Broadband Coverage in Europe 2019: Coverage in Switzerland

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1.0 Introduction

In order to foster the development of the network-based knowledge economy and stimulate growth, the European Commission has been promoting strategies to encourage digital opportunities and enhance Europe's leading position in digital economy. In May 2015, the Digital Single Market (DSM) strategy was adopted to eliminate online barriers which hamper the free movement of goods and services online. Businesses, governments and individuals are inhibited by operating across 28 different regulatory environments and cannot fully benefit from the emerging digital tools available to them.

The European Commission estimates that once complete, a DSM could create up to €415 billion per year and generate hundreds of thousands new jobs. The DSM strategy is based on three pillars:

1. Access: better access for consumers and businesses to digital goods and services across Europe;
2. Environment: creating the right conditions and a level playing field for digital networks and innovative services to flourish;
3. Economy & Society: maximising the growth potential of the digital economy.

However, in order for consumers, businesses and governments to fully benefit from the provisions of the DSM, it is essential that access to digital infrastructure is ensured by facilitating the roll out of reliable high-speed broadband networks across Europe.

In 2010, the Digital Agenda for Europe (DAE) was created as one of the flagship initiatives of the Europe 2020 strategy, and included specific broadband coverage targets stretching to 2020:

- Universal broadband coverage of speeds above 30 Mbps by 2020
- 50% broadband coverage of speeds above 100 Mbps by 2020.

Additionally, in September 2016, the European Commission introduced a new set of competitive Gigabit Society connectivity targets to be achieved by 2025. These targets include:

- Gigabit connectivity for all main socio-economic drivers such as schools, transport hubs and main providers of public services as well as digitally intensive enterprises.
- All urban areas and all major terrestrial transport paths to have uninterrupted 5G coverage.
- All European households, rural or urban, will have access to Internet connectivity offering a downlink of at least 100 Mbps, upgradable to Gigabit speed.

Moreover, the Connectivity for a Competitive Digital Single Market communication identified and confirmed the importance of investment-friendly regulatory and policy framework, which would facilitate high-capacity broadband deployments as well as a need for forward-looking European regulatory policy, especially with regards to 5G spectrum allocation and access.

The European Commission has been monitoring broadband deployments since 2008 with the Digital Scoreboard serving as a tool for assessing progress towards these targets. Broadband availability metrics are also a component of the Digital Economy and Society Index (DESI) that summarises indicators on Europe's digital performance and Member States' digital competitiveness. One of DESI's five-dimension measures focuses on connectivity and evaluates the deployment and quality of broadband infrastructure.

In order to monitor the progress of broadband networks' deployment across the Member States, DG Connect (the European Commission Directorate General for Communications Networks, Content and Technology) has commissioned the Broadband Coverage in Europe (BCE) project to examine household coverage of all of the main fixed and wireless broadband technologies with a specific focus on Next Generation Access (NGA) technologies. In 2013, DG Connect selected the consortium of IHS Markit & VVA to run the three-year project. In 2016, IHS Markit partnered with the previous research provider of the BCE study, Point Topic, and was subsequently chosen to continue to deliver the broadband coverage research for the period 2016-2018. In 2019, the IHS Markit and Point Topic research team was awarded the research contract until 2021. In August 2019, IHS Markit Technology, which the Broadband Coverage in Europe research team is part of, was acquired by Informa Group and the new research

organisation has been since rebranded as Omdia. Whilst IHS Markit remains as the lead contractor of this study, the original research team now belongs under Omdia and continues to be supported by Point Topic.

The European Commission publishes and analyses the data in the Digital Scoreboard. A number of broadband coverage indicators are also included in the Digital Economy and Society Index (DESI) and the European Semester related country assessments. In order to align reporting of the broadband coverage data with the publications of the DESI, the broadband coverage data collection has been scheduled to reflect the situation at the end of June (i.e. half-year data rather than year-end data points are collected). This change was first implemented in the 2015 edition of the BCE study and has been continued since then.

As in previous years, the study is primarily based on a survey of broadband network operators and National Regulatory Agencies (NRAs) to obtain a Europe-wide picture of the coverage of the nine main broadband technologies. The study initially covered thirty countries including the EU28, Norway, and Iceland. A separate study was commissioned by Glasfasernetz Schweiz to conduct identical research of broadband coverage in Switzerland. Results of the study are also included in this report increasing the total number of study countries to 31.

The nine broadband technologies analysed in this study are:

- DSL (including VDSL)
- VDSL (including VDSL2 Vectoring)
- VDSL2 Vectoring
- Cable modem DOCSIS 3.0 (including DOCSIS 3.1)
- DOCSIS 3.1
- FTTP (Fibre-to-the-property)
- FWA (Fixed Wireless Access)
- LTE
- Satellite

Coverage of these technologies is reported at both the national and rural levels, based on the number of homes passed by each individual technology.

Compared to the previous iterations of the Broadband Coverage in Europe study, the research team in agreement with DG Connect, reviewed the categories included in the study and made several changes to reflect the technological developments and requirements of broadband connectivity. The previously tracked metrics of standard cable modem broadband, WiMAX, and HSPA were excluded and three new technologies were introduced: VDSL2 Vectoring, cable modem DOCSIS 3.1, and FWA. VDSL2 Vectoring was included to indicate availability of higher-capacity bandwidth services (typically providing download speeds higher than 100Mbps) offered via legacy copper networks. Tracking of cable network upgrades to DOCSIS 3.1 provides insight into coverage of networks capable of delivering gigabit speeds. Fixed Wireless Access (FWA) technologies, including wi-fi, WiMAX and in particular 4G LTE TD standards have been gaining popularity in the last number of years and the research team anticipates FWA to become even more relevant access technology once 5G FWA becomes available.

The study also aims, as requested by DG Connect, to estimate the overall "combination" coverage of technologies, accounting for the overlap of the different technologies capable of delivering a comparable level of performance. The combination categories included in this study are:

- Overall fixed broadband coverage
    - Includes all the main fixed-line broadband access technologies, but excludes satellite
    - Combination of DSL (including VDSL and VDSL2 Vectoring), cable modem DOCSIS 3.0 (including DOCSIS 3.1), FTTP, and FWA

- Next Generation Access (NGA) coverage
    - Includes fixed-line broadband access technologies capable of achieving download speeds meeting the Digital Agenda objective of at least 30 Mbps coverage
    - Combination of VDSL (including VDSL2 Vectoring), DOCSIS 3.0 (including DOCSIS 3.1), and FTTP

- Very High Capacity Networks (VHCN) coverage
    - Includes fixed-line broadband access technologies primarily capable of achieving gigabit download speeds
    - Combination of DOCSIS 3.1 and FTTP
    - This category has been introduced for the first time as per the Tender Specifications for SMART 2019/2020.

The previously tracked Overall broadband coverage category, which included both fixed and mobile technologies, was excluded from the study in 2019 as overall broadband coverage levels reached universal coverage in vast majority of study countries and the relevance of findings relating to this category has become limited.

Due to the fact that multiple operators may deploy their networks in the same or similar areas, particularly in urban and more densely populated locations, it is necessary to take into account the possibility of overlapping coverage when determining coverage of the individual technologies as well as combination categories.

The methodology used in this report mirrors the approach developed by Point Topic in 2012, adopting a regional approach to measuring overlapping and complementary coverage. Coverage data was collected on a regional level using NUTS 3 statistical units as a research basis. The NUTS (Nomenclature of Units for Territorial Statistics) areas are geographical subdivisions generally based on existing national regional divisions of EU countries and associated countries (such as Norway, Iceland and Switzerland). More specifically, NUTS 3 level areas are smaller regional units of 150,000 to 800,000 inhabitants. There are 1,386 NUTS 3 areas in the 31 study countries. With general statistical data (such as population, household, and area size) readily available on NUTS 3 level, using this regional approach provides a comprehensive and detailed view of broadband coverage across Europe and allows for a year-to-year comparison with the BCE 2012-2018 data (with the exemption of the new categories introduced in the 2019 study).

In addition to individual technology coverage and combination technology coverage, DG Connect required coverage by download speed to be included in the study. The following speed categories were thus included among the research metrics:

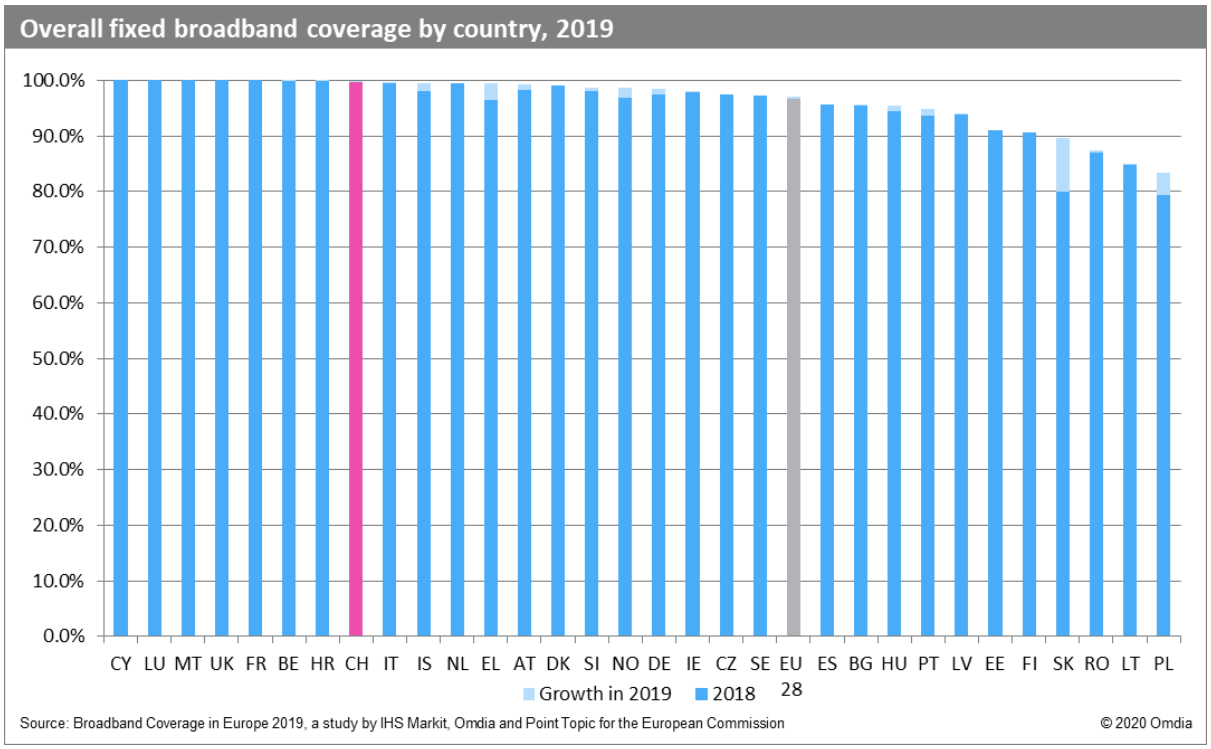
- Coverage by broadband network/s capable of at least 2 Mbps download speed
- Coverage by broadband network/s capable of at least 30 Mbps download speed
- Coverage by broadband network/s capable of at least 100 Mbps download speed
- Coverage by broadband network/s capable of at least 1Gbps download speed

Coverage by speed categories was first estimated by the research team in the 2013 edition of the BCE study. By including this additional metric, it is possible to obtain an additional analytical layer to evaluate the study countries' progress towards the Digital Agenda goals and determine the actual speeds consumers will be able to receive on the networks available to them. Coverage of at least 1Gbps download speed is a newly introduced category added in the study for the first time in 2019.

