA, Elisa and Telia: access rights, non-discrimination, transparency, pricing, cost-oriented price caps on fibre local loop unbundling (based on Long Run Incremental Cost plus, LRIC+), conditional cost orientation on copper (stable copper prices for next 3 years), fair and reasonable pricing of virtual unbundled local access and cost accounting. On the other hand, FICORA has imposed the following remedies in Market 3a on 18 smaller operators: access rights, non-discrimination and transparency obligations.

The Finnish Transport and Communications Agency, Traficom, has also started a new market analysis for ex-market 18 (broadcasting transmission services to deliver broadcast content to end-users).

4. End-user matters

By 12 December 2018, 162 complaints had been addressed to FICORA F. Almost all of them were resolved through guidance without the need to open formal administrative proceedings. Quality of service, numbering-related issues and pricing were among some of the most commonly reported issues.

In July 2018, the Finnish Consumer Ombudsman scrutinised the marketing of phone subscriptions and mobile broadband subscriptions as '5G subscriptions' by one of the main market players. The necessary 5G network was not yet in general use and no 5G terminal devices were available to consumers. It turned out that the subscriptions used 4G technology. Against this background, the Ombudsman instructed the relevant market player to stop marketing the subscriptions as '5G subscriptions'. The operator promised to comply with the Ombudsman's request.

In April 2018, the online shops of four of Finland's largest telecoms companies were found to have given consumers misleading information about the sales processes of mobile phone and mobile broadband subscriptions. The Consumer Ombudsman asked for commitments from the respective companies to have any irregularities on their websites corrected. All of the companies concerned promptly corrected their websites. The involvement of the Consumer Ombudsman took place as part of a joint sweep by the EU consumer authorities in November 2017, when the websites of 207 telecoms companies were checked[210].

a. Net neutrality

In 2018, FICORA did not impose requirements on technical characteristics, a minimum Quality of Service and other appropriate and necessary measures. In April 2018, it issued an opinion on Quality of Service differentiation in mobile networks, enabling internet service providers (ISPs) to offer subscriptions with different Quality of Service as they should be able to agree with their customers while making sure that end-user rights are not infringed.

Traficom has updated its net neutrality guidance for ISPs and stressed in particular that they should give end-users a public IPv4 address free of charge when requested. According to Traficom, network address translation limits end-users' possibilities to exercise their right to freely use services and applications.

b. Roaming

On 27 April 2018, FICORA allowed Elisa to continue charging its subscribers for data roaming when

[210] Source: Finnish Competition and Consumer Authority.

in another Member State for another year. It also renewed DNA's authorisation to apply surcharges to its subscribers' roaming consumption in EU and European Economic Area (EEA) countries[211]. Furthermore, it also renewed the roaming derogations granted to Telia and Moi Mobiili.

Even though the operators mentioned above were granted derogations, most Finnish subscribers increased their consumption of roaming services when abroad. They have consumed 1.2 times more roaming minutes (calls made) in Q4-2017 than in Q4-2016 and 2.7 times more data in Q4-2017 than in Q4-2016. Finnish subscribers also consumed 1.2 times more roaming minutes (calls made) in Q1-2018 than in Q1-2017 and 2.9 times more roaming data in Q1-2018 than in Q1-2017.

c. Emergency communications — 112

112 is the only emergency number in use in Finland. As for disabled users, legislation already included requirements for network operators to implement 112 SMS in 2015.

Near instant times (up to 10 seconds) were also reported for the provision of network-based caller location by Finland[212]. On the other hand, the time needed to receive handset-based location was 5 seconds.

In 2018, Traficom initiated the update of the Regulation on technical implementation and ensuring emergency traffic (FICORA 33 G/2016 M)[213]. The update will include examining the technical requirements to VoLTE and VoWiFi emergency calls. It is expected to be ready in 2019.

d. Universal service

There have not been any changes to the scope of universal service. Public payphones, directories and/or directory enquiry services are not part of the universal service obligation.

A 2 Mbps broadband connection is within the scope of the universal service obligation. Broadband can be fixed or mobile. The download speed of the connection must be at least 2 Mbps. Some variation is allowed, but the average minimum speed must be 1.5 Mbps over a measurement period of 24 hours, and 1 Mbps over any measurement period of 4 hours.

5. Institutional issues

As of 1 January 2019, the Finnish Transport Safety Agency (Trafi), FICORA and certain functions of the Finnish Transport Agency merged to form Traficom, the new Finnish Transport and Communications Agency. Their functions and services have continued without interruption and will be further developed. There are some 900 employees at the Agency across 15 locations in Finland. By Governmental Decision of 19 December 2018, Mrs Kirsi Karlamaa[214] was appointed Director-General.

6. Conclusion

While Finland has good fixed broadband and 4G coverage in general, coverage in rural areas could be further improved. The main problem has been the lack of incentive for market players to invest in sparsely populated areas of the country. State aid rules were amended to tackle this issue. So far, many broadband rollout projects are ongoing as a result of better rules.

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[211] The renewed authorisation is valid from 15 April 2018.

[212] Implementation of the single European emergency number 112 – Results of the twelfth data-gathering round.

[214] Mrs Karlamaa had been appointed Director-General of FICORA from 22 October 2015 for a five-year term of office. The appointment decision is valid for a five-year term as of 20 December 2018.

In addition, Finland is a frontrunner when it comes to promoting 5G use nationwide. Parts of the necessary spectrum bands for 5G use cases were auctioned in November 2018 in significant blocks and at sustainable prices. Spectrum may already be used to construct 5G networks from the beginning of 2019. The relevant spectrum policy measure is part of a broader digital infrastructure strategy aligned with the Commission's connectivity objectives for Europe in 2020.

Sweden

	Sweden				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
1a1 Fixed broadband coverage % households	**99%** 2016	**99%** 2017	**97%** 2018	***16***	**97%** 2018
1a2 Fixed broadband take-up % households	**72%** 2016	**78%** 2017	**76%** 2018	***12***	**77%** 2018
1b1 4G coverage % households (average of operators)	**95%** 2016	**96%** 2017	**96%** 2018	***15***	**94%** 2018
1b2 Mobile broadband take-up Subscriptions per 100 people	**120** 2016	**122** 2017	**123** 2018	***7***	**96** 2018
1b3 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	**NA**	**NA**	**22%** 2018	***10***	**14%** 2018
1c1 Fast broadband (NGA) coverage % households	**75%** 2016	**78%** 2017	**86%** 2018	***16***	**83%** 2018
1c2 Fast broadband take-up % households	**45%** 2016	**57%** 2017	**60%** 2018	***5***	**41%** 2018
1d1 Ultrafast broadband coverage % households	**NA**	**76%** 2017	**84%** 2018	***8***	**60%** 2018
1d2 Ultrafast broadband take-up % households	**36%** 2016	**48%** 2017	**54%** 2018	***1***	**20%** 2017
1e1 Broadband price index Score (0 to 100)	**97** 2016	**87** 2017	**86** 2018	***15***	**87** 2017

1. Progress towards a gigabit society

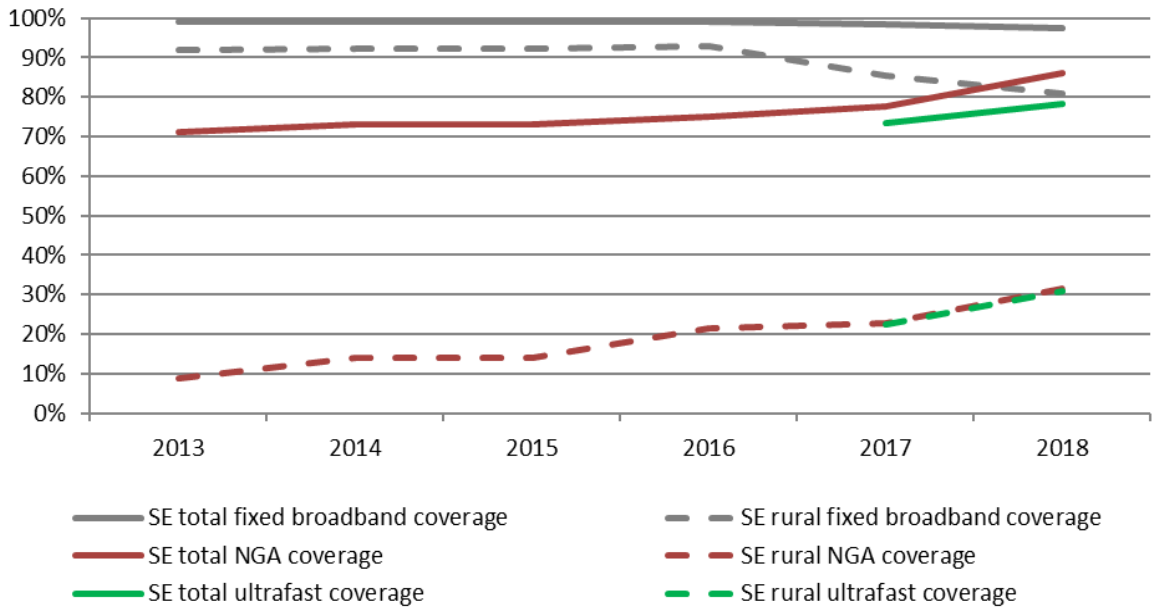
In its 2016 broadband strategy, Sweden set three ambitious goals: (i) by 2020, 95 % (as opposed to the initial 90 % target) of all households and businesses should have broadband access of at least 100 Mbps; (ii) by 2023, the whole country should have access to stable mobile services of good quality; and (iii) by 2025, the whole country should have access to high-speed broadband. According to the Swedish regulator's (PTS, Post- och Telestyrelsen) forecast and assessment, it seems that Sweden will not succeed in reaching them.

The European Agricultural Fund for Rural Development (EARDF) and national co-funding are used in the rural development programme and the European Regional Development Fund (ERDF) and regional and local co-funding in the regional development programmes for the period 2014-2020. Specifically, the budget for the 2014-2020 rural development programme was estimated at € 425 million from which 81 % was granted and 12.6 % was paid out. The budget for the 2014-2020 regional development programme was estimated at € 60 million and was fully granted and around 39 % was paid out. Currently, the Ministry examines the introduction of a national supply aid scheme under the General Block Exemption Regulation (GBER), which can be designed specifically for the market conditions in Sweden.

The high use of internet in Sweden and consumer demand for high-speed connections, in combination with the increased consumption of data-intensive services, are the main drivers for the deployment of very-high speed networks above 100 Mbit/s and for gigabit access. Households in single dwelling units have been willing to pay an installation fee of around € 2000 to connect their homes to a fibre network. There is political commitment at national and regional level for broadband deployment and digitalized public services, which stimulates consumer demand.

The broadband projects are progressing well. However, the remaining sparsely populated areas are still difficult to cover and there have been delays in deployment primarily due to permit granting procedures. PTS published a report analysing ways to make administrative permit-related processes more efficient. Based on this report, the government tasked the Swedish Transport Administration (Trafikverket) with reviewing their process of granting permits to deploy broadband along roads. PTS continues to work with authorities and stakeholders to find solutions to remove obstacles for an efficient broadband deployment. In addition, a discussion is ongoing for a national aid scheme to improve the allocation of funding, directing it to areas where it is most needed.

Fixed, NGA and ultrafast coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June. Ultrafast coverage metrics are available for 2017 and 2018.

