Broadband Coverage in Europe 2015

Mapping progress towards the coverage objectives of the Digital Agenda

FINAL REPORT

A study prepared for the European Commission
DG Communications Networks, Content and Technology
by:

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Executive Summary

- The Broadband Coverage in Europe study is designed to monitor the progress of EU Member States toward their specific broadband coverage objectives – namely: 'Universal Broadband Coverage with speeds at least 30 Mbps by 2020' and 'Broadband Coverage of 50% of households with speeds at least 100 Mbps by 2020'.

- In 2013, DG Connect selected the consortium of IHS & VVA to run the project. IHS & VVA surveyed NRAs and telecommunications groups across each participating state to compile the requisite information, with the first annual report published in 2014 and second report following in 2015. This document builds on the previous reports and where possible IHS & VVA adopted similar data collection and analysis methods to those implemented by the previous contractor, Point Topic, in the period 2010-2012. This was done in order to ensure comparability of datasets for the purposes of time-series assessment.

- The timeline of the data collection for the 2015 edition of the BCE study has been moved forward in order to align reporting of the broadband coverage data with the publications of the Digital Economy and Society Index and the European Semester related country assessments. For this reason, the collected data reflects the situation at the end of June 2015 compared to the end-of-year data (i.e. end of December) collected in previous years.

- This report covers 31 countries across Europe – the EU28, plus Norway, Iceland and Switzerland, and analyses the availability of nine broadband technologies (DSL, VDSL, cable modem, DOCSIS 3.0, FTTP, WiMAX, HSPA, LTE and satellite) across each market, at national and rural levels. In addition, three combination categories indicating the availability of one or more forms of broadband coverage are also published. These cover overall fixed and mobile broadband availability, fixed broadband availability and next generation access (NGA) availability.
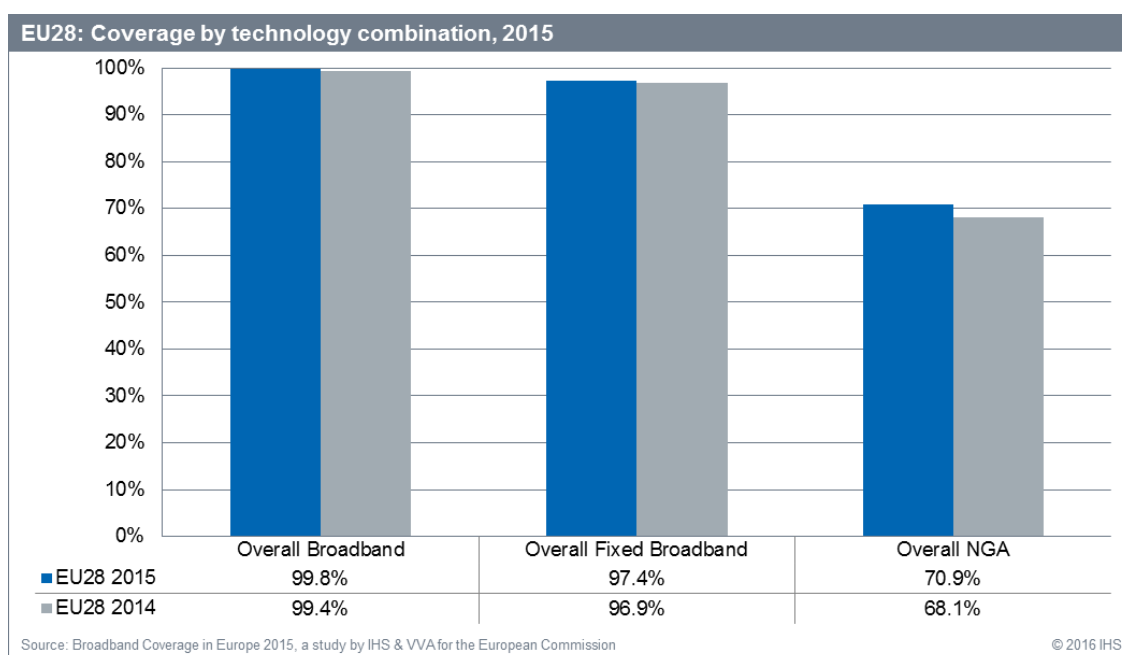
EU28: Coverage by technology combination, 2015

	Overall Broadband	Overall Fixed Broadband	Overall NGA
■ EU28 2015	99.8%	97.4%	70.9%
■ EU28 2014	99.4%	96.9%	68.1%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

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- The collected data show that over 217 million EU households (99.8%) had access to at least one of the main fixed or mobile broadband access technologies at the end of June 2015 (excluding satellite). This represents a 0.4 percentage point increase, or 660,000 additional households compared to the end of 2014.

- The overall fixed broadband coverage mirrored the increase in overall broadband coverage, rising from 96.9% in 2014 to 97.4% by mid-2015, representing an additional 870,000 EU 28 households gaining access to fixed broadband.

- Coverage by next generation access services (VDSL, DOCSIS 3.0 and FTTP) continued its increase observed in the previous years, increasing by 2.8 percentage points compared to 2014 to reach 70.9% EU households in the first half of 2015. This increase equals to 6 million new households, with almost 155 million households in the EU in total having access to next generation broadband by mid-2015.

- Rural broadband coverage continued to lag behind national coverage across the EU28. By mid-2015, 98.4% of rural households were covered by at least one broadband technology, but only 27.8% of rural households had access to next generation services.

EU28: Coverage by technology combination in rural areas, 2015

	Overall Broadband	Overall Fixed Broadband	Overall NGA
■ EU28 2015	98.4%	90.6%	27.8%
■ EU28 2014	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission © 2016 IHS
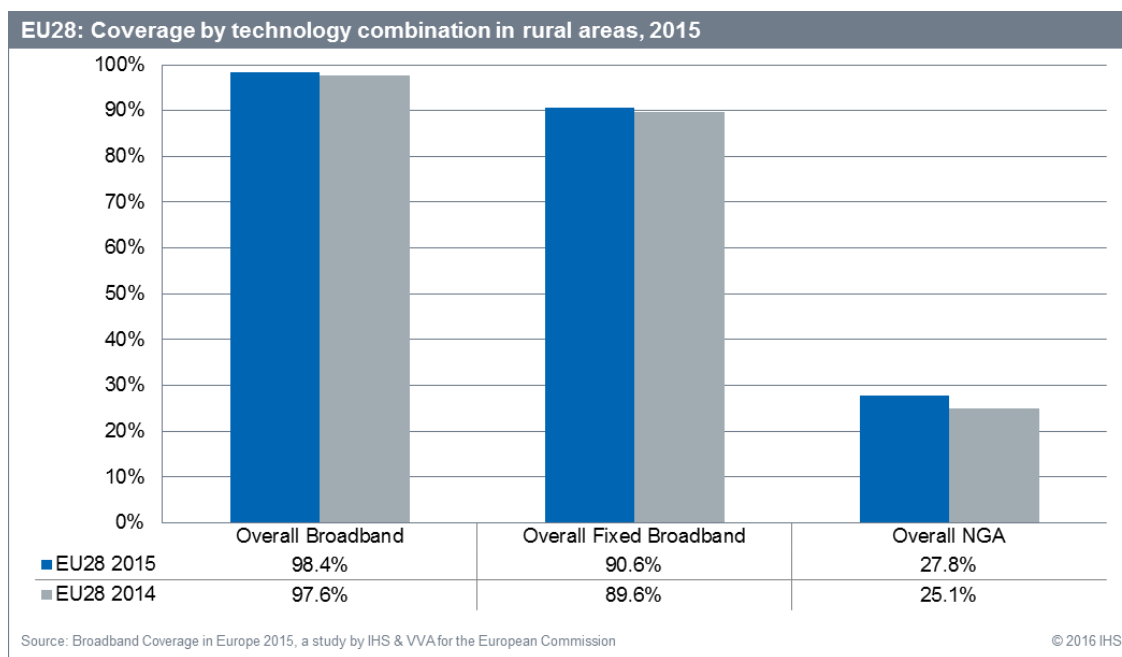
- As in previous years, satellite broadband remained the most pervasive technology in Europe in terms of overall coverage. However, satellite coverage is still limited in the Baltic countries and is absent in Iceland.

- DSL was the most widespread fixed access technology, covering 94.0% of EU households (up from 93.5% in 2014). It is followed by cable, with household coverage of 43.8% (up from 43.5% in 2014). WiMAX coverage was 19.7% in mid-2015 compared to 19.6% at the end of the previous year.

- VDSL remained the fastest-growing NGA technology, with coverage increasing by 3.4 percentage points to reach 41% EU households during the first six months of 2015. VDSL therefore remains the key driver of NGA coverage growth.

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	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ EU28 2015	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%
■ EU28 2014	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
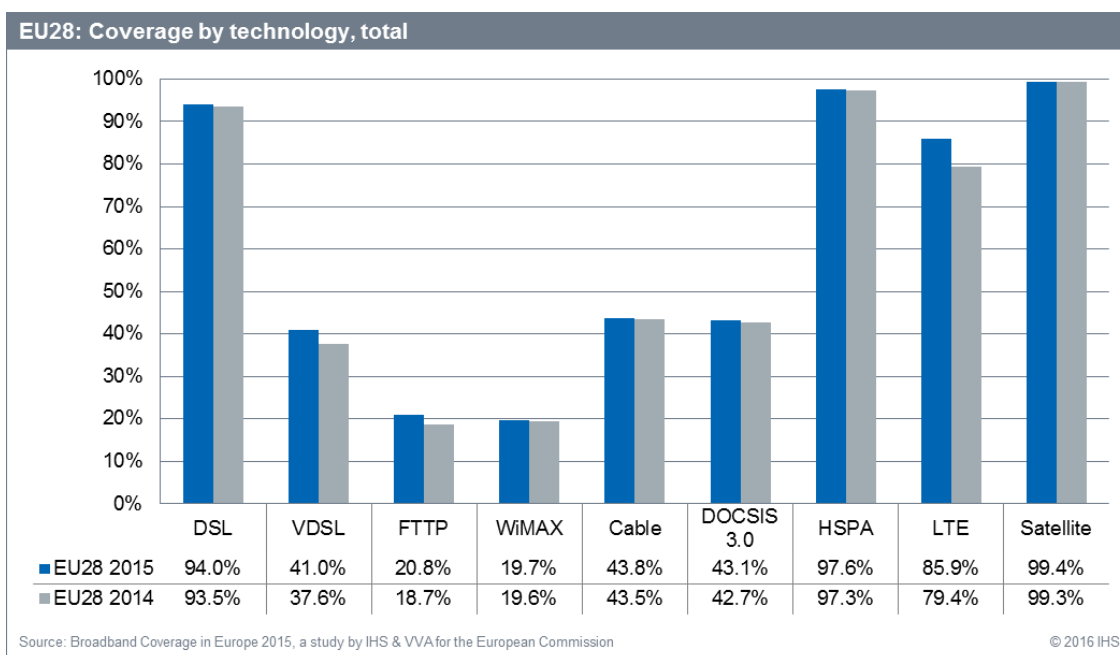
- FTTP and DOCSIS 3.0 coverage increased at a slower rate than VDSL, with coverage increasing by 2.1 and 0.5 percentage points respectively. In mid-2015, 20.8% of EU households had access to FTTP connections, while DOCSIS 3.0 cable networks passed 43.1% of homes.

- Examining mobile broadband technologies, HSPA networks covered 97.6% of EU households, which represents a slight increase compared to 2014, when HSPA reached 97.3% households. As of mid-2015, all Member States had LTE-capable networks, with LTE coverage rising by 6.5 percentage points to 85.9%. This also means that LTE remains the fastest growing broadband access technology in terms of coverage.

- Rural broadband coverage remained considerably lower than total coverage. Fixed broadband coverage in rural areas continued to lag behind national coverage by almost seven percentage points (90.6% coverage at rural level, compared to 97.4% total coverage). The gap was much larger for NGA technologies, with 27.8% coverage versus 70.9%).

- As in the previous year, the biggest improvements in rural fixed broadband coverage were reported for VDSL, where coverage increased by 1.8 percentage points to 16.9%. This shows that continued efforts are made by governments and operators to upgrade existing DSL networks and improve rural households' access to NGA technologies.

- HSPA coverage increased by 1.1 percentage points in rural areas in the first six months of 2015, reaching 90% of rural households. LTE recorded the largest coverage increase in rural areas during the first half of 2015, with coverage increasing by 9.3 percentage points to 36.3%.

EU28: Coverage by technology, rural areas

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ EU28 2015	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	99.4%
■ EU28 2014	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
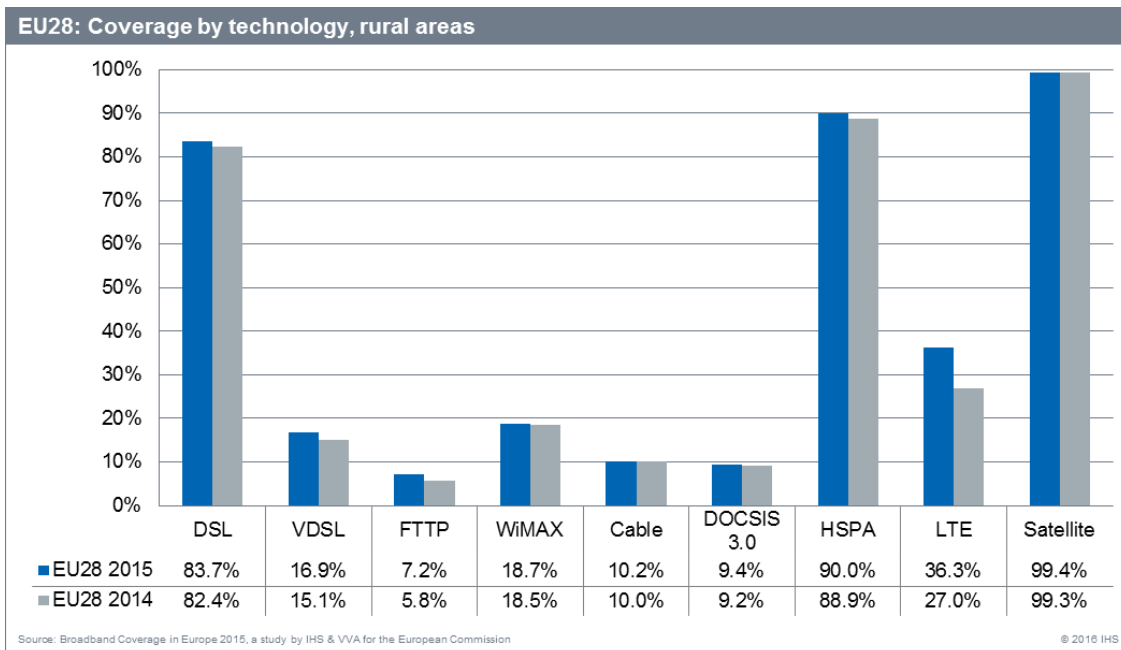
- Out of the 31 study countries, 18 countries had fixed broadband coverage levels at or above the EU28 average of 97.4%. As in 2014, fixed broadband coverage was highest in Cyprus, Luxembourg, Malta, the Netherlands and the United Kingdom where it covered 100% of households. Only four countries reported coverage levels below 90%. These countries were the same as in the previous year and included Estonia, Romania, Slovakia and Poland.

Overall fixed broadband coverage by country, 2015

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
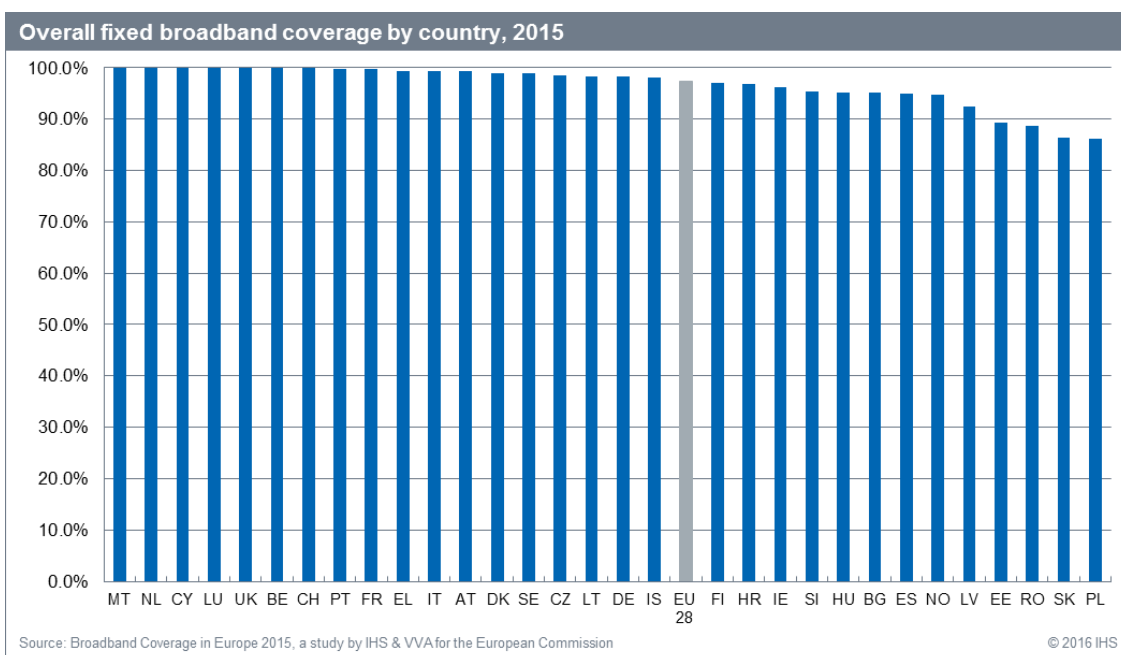
- Malta remained the only country to report complete coverage for NGA technologies. Switzerland, Belgium, the Netherlands, and Lithuania were the only four countries where NGA coverage exceeded 95%.

- Out of the 31 study countries, 25 countries performed above the European average (70.9%) with regards to NGA availability. France, Italy and Greece continued to be

the only three counties with NGA coverage under 50%. As in 2014, Greece reported the lowest NGA coverage, with only 36.3% of homes passed by NGA networks.

Overall NGA coverage by country, 2015

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
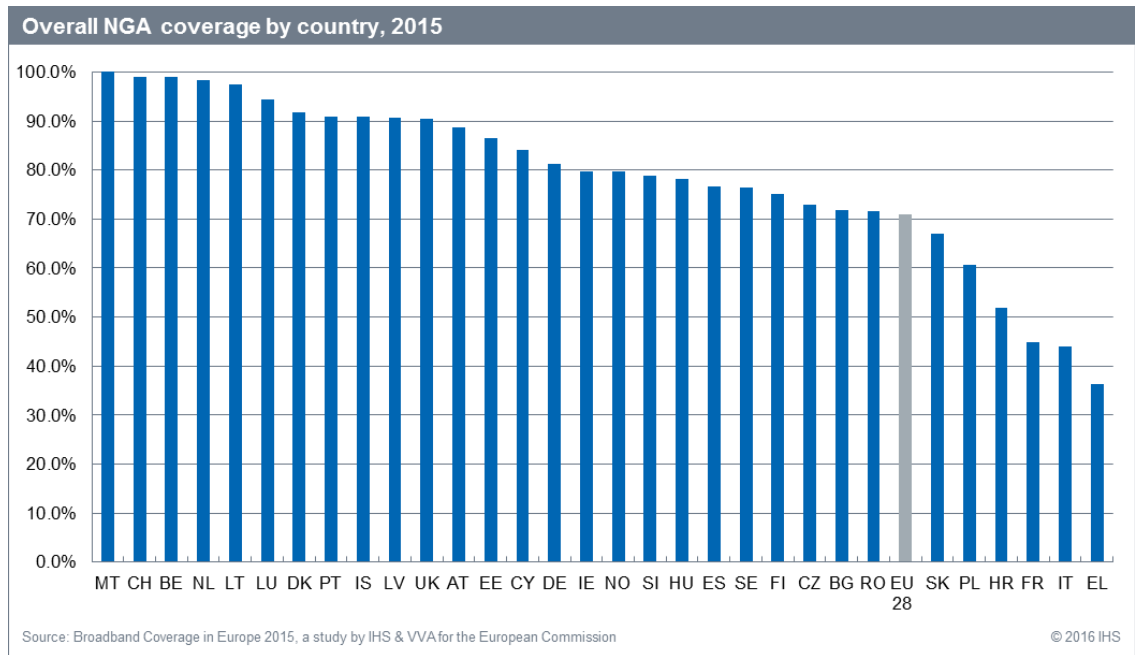
- Almost all of the countries in this study reported HSPA coverage levels above 95%, with Ireland, Slovakia and Germany being the exceptions (at 94.6%, 91.8% and 91.5% respectively).

- LTE coverage across Europe has further increased throughout the first six months of 2015 and LTE is now offered in all countries. In comparison, in 2014 there was one country without LTE coverage and three in 2013. The EU28 coverage grew by 6.5 percentage points, increasing from 79.4% to 85.9%. Norway, Netherlands, Sweden and Denmark were the leaders in terms of LTE coverage in 2015, with over 99% of households covered.

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1.0 Introduction

With the goal of fostering the development of a network-based knowledge economy and stimulate growth, the Digital Agenda for Europe (DAE), adopted in 2010 as a flagship initiative of Europe 2020, includes a set of specific broadband coverage targets:

- Universal broadband coverage by 2013; and

- Universal broadband coverage of speeds at least 30 Mbps by 2020.

In order to monitor the progress of the broadband coverage objectives of the Digital Agenda, DG Connect (the European Commission Directorate General for Communications Networks, Content and Technology) has commissioned the Broadband Coverage in Europe 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 & VVA to run the project, with the first report published in 2014 and the second report following in 2015. This document builds on the previous two reports.

It is important to note that the timeline of the data collection for the 2015 edition of the BCE study has been moved forward in order to align reporting of the broadband coverage data with the publications of the Digital Economy and Society Index and the European Semester related country assessments set for early 2016. For this reason, the broadband coverage data collection will be from now on scheduled to reflect the situation at the end of June (i.e. half-year data rather than year-end data points will be collected). The study will continue to run on a once-a-year basis.

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. 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
- 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:

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- 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 in 2013. For the 2013 study IHS & VVA, in agreement with DG Connect, decided to apply similar methodology to the one used by Point Topic, the previous contractor, in the 2010-2012 period and use 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, BCE 2013 and BCE 2014 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 added 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

By including the additional metric, it is possible to obtain an additional analytical layer to evaluate the study countries' progress towards the Digital Agenda goals. However, since the main focus of the BCE study remains an analysis of the technology coverage and due to the fact that the level of quality of received data continues to vary quite substantially, the research team decided to include the analysis of coverage by speed categories in the form of an Appendix of this report.

The following table details the scope of the Broadband Coverage in Europe 2015 study.

Scope	Description of Broadband Coverage Metrics
Geographical coverage	• EU28 + Iceland, Norway and Switzerland • Rural and national coverage
Technologies	The following technologies are included: • DSL (excluding VDSL) • Cable modem (excluding DOCSIS 3.0) • HSPA • FTTP (Fibre to the Home and Fibre to the Building) • VDSL • Cable modem DOCSIS 3.0 • LTE • WiMAX • Satellite The study also covers the following technology combinations: • Overall broadband coverage (including DSL, VDSL, FTTP, Cable modem, Cable modem DOCSIS 3.0, WiMAX, HSPA and LTE) • Overall fixed broadband coverage (including DSL, VDSL, FTTP, Cable modem, Cable modem DOCSIS 3.0 and WiMAX) • NGA coverage (including VDSL, FTTP and cable modem DOCSIS 3.0)
Speeds	The study covers the following speed categories: • At least 2 Mbps download • At least 30 Mbps download • At least 100 Mbps download

Acknowledgements

2.0 Project Objectives

The general objective of the study is to provide datasets in line with the specific objectives below:

- Collect coverage data on country level, regional and rural level for different technologies through:
  - a survey of operators (ISPs) and National Regulatory Authorities (NRAs);
  - a review of alternative sources (e.g. operator websites, white papers, consultant reports);

- Estimate coverage for different technology and speed combinations; and

- Report on the findings on EU and country-level and prepare a database with statistical data.

3.0 Methodological approach in detail

The methodological approach used in the 2015 edition of the Broadband Coverage in Europe study mirrors the approach used in the 2013 and 2014 studies. At the onset of the project, the IHS & VVA research team decided, following an extensive initial discussion with DG Connect, to adopt similar methodology to the one previously applied by Point Topic, in order to ensure 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.

As noted previously, the timeline of the data collection for the 2015 edition of the BCE study has been moved forward by six months. 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). While the same methodology has been applied, it is important to keep in mind that the coverage changes reported in this study are indicative of developments in the first six months of the year rather than the whole year, as was the case in the previous iterations of the broadband coverage research. As such, direct comparisons should not be drawn between the 2015 data and the coverage data reported in previous years without pointing out the changed timeline.

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

3.1 Survey design and data collection

For the sake of consistency, IHS & VVA used similar wording and formatting of the survey questionnaire as in 2013 and 2014, which was based on a questionnaire designed by Point Topic for the 2012 study. Using near-identical question wording enables the research team to deliver findings which can be compared with research undertaken in previous years by both IHS & VVA and Point Topic.

Where possible, the research team contacted survey participants that were approached for the 2012, 2013 and 2014 data collection. DG Connect kindly provided the research team with original contact list including representatives of both national regulatory bodies as well as broadband network operators originally used for the 2012 BCE study. During the data collection for the 2013, 2014 and 2015 studies 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 generally 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 - For the 2013 study, a new metric was introduced – that of speed coverage. Thus, the 2013 survey questionnaire was 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 2014 and 2015 studies.

In a number of cases, coverage data was delivered on a more detailed geographical level than the requested NUTS 3 areas. In these cases, IHS & VVA 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 IHS & VVA 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.

3.2 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.

In order to be able to analyse rural coverage in a consistent manner, the IHS & VVA team obtained from Point Topic updated estimations of rural population in individual NUTS 3 regions. According to the updated data, in 2015 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.

3.3 Additional research conducted in parallel to the survey

In addition to data gathered through the NRAs and ISPs survey, the IHS & VVA 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 & VVA 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

3.4 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 IHS & VVA team was able to provide estimates for each of the nine broadband technologies in all NUTS 3 areas both on total and rural level.

3.5 Estimating coverage for different technology combinations and speed categories

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, IHS and VVA applied similar methodology in the 2013, 2014 and 2015 studies to the approach used by Point Topic in the 2012 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.

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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 publication of the finalised data in the 2015 update of the Digital Agenda Scoreboard.

In a number of cases, new and more accurate data was provided to the research team reflecting the 2014 data and thus justifying restatement of the figures published in the Broadband Coverage in Europe 2014 study. Restatements are indicated in the data tables sections of individual country chapters.

4.0 European Overview

4.1 Europe-wide coverage by technology combinations

The main objective of the 2015 Broadband Coverage in Europe study was to assess the availability of broadband services across the EU, with additional information provided for Norway, Iceland and Switzerland.

The nine main broadband technologies covered in the previous editions of the study were analysed to ensure comparability and to evaluate progress in broadband roll-out across Europe.

The collected data show that over 217 million EU households (99.8%) had access to at least one of the main fixed or mobile broadband access technologies in mid-2015 (excluding satellite). This represents a 0.4 percentage point increase or 660,000 additional households compared to the end of 2014. When satellite coverage is included, basic broadband services are now offered to every household in the EU, meaning that the European Commission's Digital Agenda for Europe target of basic broadband for all by 2013 has been achieved.

EU28: Coverage by technology combination, 2015

	Overall Broadband	Overall Fixed Broadband	Overall NGA
EU28 2015	99.8%	97.4%	70.9%
EU28 2014	99.4%	96.9%	68.1%

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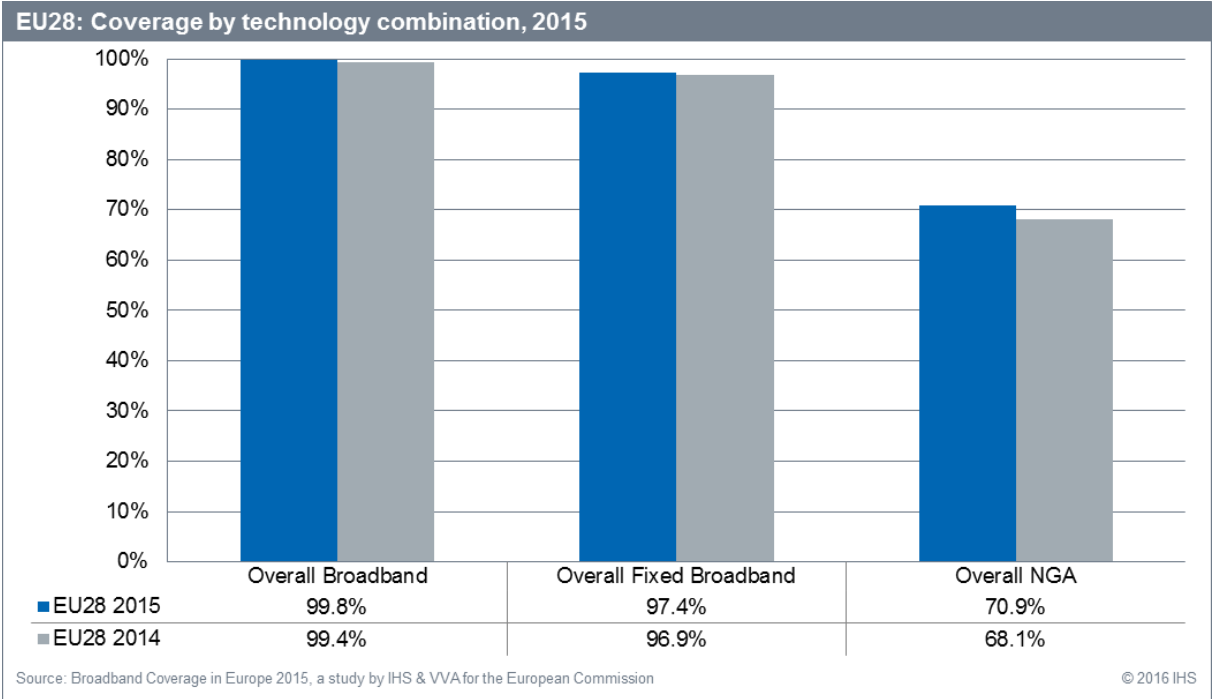
In absolute terms, the number of homes passed by fixed broadband networks (DSL, cable, FTTP or WiMAX) increased by 870,000 in the first half of 2015, translating to 97.4% homes passed in the EU28 by mid-2015, up from 96.9% at the end of 2014.

Next Generation Access (NGA) coverage combination category recorded the largest coverage increase, growing by 2.8 percentage points in the first six months of 2015, translating to 6 million new households gaining access to next generation broadband services. By mid-2015, 70.9% of households across the EU Member States were passed by at least one NGA network (VDSL, FTTP or Cable DOCSIS 3.0), compared to 68.1% at the end of 2014.

Access to fast broadband services in rural areas remains a key priority for the EU. Even though 98.4% of rural households across the EU28 had access to at least one broadband technology at the end of June 2015, only 27.8% (8.5 million rural households) could benefit from NGA broadband. Nevertheless, continued investments in rural NGA deployment contributed to rural NGA coverage increasing by 2.7 percentage points in the first half of 2015. This suggests that coverage growth is continuing at a broadly similar rate as in 2014, when rural NGA coverage improved by seven percentage points throughout the course of the whole year.

EU28: Coverage by technology combination in rural areas, 2015

	Overall Broadband	Overall Fixed Broadband	Overall NGA
■ EU28 2015	98.4%	90.6%	27.8%
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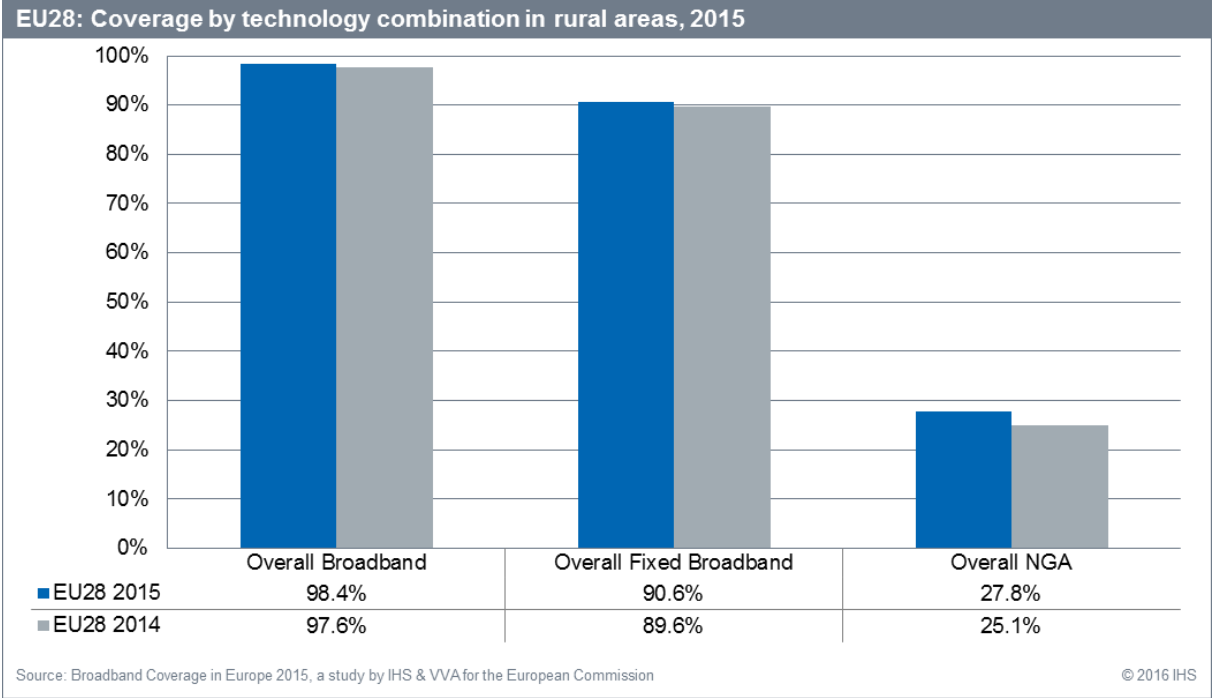
4.2 Europe-wide coverage by individual technologies

4.2.1 Coverage by technology in total

The breakdown by technology shows that satellite remained the most pervasive technology in Europe in terms of overall coverage in the first half of 2015. However, coverage of the KA-band satellites continued to be limited in the Baltic countries, where satellite reached only certain parts of Estonia, Latvia and Lithuania, and no satellite broadband services were available in Iceland. Based on our research, there has been no change in satellite broadband coverage compared to 2014.

Examining fixed broadband coverage technologies, DSL networks continued to be the most widespread, passing 94.0% of EU households by mid-2015. Cable broadband coverage increased slightly to 43.8% from 43.5%, while WiMAX coverage recorded a similarly small increase, rising from 19.6% to 19.7%. While these appear to be insignificant coverage increases, when taking into account the rising number of households, they represent sizable growth in absolute coverage: In the first six months of 2015, additional 690,000 EU households gained access to cable networks, while 200,000 additional homes were covered by WiMAX networks.

EU28: Coverage by technology, total

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ EU28 2015	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%
■ EU28 2014	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
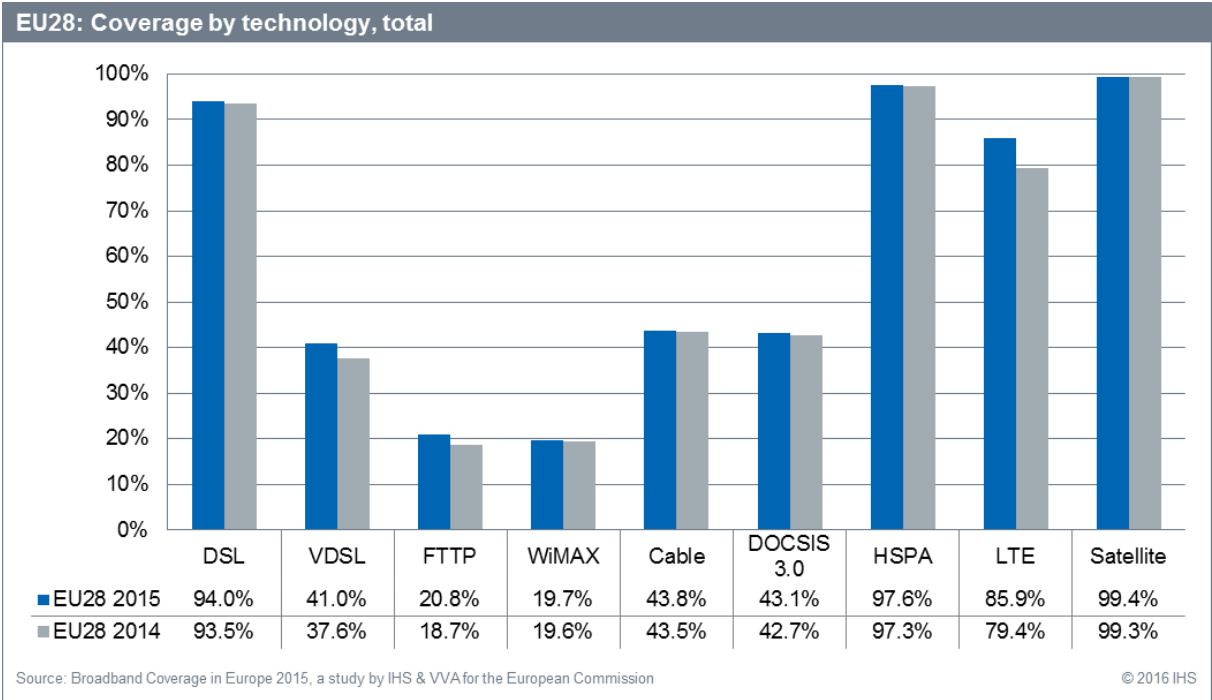
As in the previous year, VDSL was the key driver of the increase in overall NGA coverage. By mid-2015, 41.0% of homes were passed by VDSL networks, compared to 37.6% at the end of 2014. VDSL has therefore been the fastest growing fixed broadband technology for four consecutive years. Both FTTP and DOCSIS 3.0 reported moderate coverage increases during the first six months of 2015. FTTP coverage increased to 20.8% from 18.7%, while DOCSIS 3.0 coverage rose from 42.7% to 43.1% in the same period.

With upgrade of cable networks to DOCSIS 3.0 being mostly complete across the EU, DOCSIS 3.0 coverage broadly mirrored standard cable coverage, with 98.4% of homes passed by cable networks being DOCSIS 3.0 capable by mid-2015.

With regards to mobile broadband technologies, HSPA provided nearly universal coverage, reaching 97.6% of EU households in the first half of 2015. With the launch of LTE services in Cyprus, LTE became available in all Member States with coverage rising from 79.4% at the end of 2014 to 85.9% at the end of June 2015. This 6.5 percentage point increase translates to almost 14 million additional households across the EU.

4.2.2 Coverage by technology in rural areas

Due to their low population density, it has been traditionally difficult for operators to justify investments in rural areas, since such investments can be seen as economically less profitable. For this reason, achievement of the Digital Agenda's goal of universal 30 Mbps coverage by 2020 remains a substantial challenge in EU's rural regions.

As in the previous years, in mid-2015 broadband coverage levels in rural regions were considerably lower than total national coverage. Rural fixed broadband coverage continues to lag behind national coverage (90.6% coverage at rural level compared to 97.4% total coverage), with the gap being considerably larger for NGA technologies (27.8% coverage at rural level versus 70.9% for all EU households). Moreover, while the gap between total and rural coverage has been closing over the last four years, the difference between rural and total NGA coverage has remained approximately the same at around 43 percentage points. This means that while NGA coverage grows overall, the deployment continues to be focused primarily on urban areas.

Compared to 2014, there were however signs of some progress. While rural DSL coverage increased by only 0.6 percentage points in 2014, in the first half of 2015 it grew by 1.3 percentage points to 83.7%. VDSL coverage continued to increase at a similar pace as in 2014, with a 1.8 percentage point increase over the six-month period at the beginning of 2015, compared to 4.9 percentage point increase in 2014. However, as was the case in previous years, the additional VDSL coverage relates mainly to areas already covered by DSL networks, which were upgraded to VDSL. And as such, this increase would therefore not account for newly deployed networks to previously underserved areas.

EU28: Coverage by technology, rural areas

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ EU28 2015	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	99.4%
■ EU28 2014	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
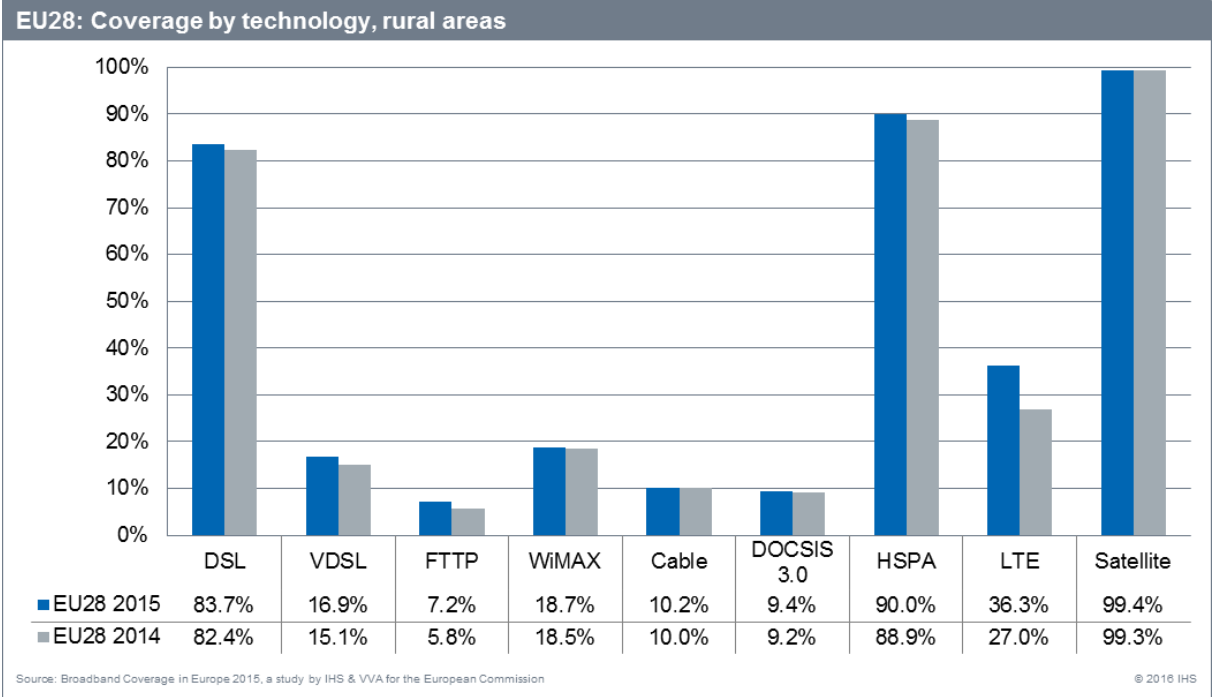
As in the previous years, DSL continued to be the most important fixed technology for rural coverage with a large gap between DSL and other fixed technologies. WiMAX was the

second most widespread fixed technology in rural areas, although it was available to only 18.7% of rural households. Availability of cable broadband services remained limited in rural areas, with cable networks passing only 10.2% of rural homes at the end of June 2015. Low rural cable coverage can be attributed to the economic nature of cable networks deployment, which has been traditionally oriented towards urban areas, where network operators can rely on higher population densities and thus present easier return on operators' investments. Where rural cable networks are available, however, they have been largely upgraded to DOCSIS 3.0, with 9.4% of rural households having access to the high-speed cable broadband services.

Given relatively low DOSCIS 3.0 coverage, VDSL continued to be the leading technology contributing to rural NGA coverage. Despite coverage rural FTTP coverage increasing by 1.4 percentage points over the course of six months, FTTP remained the least widespread rural NGA technology, reaching only 7.2% of rural homes.

In terms of mobile broadband, HSPA networks passed 90% of rural homes by mid-2015, a 1.1 percentage point increase over the course of the first six months of 2015. Continued LTE network deployment meant that LTE was the fastest growing broadband technology in rural areas in terms of coverage. LTE coverage increased by 9.3 percentage points in the first half of 2015 and reached 36.3% of rural households by mid-2015. The continued LTE deployment in rural areas is particularly important, since it can potentially ensure rural coverage in regions where fixed network deployment is problematic.

Due to the nature of satellite technology, satellite reached roughly the same level of coverage in rural areas as across the EU as a whole (99.4%). In the most sparsely populated and hard-to-reach areas, satellite remains the only option for receiving broadband access.

4.3 Country comparison by total technology coverage

4.3.1 Total overall fixed broadband by country

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, 2015

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
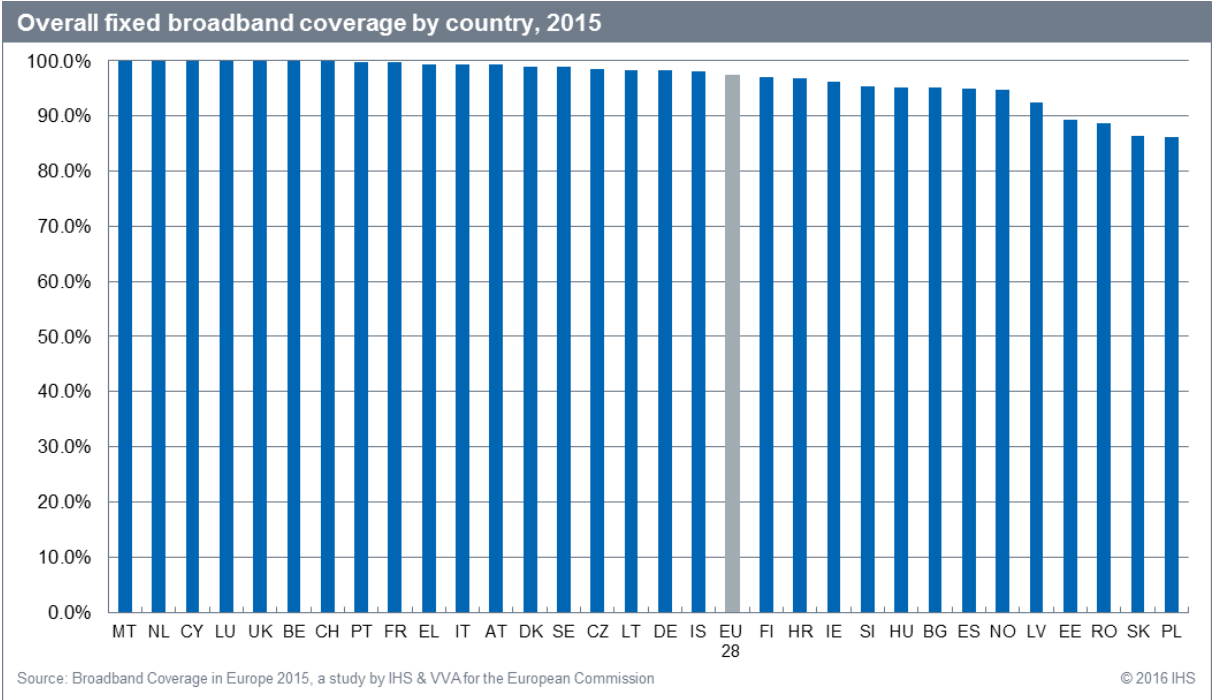
Out of the 31 study countries, 18 countries reported fixed broadband coverage levels at or above the EU average of 97.4% at the end of June 2015. As in previous years, fixed broadband coverage was highest in Cyprus, Luxembourg, Malta, the Netherlands and the United Kingdom where it reached universal or near-universal levels. Only four countries, Estonia, Romania, Slovakia and Poland, reported coverage below 90% of households in mid-2015. These countries face fixed broadband coverage challenges due to their sparsely populated and underserviced rural areas.

4.3.1.1 Total DSL coverage by country

As in the previous editions of the study, DSL was the leading fixed broadband technology in the first half of 2015 in terms of coverage, with DSL networks passing over 90% of homes in 22 study countries and 18 countries reporting DSL coverage levels above the EU average of 94.0%

At the end of June 2015, five countries reported that 100% of households were covered by DSL infrastructure. These countries are unchanged from the previous year and include Malta, the Netherlands, Cyprus, Luxembourg and the United Kingdom. However, it is important to note that while a universal DSL coverage was reported for these countries, this is generally considered to be accurate to one decimal place to account for the possibility of a negligible number of remote homes failing to receive DSL coverage.

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The universal or near-universal DSL coverage (i.e very close to 100% of households) was observed in countries with the most developed traditional telephone networks, as DSL technology utilizes fixed line twisted-pair copper network infrastructure.

DSL coverage by country, 2015

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
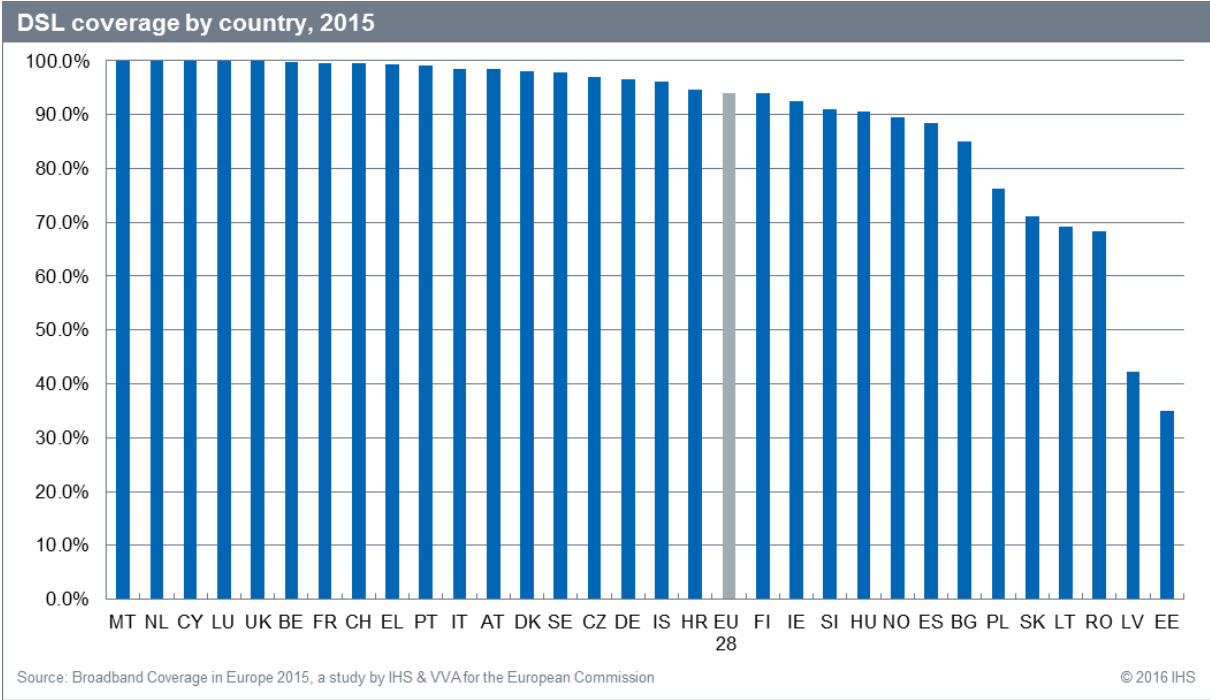
Only nine countries recorded DSL coverage levels below 90%: Norway, Spain, Bulgaria, Poland, Slovakia, Lithuania, Romania, Latvia and Estonia. In a number of these countries DSL coverage has begun to give way to NGA technologies such as FTTP, which is discussed in more detail in the individual country chapters.

4.3.1.2 Total cable coverage by country

Cable coverage is considerably more varied than DSL coverage. Cable networks tend to be most developed in urbanised countries as cable companies traditionally focus on network build-up in densely-populated urban and semi-urban areas. Another important factor is the historical presence of cable companies, often originally focused on cable TV delivery. This means that countries with strong tradition of cable TV are likely to also report higher levels of cable broadband coverage compared to countries where cable companies entered the market at a later stage or their operations failed (such as in Italy), and which therefore show overall lower cable coverage levels.

The fact that cable deployments tend to be centred around urban areas leads to generally low levels of extra coverage provided by cable technology due to overlap with DSL in these urban areas. Nevertheless, DOCSIS 3.0 cable services continue to contribute significantly to NGA broadband availability across EU as described in the following chapter.

In mid-2015, Malta was still the only country with complete cable coverage, followed by Switzerland (98.1%), Belgium (96.3%) and the Netherlands (95.1%). Seventeen other countries recorded coverage rates above the European average of 43.8%, although all these countries reported coverage levels considerably below the four leaders.

Fourteen countries reported below-average coverage rates, with cable broadband being completely absent in Greece, Iceland and Italy.