2.0 European Overview

2.1 Country comparison of fixed broadband coverage

The overall fixed broadband coverage category has been designed to provide a measure of progress in deployment of fixed broadband access technologies, which are capable of providing households with broadband services of at least 2 Mbps download speed. Four technologies make up the overall fixed broadband coverage figure: DSL (including VDSL and VDSL 2 Vectoring), cable DOCSIS 3.0 and DOCSIS 3.1), FTTP, and FWA. FTTP coverage trends are discussed in more detail in the following chapter on NGA coverage by country.



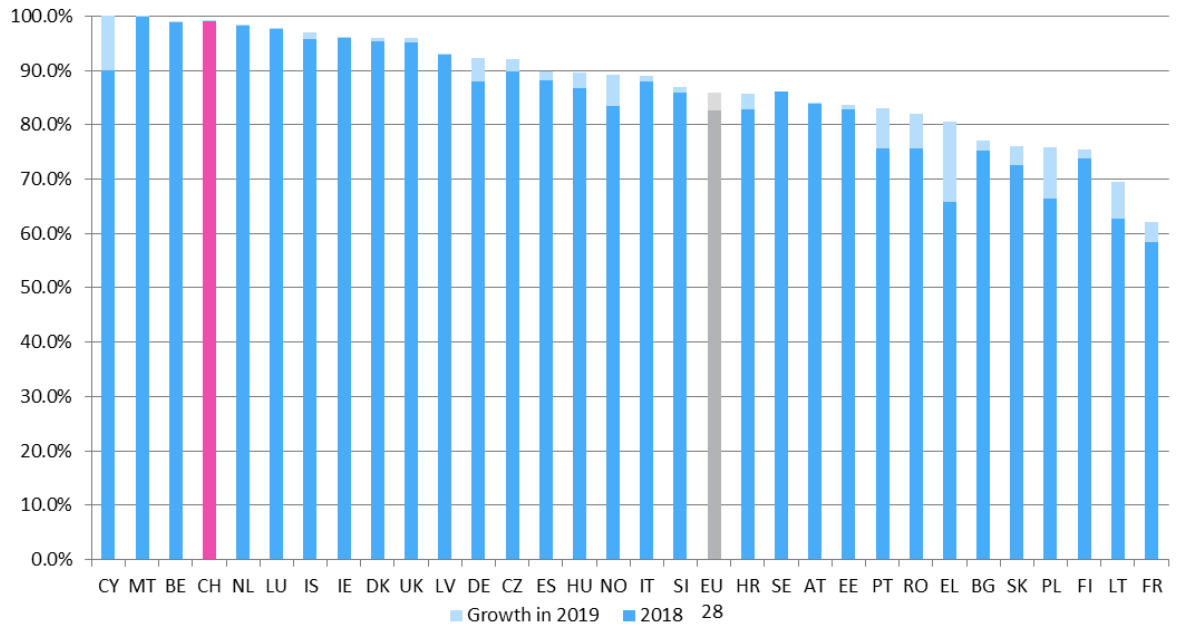
In total, 23 out of the 31 study countries registered fixed broadband coverage of above 95.0%, highlighting the breadth of fixed broadband coverage in most countries. As of mid-2019, six countries recorded complete fixed broadband coverage, namely: Cyprus, Luxembourg, Malta, the UK, France, and Belgium. On the other hand, Slovakia, Romania, Lithuania and Poland remained the only countries with fixed broadband coverage levels below 90.0%.

In Switzerland, 99.8% of homes had access to at least one fixed broadband service at the end of June 2019, unchanged from the previous year. In terms of coverage by the individual fixed technologies, DSL networks were available to the vast majority of Swiss households with DSL coverage reaching 99.5% of households.

2.2 Country comparison of NGA coverage

The NGA combination category is comprised of VDSL (including VDSL 2 Vectoring), FTTP, and cable modem DOCSIS 3.0 (including DOCSIS 3.1) technologies, all typically capable of delivering a service speed of at least 30 Mbps (although VDSL local loop lengths mean that actual speeds do vary). The main objective of the Digital Agenda for Europe is to have complete coverage of European households at this speed by 2020. The analysis of the combination category therefore constitutes an evaluation of the rollout of the relevant technologies and progress towards this goal.

Overall NGA coverage by country, 2019



Source: Broadband Coverage in Europe 2019, a study by IHS Markit, Omdia and Point Topic for the European Commission

By the end of June 2019, there continued to be considerable differences in NGA coverage across the study countries, reflecting the various strategies adopted by network operators across Europe to deploy high-speed broadband. Cyprus and Malta were the two countries that recorded complete NGA coverage, whilst Belgium and Switzerland continued to reach near universal NGA coverage levels.

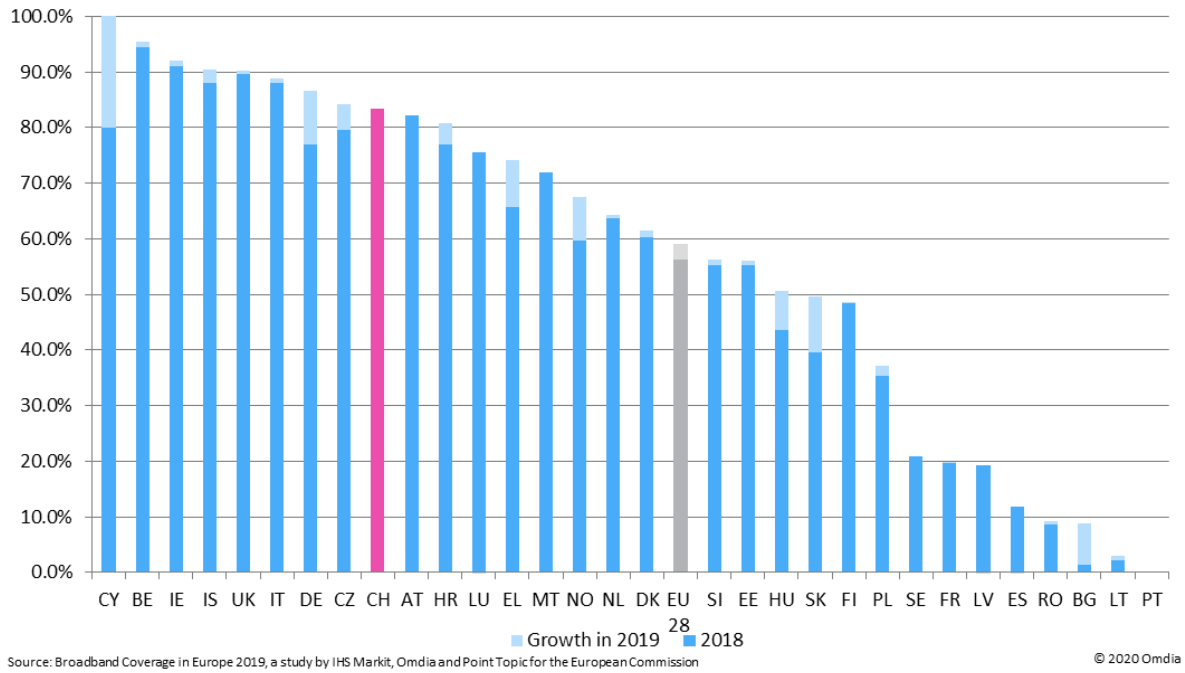
On the other hand, thirteen countries reported coverage levels below the European average of 85.8%, with France remaining the country with the lowest coverage of the study, with 62.1% of homes passed by NGA networks.

VDSL broadband services were available to 59.2% EU households by mid-2019. Despite VDSL coverage having grown at a slower pace than FTTP coverage, many operators continued to focus their deployment strategies on upgrading existing copper infrastructure, rather than investing in the typically more expensive deployments of fibre optic networks all the way to customers' property.

It is important to note that broadband performance on VDSL lines varies depending on the length of the copper loop from the VDSL enabled cabinet connected to the optical fibre backhaul. Formerly, households with a VDSL connection at a distance of about 500 metres from a VDSL enabled street cabinet or exchange, typically, reached download connection speeds of around 25 Mbps. However, with the newest VDSL technology, these speeds can be achieved up to a distance of 1 000 metres.

By mid-2019, Cyprus, Belgium, Ireland, Iceland, and the UK all recorded VDSL coverage levels that exceeded 90.0%, whilst VDSL networks passed more than 80.0% of homes in six other countries (Italy, Germany, Czech Republic, Switzerland, Austria, and Croatia). Overall, 17 study countries recorded VDSL coverage levels that were higher than the EU average of 59.2%. Over the study period, Cyprus saw a double-digit percentage point increase (20 p.p.) in VDSL coverage with VDSL services available to all households in the country.

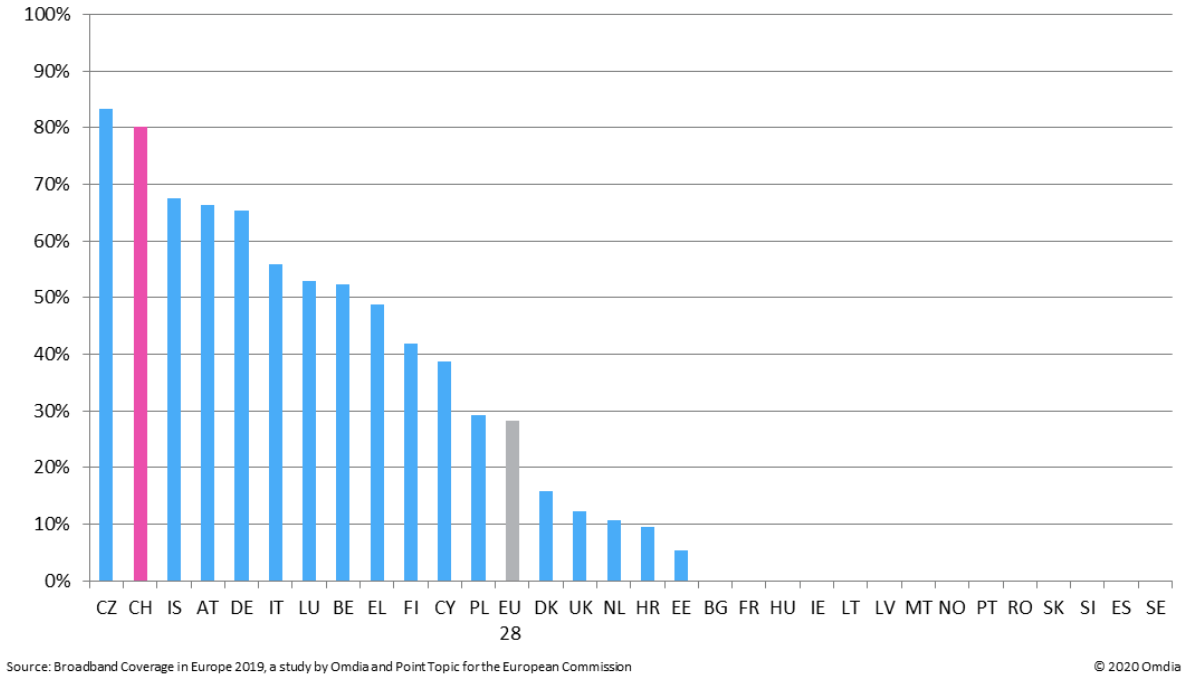
Overall VDSL coverage by country, 2019



However, VDSL services remained far from widespread in a number of countries. Latvia, Spain, Romania, Bulgaria, and Lithuania all recorded VDSL coverage below 20.0%, while Portugal remained the only country with no VDSL availability. Yet, it is important to note that in many of these countries, operators traditionally focus on deploying other NGA technologies, such as FTTP.