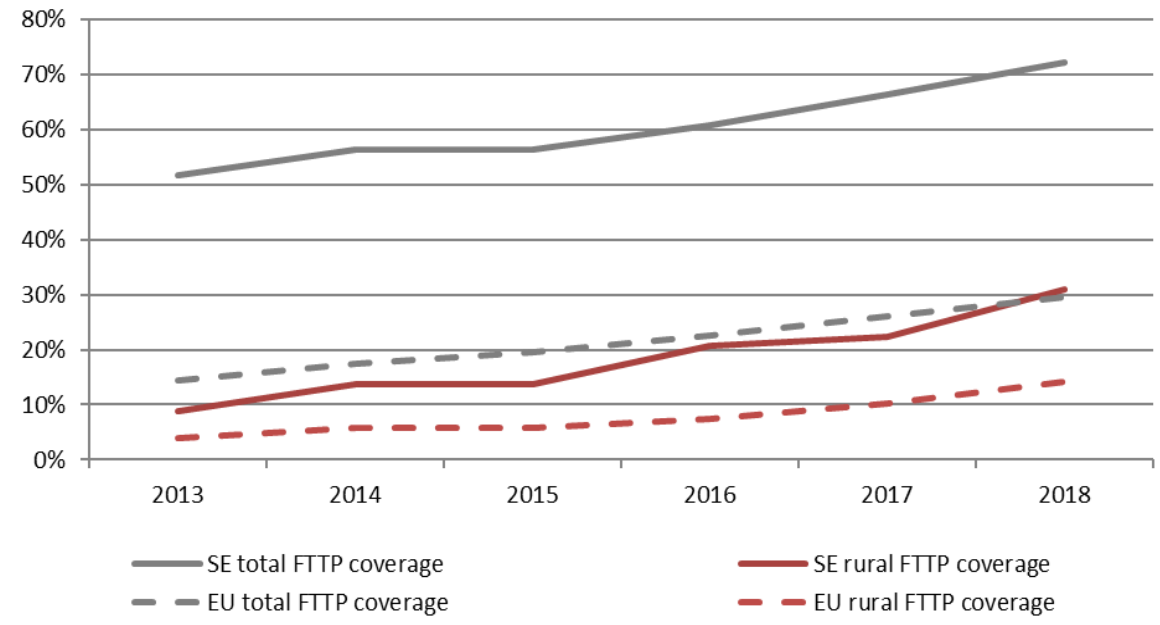
Sweden ranks fourth in connectivity scoring well above the EU average (70.4 against 59.3 for the EU). Fast broadband coverage increased from 78 % in 2017 to 86 % in 2018. Ultrafast broadband coverage also increased to 84 % and Sweden now ranked eighth among the other Member States.

Sweden's fibre to the premises (FTTP) total coverage increased to 72.2 % in 2018 (from 66.4 %) almost 2.5 times more than the EU average (29.6 %). Sweden achieved 31 % FTTP coverage in rural areas, which is more than double the EU average (14.2 %).

Sweden ranks tenth in 5G readiness scoring 22 % (two times higher than the EU average). By the end of 2018, it had assigned spectrum in the 700 MHz band, which will be available for use for 5G by 2020. In Sweden 14 trial licences in 9 different locations have been issued for spectrum in the 5G pioneer bands, 3.4-3.8 GHz & 24.25-27.5 GHz as well as in 2.3 GHz. Uninterrupted 5G wireless broadband coverage in all urban areas in Sweden as defined by the EU, is expected to be fulfilled by commercial rollout mainly in the 3.4-3.8 GHz band, which will be auctioned in 2020. In May 2018 PTS published a preliminary study on frequency use for 5G in the 24.25-27.5 GHz band, which was based on an assessment of the national situation as well as of the demand and need for frequencies for 5G in Sweden.

Sweden has already started working on the transposition of the European Electronic Communications Code (EECC). The Ministry has formed a team, which will be responsible for the transposition of the EECC and will work closely with PTS.

Fibre-to-the-premises (FTTP) coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June.

2. Market developments

In October 2018, the Commission approved, under the EU Merger Regulation, the Tele2's proposed acquisition of Com Hem. Tele2 was mainly active in mobile telecommunications, while Com Hem's main activities were in fixed telecommunications and cable-TV. The two companies decided to merge in order to create a leading integrated operator in Sweden's telecom market. The merged entity will trade under the Tele2 brand and will continue to face significant competition from other players such as Telia and Telenor, both active in all retail telecoms markets in Sweden, as well as 3 Sweden, which is active in the retail mobile telecom market in Sweden.

2.1. Fixed markets

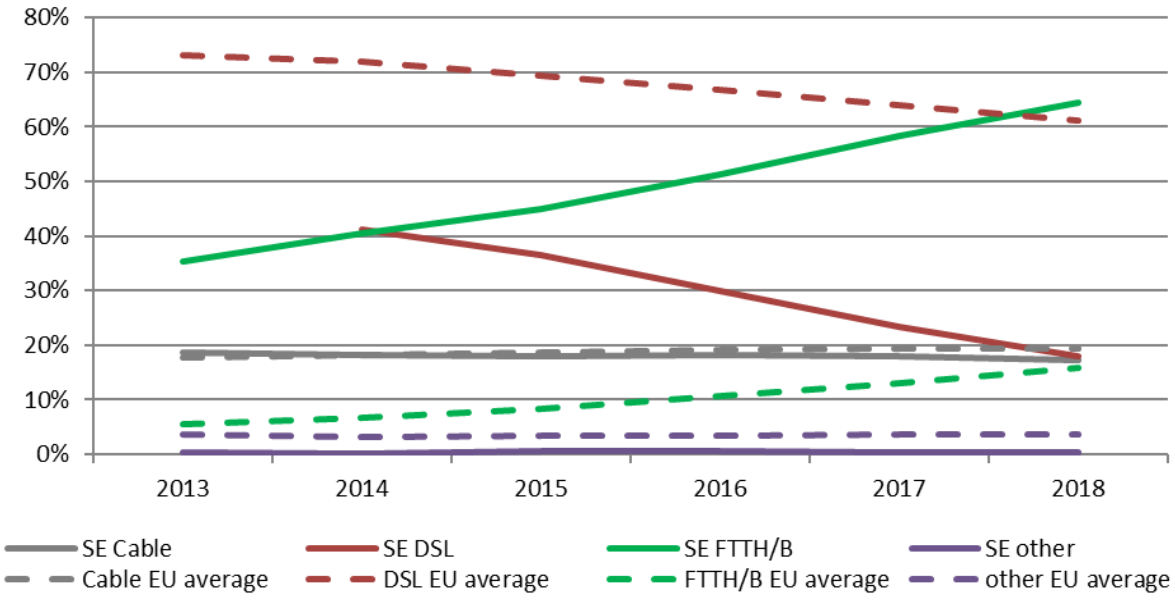
There are around 210 fixed network operators in Sweden and around 160 local fibre networks (active in approximately 180 municipalities). Municipality networks are usually active only at wholesale level, providing infrastructure to commercial Internet service providers (ISPs) – only 2.5 % of broadband subscriptions are provided by municipality networks acting as ISPs. Most of Sweden's 190 ISPs use infrastructure owned by someone else to provide their services (key exceptions: Telia, Com Hem). According to data from PTS, the incumbent, Telia, has the largest market share in the broadband market (32.7 %). Second in terms of market share is Com Hem, which has now merged with Tele2 (21.7 %), and third is Telenor (18.1 %).

Fibre dominates the fixed broadband market in Sweden. The number of fibre subscriptions is increasing, while the number of subscriptions via the legacy copper network (xDSL) is steadily decreasing. The cable and DSL market share fell in 2018 to 17.3 % (from 18.1 % in 2017) and 17.9 %

(from 23.3 % in 2017) respectively. The fibre to the home/building (FTTH/B) market share in Sweden (64.3 %) was more than 4 times the EU average in 2018 (15.9 %).

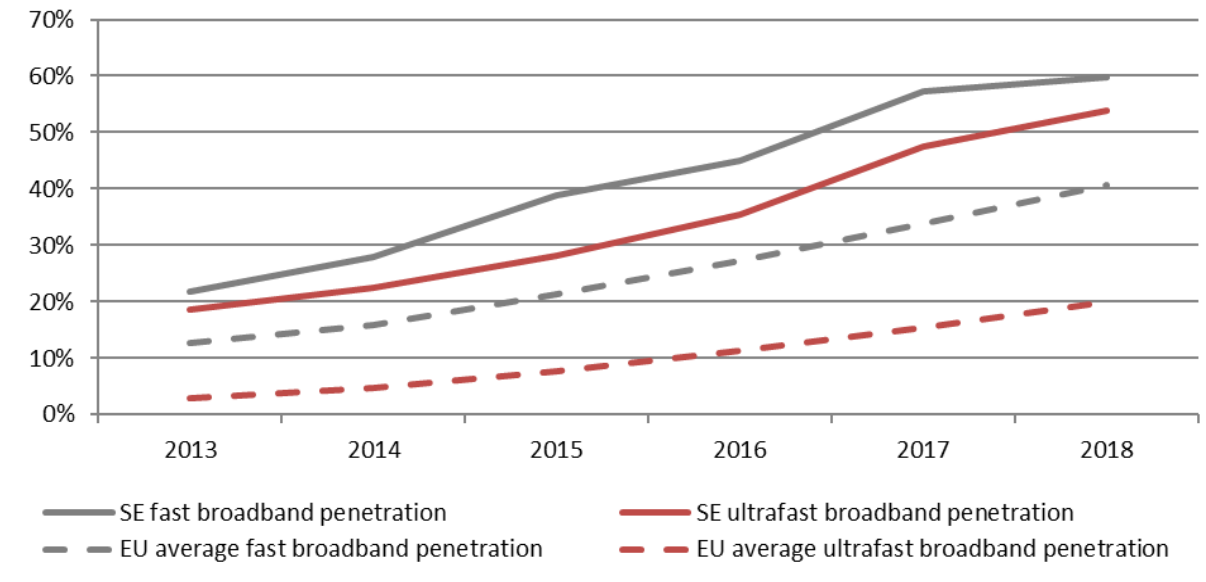
Take-up of fixed broadband showed a small decrease from 78 % in 2017 to 76 % in 2018. The share of fast broadband connections (providing at least 30 Mbps) is significantly higher than the EU average (60 % compared with 41 % across the EU) and has slightly increased since 2017, when it stood at 57 %.

Broadband market shares at Member State level by technology, % of fixed broadband lines, 2013-2018



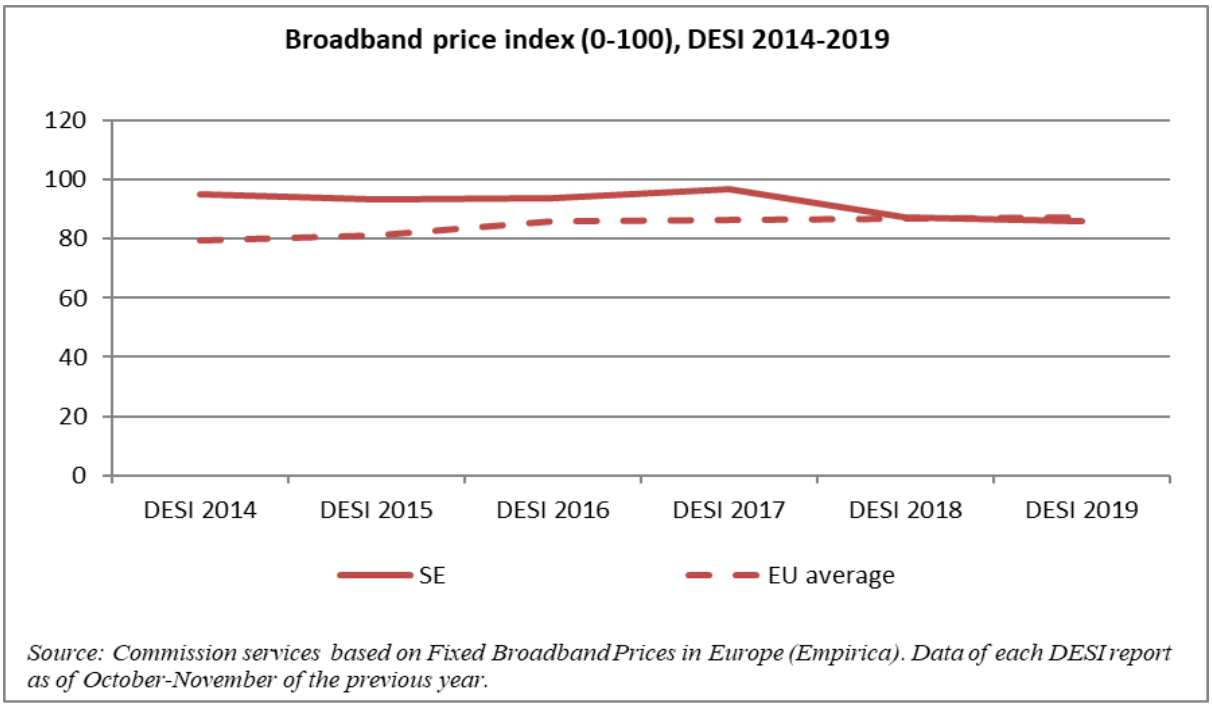
Source: Communications Committee (COCOM). Annual data as of 1st of July.