Cable coverage by country, 2015
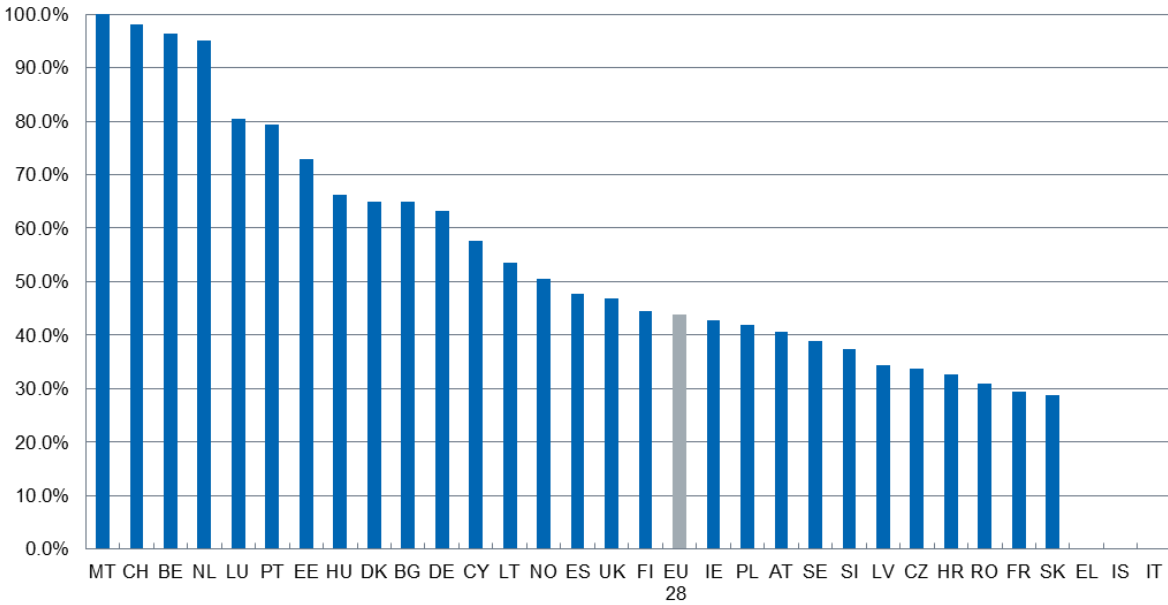
Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

4.3.1.3 Total WiMAX coverage by country

When determining WiMAX coverage, it is important to keep in mind the limitations of WiMAX signals. WiMAX can technically offer quite extensive geographic reach, yet the number of customers that the network can realistically support may be much smaller than a fixed wireline technology. Another challenging factor is the great fragmentation of the European WiMAX market, which features many small providers operating across Europe. On the other hand, WiMAX technology generally provides a viable broadband solution for less-densely populated and harder-to-reach areas.

WiMAX coverage by country, 2015
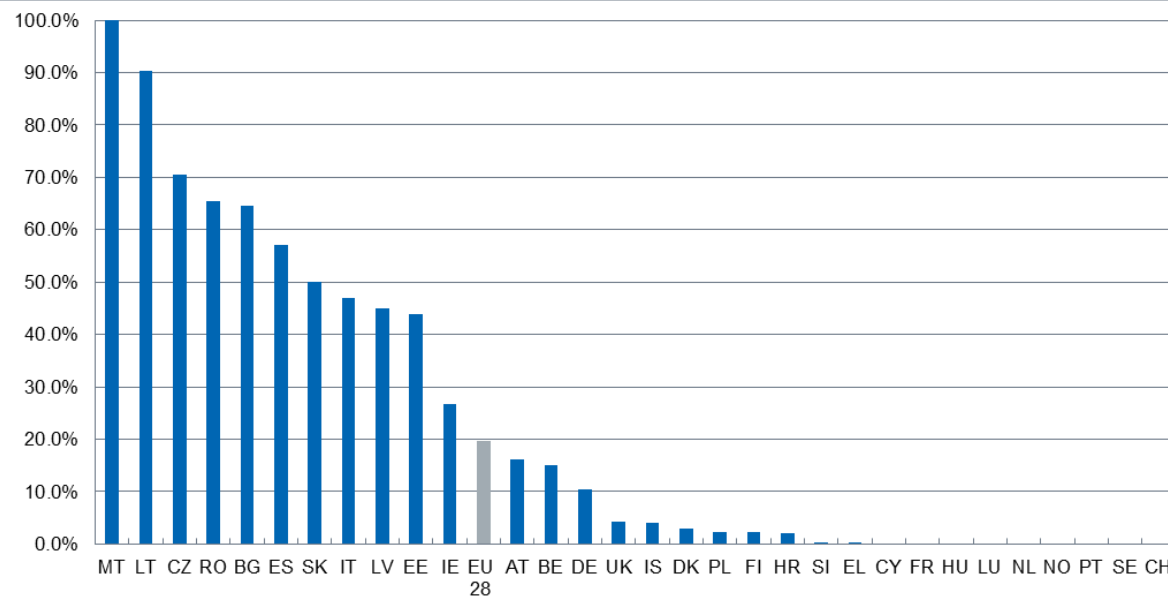
Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

In the first half of 2015, WiMAX remained a rather marginal broadband technology in the majority of study countries, with nine countries reporting no WiMAX availability and another eight countries reporting levels below 5%.

Yet, in countries such as Malta, Lithuania, Czech Republic, Romania and Bulgaria, WiMAX continued to play an important role in contributing to broadband availability, with coverage exceeding 60%. Malta was again the only country reporting 100% WiMAX coverage, followed by Lithuania with 90.3% households covered by WiMAX networks.

4.3.2 Total overall NGA coverage by country

The NGA combination category comprises VDSL, FTTP and DOCSIS 3.0 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[1]). 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 therefore constitutes an evaluation of the roll-out of the relevant technologies and progress towards this goal.

Overall NGA coverage by country, 2015

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

The chart above shows that, as was the case with cable coverage, the highly urbanised countries recorded the highest NGA coverage. Malta remained the only country to report complete coverage for the NGA technology category, followed by Switzerland, Belgium, the Netherlands and Lithuania all reporting coverage levels exceeding 95%.

Nevertheless, there are considerable differences in coverage across the study countries, reflecting the various strategies and approaches to high-speed broadband deployment adopted across Europe. Of the 31 study countries, only six countries (Slovakia, Poland, Croatia, France, Italy, and Greece) reported coverage levels below the European average (79.9%). What is more, coverage levels in these countries remain very low compared to the top performers with NGA services in France and Italy being available to only around 44% of households. In Greece only 36.3% of homes were passed by NGA networks at the end of June 2015.

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[1] Please see the Appendix for more information on differences between technology and speed coverage.

4.3.2.1 Total VDSL coverage by country

As in the previous years, VDSL continued to be the fastest growing NGA technology. By mid-2015, VDSL networks passed 41.6% of EU homes compared to 37.6% at the end of 2014. This is a reflection of a trend observed already in 2013, which sees operators focusing their deployment strategies on upgrading existing copper networks instead of investing in the typically more expensive deployments fibre optic networks all the way to customers' properties.

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. Typically, households with a VDSL connection and a distance of about 500 metres from a VDSL enabled street cabinet or exchange reach download connection speeds of around 25 Mbps.[2]

VDSL coverage by country, 2015

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
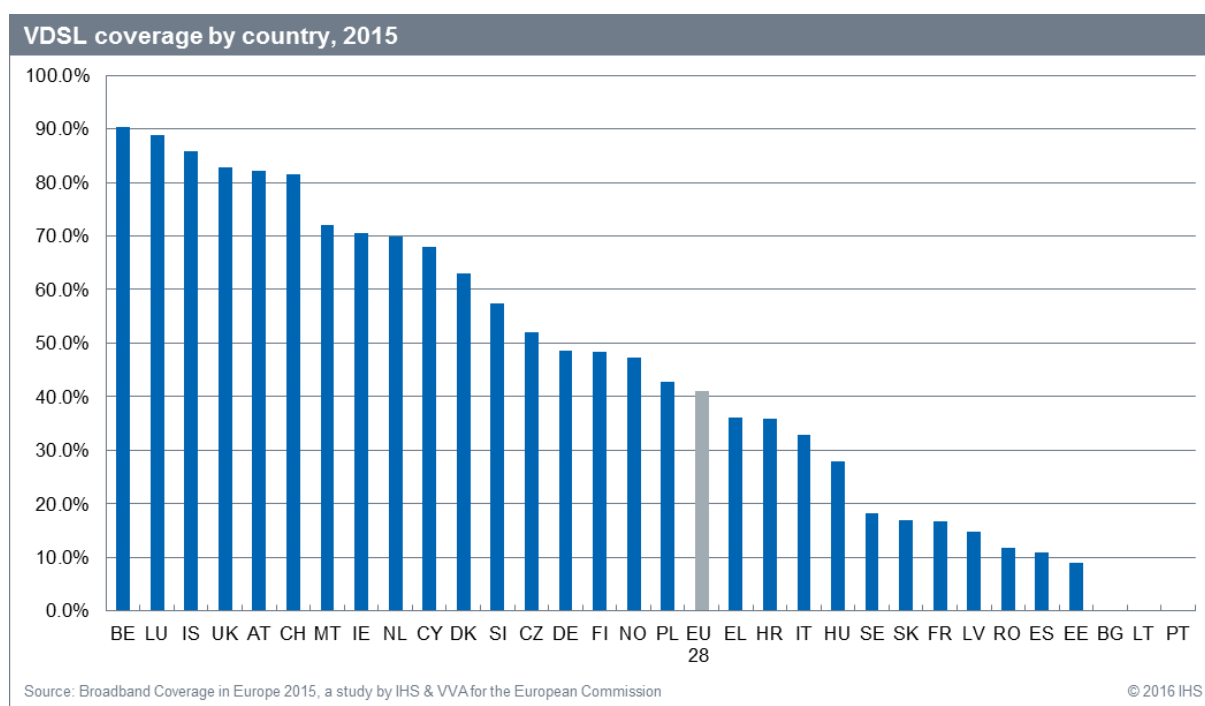
VDSL however remains far from widespread in most markets. Only Belgium reported VDSL coverage exceeding 90%, while five other countries reported coverage levels of over 80% (Luxembourg, Iceland, the UK, Austria and Switzerland). Overall, 17 study countries achieved VDSL coverage exceeding the EU average.

At the end of June 2015, VDSL was not available in Bulgaria, Lithuania and Portugal, all countries, which traditionally prefer other NGA technologies over VDSL. Some countries, on the other hand, saw substantial coverage increases, such as in Poland and Norway, where VDSL coverage increased by 14.2 and 10.8 percentage points respectively during the first six months of 2015.

4.3.2.2 Total FTTP coverage by country

As of mid-2015, the Baltic countries were joined by Portugal at the top of the FTTP coverage ranking. Lithuania and Latvia remained the two countries with the highest FTTP coverage, with 95.1% households passed by FTTP in Lithuania and 85.0% in Latvia. They were followed by Portugal at 75.4% and Estonia at 73.1%. This broadly reflects the national broadband strategies of these countries, which place particular emphasis on fibre roll-out.

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[2] For further analysis of technology vs. speed coverage please see the Appendix.

As in 2014, the strongest growth in FTTP coverage was recorded in Portugal, where FTTP coverage increased by almost 10 percentage points during the first six months of 2015. One of the major contributors to this rise is the strategic business model of Portuguese 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, 2015

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

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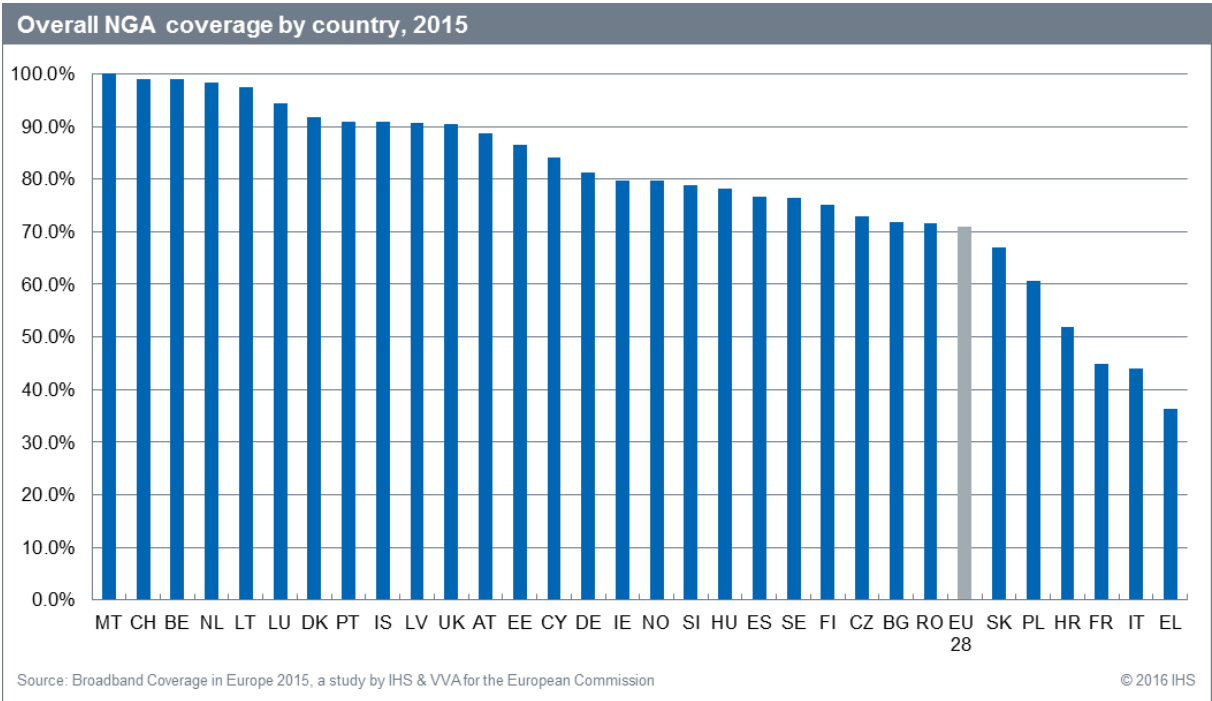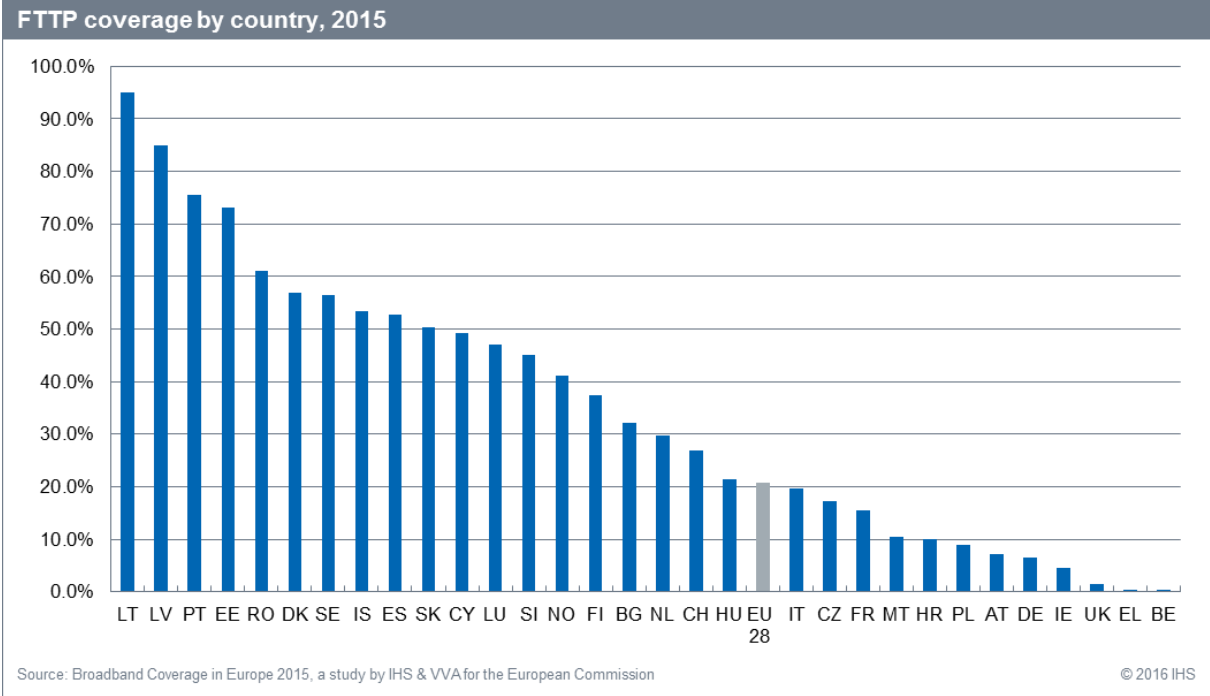Twelve countries reported coverage levels below the EU average. While FTTP access is on offer in all study countries, in some of the countries FTTP is available only on a very limited basis. In Greece and Belgium fibre networks covered only 0.4% of households. In the UK, FTTP coverage was only slightly higher at 1.4%.

4.3.2.3 Total DOCSIS 3.0 coverage by country

In mid-2015, European cable network operators continued to upgrade their cable networks to the DOCSIS 3.0 standard, even though most of the work has already been done in the last couple of years. By mid-2015, 98.5% of cable networks across Europe were upgraded to DOCSIS 3.0 technology compared to 98.2% at the end of 2014.

By the end of June 2015, cable networks in 11 countries were fully upgraded, while DOCSIS 3.0 constituted over 80% of cable networks in almost all countries with cable broadband coverage. The only exception is Croatia, where the upgrade proceeded at a slower pace and by mid-2015 only 70.2% cable connections used DOSCIS 3.0 technology, with a total DOCSIS 3.0 coverage standing at 23% of households.

Malta remained the only country with 100% DOCSIS 3.0 coverage, followed by Switzerland at 98.1%, Belgium at 96.3% and the Netherlands at 95.1%. As in 2014, 17 of the study countries performed better than the EU average (43.1% of households). As noted in previous sections, Greece, Iceland and Italy lack cable broadband networks and thus reported no DOCSIS 3.0 coverage.

Docsis 3.0 coverage by country, 2015
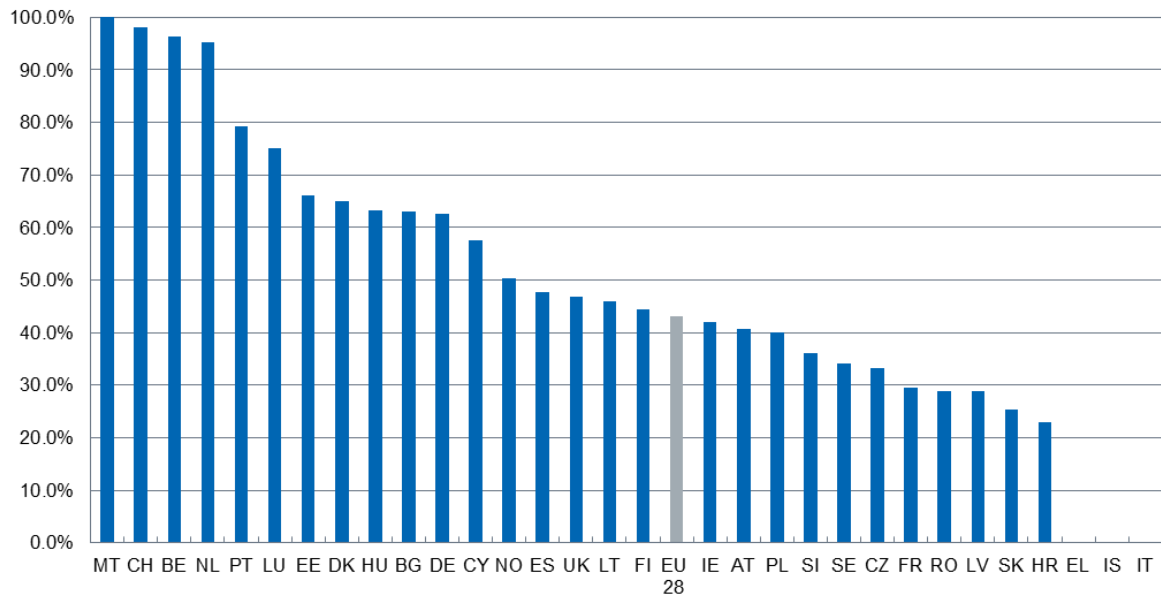
4.3.3 Mobile broadband technologies coverage by country

4.3.3.1 Total HSPA coverage by country

Looking at mobile broadband technologies, by mid-2015 HSPA provided nearly universal coverage, reaching 97.6% of EU households compared to 97.3% at the end of 2014. The limited coverage increases reflect the fact that HSPA coverage approaches saturation levels. Almost all of the countries in this study reported HSPA coverage levels above 95%. The exceptions, as in 2014, were Ireland, Slovakia and Germany (at 94.6%, 91.8% and 91.5% respectively).

HSPA coverage by country, 2015

However, it is important to note that the actual performance and user experience of HSPA broadband varies greatly due to varying standards of individual operators as well as actual conditions in each coverage area. CDMA-based mobile networks (such as HSPA) are also subject to changes in the range of the geographical area covered by a cellular telephone transmitter based on the amount of traffic using that transmitter in any given moment – so called cell breathing. Thus, the quality of mobile broadband connection can vary significantly, within an area as a consequence of geographic or building features, and temporally as a consequence of cell breathing. There can also be significant differences between indoors and outdoors coverage with respect to mobile broadband performance. For the purpose of this study the research team defined HSPA coverage based on outdoors coverage of premises.

4.3.3.2 Total LTE coverage by country

LTE was the fastest growing broadband technology in terms of coverage, which increased by 6.5 percentage points in the first half of 2015, reaching 85.9% of EU households. By mid-2015, LTE was available in all Member States for the first time, with 18 study countries reporting coverage levels exceeding the EU average.
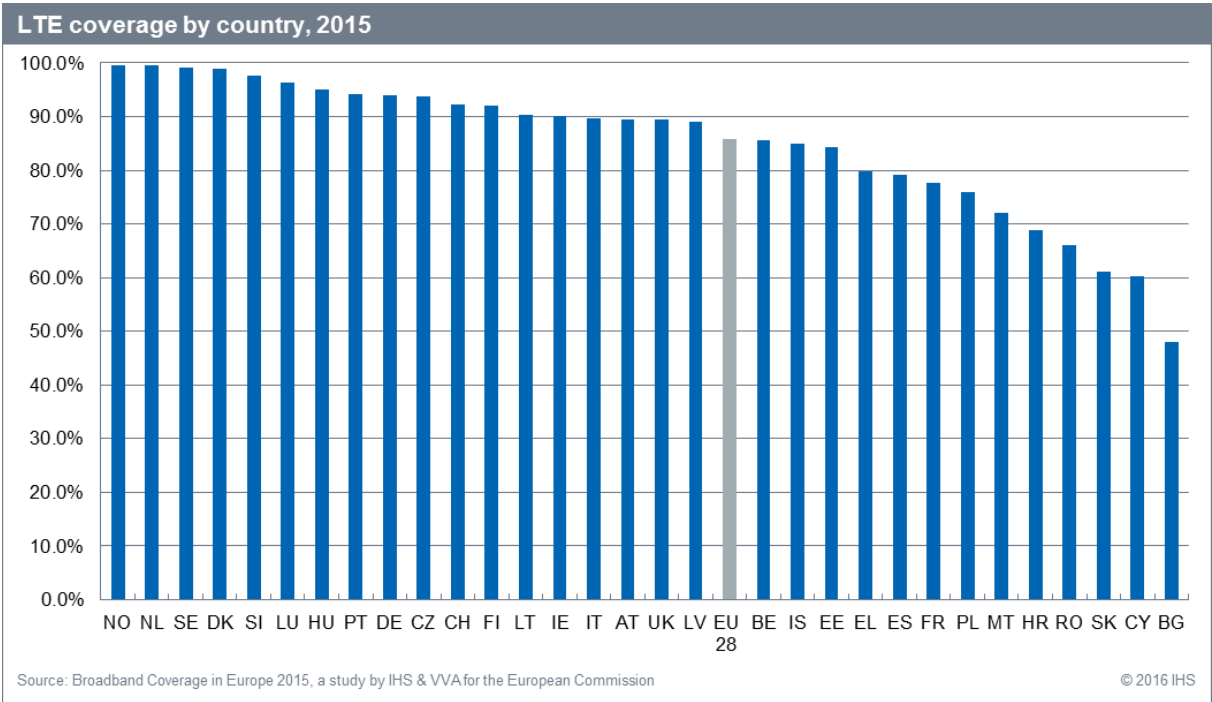
Norway, the Netherlands, Sweden and Denmark were the leaders in terms of LTE coverage, with 99% or more households covered. In particular, Norwegian LTE coverage increased by 16.6 percentage points during the first six months of 2015 making it the leader in terms of availability of LTE services. The highest increase was however reported in Latvia, where the proportion of households covered by LTE networks increased by 24 percentage points to 89.0%. After having been overtaken by Cyprus, where LTE became available to 60.2% of homes, Bulgaria remained the country with the lowest LTE coverage at 48.1%.

4.3.3.3 Total satellite coverage by country

At the end of June 2015, all of the study countries, with the exception of Iceland, were covered by KA-band satellite capable of delivering 2 Mbps broadband services. However, there continued to be only partial satellite coverage in Estonia, Lithuania and Latvia. As in 2014, satellite beams still capable of reaching about 75% of Estonian households, approx.

50% of Lithuanian households and just over 20% of Latvian homes. In addition, satellite dishes with 1.2m diameter are required to receive satellite broadband services in these areas, thus making the widespread use of satellite broadband in these three countries more challenging.

Satellite coverage by country, 2015

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
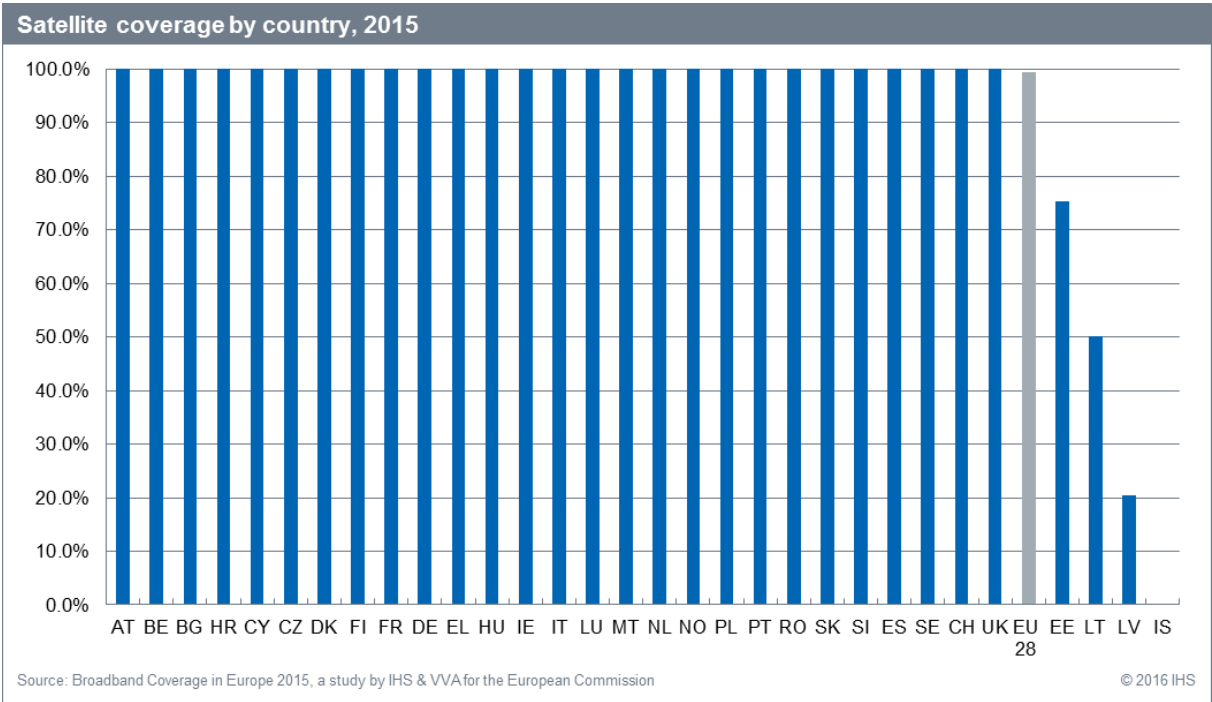
Moreover, it is important to note that while satellites are technically able to cover all households in the reach of a particular beam, the actual number of users that can be serviced by a single beam is limited by the peak average bandwidth usage, thus restricting number of serviceable homes in a particular area.

As in the previous year, the research team estimated the total EU coverage of satellite broadband as reaching over 99% of EU households. Satellite coverage in rural areas was assumed to be identical to the total satellite coverage and satellite coverage for overseas administrative areas was assumed to be the same as coverage of the respective countries they belong to (France, Portugal and Spain).

4.4 Country comparison by rural technology coverage

4.4.1 Rural overall fixed broadband coverage by country

Rural fixed coverage in most study countries continued to lag behind national fixed coverage, with rural fixed broadband coverage at 90.6% rural households being 6.8 percentage points lower than total fixed broadband coverage in mid-2015. This gap is however closing: In 2014 this difference was 7.3 percentage points, 7.6 percentage points in 2013 and 12.3 percentage points in 2012.

Overall fixed broadband coverage by country, rural areas, 2015

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
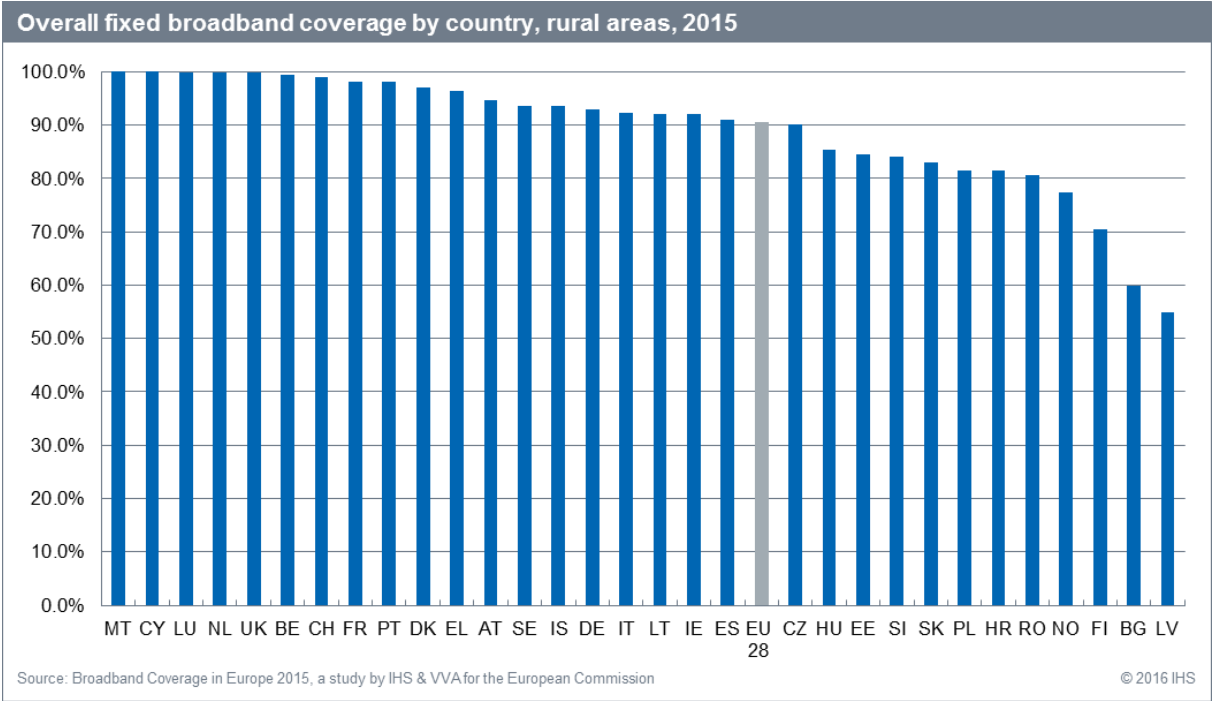
Nineteen study countries reported rural fixed broadband coverage above the EU average. Four of these countries reported complete rural fixed broadband coverage, with Malta, Luxembourg and the Netherlands being joined by Cyprus in 2015. It is however important to point out that these are countries with relatively high levels of urbanisation amongst the study countries. For instance, in 2015 just 1% of households in Malta were classified as rural, 8% in the Netherlands and 11% in Cyprus.

It should be noted that data on rural coverage collected from NRAs and individual operators was not always as comprehensive as total market-level data. In cases when information on rural coverage was incomplete, the research team estimated rural coverage using similar approach applied by Point Topic in previous years of the study. These estimations assume that a technology will typically cover a particular rural area only when urban or non-rural areas within the same region reach 100% coverage.

4.4.1.1 Rural DSL, WiMAX and cable coverage by country

In mid-2015, DSL continued to be the fixed broadband technology available to the highest number of rural households, with coverage widely spread across most countries. On average, rural DSL coverage reached 83.7% of rural EU households compared to a 94.0% total EU average. However, the difference between total and rural coverage was much larger in many countries, for example reaching over 54 percentage points in Lithuania.

DSL coverage by country, rural areas, 2015

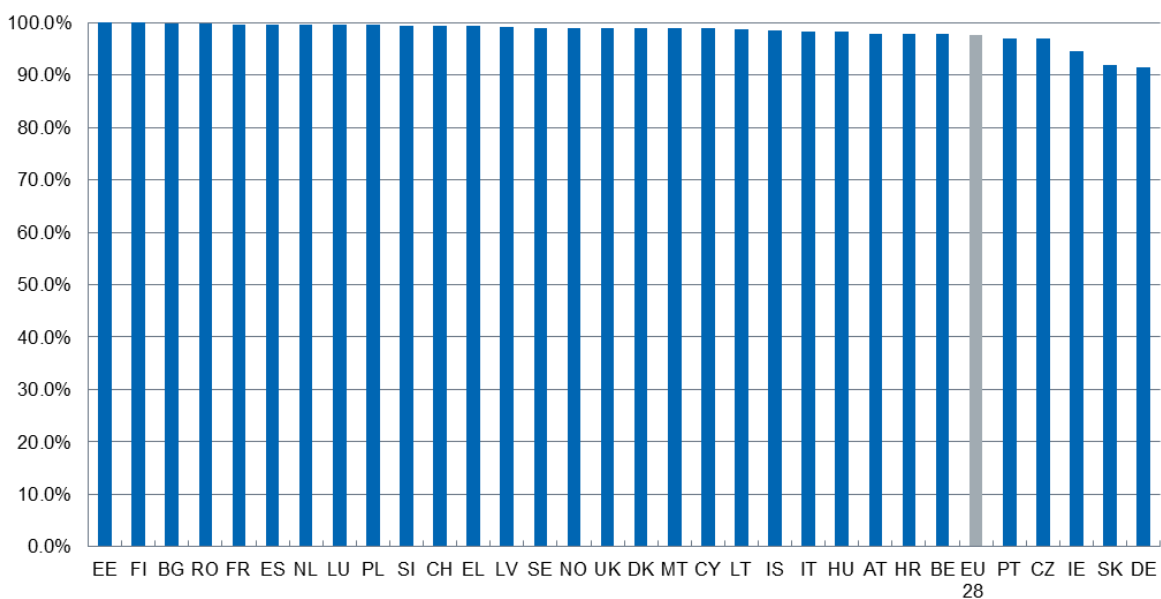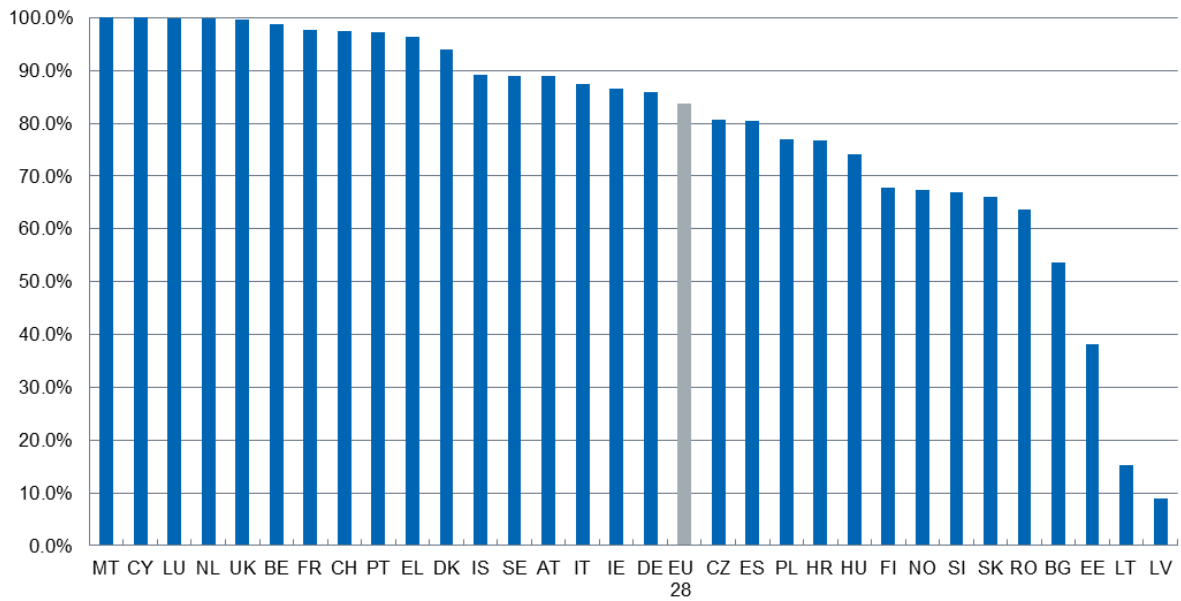Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

© 2016 IHS

Seventeen countries reported rural DSL coverage levels exceeding the European average, unchanged from 2014. Latvia and Lithuania remained the only two countries with DSL coverage figures below 20% (with only 9% of rural households covered in Latvia) in mid-2015.

Other technologies can however serve as a partial substitute for DSL in rural areas. As can be seen in the figure below depicting WiMAX coverage across the EU, countries with low-DSL coverage like Lithuania or Slovakia are among the leaders in terms of WiMAX coverage.

WiMAX coverage by country, rural areas, 2015
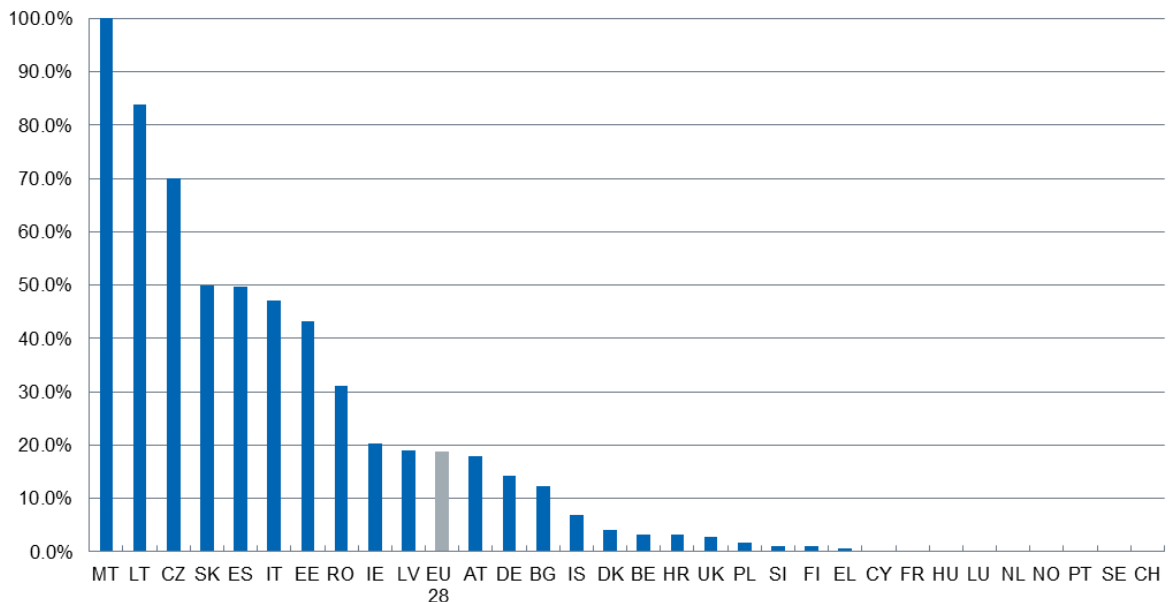
Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

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As in 2014, nine countries reported that WiMAX was not available to households in rural areas, with another eight countries reporting rural NGA coverage below 5%.

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Given the nature of cable network deployment and its primary focus on urban and semi-urban areas as discussed previously, it is not surprising that only 10.2% of rural EU households had access to cable broadband at the end of June 2015. Compared to the end of 2014, there was only a negligible, 0.2 percentage point increase in rural cable coverage.

Cable coverage by country, 2015

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
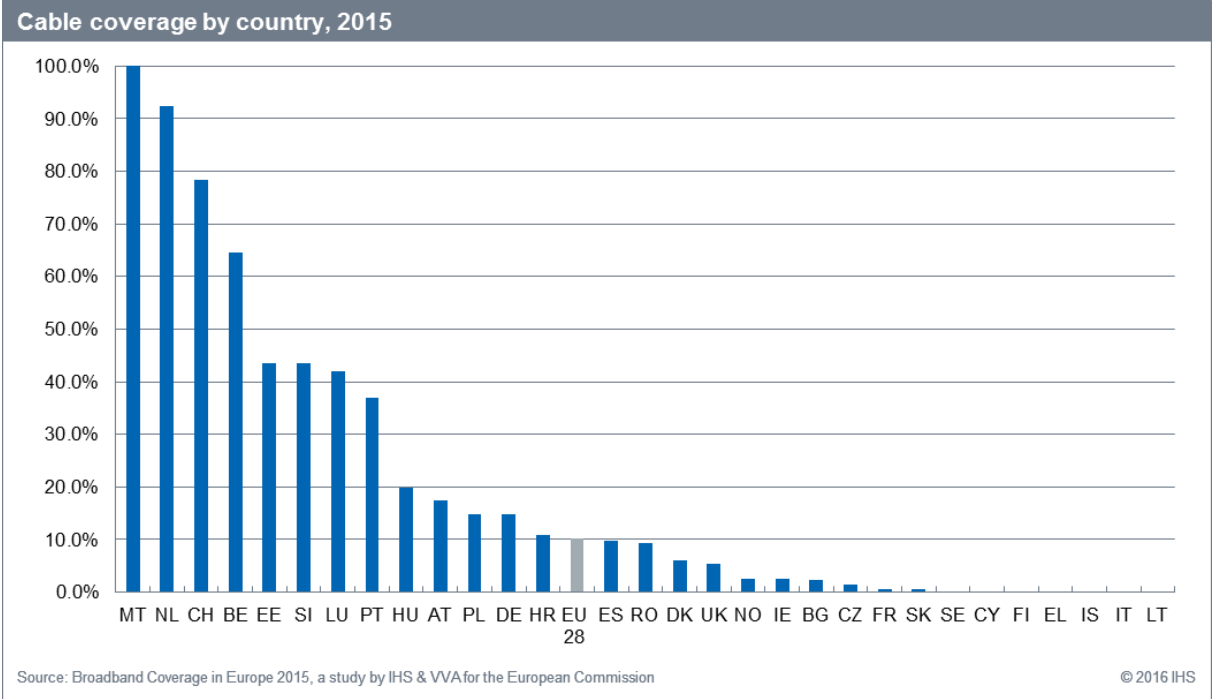
The leading countries in terms of rural cable coverage correspond to the countries achieving highest cable coverage at national level and include Malta, the Netherlands, Switzerland and Belgium. Of these, only in Malta complete rural cable coverage was recorded, mirroring total cable coverage in the country. Although it is important to take into account the fact that only 1% of Maltese households are classified as rural.

4.4.2 Rural NGA coverage by country

Ensuring access to high speed broadband services for rural households is one of the main challenges that European countries face in implementing their national strategies for achieving the targets set out in the Digital Agenda for Europe.

As can be seen in the chart below, none of the study countries reported complete rural NGA coverage, with a rural EU average, at 27.8%, being considerably lower than total NGA coverage (70.9%). What is even more important, while the gap between rural and total fixed coverage has been closing over the last couple of years, the difference between rural and total NGA coverage remains the same at approx. 43 percentage points, meaning that even though NGA coverage grows overall, the deployment continues to be focused primarily on urban areas.

Eighteen countries performed better than the average, with the best performing countries being Malta, the Netherlands and Luxembourg, all with coverage exceeding 90%,

As of mid-2015, Italy remained the only country with no rural NGA coverage, although Bulgaria and Greece both recorded coverage levels below 5%. However, in all three of these countries availability of DSL connections in rural areas is rather high and an upgrade of such networks to VDSL could potentially lead to increased rural NGA coverage in the future, particularly in Italy and Greece, where VDSL technology has already been deployed on a national scale.
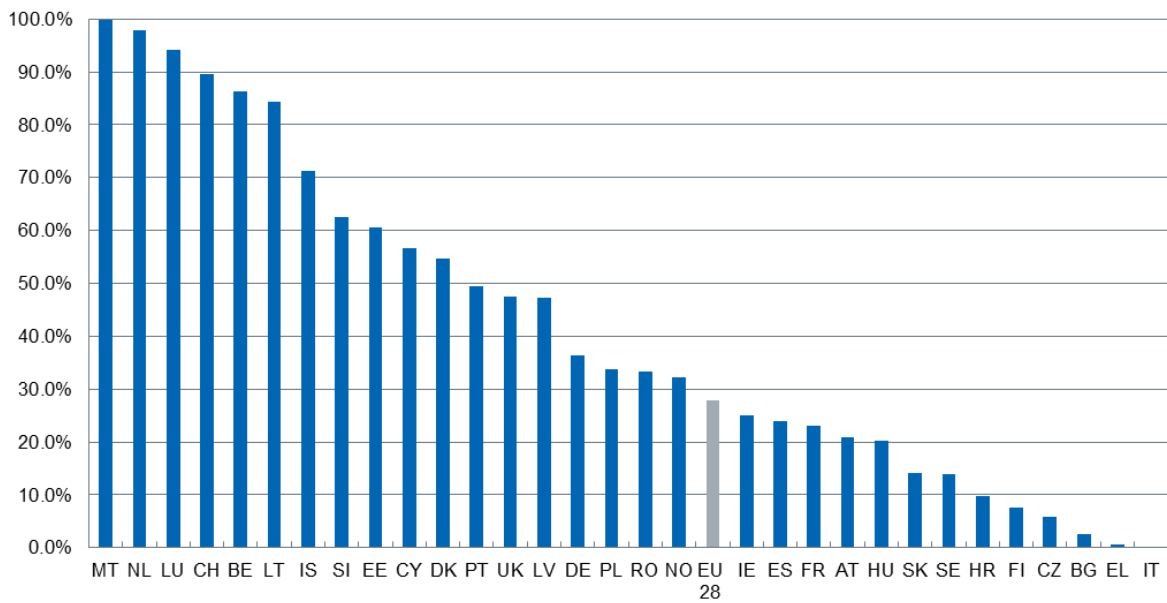
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Overall NGA coverage by country, rural areas, 2015

4.4.2.1 Rural VDSL, FTTP and DOCSIS 3.0 coverage by country

VDSL remained the leading rural NGA technology, passing 16.9% of rural homes in the EU by mid-2015, which constitutes an increase of 1.8 percentage points compared to the end of 2014.

Luxembourg remained the leader in terms of rural VDSL coverage, with almost 90% of rural households covered. It was followed, as in 2014, by Belgium and Iceland, with coverage levels slightly over 70%.

VDSL coverage by country, rural areas, 2015
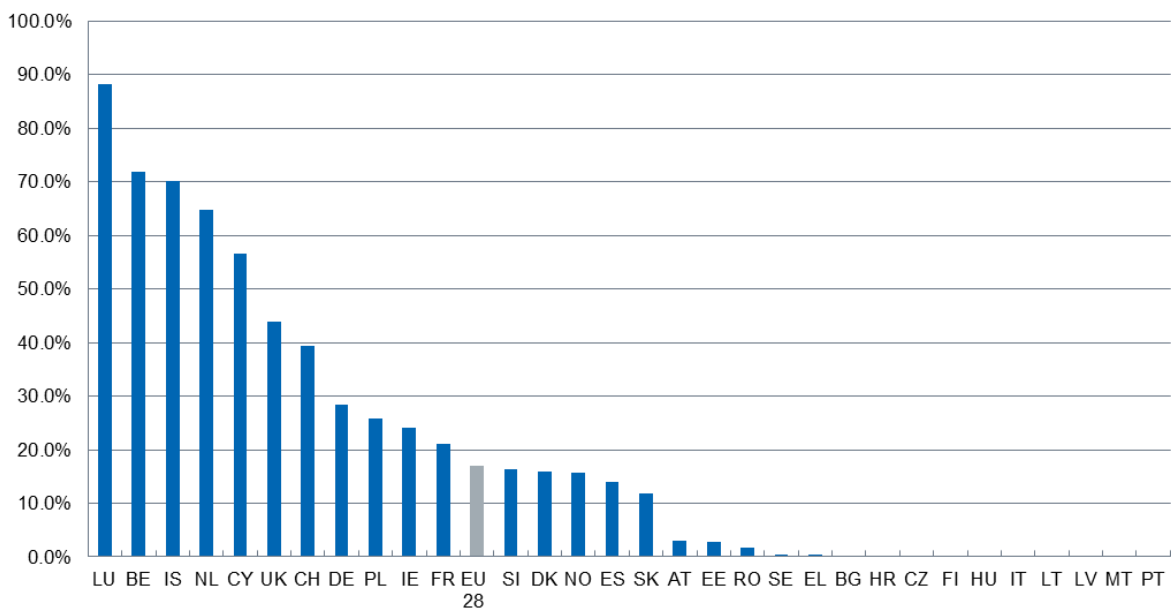
FTTP was considerably less widespread in rural regions compared to VDSL, with only 7.2% of rural EU households covered. As in the previous years, Lithuania was the only country to report FTTP coverage considerably above 50% of rural households (84.4%). Eleven other countries reported above-average FTTP availability, although in majority of these countries coverage was below 30%. As of mid-2015, FTTP was still not available in rural areas in six countries.

FTTP coverage by country, rural areas, 2015
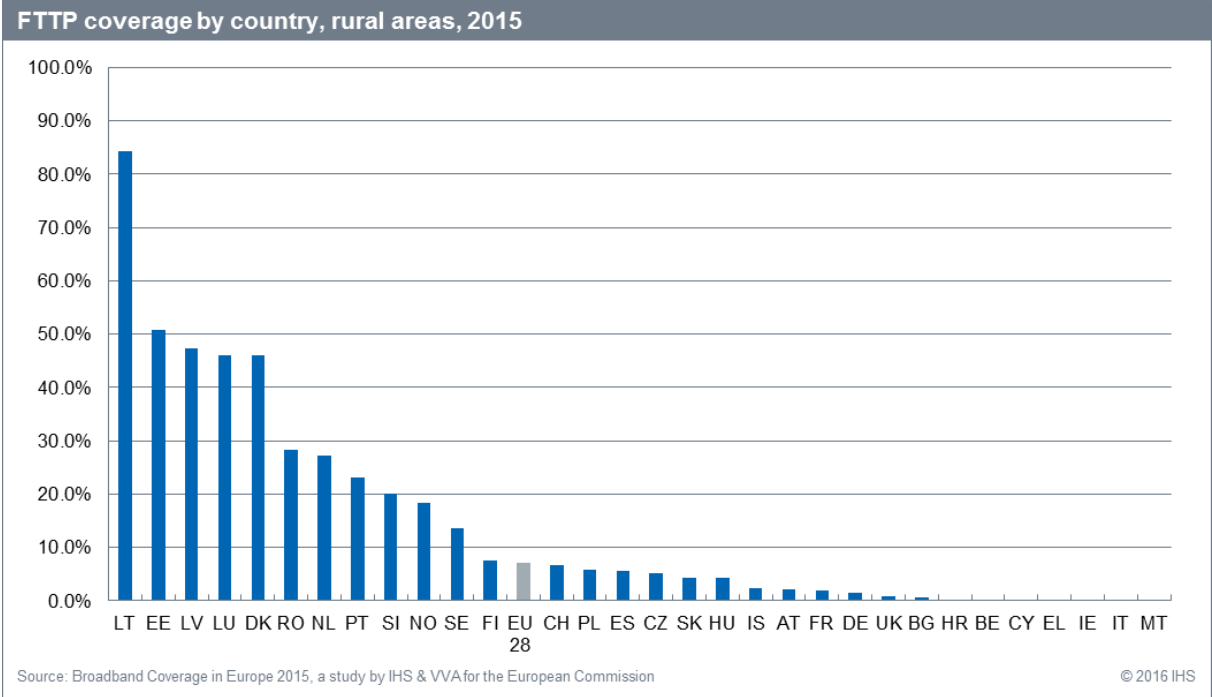
Developments in rural DOCSIS 3.0 coverage broadly reflected the availability of standard cable broadband services, with coverage rising by 0.2 percentage points to 9.4% of rural EU households. Malta was the only country with near-complete rural DOCSIS 3.0 coverage, followed by the Netherlands with 92.4% of rural homes passed by the high-speed cable networks.