Availability of VDSL2 Vectoring technology was tracked for the first time in 2019 to indicate coverage of higher-capacity bandwidth services offered via legacy copper networks, i.e. those typically providing download speeds higher than 100Mbps.

VDSL 2 Vectoring coverage by country, 2019

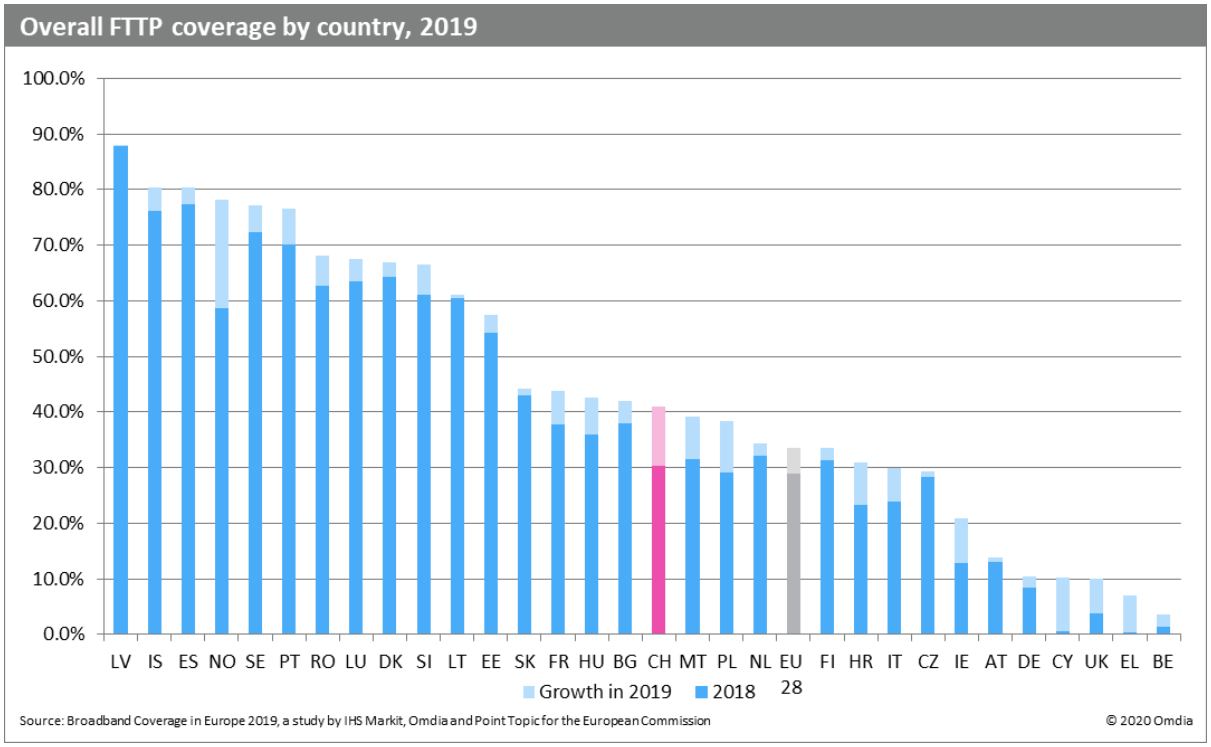


On average, VDSL2 Vectoring coverage reached 28.2% of EU households at the end of June 2019. However, availability of VDSL2 Vectoring services varied widely across the EU, between 0.0% and 80.0%. The technology was absent in fourteen study countries, and its coverage surpassed 50.0% of households in eight countries. It is worth noting though that two countries, Switzerland and Iceland, which recorded two of the three highest VDSL2 Vectoring coverage levels are not EU Member States and therefore are not included in the average EU28 VDSL2 Vectoring coverage calculation.

The Czech Republic recorded the highest VDSL2 Vectoring coverage of this study, with 83.3% of homes passed by VDSL2 Vectoring. Moreover, due to the focus of the Czech incumbent's infrastructure arm on deploying VDSL2 Vectoring solutions over the last year, the whole VDSL network footprint has been upgraded to offer services with download speeds higher than 100 Mbps.

In the case of Italy, VDSL2 Vectoring is not deployed, but due to the nature of the legacy copper network grid, with large number of cabinets positioned close to customer premises, the VDSL network is capable of reaching speeds higher than 100Mbps. In order to not skew the results unfavourably, the research team worked with the Italian NRA to precisely identify those households close enough to the cabinet to receive at least 100Mbps coverage and only those were classified as VDSL2 Vectoring passed for the purposes of the study and included in this category.

As was the case last year, FTTP was the fastest growing NGA technology, increasing by 4.5 percentage points in the twelve months to mid-2019. Latvia remained the country with the highest FTTP coverage level, with 88.1% of households passed. Last year, Latvia was the only study country with FTTP availability over 80.0%, but by mid-2019, two new countries had achieved this level: Iceland and Spain (both reaching 80.4%). Norway recorded the largest FTTP increase over the study period, with FTTP coverage growing by 19.4 percentage points and reaching 78.1% Norwegian households by the end of June 2019.

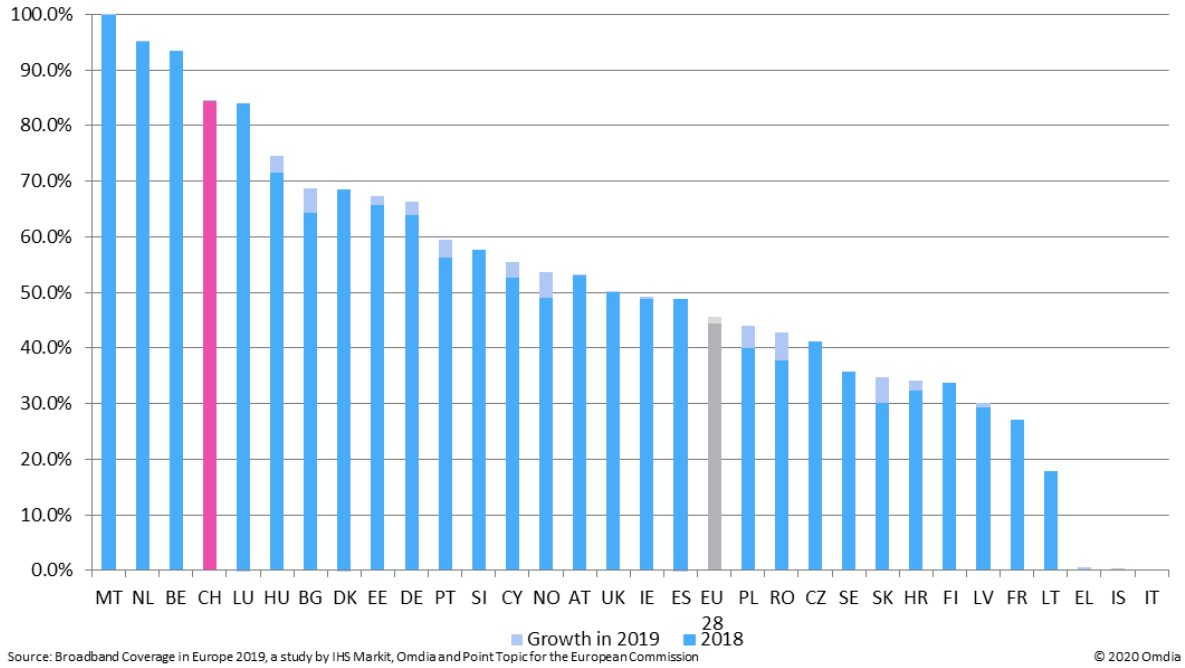


On average, a third (33.5%) of EU homes were passed by FTTP networks with only ten countries recording FTTP coverage below the EU average. Whilst FTTP networks were available in all study countries, availability remained limited in some. However, this year, only one country recorded FTTP coverage below 5.0%: Belgium, with 3.6% of households passed, and only one other country (Greece) recorded FTTP coverage below 10.0%. In both countries, operators have prioritised VDSL upgrades to existing DSL networks as opposed to investing in the typically more expensive FTTP technology. Similar strategy was adopted by operators in other countries such as Austria, Germany, Cyprus, and the UK, which all recorded FTTP coverage levels below 20% in mid-2019. Such operators tend to view the speeds associated with VDSL technologies as sufficient to satisfy current demand. In addition, some of these

operators have also been trailing out solutions such as G.fast to increase achievable speeds using existing copper infrastructure.

At the end of June 2019, cable modem DOCSIS 3.0 was available to 45.5% of EU households, up from 44.4% in mid-2018. As was the case in previous iterations of this study, cable availability varied widely across study countries, with complete absence of coverage in Italy to universal coverage in Malta. The Netherlands and Belgium were the only other two countries where coverage exceeded 90.0%, and Switzerland and Luxembourg the only other two countries where coverage exceeded 80.0%.

Overall DOCSIS 3.0 coverage by country, 2019

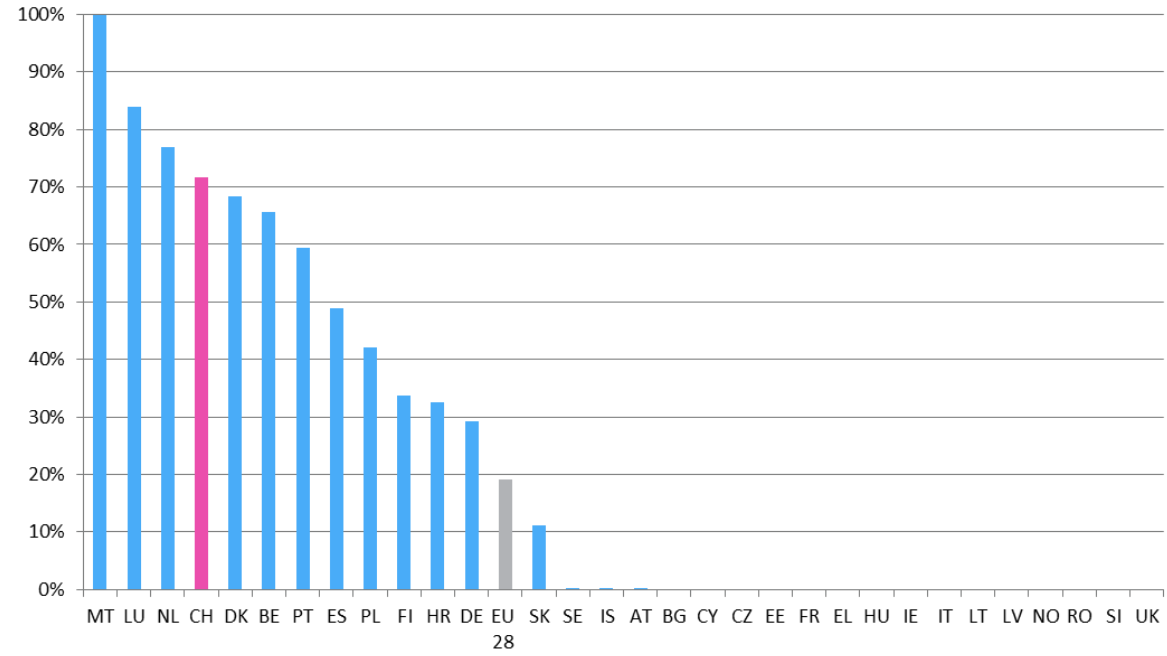


Overall, cable modem DOCSIS 3.0 coverage has remained relatively stable over the last few years, owing to cable networks having largely been upgraded to DOCSIS 3.0 already, and the lack of further deployment of cable networks. By mid-2019, Romania recorded the largest cable modem DOCSIS 3.0 coverage increase, with an extra 5.1 percentage points of households covered since mid-2018. However, decommission of cable networks and their upgrade to FTTH has already started in a number of study countries, with Slovenia witnessing the largest decrease, with 2.2 percentage points since mid-2018.