Fast and ultrafast penetration at Member State level, 2013-2018



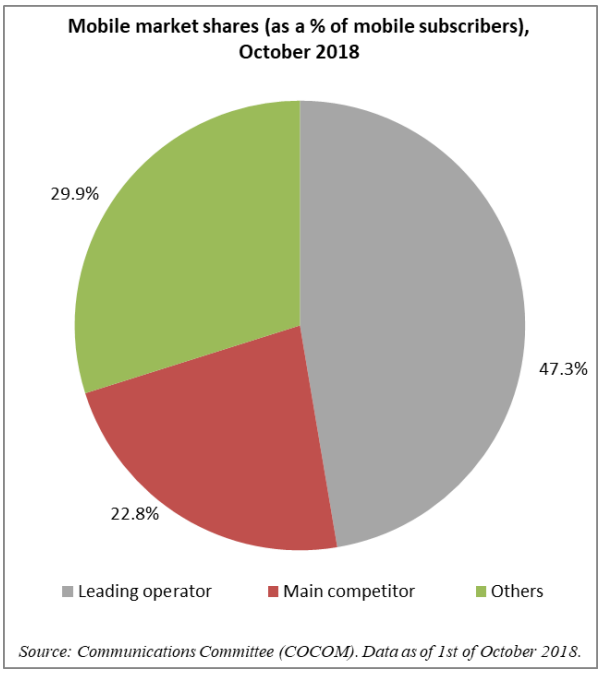
Source: Communications Committee (COCOM). Annual data as of 1st of July.

Fast broadband penetration in Sweden increased to 54.1 % in 2018 (from 43 % in 2017) remaining above the EU average (40.6 %). Ultrafast broadband penetration reached 30.1 % in 2018 (17.6 % in 2017), which is higher than the EU average (19.9 %). In 2018 there was a slight increase of the fixed broadband price index(86 out of 100 compared with 87 out of 100 in 2017) representing a small price increase for high-speed broadband, although prices in Sweden remain close to the EU average (87 out of 100)[215].



Source: Commission services based on Fixed Broadband Prices in Europe (Empirica). Data of each DESI report as of October-November of the previous year.

2.2. Mobile markets



Source: Communications Committee (COCOM). Data as of 1st of October 2018.

The Swedish mobile market is a competitive market, with five mobile network operators dominating it: Telia, Tele 2, Telenor, 3 Sweden and Net 1, an operator offering services in the 450 MHz band. There are also several mobile virtual network operators (MVNOs) with very limited market shares. In November 2016, Tele2 bought the MVNO TDC Sweden. The incumbent, Telia, continues to have the largest market share (47.3 %). Its main competitor and second largest operator follows with a market share of 22.8 %.

Sweden has the seventh highest mobile broadband penetration in the EU in 2018. Specifically, take-up of mobile broadband reached 123 % and is one of the highest in Europe. Sweden still has competitive mobile broadband prices that are

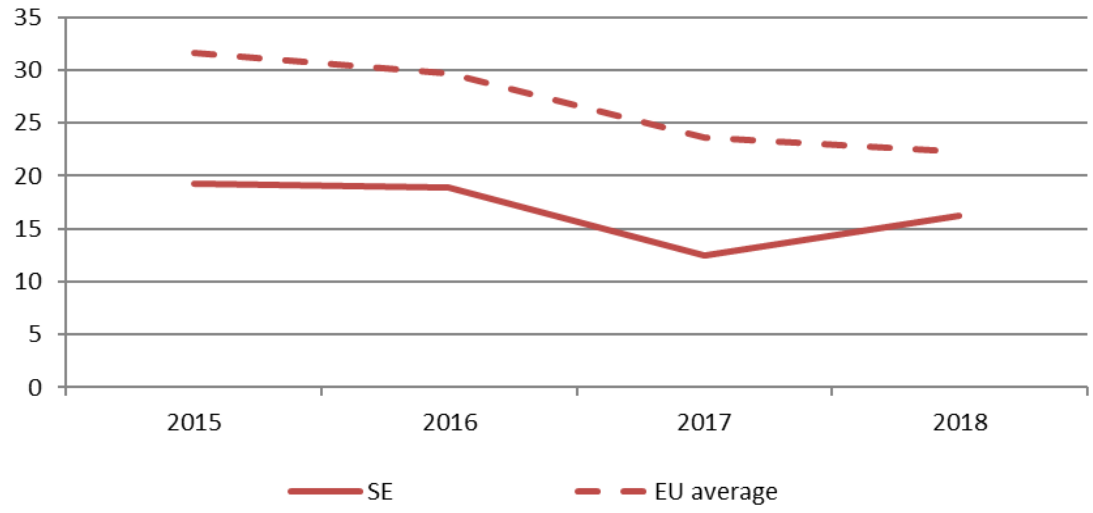
[215] The fixed broadband price index weighs the cheapest retail offers from standalone, double play (BB + TV, BB + fixed telephony) and triple play (BB+TV+fixed telephony) and three speeds categories - 12-30 Mbps, 30-100 Mbps and +100 Mbps. This indicator presents values from 0 to 100 (which should not be read as prices) and the higher the values, the better the country performs in terms of affordability of prices relative to purchasing power.

lower than the EU average. Based on the Mobile Broadband Price Study, the least expensive offer for handset (1GB+300 calls basket) in Sweden was €/PPP 16.2 in 2018, while the EU average price was €/PPP 22.30 in 2018.

Swedish mobile operators all share infrastructure in various partnerships, while competing at retail level. The build-up of the excellent 3G coverage in Sweden was boosted by the network sharing arrangements of Telia and Tele 2 (infrastructure joint venture Svenska UMTS-nat AB (SUNAB)) and of Telenor and 3 Sweden (3G Infrastructure Services AB (3GIS)) in the 2100 MHz band, initially licenced with coverage obligations. Net4Mobility, owned by Tele2 and Telenor, has explicit coverage requirements in its 800 MHz licence.

The phase-out of 2G and 3G will be a market-based process in Sweden. One important factor is that the 900 MHz and 2100 MHz licences expire at the end of 2025. Tele2 and Telia announced that their 3G infrastructure joint venture SUNAB is to begin from the end of 2018 phasing out its networks with a view to shutting down its 3G services completely by 2025. Customers will be migrated from 3G to 4G networks. PTS expects a slower phase-out of 2G than 3G due to the 2G M2M/IoT connections that are largely installed in Sweden.

Least expensive offer for handset (1 GB + 300 calls basket) at Member State level, EUR/PPP, 2015-2018



Source: Mobile Broadband Price Study (Van Dijk and Empirica). Prices expressed in EUR/(Purchase parity power - PPP), VAT included. Annual data as of February.

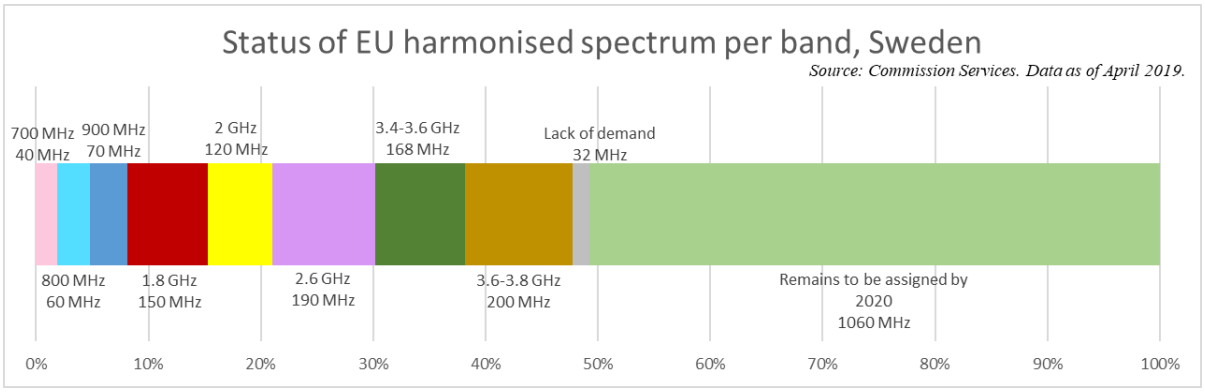
3. Regulatory developments

3.1. Spectrum

In Sweden, 48 % of the spectrum harmonised at EU level for wireless broadband has been assigned[216]. The spectrum still to be assigned is mainly in the 1.5 GHz band, the 3.4-3.8 GHz and the 26 GHz bands.

[216] The 5G spectrum readiness indicator is based on the amount of spectrum already assigned and available for use for 5G by 2020 within the so-called 5G pioneer bands in each EU Member State. For the 3.4-3.8 band this means that only licences aligned with the technical conditions annexed to Commission Decision (EU)2019/235, are considered 5G-ready. On the contrary, the percentage of harmonised spectrum takes into account all assignments in all harmonised bands for electronic

In December 2018, Sweden concluded the 700 MHz auction authorising 2×10 MHz for Telia and 2×10 MHz (two lots on 2x5 MHz) for Net4Mobility (Tele2 and Telenor joint venture), while the SDL (Supplemental Downlink) spectrum remained unsold thus leading to high prices relative to the investment needs, i.e. 67 euro cent/MHz/pop. The 2×10 MHz FDD (Frequency Division Duplex) lot has an associated coverage obligation, which ensures that at least SEK 300 million will be used to improve coverage in areas that are located in the vicinity of roads, households and holiday homes and lack outdoor coverage for voice services and/or data services of 10 Mbit/s. As initially announced, an additional 2x10 MHz FDD lot has been kept available for digital terrestrial television (DTT)[217] until the end of 2019. There has been discussions to use this spectrum for a future blue light (Public Protection and Disaster Relief) network but the Government has not decided on the issue. The licences run for 22 years. There were complaints from the market players regarding the spectrum cap, reserve price for SDL lots and the design of the auction. The outcome of the recent 700 MHz spectrum auction could however be appealed. 3 Sweden had already appealed against the auction's spectrum cap in July 2018 but the appeal was rejected by the administrative court since the auction had not taken place at that time.



Preparations for the 3.4-3.8 GHz band auction started in May 2018 and a first consultation was launched in early 2019. The final version of the call for application is scheduled for the third quarter of 2019 and the auction is planned for the first quarter of 2020 at the latest. The National Regulatory Authority is discussing whether to reserve 100 MHz out of the 400 MHz available for local licences in the 3.7-3.8 GHz band. The mobile operators voiced concerns for this reservation of spectrum, against a similar spectrum cap as the one applied in the 700 MHz band auction and with the fact that the auction will take place only in 2020.

In May 2018, PTS published a preliminary study on 5G frequency use in the 24.25-27.5 GHz band based on an assessment of the situation in Sweden as well as the demand and need for 5G frequencies in Sweden. At the time, it was unclear how much of the 24.25–27.5 GHz band would be allocated for 5G, due to the co-existence issues with Earth Exploration Satellite Service (EESS) below 26 GHz. Based on the response received, PTS decided to proceed with auctioning the band only when the conditions for the entire band are clear. The plan is to allow the use of at least 1 GHz in this band by 31 December 2020, as the upper 1 GHz of the 24.25-27.5 GHz band is unused.

communications services (including 5G pioneer bands), even if this does not meet the conditions of the 5G readiness indicator.

[217] Ku2018/02272/MF.

3.2. Regulated access

The previous reviews of the market for wholesale local access provided at a fixed location (Market 3a of the 2014 Recommendation on relevant markets[218]) and of the market for wholesale central access provided at a fixed location for mass-market products (Market 3b of the 2014 Recommendation on relevant markets) date back to 2015. PTS is planning to launch a second consultation on Market 3a during Q2 2019 (consulting complete draft decisions including remedies). PTS will then notify the Commission of the draft decisions in due course.

In June 2018, PTS undertook a public consultation on the market analysis of Market 3a. PTS concluded that copper and fibre in a forward-looking perspective are no longer on the same product market, leading to the conclusion of two separate relevant product markets at both retail and wholesale level. PTS noted that consumers ask for ultrafast broadband with speeds that only fibre can provide. Its analysis shows that Telia has such an economical position on both submarkets justifying the continued regulation of Market 3a.