Docsis 3.0 coverage by country, rural areas, 2015
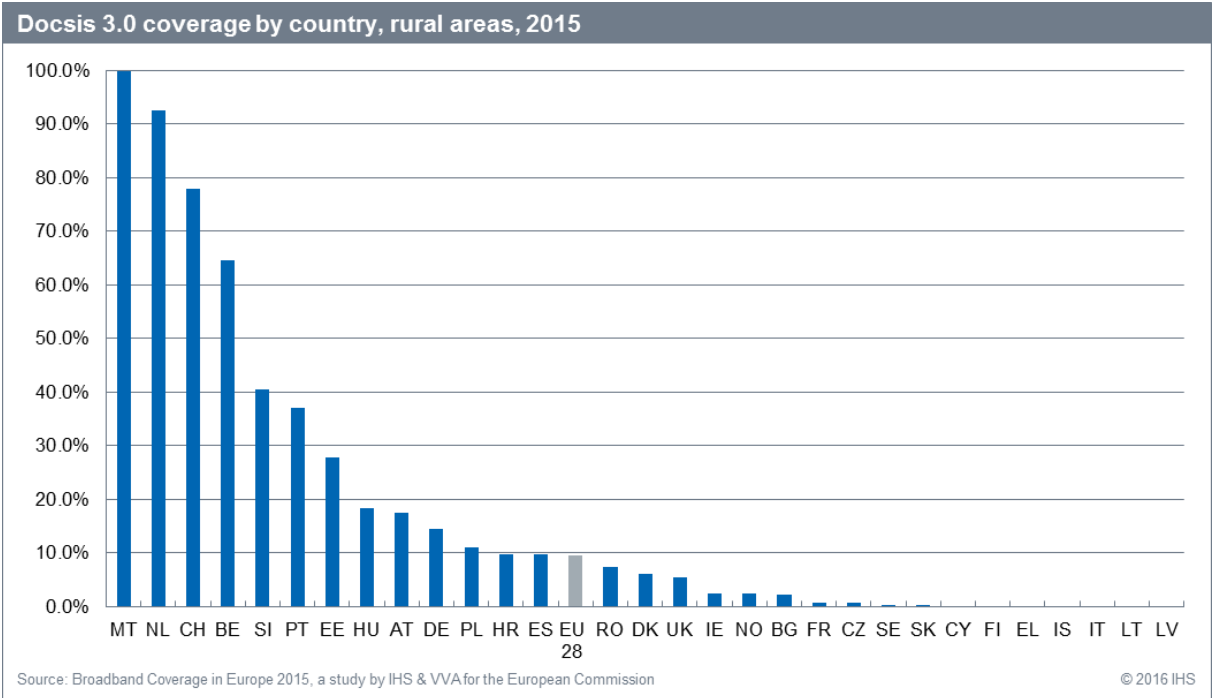
4.4.3 Rural Mobile coverage by country

4.4.3.1 Rural HSPA coverage by country

Out of all technologies, HSPA offered the second widest rural broadband coverage in the EU after satellite broadband, although ten countries still report HSPA coverage of less than the EU average (90%). The leaders in terms of coverage were Estonia and Finland, both reporting complete coverage, followed closely by Bulgaria, Luxembourg and Romania (99.6%, 99.6% and 99.5% respectively).

HSPA coverage by country, rural areas, 2015

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

© 2016 IHS
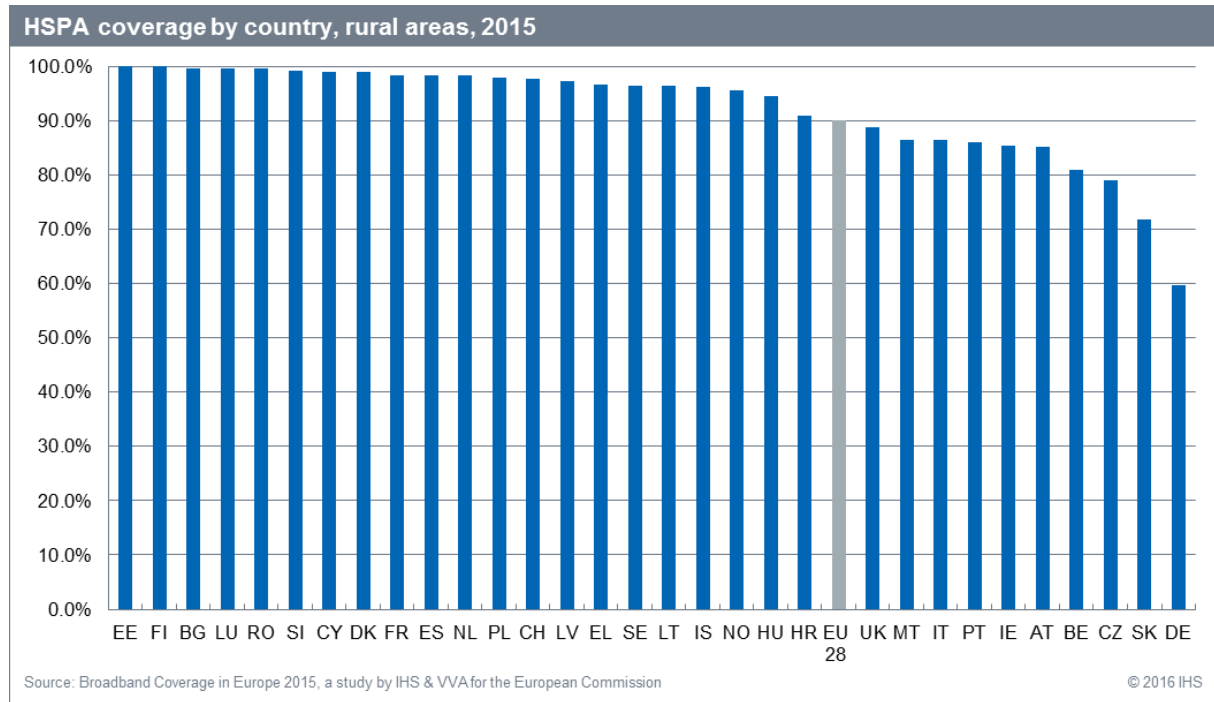
4.4.3.2 Rural LTE coverage by country

Rural LTE continued to improve during the first half of 2015, with total EU coverage increasing by 9.3 percentage points from 27.0% to 36.3%.

LTE coverage by country, rural areas, 2015

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

© 2016 IHS

IHS Global Limited, Valdani Vicari Associati
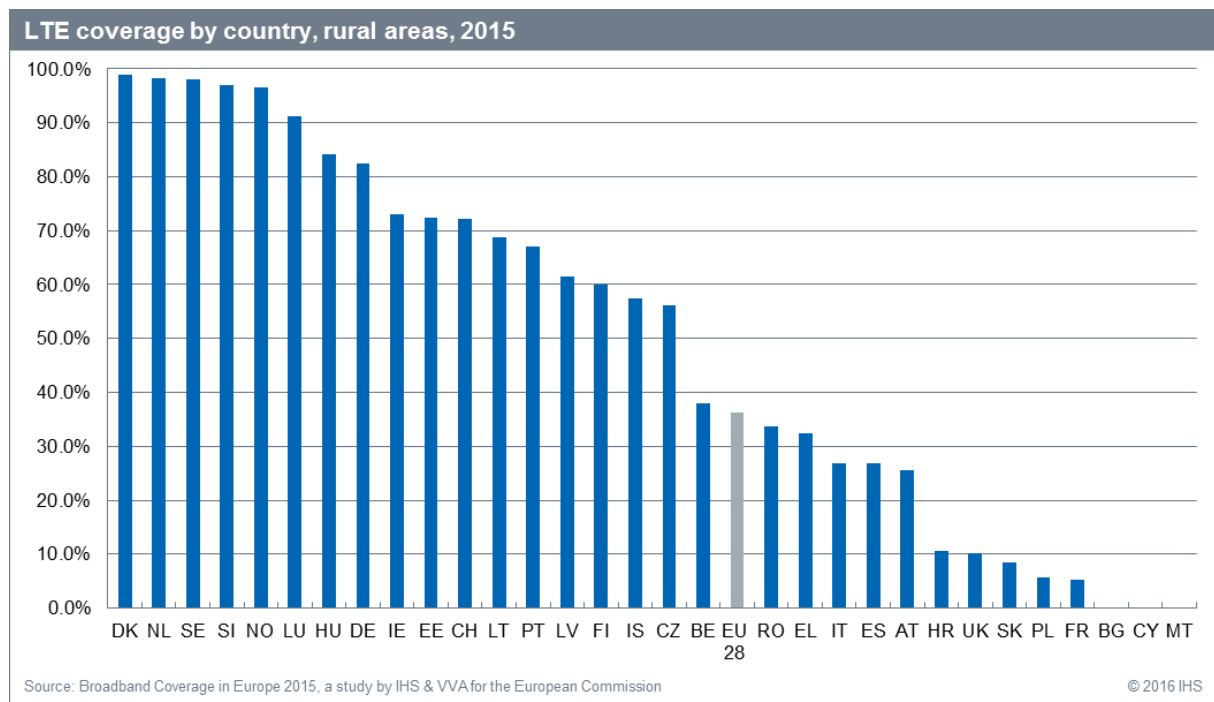
While 18 countries reported coverage levels exceeding the EU average, there are still considerable differences compared to HSPA, with three countries recording no rural LTE coverage (Bulgaria, Cyprus and Malta).

The two best performers, Denmark and Sweden, were joined by the Netherlands, with all three countries having coverage rates above 98%. The highest coverage increases were reported in Hungary and Norway, with rural LTE coverage rising by 69.1 and 64.9 percentage points, respectively, and reaching 84.1% of rural Hungarian households and 96.6% of rural homes across Norway.

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4.5 NUTS 3 level total coverage

The maps included in this chapter indicate the distribution of fixed and NGA broadband coverage across Europe's regions and demonstrate the study results discussed in the previous chapters of this report.
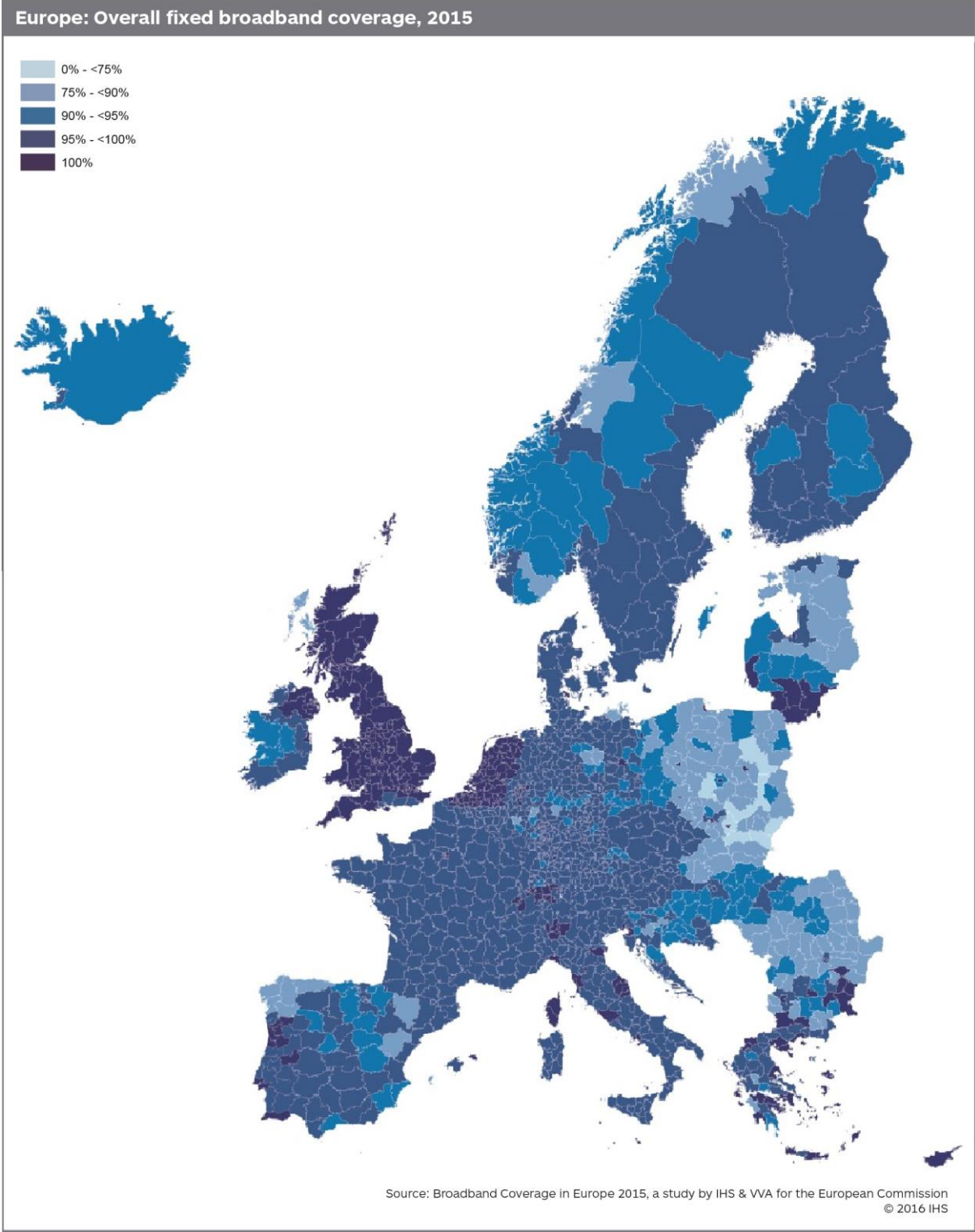
Europe: Overall fixed broadband coverage, 2015
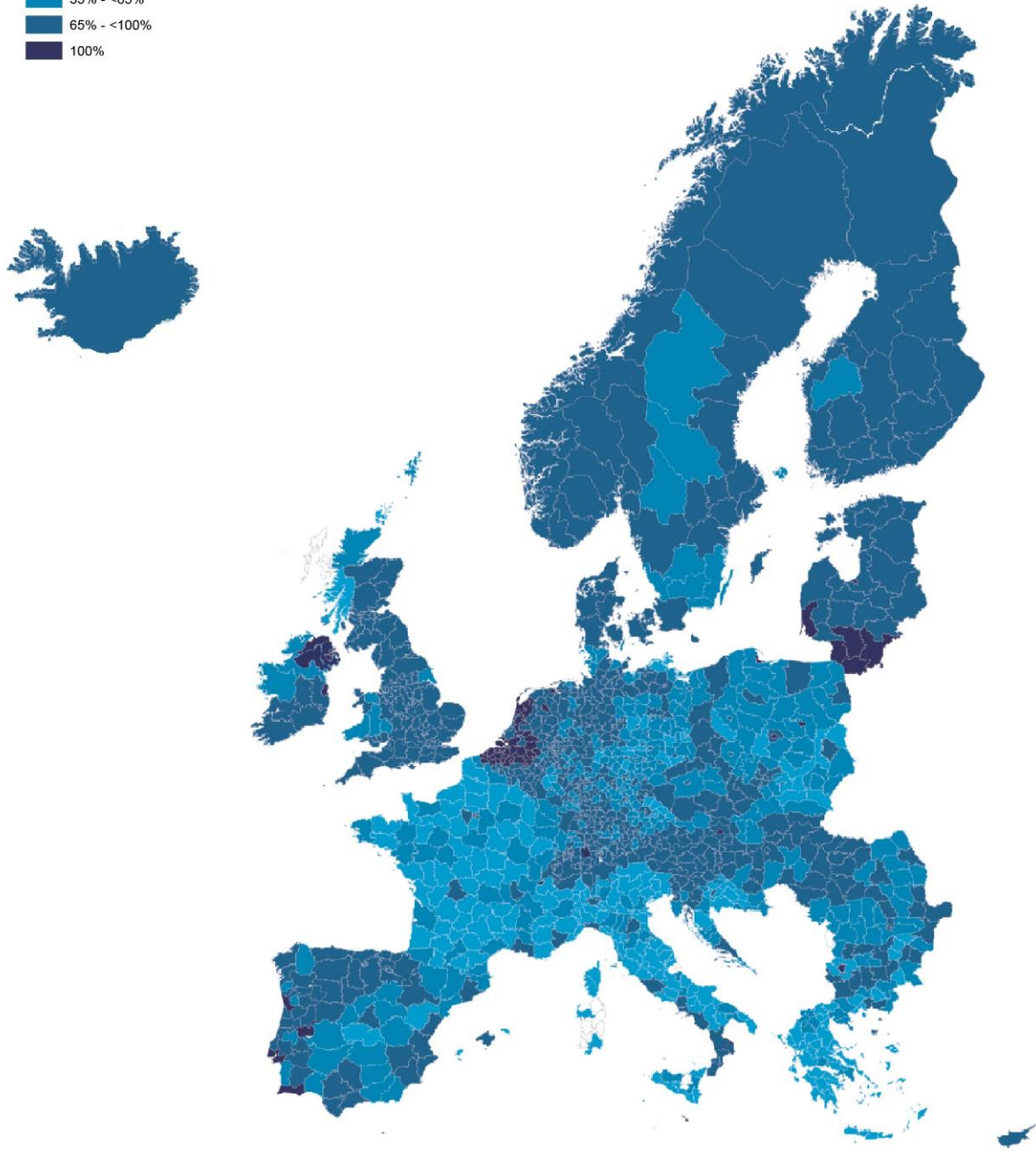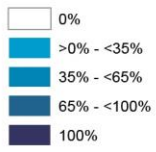
- 0% - <75%
- 75% - <90%
- 90% - <95%
- 95% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS

Europe: NGA broadband coverage, 2015

- 0%
- >0% - <35%
- 35% - <65%
- 65% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS

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5.0 Coverage by Country

5.1 Austria

5.1.1 National coverage by broadband technology

Overall broadband coverage in Austria during the first half of 2015 remained broadly unchanged compared to 2014 and was slightly below the EU average. Fixed broadband coverage on the other hand exceeded the EU average by 1.8 percentage points. After a considerable increase in 2014, NGA coverage remained stable during the first six months of 2015. While Austria performed above the EU average with regards to total NGA coverage, it continued to lag behind the EU average in terms of rural NGA coverage.

Austria: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
■ Austria	99.3%	99.2%	88.8%	94.8%	94.7%	20.8%
▨ EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
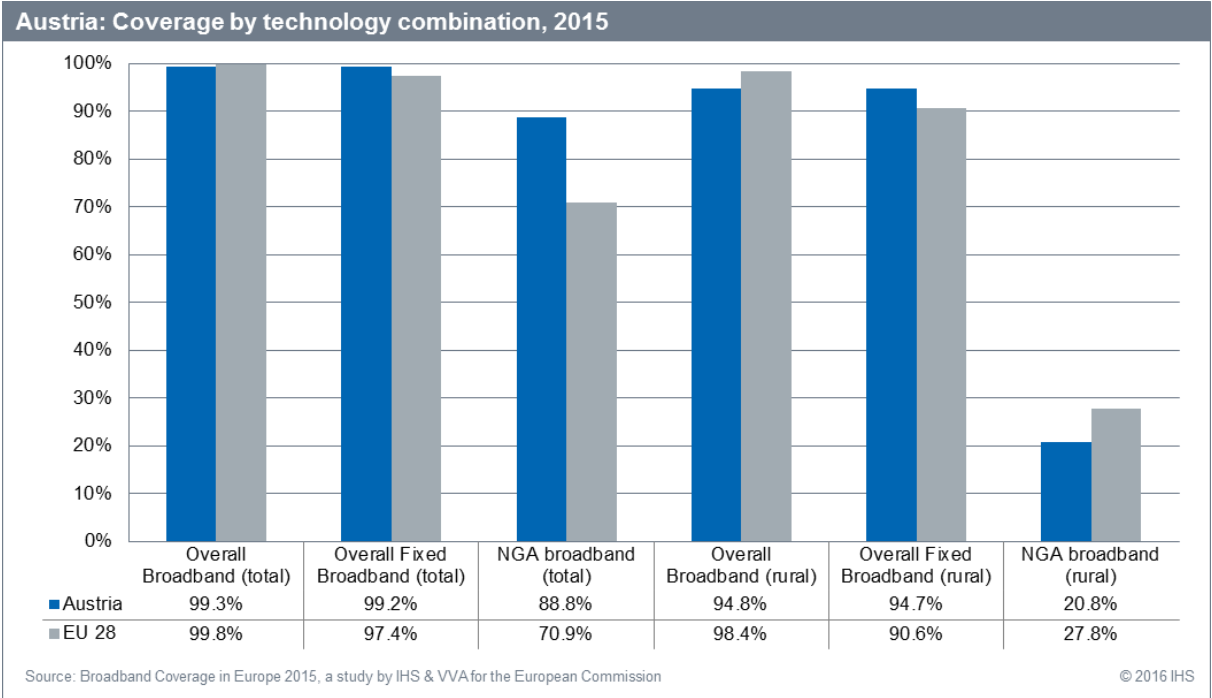
DSL was the prevalent broadband technology, although it remained unchanged from 2014, covering 98.4% of Austrian households. Despite a 1.5 percentage point increase in cable coverage, at 40.6% it remained below the EU average.

Looking at total NGA coverage, Austria continued to perform significantly better than the EU average. As in 2014, VDSL was the key NGA technology available to 82.1% of households at the end of June 2015 but registered a rather modest 0.6 percentage point increase following a rapid growth in the previous year.

Both FTTP and DOCSIS 3.0 coverage remained below the EU average, with 1.5 percentage point increase in DOCSIS 3.0 coverage and FTTP staying at its 2014 level. This reflects the general preference given to VDSL compared to the other NGA technologies.

The most substantial development was reported with regards to LTE, with coverage increasing by 29.5 percentage points over the six-month period and reaching 89.5% of Austrian households, thus outperforming the EU average for the first time. The dramatic increase could be primarily attributed to continued LTE deployment by the operator Hutchison Drei.

Austria: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ Austria	98.4%	82.1%	7.1%	16.1%	40.6%	40.6%	98.0%	89.5%	100.0%
■ EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
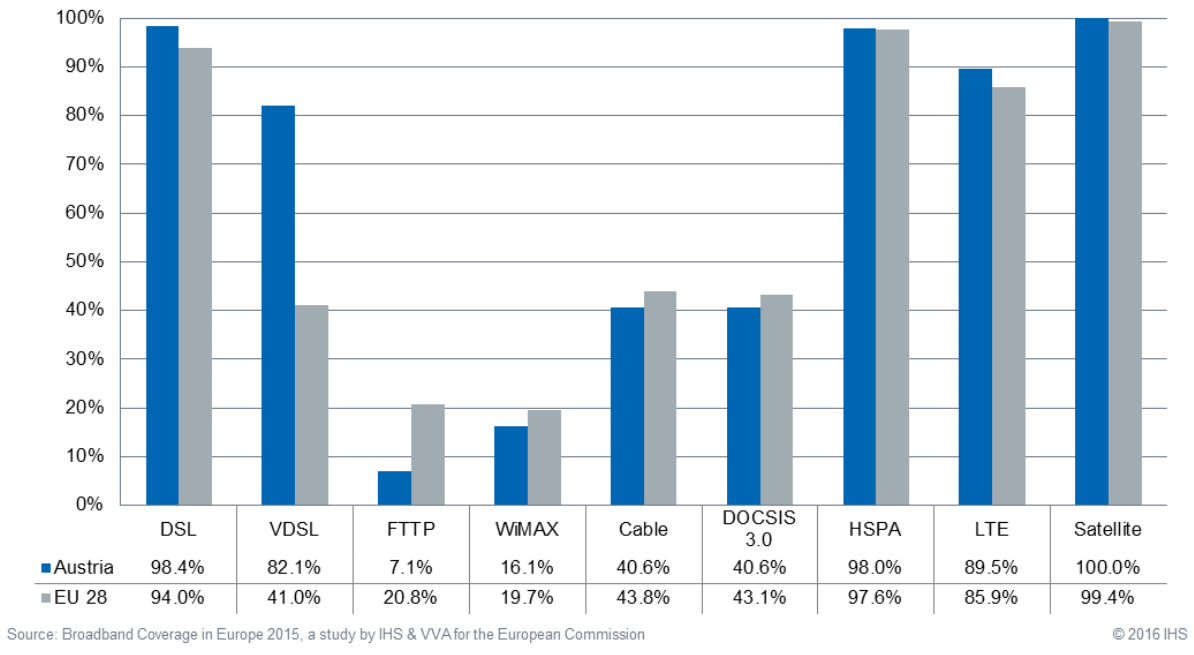
Developments in rural areas mirrored those in the country as a whole, with DSL remaining the primary broadband technology, covering 88.9% of rural households. Cable modem coverage in rural areas increased only marginally to 17.4%, but was still considerably higher than the EU average.

Austria: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ Austria	88.9%	3.0%	2.1%	18.0%	17.4%	17.4%	85.2%	25.6%	100.0%
■ EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
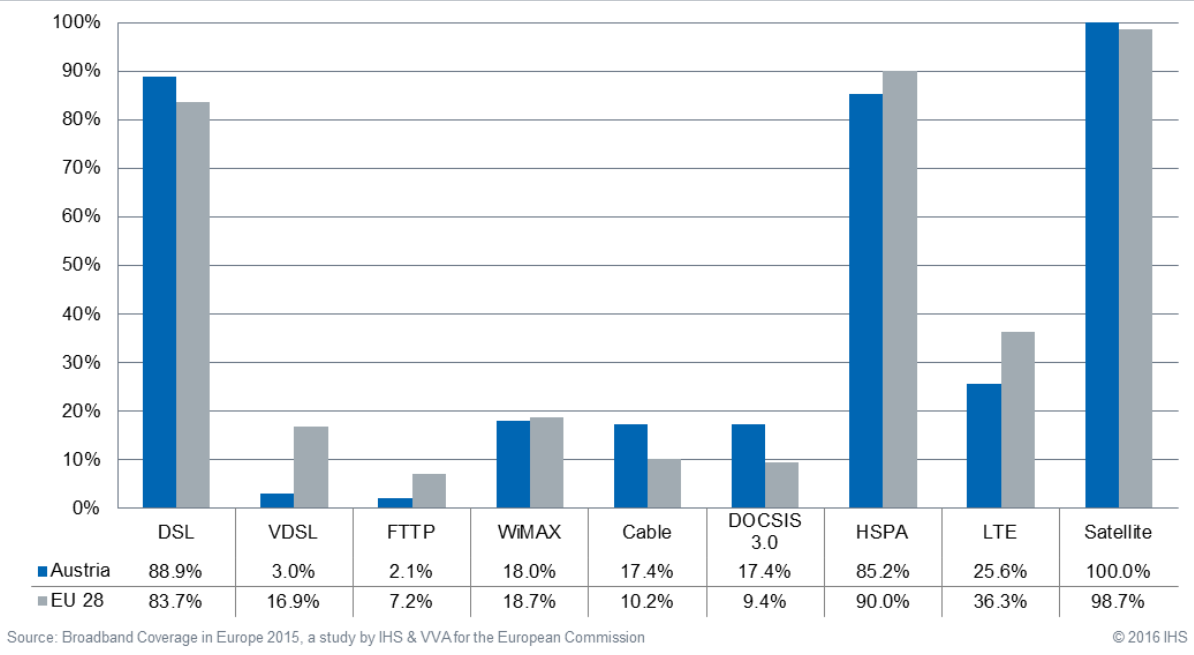
Rural NGA coverage increased by only 0.7 percentage points in the first half of 2015, suggesting slower progress compared to 2014, when rural NGA coverage grew by 4.7 percentage points. Relatively low rural NGA coverage in Austria could be attributed to the gap between rural and total VDSL coverage, which was almost 80 percentage points - the largest among the study countries. This suggests that while VDSL is central to providing NGA broadband on national level, its reach has not yet extended to rural areas. Instead, at 17.4% coverage, DOCSIS 3.0 remained the key NGA access technology in rural areas.

5.1.2 Regional coverage by broadband technology

Examining individual regions, fixed broadband coverage did not vary significantly across regions, with all regions reporting coverage in the 98%-100% range.

Austria: Overall fixed broadband coverage, 2015

Legend:
- 0% - <75%
- 75% - <90%
- 90% - <95%
- 95% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS
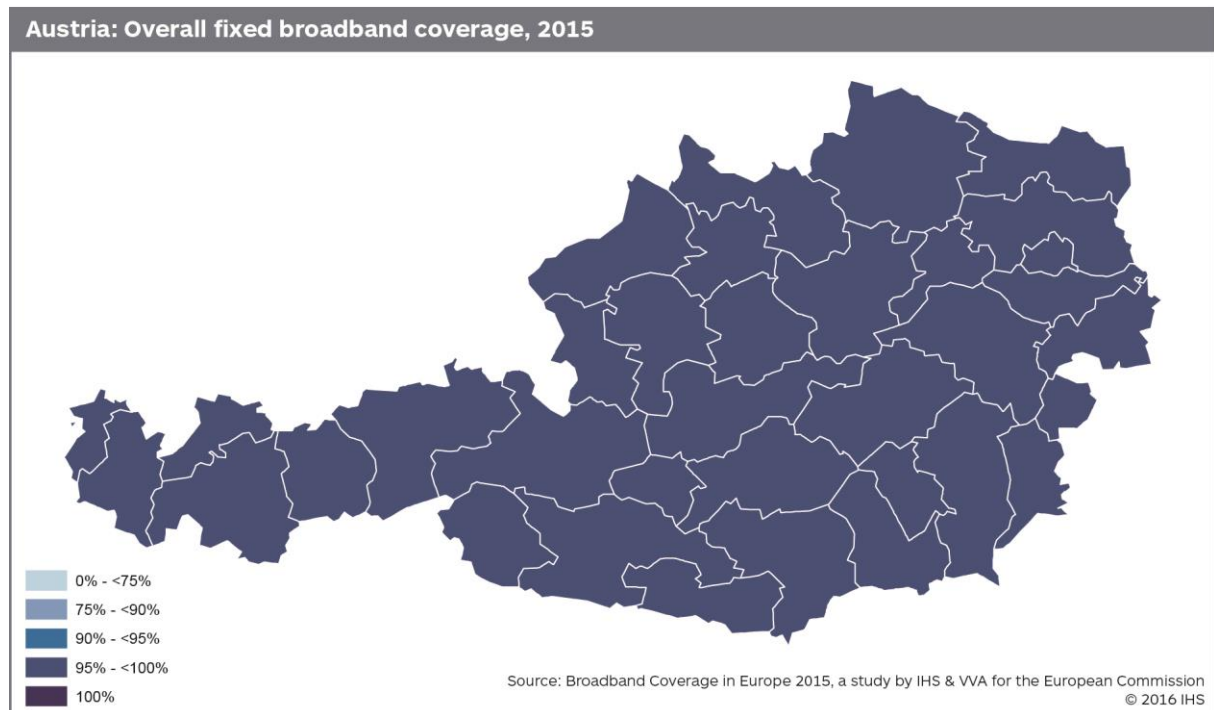
With regards to NGA coverage, the situation was more varied, with coverage levels ranging from close to 65% in the Mühlviertel to nearly 100% in Vienna. The coverage improvements were relatively modest, with most regions reporting coverage increases of less than one percentage point. The only exception was Linz-Wels, where NGA coverage improved by 5.5 percentage points, which can be attributed primarily to DOSCIS 3.0 cable network deployment in the region.

Austria: NGA broadband coverage, 2015

Legend:
- 0%
- >0% - <35%
- 35% - <65%
- 65% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS
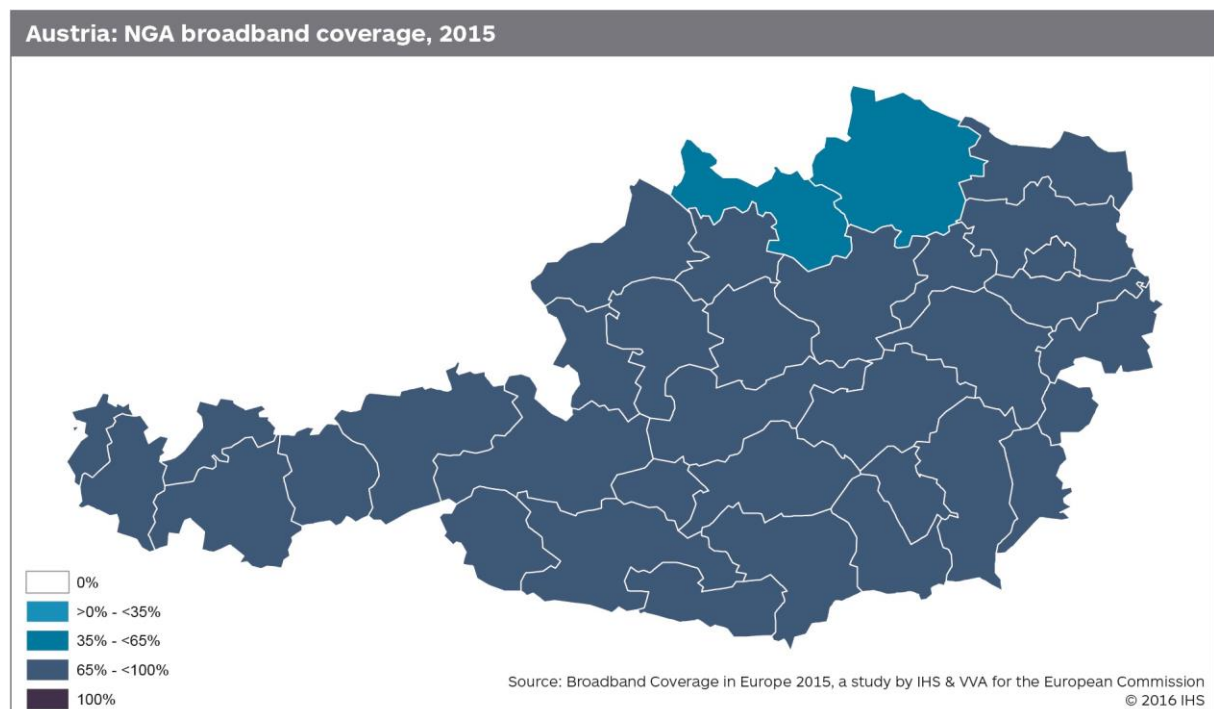
5.1.3 Regulatory and market overview

The Austrian broadband strategy "Broadband Strategy 2020" adopted in November 2012 and overseen by the Federal Ministry of Transport, Innovation and Technology (BMVIT), remains in place until 2020 and constitutes the key policy initiative in the country. The main strategy target is the provision of nearly universal (99% of households) high-speed internet access by 2020.

To support the strategy Austria put in place a funding programme aiming to invest EUR 1 billion starting in 2015, focusing on improving broadband coverage and in particular closing the urban-rural gap.[3] The funding programme, "Breitband Austria 2020 - BBA2020", consists of four elements, focusing on access measures, backhaul, piping and development of services and applications, with the first funding calls published in 2015.[4]

The fixed broadband market in Austria is split between two key technologies, namely DSL and cable. The incumbent, A1 Telekom Austria, and Tele2 are the two main DSL providers, but DSL services are also provided by the leading cable operator, UPC. The cable segment of Austria's telecoms market is fragmented with a number of regional players, such as Salzburg Cable, Liwest (Linz-Urfahr area) and Kabelplus (Lower Austria). On top of being provided by A1 Telekom Austria in selected areas, FTTP services are also offered primarily by a number of small and mainly locally operating providers, such as Wien Energy, which offers FTTP services in the Vienna area.

Key players within the mobile broadband market include the incumbent A1 Telekom Austria followed by T-Mobile and Hutchison Drei. In the first half of 2015, Austria has however seen a number of new players entering the mobile market as mobile virtual network operators (MVNOs). These include Tele2, which to date provided fixed-line broadband services[5], cable operator UPC and the discount retailer Hofer[6].

As noted in the previous sections, most significant developments in broadband coverage in the first half of 2015 related to an extended LTE coverage, which was mostly due to Hutchison Drei's deployments across the country, making its network the largest LTE network in Austria[7].

With regards to market developments in the fixed broadband market, the incumbent A1 Telekom Austria continued its focus on new technologies upgrading the copper network with advancing the G.fast technology, first trialled at the end of 2014, and Vplus. G.fast (also called also called FTTdp standing for 'fibre-to-thedistribution-point') utilizes much higher frequency bands than current copper based network systems, while enabling aggregate speeds of up to 500 Mbps at a distance of 100 metres from an exchange. Vplus technology serves as a middle step between traditional VDSL and G.fast achieving aggregate speeds of 200 Mbps and more over copper at distances of up to 500 meters and 300 Mbps over distances shorter than 250 meters. In the long term, A1 Telkom Austria aims to reach a target of 99% of households having access to 100 Mbps broadband by 2020 by utilizing these technologies.[8]

Since 2013, all cable networks in Austria have been upgraded to DOCSIS 3.0 and cable providers continuously compete on broadband speed offerings. Liberty Global-backed UPC and Kabelplus continued to offer packages with speeds of up to 250 Mbps download, while Salzburg AG's began to offer speeds up to 150 Mbps under its CableLink brand in 2015.

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[3] http://www.bmvit.gv.at/bmvit/telekommunikation/breitbandstrategie/downloads/breitbandinfofolder.pdf

[4] http://www.bmvit.gv.at/telekommunikation/breitbandstrategie/foerderungen/bba2020/index.html

[5] http://www.tele2.com/media/press-releases/2015/tele2-austria-becomes-a-mobile-provider/

[6] https://www.telegeography.com/products/commsupdate/articles/2014/12/17/hofer-to-join-upc-in-austrian-mvno-sector-from-january/

[7] https://www.drei.at/portal/de/bottomnavi/ueber-drei/presse/presse-details-1240395.html

[8] https://www.alcatel-lucent.com/press/2015/alcatel-lucent-transforms-a1-telekom-austrias-network-innovative-ultra-broadband-technologies-will

5.1.4 Data tables for Austria

Statistic	National
Population	8,506,889
Persons per household	2.2
Rural proportion	13.7%

Technology	Austria 2015		Austria 2014		Austria 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	98.4%	88.9%	98.4%	88.9%	98.3%	90.6%	94.0%	83.7%
VDSL	82.1%	3.0%	81.6%	2.4%	51.2%	1.3%	41.0%	16.9%
FTTP	7.1%	2.1%	7.1%	2.1%	7.1%	2.2%	20.8%	7.2%
WiMAX	16.1%	18.0%	16.5%	18.0%	17.2%	17.9%	19.7%	18.7%
Cable	40.6%	17.4%	39.1%	17.2%	39.1%	17.5%	43.8%	10.2%
DOCSIS 3.0	40.6%	17.4%	39.1%	17.2%	39.1%	17.5%	43.1%	9.4%
HSPA	98.0%	85.2%	98.0%	85.0%	97.9%	85.0%	97.6%	90.0%
LTE	89.5%	25.6%	60.1%	4.6%	35.0%	0.3%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	99.3%	94.8%	99.3%	94.6%	99.2%	95.5%	99.8%	98.4%
Overall fixed broadband	99.2%	94.7%	99.2%	94.5%	99.1%	95.5%	97.4%	90.6%
NGA broadband	88.8%	20.8%	88.2%	20.2%	70.2%	15.5%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.2 Belgium

5.2.1 National coverage by broadband technology

In the first half of 2015, broadband coverage Belgium continued to exceed the EU average in all combination categories. In particular, Belgium was one of the leading countries in terms of NGA coverage, both on national and rural level.

Belgium: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Belgium	99.9%	99.9%	98.9%	99.4%	99.4%	86.4%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
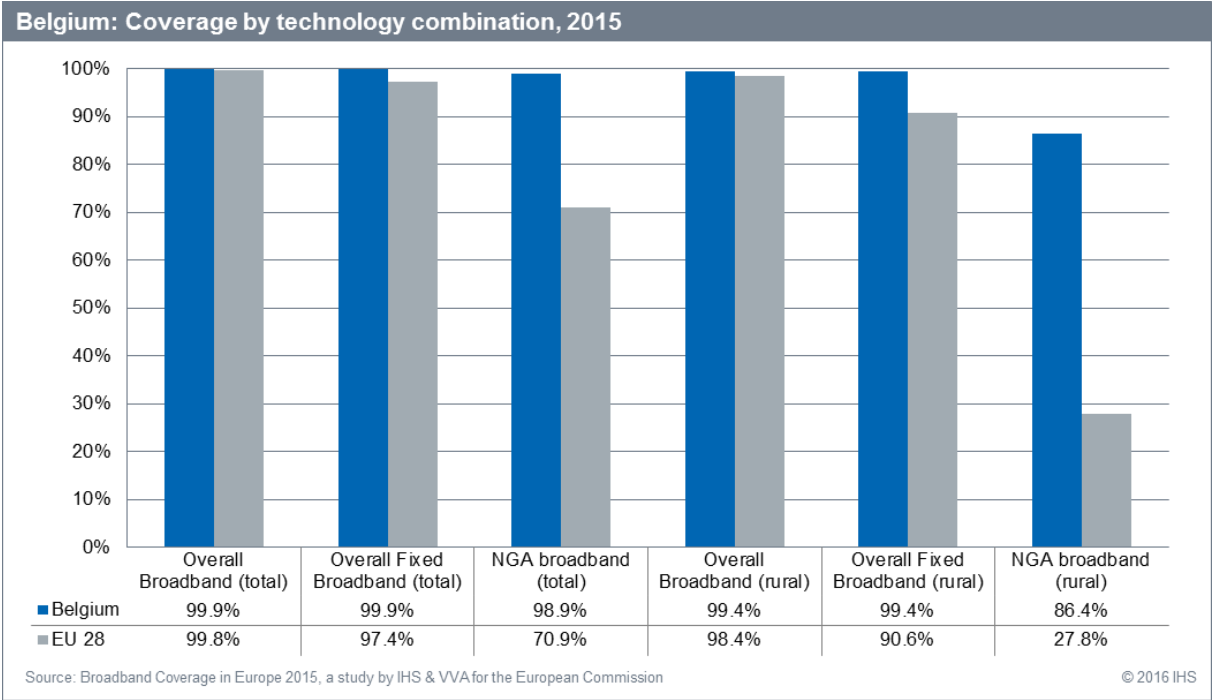
Looking at fixed broadband technologies at national level, Belgium already reported relatively high DSL, VDSL and cable coverage at the end of 2014 and no substantial coverage increases were reported in the first half of 2015.

Belgium: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Belgium	99.9%	90.4%	0.4%	15.0%	96.3%	96.3%	97.9%	85.6%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

DOCSIS 3.0 remained the key NGA technology in Belgium, although Belgium was also the European leader in terms of VDSL coverage, with 90.4% homes passed compared to the EU average of 41.0%.

As in the previous year, most progress was made in terms of LTE coverage, with coverage increasing by further 17.8 percentage points to 85.6% by the end of June 2015, just under the EU average of 85.9%. This reflects the continued investments in the LTE network of mobile operators such as Mobistar and the incumbent, Proximus.

Belgium: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Belgium	98.8%	71.9%	0.0%	3.3%	64.6%	64.6%	81.0%	38.0%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
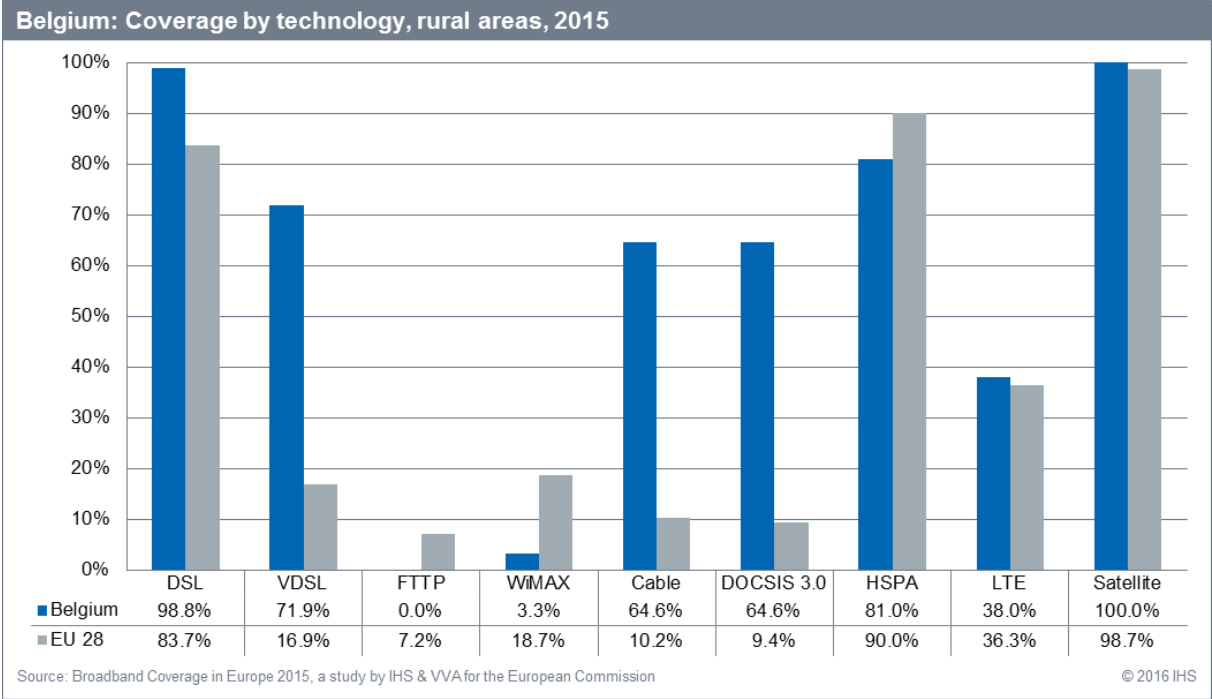
While in rural areas DSL remained the main broadband access technology covering 98.8% of rural households, Belgium is also characterised by relatively high rural cable coverage, with 64.6% of rural homes passed compared to EU average of 10.2%. Rural VDSL and DOCSIS 3.0 coverage increased in the first half of 2015 by 2.7 and 4.6 percentage points, respectively, contributing to the relatively high overall rural NGA coverage. Rural LTE coverage increased by 9.8 percentage points since the end of 2014 and reached 38.0% of rural households.

When comparing rural coverage in Belgium with other countries it is important to keep in mind that Belgium is the second most urbanised country included in the study (after Malta), with only 4.4% of households classified as rural compared to the EU average of 14.1%.

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5.2.2 Regional coverage by broadband technology

On regional level, fixed broadband coverage in all Belgian regions exceeded 99% with no substantial changes in fixed coverage recorded in any of the regions.

Belgium: Overall fixed broadband coverage, 2015

0% - <75%
75% - <90%
90% - <95%
95% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
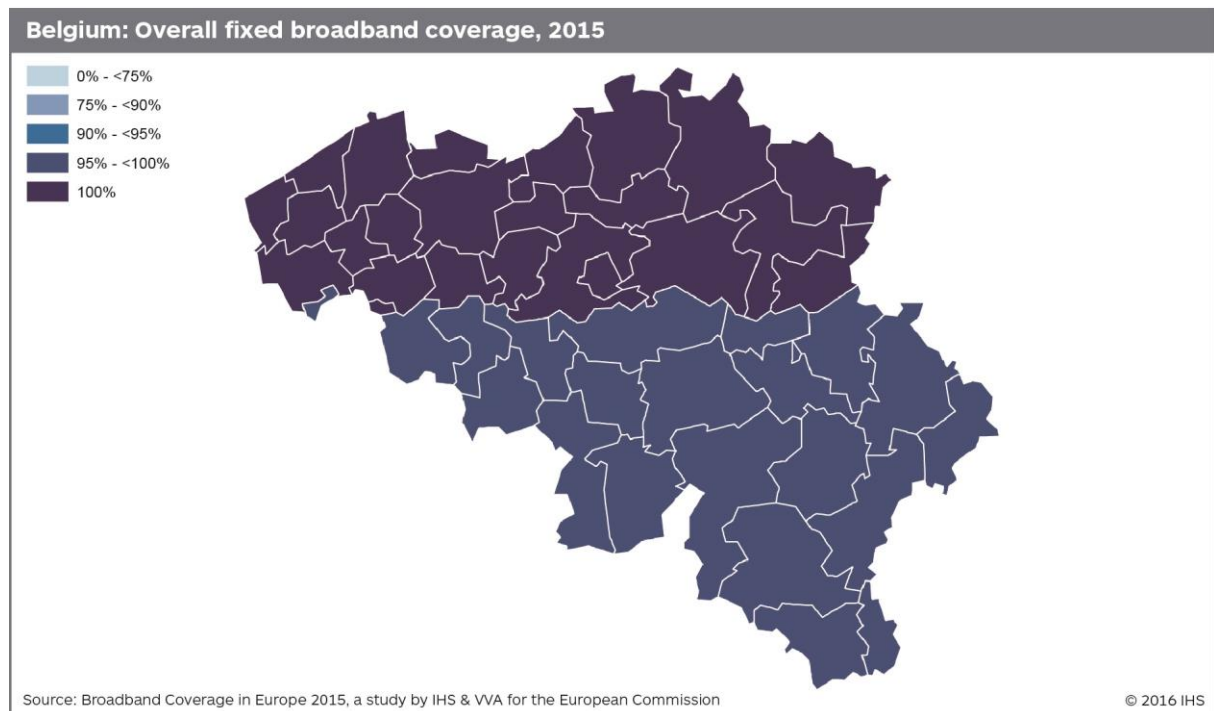
With regards to NGA technologies, a clear pattern can be observed when comparing the Flemish and the Walloon regions. While the former regions reported complete NGA coverage, coverage rates in the Walloon regions varied between 94% and almost 100%, with some regions reporting considerable coverage increases (nearly 15 percentage points in both Bastogne and Neufchâteau).

Belgium: NGA broadband coverage, 2015

0%
>0% - <35%
35% - <65%
65% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
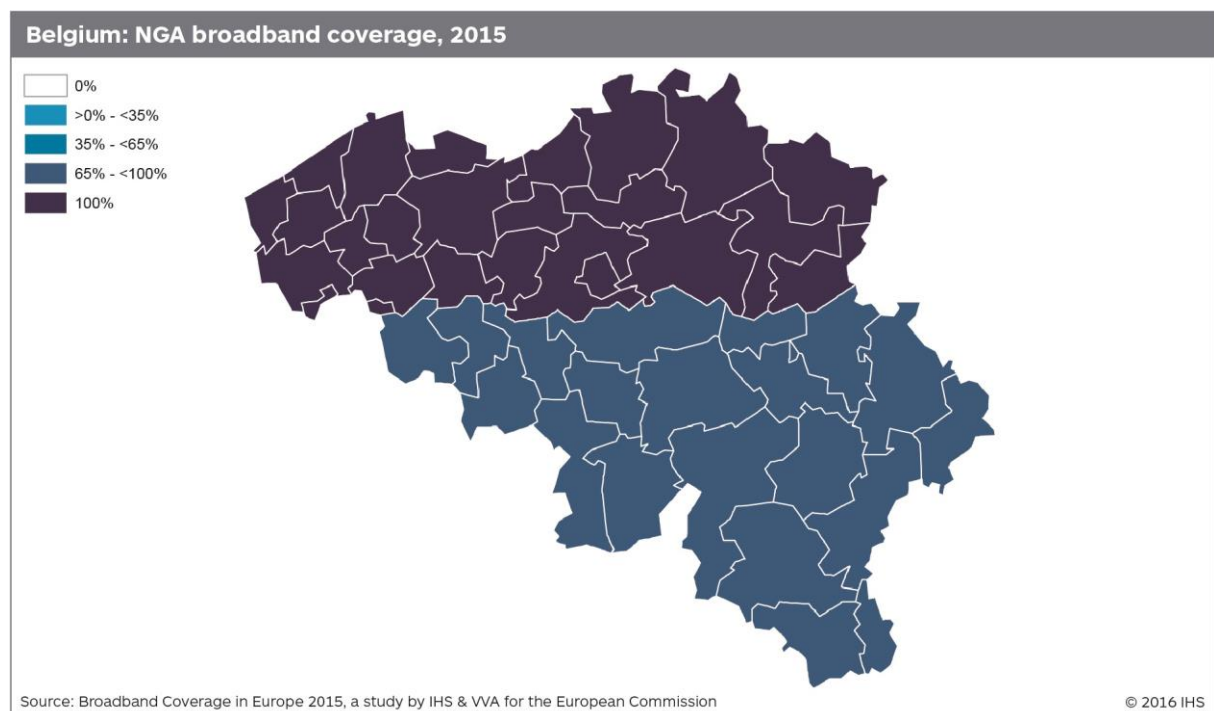
5.2.3 Regulatory and market overview

In April 2015, the Belgian government announced the "Digital Belgium" strategy.[9] It serves as the current broadband strategy, with one of its five pillars focusing on digital infrastructure. One of the elements of that pillar, called the "stimulus for ultra-fast internet", aims to lower costs and reduce administrative burden to encourage a continued roll-out of advanced broadband infrastructure using a mix of technologies in order to ensure universal broadband access while lowering costs and administrative burden connected with network deployment.[10]

Fixed broadband market in Belgium is dominated by DSL and cable technologies, with the two leading providers being the incumbent telecoms provider Proximus (previously Belgacom) and cable provider Telenet. The market also includes a number of regional cable providers such as Numericable, Tecteo and Brutele and other smaller DSL operators, such as KPN, Orange and Digiweb, which in April 2015 announced new high-speed VDSL offers.[11]

As in previous years, Proximus continued to focus on extending the VDSL 2 vectoring technology throughout its entire network during the first six months of 2015. The upgraded network enables delivery of up to 70 Mbps on the company's copper lines. In 2015, Telenet provided services with up to 160 Mbps download speeds but the company announced already at the end of 2014 a EUR 500 million five-year investment plan to upgrade its HFC (hybrid fibre-coaxial) network to increase download speeds to gigabit levels.[12]

The three leading mobile operators in the Belgian telecommunications market include Proximus, Mobistar and BASE, with the latter in the process of being sold by the Dutch telecom company KPN to the cable operator Telenet.[13] The leading operators continue to invest in LTE deployment, and tested or commercially launched LTE-Advanced (LTE-A) networks.[141516]

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[9] http:// http://www.digitalbelgium.be/

[10] http://www.digitalbelgium.be/en#pillars

[11] http://media.digiweb.ie/digiweb-launches-new-fixed-internet-products-in-belgium/

[12] https://corporate.telenet.be/en/news-and-media/press-announcements/telenet-investing-expansion-giga-network-everyone

[13] http://investors.telenet.be/phoenix.zhtml?c=241896&p=irol-acqbase

[14] https://www.proximus.com/en/news/proximus-quality-again-three-steps-ahead

[15] https://corporate.mobistar.be/en/news-medias/after-mechelen-mobistar-tripling-its-4g-speed-launching-4g-brussels-and-mons

[16] https://www.basecompany.be/en/about-us/press/lte-advanced.html

5.2.4 Data tables for Belgium

Statistic	National
Population	11,203,992
Persons per household	2.3
Rural proportion	4.5%

Technology	Belgium 2015		Belgium 2014		Belgium 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	99.9%	98.8%	99.9%	98.8%	99.9%	98.9%	94.0%	83.7%
VDSL	90.4%	71.9%	90.0%	69.2%	88.5%	57.8%	41.0%	16.9%
FTTP	0.4%	0.0%	0.4%	0.0%	0.4%	0.0%	20.8%	7.2%
WiMAX	15.0%	3.3%	15.1%	3.3%	15.2%	3.3%	19.7%	18.7%
Cable	96.3%	64.6%	96.2%	60.1%	95.9%	59.8%	43.8%	10.2%
DOCSIS 3.0	96.3%	64.6%	96.2%	60.1%	95.9%	59.8%	43.1%	9.4%
HSPA	97.9%	81.0%	97.8%	77.4%	98.8%	75.8%	97.6%	90.0%
LTE	85.6%	38.0%	67.8%	28.2%	45.6%	3.9%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	99.9%	99.4%	99.9%	99.5%	99.9%	99.6%	99.8%	98.4%
Overall fixed broadband	99.9%	99.4%	99.9%	99.4%	99.9%	99.6%	97.4%	90.6%
NGA broadband	98.9%	86.4%	98.8%	84.0%	98.3%	74.9%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.
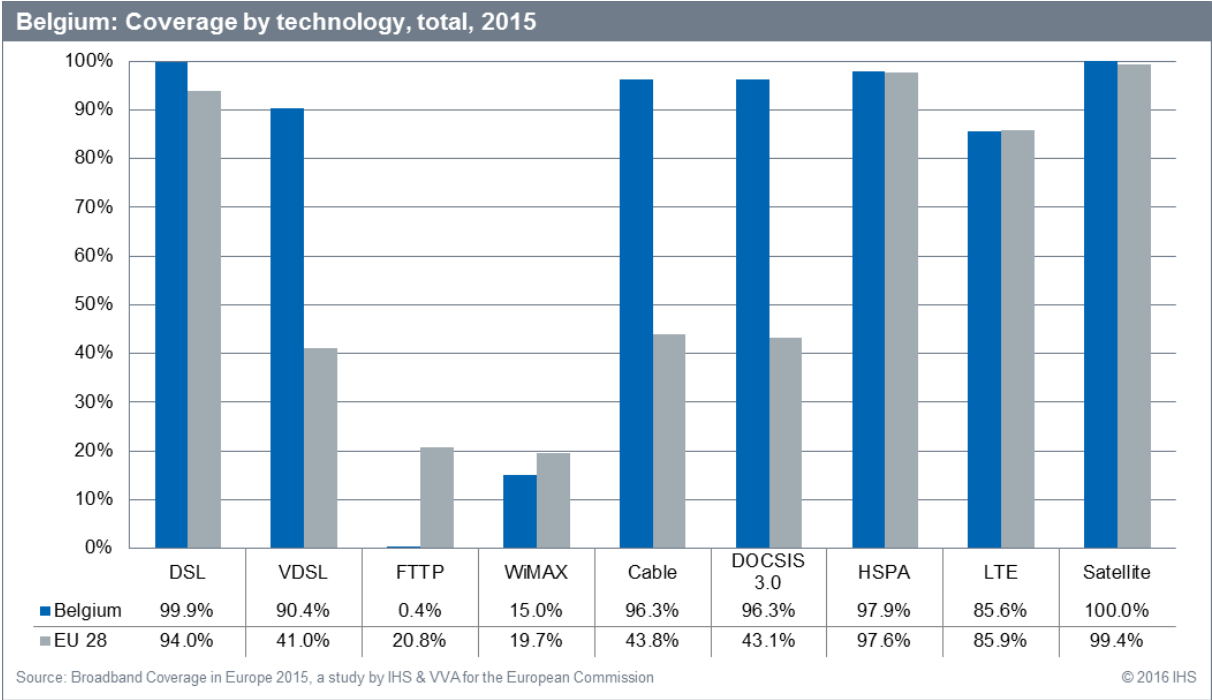
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5.3 Bulgaria

5.3.1 National coverage by broadband technology

As of mid-2015, fixed broadband coverage in Bulgaria remained below the EU average on both national and rural level, with rural fixed coverage at 60% being the second-lowest among the study countries. While rural fixed coverage increased by 0.5 percentage points in the first six months of 2015, this growth was not sufficient to close the gap to the rest of the EU.

