Broadband Coverage in Europe 2016:

Coverage in Switzerland

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1.0 Introduction

In order to foster the development of 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 free movement of goods and services online and mean that businesses, governments and individuals cannot fully benefit from digital tools that would be available to them but that are currently locked in 28 different regulatory environments.

The European Commission estimates that once completed, 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 the 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 roll out of reliable high-speed broadband networks across Europe.

In 2010, the Digital Agenda for Europe (DAE) was drawn 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.

The Digital Scoreboard serves 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 measures the deployment and quality of broadband infrastructure.

In order to monitor the progress of the 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 measure the household coverage of all 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.

The 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 carried on going forward.

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 was to cover 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. This report presents results of this additional research as well as Europe-wide overview of the broadband coverage trends at the end of June 2016.

The nine broadband technologies analysed in this study are:

- DSL (including VDSL)
- VDSL
- Cable modem (including DOCSIS 3.0)
- DOCSIS 3.0
- FTTP (Fibre-to-the-property)
- WiMAX
- HSPA
- LTE
- Satellite

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

The study also aims, as requested by DG Connect, to estimate the overall coverage of "combination" 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, and similar to previous years, are:

- Overall broadband coverage
    - Includes all the main broadband technologies, both fixed and mobile, but excludes satellite
    - Combination of DSL (including VDSL), cable modem (including DOCSIS 3.0), FTTP, WiMAX, HSPA and LTE

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

- 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, DOCSIS 3.0, and FTTP

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 the technology combinations.

The methodology used in this report mirrors the approach developed by Point Topic in 2012, adopting 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 1,357 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 2012-2015 data.

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 speed categories was first estimated by IHS Markit 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 particular networks available to them.

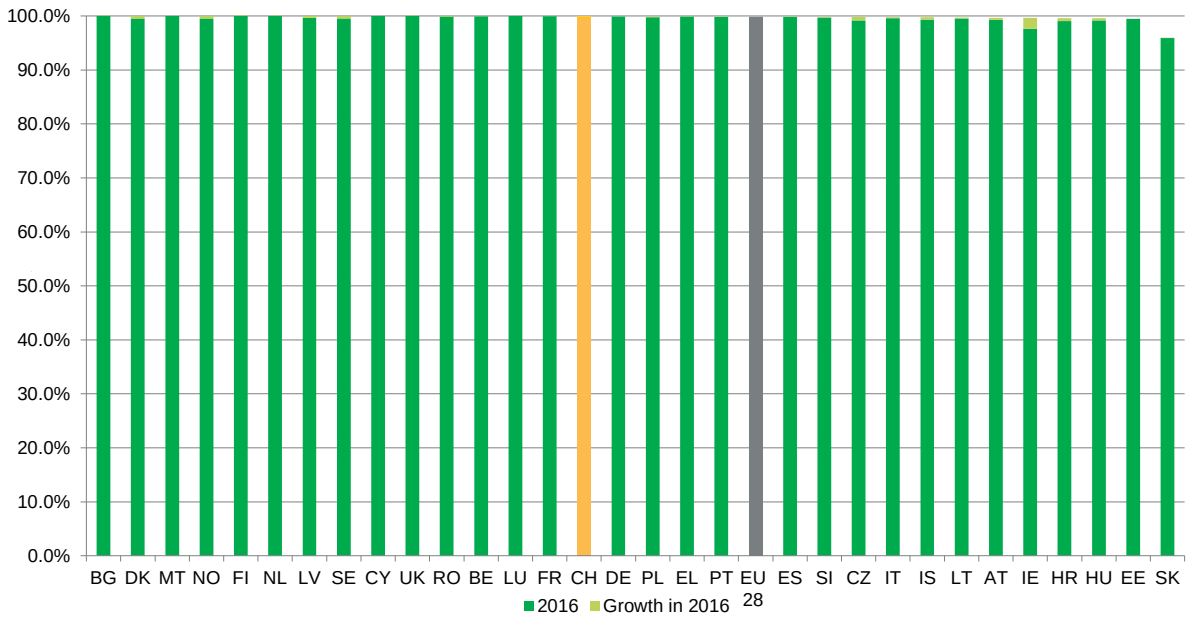
2.0 European Overview

2.1 Country comparison of overall broadband coverage

The overall broadband coverage combination category combines broadband coverage of all fixed broadband access technologies (DSL, cable, FTTP, WiMAX) as well as mobile broadband technologies (HSPA and LTE).

This category provides an indication of the number of households covered by basic broadband provided by at least one of the abovementioned technologies.

Overall broadband coverage by country, 2016



Source: Broadband Coverage in Europe 2016, a study by IHS Markit and Point Topic for the European Commission

At the end of June 2016, more than 99.9% of Swiss households had access to at least one fixed or mobile broadband service. In terms of overall broadband coverage, Switzerland ranked above the EU average of 99.8% and was among the 15 countries which recorded complete or very nearly complete overall broadband coverage. Slovakia was the only country, where overall broadband coverage levels did not reach 99% or more households with 95.9% of Slovak households being passed by at least one mobile or fixed broadband technology.

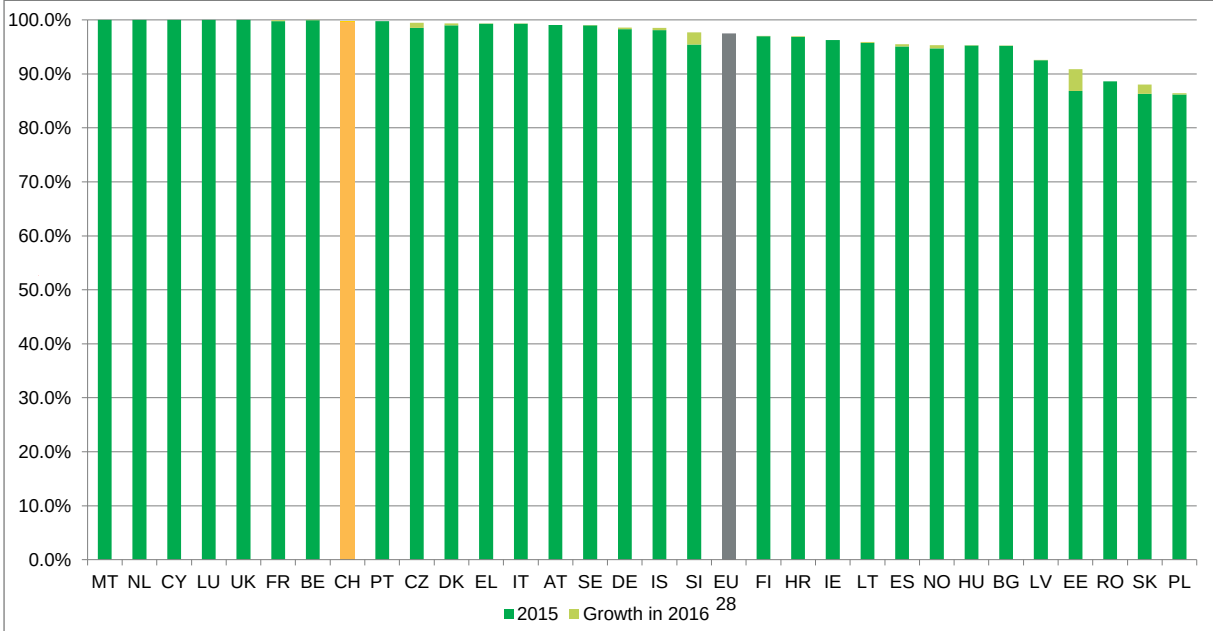
No significant increases in overall broadband coverage were reported in terms of overall broadband coverage compared to mid-2015. This is due to the fact that HSPA rollout, which is generally the biggest driver of this category, has been mostly finished and widespread already in 2014 and availability of DSL (the second most important contributor) is saturated across the majority of European countries.

As was mentioned in previous reports on broadband coverage in Switzerland, while all households in Switzerland are guaranteed by law (Universal Service Obligation) to be able to get connected to at least 2Mbps, our research estimates show that there continues to be a small number of homes (0.06%) that cannot be serviced by either fixed or mobile broadband connections. However, given the fact that 100% satellite coverage was reported for Switzerland, it is possible to assume that satellite broadband services are available to all Swiss households.

2.2 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 figures: DSL (including VDSL), cable (including DOCSIS 3.0), FTTP, and WiMAX. Note that FTTP coverage trends are discussed in more detail in the following chapter on NGA coverage by country.