Regarding Market 3b, while there was no public consultation on market analysis, PTS has been monitoring the market developments and concludes that the competitive situation remains satisfactory and that regulation on Market 3a would be sufficient as to ensure effective competition at retail level. Consequently, PTS believes that Market 3b should remain unregulated.

In September 2018, PTS adopted a new cost model to calculate fixed termination rates and wholesale local access prices. PTS developed this model with the purpose of being able to determine prices within the framework of PTS's regulation of the fixed network to boost competition and to assess long-term investment costs for the digitalisation of Sweden. The new cost model is a Bottom-up Long Run Incremental Cost (BU-LRIC) model, based entirely on fibre infrastructure, with economic adjustments for calculating copper based service. The modelled operator is a hypothetical efficient operator that is vertically integrated and has national coverage. The new proposed weighted average cost of capital (WACC) is 6.3 % (previously 7.5 %). New fixed termination rates (FTR) (Market 1 of the 2014 Recommendation on relevant markets) and local loop unbundling (LLU) (copper) prices have been set from 1 October 2018.

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) and for wholesale voice call termination on individual mobile networks (Market 2 of the 2014 Recommendation on relevant markets) will be consulted with operators in Q2 2019 and thereafter notified to the Commission in Q3 2019.

PTS continues to regulate the broadcasting market (the market for broadcasting transmission services to deliver broadcast content to end users, Market 18 of the 2003 Recommendation on relevant markets[219]). PTS last notified the Commission a review of this market in 2016. The market for broadcasting transmission services is no longer listed in the Recommendation on relevant markets due to evidence of greater platform competition in the majority of Member States and fewer capacity

[218] 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.

[219] 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 (Text with EEA relevance) (notified under document number C(2003) 497).

constraints. This can be attributed to the transition from analogue to digital transmission platforms. While recognising the special characteristics of the Swedish market, the Commission has invited PTS to closely monitor market developments and to carry out a new market analysis as soon as possible. A consultation on Market 18 will take place during Q2 2019. The Commission will then be notified of the market analysis in Q3 2019.

4. End-user matters

According to the 2018 consumer markets scoreboard[220], from a consumer perspective, the performance of the mobile telephone services in Sweden has recorded an important improvement by 4.9 points at the market performance index (MPI)[221], between 2015-2017, but still scores 2.7 percentage points below the market's EU average score. Internet provision showed a small improvement by 0.8 points at the market performance index in the period 2015-2017 but its MPI score is 3.1 points below the market's EU average. However, internet provision is the market with the greatest improvement since 2013 (+7.3 percentage points of MPI). Fixed telephone services recorded no improvement in the period 2015-2017 and they have an MPI, which is 3.8 points below the market's EU average score.

From 1 January 2018 to 31 December 2018, PTS received overall 2.344 complaints, the topics of which were as follows: numbers (including for example problems related to number portability, strange numbers calling, so called spoofing), interruption of services, discontentment with the ongoing withdrawal of copper based network by Telia, problems related to coverage and questions about universal services at the new 10 Mbit/s speed. As far as the complaints about fibre connections are concerned, consumers face delays in the delivery time of the fibre connection and the disputes concern the fee for cancellation in case of withdrawal and the duration of contracts. A number of the complaints are linked to the fact that the incumbent, Telia, is discontinuing the regular land-line (copper line) in exchange for more future-proof and modern technology, such as mobile network services and fibre.

However, it could be clarified that PTS, as a national regulatory authority, does not provide legal guidance or support in individual cases regarding the end-user's issues from a civil law perspective. The authority provides information on the legal framework on electronic communications and general guidance on possible ways forward for end-users who are experiencing issues with their provider of electronic communications. If the issue is regulated under the Swedish electronic communications Act (2003:389), the authority can enforce specific provisions. The Swedish Telecom Advisors, a consumer advising organisation, offer legal advice based on the framework for electronic communications as well as general consumer and contract law, in the area for telecoms. They also help individual consumers to solve disputes and liaise with providers. PTS cooperates with both the Swedish Telecom Advisors and the Swedish Consumer Agency, which handles the complaints on telecom related end-user issues, i.e. on industry agreements and national guidelines. The Swedish Board for Consumers Disputes, provides out-of-court dispute resolution.

As far as transparency and publication of information is concerned, PTS publishes a price report every year. It includes different price comparisons, for example tariffs for broadband and telephony, and compares how prices have evolved within a certain period. The PTS price report is based on an international price comparison (in a selection of 16 OECD-countries) for the services concerned, such as fixed and mobile broadband etc. The statistics are available on PTS' portal for statistics. The report

[220] Consumer Markets Scoreboard, 2018 Edition, Justice and Consumers, European Commission.
[221] The MPI is a composite indicator ranging from 0 to 100 which measures how well a given market performs according to consumers.

also describes market trends. PTS had a price comparison tool, between 2005 and 2012, but the experience was negative and it was difficult to keep the information up-to-date. However, there are other comparison tools available in the market.

a. Net neutrality

On 28 September 2018, the Stockholm Administrative Court rejected Telia's appeal against the decision issued on the traffic management case initiated in 2016. PTS took two enforcement decisions related to zero-rating offers provided by Telia. The case concerned traffic management that infringed Article 3(3) of Regulation (EU) 2015/2120 on Telia's free streaming offers. Specifically, Telia had offered free use of specific social media ('Free surf on social media' (Social) and 'Free surf listening' (Listen)), once end-users had used up their data volume. The Court found that the technical measure taken by Telia under the two zero-rating offers, constitute a traffic management measure covered by Article 3(3) of the Regulation. The court ruled against Telia[222] and upheld PTS decisions on the case.

PTS issued a decision[223] in 2018 on 3 Sweden's zero-rating offer 3Musiksurf. PTS found that 3 Sweden's processing of data traffic required consent from users according to Section 17 of Chapter 6 of the Swedish Electronic Communications Act. Despite the fact that this decision was not based on Article 3(4) of the Regulation (EU) 2015/2120, it can be seen as a case related to the Regulation since there is a zero-rating offer involved and it relates to the processing of personal data when traffic management measures are undertaken.

In mid-December 2018, PTS opened a formal monitoring case against the ISP Bahnhof for suspected traffic management measures in breach of Article 3(3) of Regulation (EU) 2015/2120. Bahnhof has allegedly blocked access to specific websites. PTS has requested more information from the ISP in order to assess whether traffic management measures have been taken and if so whether these are in breach of Regulation (EU) 2015/2120.

b. Roaming

According to the study "International Roaming BEREC Benchmark Data Report October 2017 - March 2018, BoR"[224] , there is a definite upward trend in the consumption of roaming services in Sweden. The reported data indicate that traffic for calls made grew by 1.5 % in Q1 2018, compared to Q1 2017[225]. Data traffic increased by 4 % in Q1 2018 compared to Q1 2017[226].

As far as prices are concerned, the average wholesale price per minute for roaming voice calls in Sweden has decreased from 1.50 euro cents in Q4 2017 to 1.39 euro cents in Q1 2018, while the EU average price for Q1 2018 is 2.06 euro cents.[227] The average wholesale data price per MB has been also decreased from 0.20 euro cents in Q4 2017 to 0.10 euro cents in Q1 2018, while the EU average price for Q1 2018 is 0.27 euro cents.[228].

During summer 2018, PTS identified six cases of confirmed or potential non-compliance with the roam like at home (RLAH) rules, which are provided in Regulation (EU) 2015/2120 and have applied since June 2017.

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[222] Stockholm Administrative Court 28 September 2018, case no. 4207-17.
[223] PTS Decision of 25 January 2018, ref.no. 15-9830. This decision cannot be appealed.
[224] International Roaming BEREC Benchmark Data Report October 2017 - March 2018, BoR (18) 160, Date of registration: 10.10.2018, https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/8251-international-roaming-berec-benchmark-data-report-october-2017-march-2018 .
[225] Figure 31 of the International Roaming BEREC Benchmark Data Report October 2017 - March 2018.
[226] Figure 72 of the International Roaming BEREC Benchmark Data Report October 2017 - March 2018.
[227] Figure 18 and 19 of the International Roaming BEREC Benchmark Data Report October 2017 - March 2018.
[228] Figures 59 and 60 of the International Roaming BEREC Benchmark Data Report October 2017 - March 2018.

Four of the cases concerned non-application of national retail prices for calls made when roaming in the EU/EEA. The four Mobile Virtual Network Operators (MVNOs) updated their price information in compliance with Regulation (EU) 2015/2120 and the cases were closed. The other two cases concerned a respectively lack of notification from two MVNOs to PTS of the applicable fair use policy and wrong fair use policy data limits while roaming, i.e. non-compliance with Article 4(2) of Commission Implementing Regulation 2016/2286[229]. The first case was resolved after the MVNO updated its fair use policy. The second case was resolved after the MVNO changed its offer following the intervention and decision of PTS concerning fair use volume for open data bundles according to Article 4(2) Commission Implementing Regulation.

A case against 3 Sweden, opened in 2017, was finally resolved in July 2018 after PTS formally issued an injunction against the operator. Specifically, 3 Sweden had a zero rating offer on certain music streaming service offered only nationally and not while roaming. Following to PTS's decision, the operator adjusted its zero rating offer so that it also apply while roaming. PTS investigated a similar case with Telenor, which also had a zero rating offer for streaming TV not applicable while roaming. The operator changed the offer voluntarily during the investigation process.

c. Emergency communications - 112

The European emergency number 112 is the main emergency number in use in Sweden. Mobile and landline caller location is provided by automatic pull from database and the time needed to provide it is less than 1 second on request. In addition, the area of location given by cell-ID is around 3 km2 on average. People with disabilities can access emergency services by text message (SMS), relay services as well as videophone and total conversation. The most common way for disabled end-users to access emergency number 112 is via relay services, which are procured by PTS and offered free of charge to end-users.

d. Universal service

There is currently no designated universal service provider in Sweden. In March 2018, the national universal service regulation was amended to ensure that broadband/functional access to the internet is now set at a minimum speed of 10 Mbps instead of 1 Mbps. PTS is responsible for ensuring that all permanent residences and permanent establishments can access telephony and/or the internet. Since March 2018, private persons or companies can apply for government funding for access to telephony and/or the internet at a fixed location. Lack of access is defined as no offers on the market under SEK 5, 000 (€ 500) for access to telephony or internet access that can deliver 10 Mbps. Sweden provides state funding, if permanent residences or permanent establishments cannot access telephony and/or the internet for less than SEK 5, 000 (€ 500) and uses in this respect social allowances rather than a system of social tariffs. Funding for universal service is achieved by public procurement and, as a result, the net-cost has not been calculated and there were no unfair burden claims.

5. Institutional issues

There is an increasing tendency to appeal significant market power (SMP)-decisions and all SMP-decisions were appealed in the last few years (including deregulation of markets). Most of the appeals concern decisions directed at other operators and one operator is over-represented (80 % of the appeals).

[229] Commission Implementing Regulation 2016/2286 of 15 December 2016 laying down detailed rules on the application of FUP and on the methodology for assessing the sustainability of the abolition of retail roaming surcharges and on the application to be submitted by a roaming provider for the purposes of that assessment.

6. Conclusion

Sweden is a front-runner in ultrafast connectivity and one of the most competitive telecoms markets in Europe. It ranks tenth in the 5G readiness scoring 22 %. This is substantially higher than the EU average (14 %) showing the country's potential as far as 5G roll out is concerned. The biggest challenge in achieving the goals of its ambitious broadband strategy by 2020 is to address the difficulties of rollout and coverage in the remaining sparsely populated areas. In this respect a spectrum policy consistent with its investment needs will be key. The Ministry and PTS continue to work with the authorities and stakeholders in order to solve the delays with the permit granting procedures and to achieve a more efficient allocation of funding.