More progress was made with regards to national NGA coverage, with NGA availability increasing by 2.4 percentage points, driven by FTTP and DOCSIS 3.0 coverage. While on national level, NGA coverage in Bulgaria exceeded the EU average and more than 7 in 10 (71.8%) Bulgarian households had access to high-speed broadband services, in rural areas NGA networks passed only 2.7% of rural homes.

Bulgaria: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Bulgaria	100.0%	95.2%	71.8%	99.9%	60.0%	2.7%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS
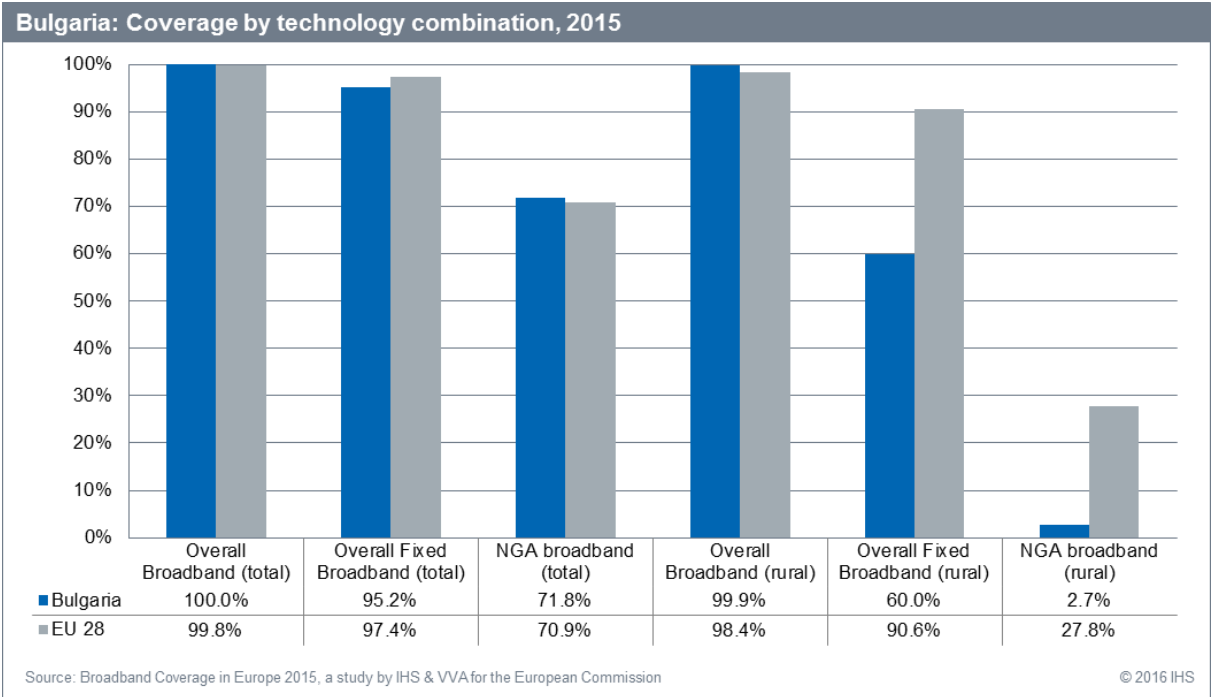
With regards to individual technologies, DSL remained the most prevalent fixed broadband technology in Bulgaria, although at 85.1% DSL coverage remains below the EU average. Bulgaria was however also characterised by above-average WiMAX (64.6%) and cable coverage (64.9%). While WiMAX coverage in Bulgaria reaches high levels, it should be noted that one of the largest WiMAX providers, Max Telekom, plans to cease operations of WiMAX services with customers to be migrated to its LTE networks in the course of 2016.[17]

With VDSL absent in Bulgaria, NGA coverage was driven by DOCSIS 3.0, which covered 62.9% of households, and to a lesser extent FTTP, with 32.2% coverage. FTTP also recorded the most substantial coverage increase among fixed technologies in the first six months of 2015, with coverage rising by 3.9 percentage points.

Looking at FTTP coverage, it is important to note one specific aspect of the Bulgarian broadband market: In many areas, fibre optic cable is rolled out very near to individual properties or blocks of flats, with coaxial cable used in the distance from the last amplifier to

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[17] https://www.maxtelecom.bg/bg/za-nas/novini/maks-migrira-vsichki-svoi-klienti-ot-wi-max-kym-4g-lte-operatoryt-dobavi-2-novi-grada-s-4g-pokritie

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the customers' homes. While this FTTLA (fibre-to-the-last-amplifier) architecture is sometimes described as FTTB, in the case of Bulgaria this coverage was classified as DOCSIS 3.0 rather than FTTP. This classification was applied by Point Topic in previous years of the study and the IHS & VVA research team maintained this approach in subsequent analysis. Given that both FTTP and DOCSIS 3.0 technologies are combined in the NGA broadband coverage category, this classification does not impact the total NGA coverage levels.

Bulgaria: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Bulgaria	85.1%	0.0%	32.2%	64.6%	64.9%	62.9%	99.9%	48.1%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
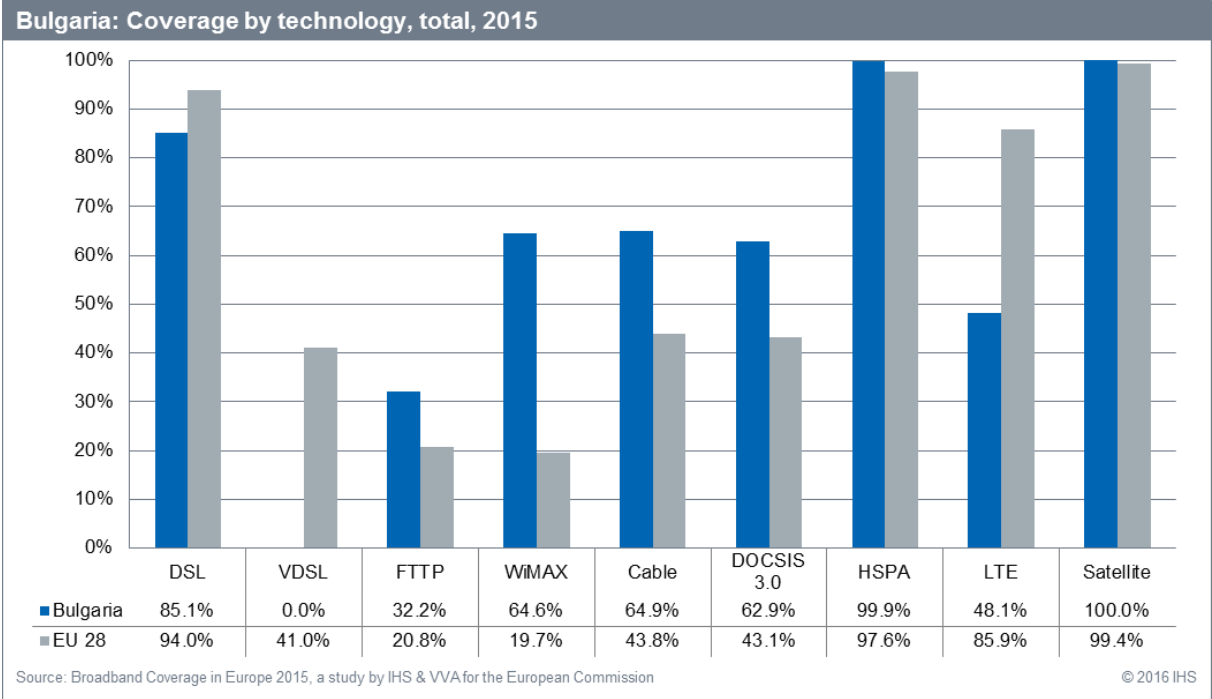
LTE coverage continued to increase in 2015 and grew by 12 percentage points during the first half of the year, even though, at 48.1%, LTE coverage in Bulgaria was the lowest in the EU. Further coverage expansion is however expected in the second half of 2015 due to both the continued investment by Max Telecom, as well as the entries of Telenor Bulgaria and Bulsatcom into the Bulgarian LTE market.

Bulgaria: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Bulgaria	53.6%	0.0%	0.7%	12.3%	2.2%	2.2%	99.6%	0.0%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
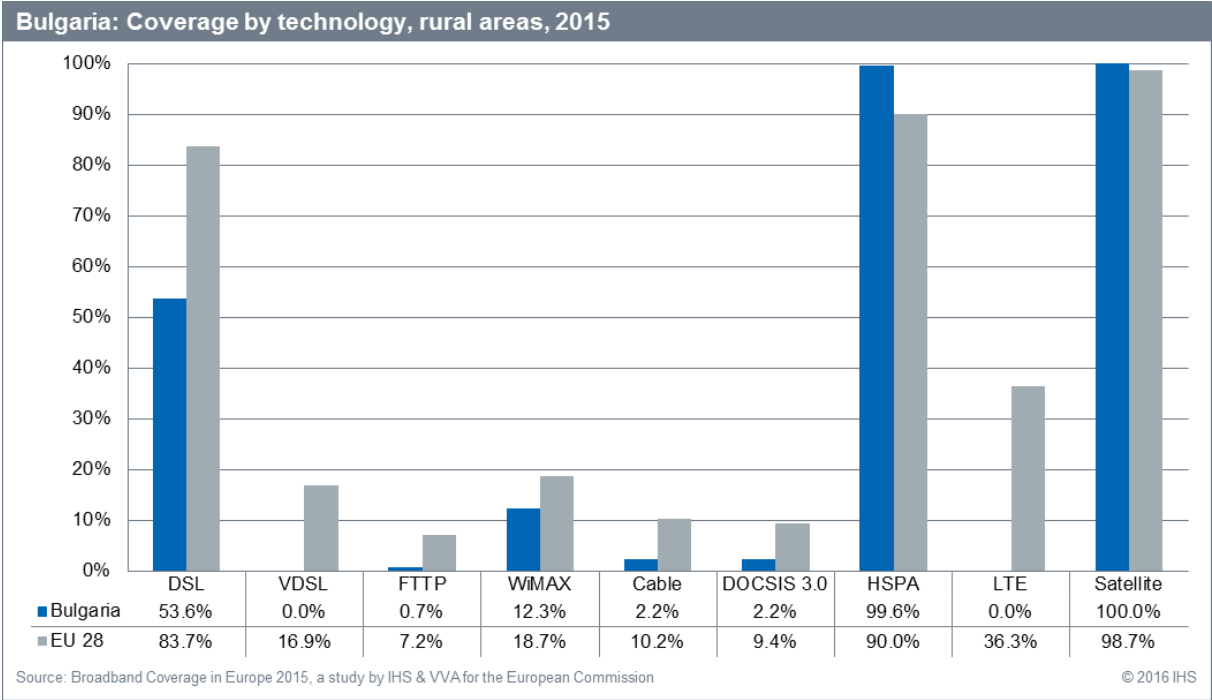
Broadband coverage in rural areas in mid-2015 remained limited compared to the other study countries. DSL was the most prevalent technology, with 53.6% rural coverage, followed by WiMAX, which covered 12.3% of rural households. In both cases, the coverage levels were unchanged compared to 2014.

Rural DOCSIS 3.0 and FTTP were the only NGA technologies available to rural households, although they covered 0.7% and 2.2% of households respectively. This represents a 0.5 and a 0.8 percentage point increase since the end of 2014.

As in the previous year, LTE was not available in rural areas, although Bulgaria did benefit from near-universal rural HSPA coverage, which increased by 1.7 percentage points in the first half of 2015 to reach 99.6% of rural households.

5.3.2 Regional coverage by broadband technology

Fixed broadband coverage in Bulgaria ranged between 85% and 100% across individual regions, with nine regions (Gabrovo, Silistra, Varna, Shumen, Burgas, Sliven, Sofia, Blagoevgrad, and Kardzhali) recording complete coverage.

Bulgaria: Overall fixed broadband coverage, 2015

- 0% - <75%
- 75% - <90%
- 90% - <95%
- 95% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS
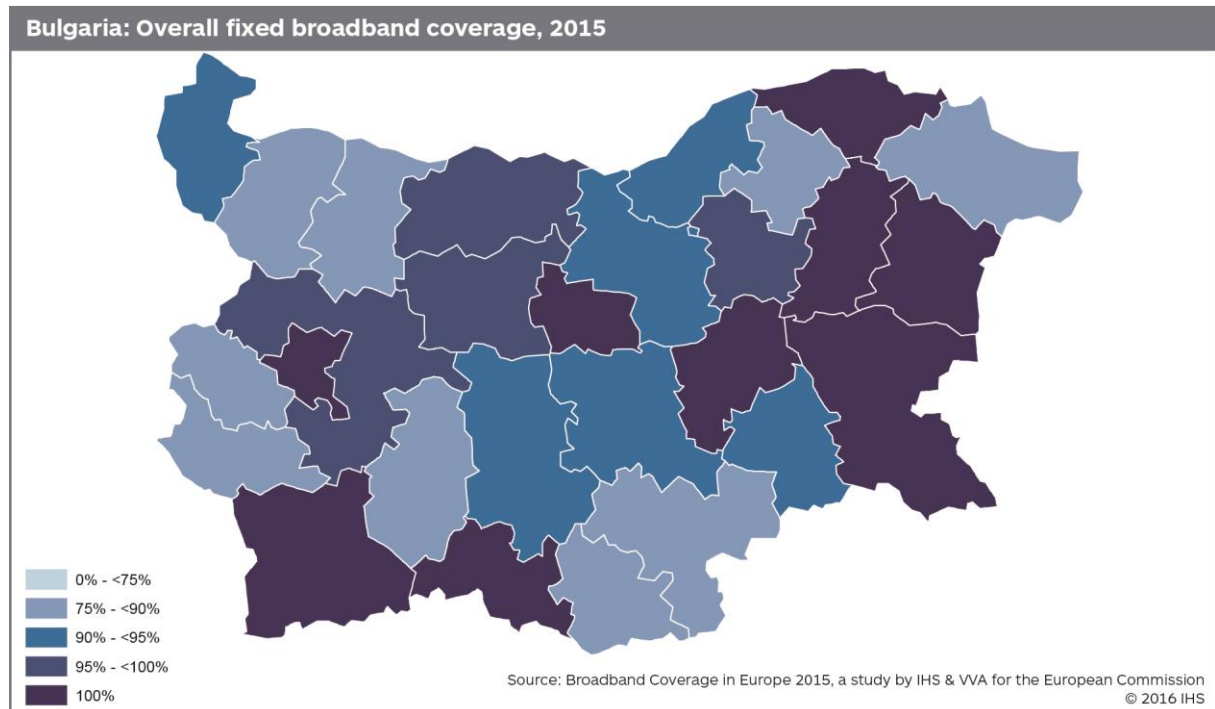
In mid-2015, NGA coverage in Bulgaria remained very varied, with coverage levels ranging from no coverage in Vidin to complete NGA coverage in the capital Sofia.

Bulgaria: NGA broadband coverage, 2015

- 0%
- >0% - <35%
- 35% - <65%
- 65% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
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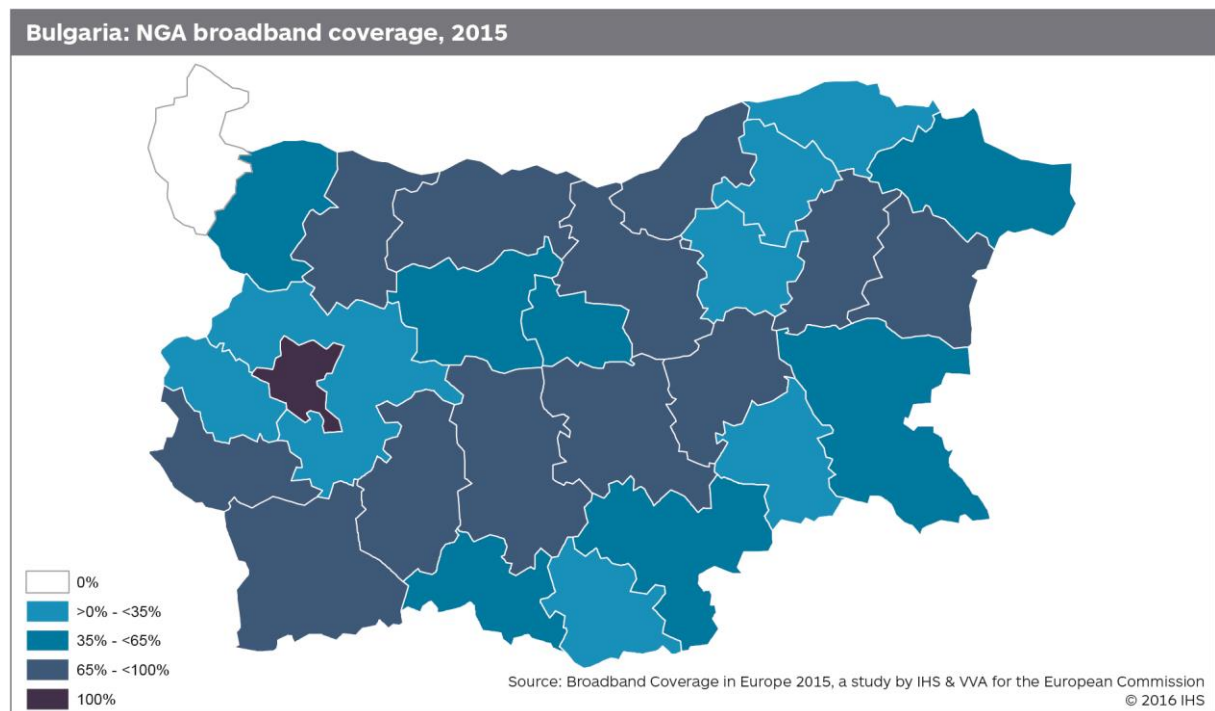
5.3.3 Regulatory and market overview

The "National Broadband Infrastructure Plan for Next Generation Access" constitutes the latest strategic document relevant to the development of broadband infrastructure and services in Bulgaria. Published in 2014, it sets out the strategic priorities for the period up to 2020 on the basis of the Digital Agenda goals. It distinguishes between "black" (two or more providers of NGA services), "grey" (at least one provider), and "white" (no providers) areas and sets out the following targets:

- Development of fixed broadband networks, in order to provide 100% broadband access with speeds exceeding 100 Mbps in black areas, 80% in grey areas, and 60% in white areas;
- Enabling optical fibre connectivity and broadband access with speeds of over 100 Mbps to at least 65% of households in black areas, 55% in grey areas and 34% in white areas;
- Enabling optical fibre connectivity and broadband access with speeds of over 100 Mbps for all business organizations in black, grey and white areas.[18]

Bulgarian broadband market is characterised by high fragmentation with a large number of smaller operators providing mostly fibre-based services on a local level. The incumbent, Vivacom (brand name of Bulgarian Telecommunications Company), is the main telecom operator in the Bulgarian market, offering DSL, FTTP and HSPA services. Its main competitor in the fixed broadband market is the largest cable operator, Blizoo, which has been acquired by Mobiltel, the Bulgarian subsidiary of Telekom Austria Group in 2015.[19] In April 2015 Blizoo announced a network upgrade using the DOCSIS 3.0 standard and increasing speeds to up to 200 Mbps.[20]

A number of alternative providers originally focused on different access technologies have also begun to invest in fibre networks rollout in recent years. These include a satellite and pay-TV operator, Bulsatcom, and mobile operator MTel (MobilTel) via its subsidiary, SpectrumNet.

Following the launch of LTE service by Max Telecom in May 2014, which constituted the first LTE offer in the country, Max Telecom continued to extend its network reaching approximately 50% of the urban population by mid-2015.[21] The operator also announced its future plans to discontinue its WiMAX offer and migrate the existing customers onto the LTE network in the course of 2016.[22] In the first half of 2015, Bulsatcom also began to offer LTE services[23] and Telenor Bulgaria was scheduled to launch commercial LTE offers over its own network by the end of the year.

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[18] https://www.mtitc.government.bg/upload/docs/2014-07/BG_NGA_PLAN_ENG.pdf

[19] http://www.telekomaustria.com/en/newsroom/2015-7-29-bulgarian-subsidiary-mobiltel-acquires-cable-operator-blizoo

[20] http://www.blizoo.bg/corp_news.html?single_news=25

[21] https://www.maxtelecom.bg/en/about/news/max-expands-along-the-black-sea-coast

[22] https://www.telegeography.com/products/commsupdate/articles/2015/11/03/max-to-discontinue-wimax-services-in-november/

[23] http://tv-novini.com/article_5184/plamen-genchev-4g-mrejata-na-bulsatkom-veche-ima-17-pokritie.html

5.3.4 Data tables for Bulgaria

Statistic	National
Population	7,202,198
Persons per household	2.4
Rural proportion	20.1%

Technology	Bulgaria 2015		Bulgaria 2014		Bulgaria 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	85.1%	53.6%	85.1%	53.6%	85.0%	53.5%	94.0%	83.7%
VDSL	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	41.0%	16.9%
FTTP	32.2%	0.7%	28.3%	0.2%	22.9%	0.2%	20.8%	7.2%
WiMAX	64.6%	12.3%	64.6%	12.3%	64.6%	12.3%	19.7%	18.7%
Cable	64.9%	2.2%	64.5%	1.4%	62.5%	0.0%	43.8%	10.2%
DOCSIS 3.0	62.9%	2.2%	61.4%	1.4%	57.7%	0.0%	43.1%	9.4%
HSPA	99.9%	99.6%	99.6%	97.9%	99.6%	98.5%	97.6%	90.0%
LTE	48.1%	0.0%	36.1%	0.0%	0.0%	0.0%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	100.0%	99.9%	99.9%	99.3%	99.8%	99.3%	99.8%	98.4%
Overall fixed broadband	95.2%	60.0%	95.1%	59.4%	92.5%	59.8%	97.4%	90.6%
NGA broadband	71.8%	2.7%	69.4%	1.4%	67.7%	0.2%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.4 Croatia

5.4.1 National coverage by broadband technology

In the first half of 2015, fixed broadband coverage in Croatia remained stable and at 96.9%, was slightly below the EU average. More progress has been made in terms of NGA coverage, which increased by 4.5 percentage points since December 2014 with 52.0% of Croatian household having access to high-speed broadband services at the end of June 2015. However, in rural areas NGA networks passed only 9.8% of rural homes, a figure considerably below the European average of 27.8%.
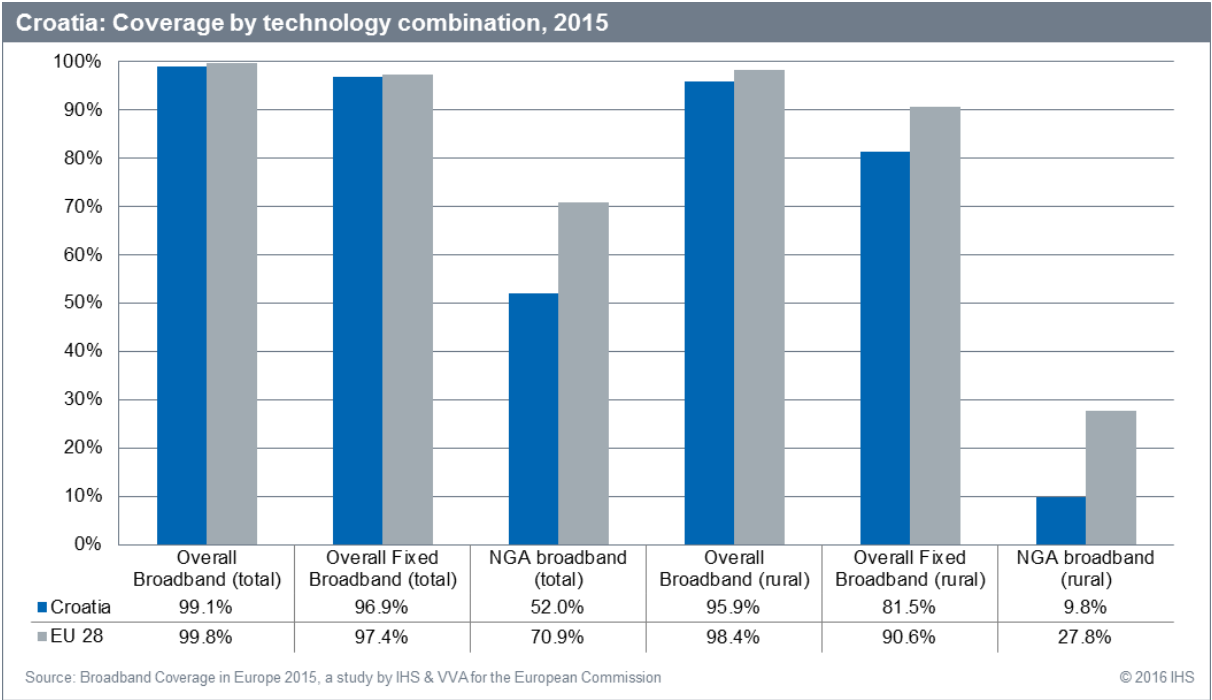
Croatia: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Croatia	99.1%	96.9%	52.0%	95.9%	81.5%	9.8%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

Looking at individual technologies, DSL was the dominant fixed broadband technology covering 94.7% of Croatian households by mid-2015.

Croatia: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Croatia	94.7%	35.9%	10.1%	2.0%	32.7%	23.0%	98.0%	68.9%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

Cable coverage increased by 1.7 percentage points in the first six months of 2015 reaching 32.7% of households, but remained lower than the EU average.

The overall increase in NGA coverage can be attributed primarily to increase in VDSL coverage, which grew by 4.5 percentage points making VDSL services were available to 35.9% of households across Croatia. As is 2014, it was mostly the continued incumbent, T-Hrvatski Telekom's network upgrades that accounted for the VDSL increase. The other two NGA technologies also recorded increases in their respective coverage levels, albeit at a smaller scale than VDSL. DOCSIS 3.0 networks passed 23.0% of Croatian homes, a 1.2 percentage point increase, while FTTP coverage grew by 1.3 percentage points reaching 10.1% of households at the end of June 2015.

During the first six months of 2015, Croatian mobile operators, such as T-Hrvatski Telekom and VIPNet, continued to roll-out their LTE networks (first launched in 2012) increasing total LTE coverage by 10.8 percentage points, reaching 68.9% of homes.

Croatia: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ Croatia	76.7%	0.0%	0.0%	3.2%	10.9%	9.8%	91.0%	10.7%	100.0%
■ EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%
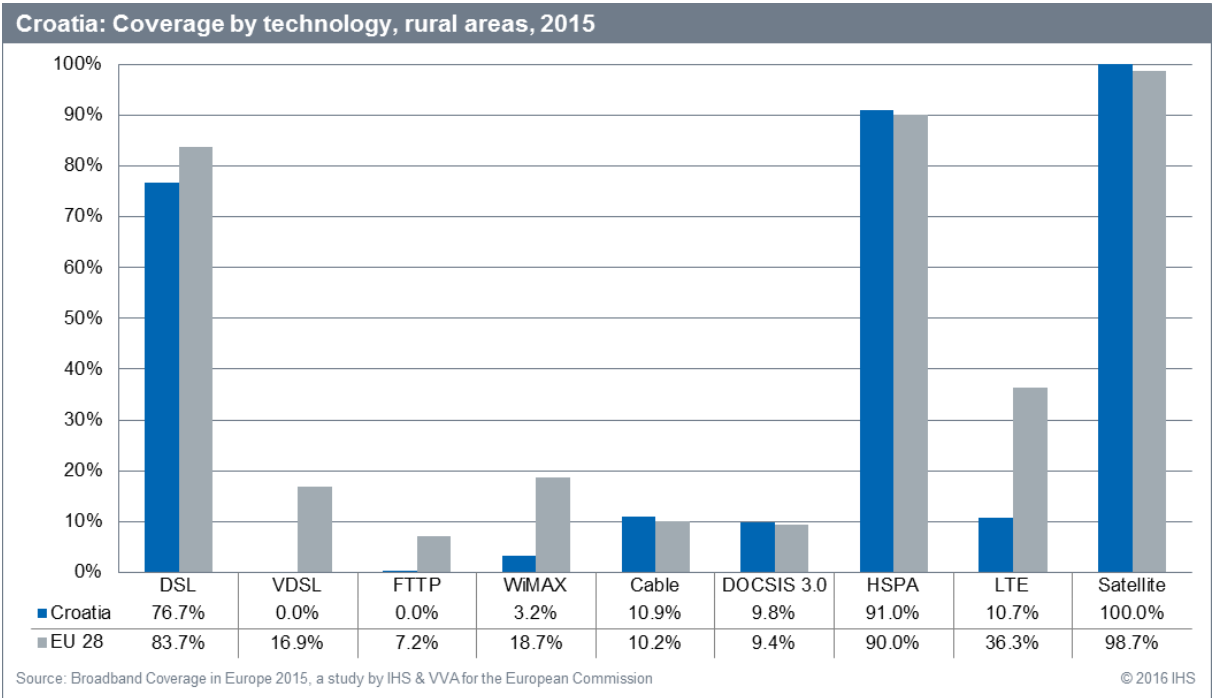
In rural areas, DSL continued to be the key broadband access technology with DSL network passing 76.7% of rural homes at the end of June 2015. Both standard cable and DOCSIS 3.0 rural coverage remained stable compared to 2014 and DOCSIS 3.0 continued to be the only NGA technology available in rural areas with 9.8% of rural homes being passed by DOCSIS 3.0 network.

Even though quite significant increase was recorded in total LTE coverage, this growth was mainly limited to urban areas and did not translate to any dramatic increase in rural LTE availability. Rural LTE coverage grew by 3.2 percentage points in the first six months of 2015 but LTE networks reached just 10.7% of rural households across Croatia.

5.4.2 Regional coverage by broadband technology

Looking at regional coverage patterns, all regions reported fixed broadband coverage levels exceeding 90% with the exception of the Krapinsko-zagorska region (79.8% coverage). In most regions, coverage increases were less than one percentage point, with the most substantial change reported in the Bjelovarsko-bilogorska region (2.4 percentage points).
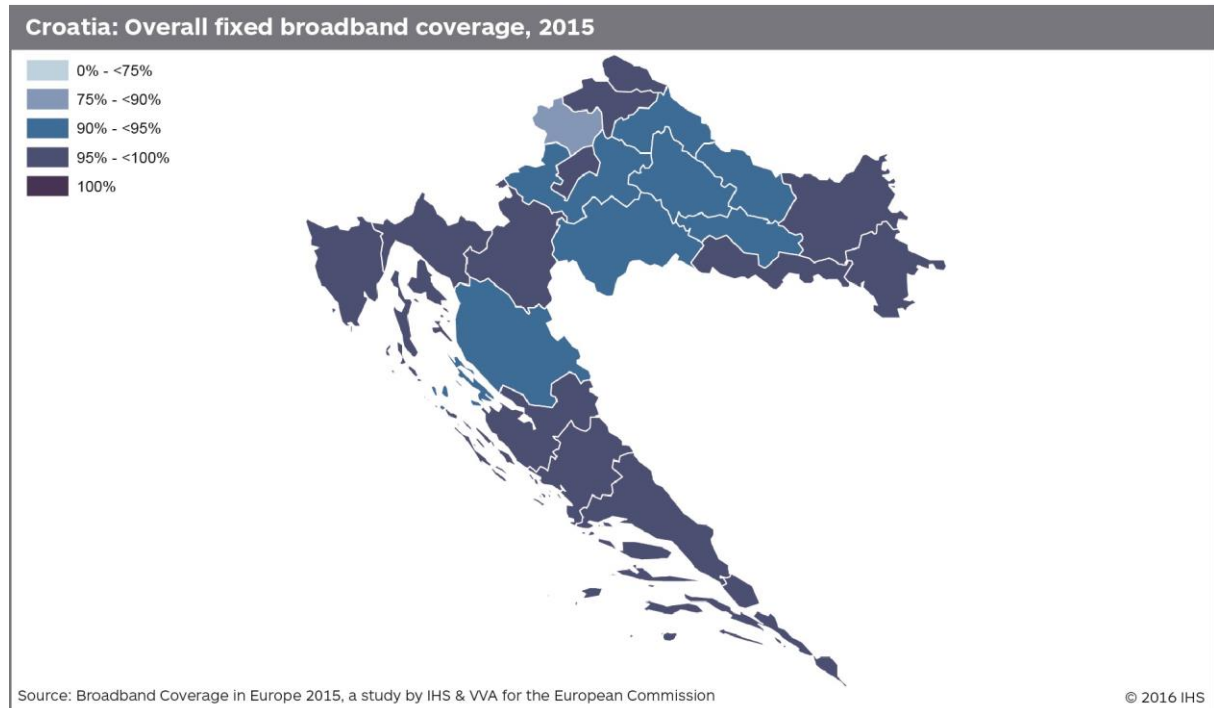
NGA coverage remained very varied, ranging from less than 20% in Krapinsko-zagorska region to over 80% in Zagreb. Some substantial increases were reported for NGA coverage, with coverage increases exceeding ten percentage points in three regions (Požeško-slavonska, Vukovarsko-srijemska and Licko-senjska zupanija).

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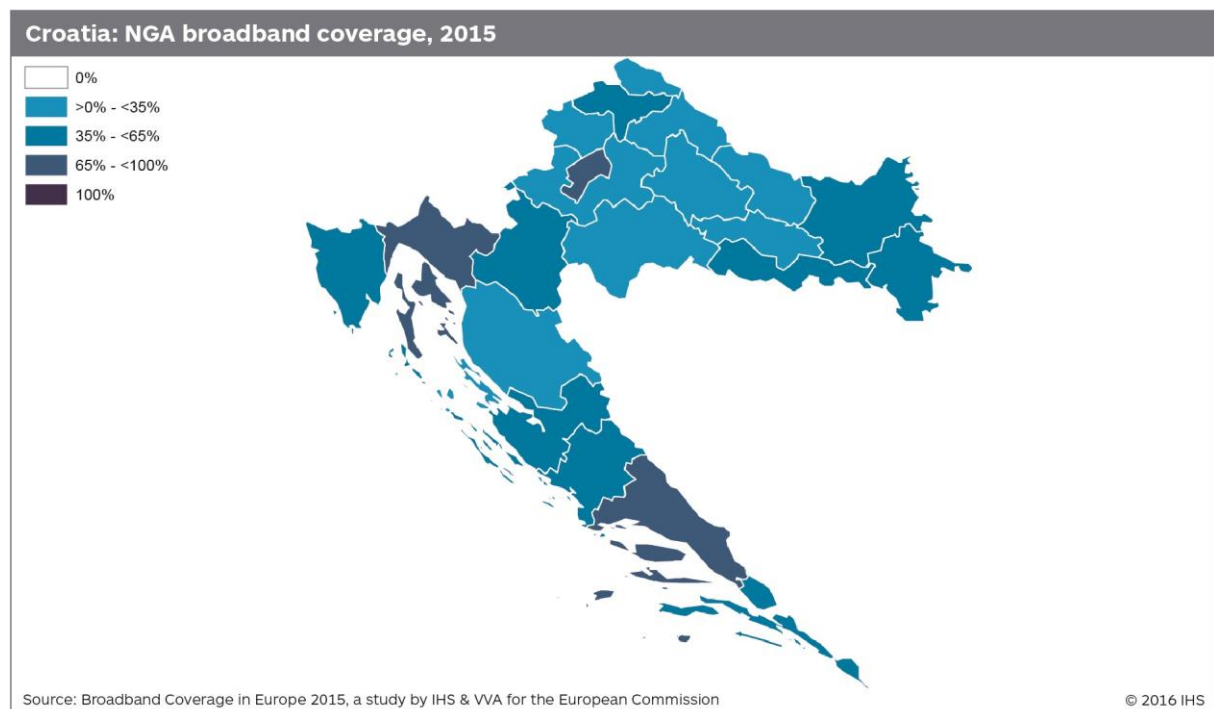
5.4.3 Regulatory and market overview

Croatia's national broadband plan, the "Strategy for Broadband Development in the Republic of Croatia 2012 – 2015" was published in 2011 and remains the key element of the digital policy framework in the country. It defines the main policies for the development of national broadband infrastructure.[24] Specific targets included in the plan were 75% fixed coverage via basic broadband (greater than 2 Mbps) by the end of 2013 and 35% fixed coverage via broadband faster than 30 Mbps by the end of 2015. In addition, 90% of the population was to have access to fixed or wireless broadband services (greater than 2 Mbps) by the end of 2013 and 50% of Croatians were to have fixed or wireless access via broadband faster than 30 Mbps by the end of 2015.

The Croatian broadband market is largely dominated by the incumbent, T-Hrvatski Telekom, which provides DSL, VDSL and FTTP services, and Vipnet, a cable operator. Other alternative providers operate mostly on local basis providing cable, FTTP and WiMAX services. In mid-2015, T-Hrvatski Telekom provided download speeds of up to 50 Mbps on its VDSL network and up to 200 Mbps on its FTTP network, while Vipnet was offering up to 120 Mbps cable broadband service.

At the beginning of 2015, the Croatian telecommunications regulator, HAKOM, mandated an increase of minimum allowed download speed for universal broadband service from 144kbps to 1 Mbps. This requirement means that from 2015 the universal provider, incumbent T-Hrvatski Telekom, needs to provide packages that meet such requirements.[25]

With regards to further LTE deployment, Tele2, the smallest of the three mobile network operators announced in 2015 that it plans to launch its own LTE network in the first quarter of 2016, thus joining T-Hrvatski Telekom and VIPNet as a provider of LTE in Croatia.[26] In addition, in February 2015 T-Hrvatski Telekom announced a doubling of maximum speeds on its LTE network from 75 Mbps to 150 Mbps utilizing a previous allocation (in December 2014) of additional spectrum in the 1800 MHz band.[27]

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[24] http://www.mppi.hr/UserDocsImages/w%20StrategyBB%205_12.pdf

[25] https://www.telegeography.com/products/commsupdate/articles/2014/12/22/t-ht-required-to-provide-minimum-1mbps-connection/

[26] https://www.telegeography.com/products/commsupdate/articles/2015/11/18/tele2-croatia-plans-lte-in-q1-2016/

[27] http://www.t.ht.hr/en/Press/press-releases/2132/HT-doubles-4G-network-speed.html

5.4.4 Data tables for Croatia

Statistic	National
Population	4,246,809
Persons per household	2.8
Rural proportion	22.6%

Technology	Croatia 2015		Croatia 2014		Croatia 2013		EU28 2015	
	Total	Rural	Total	Total	Total	Rural	Total	Rural
DSL	94.7%	76.7%	94.6%	76.1%	94.3%	74.3%	94.0%	83.7%
VDSL	35.9%	0.0%	*31.4%*	0.0%	16.8%	0.0%	41.0%	16.9%
FTTP	10.1%	0.0%	8.8%	0.0%	6.9%	0.0%	20.8%	7.2%
WiMAX	2.0%	3.2%	2.0%	3.2%	0.1%	0.2%	19.7%	18.7%
Cable	32.7%	10.9%	31.0%	10.2%	28.4%	4.6%	43.8%	10.2%
DOCSIS 3.0	23.0%	9.8%	21.8%	9.7%	19.0%	0.0%	43.1%	9.4%
HSPA	98.0%	91.0%	97.7%	89.9%	94.1%	69.9%	97.6%	90.0%
LTE	68.9%	10.7%	58.1%	7.5%	24.4%	5.3%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	99.1%	95.9%	99.0%	95.4%	97.6%	87.2%	99.8%	98.4%
Overall fixed broadband	96.9%	81.5%	96.6%	80.9%	97.1%	76.8%	97.4%	90.6%
NGA broadband	52.0%	9.8%	*47.5%*	10.2%	33.3%	0.0%	70.9%	27.8%

Note: Newly available data for 2015 suggested that the original 2014 data for VDSL coverage was overestimated. For this reason and upon a discussion with the NRA, the research team decided to restate the 2014 VDSL and NGA coverage figures (highlighted in italics).

The 2015 figures represent state of broadband coverage as of end of June 2015. Unless restated, the 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.
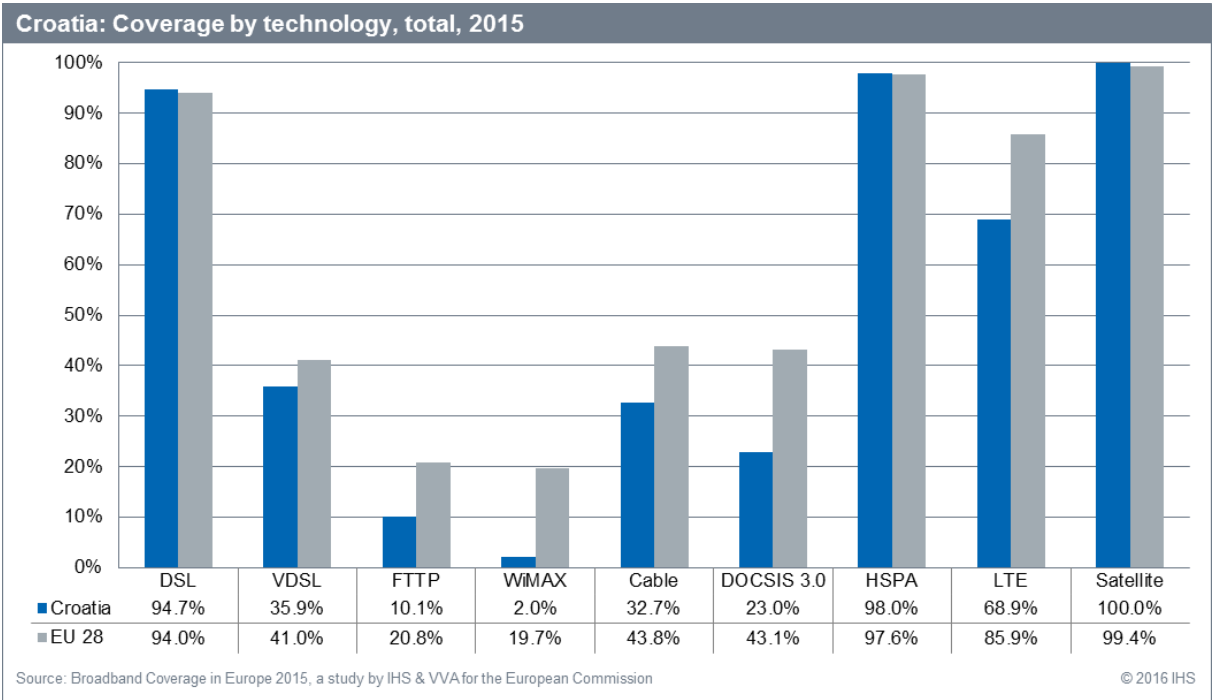
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5.5 Cyprus

5.5.1 National coverage by broadband technology

Cyprus achieved complete overall and fixed broadband coverage already in 2012, and further progress in terms broadband coverage can thus be recorded only for NGA technologies. In the first six months of 2015, total and rural NGA coverage increased by 3.9 and 5.6 percentage points, respectively, to reach 84% of total households and 56.6% of rural households. In both cases, NGA coverage in Cyprus exceeded the EU average.

Cyprus: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Cyprus	100.0%	100.0%	84.0%	100.0%	100.0%	56.6%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
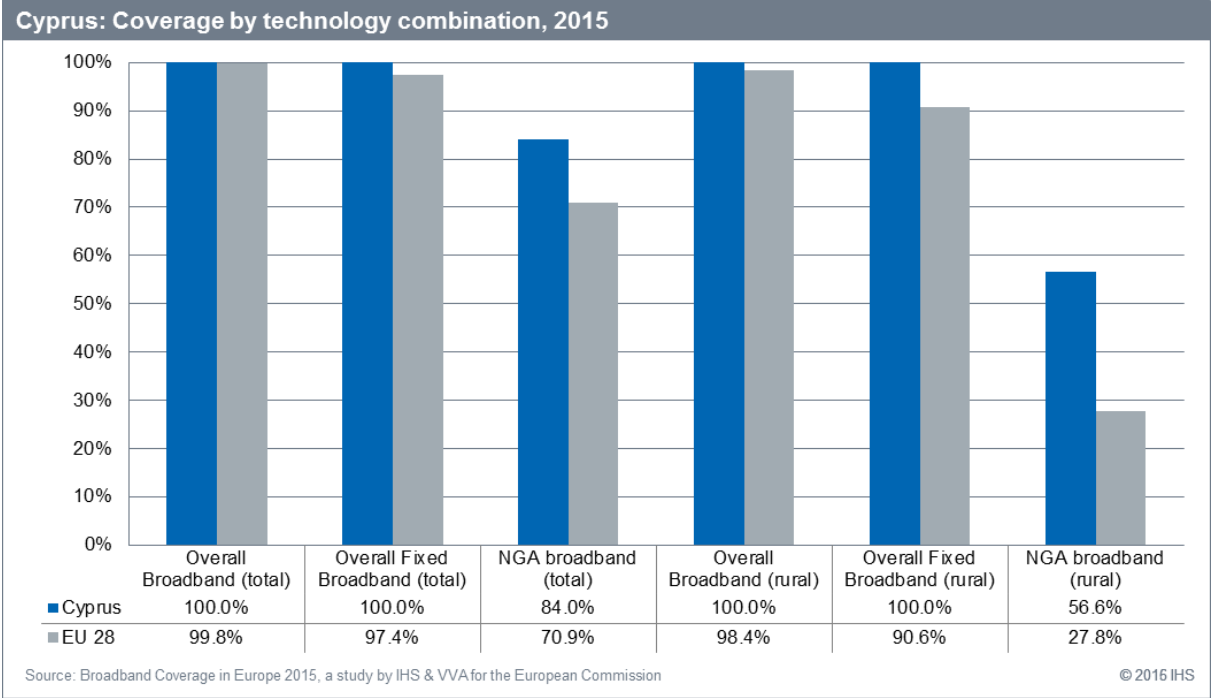
The universal fixed broadband coverage in Cyprus can be attributed to complete DSL availability, although Cyprus also reported above-average cable coverage levels.

Cyprus: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Cyprus	100.0%	68.0%	49.3%	0.0%	57.5%	57.5%	99.0%	60.2%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

VDSL was the key NGA technology, with coverage increasing by 7.8 percentage points to 68%, reflecting continued investments by the incumbent CYTA in its network upgrade. VDSL was followed by DOCSIS 3.0, which passed 57.5% of homes, while FTTP services were available to nearly a half (49.3%) of Cypriot households.

LTE was the only technology (with the exception of WiMAX, which is not present in the country) where Cyprus performed worse than the EU average. The first LTE services were only launched in March 2015 by two mobile operators MTN and PrimeTel. Yet due to an extensive roll-out, LTE networks passed 60.2% of homes by the end of June 2015 meaning that Cyprus was no longer the worst performer in the EU in terms of LTE.

Cyprus: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Cyprus	100.0%	56.6%	0.0%	0.0%	0.0%	0.0%	99.0%	0.0%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
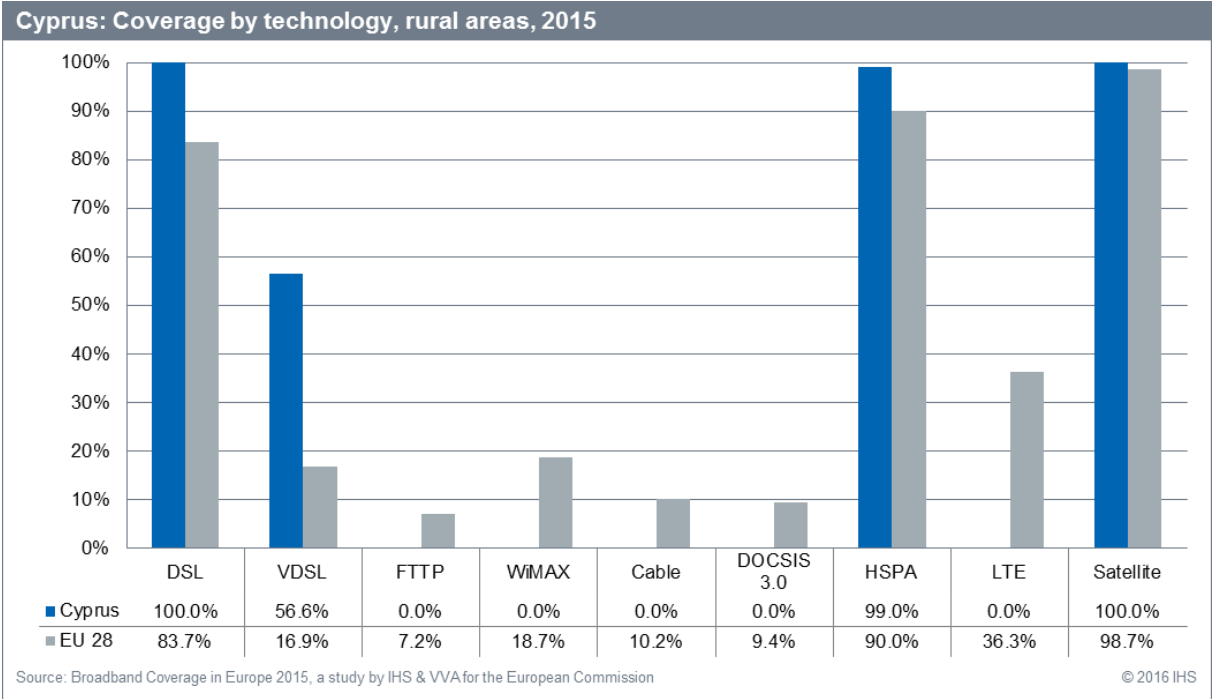
DSL was the only fixed broadband technology available to rural households in Cyprus providing complete rural coverage. Given that neither FTTP nor DOCSIS 3.0 networks were present in rural areas, VDSL was the only NGA access technology available to rural households. Yet, rural VDSL coverage increased by 5.6 percentage points and reached 56.6% of rural households in the first six months of 2015.