Overall fixed broadband coverage by country, 2016



Source: Broadband Coverage in Europe 2016, a study by IHS Markit and Point Topic for the European Commission

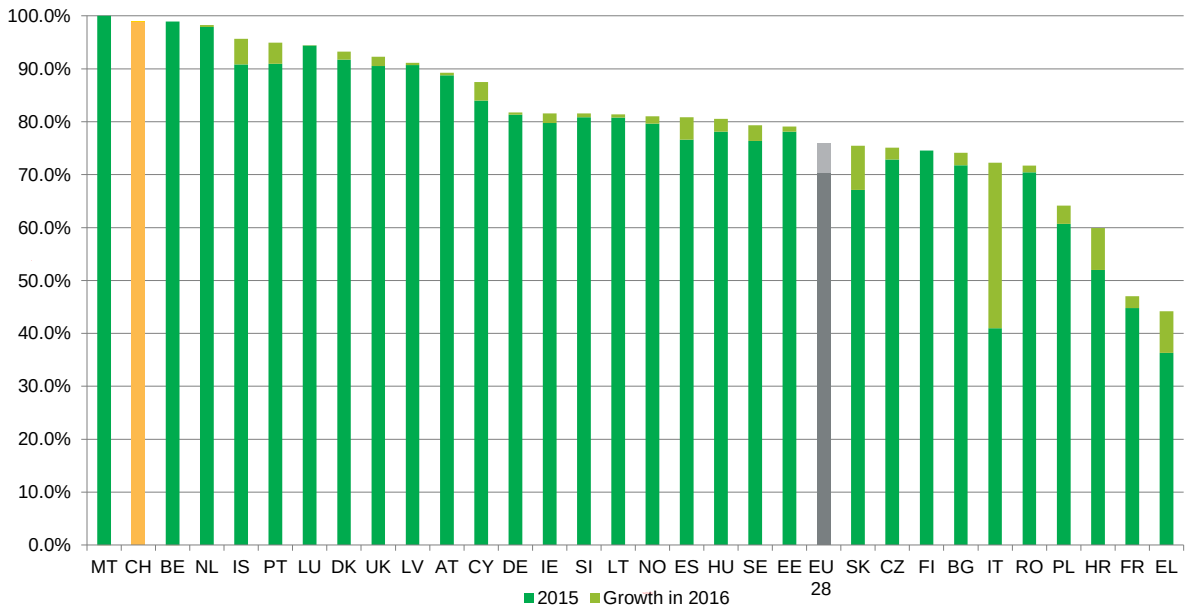
Out of the 31 study countries, 26 countries registered fixed broadband coverage of above 95%, indicating the breadth of fixed broadband coverage in most nations. Compared to the previous year, more countries are above the European average for overall fixed broadband coverage with 19 countries reporting fixed broadband coverage levels at or above the EU average of 97.5% at the end of June 2016. Several countries recorded complete, or near-complete, fixed broadband coverage including Cyprus, Luxembourg, Malta, the Netherlands and the United Kingdom. Only three countries (Romania, Slovakia and Poland) reported coverage below 90% in mid-2016. These countries face fixed broadband coverage challenges due to their sparsely populated and underserviced rural areas.

In Switzerland, 99.8% of homes had access to at least one fixed broadband service at the end of June 2016, unchanged from the previous year. In terms of coverage by the individual fixed technologies, DSL networks are available to the vast majority of Swiss households with DSL coverage reaching 99.5% of households. During the 2016 data collection, the research team received new data suggesting overestimation of availability of cable broadband services leading to restatements of cable coverage in Switzerland. At the end of June 2016, cable networks passed 84.3% of Swiss homes.

2.3 Country comparison of NGA coverage

The NGA combination category comprises VDSL, FTTP and DOCSIS 3.0 technologies, all typically capable of delivering a service speed of at least 30Mbps (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 NGA coverage category therefore constitutes an evaluation of the roll-out of the relevant technologies and progress towards this goal.

Overall NGA coverage by country, 2016



Source: Broadband Coverage in Europe 2016, a study by IHS Markit and Point Topic for the European Commission

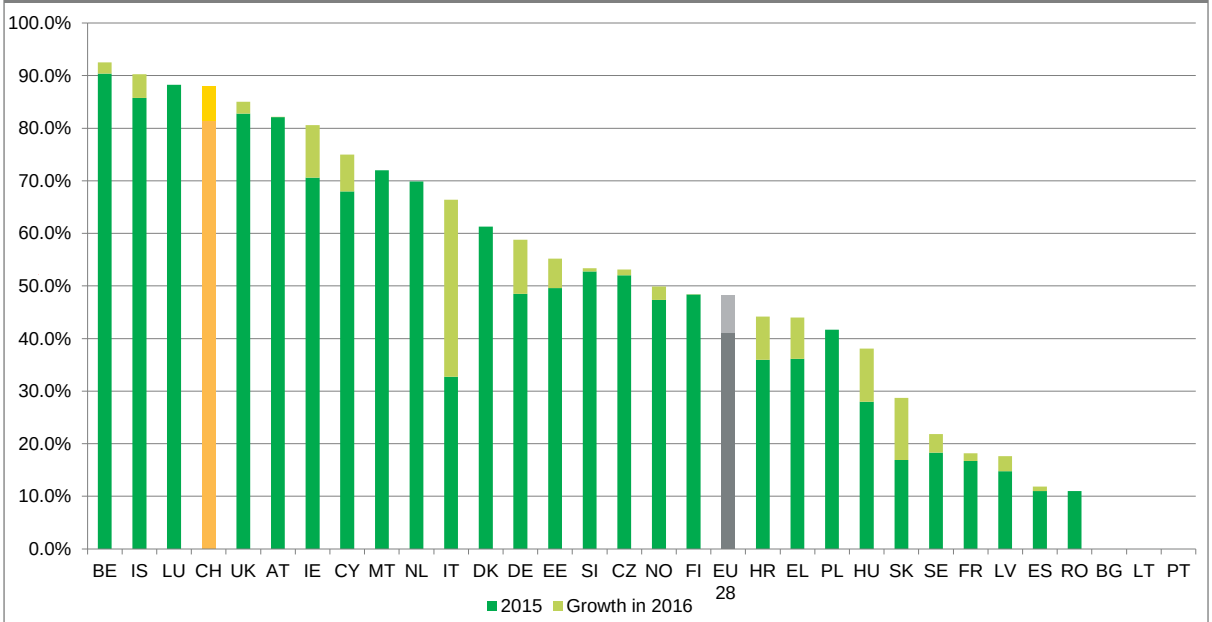
The chart presented above shows that highly urbanised countries generally record the highest NGA coverage. Malta remained the only country to report complete coverage for the NGA technology category; while Switzerland, Belgium, the Netherlands, Iceland and Portugal all recorded NGA coverage levels above 95%.

There continued to be considerable differences in NGA coverage across the study countries, reflecting the various strategies and approaches to high-speed broadband deployment adopted across Europe. Of the 31 study countries, ten countries reported coverage levels below the European average (75.9%). Even though it remains below the EU average, Italy recorded a staggering 31.3 percentage point growth in NGA coverage and NGA networks passed nearly three-quarters (72.3%) of Italian homes at the end of June 2016. Nevertheless, coverage levels in some countries remain very low compared to the top performers. For instance, NGA services in France and Greece are available only to around 45% of households.

Among the individual NGA technologies, VDSL remained the fastest growing NGA technology during the study period. At the end of June 2016, VDSL networks passed nearly a half (48.2%) of EU homes compared to 41.1% in mid-2015. This shows that coverage growth is continuing at a similar rate to the first six months of 2015, when total VDSL coverage improved by 3.5 percentage points. Operators continue to focus their deployment strategies on upgrading existing copper networks instead of investing in the typically more expensive deployments of fibre optic networks all the way to customers' property.

VDSL however remains far from widespread in most markets. Belgium and Iceland were the only two study countries to report VDSL coverage exceeding 90%, although five other countries reported coverage levels of over 80% (Luxembourg, Switzerland, the UK, Austria and Ireland). Eighteen study countries achieved VDSL coverage exceeding the EU average, however, VDSL remains far from widespread in most markets.