United Kingdom

	United Kingdom				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
1a1 Fixed broadband coverage % households	**>99.5%** 2016	**100%** 2017	**100%** 2018	***1***	**97%** 2018
1a2 Fixed broadband take-up % households	**87%** 2016	**88%** 2017	**93%** 2018	***2***	**77%** 2018
1b1 4G coverage % households (average of operators)	**93%** 2016	**98%** 2017	**98%** 2018	***11***	**94%** 2018
1b2 Mobile broadband take-up Subscriptions per 100 people	**91** 2016	**89** 2017	**99** 2018	***10***	**96** 2018
1b3 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	**NA**	**NA**	**0%** 2018	***13***	**14%** 2018
1c1 Fast broadband (NGA) coverage % households	**92%** 2016	**94%** 2017	**95%** 2018	***7***	**83%** 2018
1c2 Fast broadband take-up % households	**37%** 2016	**47%** 2017	**53%** 2018	***12***	**41%** 2018
1d1 Ultrafast broadband coverage % households	**NA**	**48%** 2017	**52%** 2018	***24***	**60%** 2018
1d2 Ultrafast broadband take-up % households	**10%** 2016	**15%** 2017	**16%** 2018	***18***	**20%** 2017
1e1 Broadband price index Score (0 to 100)	**85** 2016	**87** 2017	**86** 2018	***17***	**87** 2017

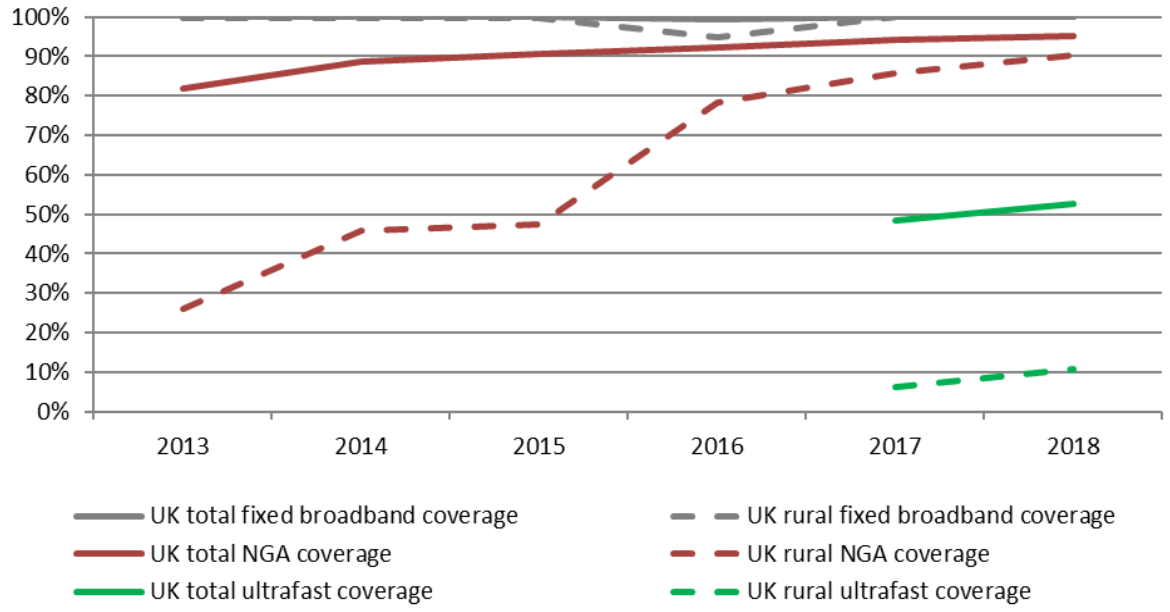
1. Progress towards a gigabit society

The United Kingdom ranks first on standard fixed broadband coverage and is above the EU average on next generation access coverage. However, it lags behind on ultrafast coverage in both relative and absolute terms. While total ultrafast coverage is on average 8 percentage points below the EU average, ultrafast coverage in rural areas is almost 19 percentage points below the EU average. The underlying reason is geographical characteristics, with large areas of the UK being remote and rural. Furthermore, this figure reflects mainly the wide availability of upgraded legacy networks — the UK's fibre to the premises (FTTP) networks only cover 3.8 % of the population (EU 29.6 %). The deployment of gigabit networks in the UK relies, and most probably will continue to rely, on private investments in the main, supported by public investment in less commercially viable areas of the country.

As regards FTTP coverage, while it increased by almost 1 million premises compared to 2017, it continues to be almost 26 percentage points below the EU average. Its rural FTTP coverage is higher than the total, but still approximatively 8 percentage points lower than the EU average. This growth is reportedly due to the increased investment activity of the incumbent, Openreach, as well as a number of alternative network operators. Openreach has committed to rolling FTTP out to 3 million premises by 2020 and is already at 1.2 million premises passed. Virgin Media, currently the UK's second largest broadband network, is also expanding its FTTP footprint through its Project Lightning programme. CityFiber raised over GBP 1 billion as a part of their proposed GBP 2.5 billion investment to bring full fibre to five million homes. It also reached an agreement with Vodafone to purchase services from its wholesale network. Vodafone announced its intention to make full fibre available to one million premises across 12 cities by 2021, possibly extending it to a further four million premises by 2025. Hyperoptic has brought forward its target of two million homes passed to

2021 (from 2022) and its target of five million homes passed to 2024 (from 2025), following a successful debt raise of £250 million and Abu Dhabi's sovereign investment fund acquiring a minority stake. TalkTalk is currently adding a further 40,000 premises in York and plans to complete this by the end of 2019. It also has an ambition to go further in the future and expand its FTTP network to three million premises with its FibreNation venture. There are also a number of other alternative networks active in this space, including Gigaclear which focuses on FTTP in rural areas.

Fixed, NGA and ultrafast coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June. Ultrafast coverage metrics are available for 2017 and 2018.

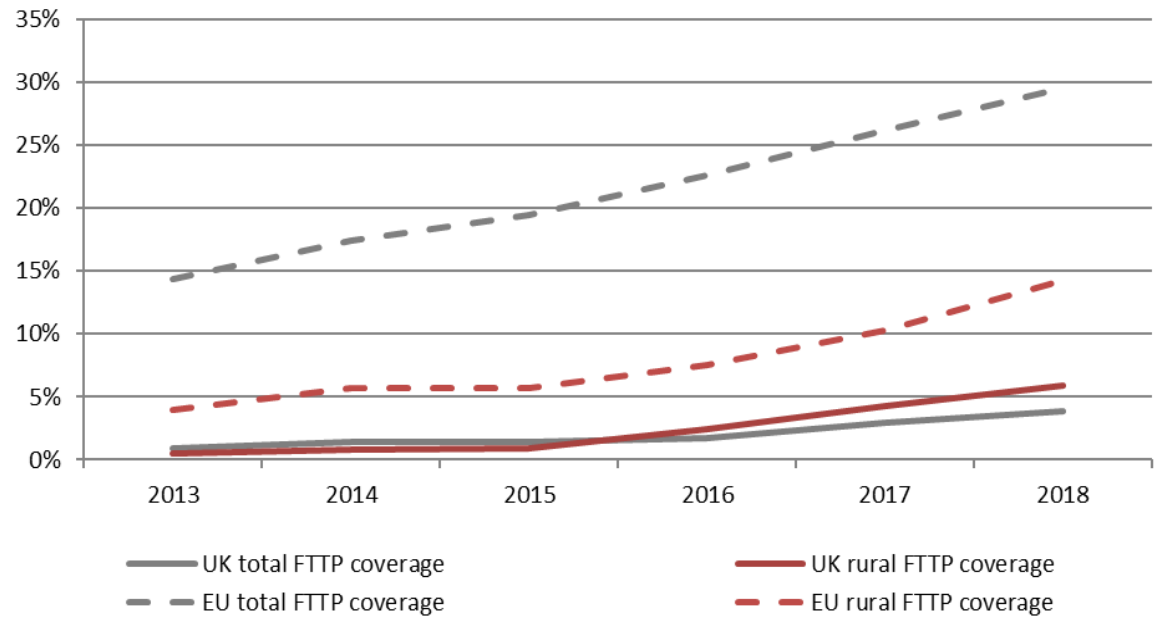
On 23 July 2018, the British Government published its future telecoms infrastructure review in which it set out its long-term strategy to support the development of gigabit capable, full fibre networks and 5G. On the issue of underinvestment in fibre deployment in rural and non-competitive areas[230], the government intends to apply the 'outside-in' approach. The first step of this approach will pilot a model to fund fibre connections for local hubs, starting with primary schools, alongside vouchers for gigabit-capable connections to homes and businesses. Within The Department for Digital, Culture, Media & Sport, the Barrier Busting Task Force was established to identify barriers to fixed and mobile network deployment and overcome them in cooperation with industry, local authorities and stakeholders. Some incentives for faster full fibre rollout were put in place, such as 100 % business rates relief for operators that install new fibre on their network during the first 5 years[231].

On 24 July 2018, the UK's telecoms regulator Ofcom published its strategy 'Regulatory certainty to support investment in full fibre broadband'[232]. It complements the future telecoms infrastructure review and outlines its strategic approach to facilitating fast full fibre rollout. Plans include regulating business and residential markets together. Regarding Openreach's ducts and poles, Ofcom plans to

[230] The government estimated that 10 % of the UK (approximately 3 million premises) can be categorised as both rural and non-competitive areas.
[231] Telecommunications Infrastructure Act 2018.
[232] https://www.ofcom.org.uk/__data/assets/pdf_file/0025/116539/investment-full-fibre-broadband.pdf

implement unrestricted access, which would halve the upfront costs of building the full fibre network. As competition in full fibre develops, Ofcom plans to move to further geographic segmentation and published consultations on this in December 2018 and March 2019.

Fibre-to-the-premises (FTTP) coverage, total and rural at Member State level (% of households), 2013-2018



Source: Commission services, Broadband coverage in Europe Study, commissioned to IHS and Point Topic. 2013-2014 data as of end of December; 2015-2018 data as of end of June.

There are several funding programmes in place in the UK. The local full fibre networks programme has been allocated GBP 290 million of national funding from 2017 to 2021[233]. Thanks to the rural gigabit connectivity programme, GBP 200 million of national funding will be allocated from April 2020 to April 2022 for broadband in rural areas. Under the superfast broadband programme, GBP 85.5 million has been allocated for 2018-19 and 2019-20. The Department for Environment, Food and Rural Affairs announced a GBP 75 million investment through the rural broadband infrastructure scheme, with plans to utilise EU funding from the rural development programme for England 2014-2020 (funded by the European Agricultural Fund for Rural Development). In the WiFi4EU first call, only 15 eligible British entities won €15,000 vouchers.

The UK aims to be a world leader in 5G and to ensure that most of the population has access to a 5G signal by 2027. The UK has had a 5G strategy since March 2017, which was updated in December 2017. The UK Government's Future Telecoms Infrastructure Review builds on its 5G Strategy, and sets out the steps the UK will take to deliver its ambitions on 5G technology.

The Government's 5G Testbeds and Trials Programme, working in partnership with industry and others, aims to stimulate the market for 5G services, including calls for 5G security and self-driving cars and improve the commercial case for investment. After running a competition as part of the 5G Testbeds and Trials Programme's first phase of funding, in March 2018, the UK Government selected

[233] It was announced in March 2018 that the first wave provided over GBP 95 million for 13 areas. https://www.gov.uk/guidance/local-full-fibre-networks-programme

six proposals from across the UK[234]. As part of a second phase of investment, the 5G Programme is currently working on the creation of large-scale testbeds - the Connected Communities projects - in both rural and urban settings. In September 2018, the location for the Urban Connected Community (UCC) project was announced as the West Midlands, with up to GBP 50 million available to the project. The Government is currently working on the development of one or multiple large-scale rural projects, the Rural Connected Communities (RCC) project, which will launch in 2019 and is expected to run until 2021. The Government is also considering running 5G projects that will have a primary focus on specific vertical industry sectors. These projects are currently being explored, with activities expected to commence in the summer.

The 700 MHz clearance programme is a government-funded programme to clear some of the 700 MHz spectrum currently used by digital terrestrial television and programme making and special events licensees. Ofcom assigned 150 MHz of time division duplex' spectrum in the 3.4-3.6 GHz band in 2018. Moreover, spectrum auctions for 700 MHz and 3.6-3.8 GHz are planned only for early 2020. Ofcom's proposal for the 3.6–3.8 GHz band includes options on how to facilitate the rearrangement of fragmented holdings in the band to ensure large contiguous blocks suitable for 5G use. As a result, the UK, together with 17 other Member States, did not score on the 5G indicator[235].