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5.5.2 Regional coverage by broadband technology[28]

Cyprus: Overall fixed broadband coverage, 2015

0% - <75%
75% - <90%
90% - <95%
95% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS

Cyprus: NGA broadband coverage, 2015

0%
>0% - <35%
35% - <65%
65% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS

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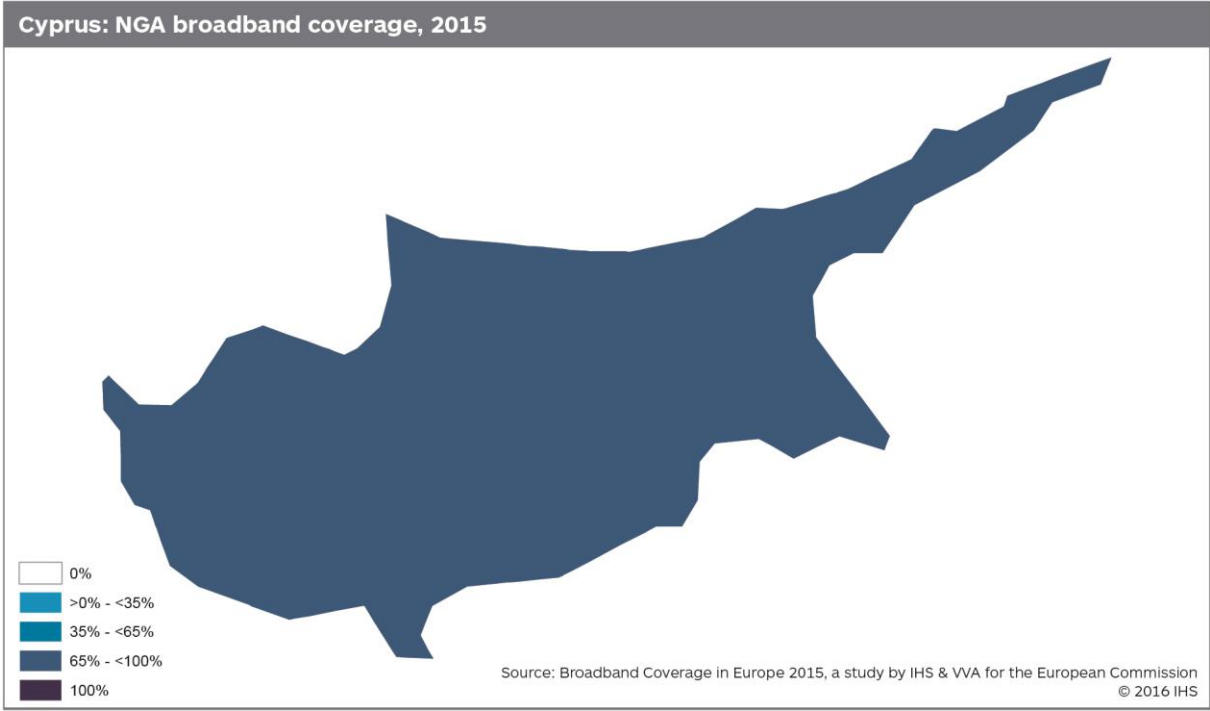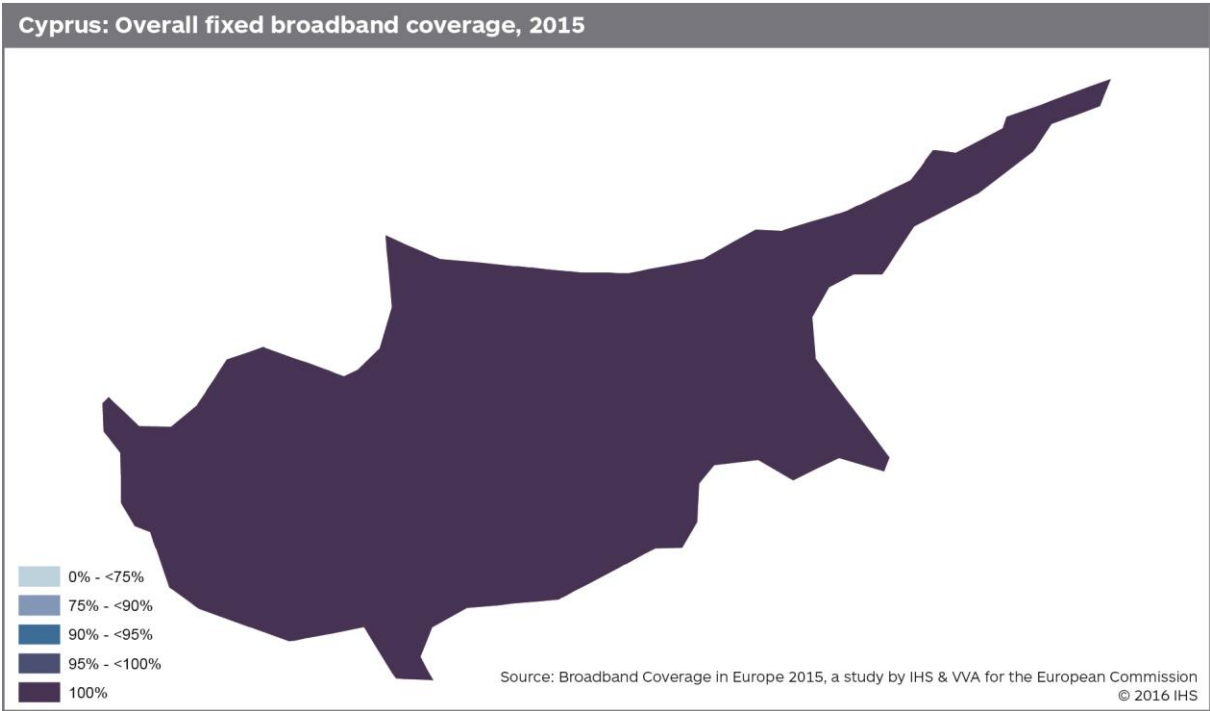
[28] Please note that even though the map depicts the area of the whole island, the data on broadband coverage concern only the areas under the effective control of the Republic of Cyprus.

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5.5.3 Regulatory and market overview

The "Digital Strategy for Cyprus" was published in 2012 and remains the key strategic document setting out goals of the country's broadband policy until 2020. The main objectives of the strategy follow the EU-wide targets, and include ensuring that all households and businesses have access to the Internet with at least 30 Mbps download speeds by 2020, and that by the same time 50% of households and businesses have access to 100 Mbps speeds.

Since Cyprus achieved complete coverage of basic fixed broadband, the key market developments relate to NGA technologies and continued LTE roll out. The state-owned incumbent CYTA, which has been rolling out VDSL services since 2011, has been undertaking a network modernisation programme in 2015, which included improving broadband speeds to up to 50 Mbps download speeds (compared to up to 32 Mbps available in 2014).[29] On top of its DSL network upgrades, CYTA, has also invested in FTTP network deployment in recent years. An alternative telco, MTN, also owns its own FTTP network.

CYTA's main competitor, cable operator, Cablenet has also invested extensively in deployment of its fully DOCSIS 3.0 capable network. Cablenet increased its speeds from up to 100 Mbps to 120 Mbps on its premium triple-play package.[30]

In March 2015, MTN and PrimeTel launched the first LTE networks in Cyprus.[31] CYTA shortly followed with an announcement of its own plans to deploy a nation-wide LTE network and by the end of the year all cities across Cyprus were covered by CYTA's network.[32]

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[29] https://www.telegeography.com/products/commsupdate/articles/2015/10/19/cyta-nearing-completion-of-network-modernisation-project/
[30] http://cablenet.com.cy/home-services-2/cable-triple-play/3play-premium-120m/
[31] http://in-cyprus.com/mtn-primetel-launch-4g-networks/
[32] https://www.cyta.com.cy/network-reliability/en

5.5.4 Data tables for Cyprus

Statistic	National
Population	858,000
Persons per household	2.8
Rural proportion	11.4%

Technology	Cyprus 2015		Cyprus 2014		Cyprus 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	94.0%	83.7%
VDSL	68.0%	56.6%	60.2%	51.0%	54.0%	45.0%	41.0%	16.9%
FTTP	49.3%	0.0%	48.8%	0.0%	48.7%	0.0%	20.8%	7.2%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.7%	18.7%
Cable	57.5%	0.0%	56.3%	0.0%	46.2%	0.0%	43.8%	10.2%
DOCSIS 3.0	57.5%	0.0%	56.3%	0.0%	46.2%	0.0%	43.1%	9.4%
HSPA	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	97.6%	90.0%
LTE	60.2%	0.0%	0.0%	0.0%	0.0%	0.0%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.8%	98.4%
Overall fixed broadband	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	97.4%	90.6%
NGA broadband	84.0%	56.6%	80.1%	51.0%	77.0%	45.0%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.
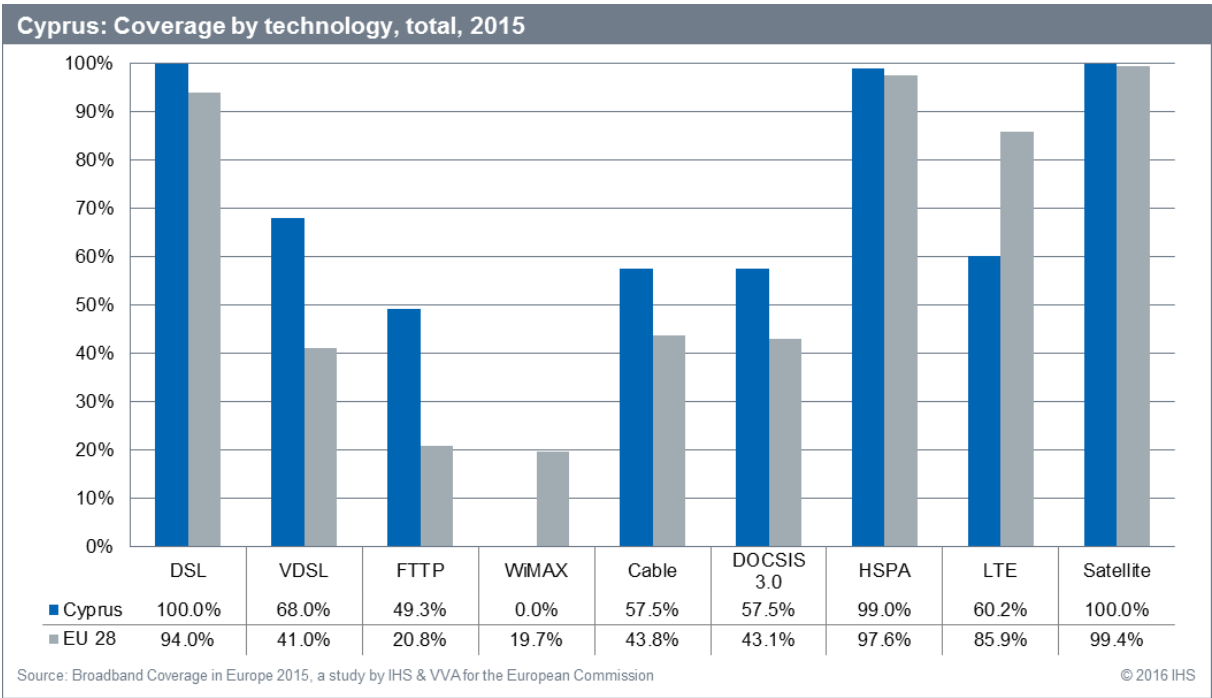
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5.6 Czech Republic

5.6.1 National coverage by broadband technology

As of mid-2015, 98.5% of Czech homes were passed by at least one fixed broadband technology, the same coverage level as recorded in the previous year and slightly above the EU average of 97.4%. In rural areas, 9 in 10 (90.2%) rural households had access to fixed broadband services. The most significant progress was made with regards to NGA technologies, with 72.9% of households being able to connect to high-speed broadband at the end of June 2015, a 5.5 percentage point increase compared to 2014. While total NGA coverage exceeded the EU average by two percentage points, progress in availability of NGA services in rural areas remained limited. With only 5.7% of rural homes passed by NGA networks in mid-2015, Czech rural NGA coverage continued to be well below the EU average of 27.8% and one of the lowest among the study countries.

Czech Republic: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Czech Rep	99.2%	98.5%	72.9%	94.2%	90.2%	5.7%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
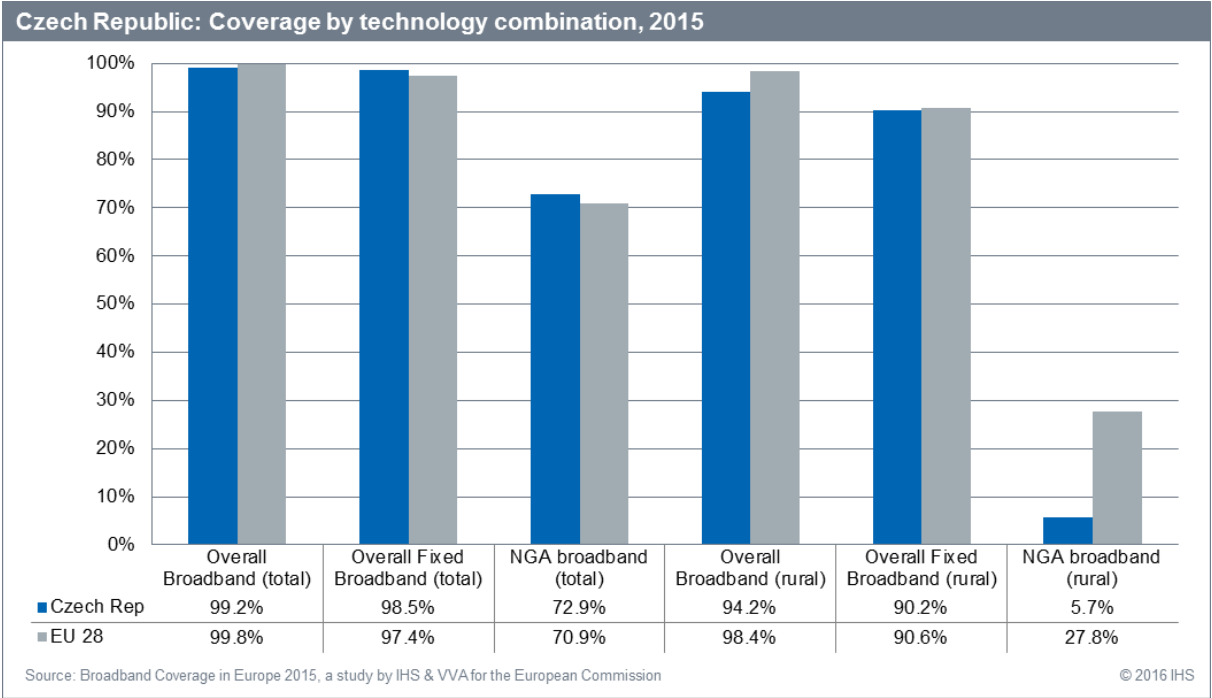
DSL and WiMAX were the two dominant fixed broadband technologies in the Czech Republic, with coverage levels remaining unchanged in mid-2015 at 97% and 70.6%, respectively. The Czech broadband market is characterised by a large number of small local WiMAX providers, which is reflected in the relatively high total WiMAX coverage figure based on the combined coverage offered by these providers.

Cable coverage also remained at its 2014 level with cable broadband services being available to a third (33.7%) of Czech households. As cable companies have traditionally limited their presence to big cities across the Czech Republic, vast majority of the households covered by cable networks were located in urban areas.

The most significant developments were recorded in terms of NGA coverage. Due to continued roll-out of VDSL by the incumbent, O2, VDSL coverage increased by 6.3 percentage points in the first six months of 2015 reaching more than a half (52.0%) of Czech households. Cable companies, such as UPC or Nej.cz, also continued with improvement works on their networks resulting in a near complete upgrade of all cable networks in the Czech Republic to the DOCSIS 3.0 standard and a total of 33.3% of households having access to high-speed cable broadband services. Further increases were also recorded for

FTTP coverage, with FTTP services being available to 17.3% of Czech households, a 3.4 percentage point growth compared to the end of 2014.

Following a dramatic increase in LTE coverage in 2014 (the highest out of all study countries), the pace of LTE roll-out slowed down with LTE coverage growing by only 1.8 percentage points. Nevertheless, with 93.8% of homes passed by at least one LTE network in mid-2015, the Czech Republic outperformed the EU average of 85.9%.

Czech Republic: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Czech Rep	97.0%	52.0%	17.3%	70.6%	33.7%	33.3%	97.0%	93.8%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
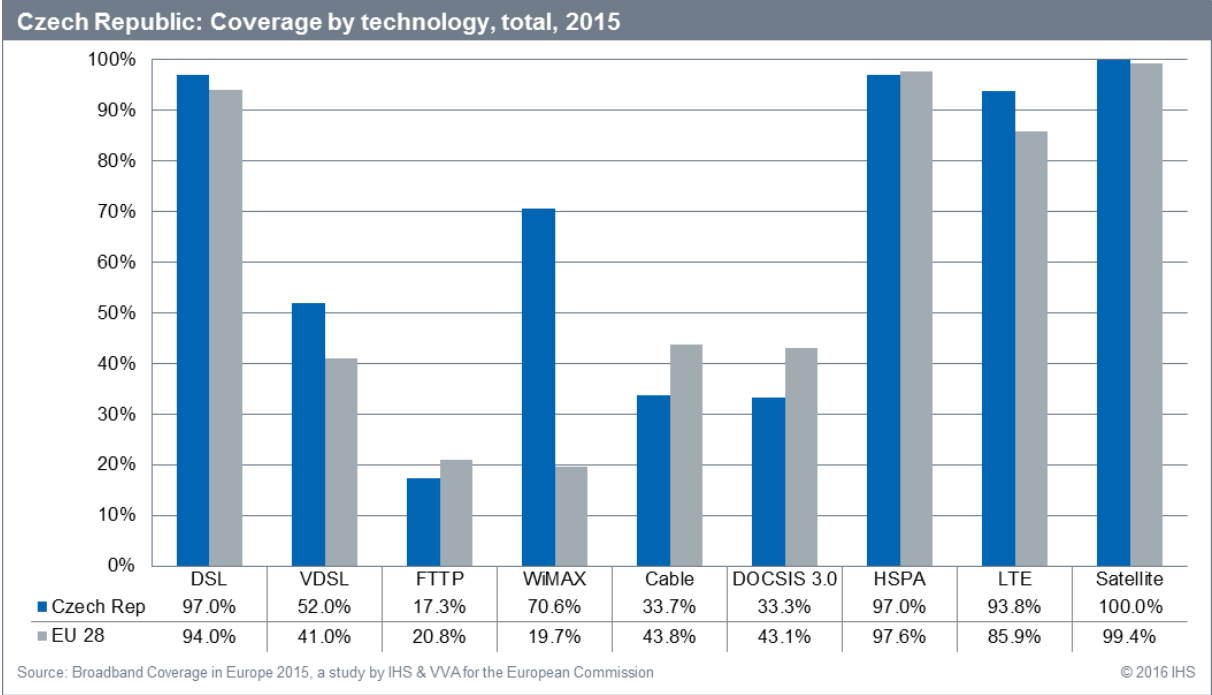
In rural areas, biggest coverage increase was recorded for LTE technology, which grew by 12.9 percentage points and at the end of June 2015, LTE services were available to 56.1% rural households across the Czech Republic. With VDSL upgrades focused on urban areas and cable networks being also mostly limited to cities, FTTP was the most prevalent NGA technology, although it was available to only 5.2% of rural households.

Czech Republic: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Czech Rep	80.6%	0.0%	5.2%	69.9%	1.5%	0.6%	79.0%	56.1%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
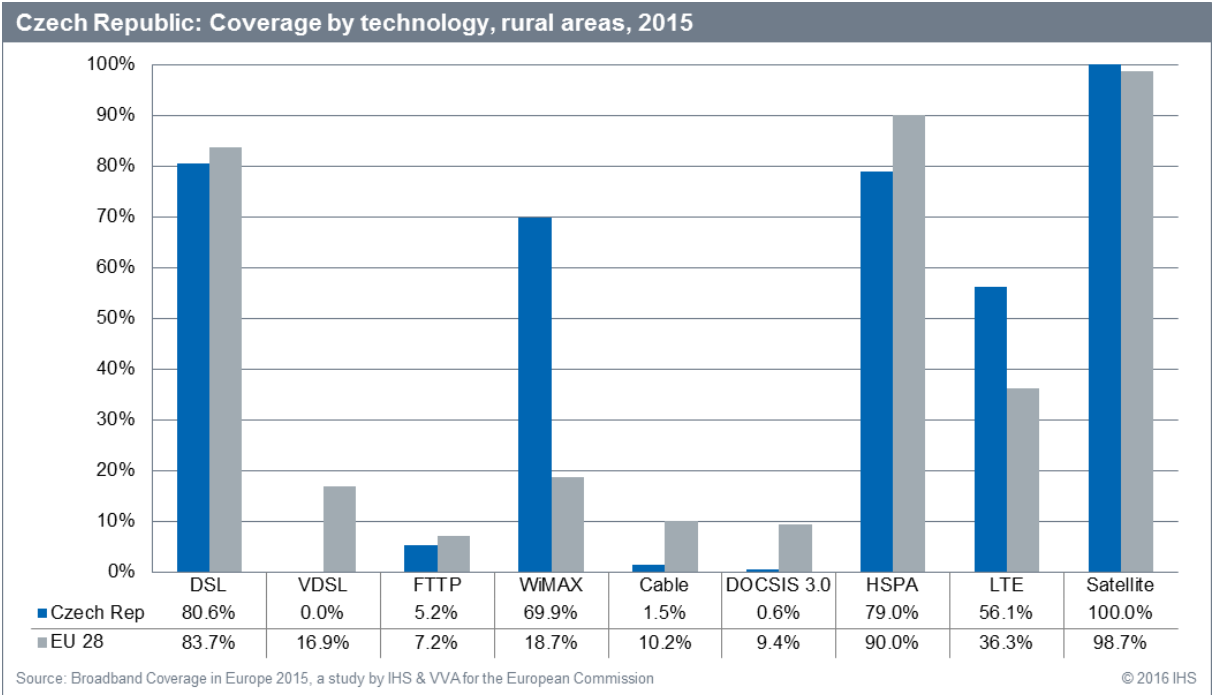
5.6.2 Regional coverage by broadband technology

Fixed broadband coverage levels in all regions exceeded 97% although no region reported compete coverage. No significant fixed broadband coverage changes were reported in any of the regions.

Czech Republic: Overall fixed broadband coverage, 2015

Legend:
- 0% - <75%
- 75% - <90%
- 90% - <95%
- 95% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS
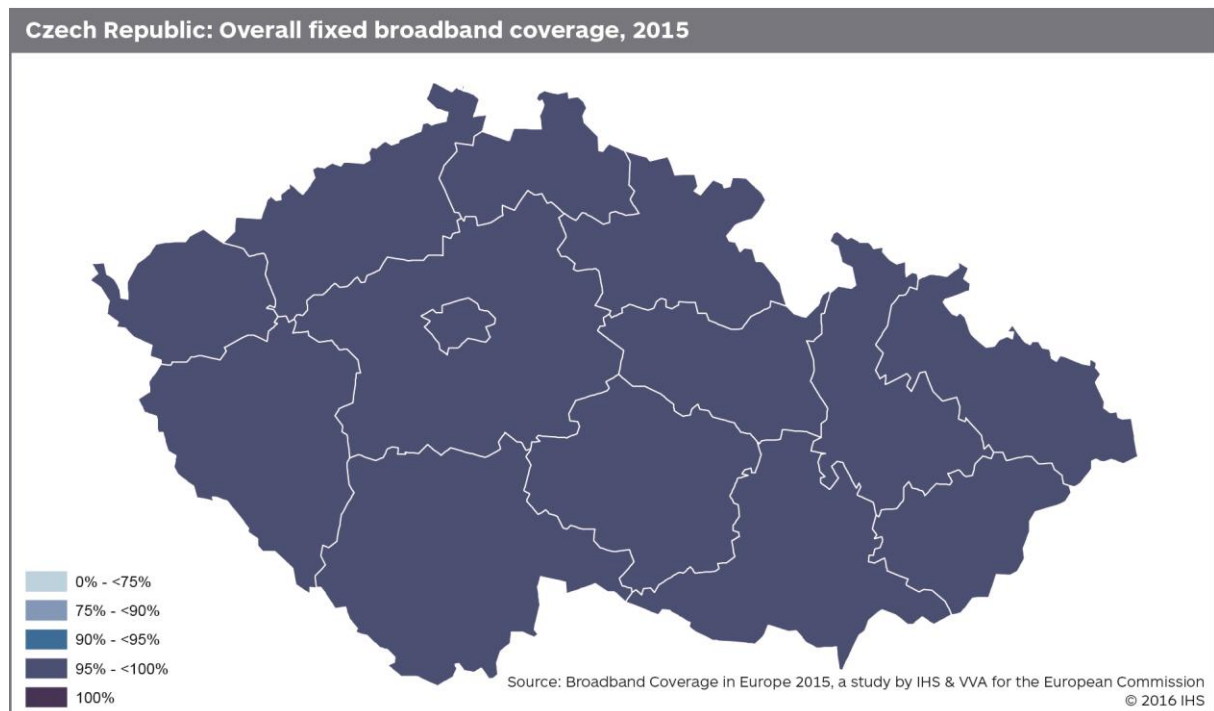
NGA coverage ranged from less than 60% in Pardubický kraj to nearly 90% in the capital, Prague, with the majority of regions reporting an increase in NGA coverage of at least five percentage points.

Czech Republic: NGA broadband coverage, 2015

Legend:
- 0%
- >0% - <35%
- 35% - <65%
- 65% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS
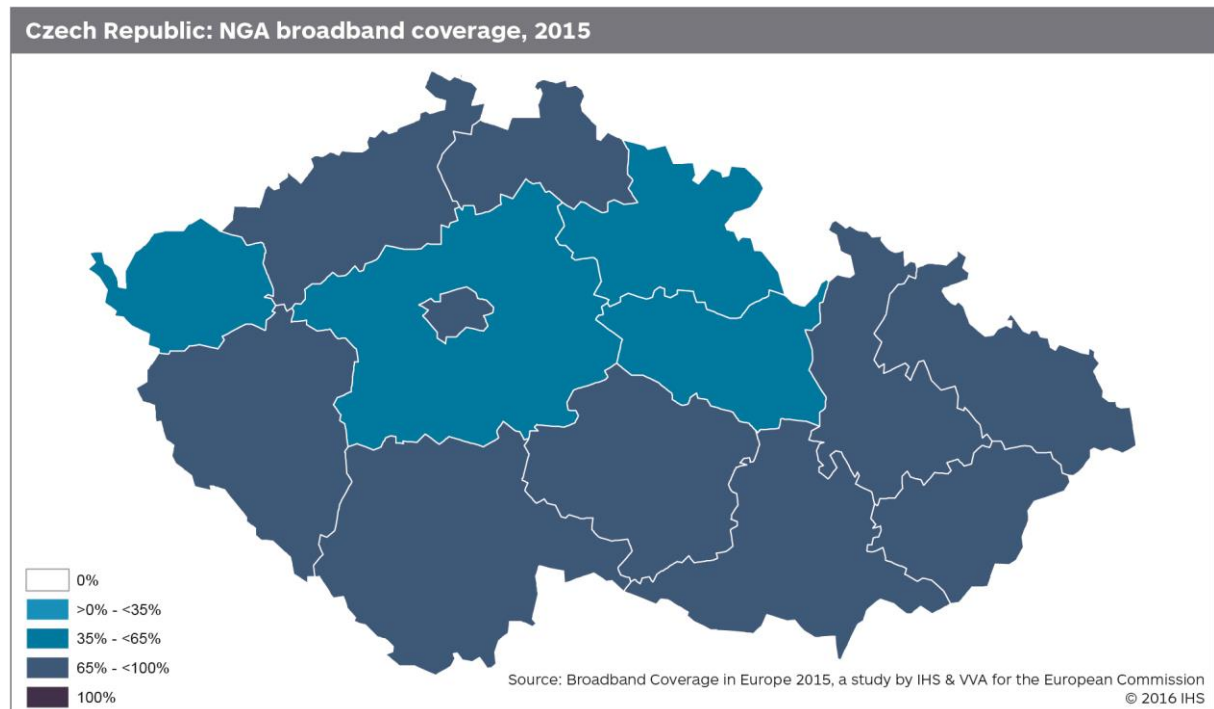
5.6.3 Regulatory and market overview

The Czech Republic's national broadband strategy "Digital Czech Republic 2.0" announced in 2013 and valid until 2020 remains the key strategic policy document for broadband development in the country. The strategy's main goals are generally in line with the Digital Agenda's targets of universal 30 Mbps coverage and 100 Mbps coverage of 50% of households by 2020.

In June 2015, PPF Group finalised the division of the incumbent operator, O2 Czech Republic. In order to ease regulatory oversight and improve O2's competitiveness in the retail market, the company's infrastructure assets were spun off into a separate company, CETIN. This unprecedented move made the previously Telefonica-owned O2 Czech Republic the first incumbent ever to voluntarily become a retail service-only company. The newly established CETIN retained the incumbent's fixed-line network, fibre backbone, mobile towers and mobile radio equipment as well as data centres, while the legacy O2 was transformed into a publicly-listed retail fixed and mobile operator offering voice, data and TV services.

Following the division, CETIN announced a seven-year plan to invest approx. EUR 814 million in both fixed and mobile network development, including a particularly considerable investment in VDSL technologies and vectoring,[33]

Yet in terms of the Czech broadband market, competition remained concentrated mainly between O2's DSL and VDSL offering and the cable operators led by Liberty Global-backed UPC. WiMAX and FTTP network operators are active on localised bases in areas, where O2/CETIN or cable operators either are not present or their services lack consistent quality and local providers are able to offer better and/or cheaper services.[34]

Despite more limited progress in terms of LTE deployment in the first half of 2015, further investments have been announced by leading mobile operators. T-Mobile made a number of steps to upgrade its offer including trials of 400G data transmission.[35] Similarly, Vodafone trialled a tri-band carrier aggregation protocol in the summer of 2015.[36] O2/CETIN also made further steps to increase LTE coverage and in June 2015 launched Air Internet, an LTE-based service aiming to provide high-speed broadband connections to households without access to reliable fixed networks.[37]

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[33] https://www.cetin.cz/tiskove-centrum/-/asset_publisher/7E0pI2f3p5ci/content/cetin-investuje-22-miliard-korun-do-rozvoje-siti

[34] http://www.internetprovsechny.cz/stav-broadbandu-v-cr-aneb-zaostreno-na-optiku/

[35] https://www.telegeography.com/products/commsupdate/articles/2015/05/27/t-mobile-alca-lu-complete-400g-data-transmission-trials/

[36] http://www.vodafone.cz/en/about-vodafone/press-releases/message-detail/vodafone-v-ceske-republice-testuje-rychlejsi-lte/

[37] https://www.telegeography.com/products/commsupdate/articles/2015/06/23/o2-czech-launches-air-internet-with-92-household-coverage/

5.6.4 Data tables for Czech Republic

Statistic	National
Population	10,512,419
Persons per household	2.4
Rural proportion	14.3%

Technology	Czech Rep. 2015		Czech Rep. 2014		Czech Rep. 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	97.0%	80.6%	97.0%	*80.7%*	97.0%	*82.3%*	94.0%	83.7%
VDSL	52.0%	0.0%	45.7%	*0.0%*	41.0%	*2.5%*	41.0%	16.9%
FTTP	17.3%	5.2%	13.9%	*4.0%*	13.4%	*2.5%*	20.8%	7.2%
WiMAX	70.6%	69.9%	70.6%	*70.0%*	70.6%	*70.6%*	19.7%	18.7%
Cable	33.7%	1.5%	33.4%	*1.4%*	33.0%	*1.8%*	43.8%	10.2%
DOCSIS 3.0	33.3%	0.6%	31.9%	*0.6%*	31.5%	*0.5%*	43.1%	9.4%
HSPA	97.0%	79.0%	97.0%	*79.0%*	94.9%	*55.0%*	97.6%	90.0%
LTE	93.8%	56.1%	91.9%	*43.2%*	12.0%	*0.0%*	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	*100.0%*	100.0%	*100.0%*	99.4%	98.7%
Overall broadband	99.2%	94.2%	99.2%	*94.2%*	98.9%	*91.2%*	99.8%	98.4%
Overall fixed broadband	98.5%	90.2%	98.5%	*90.2%*	98.5%	*91.2%*	97.4%	90.6%
NGA broadband	72.9%	5.7%	67.3%	*4.5%*	63.7%	*4.0%*	70.9%	27.8%

Note: During the 2015 data collection, an improved methodology for capturing rural data led to the restatement of the 2013 and 2014 rural coverage figures (highlighted in italics).

The 2015 figures represent state of broadband coverage as of end of June 2015. Unless restated, the 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.7 Denmark

5.7.1 National coverage by broadband technology

While the overall broadband coverage in Denmark was slightly below the EU average (99.5% compared to 99.8%), the country was a strong performer in all other combination categories, with fixed and NGA coverage exceeding the respective EU averages at both national and rural level. During the first half of 2015, the coverage levels for all combination categories remained generally unchanged with the exception of rural NGA combination category, which grew by a percentage point reaching 54.7% of rural households.

Denmark: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Denmark	99.5%	99.0%	91.7%	99.5%	97.0%	54.7%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
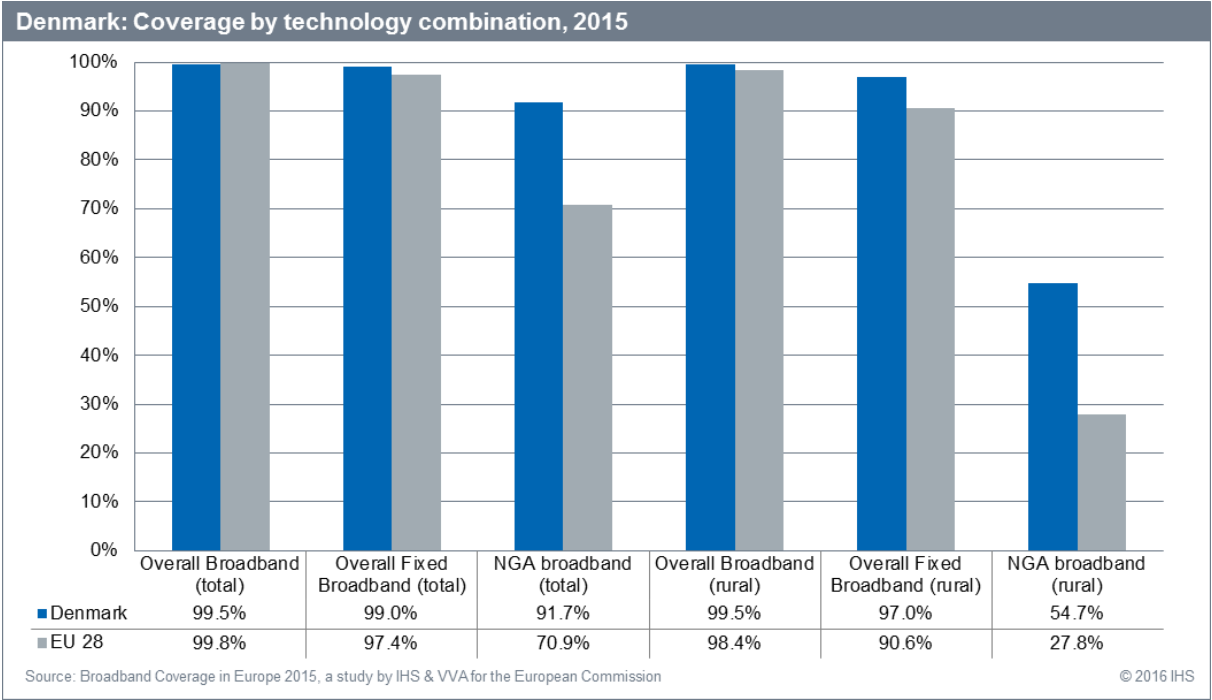
Looking at the individual fixed broadband technologies, DSL was the dominant fixed broadband technology available to 98.2% of households. All other technologies (apart from WiMAX) recorded strong coverage and outperformed the EU average coverage levels.

At the end of June 2015, VDSL services were available to 63.0% of Danish households while FTTP networks passed 57% of homes, a 5.4 percentage point increase compared to December 2014. Cable networks (fully upgraded to DOCSIS 3.0) covered 65.0% of households and registered a 1.9 percentage point increase. However, the fact that total NGA coverage did not increase overall suggests that in both cases the coverage increases related to regions already covered by other NGA technologies.

While Denmark did not experience a further increase in LTE coverage, at 99.0% it already reached a level of LTE coverage that considerably exceeded the EU average. This reflects Denmark's role as an early adopter of LTE, with the first commercial network launched already in 2010.

Denmark: Coverage by technology, total, 2015
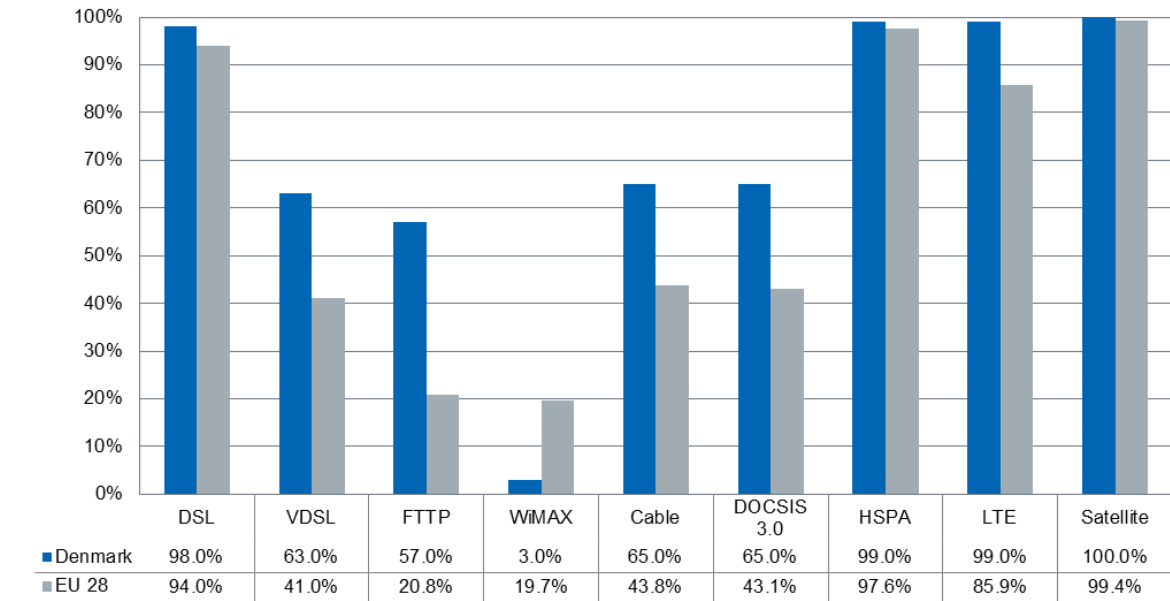
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ Denmark	98.0%	63.0%	57.0%	3.0%	65.0%	65.0%	99.0%	99.0%	100.0%
■ EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

DSL was the key fixed broadband technology in rural areas, passing 94.0% of rural households. However, only a relatively small proportion of the existing rural DSL infrastructure has been upgraded to VDSL and only 16.0% of rural households had access to VDSL services. Instead, FTTP remained the key NGA technology in rural areas, with 46.0% of rural homes passed by FTTP networks at the end of June 2015, a 4.0 percentage point increase.

With rural LTE coverage reaching 99.0% of rural households, Denmark remained the leading country in terms of rural LTE access.

Denmark: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ Denmark	94.0%	16.0%	46.0%	4.0%	6.0%	6.0%	99.0%	99.0%	100.0%
■ EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

5.7.2 Regional coverage by broadband technology

All regions in Denmark reached similarly high fixed broadband coverage levels with more than 98% of households having access to at least one fixed broadband service in each reagion.
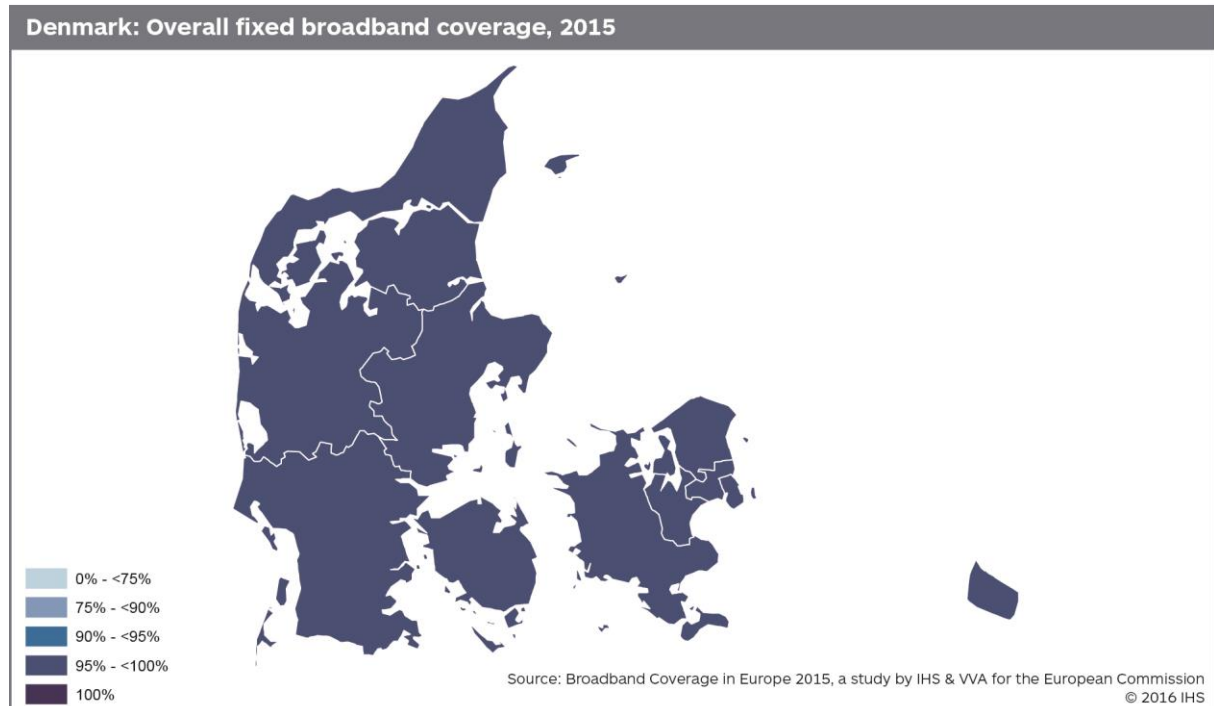
Regional NGA coverage was more varied with two regions (Fyn and Vest-og Sydsjælland in central Denmark) recording NGA coverage around 82% of households and nearly all homes were passed by NGA networks in Copenhagen.

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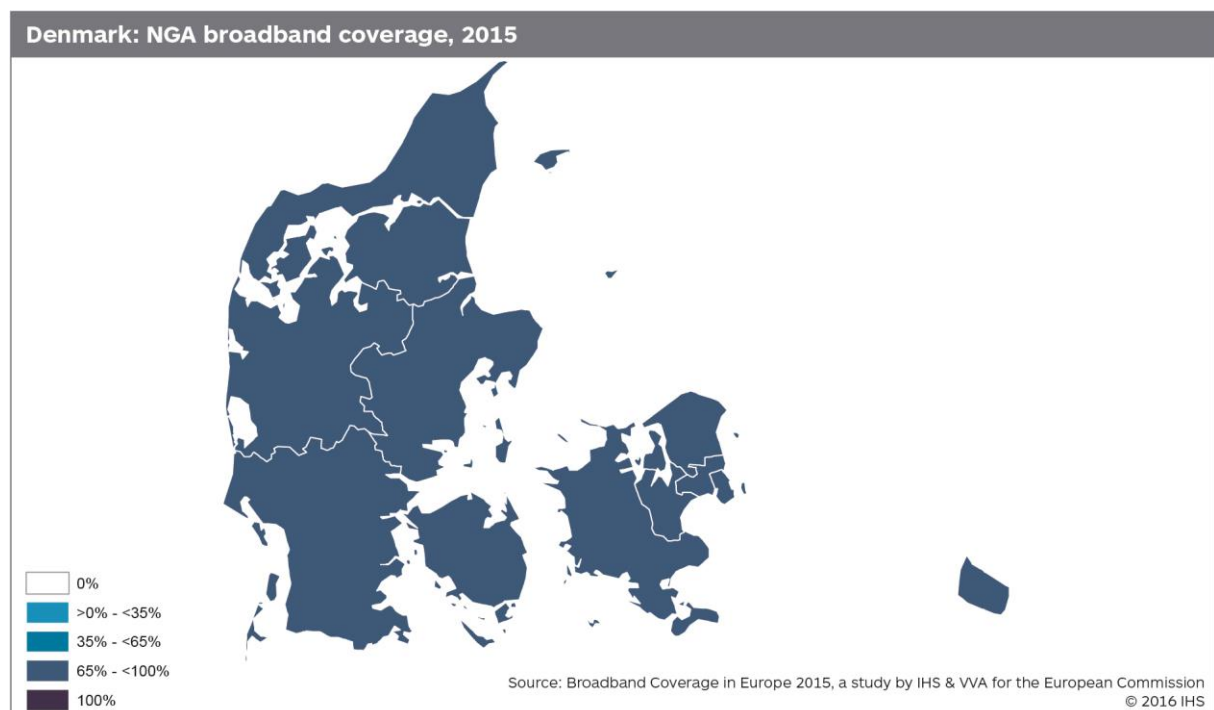
5.7.3 Regulatory and market overview

The Danish national broadband strategy was published in 2013 and set a goal for all homes and businesses to have access to broadband services with speeds of at least 100 Mbps download and 30 Mbps upload by 2020. In 2015, the Danish government released an "Agreement on the growth plan for digitization in Denmark", which set out a range of priorities to achieve the aforementioned goal. These include:

- Allocating the 700 MHz spectrum band to wireless broadband;
- Ensuring coverage requirements in frequency auctions;
- More efficient use of existing physical infrastructure;
- Support for local initiatives to improve penetration;
- Support for sharing agreements between operators to provide coverage in remote areas;
- Improved access to finance to support industry investment in improved access;
- Improved scrutiny of mergers and acquisitions;
- Future-proofing of telecommunication regulation.[38]

Danish fixed broadband market is dominated by TDC, the incumbent operator, which operates a DSL network, as well as a cable network through its subsidiary YouSee. TDC and Huawei announced in June 2015 that they were the first to test the DOCSIS 3.1 technology, which TDC aims to deploy in 2016 to ensure up to 1Gbps download speeds over its cable network.[39]

TDC faces competition from a range of smaller players, including cable and DSL providers and a large number of FTTP providers, often utility companies, which have taken on the FTTP broadband provision. Most of these companies tend to operate locally, focusing on more restricted geographic areas.

Given that Denmark was one of the first adopters of LTE services and LTE coverage has already reached near universal levels, Danish operators are pushing further innovations of their LTE networks focusing on increased speeds and improved services. Throughout 2015, all three mobile operators (TDC, Telenor, and Telia)[40] launched advanced LTE (LTE-A or also called "4G+" by TDC and Telenor)[41] networks utilising carrier aggregation technology resulting in increased up to 300Mbps download speeds.[42]

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[38] https://www.evm.dk/~/media/files/2015/aftale-om-v-kstplan-for-digitalisering-i-danmark.ashx?la=da

[39] http://pr.huawei.com/en/news/hw-441128-docsis3.1.htm#.VrTLkJMrJE4

[40] https://www.telegeography.com/products/commsupdate/articles/2015/07/06/tdc-starts-4g-network-deployment/

[41] http://www.telenor.com/media/articles/2015/a-string-of-network-innovations-in-denmark/

[42] https://www.telegeography.com/products/commsupdate/articles/2015/08/10/telia-embarks-on-lte-a-deployment/

5.7.4 Data tables for Denmark

Statistic	National
Population	5,627,235
Persons per household	2.1
Rural proportion	10.9%

Technology	Denmark 2015		Denmark 2014		Denmark 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	98.0%	94.0%	98.2%	95.0%	98.2%	89.2%	94.0%	83.7%
VDSL	63.0%	16.0%	65.8%	20.6%	21.7%	11.0%	41.0%	16.9%
FTTP	57.0%	46.0%	51.6%	42.0%	46.8%	4.2%	20.8%	7.2%
WiMAX	3.0%	4.0%	0.0%	0.0%	0.0%	0.0%	19.7%	18.7%
Cable	65.0%	6.0%	63.1%	6.5%	63.6%	0.0%	43.8%	10.2%
DOCSIS 3.0	65.0%	6.0%	63.1%	6.5%	61.7%	0.0%	43.1%	9.4%
HSPA	99.0%	99.0%	99.0%	99.0%	99.1%	94.0%	97.6%	90.0%
LTE	99.0%	99.0%	99.0%	99.0%	73.7%	10.0%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	99.5%	99.5%	99.5%	99.5%	99.7%	97.0%	99.8%	98.4%
Overall fixed broadband	99.0%	97.0%	99.1%	97.5%	99.1%	91.3%	97.4%	90.6%
NGA broadband	91.7%	54.7%	91.7%	53.7%	82.6%	13.1%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.8 Estonia

5.8.1 National coverage by broadband technology

While fixed broadband coverage in Estonia remained lower than the EU average, both on national and rural level, further progress was made with regards to NGA coverage. By mid-2015, NGA coverage in Estonia reached 86.4% of total households and 60.7% of rural homes were passed by high-speed broadband networks, a 3.3 and 3.6 percentage point respective increase compared to December 2014. Compared to the EU average levels, Estonia continued to be well ahead in terms of both national as well as rural NGA availability.

Estonia: Coverage by technology combination, 2015

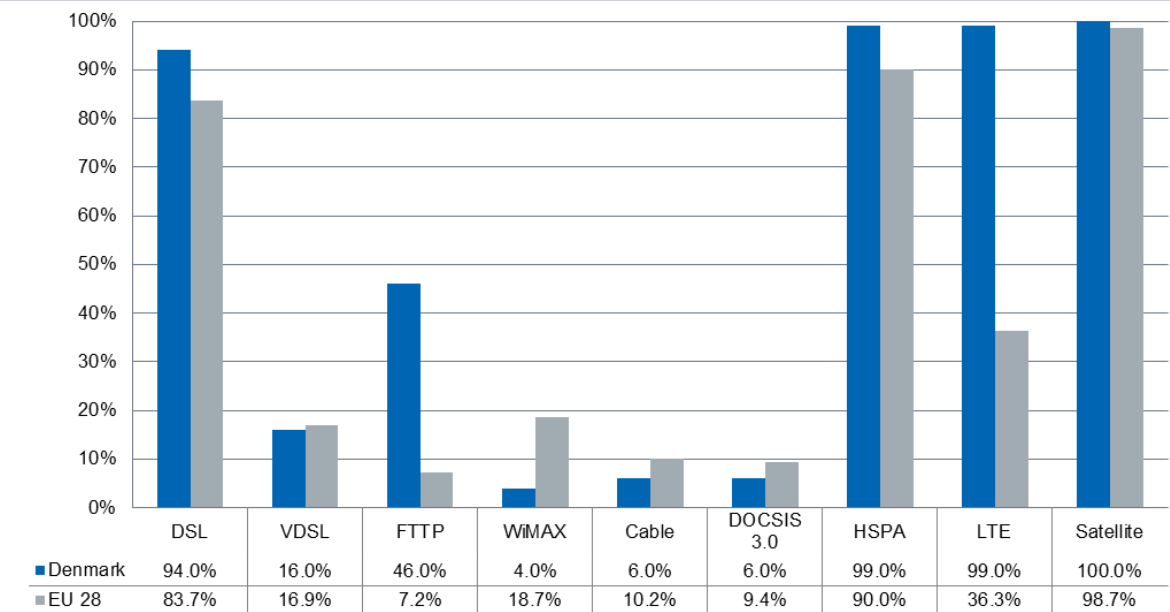|	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Estonia	100.0%	89.3%	86.4%	100.0%	84.5%	60.7%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
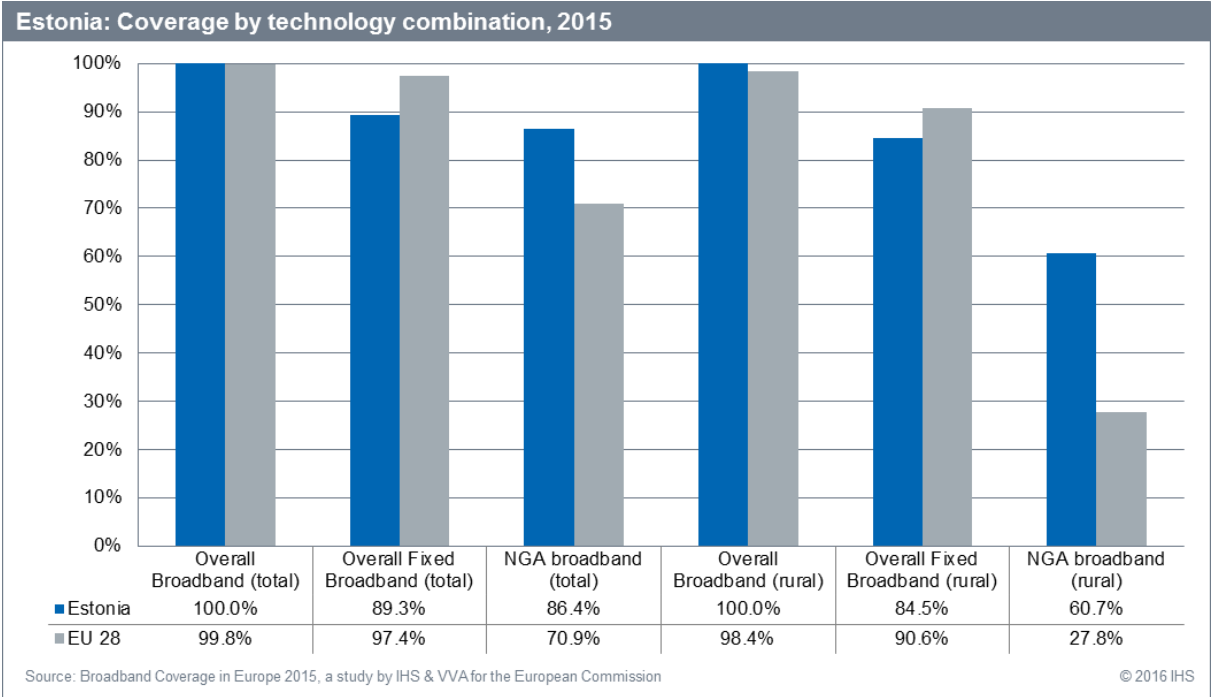
Looking at the coverage of individual technologies, Estonia has been traditionally characterised by rather low (in fact, lowest in the EU) DSL coverage, which is balanced out by extensive FTTP and cable coverage. FTTP was the most prevalent broadband technology, with coverage reaching 73.1% of Estonian households and increasing by 4.5 percentage points in the first six months of 2015.