VDSL coverage by country, 2016



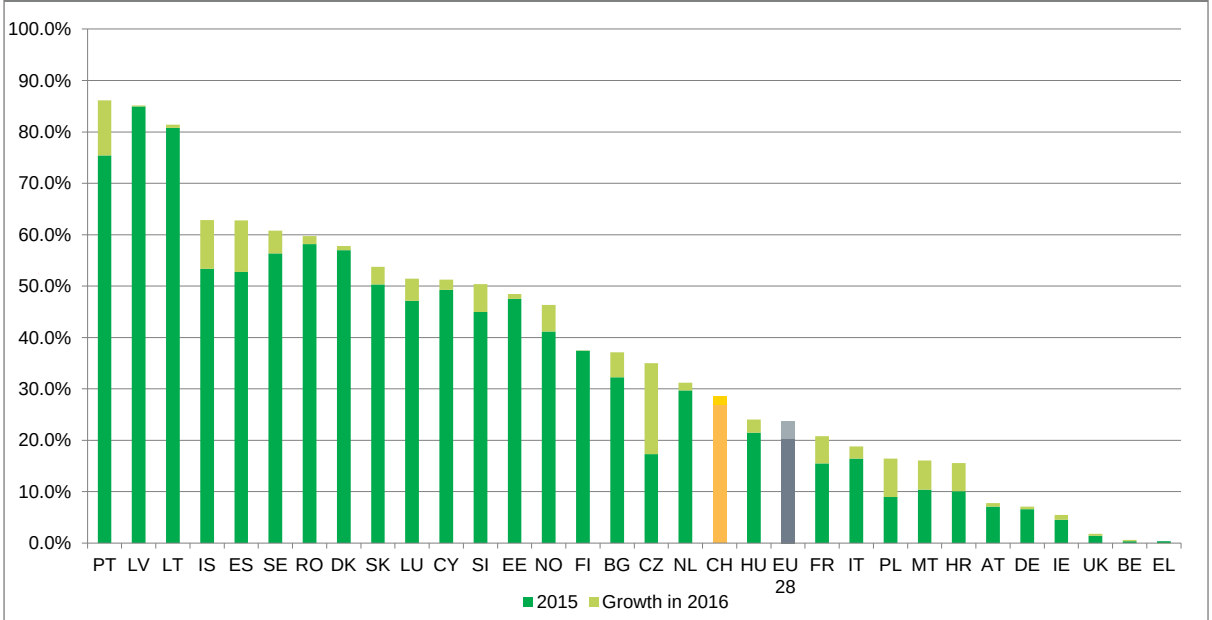
Source: Broadband Coverage in Europe 2016, a study by IHS Markit and Point Topic for the European Commission

At the end of June 2016, VDSL was not available in Bulgaria, Lithuania and Portugal, while four countries had less than 20% coverage (France, Latvia, Spain and Romania). Traditionally, many of these countries prefer other NGA technologies over VDSL. However, in other countries, there was a substantial increase in NGA coverage. For instance, VDSL coverage in Italy more than doubled during the twelve-month period to mid-2016, as coverage increased by 33.6 percentage points. Iceland, Germany, Hungary and Slovakia also witnessed double-digit growth in VDSL coverage during the twelve-month period to mid-2016.

In 2016, FTTP coverage continued to grow in Portugal, improving by 10.7 percentage points during the twelve-month period to mid-2016. As a consequence of this growth, Portugal with 86.1% FTTP coverage has now surpassed Latvia (85.2%) and Lithuania (81.4%) to rank first in terms of FTTP coverage among all study countries.

The strongest growth in FTTP coverage, however, was recorded in Czech Republic, where availability of FTTP services increased by 17.7 percentage points during the twelve-month period to mid-2016 with more than a third (35%) of Czech homes passed by FTTP networks, driven primarily by small and local deployments. In the same period, Spain also saw a substantial 10.0 percentage point FTTP coverage increase, rising by 10.0 percentage points to reach 62.8% of Spanish households. One of the major contributors to the rise of FTTP coverage in both Portugal and Spain is the strategic business model of Portuguese and Spanish network operators, which is based on network sharing and cooperation on joint roll-out of FTTP networks all the way to customers' premises.

FTTP coverage by country, 2016



Source: Broadband Coverage in Europe 2016, a study by IHS Markit and Point Topic for the European Commission

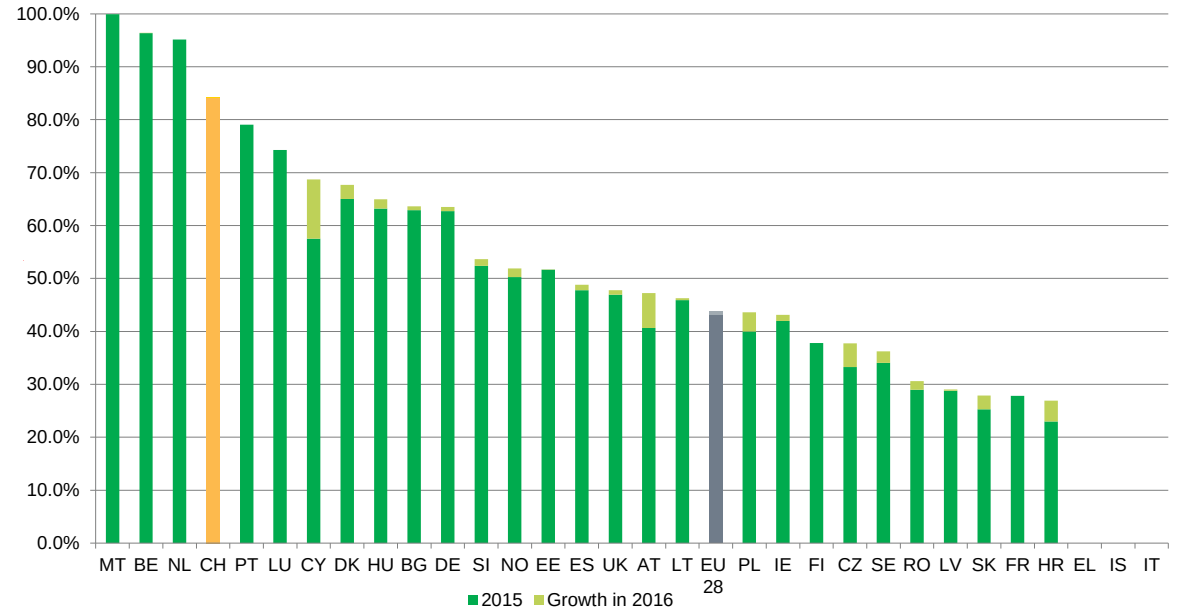
Eleven countries reported coverage levels below the EU average. While FTTP access is on offer in all study countries, in some of the countries FTTP services are available only on a very limited basis. As in previous years, Greece and Belgium reported the lowest levels of FTTP coverage, at 0.6% and 0.4%. In the UK, FTTP coverage was only slightly higher at 1.8%. This reflects the preference of operators in these countries to prioritise their deployment strategies on upgrading existing VDSL networks, rather than investing in the typically more expensive FTTP technology. These operators view the speeds associated with VDSL technologies as sufficient to satisfy current demand. And some operators, such as Swisscom in Switzerland and BT in the UK, have also begun to trial solutions such as G.fast in selected areas to further increase speeds to up to gigabit levels with a view of wider scale implementation in the future as consumer demand grows.

In mid-2016, European cable network operators continued to upgrade their cable networks to the DOCSIS 3.0 standard, although a large part of the work has already been done in previous years. The percentage of cable networks across Europe upgraded to DOCSIS 3.0 technology increased to 99.0%, an increase of 0.5 percentage points in the twelve-month period to mid-2016.

A further 4 countries fully upgraded their cable networks to DOCSIS 3.0 by mid-2016, meaning that cable networks in 15 study countries were fully upgraded. DOCSIS 3.0 comprised over 80% of cable networks in all countries with cable broadband coverage, with the exception of Croatia. However, even in Croatia the pace of DOCSIS 3.0 upgrades seems to have picked up with 78.6% of cable homes passed being upgraded to the DOCSIS 3.0 standard compared to only 70% in mid-2015.

Malta was the only country to record 100% DOCSIS 3.0 coverage, while Belgium and the Netherlands remained the other countries to report DOCSIS 3.0 coverage levels above 95%. Beyond this, all other study countries recorded DOCSIS 3.0 coverage levels below 85%. Eighteen of the study countries performed better than the EU average (43.9%). The biggest improvement in terms of the number of homes passed by DOCSIS 3.0 was recorded in Cyprus, where coverage increased by 11.2 percentage points. As in previous years, Greece, Iceland and Italy remained the three study countries without a cable broadband network and therefore reported no DOCSIS 3.0 coverage.