2. Market developments

here have been no significant new entrants or changes in market share in 2018.Contrary to service-based competition, the trend of increasing infrastructure competition started to develop in 2018. In its strategy 'Regulatory certainty to support investment in full fibre broadband', Ofcom also announced its intention to incentivise companies to build networks by opening up infrastructure to competing operators, e.g. Openreach's duct and pole network. The goal is to increase infrastructure competition involving alternative operators that would compete with Openreach.

The number of minutes originating on fixed networks has continued to fall both in absolute and relative terms compared to mobile calls. The volume of outgoing calls from mobile phones continued to decline throughout 2018 (falling from 2,586 million minutes to 2,167 million minutes)[236].

The number of fixed lines decreased for the second successive year in 2017, declining from 32.2 m. at the end of 2017 to 32.0 m. at the end of 2018.[237] The number of mobile connections has continued to grow and increased by 0.5 m. over the same period. Overall, 96 % of households has a mobile phone and 81 % had a landline in their home in Q1 2018[238].

2.1. Fixed markets

With 78.6 %, DSL is the predominant technology for broadband in the UK. Cable remains stable at around 20 %. Fibre to the home/building is increasing, butlags behind the EU average.

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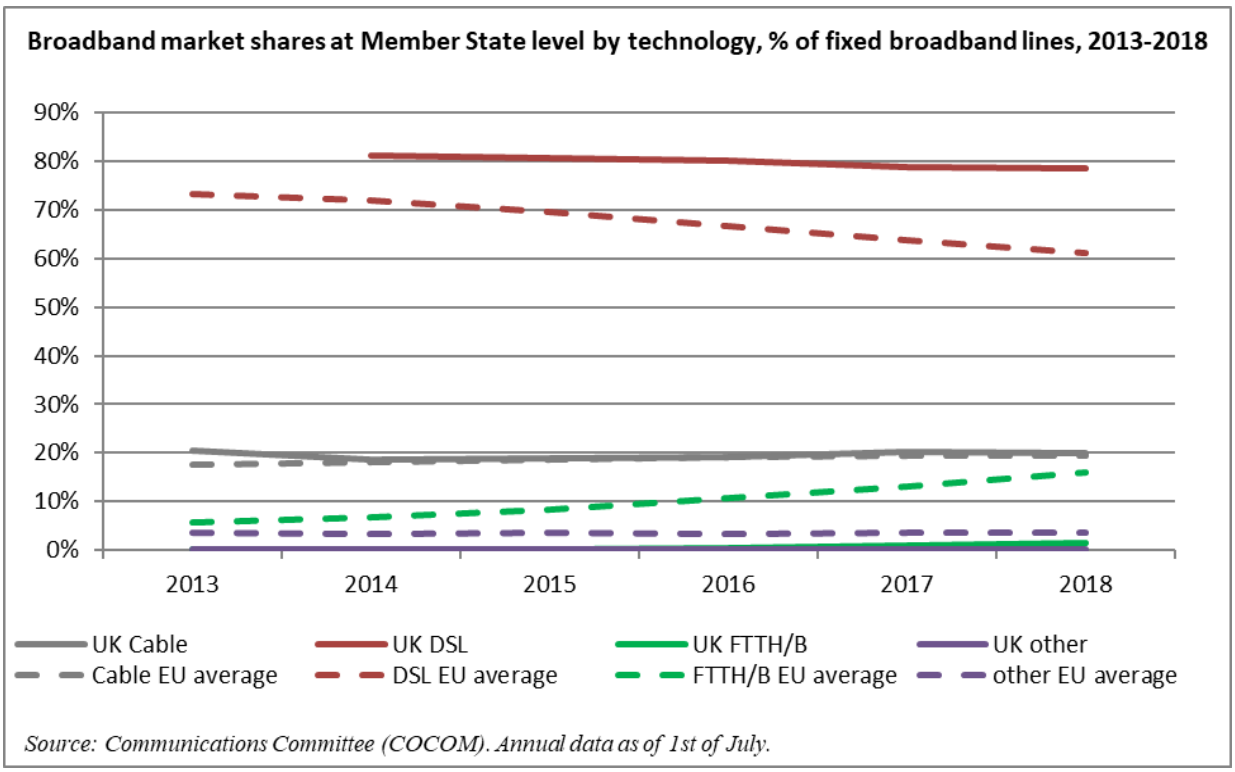
[234] 5G RuralFirst: Rural Coverage and Dynamic Spectrum Access Testbed and Trial, 5G Smart Tourism, Worcestershire 5G Consortium - Testbed and Trials, Liverpool 5G Testbed, AutoAir: 5G Testbed for Connected and Autonomous Vehicles, 5G Rural Integrated Testbed (5GRIT). More information available on: https://www.gov.uk/government/collections/5g-testbeds-and-trials-programme.

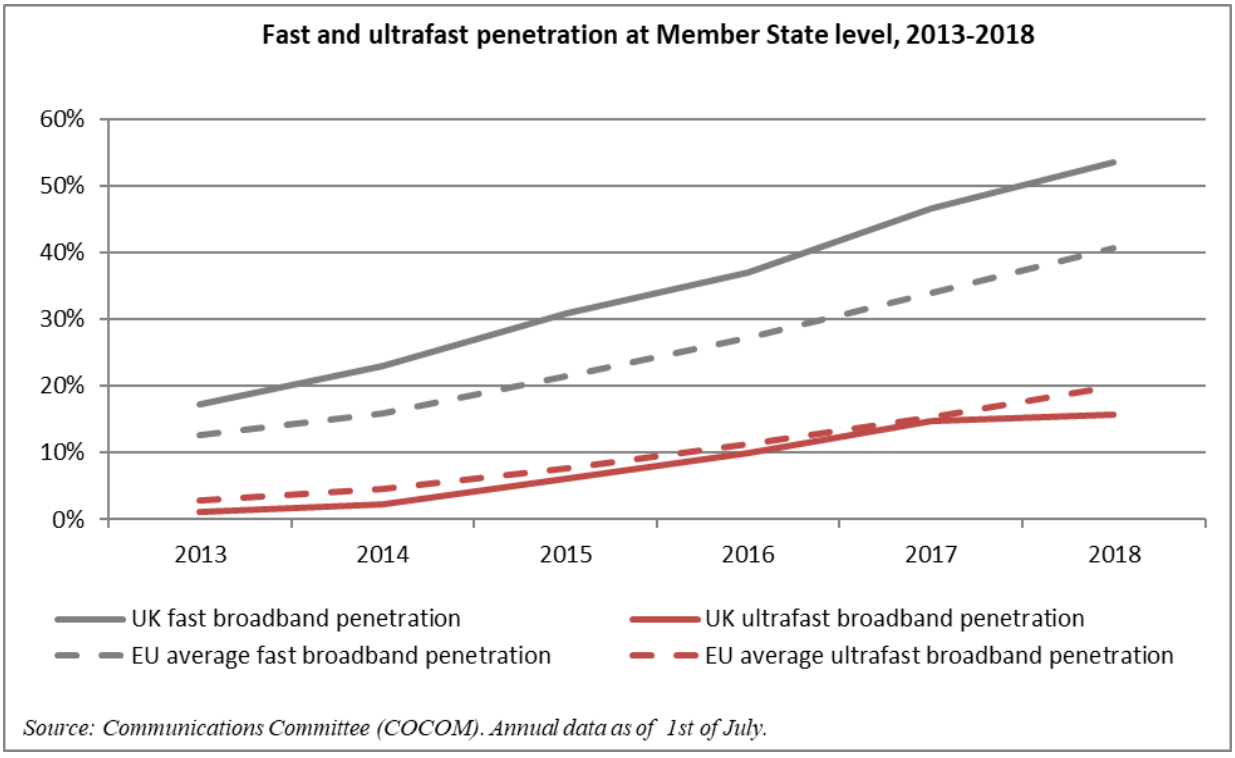
[235] The 5G indicator draws exclusively from the amount of spectrum assigned in the 5G pioneer bands.

[236] Table 10: Summary of residential call volumes by call type, Ofcom Telecommunications Market Data Q4 2018: https://www.ofcom.org.uk/research-and-data/telecoms-research/data-updates/telecommunications-market-data-update-q4-2018.

[237] Figure 4.1 UK telecoms market: key statistics, Ofcom Communication Market report 2018, available: https://www.ofcom.org.uk/__data/assets/pdf_file/0022/117256/CMR-2018-narrative-report.pdf.

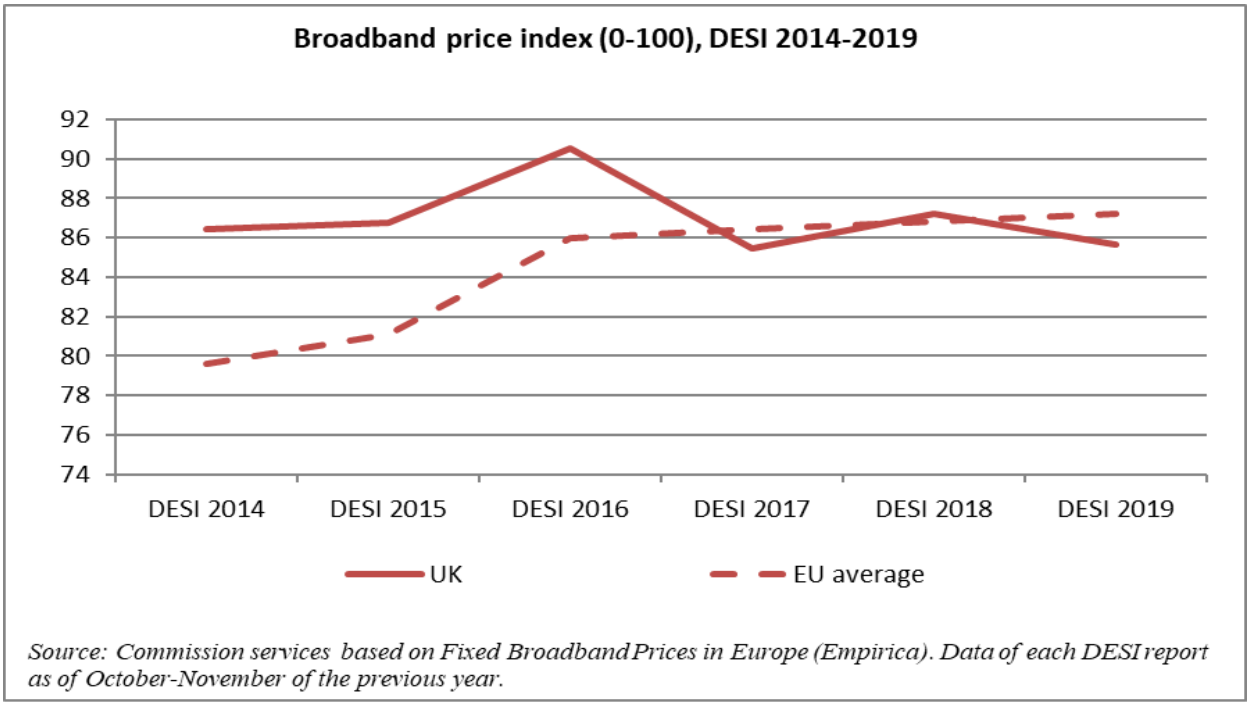
[238] Ofcom Communication Market report 2018.