Cable coverage also increased in the first six months of 2015, growing by four percentage points to 72.9%, with approximately 90% of the cable network being upgraded to DOSCSIS 3.0. With VDSL coverage staying approximately at its 2014 level and reaching less than 10% of households, FTTP and DOCSIS 3.0 continued to be the cornerstones of the high NGA coverage in Estonia.

During the first half of 2015, LTE coverage in Estonia increased by 5.1 percentage points, yet with 84.3% of households covered by the LTE networks, Estonia remained slightly below the EU average. Estonia, along with Latvia and Lithuania, continued to be only partially addressed by satellite broadband services – with significant limitations on addressable market in a number of areas due to the orbital slots of the relevant satellites and the subsequent local requirements for larger dishes to receive the satellite signals.

Estonia: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Estonia	35.0%	8.9%	73.1%	43.9%	72.9%	66.1%	100.0%	84.3%	75.4%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission © 2016 IHS
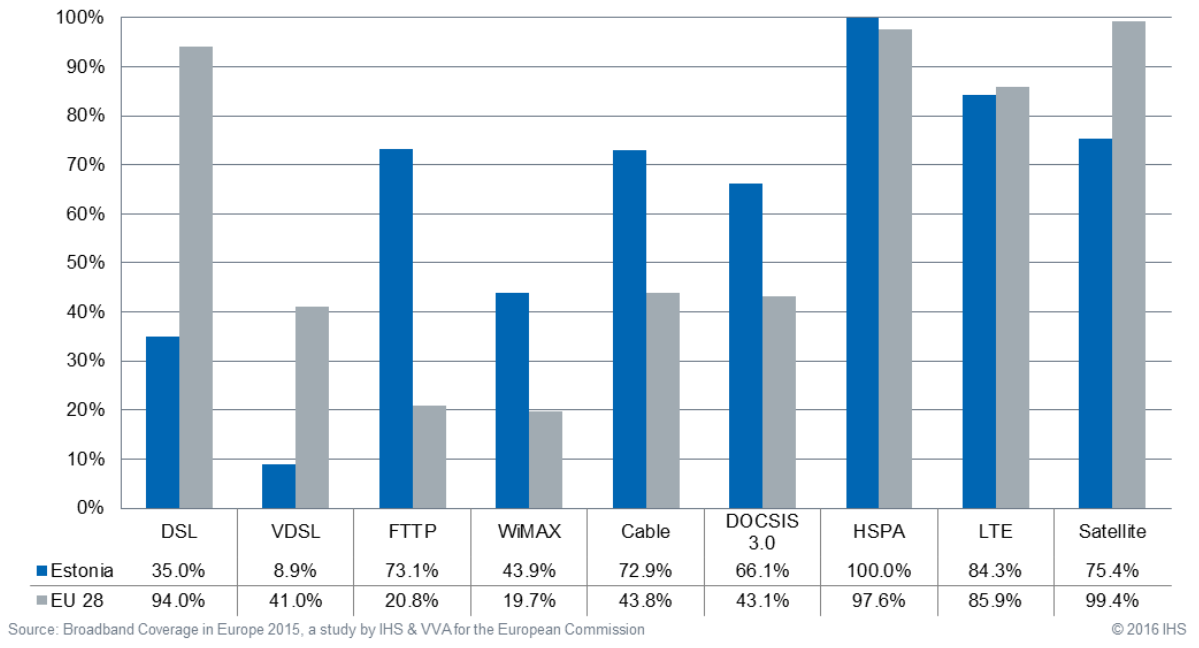
The situation in rural areas broadly reflected the national-level patterns, with FTTP and cable (50.7% and 43.5%) being the dominant fixed technologies, although they were closely followed by WiMAX and DSL (43.1% and 38.1%). Nevertheless, the relatively high rural FTTP coverage (second highest in the EU) and the fact that it exceeded cable or DSL coverage made Estonia stand out from other study countries.

Mobile coverage is strong in rural areas with universal HSPA coverage and 72.5% rural homes passed by LTE networks at the end of June 2015.

Estonia: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Estonia	38.1%	2.8%	50.7%	43.1%	43.5%	27.8%	100.0%	72.5%	75.4%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission © 2016 IHS
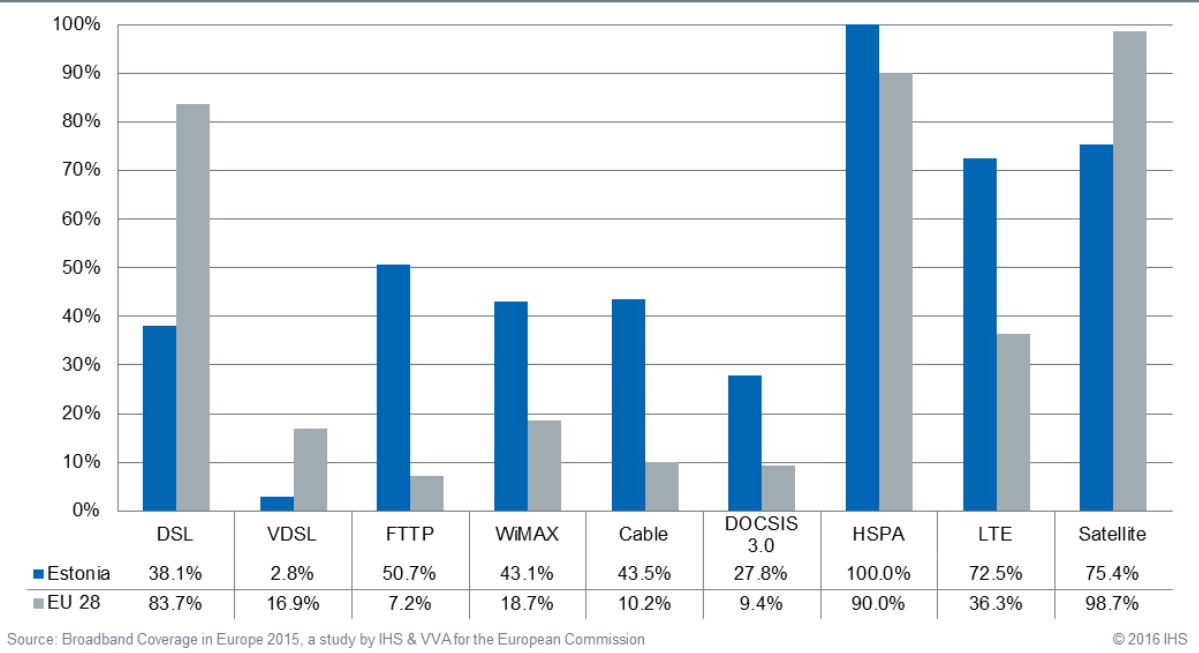
5.8.2 Regional coverage by broadband technology

There were considerable differences in fixed broadband coverage in Estonia's five regions, with coverage in the Põhja-Eesti region exceeding 99%, while coverage in the Lõuna-Eesti region being only little over 75%. However, clear signs of a catch-up process could be seen, with the three regions with coverage levels under 80% being also the regions that experienced increases in coverage in the first six months of 2015.

Estonia: Overall fixed broadband coverage, 2015

0% - <75%
75% - <90%
90% - <95%
95% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS
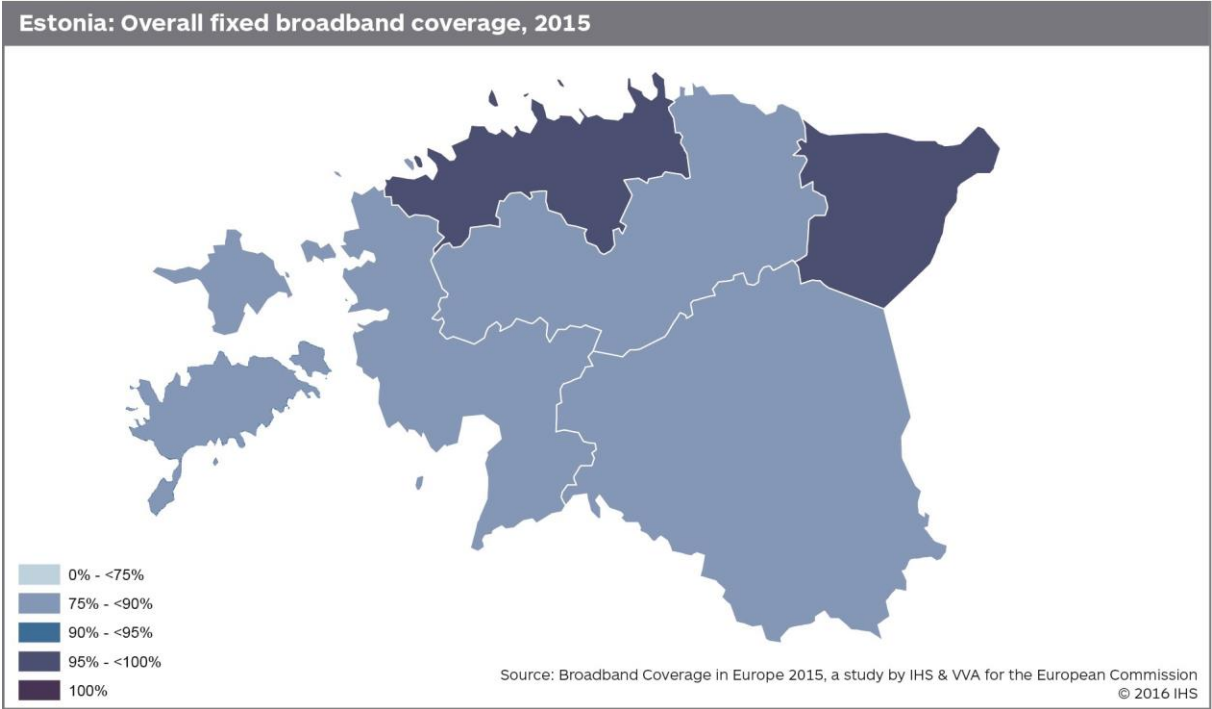
Regional NGA coverage patterns reflected those for fixed broadband, with three regions reporting coverage under 80% and two regions reporting coverage exceeding 90%.

Estonia: NGA broadband coverage, 2015

0%
>0% - <35%
35% - <65%
65% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
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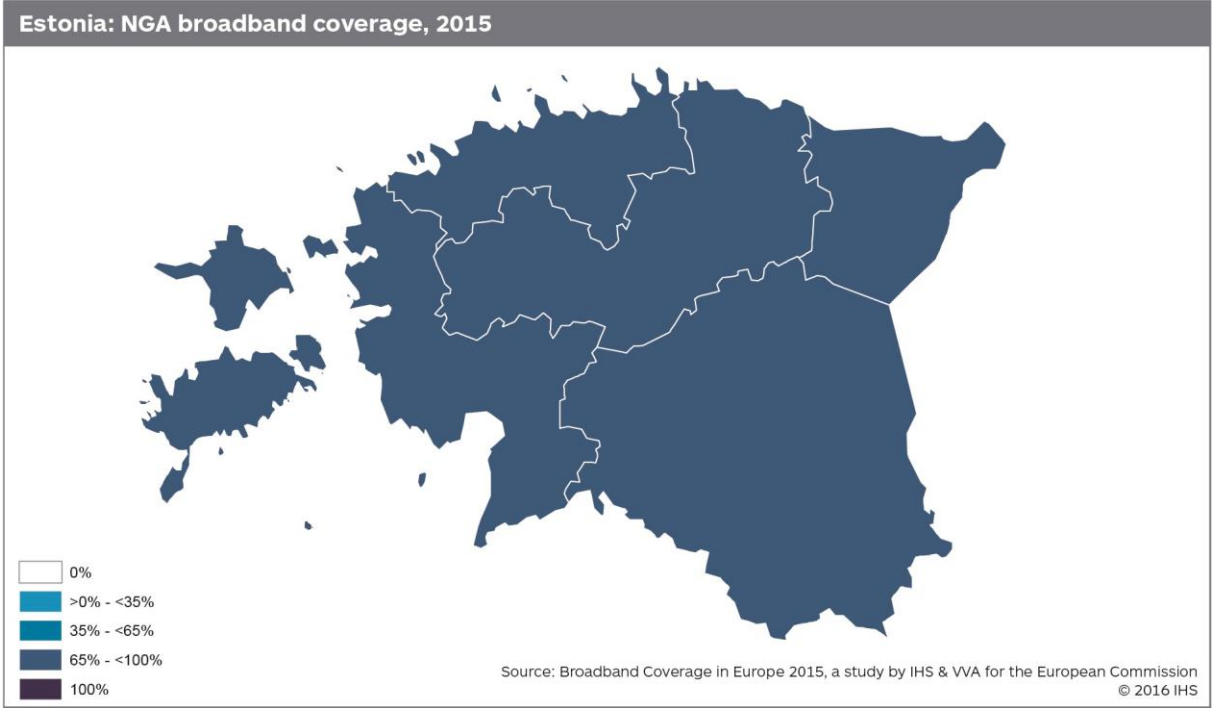
5.8.3 Regulatory and market overview

The targets and measures for broadband roll-out in Estonia were updated in 2014 as part of the country's Digital Society Strategy 2020. The main objective of the national broadband programme is to bridge the digital gap between urban and rural areas by developing NGA infrastructure in rural areas. Specific goals outlined in the strategy include:

- full coverage with connections of at least 30 Mbps by 2020;
- ultra-fast with at least 100 Mbps accounting for 60% of subscriptions by 2020.[43]

In order to reach these targets, an EstWin project (supervised by the governmental Estonian Broadband Development Foundation) has been established to rollout more than 6000 kilometres of fibre-optic cable network, with the aim of 98% of all residential and commercial buildings being located within 1.5 km of at least one access point.[44]

Key players in Estonia's broadband market are the TeliaSonera owned incumbent, operating under the Eesti Telekom/Elion brand for fixed services and EMT brand for mobile services, and cable operators Starman and STV. Both the Estonian government as well as the incumbent have traditionally adopted an approach primarily promoting FTTP deployment at the expense of VDSL upgrades. Both Elion[45] and Starman[46] offer 500 Mbps maximum download speed on their premium packages while STV was offering up to 300 Mbps download cable broadband services[47].

As one of the early adopters of LTE (first launched already in 2010) Estonia's mobile network operators have begun to focus on exploring innovative technologies such as LTE-Advanced (LTE-A) to improve customer experience and increasing speeds over mobile networks with Tele2 announcing the deployment of an LTE-A network in the north of the country in 2015.[48]

[43] https://e-estonia.com/wp-content/uploads/2014/04/Digital-Agenda-2020_Estonia_ENG.pdf

[44] http://www.elasa.ee/index.php?page=3

[45] https://www.telia.ee/era/internet/pusiuhendus/

[46] http://www.starman.eu/teenused/internet

[47] http://stv.ee/est/eraklient/internet/

[48] https://www.telegeography.com/products/commsupdate/articles/2015/11/26/tele2-eesti-prepares-375mbps-lte-a-launch/

5.8.4 Data tables for Estonia

Statistic	National
Population	1,315,819
Persons per household	2.2
Rural proportion	21.7%

Technology	Estonia 2015		Estonia 2014		Estonia 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	35.0%	38.1%	33.8%	36.7%	36.4%	35.9%	94.0%	83.7%
VDSL	8.9%	2.8%	8.6%	2.7%	1.4%	0.0%	41.0%	16.9%
FTTP	73.1%	50.7%	68.7%	47.4%	66.2%	58.3%	20.8%	7.2%
WiMAX	43.9%	43.1%	40.9%	40.0%	40.6%	38.7%	19.7%	18.7%
Cable	72.9%	43.5%	68.9%	41.0%	57.2%	16.4%	43.8%	10.2%
DOCSIS 3.0	66.1%	27.8%	62.1%	26.0%	52.6%	0.0%	43.1%	9.4%
HSPA	100.0%	100.0%	99.0%	98.0%	99.9%	99.6%	97.6%	90.0%
LTE	84.3%	72.5%	79.2%	74.7%	85.0%	84.8%	85.9%	36.3%
Satellite	75.4%	75.4%	75.4%	75.4%	75.4%	75.4%	99.4%	98.7%
Overall broadband	100.0%	100.0%	99.8%	99.1%	100.0%	99.8%	99.8%	98.4%
Overall fixed broadband	89.3%	84.5%	88.4%	84.1%	84.7%	87.2%	97.4%	90.6%
NGA broadband	86.4%	60.7%	83.1%	57.1%	73.9%	58.3%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.9 Finland

5.9.1 National coverage by broadband technology

As of mid-2015, Finland recorded complete broadband coverage, with fixed broadband coverage being slightly lower than the EU average and NGA coverage exceeding the EU average by over 4 percentage points. In rural areas, some progress was made with regards to fixed broadband coverage, which increased by 1.4 percentage points with high-speed broadband being available to 70.5% rural households at the end of June 2015. Nevertheless, both fixed broadband as well as NGA coverage in rural areas remains almost twenty percentage points below the EU average levels. In mid-2015, only 7.6% of rural homes were passed by at least one NGA network, a figure unchanged from 2014.

Finland: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
■ Finland	100.0%	97.0%	75.1%	100.0%	70.5%	7.6%
▇ EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
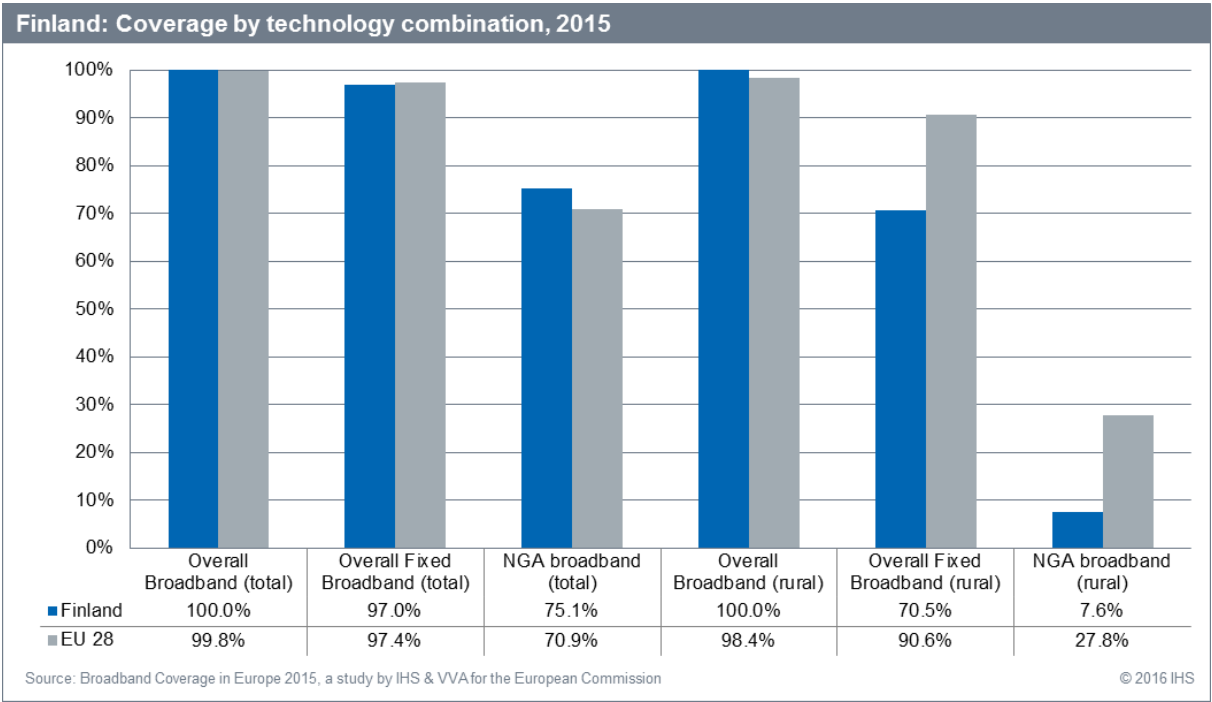
Looking at individual technologies, as in 2014 national coverage for all technologies was at the average EU level or higher, with the exception of WiMAX. DSL was the driving fixed broadband technology covering 94% of Finnish households and VDSL was the NGA access technology with the widest coverage available to 48.4% homes. Cable networks are fully upgraded to DOCSIS 3.0 and passed 44.4% of homes while 37.4% of households had access to FTTP services at the end of June 2015.

No substantial coverage changes were reported for any fixed technology in the first half of 2015. As for mobile technologies, HSPA coverage increased by 0.5 percentage points and now covers the whole country. Due to growth in LTE coverage in other study countries, Finland lost its position as one of the leaders in terms of LTE coverage during the first six months of 2015. Nevertheless, LTE networks were available to more than 9 in 10 (92.1%) of Finnish households.

Finland: Coverage by technology, total, 2015
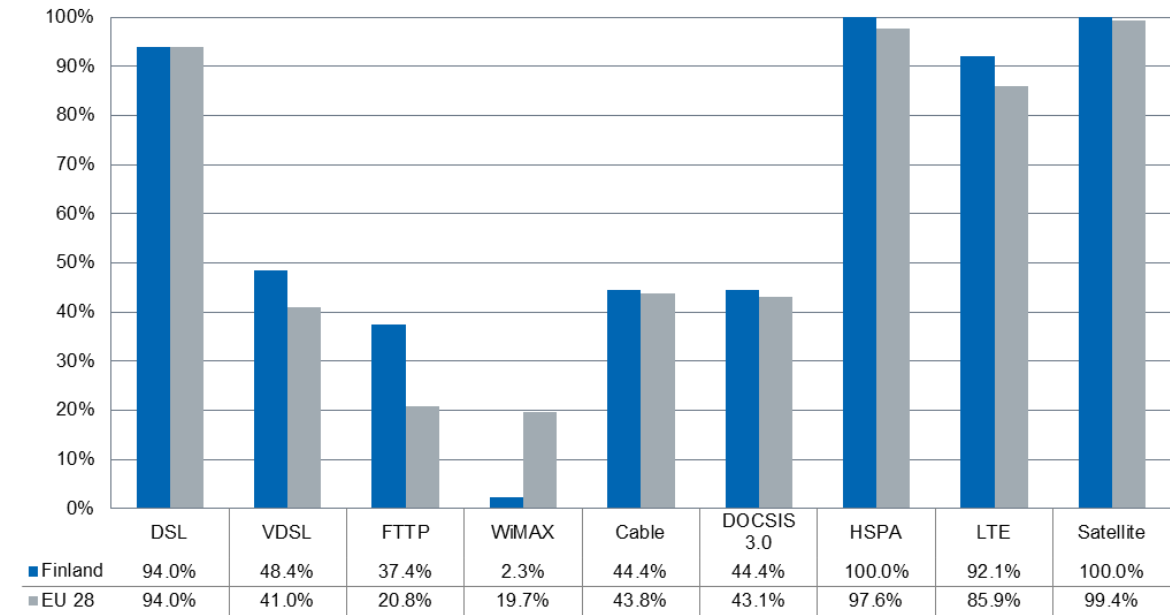
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Finland	94.0%	48.4%	37.4%	2.3%	44.4%	44.4%	100.0%	92.1%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

In rural areas, DSL was the most prevalent of the three technologies available to rural households, along with FTTP and WiMAX. Although rural DSL coverage increased by 1.5 percentage points to 67.9% it remained below the EU average. WiMAX coverage remained very low at 1.1%.

Continued absence of DOCSIS 3.0 and VDSL networks in rural areas means that FTTP was the sole contributor to rural NGA access, covering 7.6% of rural households.

Some progress was made with regards to rural HSPA and LTE coverage, which increased by 2.8 and 3.7 percentage points respectively and exceeded the respective EU averages. In particular, HSPA achieved 100% rural coverage, which makes Finland one of the two countries, along with Estonia, to report complete rural HSPA coverage.

Finland: Coverage by technology, rural areas, 2015
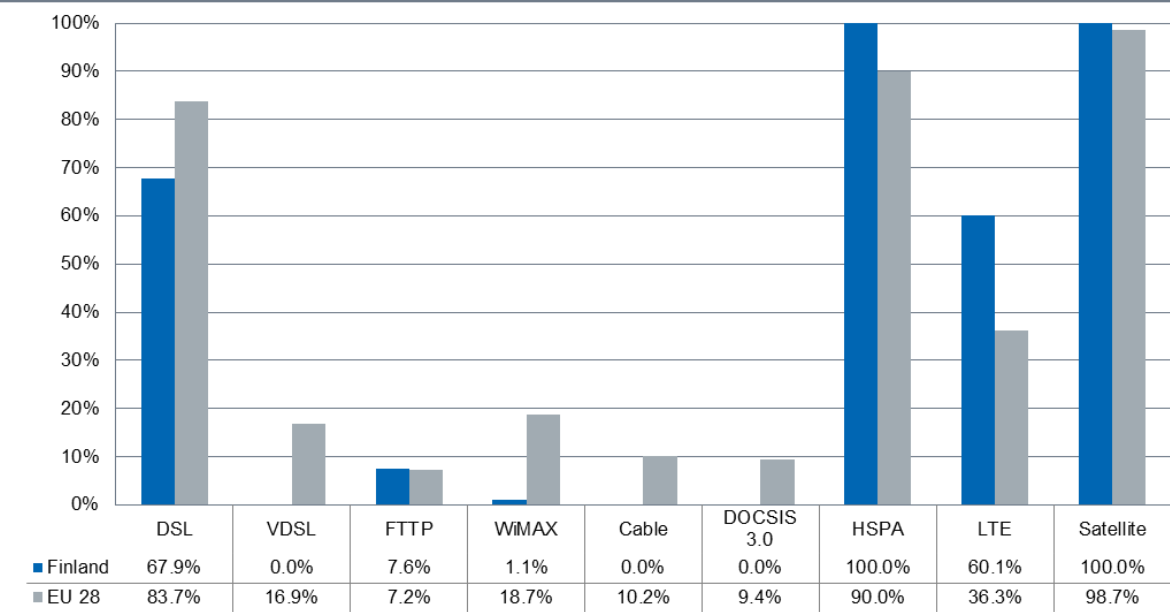
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Finland	67.9%	0.0%	7.6%	1.1%	0.0%	0.0%	100.0%	60.1%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

5.9.2 Regional coverage by broadband technology

As in 2014, in most regions in Finland fixed broadband coverage reached levels above 95%, with only four of the nineteen regions falling short of this threshold. No significant changes in regional fixed broadband coverage were reported in any of the regions.
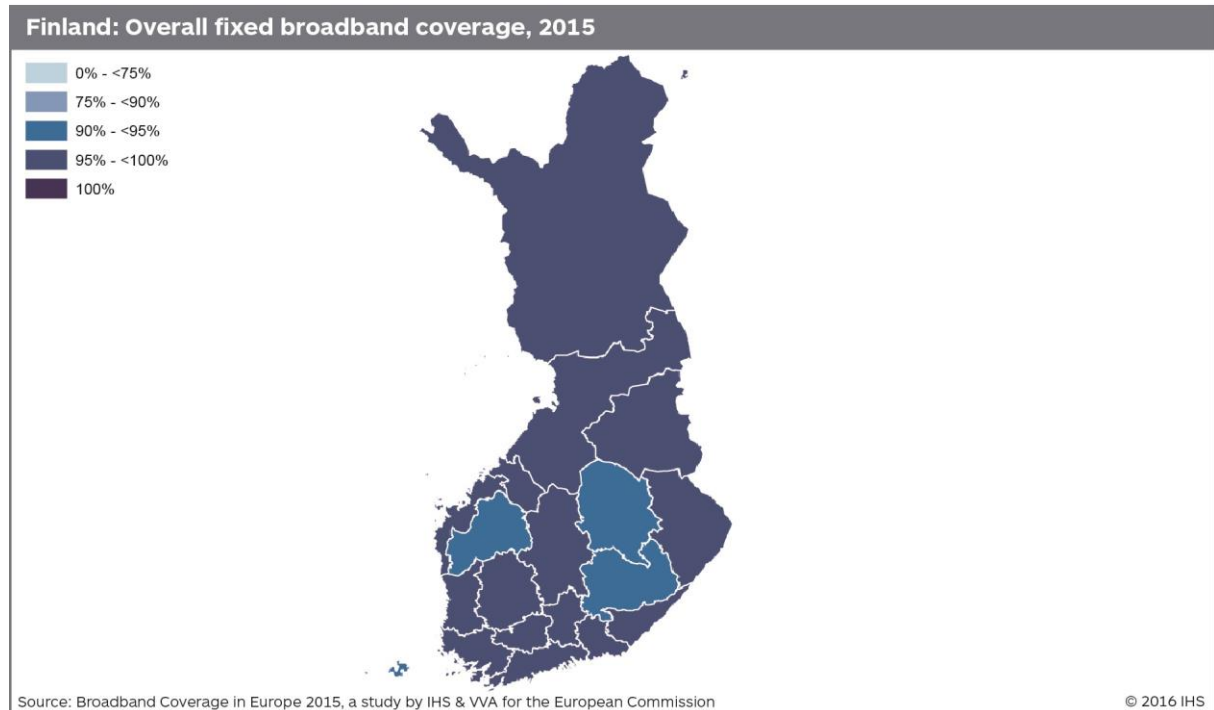
NGA coverage varied more considerably, with the lowest coverage level reported in the Åland region (less than 55%) and highest in Helsinki (over 80%). Most regions reported no significant coverage changes in the first six months of 2015. The region reporting the largest coverage increase was Pohjanmaa, where NGA coverage increased by 1.7 percentage points.

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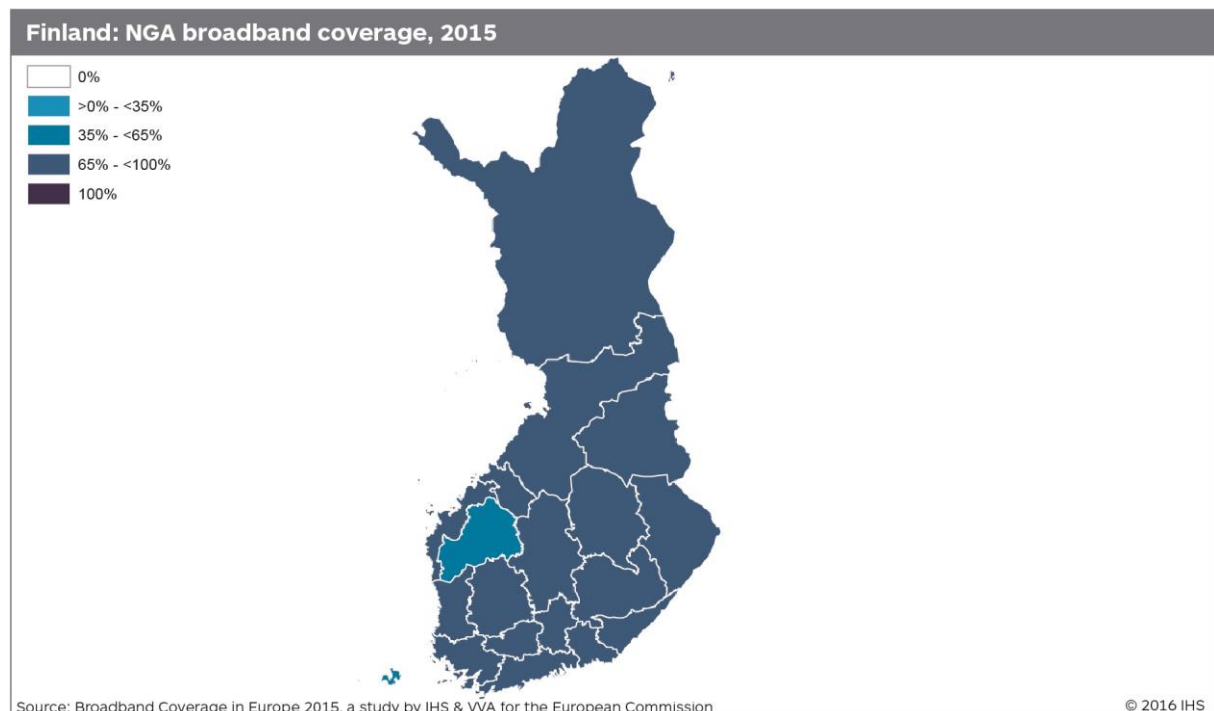
5.9.3 Regulatory and market overview

In 2010, the Finnish Ministry of Transport and Communications stipulated an access to at least 1 Mbps broadband services to be a legal right by the end of 2015.[49] The Finnish government has provided subsidies to local operators serving rural communities in order to accomplish this goal, with more recent reports indicating that this minimum speed to be further raised to 2 Mbps.[50]

At the end of December 2008, the Finnish government launched the "Broadband 2015" project with the aim of providing state aid for the construction of high-speed broadband networks in areas deemed less attractive by operators. As part of the project, aid totalling EUR 130 million has been available for funding broadband projects. This aid has been supplied by the Finnish regulator (FICORA), the EU Rural Development Programme for Mainland Finland and Finnish municipalities.[51]

Finnish fixed broadband market is dominated by TeliaSonera, the incumbent, and cable operators Elisa and DNA, with both Elisa and DNA also offering some DSL services and all operators investing in FTTP networks deployment. Moreover, there are a number of local municipal initiatives investing into FTTP networks rollout in smaller towns.

Due to the already rather high level of LTE coverage reached in Finland by mid-2015, Finnish operators are currently investing considerably in the innovation of their LTE networks. In December 2014, TeliaSonera announced small scale LTE-Advanced (LTE-A) deployment in Helsinki[52], while in the first quarter of 2015 mobile operators Ukko and DNA were both reported to be trialling LTE-A networks.[53] Efforts are also being made to improve coverage in more remote and rural areas, with TeliaSonera and DNA announcing plans to deploy a shared network in order to improve mobile broadband coverage of the north-eastern areas of the country, covering 50% of the territory and 15% of its population by 2017.[54]

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[49] https://www.viestintavirasto.fi/attachments/vivi_yp_laajakaista_EN.pdf

[50] http://www.telecompaper.com/news/finland-to-increase-minimum-broadband-speed-to-2-mbps--1072102

[51] https://www.viestintavirasto.fi/en/steeringandsupervision/broadband2015subsidies.html

[52] https://www.sonera.fi/medialle/showArticleView?article=viisi-vuotta-4gt--soneran-4g-nopeus-nousee-300-megaan&id=71887472-f378-494f-9622-5db03b4974a0

[53] https://www.telegeography.com/products/commsupdate/lists/country/finland/

[54] http://www.omnitele.com/2014/omnitele-designs-high-capacity-shared-network-for-suomen-yhteisverkko/

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5.9.4 Data tables for Finland

Statistic	National
Population	5,451,270
Persons per household	2.1
Rural proportion	18.8%

Technology	Finland 2015		Finland 2014		Finland 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	94.0%	67.9%	94.0%	66.4%	93.4%	60.0%	94.0%	83.7%
VDSL	48.4%	0.0%	48.4%	0.0%	46.0%	0.0%	41.0%	16.9%
FTTP	37.4%	7.6%	37.7%	7.5%	29.4%	7.0%	20.8%	7.2%
WiMAX	2.3%	1.1%	2.3%	1.1%	2.2%	0.1%	19.7%	18.7%
Cable	44.4%	0.0%	44.3%	0.0%	42.5%	0.0%	43.8%	10.2%
DOCSIS 3.0	44.4%	0.0%	44.3%	0.0%	42.5%	0.0%	43.1%	9.4%
HSPA	100.0%	100.0%	99.5%	97.2%	99.5%	97.2%	97.6%	90.0%
LTE	92.1%	60.1%	92.1%	56.3%	85.5%	8.0%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	100.0%	100.0%	99.8%	98.6%	99.8%	98.6%	99.8%	98.4%
Overall fixed broadband	97.0%	70.5%	97.0%	69.2%	96.7%	63.5%	97.4%	90.6%
NGA broadband	75.1%	7.6%	75.1%	7.5%	72.1%	7.0%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.10 France

5.10.1 National coverage by broadband technology

While in the first half of 2015 France reported complete broadband coverage and above-average fixed broadband coverage on both national and rural levels, it lagged behind the EU average in terms of NGA broadband. Total NGA broadband coverage increased by 2.2 percentage points to 44.8% and rural NGA coverage grew by 3.1 percentage points to 23.0% compared to the respective EU averages of 70.9% and 27.8%.

France: Coverage by technology combination, 2015

|	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
France	100.0%	99.8%	44.8%	99.7%	98.2%	23.0%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
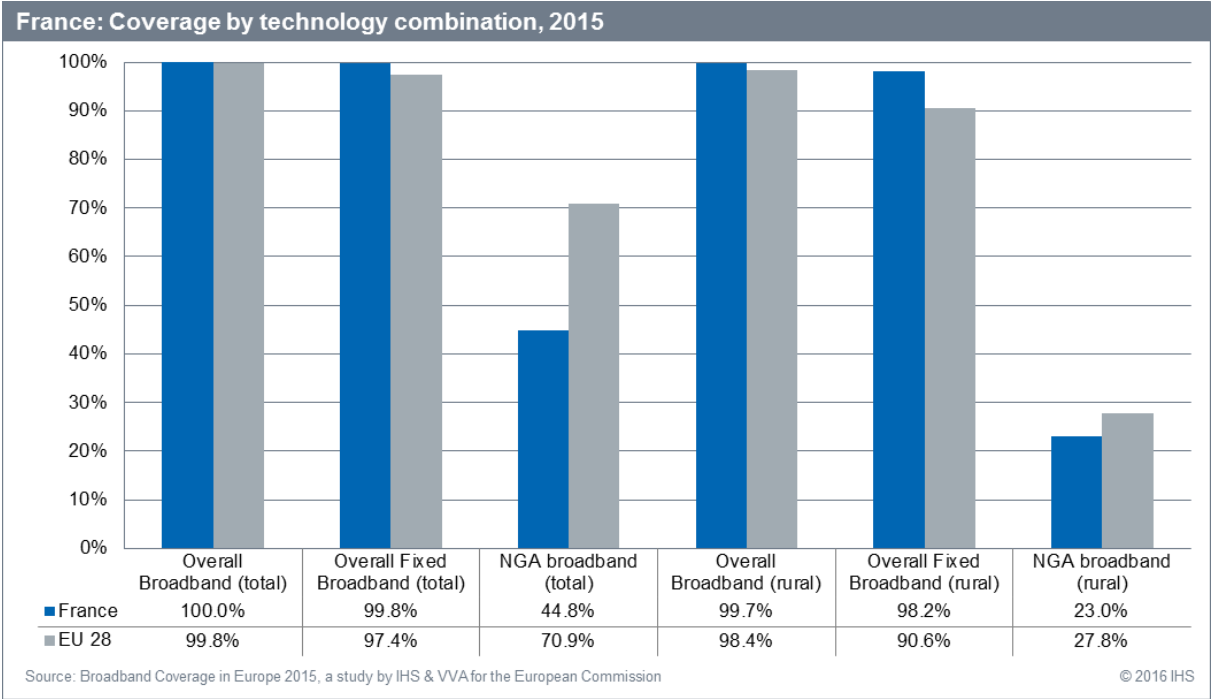
DSL was the dominant fixed broadband technology in terms of coverage of French households, covering 99.5% of households. VDSL coverage grew by 1.3 percentage points in the first half of 2015 with 16.7% of homes having access to VDSL services.

France: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
France	99.5%	16.7%	15.5%	0.0%	29.5%	29.5%	99.8%	77.5%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

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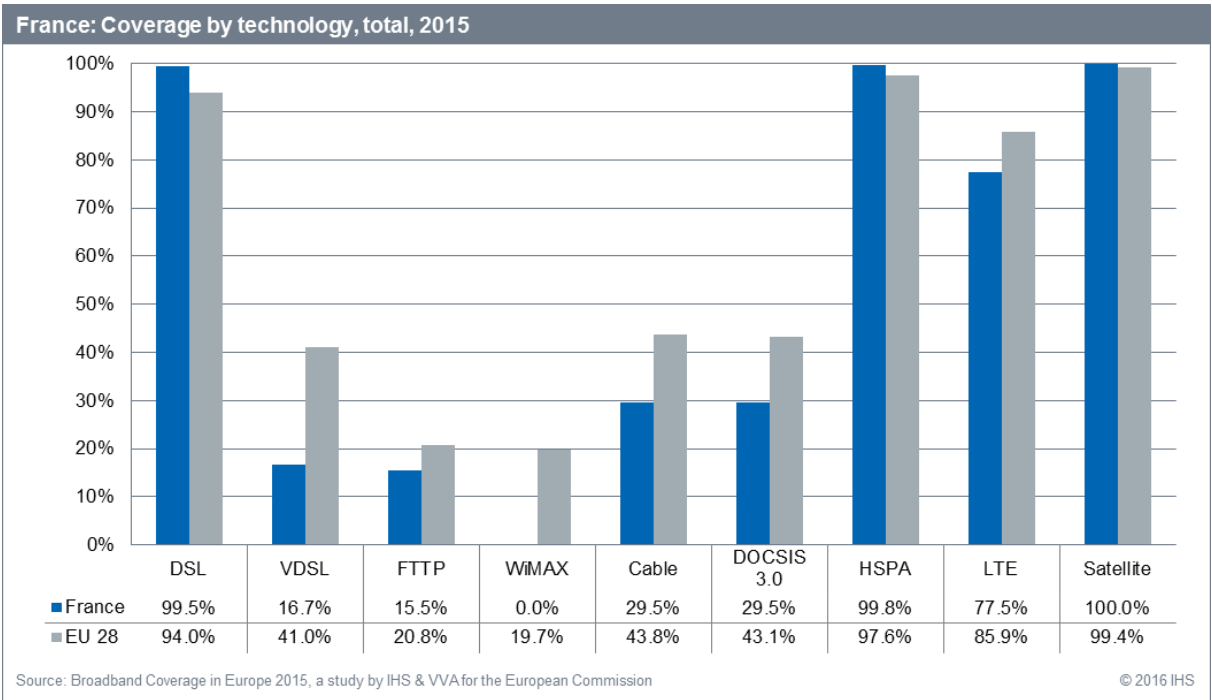
Nevertheless, due to the complete DOCSIS 3.0 upgrade of French cable networks, DOCSIS 3.0 is the leading NGA technology, reaching 29.5% of households. However, cable operators have not expanded their networks' footprint in the last three years and it is thus possible to expect VDSL and FTTP technologies playing a much more important role in French NGA broadband composition in the near future. FTTP networks passed 15.5% of households at the end of June 2015, a 1.9 percentage point increase.

LTE coverage increased by 2.2 percentage points in the first half of 2015 to reach 77.5% of households, meaning that LTE coverage remained under the EU average of 85.9% suggesting that by mid-2015 the pace of LTE deployment in France has not been as fast as in other study countries.

France: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
France	97.6%	21.1%	2.0%	0.0%	0.7%	0.7%	98.4%	5.3%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
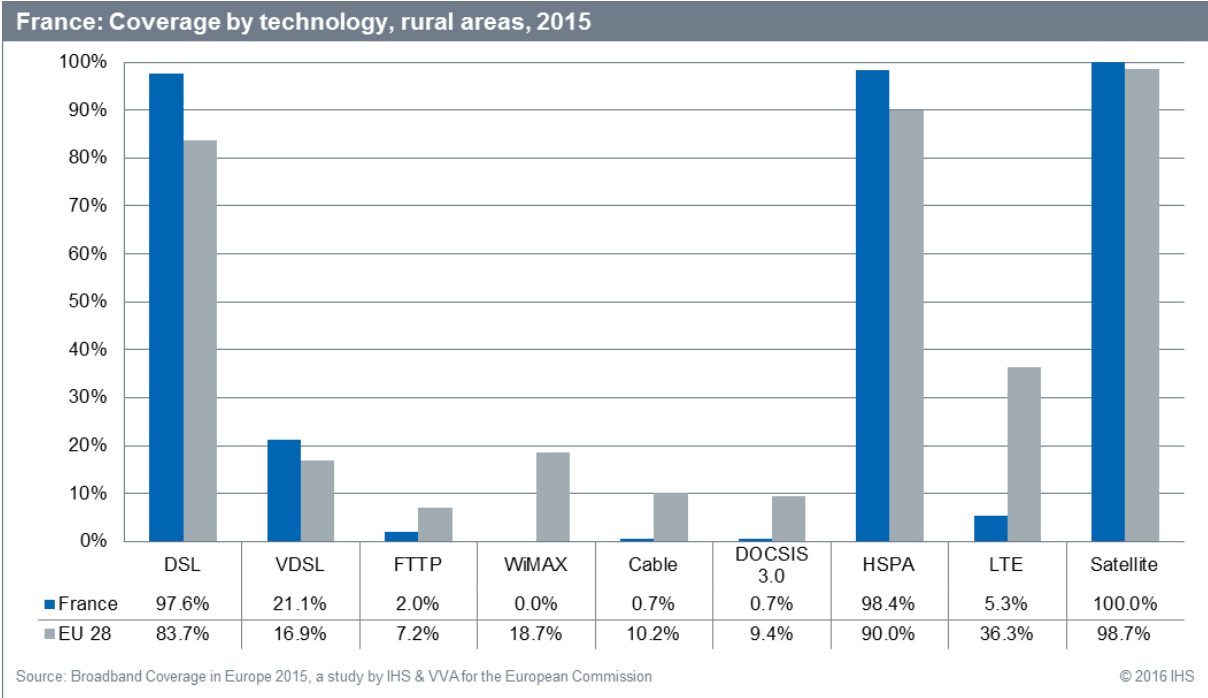
France was characterised by relatively high rural DSL coverage with 97.6% of rural homes passed. On the other hand rural cable coverage remained very low with only 0.7% rural homes having access to cable broadband services. VDSL was therefore the driving NGA technology, covering 21.1% of rural households, while FTTP networks passed only 2.0% of rural homes. VDSL was also the fixed technology that experienced the highest coverage growth in rural areas, with coverage increasing by 3.4 percentage points over the first six months of 2015.

LTE coverage in rural areas remained low, and even though rural LTE coverage increased by 2.4 percentage points, at 5.3% rural homes passed, rural LTE coverage was considerably below the EU average of 36.3%. France therefore remained one of the study countries with the lowest rural LTE coverage.

5.10.2 Regional coverage by broadband technology

France: Overall fixed broadband coverage, 2015

- 0% - <75%
- 75% - <90%
- 90% - <95%
- 95% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

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France: NGA broadband coverage, 2015

- 0%
- >0% - <35%
- 35% - <65%
- 65% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

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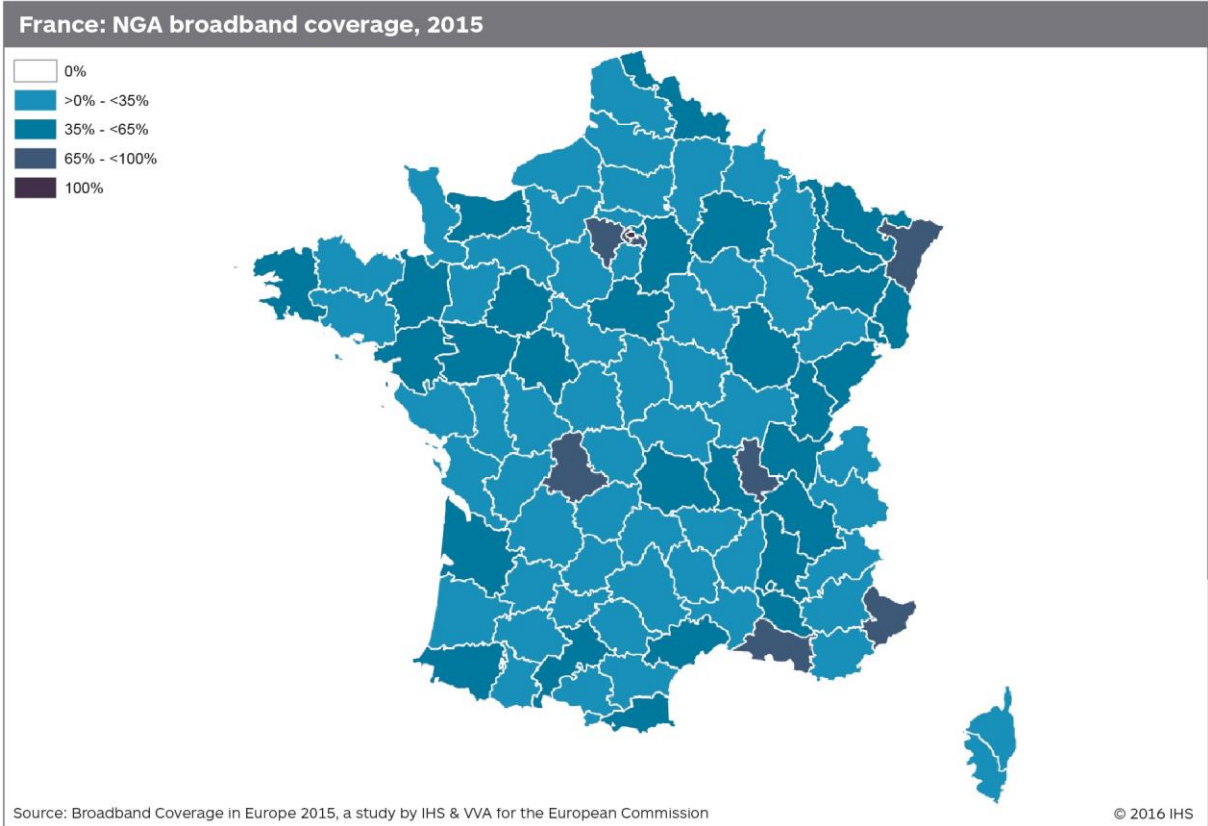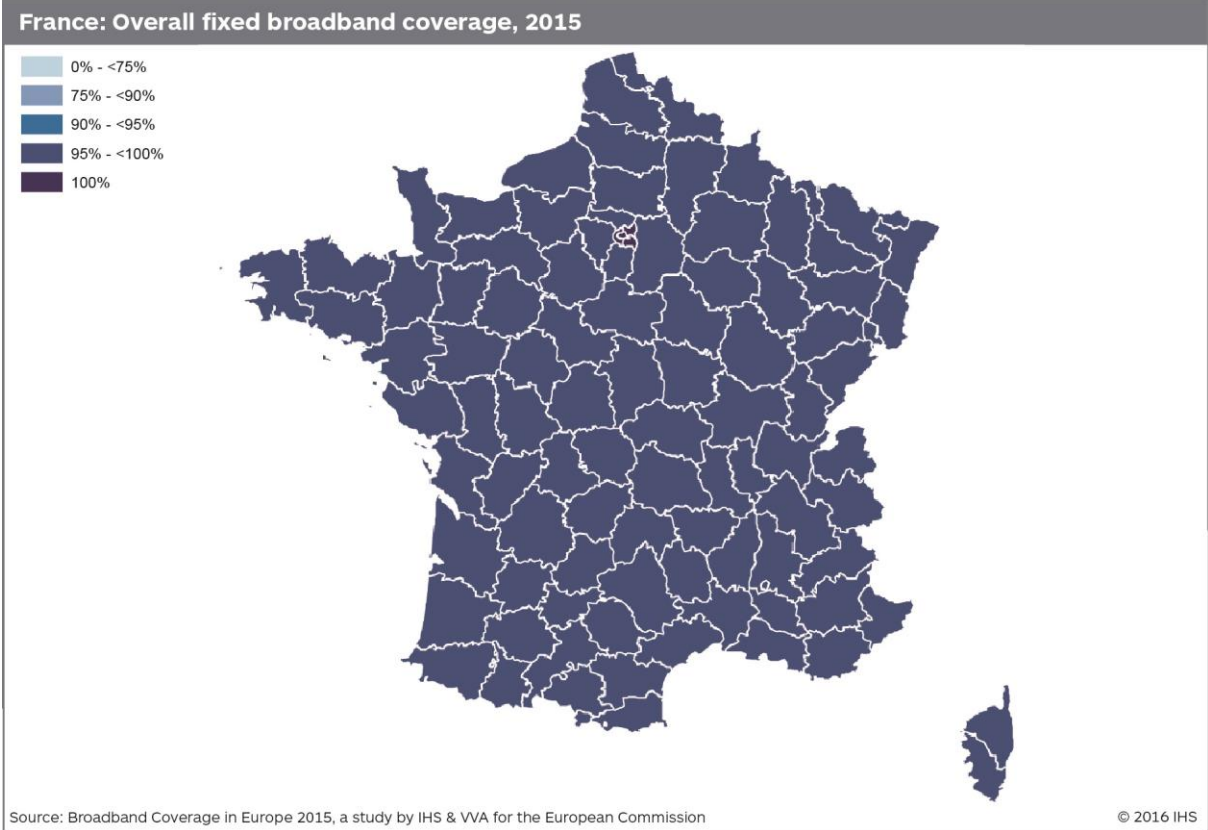
Most French regions reported fixed broadband coverage rates of 100% or very close to 100% with only the Rhône region and overseas territories of Guadeloupe and Martinique reporting coverage rates below 98%. None of the regions recorded significant increases in fixed broadband coverage with the exception of Martinique (a 2.5 percentage points growth).