Docsis 3.0 coverage by country, 2016



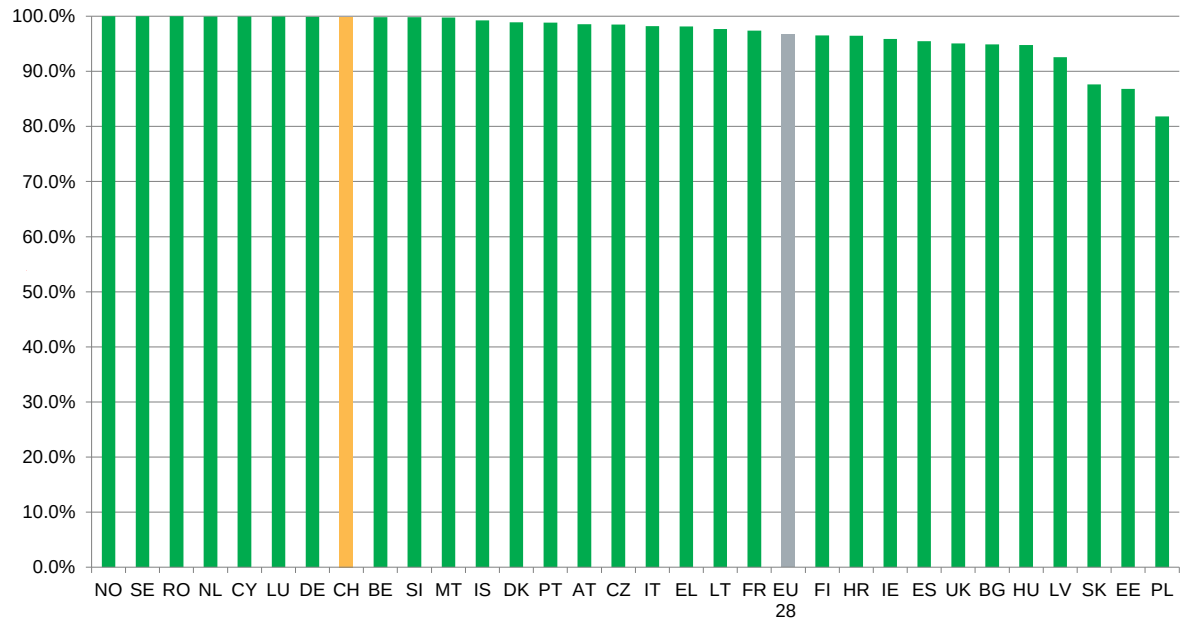
Source: Broadband Coverage in Europe 2016, a study by IHS Markit and Point Topic for the European Commission

2.4 Country comparison of speed categories

The information gathered on actual download speed of at least 2 Mbps shows that in most countries, vast majority of households had access to connections with at least 2 Mbps actual download speeds at the end of June 2016. In 11 countries, at least 2 Mbps actual download speeds were available to all or nearly-all (over 99.8%) households.

Lower availability of at least 2 Mbps broadband connections was recorded for countries with higher proportion of DSL or WiMAX networks in the make-up of fixed broadband coverage, as traditionally DSL (and WiMAX) networks tend to be less reliable in sustaining actual speeds at peak times compared to cable and FTTP networks. In Slovakia, Estonia, and Poland fewer than 90.0% of homes were passed by networks capable of delivering at least 2 Mbps actual download speeds.

Speed coverage by country: At least 2Mbps download, 2016



Source: Broadband Coverage in Europe 2016, a study by IHS Markit and Point Topic for the European Commission

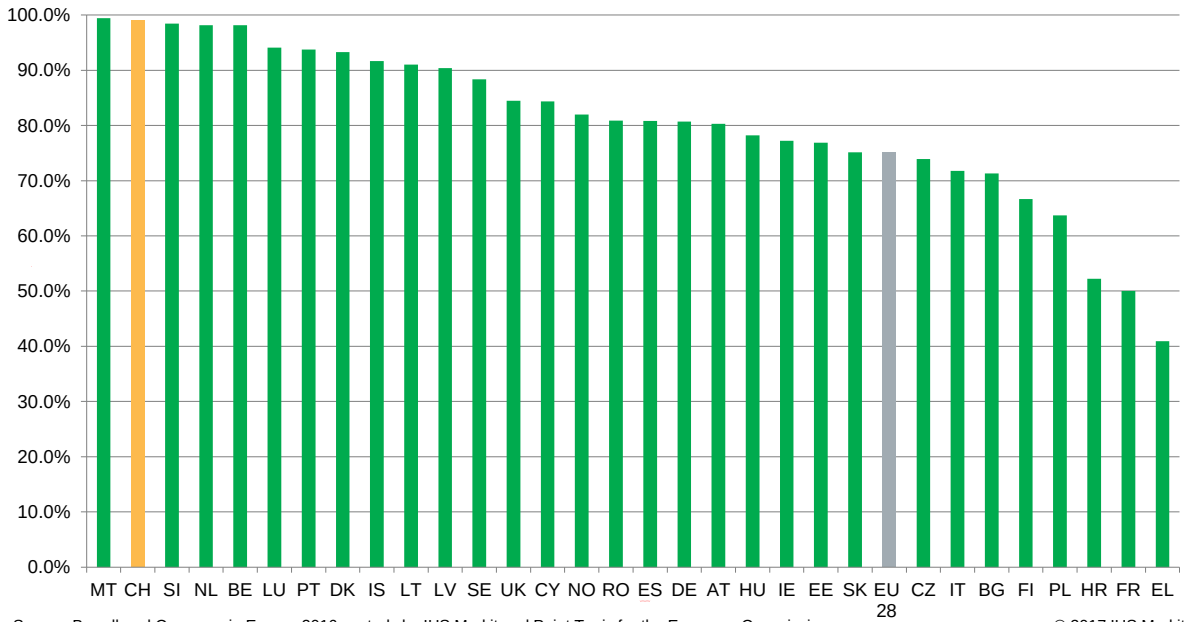
In a number of countries, availability of at least 2 Mbps broadband connections reached higher levels than that of fixed broadband coverage. In Germany, Iceland, Norway, Romania, Slovenia, and Sweden, mobile networks and LTE networks in particular were reported to provide sustainable actual downloads speeds of at least 2 Mbps and thus contributed to boosting the coverage by at least 2 Mbps speed category to surpass coverage provided by fixed broadband networks.

Similar trend was also observed when looking at the NGA coverage figures in comparison with data on at least 30 Mbps actual download speeds. In France, Lithuania, Romania, Slovenia, and Sweden more households were able to access broadband services providing them with at least 30 Mbps actual download speeds than there were homes passed by fixed NGA networks. This development shows the potential and technological improvement of the LTE networks, which in these countries were considered to be able to support the at least 30 Mbps speeds for the required majority (75%) of time at the end of June 2016.

In addition, many countries experienced a substantial growth in availability of connections supporting at least 30 Mbps actual download speeds in the twelve-month period to the end of June 2016. The highest growth was recorded in Italy, where at least 30 Mbps coverage grew by 28.2 percentage points and at the end of June 2016, more than 7 in 10 Italian households (71.8%) had access to services providing these speeds. The main reason for this growth was a steep increase in VDSL

coverage witnessed in Italy over the same period, with information provided by the main VDSL networks operators suggesting that most connections over the newly deployed VDSL networks were capable of supporting the at least 30 Mbps actual speeds.

Speed coverage by country: At least 30Mbps download, 2016



Source: Broadband Coverage in Europe 2016, a study by IHS Markit and Point Topic for the European Commission

However, this was not a case for many other countries, which have seen large increases in VDSL coverage in recent years, resulting in high levels of VDSL coverage compared to other NGA technologies. As the quality of VDSL connection speeds relies on a number of factors, such as distance from the street cabinet or presence of crosstalk, VDSL networks tend to be impacted the most in terms of inconsistencies in actual speeds achieved at peak times.