The launch of the DOCSIS 3.1 standard has allowed cable operators to compete with fibre operators on the ultrafast broadband market. At the end of June 2019, the EU average for DOCSIS 3.1 coverage stood at 19.2%, well below the DOCSIS 3.0 average of 45.5%, meaning that less than half (42.1%) of DOCSIS 3.0 networks has been upgraded to the DOCSIS 3.1 standard by the end of June 2019.

DOCSIS 3.1 coverage varied widely across study countries, between 100.0% in Malta, and 0.0% in sixteen study countries. It is to be noted that in Croatia, Denmark, Finland, Luxembourg, Malta, Poland, Portugal and Spain, cable networks have been upgraded almost entirely or entirely to the DOCSIS 3.1 standard.

DOCSIS 3.1 by country, 2019

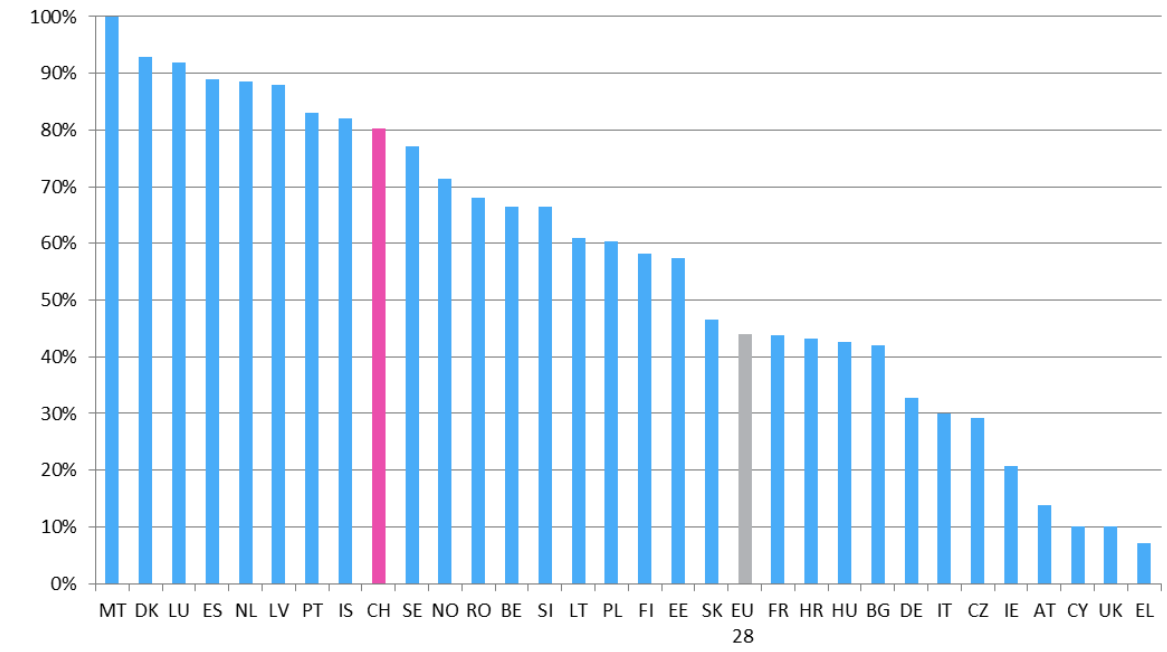


Source: Broadband Coverage in Europe 2019, a study by Omdia and Point Topic for the European Commission

2.3 Country comparison of Very High Capacity Networks (VHCN) coverage

In 2019, DG Connect requested that a new combination coverage category to be estimated on a national and rural level, indicating overall Very High Capacity Networks (VHCN) coverage. This category includes fixed-line broadband access technologies primarily capable of achieving gigabit download speeds, namely FTTP and DOCSIS 3.1.

Overall Very High Capacity Networks (VHCN) coverage by country, 2019



Source: Broadband Coverage in Europe 2019, a study by Omdia and Point Topic for the European Commission

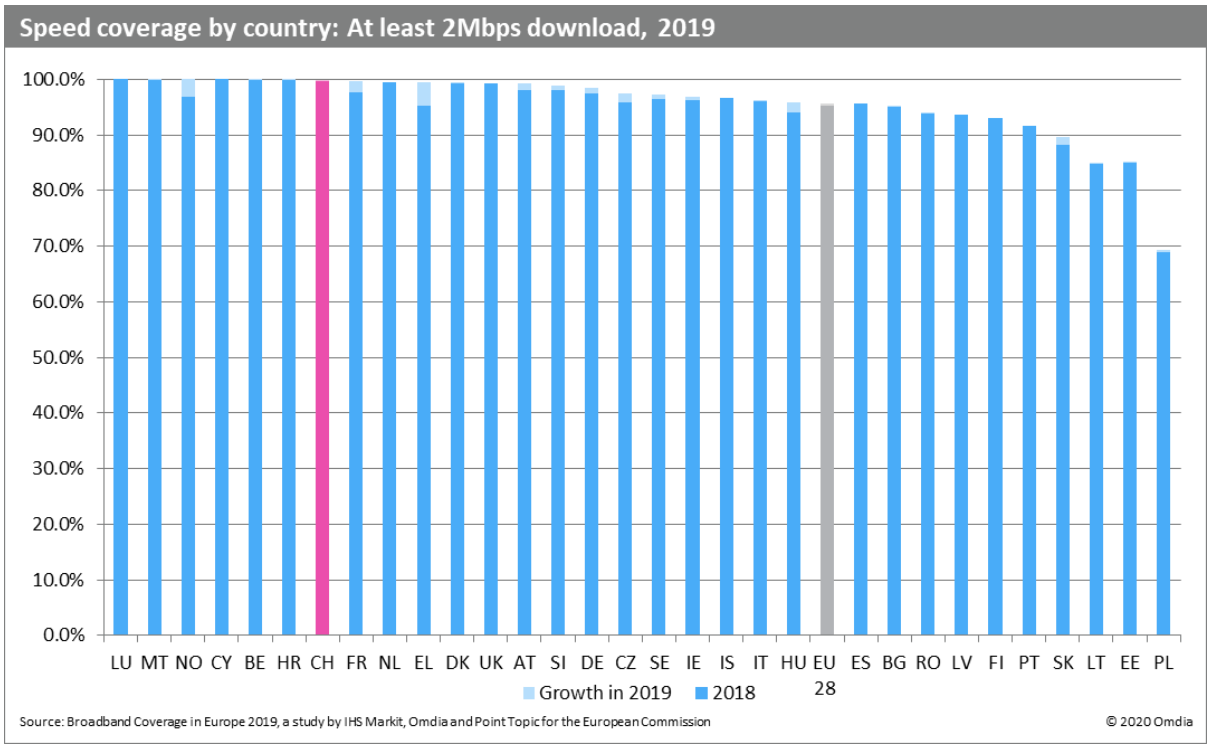
At the end of June 2019, 44.0% of EU households were passed by at least one FTTP or DOCSIS 3.1 network. Coverage ranged between 7.1% in Greece and 100.0% in Malta. Among the countries registering the highest overall VHCN coverage were those with most widespread DOCSIS 3.1 coverage, such as Denmark, Luxembourg, and Malta, all reaching coverage levels over 90.0%.

On the other hand, countries such as Cyprus, the UK, or Greece record the lowest levels, due to operators' preference for VDSL upgrades over FTTP deployments, and cable operators not yet having started on DOCSIS 3.1 upgrades.

2.4 Country comparison of speed categories

Following discussions with DG Connect, the research team has made a few changes in terms of technologies considered when estimating the coverage by speed categories. These changes reflect the technological advancements and improving capabilities of individual broadband access technologies that have been observed over the last couple of years. For this reason, availability of FWA provided over 4G LTE TD was considered in the at least 30 Mbps speed category and VDSL2 Vectoring was included in the analysis of availability of services providing at least 100 Mbps download speeds.

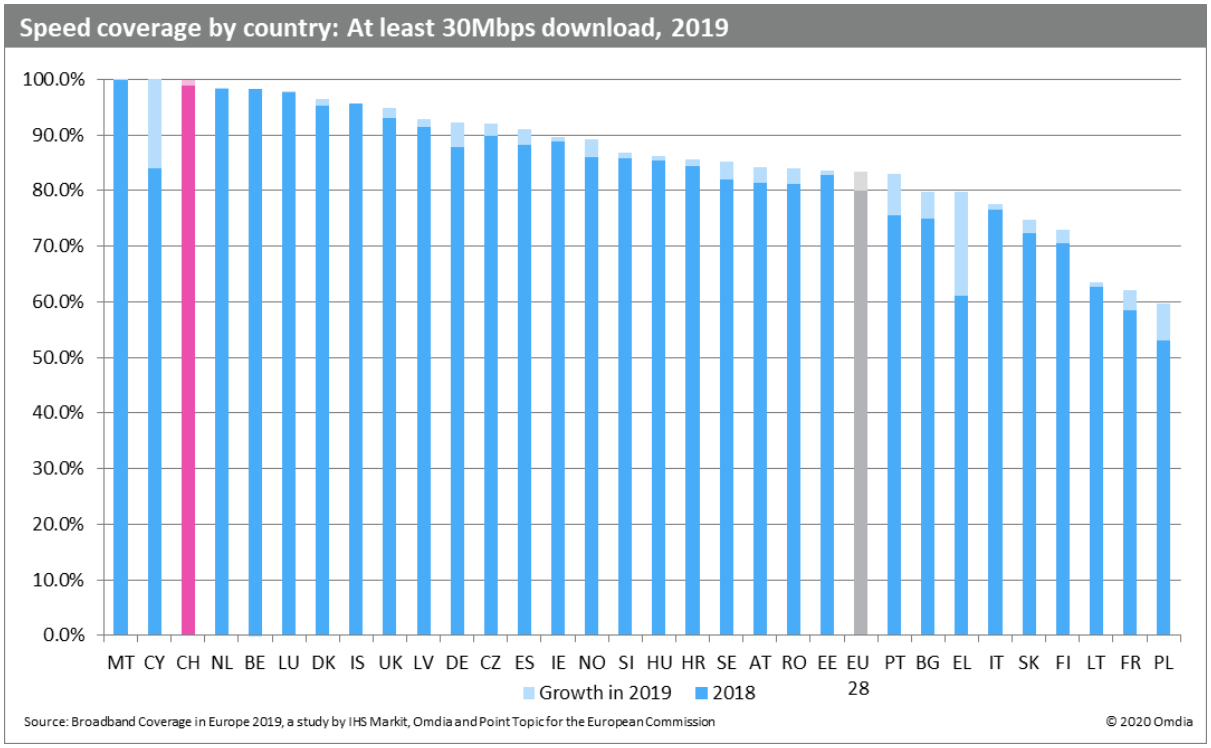
By mid-2019, in most study countries availability of fixed broadband services capable of at least 2 Mbps actual download speeds reached over 90.0%, with only Lithuania, Estonia, and Poland standing below 90.0%. In general, countries with lower availability of at least 2 Mbps broadband connections tend to have a higher proportion of DSL or WiMAX networks in the make-up of fixed broadband coverage. Traditionally, DSL (and WiMAX) networks have been less reliable in sustaining actual speeds at peak times compared to cable and FTTP networks.