The variation in terms of NGA coverage remains substantial. Although by mid-2015, all French regions reported that NGA networks were available, coverage ranged from 6.6% in Guyane to 100% in Paris. The only other region to report NGA coverage exceeding 90% was the Hauts-de-Seine region, which constitutes the broader Paris metropolitan area. This shows the considerable disparity in NGA coverage between the capital and other regions.

5.10.3 Regulatory and market overview

The key initiative for the development of broadband infrastructure in France, the "Plan France Très Haut Débit" was launched in 2013 and aims to cover the entirety of the French territory with high-speed networks by 2022. the French government plans to invest EUR 20 billion, from a mix of private and public funds, over ten years to achieve that target, with a focus on FTTP technologies in urban and highly-populated areas (estimated to account for 57% of the population) and a combination of technologies in the rest of the country.[55]

The telecoms component of the "Loi Macron" economic reform law passed in February 2015 was designed to support fibre roll-out, facilitating infrastructure deployment in buildings. In addition, the law includes provisions relating to mobile broadband coverage, requiring mobile operators to deploy 2G networks in unserved areas by 2016 and 3G/4G networks by 2017, which should introduce HSPA or LTE mobile broadband coverage to 170 municipalities without access to mobile broadband services.[56]

The key market player in France is the incumbent Orange, which offers DSL, cable, and FTTP technologies. Orange is one of the drivers of fibre deployment in France and in April 2015 it announced the plan to triple its investments in FTTP by 2020 and connect additional sixteen million homes, equating to 60% coverage, by 2022.[57]

The acquisition of the operator SFR by Numericable at the end of 2014 created a large player in the French broadband market, with a long-term objective of further expanding the company's fibre-optic network.[58] Among other efforts, the operator aims to further invest in covering 50% of medium-density areas, following a renegotiated sharing agreement with Orange (originally signed between SFR and Orange in 2011 to avoid duplication of FTTP networks deployment in less dense areas) and lifting an exclusivity clause, which originally prohibited Orange from deploying its FTTP network in Numericable-SFR municipalities.[59]

LTE networks have been introduced in France in 2012, with Orange and SFR launching their networks at the end of that year, while Bouygues and Iliad launched their respective services in 2013. Key developments since then related primarily to LTE-Advanced (LTE-A) deployment, with operators such as SFR expanding LTE-A coverage throughout 2015.[60] Moreover, Orange has already begun testing of 5G technologies in the city of Belfort, which are set to run until the end of 2016.[61]

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[55] http://www.francethd.fr/le-plan-france-tres-haut-debit/qu-est-ce-que-le-plan-france-tres-haut-debit.html

[56] https://www.telegeography.com/products/commsupdate/articles/2015/04/20/french-government-approves-amendment-mandating-rural-mobile-expansion/

[57] http://www.orange.com/en/Press-and-medias/press-releases-2016/press-releases-2015/Orange-picks-up-speed-with-100-Fibre-Orange

[58] http://numericable-sfr.com/nous-connaitre/groupe-numericable-sfr-en-bref/03102015-1003-presentation-du-groupe-numericable-sfr

[59] http://www.autoritedelaconcurrence.fr/user/standard.php?id_rub=607&id_article=2658

[60] http://numericable-sfr.com/presse/communiques-de-presse/communique-de-presse-groupe-numericable-sfr/02122015-0800-sfr-lance-la-4g-marseille

[61] http://www.20minutes.fr/high-tech/1702279-20151005-orange-va-tester-5g-belfort

5.10.4 Data tables for France

Statistic	National
Population	65,835,579
Persons per household	2.2
Rural proportion	15.6%

Technology	France 2015		France 2014		France 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	99.5%	97.6%	99.5%	97.6%	99.4%	96.9%	94.0%	83.7%
VDSL	16.7%	21.1%	15.5%	17.7%	13.4%	14.6%	41.0%	16.9%
FTTP	15.5%	2.0%	13.6%	1.7%	10.5%	1.3%	20.8%	7.2%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.7%	18.7%
Cable	29.5%	0.7%	29.2%	1.3%	30.3%	0.6%	43.8%	10.2%
DOCSIS 3.0	29.5%	0.7%	29.2%	1.3%	30.3%	0.6%	43.1%	9.4%
HSPA	99.8%	98.4%	99.8%	98.5%	99.8%	98.5%	97.6%	90.0%
LTE	77.5%	5.3%	75.4%	2.8%	68.0%	0.0%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100%	99.4%	98.7%
Overall broadband	100.0%	99.7%	100.0%	99.7%	99.9%	99.2%	99.8%	98.4%
Overall fixed broadband	99.8%	98.2%	99.7%	98.5%	99.7%	97.1%	97.4%	90.6%
NGA broadband	44.8%	23.0%	42.6%	20.0%	40.9%	16.2%	70.9%	27.8%

Note: It was pointed out by the French regulator, ARCEP, that detailed data related to different technologies on coaxial cable is not available for France. However, as indicated, 29.5% of households have a fixed Internet access to high speed broadband via a coaxial cable network, all available technologies included. The HSPA category includes 3G networks.

The data includes both overseas territories as well as mainland France.

The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.11 Germany

5.11.1 National coverage by broadband technology

As of mid-2015, Germany reported almost complete broadband coverage, as well as above-average fixed broadband and NGA coverage on both national and rural levels. While on national level there were only limited increases in fixed broadband and NGA broadband coverage (0.4 and 0.5 percentage points respectively), rural NGA coverage increased by 3.3 percentage points to 36.4% in the first half of 2015.

Germany: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Germany	99.9%	98.3%	81.4%	97.4%	93.0%	36.4%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
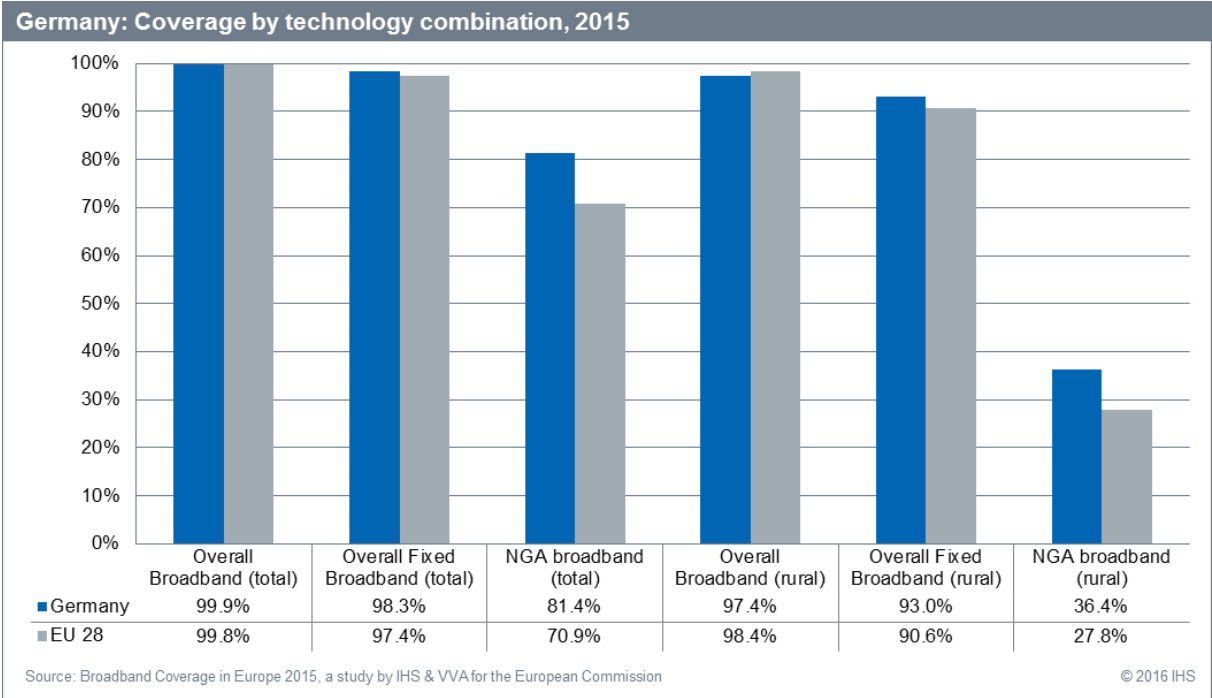
DSL was the dominant broadband access technology in terms of coverage, passing 96.9% of German homes. Standard cable coverage was lower, at 63.2%, although it still exceeded the EU average.

Most substantial coverage gains were reported for VDSL and FTTP, coverage of which increased by 5.5 and 2.2 percentage points respectively and at the end of June 2016 nearly a half (48.5%) of households had access to VDSL services and 6.6% of homes were passed by FTTP networks. However, DOCSIS 3.0 remained the key NGA technology with high-speed cable broadband available to 62.7% of households.

The lack of FTTP coverage partly reflects the long-term focus of leading broadband network operators on alternative technologies and upgrades to their legacy copper or coaxial cable networks rather than on new FTTP networks build-up.

By mid-2015, Germany again reported the lowest HSPA coverage among the study countries, with only 91.5% of households covered. At the same time, LTE coverage increased by 1.9 percentage points to 94.0%, exceeding both the national HSPA coverage as well as the EU average. This is a reflection of German mobile operators' focus on deploying LTE networks in previously underserved rural areas rather than rolling out HSPA networks in these areas.

Germany: Coverage by technology, total, 2015
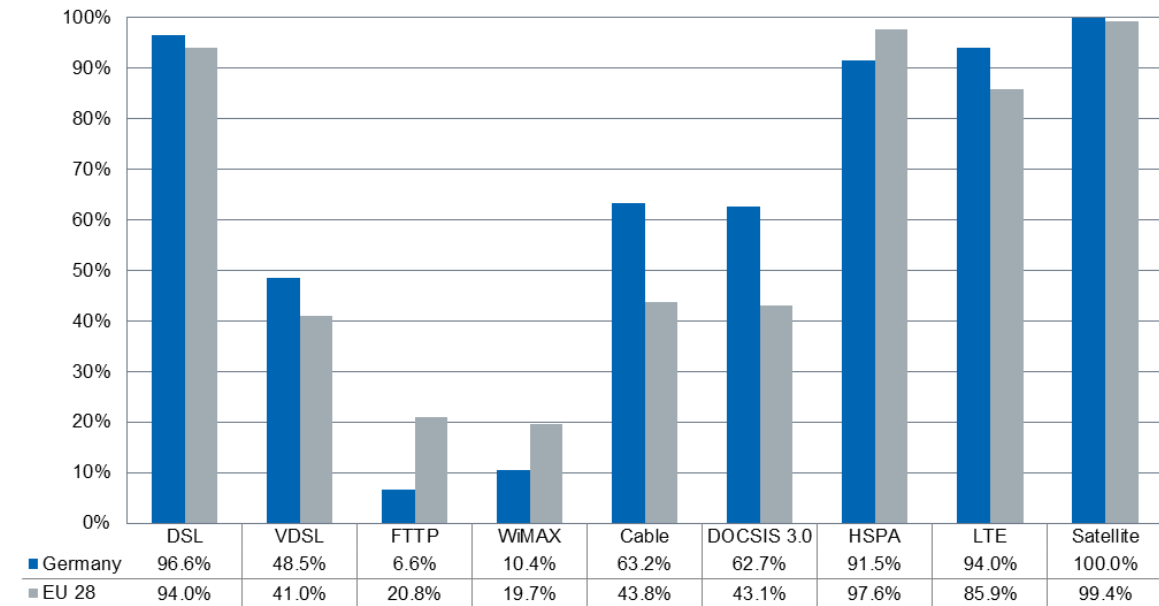
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ Germany	96.6%	48.5%	6.6%	10.4%	63.2%	62.7%	91.5%	94.0%	100.0%
■ EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

In rural areas, DSL continued to be an important driver of broadband coverage, with 86% of rural homes having access to DSL services. Cable coverage was, at 14.8%, higher than the EU average but considerably lower than DSL coverage. VDSL was the key NGA technology, covering 28.5% of rural households, a 2.5 percentage point increase compared to December 2014. High-speed cable broadband was available to 14.4% rural homes, which were passed by DOCSIS 3.0. FTTP remained limited in rural Germany with only 1.4% of rural households having access at the end of June 2015.

Germany is characterised by relatively high level of rural LTE coverage. LTE networks were available to 82.5% of rural households and LTE exceeded HSPA coverage, which at 59.6% was the lowest among the study countries.

Germany: Coverage by technology, rural areas, 2015
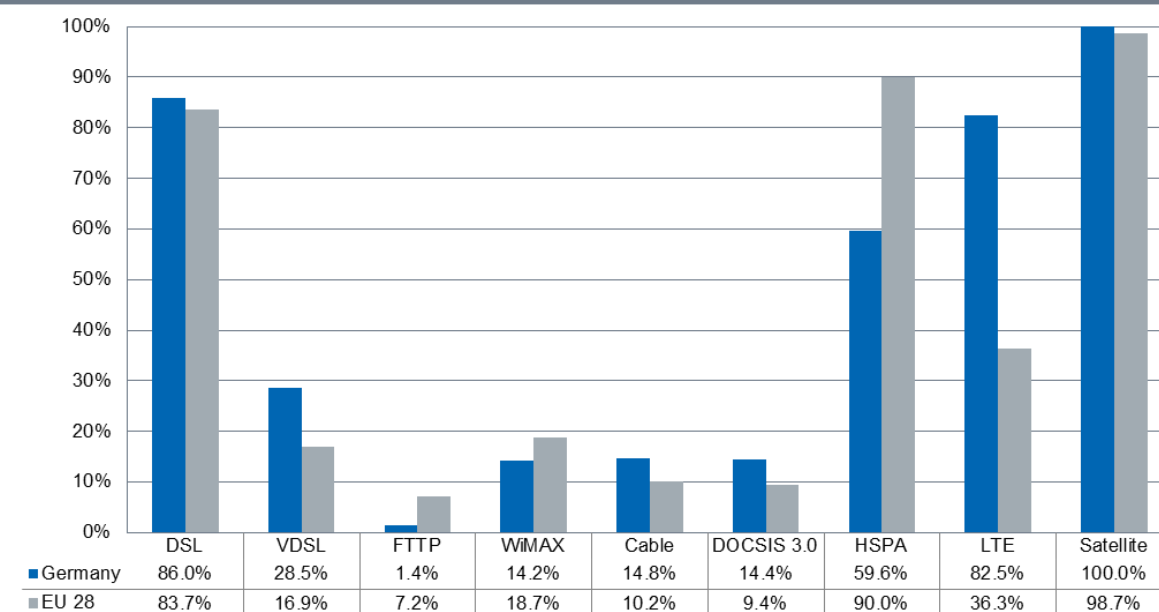
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ Germany	86.0%	28.5%	1.4%	14.2%	14.8%	14.4%	59.6%	82.5%	100.0%
■ EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

5.11.2 Regional coverage by broadband technology

Germany: Overall fixed broadband coverage, 2015

Legend:
- 0% - <75%
- 75% - <90%
- 90% - <95%
- 95% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

© 2016 IHS

Germany: NGA broadband coverage, 2015

Legend:
- 0%
- >0% - <35%
- 35% - <65%
- 65% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

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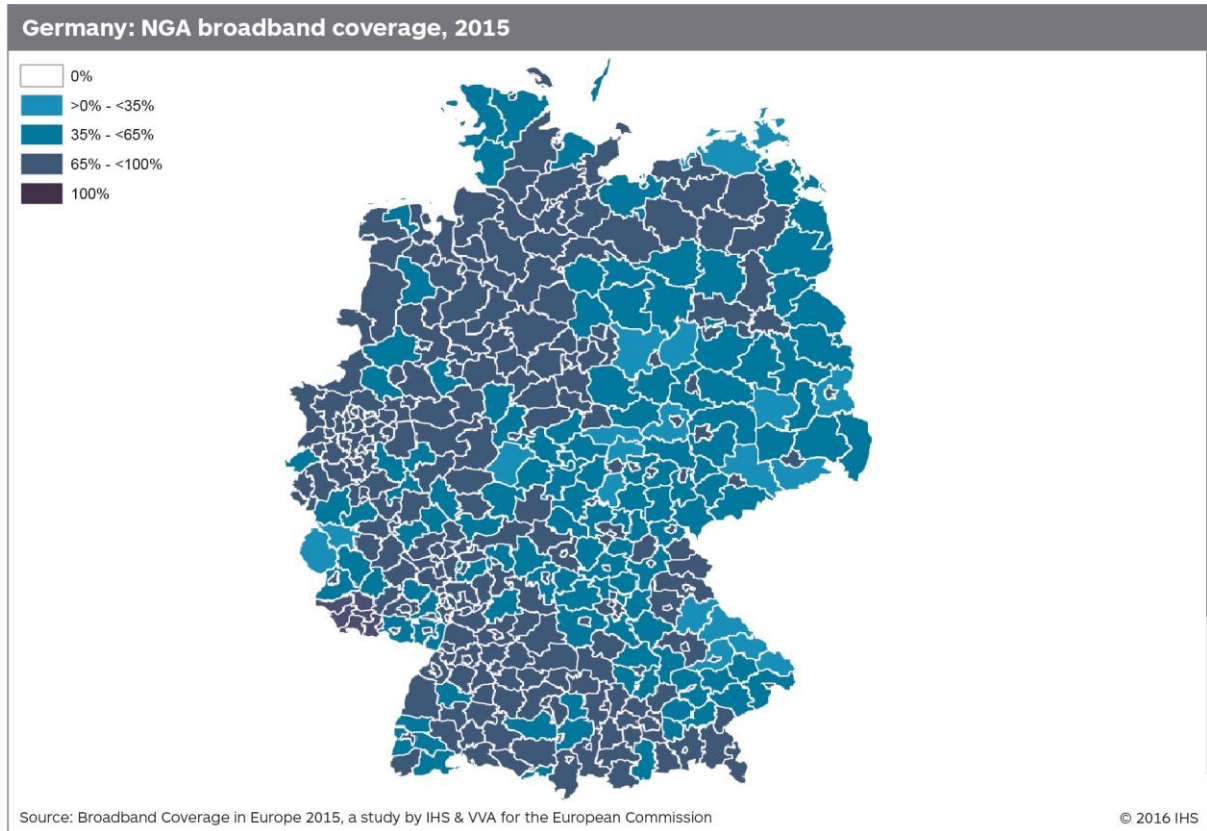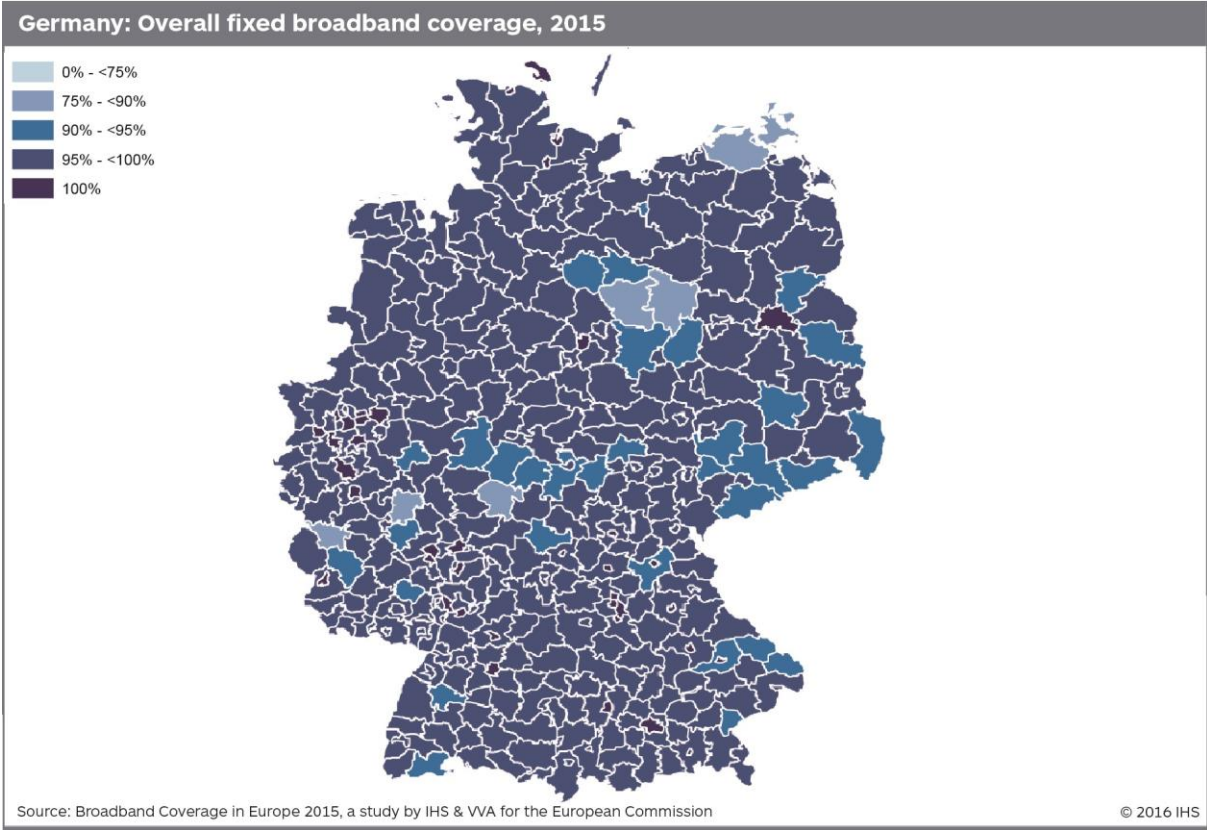
Examining regional patterns in fixed broadband coverage, significant differences could be observed, with fixed broadband coverage ranging from just over 88% in Vogelsbergkreis to 100% in most metropolitan areas. While in most regions changes in coverage were limited, two regions (Ludwigslust and Parchim) reported fixed broadband coverage increases of more than 10 percentage points

The lowest reported NGA coverage was 13.6% in the Elbe-Elster area. By comparison, most urban areas recorded NGA coverage levels exceeding 90%. Coverage changes were considerably more varied compared to fixed broadband, with some regions reporting significant progress in terms of NGA access. For instance the Parchim and Ludwigslust regions reported coverage increases of more than 60 percentage points each, and in Güstrow and Bad Doberan NGA coverage grew by more than 40 percentage points.

5.11.3 Regulatory and market overview

Germany's approach to broadband rollout has been originally laid-out in The Federal Government's Broadband Strategy, published in 2009.[62] The strategy document aimed to provide additional impetus for broadband rollout. The original targets set out in the strategy (closing broadband coverage gaps by end 2010 and 75% of households having access to 50Mbps connections by the end of 2014) have been revised in the Digital Agenda 2014-2017, which stipulated a goal of 100% coverage with 50Mbps connections by the end of 2018.[63]

In June 2015, the European Commission approved a EUR 3 billion national scheme for Germany to support the development of NGA broadband in areas where private investment is insufficient. The Commission did however express a concern with regard to the use of VDSL vectoring technology, which currently does not support open access to the network and cannot be used in state-funded projects. The German government, however, plans to develop a solution allowing for open access to vectored networks in order to ensure that vectoring can be implemented within the framework of the funding package.[64]

The key player in the German fixed broadband market is the incumbent operator Deutsche Telekom, which launched VDSL services in 2006, alongside its IPTV service. More recently, it launched vectored VDSL services, with plans to cover a further 5.9 million homes by VDSL vectoring technology by 2018, which would translate to 80% coverage.[65] Other operators also contributed to further VDSL network upgrades and deployment, with Vodafone launching its own VDSL vectoring offer in 2014 [66] and regional providers such as NetCologne[67] and EWE Tel[68] also launching vectoring offers in 2015.

Cable companies have also been rolling out next generation broadband services. Historically, network and access level ownership divisions have slowed upgrades for the cable sector in Germany, but with increasing consolidation, DOCSIS 3.0 coverage has improved substantially. Leading cable groups Kabel Deutschland and Liberty Global have in 2014 been joined by other operators in offering NGA access, such as the regional operator Tele Columbus, which launched a 400 Mbps service in Potsdam in April 2015.[69]

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[62] https://ec.europa.eu/digital-agenda/en/news/federal-government%E2%80%99s-broadband-strategy-german-national-broadband-strategy

[63] http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?doc_id=7784

[64] http://europa.eu/rapid/press-release_IP-15-5186_en.htm

[65] https://www.telegeography.com/products/commsupdate/articles/2015/02/24/telekom-expands-vdsl-vectoring-rollout-plans/

[66] https://www.telegeography.com/products/commsupdate/articles/2014/08/05/vodafone-launches-vdsl-vectoring-offer/

[67] https://www.netcologne.de/ueber-uns/unternehmen/presse/mitteilung/9329/

[68] https://www.ewe.com/de/presse/pressemitteilungen/2015/06/highspeed-internet-ewe-tel-setzt-vectoring-ein-ewe-tel-gmbh

[69] https://www.telecolumbus.com/tele-columbus-startet-400-mbits-in-potsdam/

Germany was one of the early adopters of LTE technology, being the sixth European country in which mobile operators launched LTE services. Vodafone was the first to launch an LTE network at the end of 2010, followed by Telefonica and Deutsche Telekom in 2011[70] and an alternative mobile provide E-plus in 2014. Throughout 2015, Deutsche Telekom launched LTE-Advanced services in selected areas and ran further carrier aggregation trials in Berlin.[71]

Improving rural coverage remains a priority to ensure that Germany meets its coverage targets. Since 2014, Deutsche Telekom has been offering alternative access means including hybrid LTE-DSL access connections via a hybrid router combining the two technologies.[72] An LTE-based service for rural households has also been introduced by Vodafone, with its "LTE Zuhause" offer aimed specifically to provide broadband access in rural areas without DSL and cable infrastructure.[73]

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[70] GSA 4G Market and Technology Update. Available for download here: http://www.gsacom.com/gsm_3g/info_papers.php4
[71] http://blog.telekom.com/2015/09/28/3ca-test-berlin/
[72] http://www.telecompaper.com/news/deutsche-telekom-unveils-hybrid-dsl-lte-home-router--1035238
[73] https://www.vodafone.de/unternehmen/presse/pressearchiv2015-302422.html

5.11.4 Data tables for Germany

Statistic	National
Population	80,767,463
Persons per household	2.0
Rural proportion	8.7%

Technology	Germany 2015		Germany 2014		Germany 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	96.6%	86.0%	95.8%	84.7%	94.9%	82.4%	94.0%	83.7%
VDSL	48.5%	28.5%	43.0%	26.0%	33.5%	16.7%	41.0%	16.9%
FTTP	6.6%	1.4%	4.4%	0.8%	4.4%	0.5%	20.8%	7.2%
WiMAX	10.4%	14.2%	10.1%	13.3%	12.8%	13.0%	19.7%	18.7%
Cable	63.2%	14.8%	62.4%	14.0%	59.5%	11.5%	43.8%	10.2%
DOCSIS 3.0	62.7%	14.4%	61.6%	13.4%	55.8%	8.7%	43.1%	9.4%
HSPA	91.5%	59.6%	92.5%	62.5%	92.2%	59.9%	97.6%	90.0%
LTE	94.0%	82.5%	92.1%	78.8%	81.0%	65.9%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	99.9%	97.4%	99.8%	96.9%	99.9%	98.8%	99.8%	98.4%
Overall fixed broadband	98.3%	93.0%	97.9%	92.4%	97.5%	94.9%	97.4%	90.6%
NGA broadband	81.4%	36.4%	80.8%	33.1%	74.8%	21.30%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.12 Greece

5.12.1 National coverage by broadband technology

While in mid-2015 Greece reported overall and fixed broadband coverage levels that exceeded the EU average, it continued to lag considerably behind the vast majority of the study countries in terms of NGA coverage. Even though total NGA coverage grew by 2.3 percentage points during the first six months of 2015, high-speed broadband services were available to just 36.3% of Greek households. No progress was recorded in rural NGA coverage and Greece remained at the second lowest rank in rural NGA availability among the study countries with only 0.5% of rural homes passed by NGA networks.

Greece: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Greece	99.9%	99.3%	36.3%	99.3%	96.5%	0.5%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
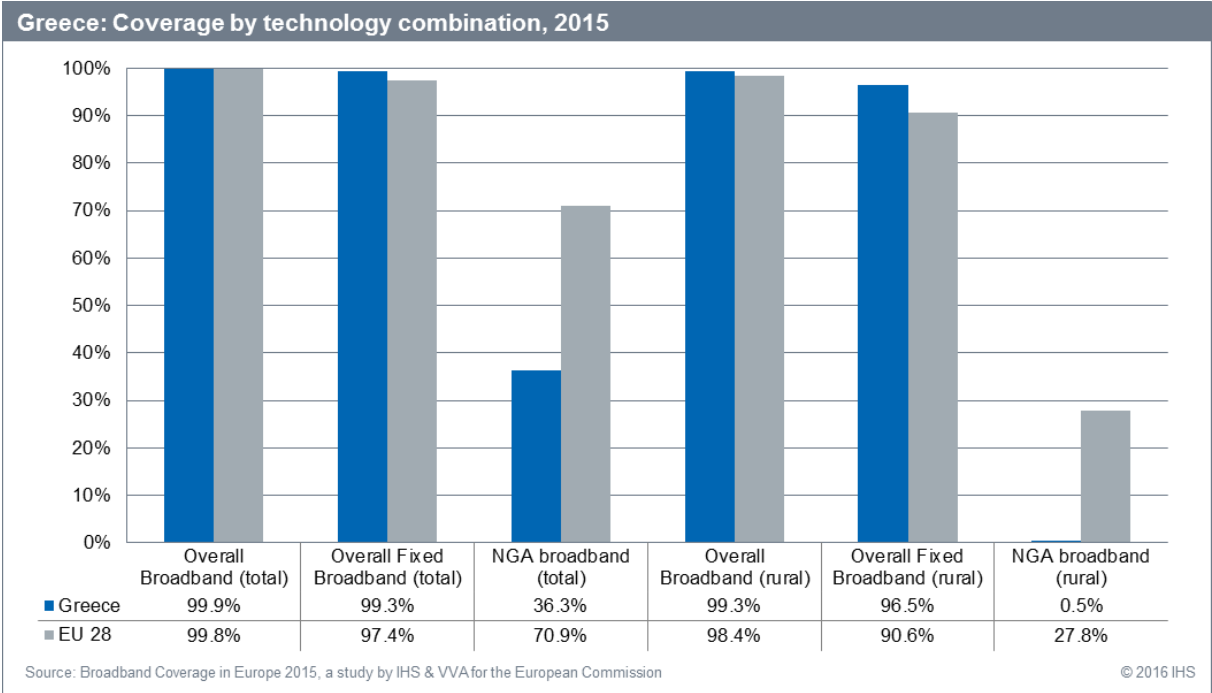
In mid-2015, Greece continued to be one of the three study countries (along with Iceland and Italy) with no cable networks presence. Coupled with very low FTTP and WiMAX coverage (0.4% and 0.1% respectively), the entire fixed broadband coverage practically relies on a single technology, namely DSL, with VDSL serving as the only source of high-speed NGA access.

DSL networks covered nearly all households (99.3%) in Greece, unchanged from previous years. The incumbent, OTE, has been heavily investing in upgrading its DSL network, yet progress in increased VDSL availability has so far been rather slow. In the first six months of 2015, VDSL coverage grew by 2.3 percentage points to 36.1% but remained below the EU average of 41%.

With regards to mobile broadband technologies, HSPA remained at its 2014 near universal coverage level (99.3%). LTE, on the other hand, recorded the most significant coverage increase among all technologies, with coverage increasing by almost 10 percentage points and reaching 79.8% of households. This increase can be attributed to continued LTE roll-out by Cosmote (OTE's mobile branch) and Vodafone Greece and a newly launched Wind Hellas' LTE network.

Greece: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Greece	99.3%	36.1%	0.4%	0.1%	0.0%	0.0%	99.3%	79.8%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
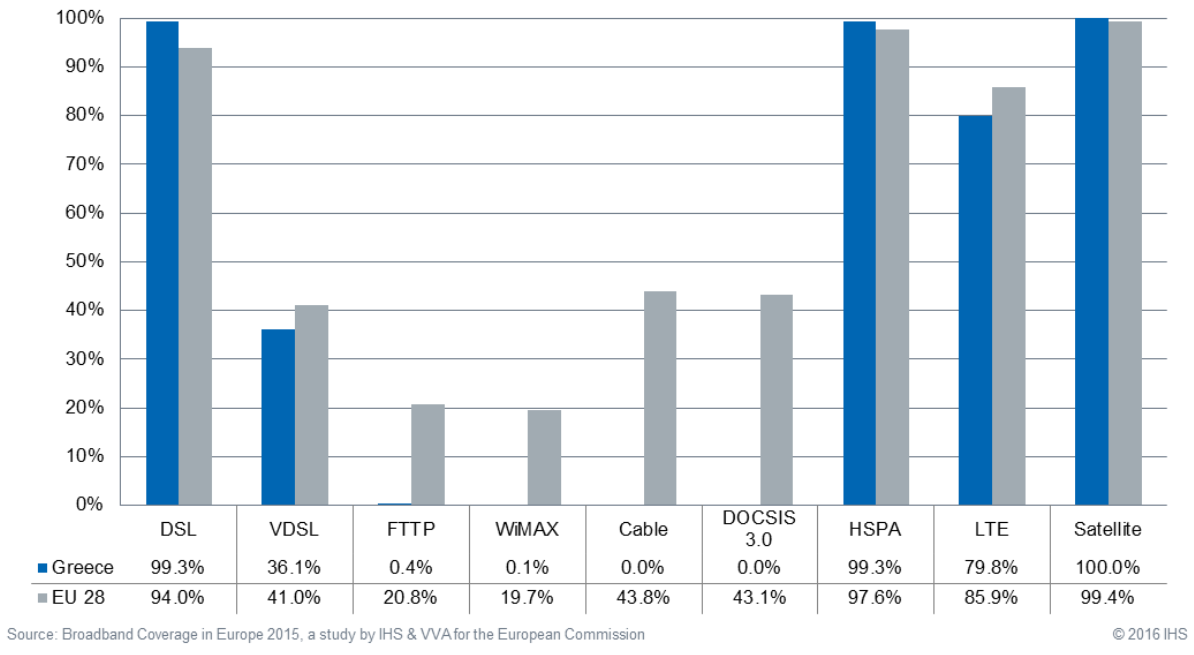
The sole fixed broadband access technology available to rural households was DSL, which provided broadband access to 96.3% of rural households. Despite the relatively high rural DSL coverage, VDSL upgrades in rural areas continued to be extremely limited achieving only 0.5% rural coverage. Thus, rural NGA availability remains very challenging in Greece.

Rural LTE coverage increased at broadly the same pace as national coverage, with 32.3% rural homes passed by LTE networks, a 9.2 percentage point increase compared to 2014.

Greece: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Greece	96.3%	0.5%	0.0%	0.5%	0.0%	0.0%	96.6%	32.3%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

5.12.2 Regional coverage by broadband technology

Greece: Overall fixed broadband coverage, 2015

0% - <75%
75% - <90%
90% - <95%
95% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

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Greece: NGA broadband coverage, 2015

0%
>0% - <35%
35% - <65%
65% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

© 2016 IHS

Most regions recorded fixed broadband coverage rates exceeding 98%. Two clear exceptions were Ileia and Evrytania, which were the only two regions with fixed coverage rates lower than 90%. It is also worth noting that the Greek island regions (such as Zakynthos, Lefkada, or Kerkyra) tended to report complete or almost complete fixed broadband coverage, while more variation was observed in mainland regions.

NGA coverage was more varied, with most regions recording coverage levels between 20% and 50%. NGA coverage exceeded 50% in only four regions (Evros, Xanthi, Rodopi and Serres) with no regions reporting NGA coverage of less than 10%. The most substantial increase in NGA broadband coverage (4.4 percentage points) was reported in Attiki.

5.12.3 Regulatory and market overview

The National Broadband Plan NGA 2014-2020 is the key document guiding national policy for the development of broadband infrastructure and digital economy. The plan has two long-term objectives in line with the Digital Agenda targets:

- Universal availability of 30 Mbps access by 2020;
- Availability of 100 Mbps connections to at least 50% of households by 2020.

The plan also includes specific steps aimed at achieving the objectives and closing coverage gaps between urban and rural areas with the help of fibre-optic networks, such as reduction of investment cost, simplification of administrative procedures and coordination of NGA networks deployment.[74]

As noted above, the Greek fixed broadband market is almost exclusively focused on DSL-based technologies, with DSL upgrades and VDSL roll-out being the key priorities for the the incumbent OTE as well as other broadband providers, such as Vodafone Greece or ForthNet. At the end of 2014, Vodafone completed its acquisition of an alternative broadband operator Hellas Online, leading to an increased consolidation of the Greek telecoms market.[75]

Cosmote, the mobile division of OTE and Vodafone Greece both launched their LTE networks in 2012 and have been expanding their footprint since then. In March 2015, Wind Hellas launched its own LTE network.[76] Meanwhile, both Vodafone[77] and Cosmote[78] begun to focus on rolling out LTE-Advanced networks during the first six months of 2015 and increasing download speeds to more than 300 Mbps.

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[74] http://www.yme.gr/getfile.php?id=6018

[75] https://www.telegeography.com/products/commsupdate/articles/2014/11/26/vodafone-completes-91-2-acquisition-of-hol/

[76] https://www.wind.gr/en/wind/support/coverage/mobile-telephony-network/4g/

[77] http://www.telecompaper.com/news/vodafone-greece-launches-lte-advanced--1067671

[78] https://www.telegeography.com/products/commsupdate/articles/2015/10/13/cosmote-launches-375mbps-lte-a/

5.12.4 Data tables for Greece

Statistic	National
Population	10,903,704
Persons per household	2.5
Rural proportion	20.3%

Technology	Greece 2015		Greece 2014		Greece 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	99.3%	96.3%	99.3%	96.3%	99.2%	97.7%	94.0%	83.7%
VDSL	36.1%	0.5%	33.8%	0.5%	26.7%	0.0%	41.0%	16.9%
FTTP	0.4%	0.0%	0.4%	0.0%	0.4%	0.0%	20.8%	7.2%
WiMAX	0.1%	0.5%	0.1%	0.4%	0.0%	0.2%	19.7%	18.7%
Cable	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	43.8%	10.2%
DOCSIS 3.0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	43.1%	9.4%
HSPA	99.3%	96.6%	99.3%	96.6%	99.5%	96.5%	97.6%	90.0%
LTE	79.8%	32.3%	70.2%	23.1%	54.8%	11.8%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	99.9%	99.3%	99.9%	99.3%	99.9%	98.8%	99.8%	98.4%
Overall fixed broadband	99.3%	96.5%	99.3%	96.4%	99.6%	97.8%	97.4%	90.6%
NGA broadband	36.3%	0.5%	34.0%	0.5%	26.9%	0.0%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.13 Hungary

5.13.1 National coverage by broadband technology

During the first half of 2015, overall fixed broadband coverage grew by 0.9 percentage points and reached 95.2%of households. Furthermore, rural fixed broadband coverage increased by 4.0 percentage points to 85.4% of rural homes passed by at least one fixed broadband technology.

Total NGA broadband coverage was the only category for which Hungary recorded a coverage value higher than the EU average. At the end of June 2015, 78.2% of Hungarian households had access to high-speed NGA broadband, a 2.6 percentage point growth. However, NGA availability in rural areas remained more limited with a fifth (20.3%) rural homes being passed by NGA networks.

Hungary: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Hungary	99.1%	95.2%	78.2%	97.3%	85.4%	20.3%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
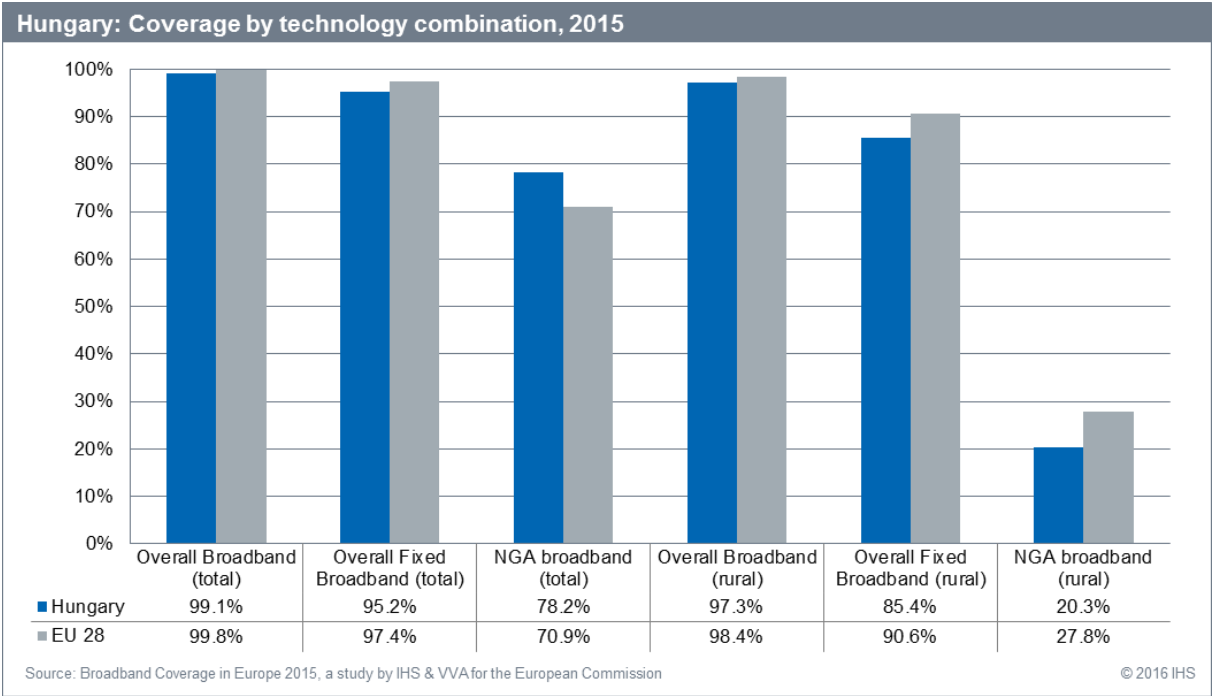
Looking at the individual technologies, DSL continued to be the most widespread technology available to 90.5% of households. Cable networks passed 66.1% of homes at the end of June 2015, a 1.9 percentage point increase and a reflection of the quite strong position of cable operators in the Hungarian broadband market.

With the majority (96%) of cable networks upgraded to DOCSIS 3.0, the high-speed cable broadband technology remained the main driver of NGA availability in Hungary. DOCSIS 3.0 coverage increased by 2.7 percentage points and reached 63.2% of households by mid-2015. VDSL services were available to 28.0% of Hungarian households, a 1.8 percentage point growth compared to December 2014, while FTTP networks passed 21.5% of homes.

LTE coverage continued to increase considerably in the first six months of 2015, growing by 22 percentage points and reaching 95.0% of households, thus exceeding the EU average of 85.9% for the first time.

Hungary: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Hungary	90.5%	28.0%	21.5%	0.0%	66.1%	63.2%	98.3%	95.0%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
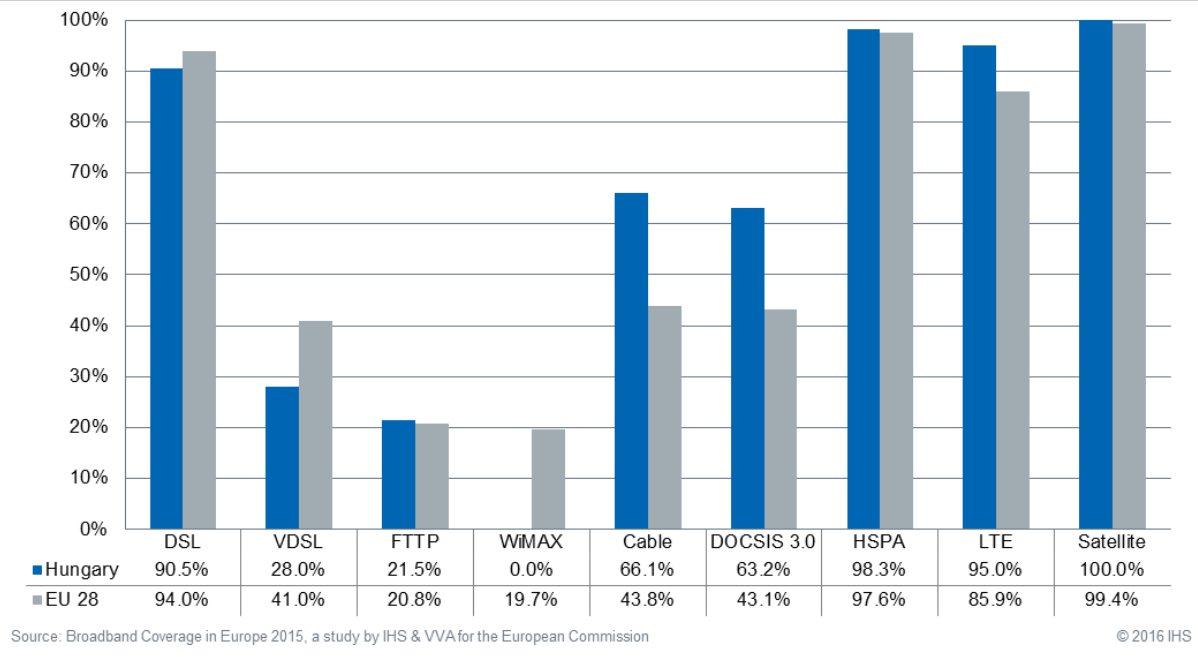
Growth in rural broadband coverage remained limited in the first half of 2015, with the exception of LTE, which registered a considerable 69.1 percentage point increase. As mobile operators expanded their LTE networks across the country, LTE services became available to 84.1% of rural households by mid-2015.

With VDSL roll-out limited to urban areas and FTTP networks passing only 4.0% of rural homes, DOCSIS 3.0 remained the key NGA technology available to rural households. And at 18.2%, Hungary's rural DOCSIS 3.0 exceeded the EU average of 9.4%.

Hungary: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Hungary	74.1%	0.0%	4.2%	0.0%	19.8%	18.2%	94.6%	84.1%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
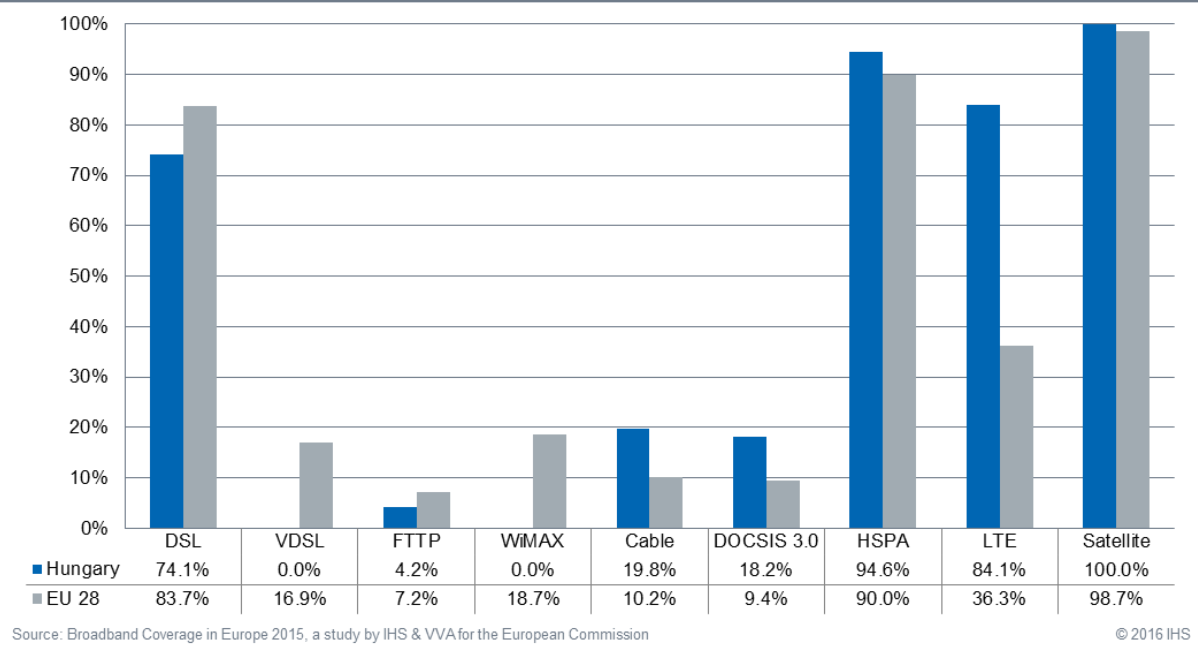
5.13.2 Regional coverage by broadband technology

On a regional level, fixed broadband coverage was lowest in Somogy (92.5%) and highest in Budapest (nearly 99%). In addition, six regions out of twenty regions recorded fixed coverage rates higher than 95%, compared to only three at the end of 2014.
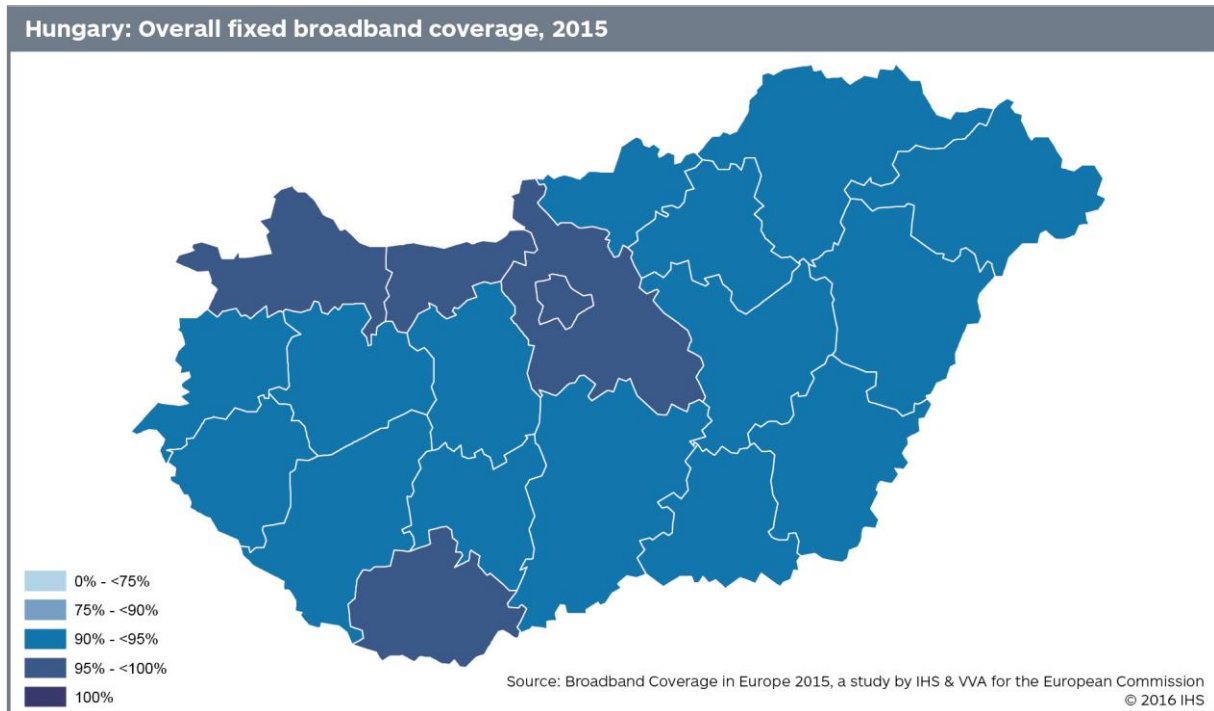
Regional NGA coverage continued to vary greatly in the first half of 2015 and ranged between nearly 63% in Somogy and close to 92% in Budapest.