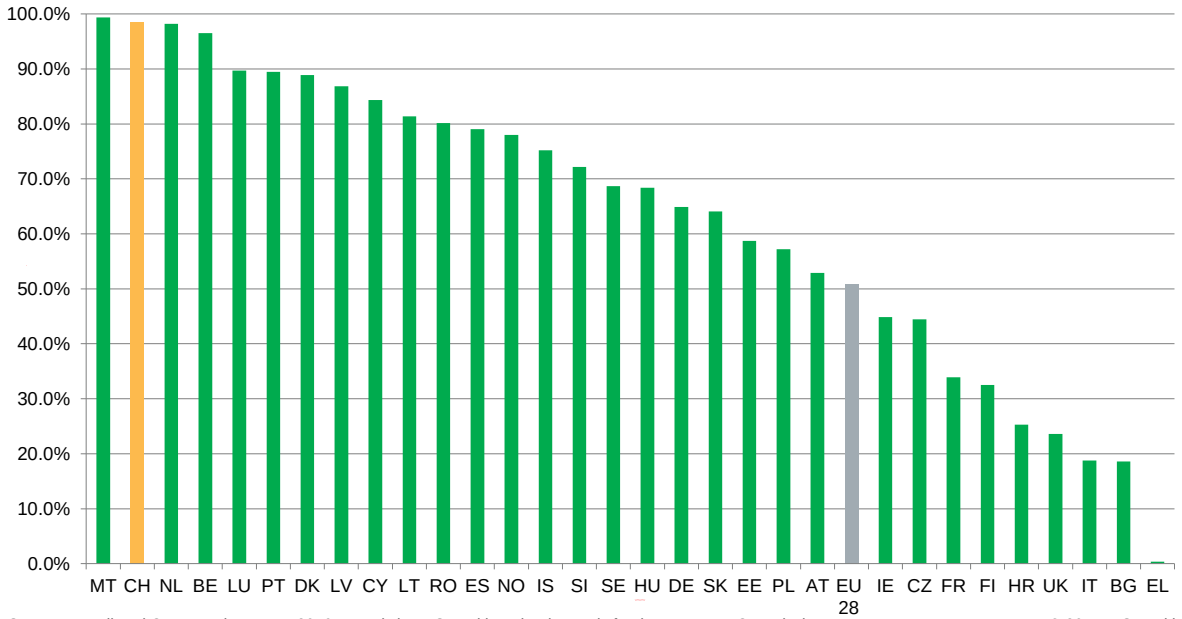
Countries, with the largest gaps between the two categories (NGA coverage and At least 30 Mbps coverage) include Austria, Finland, the UK, and Croatia, for which differences of more than 8 percentage points were recorded.

Switzerland ranked second in terms of availability of broadband services capable of providing at least 30Mbps actual broadband download speeds, with more than 98% of Swiss households having access to the high speed broadband services at the end of June 2016.

By mid-2016, the EU as whole reached the Digital Agenda goal of 50% of households having access to 100 Mbps broadband services by 2020. However, big differences remain among individual countries, with levels of 100 Mbps availability ranging from 99.4% in Malta to virtually no connections being able to support at least 100 Mbps speeds in Greece.

Biggest increases in terms of availability of at least 100 Mbps actual download speeds, were recorded for Norway and Poland, which witnessed a 39.0 and 35.2 percentage points increases, respectively. As was the case with the “At least 2 Mbps” and “At least 30 Mbps” speed categories, the main contributor to this increase was the inclusion of LTE in this category as reported by the NRAs.

Speed coverage by country: At least 100Mbps download, 2016

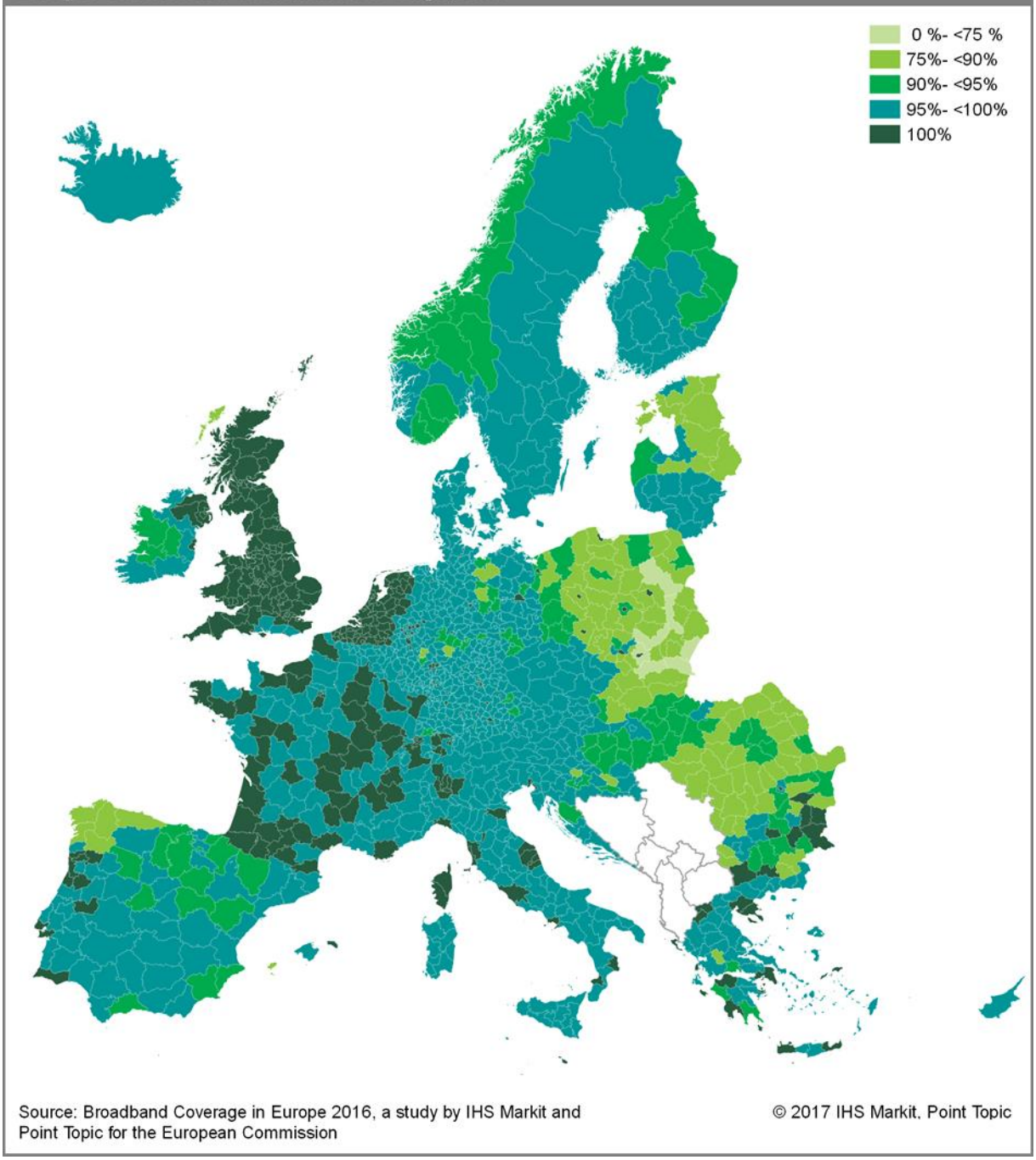


Source: Broadband Coverage in Europe 2016, a study by IHS Markit and Point Topic for the European Commission

When comparing NGA coverage levels to the availability of 100 Mbps actual download speeds, it is possible to conclude that high NGA coverage does not necessarily mean high levels of availability of at least 100 Mbps speeds. Countries such as the UK, Italy, Austria and Ireland, where VDSL networks make up significant portion of the overall NGA coverage show some of the biggest differences. For example, in the case of the UK, while 92.3% of homes are passed by NGA networks, services supporting actual download speeds of 100 Mbps and higher are available to less than a quarter (23.6%) of UK households.