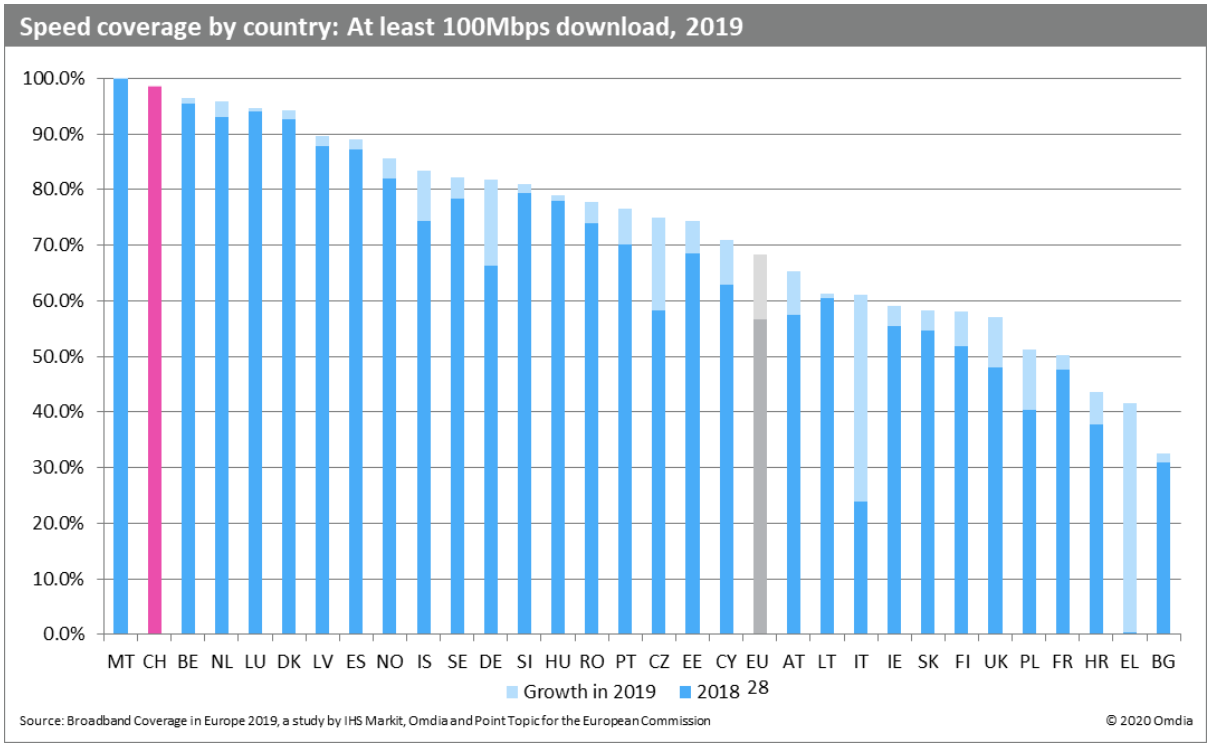
At the end of June 2019, fixed broadband services capable of at least 30 Mbps download speeds passed more than 60% of households in all study countries with the exception of Poland, which stood just below at 59.6%.

Malta and Cyprus recorded near universal at least 30 Mbps coverage and in eleven other countries (Switzerland, the Netherlands, Belgium, Luxembourg, Denmark, Iceland, the UK, Latvia, Germany, Czech Republic, and Spain), high-speed broadband service capable of delivering at least 30 Mbps download speeds were available to more than 90% households. Greece registered the highest growth with at least 30 Mbps coverage expanding by 18.7 percentage points in the twelve-month period to the end of June 2019.

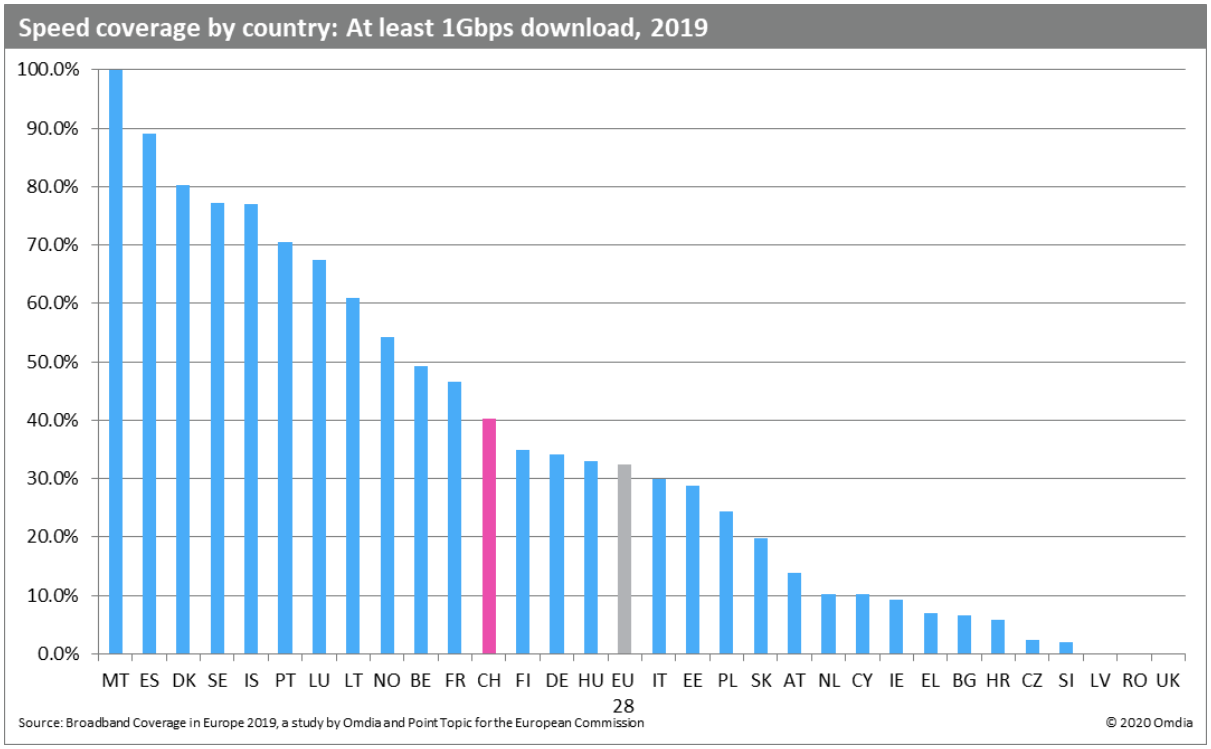
Whilst significant improvements have been made in high-speed broadband connectivity in recent years, examining availability of at least 100 Mbps speeds shows that achieving universal coverage will be challenging and generally not feasible by 2020. At the end of June 2019, 68.4% of EU households had access to broadband services capable of providing at least 100 Mbps actual download speeds. Some considerable differences remain among individual countries. By mid-2019, over 90.0% of homes in six study countries (Malta, Switzerland, Belgium, the Netherlands, Luxembourg, Denmark) were passed with a fixed broadband service capable of reaching at least 100 Mbps actual download speeds, compared to only 32.6% of homes in Bulgaria.



Greece, which was the only country with no availability of at least 100 Mbps speed coverage in 2018, recorded the highest coverage increase growing by 41.2 percentage points by mid-2019. This growth can be primarily attributed to VDSL2 Vectoring being included in the at least 100 Mbps speed category as VDSL is the dominant NGA technology deployed in in the country.



Great disparities can also be observed when analysing availability of services providing gigabit connectivity. At the end of June 2019, Malta was the only study country to record universal coverage by broadband services capable of providing at least 1 Gbps. In Spain, at least 1Gbps services we available to nearly 9 in 10 (89.0%) of households and 80.3% of Danish households had access to the ultrafast broadband services.

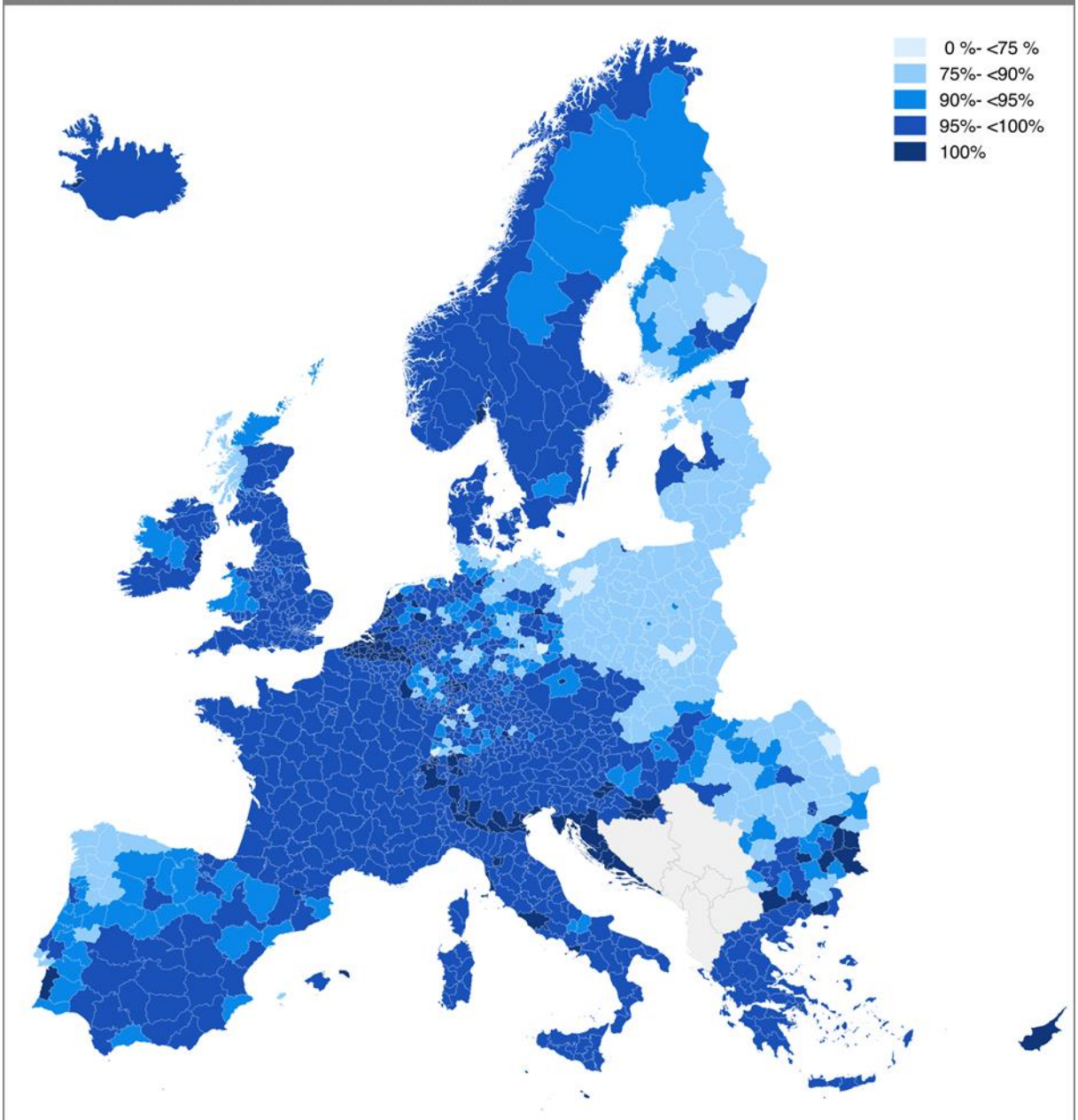


Interestingly, despite Latvia being the leader in FTTP coverage, there were no services providing at least 1Gbps download speeds available to Latvian households at the end of June 2019. However, given that FTTP infrastructure is widely deployed across the country, the Latvian operators have flexibility in terms of launching gigabit speed offering when the market conditions become ready.