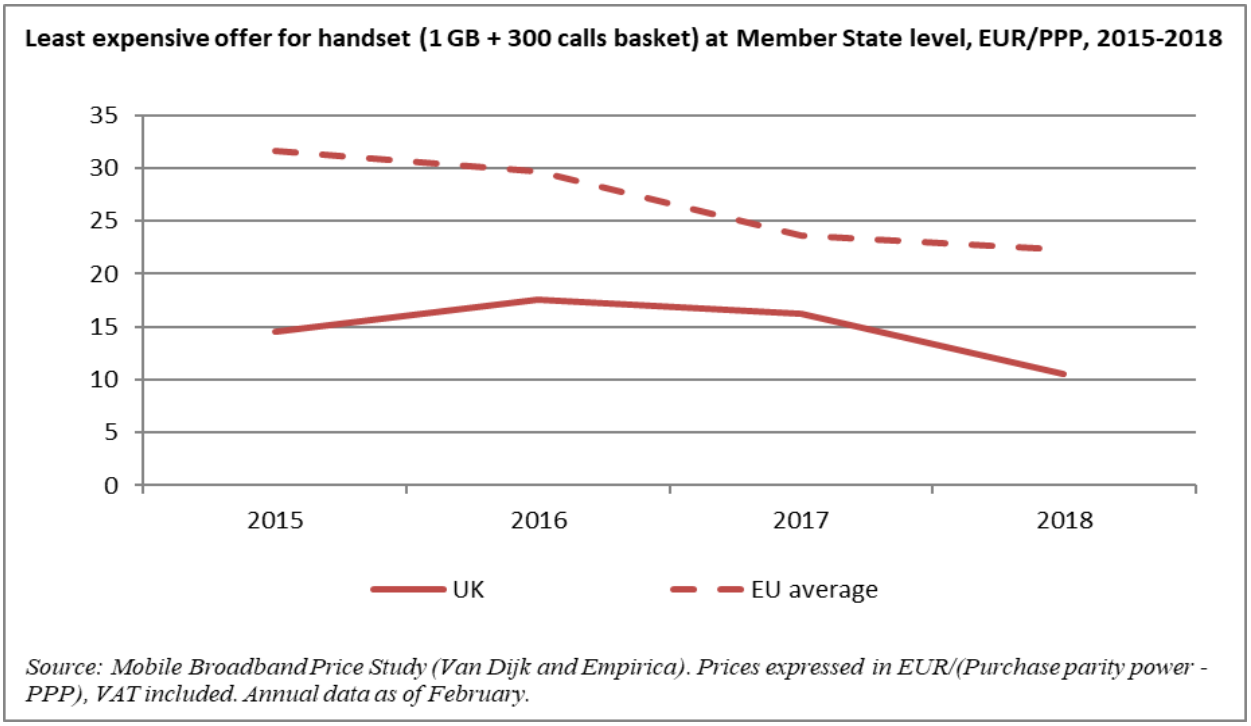
Both UK fast and ultrafast broadband penetration continued to grow in 2018. Fast broadband penetration is above the EU average, whereas ultrafast broadband penetration started to lag behind the EU average due to low availability of full fibre.

In 2018, fixed broadband prices started to increase in the UK and are currently above the EU average[239].



Source: Commission services based on Fixed Broadband Prices in Europe (Empirica). Data of each DESI report as of October-November of the previous year.

2.2. Mobile markets



Source: Mobile Broadband Price Study (Van Dijk and Empirica). Prices expressed in EUR/(Purchase parity power - PPP), VAT included. Annual data as of February.

[239] The fixed broadband price index weighs the cheapest retail offers from: standalone, double play (BB + TV, BB + fixed telephony) and triple play (BB+TV+fixed telephony) and three speeds categories - 12-30 Mbps, 30-100 Mbps and +100 Mbps. This indicator presents values from 0 to 100 (which should not be read as prices) and the higher the values, the better the country performs in terms of affordability of prices relative to purchasing power.

The mobile market is widely seen as competitive[240]. Mobile operators compete on network quality (speed, data and coverage), price and brand.

This stiff competition in the mobile market is probably why mobile broadband prices continued to decrease in 2018 and are roughly half the EU average.

It is reported that good 4G services, i.e. providing a connection speed of at least 2 Mbit/s, are available from all four mobile operators to 66 % of the UK's landmass, up from 49 % last year[241]. Indoor voice call coverage from all four operators is available to 92 % of UK premises. It is estimated that 97 % of premises can receive both decent fixed and good mobile broadband services, while 39,000 (0.1 %) are unable to access either[242].

In January 2019, O2 and Vodafone announced that they will be extending their network-sharing deal to cover 5G, following the formation of their joint venture to share the cost of rolling out faster, e.g. 4G, networks in 2012.

While the average monthly outgoing mobile call minutes per subscription decreased in 2017, the average monthly mobile data consumption increased by 48 % in June 2017, reaching 1.9 GB per active connection (compared to1.3 GB per active connection in June 2016)[243].

In the UK, mobile network operators (MNOs) connect most of their radio base stations to their switching centres using leased lines from other fixed communications providers (mainly BT). As mobile consumers' mobile data requirements have increased, the trend is now towards the use of Ethernet to replace legacy services on the main mobile backhaul links. Access to leased lines (including Ethernet lines used for mobile backhaul) is regulated by Market 4 obligations[244].

3. Regulatory developments

On 1 October 2018, BT transferred 31,000 of its staff to Openreach Limited. Openreach therefore became a legally separate company with its own brand, staff, management, purpose and strategy[245]. Ofcom established a dedicated Openreach Monitoring Unit[246] to assess whether the new rules are being implemented successfully. A first report on the results of monitoring was published in June 2018[247]. Ofcom found that the steps taken are broadly satisfactory. However, work is needed to ensure more independent decision-making and better service for consumers. In an interim report[248] published on 15 November 2018, further progress was noted. A further report from Ofcom is due in summer 2019.

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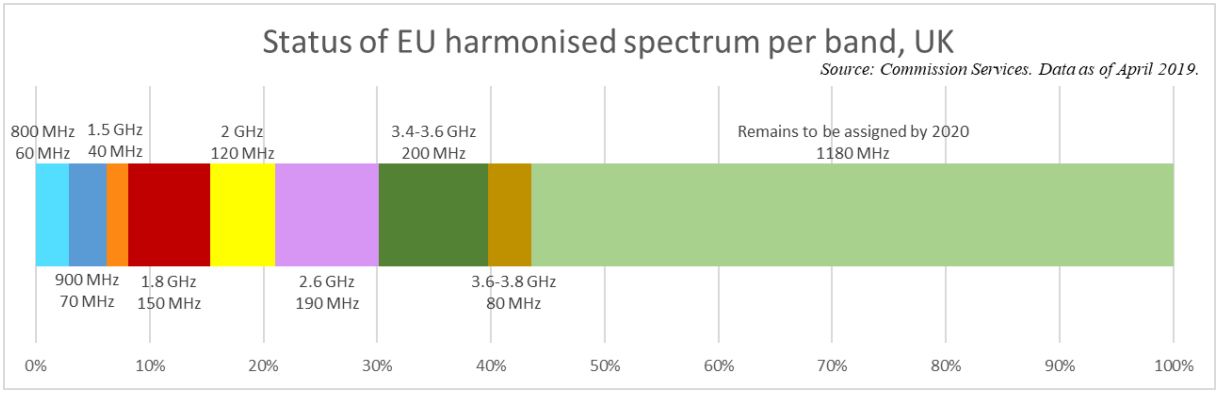
[240] Market share data are confidential and hence not reported.
[241] Data of September 2018 compared with data of June 2017.
[242] See the mobile section of the Connected Nations Report 2018:
https://www.ofcom.org.uk/__data/assets/pdf_file/0020/130736/Connected-Nations-2018-main-report.pdf
[243] Figure 4.1 UK telecoms market: key statistics, Ofcom Communication Market report 2018: https://www.ofcom.org.uk/__data/assets/pdf_file/0022/117256/CMR-2018-narrative-report.pdf.
[244] Business Connectivity Market Review SMP obligations.
[245] Ofcom had competition concerns that the former structure of Openreach gave BT the ability to discriminate against those retail competitors that rely on the Openreach network to provide broadband. In its Digital Communications Review, Ofcom therefore proposed legal separation of BT and its network division Openreach. On 10 March 2017, BT notified Ofcom of its voluntary commitments regarding the legal separation of Openreach.
[246]https://www.ofcom.org.uk/phones-telecoms-and-internet/information-for-industry/telecoms-competition-regulation/the-openreach-monitoring-unit.
[247] Full compliance monitoring reports will subsequently be published on an annual basis. First report is available here: https://www.ofcom.org.uk/__data/assets/pdf_file/0019/114814/openreach-implementation-report-2018.pdf
[248]https://www.ofcom.org.uk/__data/assets/pdf_file/0034/126799/Delivering-a-more-independent-Openreach-Interim-monitoring-update.pdf.

Some operators noted that they are cautiously optimistic about the impact of legal separation and others that no real change in the market has been observed.

3.1. Spectrum

The United Kingdom has assigned 910 MHz, which is 443.5 % of the spectrum harmonised at EU level for wireless broadband[249]. This percentage is mainly due to the lack of assignment procedure for the 700 MHz and 26 GHz band.

In April 2018, Ofcom auctioned the available spectrum in the 2.3 GHz and 3.4-3.6 GHz bands[250]. In the 3.4-3.6 GHz band, EE and Telefónica each acquired rights of use for a block of 40 MHz, Hutchison 3G for a block of 20 MHz and Vodafone for a block of 50 MHz.



Ofcom published a consultation on its plans to award the 700 MHz and the 3.6 GHz -3.8 GHz bands, in December 2018, which included proposals on coverage obligations[251]. The proposed coverage obligations consist of geographic coverage requirements (good quality mobile service outdoors in at least 90 % of the UK landmass, including at least 90 % of England, 90 % of Northern Ireland, 74 % of Scotland and 83 % of Wales), premises requirement (good quality service outdoors for at least 140 000 premises to which the obligated operator currently does not provide good coverage) and at least 500 new wide area mobile sites. The obligated operator would have to fulfil these obligations within four years of the award. Both spectrum bands are planned to be awarded by spring 2020.The consultation also sought views on potential ways to facilitate defragmentation of spectrum allocations in the 3.4-3.8 GHz band, with Ofcom noting that there are potential means for MNOs to achieve greater contiguity without regulatory intervention, for example through spectrum trading between licensees.

In April 2019, Ofcom consulted on proposals to amend the licence conditions for four spectrum access 3.4 GHz licences, one spectrum access 3.5 GHz licence and one spectrum access 3.6 GHz in order to align the licences with European Commission Decision 2019/235[252].

The UK Government has identified "meeting and going beyond the EECC requirement to release 1 GHz of spectrum in the 26 GHz band in a timely manner" as one way to achieve its strategic priorities

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

[250] https://www.ofcom.org.uk/spectrum/spectrum-management/spectrum-awards/awards-archive/2-3-and-3-4-ghz-auction.

[251] https://www.ofcom.org.uk/consultations-and-statements/category-1/award-700mhz-3.6-3.8ghz-spectrum.

[252] https://www.ofcom.org.uk/__data/assets/pdf_file/0025/144880/notice-proposal-vary-3.4-ghz-radio-spectrum-licences.pdf

in its 'Statement of Strategic Priorities for telecommunications, the management of radio spectrum and postal services'[253]. The Radio Spectrum Policy Group (RSPG) has identified the 24.25-27.5 GHz range as the pioneer Millimetre Wave band for Europe. Ofcom is currently undertaking work to understand demand for this spectrum from all potential users and has indicated that it could make the top 1 GHz available in a relatively short time frame, in line with demand. The top 1 GHz is clear except for limited use by the Ministry of Defence.

3.2. Regulated access

In the UK, all markets included in the 2014 Recommendation on relevant markets[254] are subject to *ex ante* regulation, either in full or in part. The UK also continues to regulate the markets related to access to the public telephone network at a fixed location for residential and non-residential customers and related to call origination on the public telephone network provided at a fixed location (Markets 1 and 2 under the 2007 Recommendation respectively). On 23 February 2018, Ofcom notified its intention to impose the obligations of access and price control on the market for voice call termination on individual mobile networks (Market 2)[255]. It found that all (68) operators have significant market power (SMP). The Commission had no comments.

On 23 and 26 February 2018, the Commission received notification concerning the wholesale markets for local access provided at a fixed location (Market 3a) and for access to fixed analogue exchange lines (Market 1). The Commission had no comments.

On 15 August 2018, Ofcom notified its intention to the Commission to impose a charge control on all 070 providers, which will cap the wholesale termination rate they can charge. It found that the market for 070 numbers is negatively impacted by high wholesale charges, which has led to its reputation being undermined and has caused harm to consumers. The Commission had no comments. On 1 October 2018, a final statement was published on the review of the 070 number range.

Access remedies are in place for local loop unbundling (wholesale local access market review), virtual unbundled local access (WLA market review), WFAEL (narrowband market review), physical infrastructure access (wholesale local access review) and leased lines (business connectivity market review).

In its strategy 'Regulatory certainty to support investment in full fibre broadband', Ofcom envisages moving to a single fixed telecoms market review in 2021. It considers that in the past business users demanded a high-speed, dedicated 'leased line', whereas copper and fibre to the cabinet networks were sufficient to meet the needs of most households and small business. However, in the gigabit society these lines are blurred as the fibre network will be used for a wider range of services for both business and residential customers.