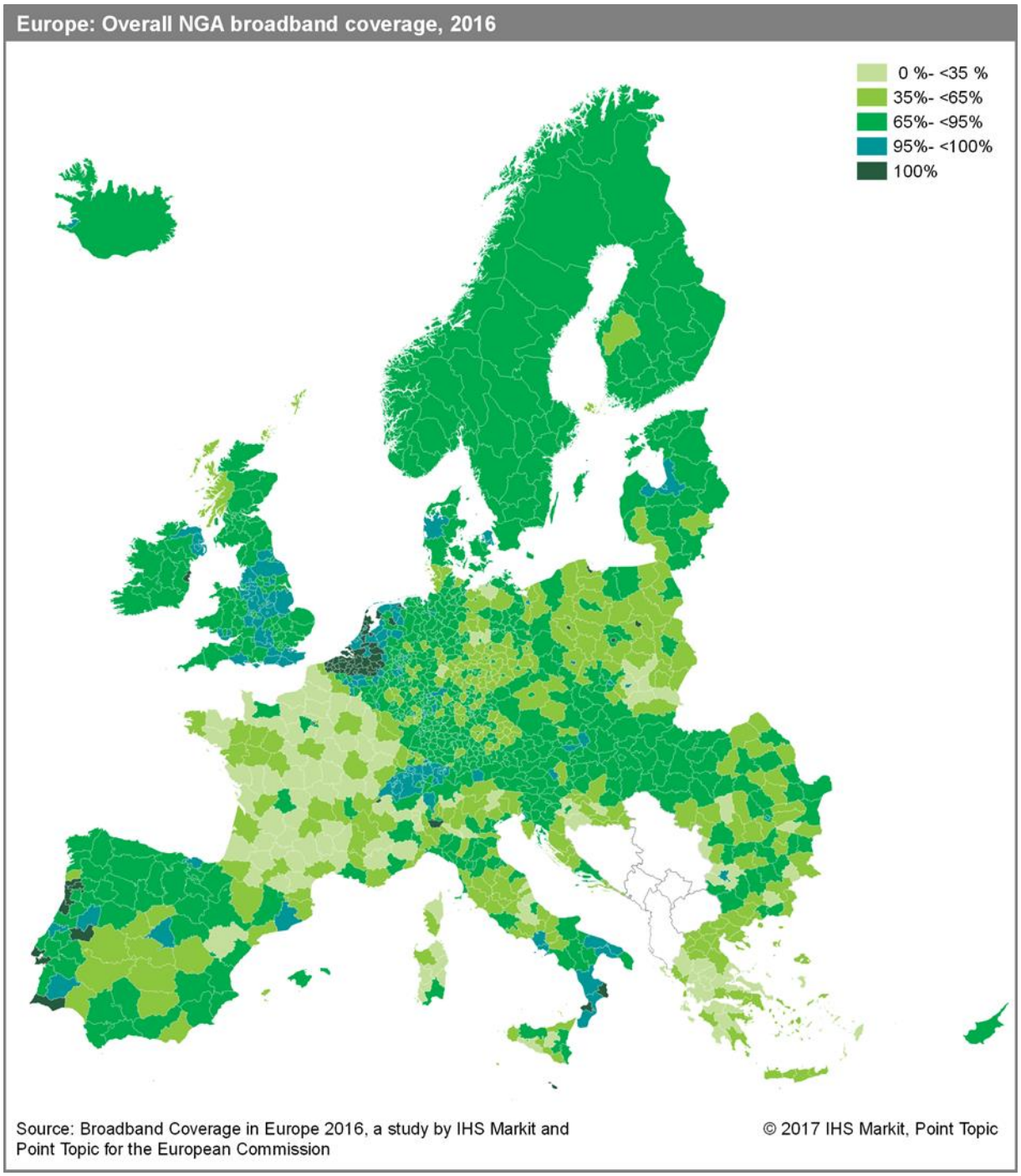
2.5 NUTS 3 coverage of overall fixed broadband

Europe: Overall fixed broadband coverage, 2016



Source: Broadband Coverage in Europe 2016, a study by IHS Markit and Point Topic for the European Commission

2.6 NUTS 3 coverage of NGA broadband



3.0 Switzerland

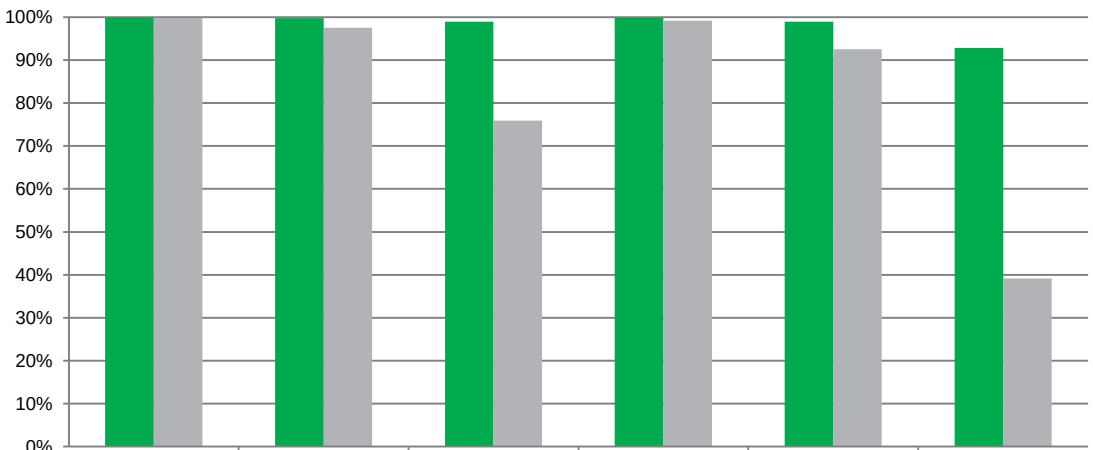
3.1 National coverage by broadband technology

As in the previous years, research on broadband coverage in Switzerland was included in the BCE study thanks to additional funding provided by Glasfasernetz Schweiz, a Swiss fibre optic industry association.

Switzerland continued to be one of the leaders in Europe in relation to broadband coverage. As in previous years, Switzerland reported above-average coverage levels for all coverage combination categories. Given the high broadband coverage levels achieved in previous years, it is unsurprising that there were no substantial changes in broadband coverage levels in the twelve-month period to the end of June 2016.

By mid-2016, Switzerland recorded universal, or near-universal, coverage for the overall broadband combination category on a national and rural level (100.0% and 99.8%, respectively), as well as for the fixed broadband combination category (99.8% and 99.0%, respectively). Similarly, NGA broadband availability was near-universal (99.0%) at a national level. At a rural level, NGA broadband services were available to 92.9% of rural households.

Switzerland: Coverage by technology combination, 2016



	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Switzerland	100.0%	99.8%	99.0%	99.8%	99.0%	92.9%
EU 28	99.9%	97.5%	75.9%	99.2%	92.6%	39.2%

Source: Broadband Coverage in Europe 2016, a study by IHS Markit and Point Topic for the European Commission

Switzerland continued to rank ahead of the EU average in terms of total coverage for each broadband technology with the exception of WiMAX, which is absent in the Swiss market. Moreover, Switzerland remained one of four countries with cable coverage above 80% of total households.[1] In previous years, cable operators, led by UPC (formerly Cablecom), have been investing substantially in cable deployment, with this activity set to continue in the next couple of years.[2] By mid-2016, Switzerland's entire cable infrastructure was upgraded to DOCSIS 3.0, meaning that cable networks serve as the key NGA technology in the country.

[1] During the 2016 data collection, the research team received new data suggesting overestimation of availability of cable broadband services leading to restatements of cable coverage in Switzerland. Nevertheless, Switzerland remains one of the leaders in cable broadband coverage.

[2] https://www.upc.at/ueber-upc/presse/pressearchiv/upc-startet-millionen-investitionsprogramm-autostrada/

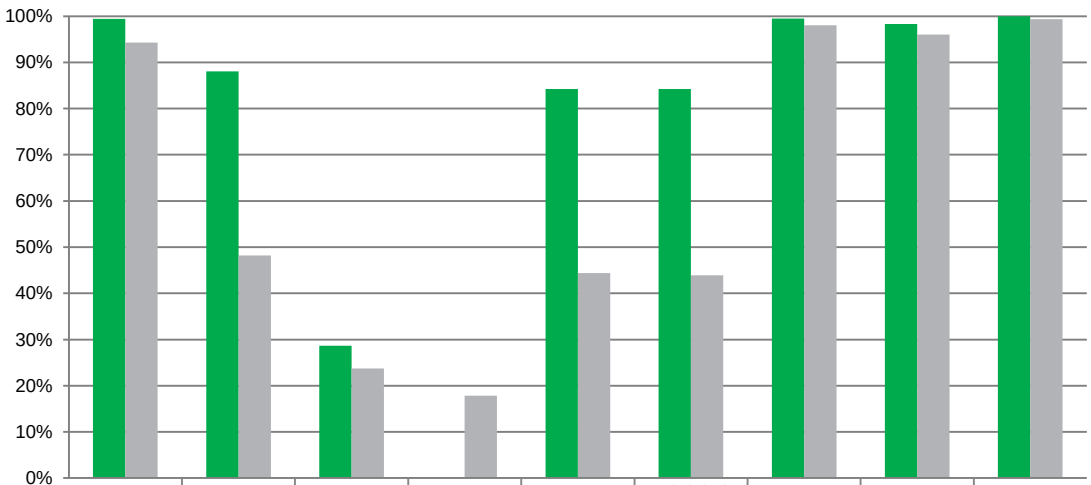
Examining other NGA technologies, Switzerland was one of six countries to record VDSL coverage of above 80%. Over the twelve-month period, VDSL coverage increased by 6.5 percentage points and at the end of June 2016, 88.0% of Swiss households had access to VDSL broadband services.