In addition to Latvia, Romania and the UK were the only other two countries, where services providing at least 1Gbps download speeds were not available at the end of June 2019. In six countries (Ireland, Greece, Bulgaria, Croatia, Czech Republic, and Slovenia) less than 1 in 10 households had access to at least 1Gbps broadband services.

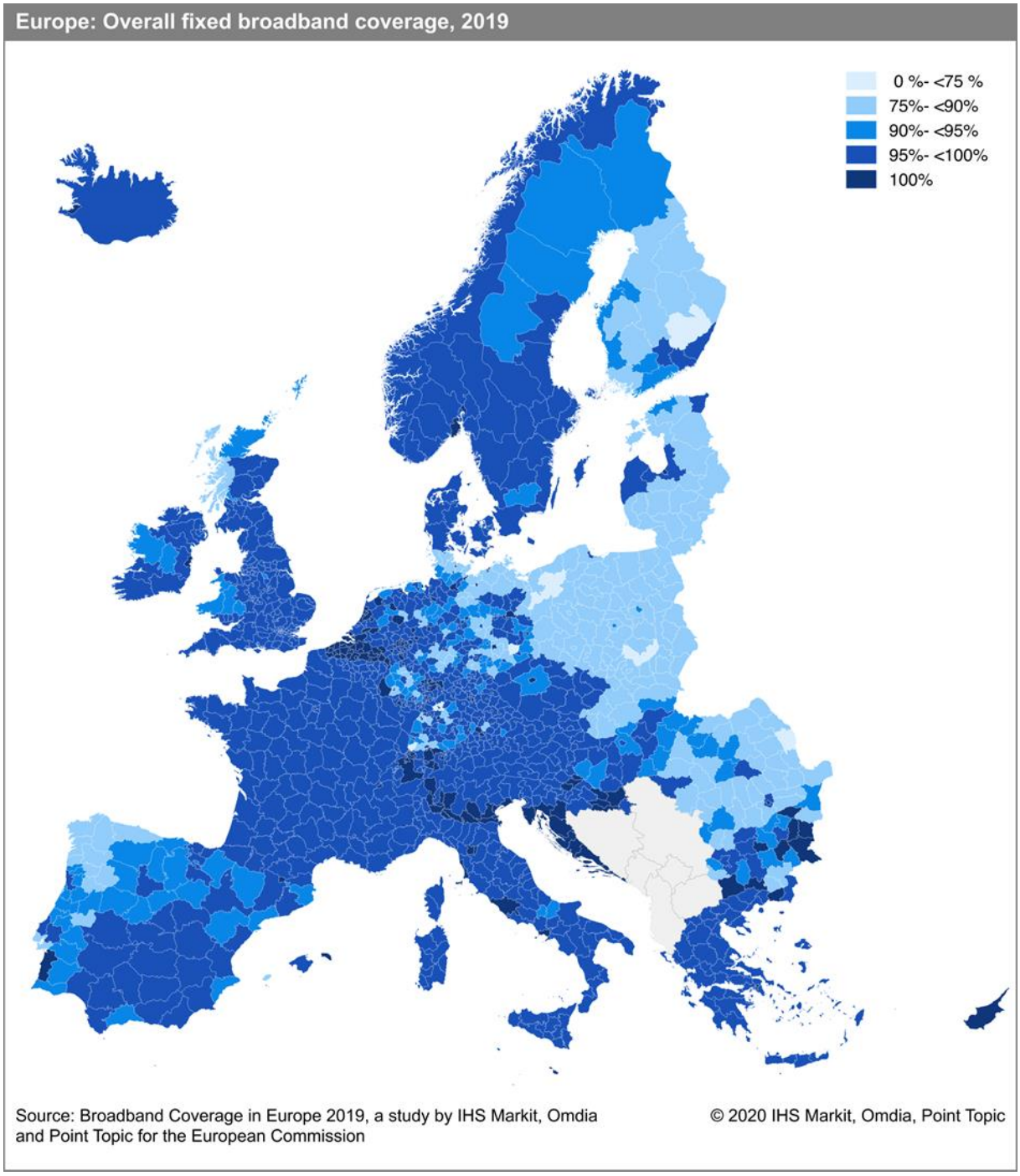
2.5 NUTS 3 coverage of overall fixed broadband

Europe: Overall fixed broadband coverage, 2019



Source: Broadband Coverage in Europe 2019, a study by IHS Markit, Omdia and Point Topic for the European Commission

2.6 NUTS 3 coverage of NGA broadband



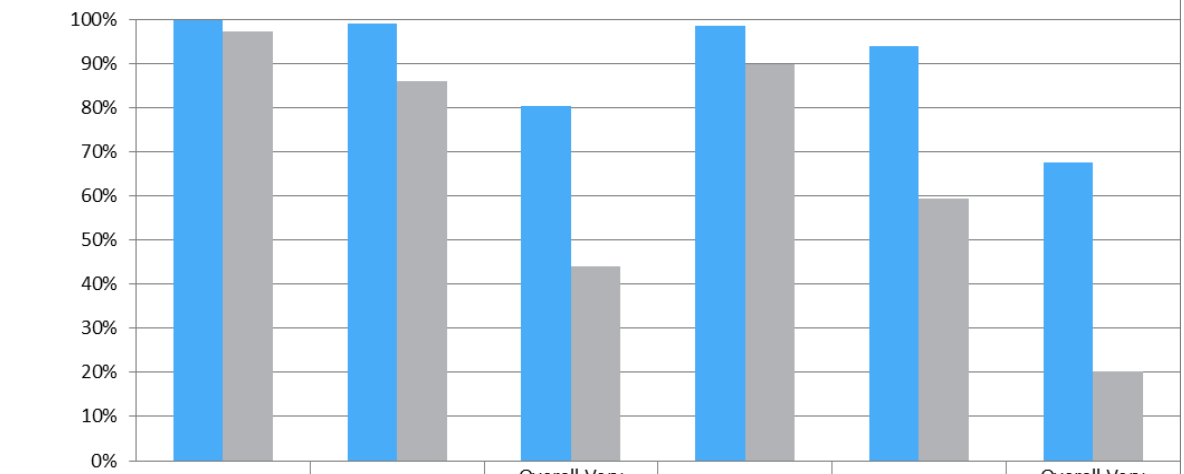
3.0 Switzerland

3.1 National coverage by broadband technology

As fixed broadband coverage was already near universal in previous years, fixed broadband availability remained stable, at 99.8% of Swiss households covered. In a similar fashion, NGA coverage also remained stable as it neared universal coverage (99.0%). In rural regions of Switzerland, fixed broadband services were available to 98.6% of rural households, whilst NGA networks passed 91.8% of rural homes.

In terms of Very High Capacity Networks (VHCN) coverage, i.e. combined coverage of DOCSIS 3.1 and FTTP, 80.4% of all Swiss households and 67.5% of rural households were covered by networks potentially capable of delivering gigabit speeds.

Switzerland: Coverage by technology combination, 2019



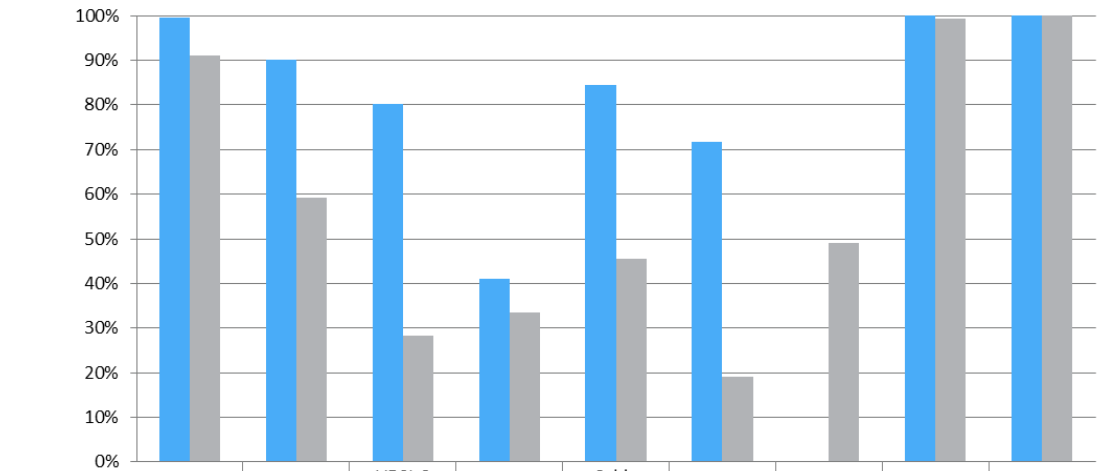
	Overall fixed broadband (total)	Overall NGA broadband (total)	Overall Very High Capacity Networks (VHCN) (total)	Overall fixed broadband (rural)	Overall NGA broadband (rural)	Overall Very High Capacity Networks (VHCN) (rural)
Switzerland	99.8%	99.0%	80.4%	98.6%	93.8%	67.5%
EU 28	97.1%	85.8%	44.0%	89.7%	59.3%	20.1%

Source: Broadband Coverage in Europe 2019, a study by Omdia and Point Topic for the European Commission

Looking at individual technologies, coverage by traditional broadband technologies remained stable this year as Switzerland continued to near universal coverage. Despite a 7.6 percentage point decrease in coverage, DSL remained the most prevalent broadband technology, reaching 91.9% of Swiss households at the end of June 2019. This decrease is a result of gradual decommission of DSL networks, which has been observed in several study countries, such as the Baltics and Nordics. Consequently, VDSL coverage also recorded decrease in coverage of 6.6 percentage points compared to mid-2018, reaching 83.5% of Swiss households. However, availability of high speed copper-based technologies was still much higher than in other study countries. Particularly in the case of VDSL 2 Vectoring, which was available to 80.2% of households, the second highest coverage level recorded in this study for this technology.

Cable modem DOCSIS 3.0 became the most widely available NGA technology in Switzerland, as 84.4% of households had access to high speed cable broadband services. By mid-2019, a significant part of cable networks has been upgraded to the DOCSIS 3.1 standard, which was available to 71.7% of Swiss households. Lastly, FTTP coverage improved significantly over the study period, with 40.9% of homes passed, up 10.6 percentage points since mid-2018. LTE coverage remained near universal, at 99.9% of households covered.

Switzerland: Coverage by technology, total, 2019

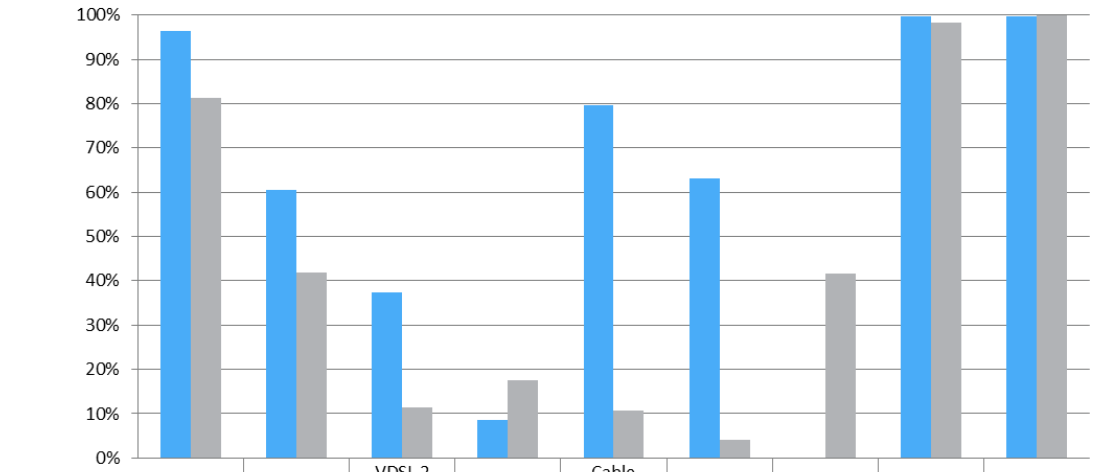


	DSL	VDSL	VDSL 2 Vectoring	FTTP	Cable DOCSIS 3.0	DOCSIS 3.1	FWA	LTE	Satellite
Switzerland	99.5%	90.1%	80.2%	40.9%	84.4%	71.7%	-	99.9%	100.0%
EU 28	91.2%	59.2%	28.2%	33.5%	45.5%	19.2%	49.1%	99.4%	99.9%

Source: Broadband Coverage in Europe 2019, a study by Omdia and Point Topic for the European Commission

Looking at individual technologies in rural regions of Switzerland, DSL remained the most widespread technology in rural Swiss areas with 96.4% of rural households having access to DSL-based broadband services.