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253 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779226/SSP_Consultation_-_Publication_Version__2_.pdf

254 These include Market 1 (Wholesale call termination on individual public telephone networks provided at a fixed location), Market 2 (Wholesale voice call termination on individual mobile networks) Market 3a (Wholesale local access provided at a fixed location), Market 3b (Wholesale central access provided at a fixed location for mass-market products), and Market 4 (Wholesale high-quality access provided at a fixed location).

255 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.

Most of the provisions of Directive 2014/61/EU[256] (the Broadband Cost Reduction Directive or 'BBCRD') were transposed in the Access to Infrastructure Regulations[257] that came into force on 31 July 2016. Article 8 was transposed separately in England, Wales, Scotland and Northern Ireland by amendments to the building regulations. The future telecoms infrastructure review envisages reviewing the UK's implementation of these regulations in 2019.

Ofcom has a dispute settlement function for the Access to Infrastructure Regulation but the dispute resolution process has not been tested yet.

The UK has not established a centralised single information point (SIP) as it considers that planning decision-making bodies already carry out the functions required by the BBCRD[258].

The operators noted that there is little interest in using the BBCRD. First, the UK has no tradition of infrastructure sharing. Second, there is different regulation in place for different industries (for instance water delivery, sewage) that is more rigorous in terms of safety standards and higher penalties. The issue of liability might therefore be contentious. Third, incentives in terms of profitability are very small and override the potential benefits. There is already SMP remedy imposed on Openreach that allows operators to access ducts and poles so they can deploy new fibre and, as noted above, Ofcom are proposing to expand this remedy to allow the use of Openreach's ducts and poles on an unrestricted basis.

4. End-user matters

Ofcom's Consumer Contact Team received some 60,000 complaints about electronic communications services in 2018 (1 January–31 October). While Ofcom does not investigate and resolve individual complaints, its Consumer Contact Team provides advice to consumers about how to resolve their complaints, including details of the applicable alternative dispute resolution schemes where relevant. Silent and abandoned calls, quality of service (in particular fault repair, line installations and mobile coverage), issues with billing/prices and customer service were the main sources of consumer complaints in 2018.

In May 2018, Ofcom published its second annual Comparing Service Quality report[259] on the quality of service experienced by customers of the UK's largest landline, broadband and mobile providers in 2017. There has been a rise in the proportion of broadband customers with a reason to complain. Broadband customers were also less satisfied with the services than mobile customers were.

Ofcom accredited three new price comparison websites,[260] and intends to review its accreditation scheme in 2019-20 to ensure it continues to work for consumers in the modern market, and to ensure alignment with the objectives of the European Electronic Communications Code.

In September 2018, the consumer body Citizens Advice submitted a complaint to the Competition and Markets Authority about the 'loyalty penalties', i.e. the practice of overcharging longstanding end-

[256] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks, Text with EEA relevance, OJ L 155, 23.5.2014, p. 1–14.
[257] https://www.legislation.gov.uk/uksi/2016/700/pdfs/uksi_20160700_en.pdf
[258] For further information, see the government response document - page 25 - following consultation on the Directive: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/534619/2016_07_04_Government_Response_FINAL.pdf
[259] Full report is available here:
https://www.ofcom.org.uk/__data/assets/pdf_file/0023/113639/full-report.pdf.
[260] In 2006, Ofcom established an accreditation scheme for PCWs that aims to provide assurance that the price comparison calculations offered by accredited companies on fixed-line, mobile, broadband and television services are accessible, accurate, up to date, transparent and comprehensive. Companies can apply to Ofcom for accreditation of their price comparison service.

users much more than new customers for the same services. It is estimated that around 20 %-25 % of UK consumers can be classified as long-standing end-users. Ofcom is finalising plans to require providers to send end-of-contract notifications to motivate inert end-users, as well as other solutions more specific to the broadband and mobile markets.

On 16 November 2018, Ofcom announced its final decisions on the early termination charge (ETC) investigations into Virgin Media and EE. It found that both Virgin Media and EE had overcharged customers; Virgin Media had set and charged ETCs that were higher than customers had contractually agreed to pay, and EE had not accounted for discounts that consumers had on their monthly charges when setting ETCs. Both providers failed to make it sufficiently clear to customers about the level of ETCs they would have to pay if they terminated their contract early. Virgin was fined GBP 7 million and EE was fined GBP 6.3 million.

All of the UK's largest internet service providers serving residential consumers are signatories to a voluntary Code of Practice that commits them to give clear information on broadband speeds to consumers when they consider or buy a home broadband service. On 1 March 2019, Ofcom updated the Code of Practice to ensure ISPs present more realistic peak-time speed information upfront, always provide a minimum guaranteed speed at the point of sale, and allow customers the right to exit their landline and TV packages penalty-free if bought together with broadband. Mobile operators are preparing for implementation of the new mobile switching rules to make switching quicker and easier. These rules were decided in late 2017[261] and need to be implemented by 1 July 2019.

In October 2018, Ofcom strengthened its rules against nuisance calls to better protect customers from the harm that they can cause. They outlined these measures, such as prohibiting operators to charge end-users for caller display in an update of their joint action plan with he Information Commissioner's Office (ICO) in March 2019[262]. The update also outlined further action by Ofcom to tackle nuisance calls via intelligence-sharing and engagement with the ICO, network operators, and international partners in order to encourage them to work collectively to find solutions to tackle consumer harm.

According to the 2018 Consumer Markets Scoreboard, the UK's markets for mobile telephone services and internet provision deteriorated in their market performance indicator score between 2015-2017 and stand 2.2 and 4.1 points below the markets' respective EU average scores[263].

a. Net neutrality

In 2017, Ofcom completed initial, informal reviews of zero-rating offerings in the UK by Three ("GoBinge") and Vodafone ("VOXI" and "Passes"). Ofcom found that the zero-rating practices at issue did not appear to materially reduce or affect end-users' choice in practice. However, Ofcom was concerned about the traffic management measures employed by Three, Vodafone and other mobile internet providers.

[261] In December 2017, Ofcom issued the Decision on reforming the switching of mobile communication services According to the new rules, mobile end-users will be able to switch provider by simply requesting and automatically receiving a unique code by text, online or phone which they can give to the provider of their choice to switch and port their number. In addition, mobile providers will no longer be allowed to charge end-users for notice periods running after the switch date. The new rules come into effect on 1 July 2019. Decision is available on the following link: https://www.ofcom.org.uk/__data/assets/pdf_file/0023/108941/Consumer-switching-statement.pdf.

[262] https://www.ofcom.org.uk/phones-telecoms-and-internet/information-for-industry/policy/tackling-nuisance-calls-messages.

[263] Consumer Markets Scoreboard 2018 Edition, p. 126.

On 6 December 2017 Ofcom opened an enforcement programme into fixed and mobile internet service providers with the aim of gathering more information about the traffic management measures they employ.[264] As a result of the information gathered during the enforcement programme, Ofcom opened formal investigations into Three and Vodafone. The traffic management concerns included Three's practice of prohibiting tethering on some tariffs and slowing down certain kinds of traffic for customers while they are roaming[265] and Vodafone's practice of restricting the resolution of video traffic[266]. Ofcom also wrote to O2 to outline concerns it had with its use of traffic management measures including the use of rate control for video content and compression techniques applied at all times to web content and images[267].

Ofcom received assurances from Three,[268] Vodafone[269] and O2[270] that by 30 April 2019, the majority of the measures concerning Ofcom would have ceased. Following these assurances Ofcom decided that no further enforcement action was required.

b. Roaming

TUK end-users consumed 1.1 times more roaming minutes (calls made) in Q1-2018 (RLAH) than in Q4-2016 (before RLAH)[271]. The UK is a net outbounder[272] of data roaming traffic[273].

On 8 March 2019, Ofcom closed its formal investigation into Lycamobile's compliance with roaming rules[274]. It concluded that Lycamobile was levying a surcharge and/or general charge in addition to the domestic retail price for regulated roaming services to enable the service to be used abroad**. It a**pplied data roaming limits that were lower than the minimum levels permitted by the regulations and applied surcharges for regulated data roaming services that were higher than the maximum surcharge permitted. Lycamobile has been required to align its practice with the rules as well as to identify and refund end-users that were unjustly charged within 3 months of the decision.

c. Emergency communications — 112

According to the Communications Committee 112 implementation report for 2018, 112 calls are answered within 0.5 seconds: 97 % of calls are answered within 10 seconds[275].

d. Universal service

In March 2018, the Communications Act 2003 was amended to include broadband in the universal service obligation[276]. The obligation provides UK consumers with a right to request a broadband

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[264] https://www.ofcom.org.uk/about-ofcom/latest/bulletins/competition-bulletins/open-cases/cw_01210.
[265] Decision on Three's investigation: https://www.ofcom.org.uk/about-ofcom/latest/bulletins/competition-bulletins/all-closed-cases/cw_01218.
[266] Decision on Vodafone's investigation: https://www.ofcom.org.uk/about-ofcom/latest/bulletins/competition-bulletins/all-closed-cases/cw_01219.
[267] https://www.ofcom.org.uk/about-ofcom/latest/bulletins/competition-bulletins/open-cases/cw_01210
[268] https://www.ofcom.org.uk/about-ofcom/latest/bulletins/competition-bulletins/all-closed-cases/cw_01218.
[269] https://www.ofcom.org.uk/about-ofcom/latest/bulletins/competition-bulletins/all-closed-cases/cw_01219.
[270] https://www.ofcom.org.uk/about-ofcom/latest/bulletins/competition-bulletins/open-cases/cw_01210.
[271] Report from the Commission on the implementation of Regulation (EU) 531/2012 of the European Parliament of the Council of 13 June 2012 on roaming and public mobile communications networks within the Union, published on 12 December 2018.
[272] An outbounder operator has a customer base which consumes more mobile services abroad (i.e. on the networks of partner operators in other EU countries), than those consumed by the partner operators' customer base on its own network.
[273] 21st International Roaming BEREC Benchmark Report.
[274] Further details are available here: https://www.ofcom.org.uk/about-ofcom/latest/bulletins/competition-bulletins/all-closed-cases/cw_01207
[275] Implementation report is available here: https://ec.europa.eu/digital-single-market/en/news/2018-report-implementation-european-emergency-number-112

connection which can provide download speeds of 10 Mbit/s and upload speeds of 1 Mbit/s. In June 2018, Ofcom asked operators to put themselves forward as potential universal service providers. On 5 December 2018, it proposed BT for the whole of the UK, excluding the Hull area, and KCOM for the Hull area as the designated providers of the broadband universal service. Designated operators will be legally required to provide high-speed broadband to customers upon request, subject to a reasonable cost threshold of GBP 3,400. For universal service financing, neither industry, cost sharing or public funds are currently used. If the cost of supplying the universal service amounts to an unfair financial burden on the universal service providers, they can be retrospectively compensated from an industry fund. Ofcom is currently considering how an industry fund would operate[277]. It expects that the first consumers will be able to make requests for connections by early 2020.

5. Conclusion

In the light of the currently modest level of fibre networks that have been rolled out, the UK has set out a clear strategy to improve the current situation, including significantly increasing its public funded support, to ensure that everyone in the UK benefits from a future-proof and innovative digital economy. On 5G, while the UK has launched the first phase of funding for 5G testbeds, a lot will depend on the auction of the 5G bands scheduled for early 2020. At the same time, work on the 4G front should continue to increase territorial coverage. Competition on the mobile market continues to bring benefits for end-users.

[276] In July 2017, BT put forward an offer to voluntarily provide 10 Mbps broadband to 99 % of UK premises by 2022, delivered by Openreach, and to provide the remaining 1 % of premises either with a service using a fixed wireless solution (delivered by EE) or act as a service provider for satellite broadband. In August 2017, Ofcom consulted on including the costs of network expansion (incurred by Openreach in delivering this voluntary commitment) within the proposed charge control for wholesale local access (WLA) services. It proposed including the costs of Openreach's network expansion in the WLA charge control, which would come into effect in April 2018. The Department for Digital, Culture, Media and Sport consulted on the design of a regulatory universal service obligation in the summer of 2017 and decided in December 2017 not to accept BT's offer.

[277] Consultation on the financing model is expected in autumn 2020.