Growth in FTTP coverage was slower compared to VDSL, nevertheless, following a 1.7 percentage point increase, FTTP networks passed 28.6% of homes by mid-2016 and remained above the EU average (23.7%). These increases can be attributed to the continued large-scale deployment of both VDSL and FTTP technologies by the incumbent operator Swisscom, launched partly in reaction to the increasing competition from cable providers.

In addition, Swisscom was also one of the first European network operators to launch commercial deployment of G.fast technology in September 2016, which will allow the company to offer download speeds to up to 500 Mbps over its copper network.[3]

With regards to mobile broadband technologies, 98.3% of Swiss homes were passed by LTE technology, an increase of 6.0 percentage points compared to mid-2015. Following widespread adoption of LTE, Swisscom and Sunrise have both introduced speed-tiered plans that offer customers the chance to upgrade to advanced LTE plans.

Switzerland: Coverage by technology, total, 2016



	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Switzerland	99.5%	88.0%	28.6%	0.0%	84.3%	84.3%	99.5%	98.3%	100.0%
EU 28	94.3%	48.2%	23.7%	17.8%	44.4%	43.9%	98.0%	96.0%	99.4%

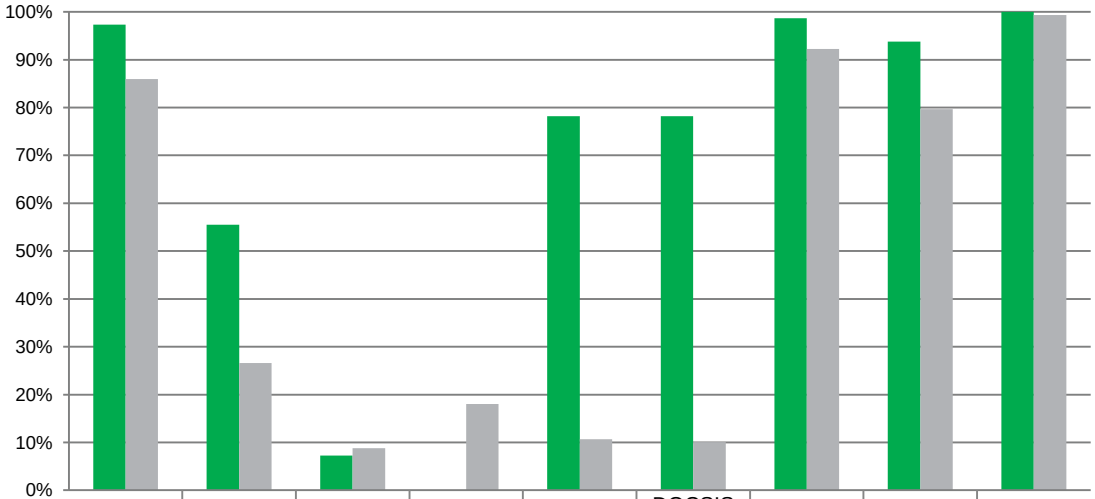
Source: Broadband Coverage in Europe 2016, a study by IHS Markit and Point Topic for the European Commission

During the twelve-month period to mid-2016, Switzerland remained one of the leaders in Europe in terms of rural cable coverage. Cable networks passed 78.2% of rural households with all of cable networks upgraded to DOCSIS 3.0. Looking at other NGA technologies, at the end of June 2016, VDSL services were available to more than a half (55.5%) of rural households in Switzerland. Meanwhile, 7.3% of rural households had access to FTTP broadband.

Examining mobile broadband access in rural areas, Switzerland was above the EU average for HSPA coverage, reaching 98.7% of rural homes by mid-2016 compared to the EU average of 92.2%. And at 93.8%, rural LTE coverage was also well above the EU average of 79.7%.

[3] https://www.swisscom.ch/en/about/medien/press-releases/2016/10/20161018-MM-Gfast.html

Switzerland: Coverage by technology, rural areas, 2016



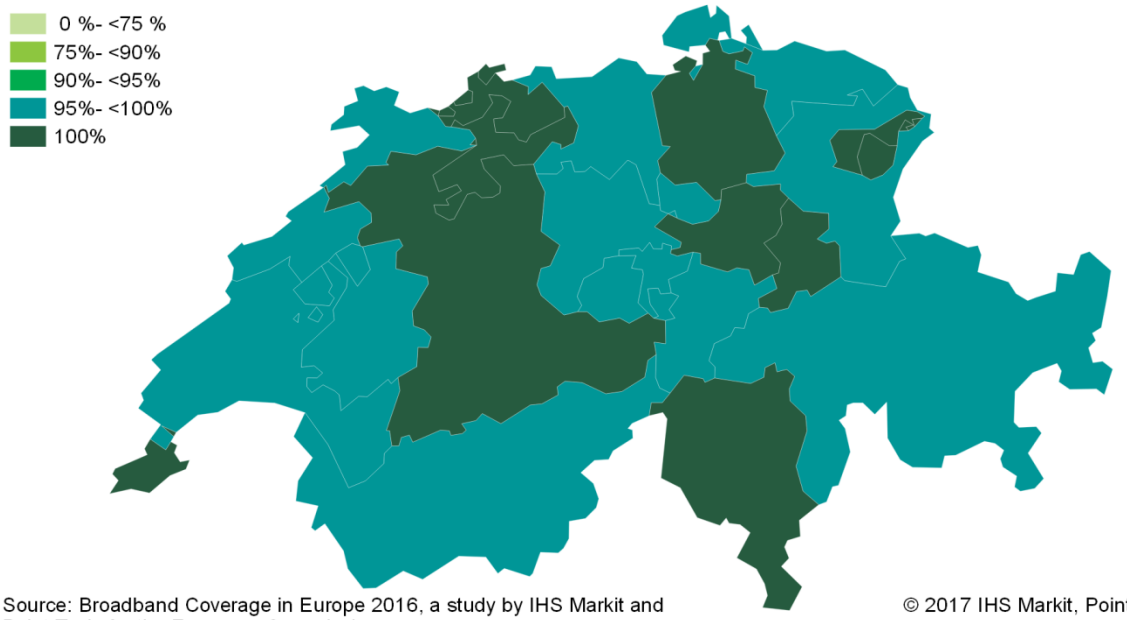
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Switzerland	97.4%	55.5%	7.3%	0.0%	78.2%	78.2%	98.7%	93.8%	100.0%
EU 28	86.0%	26.6%	8.8%	18.0%	10.7%	10.1%	92.2%	79.7%	99.4%

Source: Broadband Coverage in Europe 2016, a study by IHS Markit and Point Topic for the European Commission

3.2 Regional coverage by broadband technology

Eighteen out of the 26 Swiss regions reported virtually complete fixed broadband coverage, with fixed coverage in all of the remaining regions exceeding 96%. Lowest coverage was recorded in the Jura and Uri regions, reaching 96.1% of households.