Switzerland: Coverage by technology, rural areas, 2019



	DSL	VDSL	VDSL 2 Vectoring	FTTP	Cable DOCSIS 3.0	DOCSIS 3.1	FWA	LTE	Satellite
Switzerland	96.4%	60.5%	37.4%	8.6%	79.8%	63.0%	-	99.8%	99.7%
EU 28	81.4%	41.8%	11.3%	17.5%	10.8%	4.1%	41.7%	98.2%	99.9%

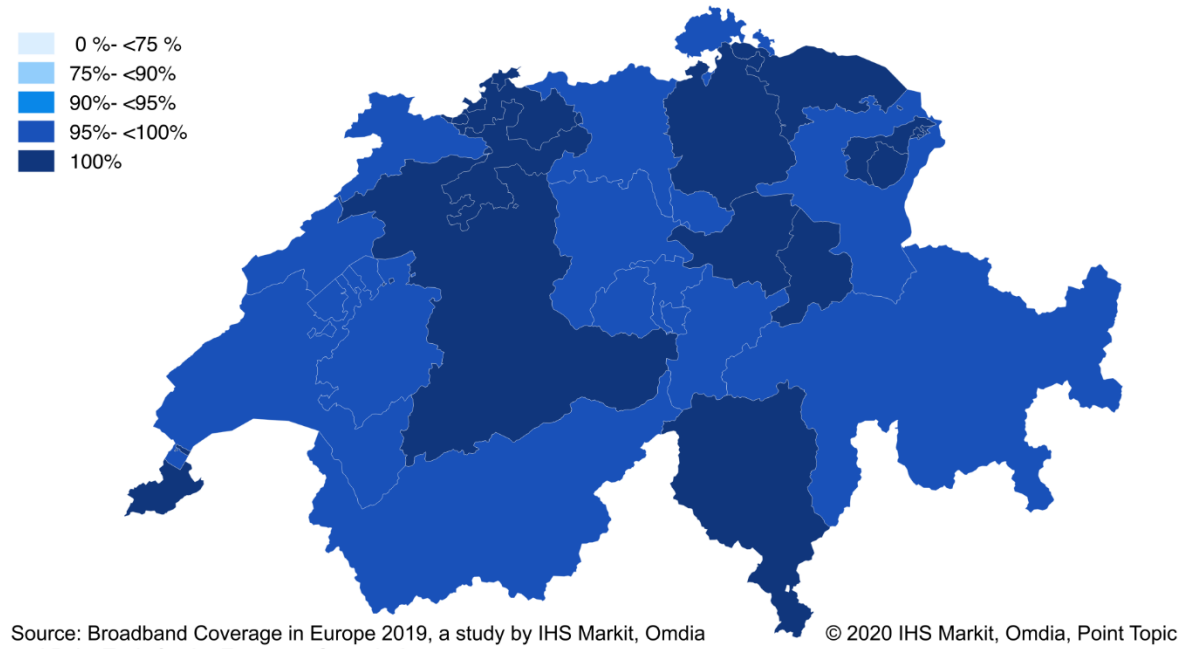
Source: Broadband Coverage in Europe 2019, a study by Omdia and Point Topic for the European Commission

As mentioned, Switzerland was among the best performers in this study in terms of rural NGA coverage, which stood this year at 93.8%, the third highest coverage achieved among the 31 countries of this study. Cable modem DOCSIS 3.0 remained the most prevalent rural NGA technology, with 79.8% of households covered, and DOCSIS 3.1 was available to 63.0% of households. VDSL networks passed 42.7% of rural homes, and VDSL 2 Vectoring-enabled services were available to 37.4% of rural households. Lastly, FTTP availability in rural regions of Switzerland remained low compared to other NGA technologies as only 8.6% of rural homes were passed by FTTP networks. Mobile broadband availability in rural regions of Switzerland slightly improved and continued to near universal coverage. LTE coverage increased by 0.1 percentage point over the study period, to reach 99.8% of rural households.

3.2 Regional coverage by broadband technology

As was the case last year, only four regions out of 26 recorded fixed broadband levels under 99.0%, with their coverage level remaining above 95.5% of households passed. Similar to last year, these four regions were Jura, Grisons (Graubünden), Obwalden and Uri.

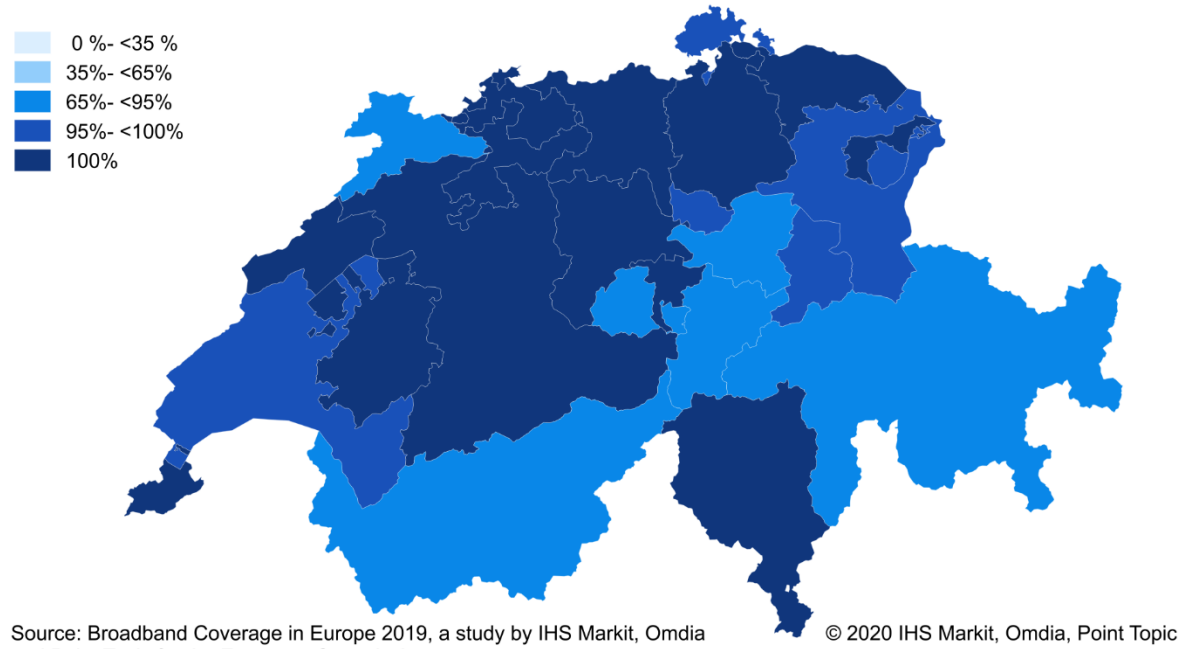
Switzerland: Overall fixed broadband coverage, 2019



Source: Broadband Coverage in Europe 2019, a study by IHS Markit, Omdia and Point Topic for the European Commission

In this iteration of the study, fourteen Swiss regions recorded universal (100 .0%) NGA coverage. Availability of NGA broadband thus ranged from 90.1% in Grisons (Graubünden) and 100.0% in fourteen regions.

Switzerland: NGA broadband coverage, 2019



Source: Broadband Coverage in Europe 2019, a study by IHS Markit, Omdia and Point Topic for the European Commission

3.3 Data tables for Switzerland

Statistic	National
Population	8,419,550
Persons per household	2.2
Rural proportion	12.5%

	Switzerland 2019		Switzerland 2018		Switzerland 2017		EU28 2019	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	91.9%	96.4%	99.5%	96.3%	99.5%	96.3%	91.2%	81.4%
VDSL	83.5%	42.7%	90.0%	60.4%	90.0%	60.6%	59.2%	41.8%
VDSL 2 Vectoring	80.2%	37.4%	-	-	-	-	28.2%	11.3%
FTT	40.9%	8.6%	30.3%	8.2%	29.5%	7.6%	33.5%	17.5%
Cable modem DOCSIS 3.0	84.4%	79.8%	84.3%	79.7%	84.3%	78.1%	45.5%	10.8%
DOCSIS 3.1	71.7%	63.0%	-	-	-	-	19.2%	4.1%
FWA	0.0%	0.0%	-	-	-	-	49.1%	41.7%
LTE	99.9%	99.8%	99.9%	99.7%	99.8%	99.4%	99.4%	98.2%
LTE average operator coverage (DESI indicator)	98.6%	-	98.6%	-	98.6%	-	96.5%	-
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.9%	99.9%
Overall fixed broadband	99.8%	98.6%	99.8%	98.6%	99.8%	98.6%	97.1%	89.7%
NGA broadband	99.0%	91.8%	99.0%	93.9%	99.0%	93.3%	85.8%	59.3%
Very High Capacity Networks	80.4%	67.5%	-	-	-	-	44.0%	20.1%
At least 2 Mbps	99.8%	-	99.7%	-	99.8%	-	95.7%	-
At least 30 Mbps	99.8%	-	98.9%	-	98.9%	-	83.3%	-
At least 100 Mbps	98.6%	-	98.5%	-	98.5%	-	68.4%	-
At least 1 Gbps	40.3%	-	-	-	-	-	32.4%	-

Note: The 2019 figures represent state of broadband coverage as of end of June 2019. The 2018 (end of June) and 2017 (end of June) figures are drawn from the previous studies conducted by IHS Markit and Point Topic.

All restatements are highlighted in italics.

4.0 Methodology

The methodological approach used in the 2019 edition of the Broadband Coverage in Europe study mirrors the approach used in the 2013-2018 studies, which was in turn based on a methodology first implemented by Point Topic in 2012. Applying the same methodological approach allows the research team to ensure both consistency and year-on-year comparability of the data.

As in previous years of the project, a survey of NRAs and broadband network operators forms the core of this study. The survey results were validated and cross-checked against additional information gathered from other sources (including public announcements by telecoms groups) in parallel with the survey data collection. The additional research also helped to fill in any gaps, which resulted from incomplete information from NRAs or operators. Lastly, survey data and additional information were combined and used to calculate national coverage by individual technologies as well as the combination coverage categories and speed coverage categories for all study countries. The timeline of the data reflects the situation at the end of June (i.e. half-year data rather than year-end data points were collected).

The following chapters of this report provide a detailed description of the project's methodology.

4.1 Survey design and data collection

For the sake of consistency, the research team used similar wording and formatting of the survey questionnaire as in 2012-2018. Using near-identical question wording enables the research team to deliver findings which can be compared with research undertaken in previous years.