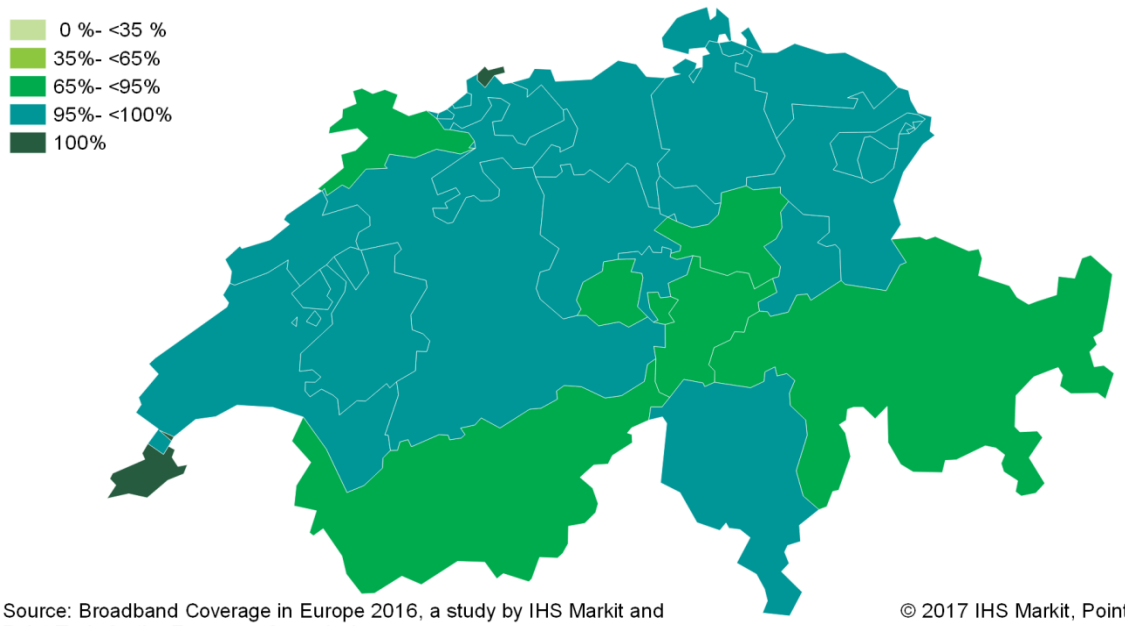
Switzerland: Overall fixed broadband coverage, 2016



Source: Broadband Coverage in Europe 2016, a study by IHS Markit and Point Topic for the European Commission

Complete NGA coverage was recorded in Geneva and Basel, with over 95% of homes passed by NGA networks in majority of the remaining regions. In five regions - Valais, Jura, Obwalden, Uri, and Graubünden – NGA coverage was lower than 95%, yet no region recorded less than 90% NGA coverage.

Switzerland: NGA broadband coverage, 2016



Source: Broadband Coverage in Europe 2016, a study by IHS Markit and Point Topic for the European Commission

3.3 Data tables for the Switzerland

Statistic	National
Population	8,233,842
Persons per household	2.3
Rural proportion	12.7%

	Switzerland 2016		Switzerland 2015		Switzerland 2014		EU28 2016	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	99.5%	97.4%	99.5%	97.4%	99.4%	97.4%	94.3%	86.0%
VDSL	88.0%	55.5%	81.5%	39.7%	79.7%	38.7%	48.2%	26.6%
FTTP	28.6%	7.3%	27.0%	6.6%	25.9%	6.2%	23.7%	8.8%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	17.8%	18.0%
Cable	84.3%	78.2%	*84.1%*	*78.0%*	*83.9%*	*77.6%*	44.4%	10.7%
DOCSIS 3.0	84.3%	78.2%	*84.1%*	*78.0%*	*83.9%*	*77.6%*	43.9%	10.1%
HSPA	99.5%	98.7%	99.4%	97.6%	99.0%	96.1%	98.0%	92.2%
LTE	98.3%	93.8%	92.3%	72.2%	91.8%	69.9%	96.0%	79.7%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	99.4%
Overall broadband	100.0%	99.8%	99.9%	*99.6%*	99.9%	99.6%	99.9%	99.2%
Overall fixed broadband	99.8%	99.0%	*99.8%*	*99.0%*	*99.8%*	*99.0%*	97.5%	92.6%
NGA broadband	99.0%	92.9%	*98.9%*	*92.7%*	*98.8%*	*91.6%*	75.9%	39.2%
At least 2 Mbps	99.8%	-	99.8%	-	99.8%	-	96.7%	-
At least 30 Mbps	98.9%	-	98.9%	-	98.7%	-	75.1%	-
At least 100 Mbps	98.5%	-	98.4%	-	98.3%	-	50.8%	-

Note: The 2016 figures represent state of broadband coverage as of end of June 2016. The 2015 (end of June) and 2014 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

Due to new and more accurate data on cable broadband coverage, previously reported coverage trends and values reported for Switzerland have been restated. All restatements are highlighted in italics.

4.0 Methodology

The methodological approach used in the 2016 edition of the Broadband Coverage in Europe study mirrors the approach used in the 2013-2015 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 collection for the 2016 edition of the BCE study follows an amended schedule first implemented for the 2015 edition of the study. This means that the collected information 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 2012-2015. 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 2012-2015 data collection. During the previous data collection the IHS Markit 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 was focused on one central question, which asked about the absolute number of homes passed by broadband networks, and was 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 2013-2015 survey questionnaires were extended to include 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. This metric and corresponding questions were retained in the 2016 study.

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.

All of the collected data was treated as commercially confidential and was used solely for the purposes of this study.

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 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, IHS & VVA team (as well as Point Topic) 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 allowed the research team to maintain a unified methodology across all of the study countries using one data source.

One of the key dimensions of the study was centred around gaining information on broadband coverage in rural areas. In order for the rural data collected in the period 2013-2015 to be comparable to the 2012 dataset, the IHS & VVA research team adopted a similar approach to determine rural households to the one used by Point Topic.

In 2012, Point Topic developed a new methodology to defining rural areas using the Corine land cover database and creating a database of population and land type in every square kilometre across Europe. Households in square kilometres with population less than one hundred were classified as rural. This granular approach based on population density enabled Point Topic to identify the truly rural areas likely to be unserved or underserved by broadband operators.

Beginning with the 2016 edition of the study, IHS Markit has partnered with Point Topic and an updated estimation of rural population in individual NUTS 3 regions was produced by Point Topic. According to the updated data, in 2016 approx. 14% of households in the study countries were rural. 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 pieces of information.

The additional research was built on the IHS Markit and Point Topic 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 were brought together to obtain the actual coverage figures for all of the 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 for 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 the overlaps of different technologies:

- Overall broadband coverage (including DSL, VDSL, FTTP, Standard cable modem, DOCSIS 3.0, WiMAX, HSPA and LTE)
- Overall fixed broadband coverage (including DSL, VDSL, FTTP, Standard cable modem, DOCSIS 3.0 and WiMAX)
- Overall NGA coverage (including VDSL, FTTP and DOCSIS 3.0)

For the sake of consistency, the research applied similar methodology in the 2016 study to the approach used in the 2012-2015 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 the previous studies, a varied formula was used in cases where some 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 reflecting the 2015 data and thus justifying restatement of the figures published in the Broadband Coverage in Europe 2015 study. During the 2016 data collection, the research team has also introduced new checks of rural coverage estimates, comparing the number of uncovered households on a total level to the number of uncovered rural households. When these checks were applied to rural coverage values reported in previous years, they identified underestimation of rural coverage in a number of countries leading to restatements of previously reported rural coverage data. Restatements are indicated in the data tables sections of individual country chapters.

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 2016 edition of the study with 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

Including this metric 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 on the particular networks available to them.

In previous years, the speed coverage metrics and analysis were included in a separate chapter in the Appendix of the BCE final report as the quality of the received data varied quite substantially across respondents. However, given the fact that speed coverage metrics have been collected and estimated for the past three years and as such have become a standard component of the study, the research team has decided to include the speed coverage analysis in the main sections of the final report for the 2016 edition of the report.

The following methodological approach was first implemented in 2013 and carried over in the subsequent iterations of the study. In order to estimate the coverage by the 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), FTTP, WiMAX, standard cable (including DOCSIS 3.0 cable), HSPA and LTE 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, FTTP, DOCSIS 3.0 cable, and LTE 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 FTTP, DOCSIS 3.0 cable, and LTE 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.

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, or 100 Mbps download speed connections if the connection's broadband speed was capable of achieving a minimum of 2, 30, or 100 Mbps 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 complete picture of coverage by the speed categories.

The research team also gave an option to the respondents to also include information on achievable speeds on LTE networks in the at least 30 Mbps and at least 100 Mbps download speed categories. With the technological improvements in terms of speed and connection quality attainable over LTE mobile networks, 2016 was the first year LTE speeds were recorded within these categories.

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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