Where possible, the research team contacted survey participants that were approached for the 2012-2018 data collection. During the previous data collection runs the research team updated and expanded the list to include new contacts in already surveyed companies and organisations as well as those companies that were not previously approached. The fact that the BCE project is a long-running project means that most respondents are familiar with the study as well as the survey questionnaire, making it easier for them to fill in the by-now familiar information.

The survey questionnaire focuses on one central question, which asks about the absolute number of homes passed by broadband networks, and is applied to the following key metrics of the research:

- Technology coverage – for each of the technologies (with the exception of satellite) a question was included asking NRAs to supply the number of homes passed by each individual technology in the country.
- Regional coverage – NRAs and operators were also asked to supply homes-passed information for each of the NUTS 3 regions in all study countries for each of the technologies.
- Rural coverage – the same questions were asked of respondents for homes passed in rural areas of each NUTS 3 region as well as for the total number of rural homes passed country-wide.
- Speed coverage - the survey questionnaire also includes questions asking participants about the numbers of homes passed by networks able to achieve speeds of at least 2 Mbps, 30 Mbps and 100 Mbps. An additional speed category of at least 1Gbps download speed was included in the 2019 survey questionnaire as requested by DG Connect.

In a number of cases, coverage data was delivered on a more detailed geographical level than the requested NUTS 3 areas. In these cases, the research team aggregated the provided data to match the NUTS 3 regions.

In addition to the coverage questions, the survey questionnaire also provided space for additional comments and explanations of the various technologies and speed specifications in cases in which respondents' definitions differed from those outlined in the survey (detailed definitions of the individual broadband technologies are included in the Appendices of this report). These comments provided further insight and were reflected in the final analysis of the data.

Given the nature of satellite broadband coverage, questions regarding satellite coverage were not included in the survey questionnaire. The satellite coverage across Europe was determined based on conversations with leading satellite providers such as Eutelsat, a KA-SAT broadband provider and other smaller satellite operators.

The research team has been from the onset of this project aware of the sensitivity of the requested data provided by operators, as much of the coverage data (especially on such a granular level) could be regarded as commercially sensitive by operators. Therefore, confidentiality of the information gathered from both NRAs as well as individual operators was assured at all stages of the survey data collection and subsequent analysis.

In order to protect the confidentiality of the data, study results for individual coverage technologies are published only on a total country level. On the regional NUTS 3 level, reported data is limited to coverage by technology combinations. As these technology combinations include multiple technologies, coverage by individual technologies or companies is concealed within the combined total coverage.

4.2 Defining households and rural areas

The central question posed by the survey questionnaire asks about the number of homes passed by individual operator and/or technology networks, depending on the respondent. In order to make determining the numbers of homes passed in each NUTS 3 region easier for respondents, the research team provided guidance by including the total number of households in each area in the survey questionnaire.

As it is not possible to obtain annually updated household figures by NUTS3 regions for all of the BCE study countries, the research team calculated the number of households in each NUTS 3 region using NUTS 3 level population data published annually by Eurostat and average household size figures also published by Eurostat annually for each country. This approach allows the research team to maintain a unified methodology across all study countries using one data source.

One of the key dimensions of the study is centred around gaining information on broadband coverage in rural areas. In order for the rural data collected in the period 2013-2019 to be comparable to the 2012 dataset, the research team uses a methodology first developed by Point Topic in 2012, which defines rural areas using the Corine land cover database, and creates a database of population and land type in every square kilometre across Europe. Households in square kilometres with a population of less than one hundred are classified as rural. This granular approach based on population density identifies the truly rural areas likely to be unserved or underserved by broadband operators.

According to an updated estimation of rural population in individual NUTS 3 regions, approximately 15% of households in the study countries were rural in 2019. Combining this information with updated population and household data from Eurostat, the EU statistical office, allowed the research team to create new estimates for the numbers of rural households across each market and NUTS 3 area.

4.3 Additional research conducted in parallel to the survey

In addition to data gathered through the NRAs and ISPs survey, the research team carried out supplemental research to check the validity of survey data as well as to fill in any missing information.

The additional research was built on the research team's extensive in-house knowledge of the European broadband sector and was complemented with country and regional-level data collected from publicly available NRAs and ISPs reports and details on broadband strategies and development plans of individual companies and governments.

This desk-based research provided basic estimates on country-level coverage for each technology. In many cases, information on regional deployments of next generation access technologies was also available, or it was possible to infer such detail from company communications.

The individual elements of the additional research were determined on a country-by-country basis and included (but were not limited to) desk research of the following publicly available sources:

- NRAs market reports
- ISPs financial reports and press releases
- Industry organisations white papers, special reports and analysis
- Industry news

4.4 Validation and integration of data

In this phase of the study, data collected through the survey and via additional research was brought together to obtain the actual coverage figures for all study countries.

The data integration was conducted on a country-by-country basis. Information gathered from additional research was cross-checked with results of the survey. In cases in which data points were missing, for example some of the NUTS 3 regions or rural coverage, a modelling methodology was applied to fill in the gaps. Models used varied on a case-by-case basis, and relied on a range of inputs, which included national coverage and regional presence data as well as the research team's knowledge of individual markets, companies' deployment strategies and ancillary data, such as population density.

Each country's data was integrated for each technology individually. This allowed the research team to first obtain estimates for individual technologies at a NUTS 3 level, which were then used to calculate estimates for technology combinations – again at a NUTS 3 level. Regional data was finally summed to obtain national-level coverage information. When integrating data on individual technologies, special attention was paid to areas for which coverage of the same technology was provided by multiple operators, in order to rule out possible overlap.

At the end of the data validation and aggregation process, the research team was able to provide estimates for each of the nine broadband technologies in all NUTS 3 areas both on total and rural level.

4.5 Estimating coverage for different technology combinations

After reaching the broadband coverage figures by individual technologies in each country and NUTS3 regions, the research team calculated estimates for the following three technology combinations, taking into account overlaps of different technologies:

- Overall fixed broadband coverage (including DSL, VDSL, VDSL2 Vectoring, FTTP, Cable modem DOCSIS 3.0, DOCSIS 3.1 and FWA)
- Overall NGA coverage (including VDSL, VDSL2 Vectoring, FTTP, cable modem DOCSIS 3.0, and DOCSIS 3.1)
- Overall Very High Capacity Networks (VHCN) coverage (including FTTP and cable modem DOCSIS 3.1)

For the sake of consistency, the research applied a similar methodology in the 2019 study to the approach used in the 2012-2018 editions of the study. Unless information provided by NRAs or telecoms groups suggested otherwise, a standardised default formula was used, taking the average of:

1. The minimum possible coverage; equal to the coverage of the most widespread technology or operator in the area; and
2. The maximum possible coverage; equal to the sum of the coverage of all the technologies or operators being considered, or to 100%, whichever was the greater.

As in previous studies, a varied formula was used in cases where technologies' coverage was more complementary than overlapping. In these cases, the minimum coverage was taken as equal to the sum of the complementary technologies, if this was greater than the most-widely available single technology.

Additionally, the estimates for combination coverage on a national level were made by summing the estimates for the NUTS 3 areas rather than applying this formula on a country level. This approach provides a more accurate data output than simply taking the country-level average.

Once the research team completed the final country level dataset, it was passed on to DG Connect and to the NRAs of all of the study countries for their feedback and comments before the finalised data was used as components of the Digital Society & Economy Index (Connectivity Dimension) and published as part of the individual country assessment reports.

In a number of cases, new and more accurate data was provided to the research team impacting previous years' data and thus justifying restatements of the figures published in the Broadband Coverage in Europe 2018 study.

4.6 Estimating coverage for speed categories

The speed categories were first included as broadband coverage metrics in 2013 in order to provide additional analytical layer to evaluate the study countries' progress towards the Digital Agenda goals and to estimate the download speeds available to households across the EU Member States. This additional component of the broadband coverage research was retained in the 2019 edition of the study with the following speed categories included among the metrics:

- Coverage by broadband network/s capable of at least 2 Mbps download speed
- Coverage by broadband network/s capable of at least 30 Mbps download speed
- Coverage by broadband network/s capable of at least 100 Mbps download speed

In addition, a new speed category was included in the 2019 study:

- Coverage by broadband network/s capable of at least 1Gbps download speed

Including the speed metrics allows for a comparison of the technology coverage, which might be reported as relatively high, to the actual speeds consumers will be able to receive over the networks available to them.

The following methodological approach was first implemented in 2013 and carried over in subsequent iterations of the study. In order to estimate the coverage by speed categories, the research team needed to develop a suitable methodology and clear definition to determine coverage by realistically achievable speeds as required by DG Connect. Thus, the following speed categories were added among the research metrics and questions regarding these categories were included in the survey questionnaire:

- Coverage by broadband network/s capable of realistically achieving actual download speeds of at least 2 Mbps. This category encompassed DSL (including VDSL and VDSL2 Vectoring), FTTP, FWA, cable modem DOCSIS 3.0 and DOCSIS 3.1 broadband access technologies. However, as not all DSL connections are capable of download speeds of 2Mbps and higher, respondents were asked to exclude those connections which did not meet the criteria from their answers.

- Coverage by broadband network/s capable of realistically achieving actual download speeds of at least 30 Mbps. This category encompassed VDSL (including VDSL2 Vectoring), FTTP, FWA (4G TD LTE standard) and DOCSIS 3.0 (including DOCSIS 3.1) cable broadband access technologies. However, as not all connections utilizing these technologies can achieve 30 Mbps and higher actual download speeds (for example, VDSL connections with distance from the exchange point higher than 500m see radical decrease in actual speeds), respondents were asked to exclude those connections which did not meet the criteria from their answers.

- Coverage by broadband network/s capable of realistically achieving actual download speeds of at least 100 Mbps. This category encompassed VDSL2 Vectoring, FTTP and DOCSIS 3.0 cable broadband access technologies. In cases where vectoring is applied to VDSL2 technology and speeds reach 100 Mbps and higher download speeds, VDSL with vectoring was asked to be included in this category. However, as not all connections utilizing these technologies can achieve 100 Mbps actual download speeds (for example, in the case of FTTB – fibre-to-the-building – connections included in the FTTP category in-building wiring can pose significant constraints on achievable end-user broadband speeds), respondents were asked to exclude those connections from their answers.

- Coverage by broadband network/s capable of realistically achieving actual download speeds of at least 1Gbps. This category encompassed FTTP and DOCSIS 3.1 cable broadband access technologies. However, as with the other speed categories, not all connections utilizing these technologies can achieve 1Gbps actual download speeds and respondents were asked to exclude those connections from their answers.

The coverage of these speed categories was then defined as a household having technical access to one or more networks supporting at least 2, 30, 100 Mbps or 1Gbps download speed connections if the connection's broadband speed was capable of achieving a minimum of 2, 30, 100 Mbps or 1Gbps download speed (respectively) for the majority of the time. 'Majority of time' is understood to mean actual download speeds achieved by a household for at least 75% of the time.

As speed information can be generally hard to decode, even for the NRAs and ISPs themselves, the research team, in addition to the collected survey data, also relied on sector knowledge regarding deployments to make informed estimates of achievable speeds to gain a complete picture of coverage by the speed categories.

Following discussions with DG Connect, the research team has made a few changes in terms of technologies considered when estimating the coverage by speed categories. These changes reflect the technological advancements and improving capabilities of individual broadband access technologies that have been observed over the last couple of years. For this reason, availability of FWA provided over 4G LTE TD was considered in the at least 30 Mbps speed category and VDSL2 Vectoring was included in the analysis of availability of services providing at least 100 Mbps download speeds.

Note that unlike the technology coverage, the speed metric categories have been determined on a country level only, as gathering information on rural and regional NUTS 3 level would not have been feasible within the scope of the study – although we hope that NRAs and ISPs will consider collecting and making such information available at a future point in time.

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