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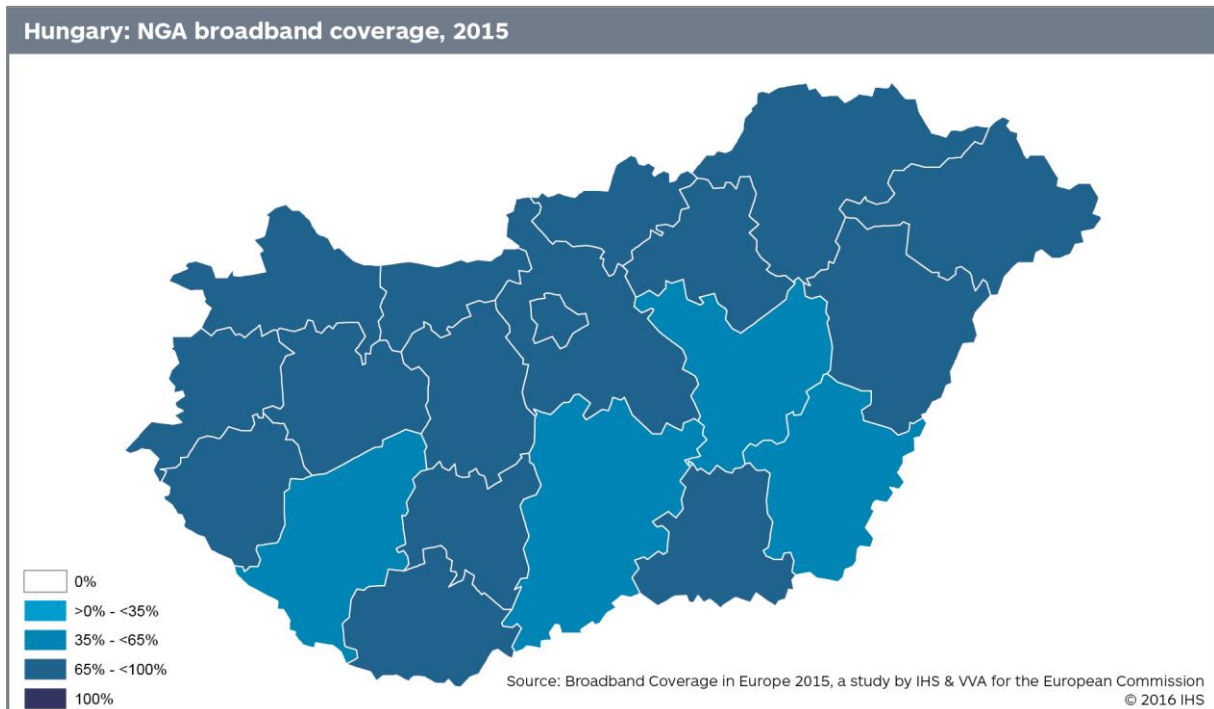
5.13.3 Regulatory and market overview

The current national broadband strategy for the period 2014-2019 sets out goals in line with the Digital Agenda targets aiming to reach complete broadband coverage of at least 30 Mbps by 2020, as well as 50% of households having speeds of at least 100 Mbps in the same timeframe. The strategy places priority on the development of an optical cable-based backhaul network, wireless technology coverage, and development of fast connections for public institutions located in rural area.[79]

Fixed broadband market in Hungary is split primarily between two operators, the incumbent Magyar Telekom, and a cable operator Liberty Global-backed UPC. Two key alternative broadband providers are cable operator DIGI Kabel and a DSL and cable provider Invitel. Invitel has been investing extensively in the development of its networks in the last couple of years and in May 2015 announced a EUR 30 million investment plan to expand its footprint to more than 500 thousand households in 98 cities.[80]

Meanwhile, Magyar Telekom has been taking a number of steps to improve its position in the NGA market, which included purchase of a number of smaller cable operators, with the aim to provide high-speed cable broadband.[81] The overall objective of the company is to ensure its broadband services are available to all households by 2018 and it has entered into an official partnership with the Hungarian government to enhance Hungary's digital development and formally promising investment into high-speed broadband infrastructure.[82]

In the mobile segment, Magyar Telekom entered into a partnership agreement with Telenor Hungary to deploy a shared 800MHz 4G LTE network across the whole country (with the exception of Budapest) with 800 base transceiver stations planned to be installed and managed by the end of 2015.[83]

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[79] http://www.vus.sk/broadband/nbbs/hu_nbbs.pdf
[80] http://www.telecompaper.com/news/invitel-starts-eur-30-mln-network-development-programme--1081287
[81] http://www.broadbandtvnews.com/2014/12/22/magyar-telekom-buys-cablecos/
[82] http://www.telekom.hu/about_us/press_room/press_releases/2014/february_21
[83] http://telecomist.com/2015/02/mtel-telenor-agree-800mhz-4g-pact/

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5.13.4 Data tables for Hungary

Statistic	National
Population	9,877,365
Persons per household	2.4
Rural proportion	31.0%

Technology	Hungary 2015		Hungary 2014		Hungary 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	90.5%	74.1%	88.7%	73.4%	88.7%	73.5%	94.0%	83.7%
VDSL	28.0%	0.0%	26.1%	0.0%	24.0%	0.0%	41.0%	16.9%
FTTP	21.5%	4.2%	20.8%	4.0%	19.8%	3.9%	20.8%	7.2%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.7%	18.7%
Cable	66.1%	19.8%	64.3%	19.2%	63.5%	17.5%	43.8%	10.2%
DOCSIS 3.0	63.2%	18.2%	60.4%	17.4%	59.7%	15.9%	43.1%	9.4%
HSPA	98.3%	94.6%	98.2%	94.2%	97.0%	90.0%	97.6%	90.0%
LTE	95.0%	84.1%	73.0%	14.9%	39.1%	9.9%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	99.1%	97.3%	99.1%	97.1%	98.5%	95.0%	99.8%	98.4%
Overall fixed broadband	95.2%	85.4%	94.4%	81.4%	94.4%	84.2%	97.4%	90.6%
NGA broadband	78.2%	20.3%	75.6%	19.4%	75.7%	17.9%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.14 Iceland

5.14.1 National coverage by broadband technology

Compared to the considerable progress observed in broadband coverage in Iceland in 2014, coverage increases were less substantial in the first half of 2015 with fixed broadband coverage remaining at its 2014 level of 98.1% households covered by at least one fixed network and NGA coverage increasing by 1.2 percentage points to 90.8%.

NGA coverage in rural areas reached 71.3% of rural households, increasing by 1.1 percentage points and greatly exceeding the EU average of 27.8%.

Iceland: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Iceland	99.3%	98.1%	90.8%	98.0%	93.5%	71.3%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
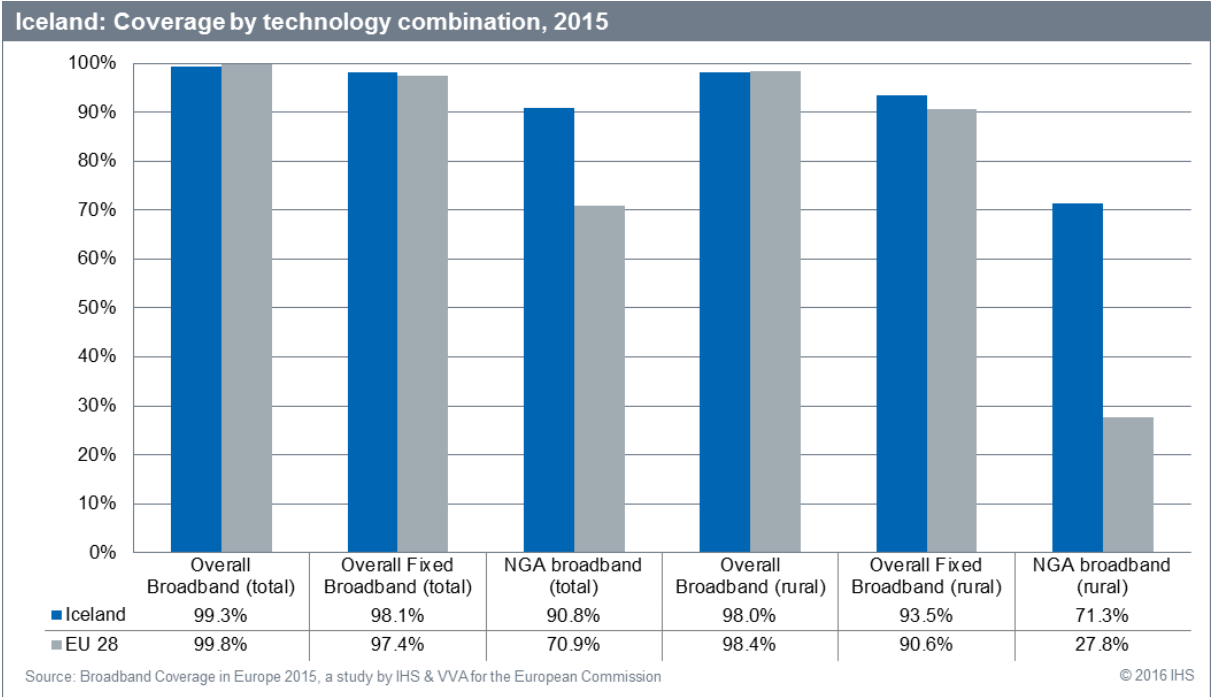
With cable connections absent in Iceland and WiMAX coverage limited, at just 4%, DSL and FTTP are the two technologies driving fixed broadband coverage in the country.

In the first six months of 2015, there were slight increases in both VDSL and FTTP coverage, which contributed to the overall growth in NGA coverage. After an extensive roll out of VDSL by the incumbent Siminn's infrastructure subsidiary, Míla, in 2014, the pace of the expansion seems to have slowed down slightly as VDSL coverage increased by just 1.5 percentage points and reached 85.8% of households by the end of June 2015. Growth in FTTP was even more limited (0.5 percentage points), nevertheless at 53.4% FTTP coverage was well above the EU average of 20.8%.

With regards to mobile broadband technologies, HSPA was available to nearly all Icelandic households (98.6%). LTE availability continued to grow substantially during the first half of 2015, recording a 12.5 percentage point increase with LTE networks passing 85.0% of homes. However, in mid-2015 LTE coverage remained below the EU average (85.9%).

IHS Global Limited, Valdani Vicari Associati
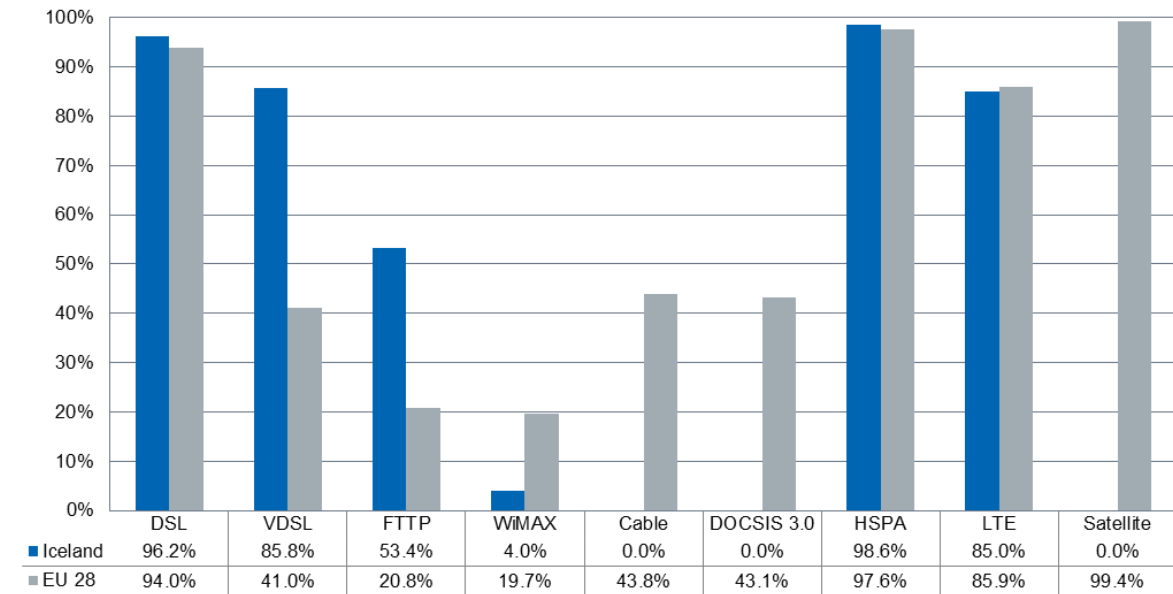
Iceland: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ Iceland	96.2%	85.8%	53.4%	4.0%	0.0%	0.0%	98.6%	85.0%	0.0%
■ EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

In rural areas, VDSL coverage increased by a moderate1.1 percentage points, reaching 70.2% of rural households. In mid-2015, Iceland remained the third country in terms of rural VDSL coverage behind Luxembourg and Belgium. There was no growth registered for rural WiMAX and FTTP coverage, which reached 7.0% and 2.3% of rural households, respectively.

A substantial increase, on the other hand, was recorded for rural LTE coverage, which grew by 10.6 percentage points to 57.3%. In addition, a 2.6 percentage point increase was observed for HSPA coverage.

Iceland: Coverage by technology, rural areas, 2015
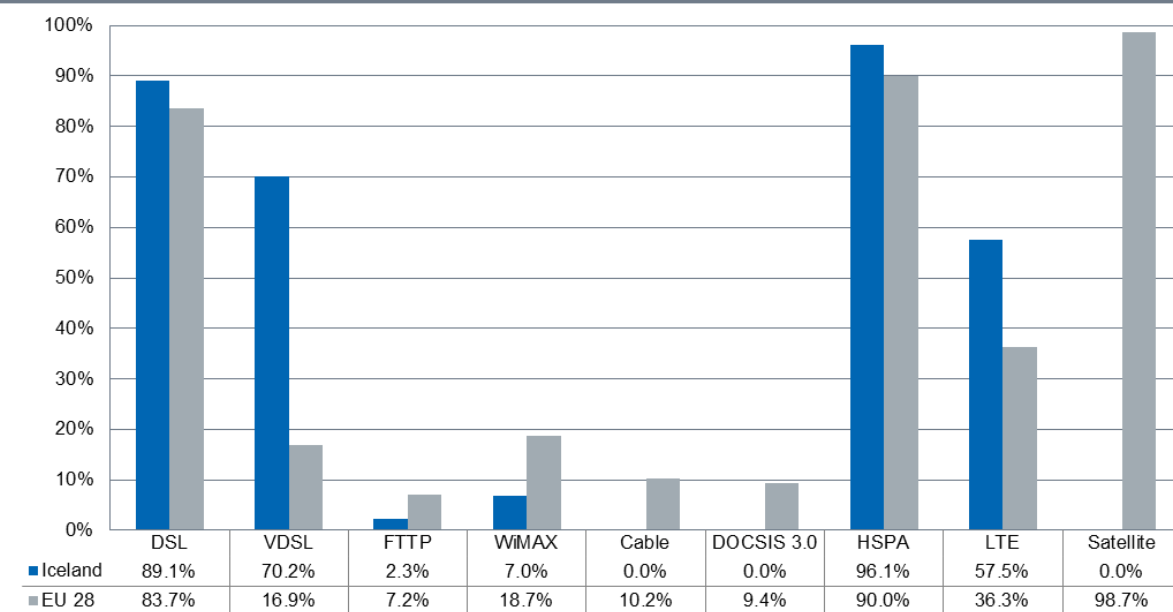
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ Iceland	89.1%	70.2%	2.3%	7.0%	0.0%	0.0%	96.1%	57.5%	0.0%
■ EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

5.14.2 Regional coverage by broadband technology

Overall fixed broadband coverage differed by nearly 5 percentage points between the two Icelandic regions, with complete coverage recorded in the more densely populated Höfudborgarsvædi region surrounding the capital Reykjavik.

Iceland: Overall fixed broadband coverage, 2015

Legend:
- 0% - <75%
- 75% - <90%
- 90% - <95%
- 95% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS
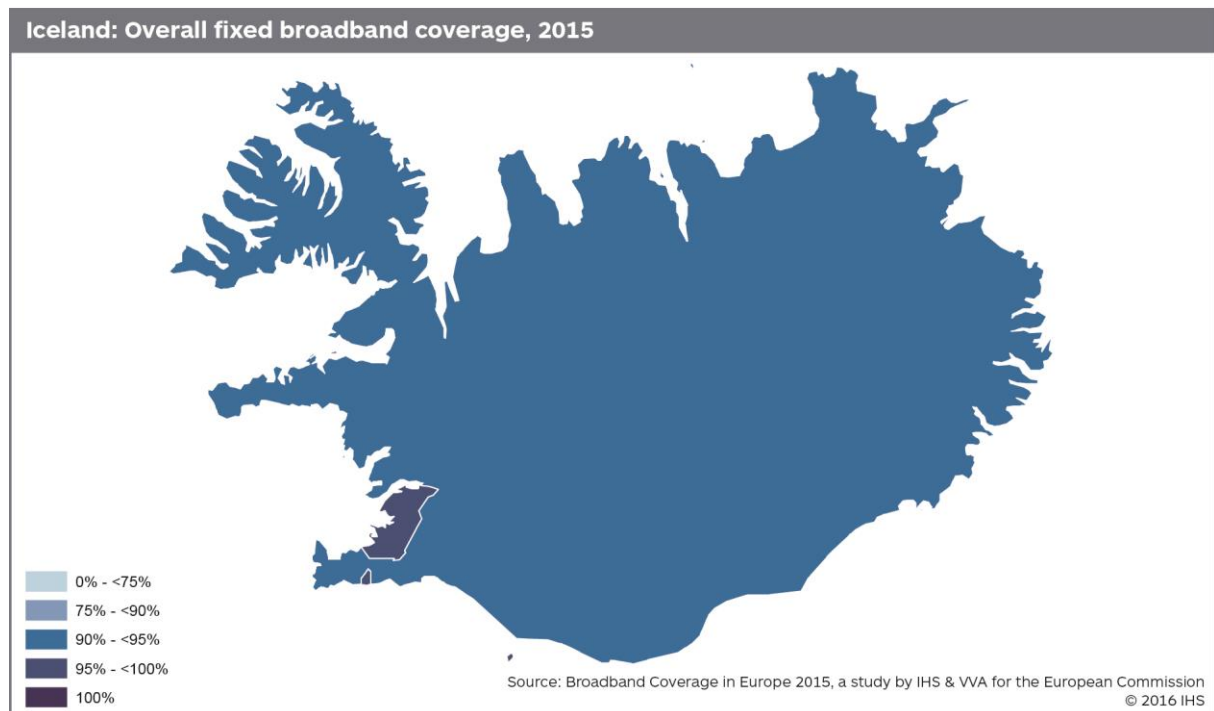
There was quite a large gap in NGA coverage between the two regions as the Höfudborgarsvædi region (i.e. the area around Reykjavik) recorded an NGA coverage level of more than 98%, while in the Landsbyggd region NGA services were available to less than 80% of households.

Iceland: NGA broadband coverage, 2015

Legend:
- 0%
- >0% - <35%
- 35% - <65%
- 65% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS
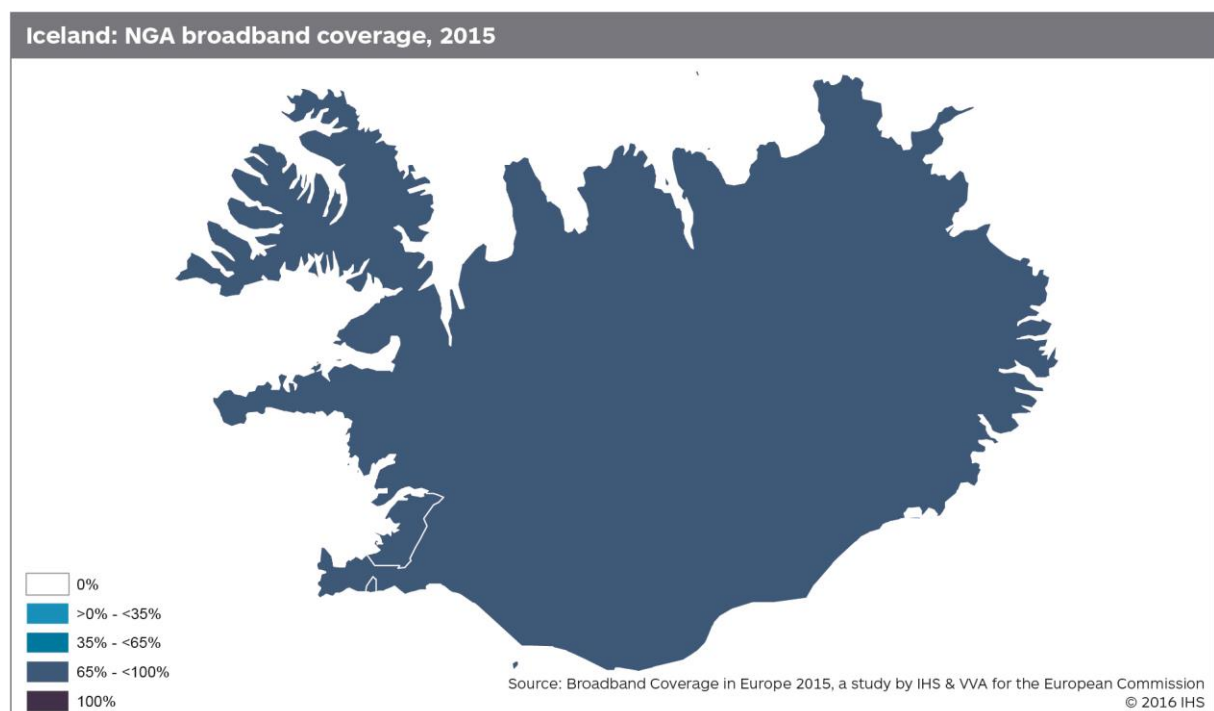
5.14.3 Regulatory and market overview

Iceland's broadband strategy was outlined in the 2008 government policy document "Iceland the e-nation".[84] The main objectives drawn out in the strategy include the improvement of broadband services, increasing the efficiency of electronic services provided by public administration offices and promoting participation of citizens on e-commerce and e-education.

In May 2015, five Nordic communications regulators from Denmark, Finland, Sweden, Norway and Iceland, have agreed to formalise their cooperation efforts and stipulate an annual rotating chairperson role in order to boost regional collaboration regarding regulatory and market issues such as telecoms regulation, spectrum issues as well as broadband infrastructure improvements.[85]

The incumbent, Siminn, is the dominant player in Iceland's fixed broadband market operating both DSL as well as FTTP networks. This mixed network ownership approach is typical for broadband providers in the country, especially in their offer of both VDSL as well as FTTP services to customers. Currently, Siminn deploys FTTP networks in new housing developments and VDSL across other areas.

Another important market player in Iceland is the power company Reykjavik Energy. It began to develop a fibre access network in 2005[86], which a range of ISPs rely on via an open access model. Providers using the network include Vodafone Iceland, 365 and Simafelagid.

LTE networks have first been launched in Iceland in 2013 by two operators, Nova and Vodafone. Siminn followed at the beginning of 2014 with its own LTE network.[87] Mobile operator, 365 Media, was expected to launch LTE services in 2015 since offering the highest bid for LTE frequencies in the 2013 auction. However, in May 2015, the provider requested an amendment of the concession terms, which originally required the operator to provide access with download speeds of 10 Mbps to 99.5% of the population by 2016 with download speed increasing to at least 30 Mbps by 2020. 365 Media requested that only 97% of population would be covered by 10 Mbps speeds by 2016 arguing that it has lost unique access to underserved areas due to Vodafone/Nova frequency sharing agreement and government's plan to deploy state-funded fibre-optic network in rural areas, thus negatively impacting its competitiveness.[88]

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[84] http://eng.forsaetisraduneyti.is/media/utgefidefni/Iceland_the_eNation.pdf

[85] http://www.telecompaper.com/news/nordic-telecoms-watchdogs-formalise-their-cooperation--1080766

[86] http://www.alacrastore.com/moodys-credit-research/Orkuveita-Reykjavikur-PBC_101741

[87] GSA 4G Market and Technology Update. Available for download here: http://www.gsacom.com/gsm_3g/info_papers.php4

[88] https://www.telegeography.com/products/commsupdate/articles/2015/05/28/365-media-requests-amendment-to-lte-concession/

5.14.4 Data tables for Iceland

Statistic	National
Population	325671
Persons per household	2.5
Rural proportion	35.4%

Technology	Iceland 2015		Iceland 2014		Iceland 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	96.2%	89.1%	96.1%	89.0%	93.2%	81.3%	94.0%	83.7%
VDSL	85.8%	70.2%	84.3%	69.1%	46.6%	0.0%	41.0%	16.9%
FTTP	53.4%	2.3%	52.9%	2.3%	53.7%	0.0%	20.8%	7.2%
WiMAX	4.0%	7.0%	4.0%	7.0%	4.0%	6.6%	19.7%	18.7%
Cable	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	43.8%	10.2%
DOCSIS 3.0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	43.1%	9.4%
HSPA	98.6%	96.1%	97.5%	93.2%	97.3%	93.0%	97.6%	90.0%
LTE	85.0%	57.5%	72.3%	46.9%	47.8%	0.0%	85.9%	36.3%
Satellite	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	99.4%	98.7%
Overall broadband	99.3%	98.0%	98.7%	97.6%	98.7%	96.5%	99.8%	98.4%
Overall fixed broadband	98.1%	93.5%	98.0%	93.5%	96.6%	84.6%	97.4%	90.6%
NGA broadband	90.8%	71.3%	89.6%	70.2%	60.5%	0.0%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.15 Ireland

5.15.1 National coverage by broadband technology

During the first six months of 2016, fixed broadband coverage in Ireland remained stable on both national and rural level reaching 96.3% of total households and 92.1% rural households. NGA coverage, on the other hand, continued to increase significantly, especially in rural areas. National NGA coverage grew by 9.2 percentage points and by mid-2015 nearly 80% of Irish households had access to high-speed broadband services. While progress in NGA availability was mostly limited to urban and semi-urban areas in previous years, in the first half of 2015, rural NGA coverage increased by a staggering 16.9 percentage points, with NGA networks passing nearly a quarter (24.9%) of rural homes. However, despite this increase, rural NGA coverage was still below the EU average of 27.8%, albeit closing the gap considerably since the end of 2014

Ireland: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Ireland	97.6%	96.3%	79.7%	95.0%	92.1%	24.9%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission © 2016 IHS
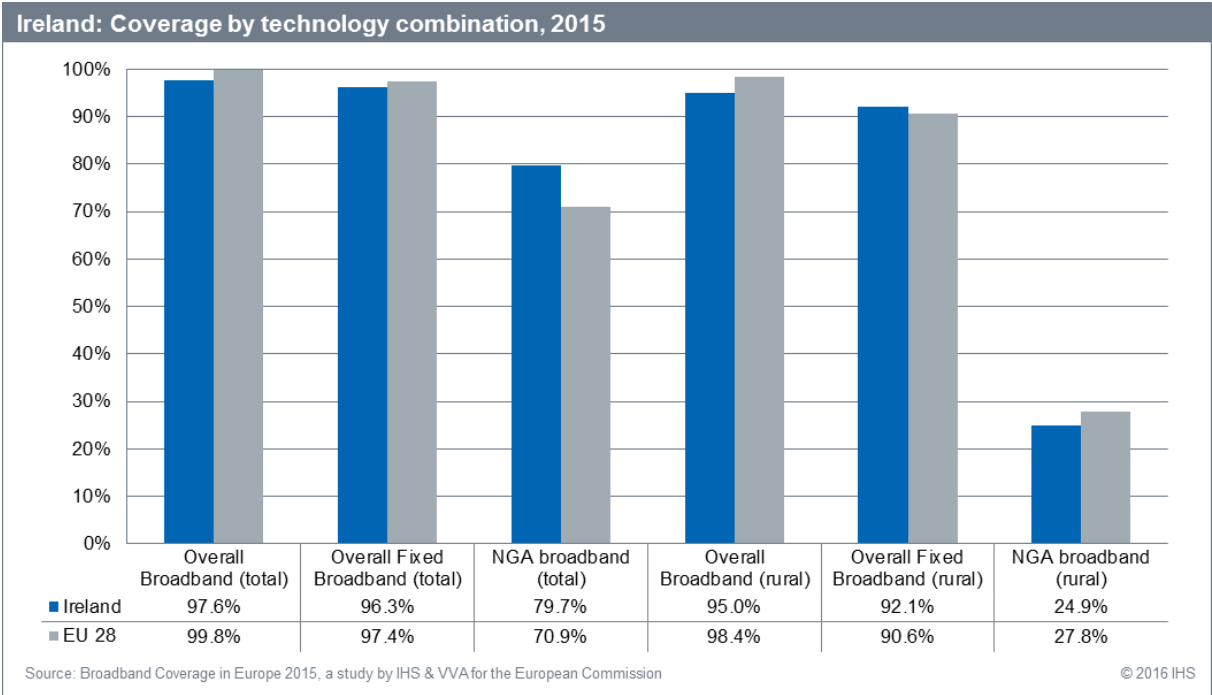
Looking at the individual technologies, VDSL and FTTP were the only two technologies to register any substantial coverage increases by mid-2015. Due to the continued VDSL roll-out by the incumbent, Eircom, VDSL coverage grew by 9.8 percentage points to 70.6% of households, greatly exceeding EU average of 41.0% and further establishing VDSL as the key NGA technology in Ireland.

During the first six months of 2015, FTTP deployment remained limited, growing by 2.8 percentage points with FTTP networks passing little less than 5% of Irish homes. However, both Eircom as well as Vodafone (in partnership with Electricity Supply Board) have commenced an extensive FTTP roll out in the second half of 2015, which will be reflected in the future iterations of this study.

Meanwhile, cable and DOCSIS 3.0 coverage remained unchanged for the last two years, staying at its 2013 level with 42.4% of households having access to cable broadband and nearly 41% being able to connect to high-speed DOCSIS 3.0 cable networks.

Following a dramatic growth in LTE availability in 2014, pace of LTE deployment has slowed down, yet after a 3.1 percentage point increase, LTE networks were available to 9 in 10 Irish households at the end of June 2015.

Ireland: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Ireland	92.5%	70.6%	4.5%	26.6%	42.7%	42.0%	94.6%	90.1%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
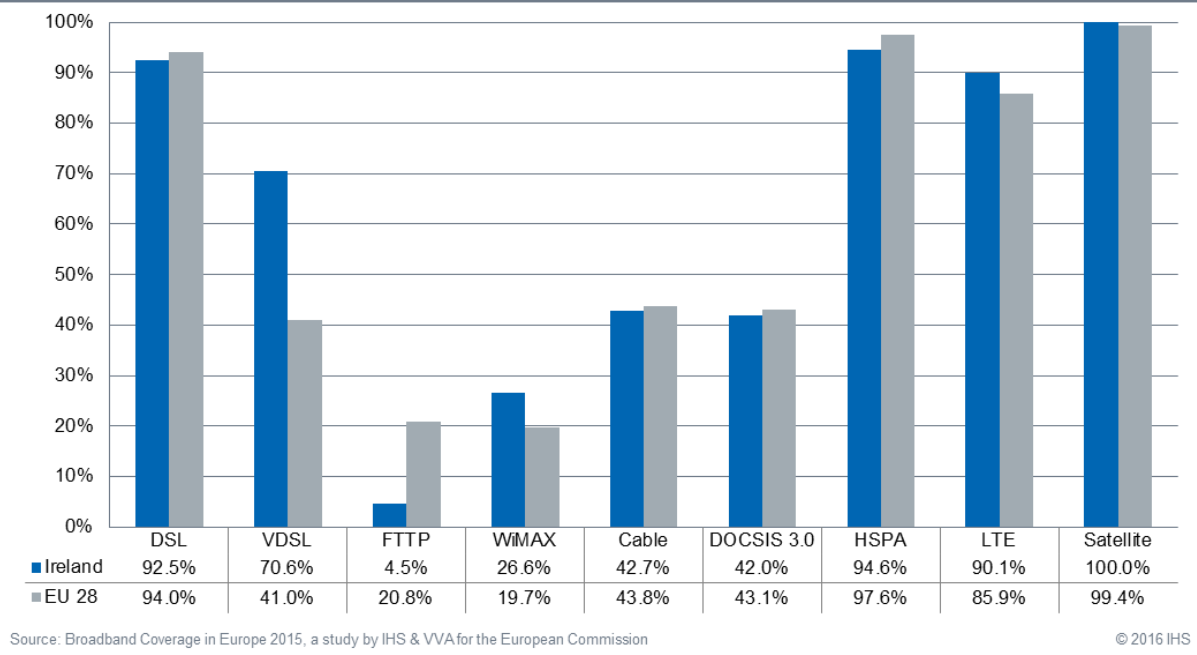
The abovementioned large increase in rural NGA coverage can be attributed to an expansion of VDSL technology into rural areas, an initial sign of Eircom's pledge to improve high-speed broadband availability in rural Ireland. In the first six months of 2015, VDSL coverage increased by 16.7 percentage points providing 24.0% of rural households with high-speed broadband services and for the first time exceeding the EU average of 16.9%. At the end of June 2015, there were no FTTP networks in rural areas and DOCSIS 3.0 coverage remained limited passing only 2.4% of rural homes.

LTE coverage in rural areas grew by 8.4 percentage points in the first half of 2015, reaching 73.0% of rural household by mid-2015 and greatly above the EU average of 36.3%.

Ireland: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Ireland	86.7%	24.0%	0.0%	20.4%	2.6%	2.4%	85.4%	73.0%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
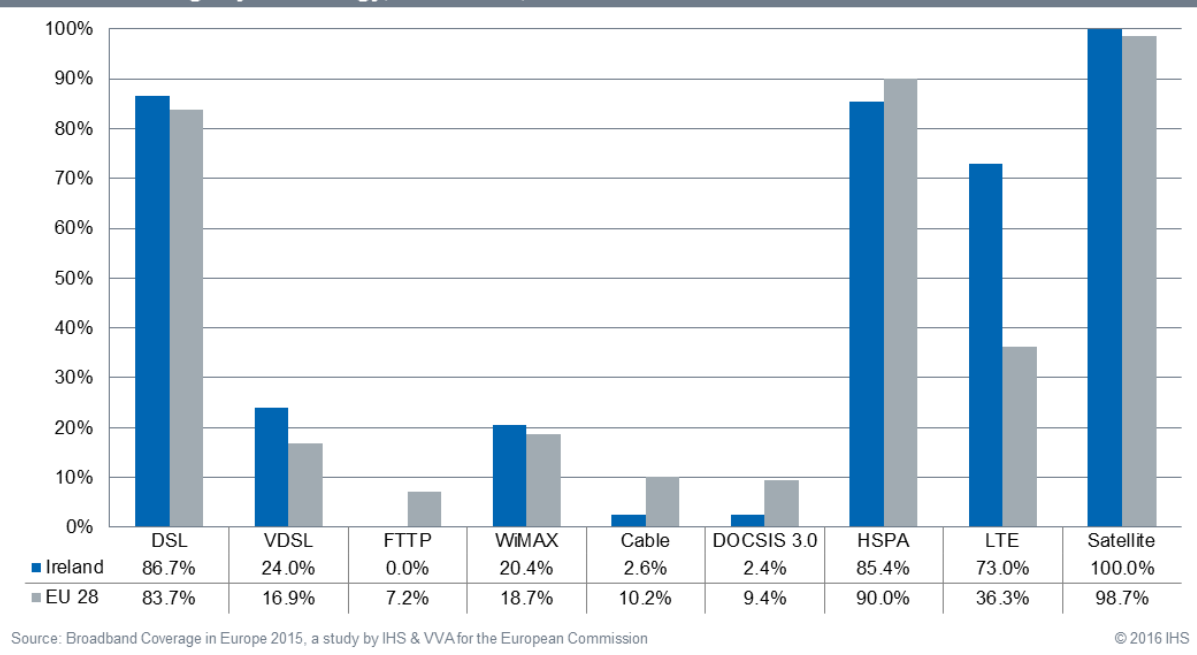
5.15.2 Regional coverage by broadband technology

Regional fixed broadband coverage in Ireland remained quite varied in the first half of 2015, with all households in Dublin having fixed broadband access but 92.1% of households in West Ireland being covered by fixed networks.

Ireland: Overall fixed broadband coverage, 2015

Legend:
- 0% - <75%
- 75% - <90%
- 90% - <95%
- 95% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

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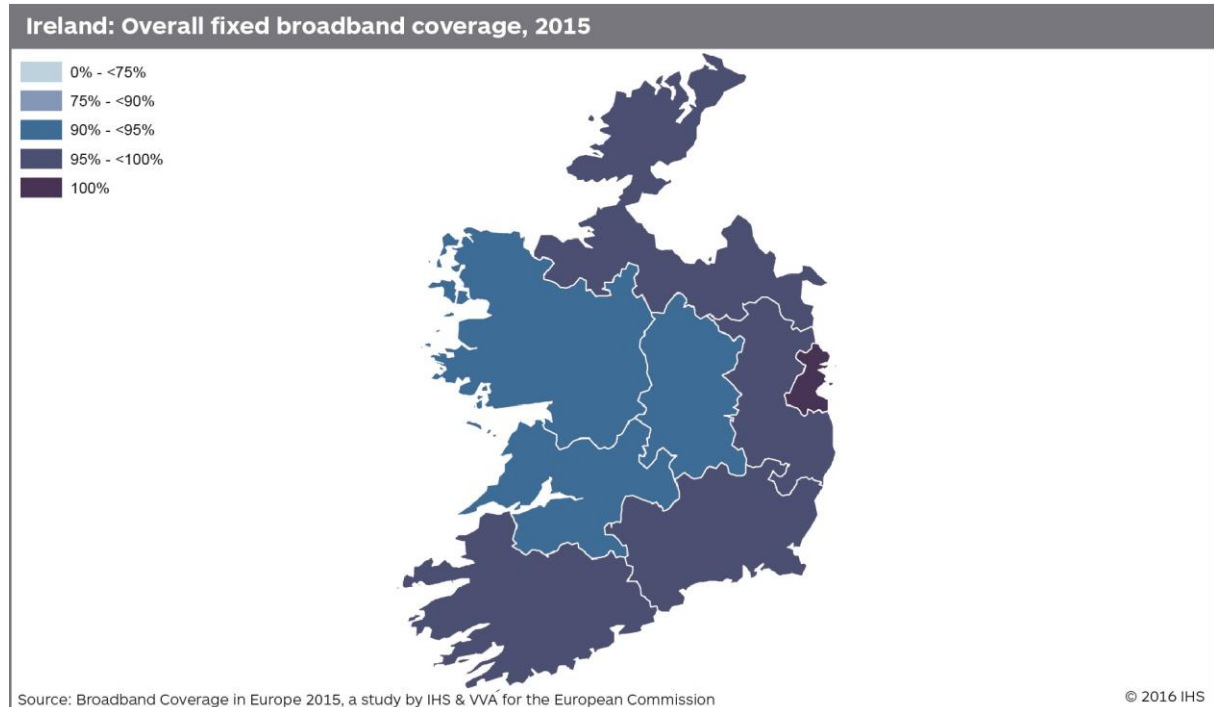
NGA coverage increased by more than 8.5 percentage points in all Irish regions with the exception of Dublin (which was already at 100%). The highest increase was recorded in the Midland region (nearly 15 percentage points), where NGA services became available to nearly 70% of households. NGA coverage outside of Dublin ranged from little over 60% in West Ireland to 93% in the Mid-West.

Ireland: NGA broadband coverage, 2015

Legend:
- 0%
- >0% - <35%
- 35% - <65%
- 65% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

© 2016 IHS
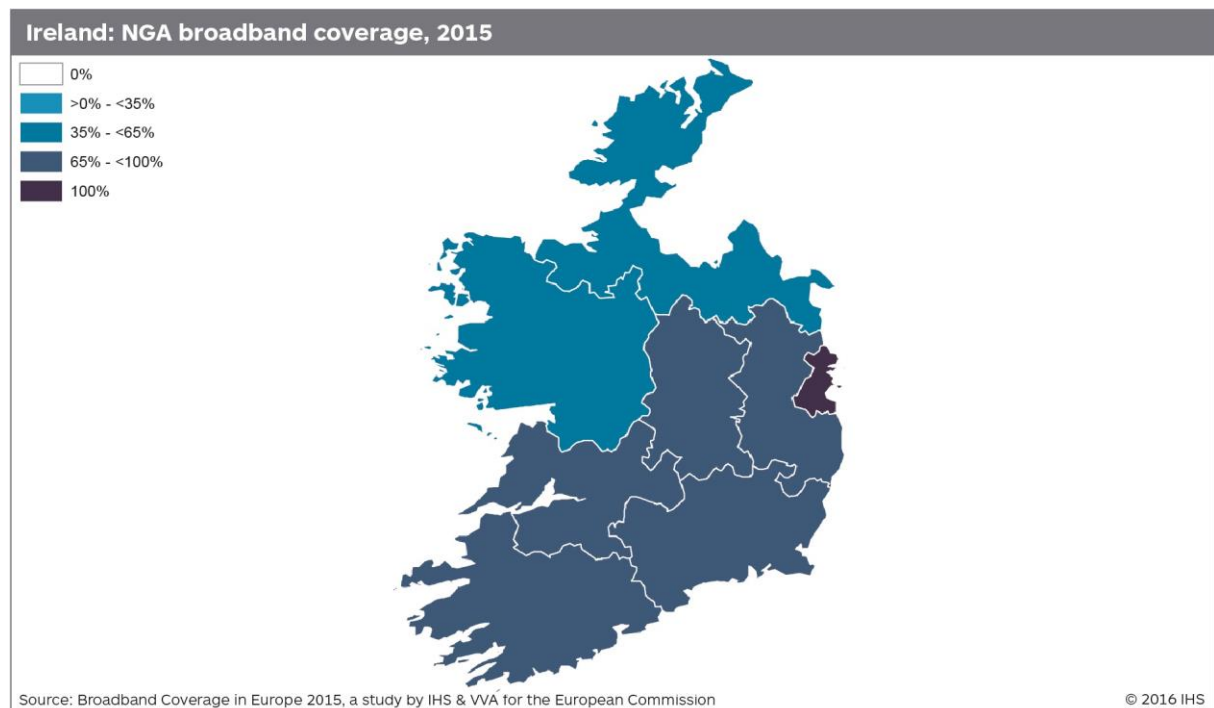
5.15.3 Regulatory and market overview

Ireland's 2012 National Broadband plan is valid until 2020. It aims at sustaining macro-economic growth and competitiveness, as well as avoiding market failures so as to secure fast and reliable broadband access in the Member State.[89] In 2015, the Department of Communications, Energy and National Resources issued a public consultation on National Broadband Plan Intervention Strategy, which set out key elements on state intervention in the broadband sector.[90] The main target speeds expected as a result of industry and government investment include:

- 70 Mbps – 100 Mbps available to at least 50% of the population whereby the majority has access to 100 Mbps;
- At least 40 Mbps to at least a further 20% of the population and as much as 35% around smaller towns and villages;
- A minimum of 30 Mbps available to all.

The fixed broadband market is dominated by the incumbent Eircom (DSL and FTTP provider) and UPC Ireland (main cable provider), which are both targeting their deployment strategies to offer faster broadband services through network upgrades and new fibre-optic networks deployment. During the first six months of 2015, UPC started offering 240 Mbps download speeds over its DOCSIS 3.0 network[91], while Eircom begun to roll-out FTTP network to an initial 66 locations with 1.9 million homes planned to be covered with up to 1Gbps speeds by 2020, with a special focus on rural deployment.[92]

Rural FTTP deployment is essential in achieving the goals set by the National Broadband Plan and in addition to Eircom's efforts, Vodafone Ireland has also started to roll-out a FTTP network in previously underserved areas in partnership with the Electricity Supply Board (ESB). Vodafone Ireland and ESB entered in the EUR 450 million 50:50 joint venture already in 2014 with a plan to utilise ESB's electricity infrastructure for network deployment initially covering 500,000 premises (representing 30% of all Irish households) across 50 towns.[93]

LTE was first launched in 2013 by Vodafone and Meteor (Eircom's mobile branch) followed by Hutchinson's Three Ireland in 2014. After a 2014 acquisition of O2 Ireland, Three begun to offer LTE services to former O2 customers in July 2015.[94]

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[89] http://www.dcenr.gov.ie/communications/en-ie/Broadband/Pages/Connecting-Communities.aspx

[90] http://www.dcenr.gov.ie/communications/en-ie/Pages/Consultation/NBP-Strategy-Intervention-Public-Consultation.aspx

[91] https://www.siliconrepublic.com/comms/2015/01/06/upc-launches-fastest-broadband-in-ireland-at-240mbps

[92] https://www.telegeography.com/products/commsupdate/articles/2015/06/04/eircom-to-supply-1gbps-broadband-to-additional-300000-rural-premises/

[93] http://www.vodafone.com/content/index/media/vodafone-group-releases/2014/esb-vodafone-ireland.html

[94] https://www.telegeography.com/products/commsupdate/articles/2015/06/12/3-ireland-to-offer-4g-to-former-o2-customers-from-1-july/

5.15.4 Data tables for Ireland

Statistic	National
Population	4,605,501
Persons per household	2.6
Rural proportion	36.8%

Technology	Ireland 2015		Ireland 2014		Ireland 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	92.5%	86.7%	92.5%	86.6%	92.5%	85.4%	94.0%	83.7%
VDSL	70.6%	24.0%	60.8%	7.3%	33.2%	4.9%	41.0%	16.9%
FTTP	4.5%	0.0%	1.7%	0.0%	1.7%	0.0%	20.8%	7.2%
WiMAX	26.6%	20.4%	26.6%	20.4%	26.6%	20.4%	19.7%	18.7%
Cable	42.7%	2.6%	42.4%	1.8%	42.4%	1.6%	43.8%	10.2%
DOCSIS 3	42.0%	2.4%	40.7%	1.7%	40.6%	1.6%	43.1%	9.4%
HSPA	94.6%	85.4%	94.6%	85.3%	94.8%	86.2%	97.6%	90.0%
LTE	90.1%	73.0%	87.0%	64.6%	35.2%	2.5%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	97.6%	95.0%	97.6%	95.0%	97.6%	93.1%	99.8%	98.4%
Overall fixed broadband	96.3%	92.1%	96.3%	92.2%	96.3%	92.7%	97.4%	90.6%
NGA broadband	79.7%	24.9%	70.7%	8.0%	54.0%	5.7%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

5.16 Italy

5.16.1 National coverage by broadband technology

During the first half of 2015, overall broadband and fixed broadband coverage remained stable, both exceeding the EU average. Even though NGA coverage grew by 7.6 percentage points in the first six months of 2015, reaching 43.9% of households, it remained considerably below EU average (70.9%). Fixed broadband coverage in rural areas improved by 1.7 percentage points and 92.2% of rural homes were passed by at least one fixed network, but NGA broadband remained absent in rural areas in mid-2015.

Italy: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Italy	99.6%	99.3%	43.9%	96.3%	92.2%	0.0%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
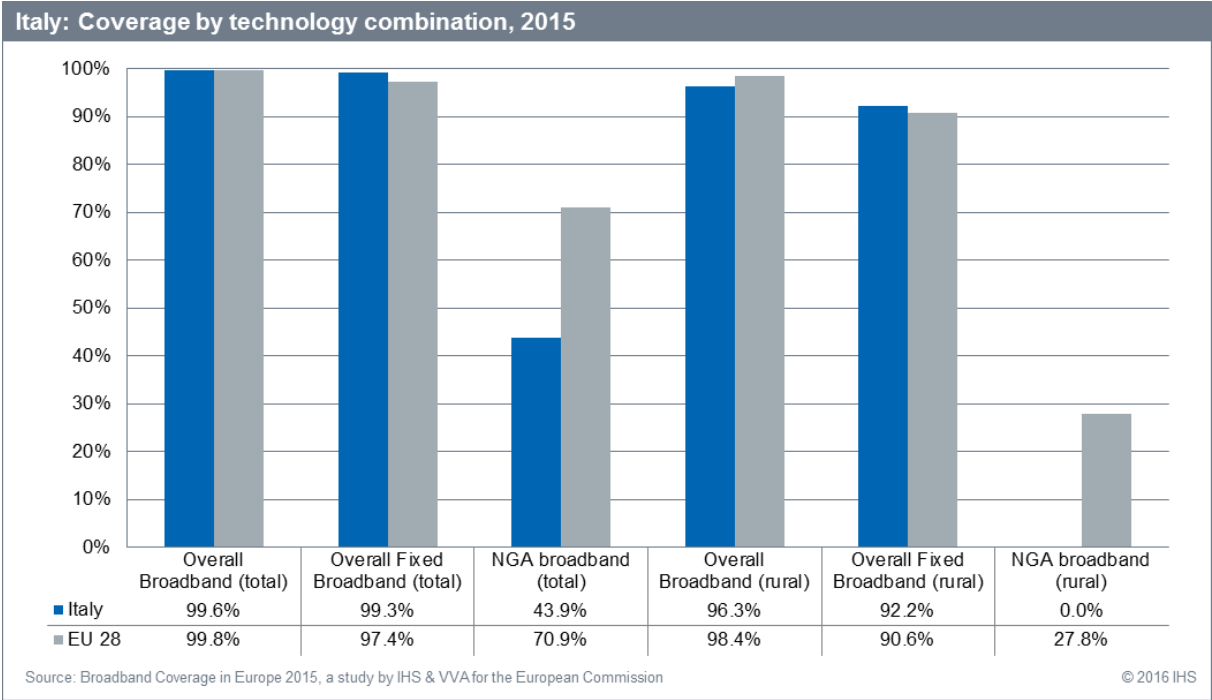
Examining individual technologies, an 8.5 percentage point increase in VDSL coverage contributed to the overall growth in NGA coverage. At the end of June, a third (32.8%) of Italian households had access to VDSL broadband services, which were primarily provided by the incumbent Telekom Italia and an alternative broadband operator, Fastweb.

With cable networks absent in Italy, FTTP is the only other NGA technology available to Italian households. In the first half of 2015, FTTP coverage remained at its 2014 level with 19.6% of homes passed by FTTP networks. FTTP services are primarily available in North Italian cities of Milan, Bologna, Turin, Verona, Vicenza and Genoa, where FTTP networks were deployed by a partly state-owned wholesale provider Metroweb (internet service provider Fastweb also holds a stake in the company), with Vodafone Italy also previously rolling-out its own FTTP networks in Milan and Bologna.

LTE coverage improved by 12.7 percentage points, reaching 89.7% of households, and thus exceeding the 85.9% EU average for the first time. All four mobile networks operators, TIM (Telekom Italia's mobile branch), Vodafone Italia, Three and Wind Italia expanded their LTE networks during the first six months of 2015, thus contributing to the increased LTE availability.

Italy: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Italy	98.4%	32.8%	19.6%	47.0%	0.0%	0.0%	98.3%	89.7%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
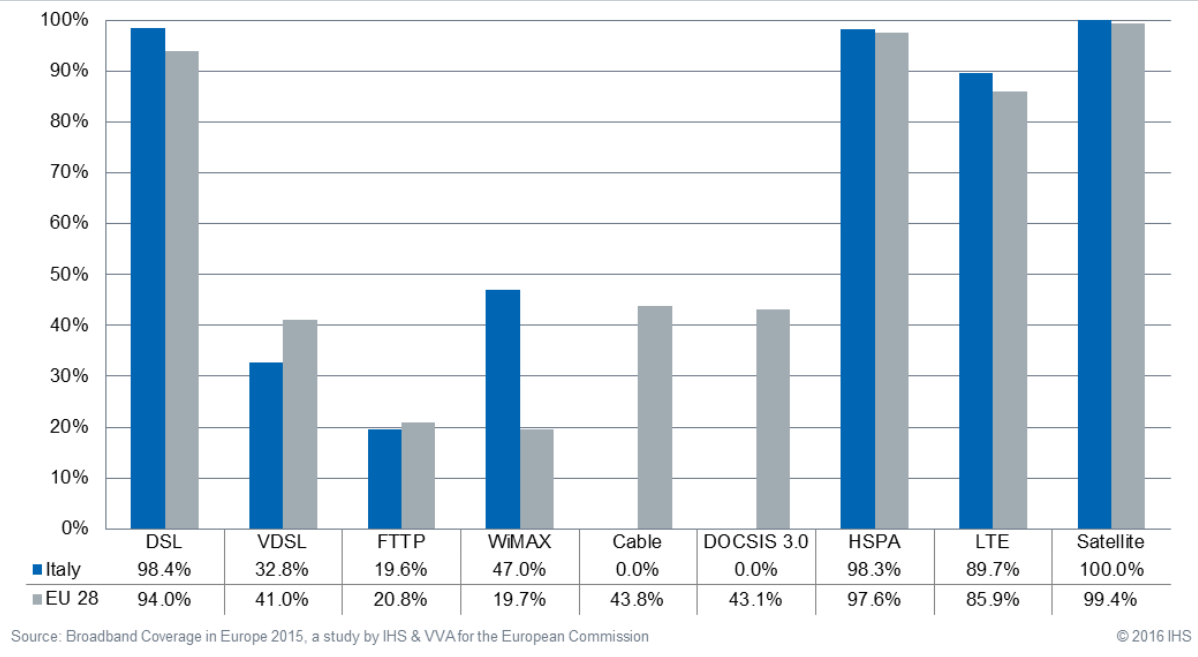
DSL continued to be the main technology providing fixed broadband access in rural areas, reaching 87.4% of rural homes across Italy. WiMAX coverage is also relatively high in rural areas, available to nearly a half (47.2%) of rural households. As investment in NGA technologies remained focused on urban areas in the first six months of 2015, no NGA coverage was recorded in rural areas.

Rural LTE coverage increased by 10.7 percentage points and by mid-2015 26.8% of rural homes were able to connect to the high-speed mobile broadband network.

Italy: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Italy	87.4%	0.0%	0.0%	47.1%	0.0%	0.0%	86.3%	26.8%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

5.16.2 Regional coverage by broadband technology

Italy: Overall fixed broadband coverage, 2015

- 0% - <75%
- 75% - <90%
- 90% - <95%
- 95% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

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Italy: NGA broadband coverage, 2015

- 0%
- >0% - <35%
- 35% - <65%
- 65% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

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There was relatively little regional variation in terms of fixed broadband coverage in mid-2015 with vast majority of regions registering coverage levels higher than 97% (only four out of 110 regions recorded lower coverage). A number of regions recorded more significant fixed coverage increases, such as Lucca (3.1 percentage point increase), Gorizia (2.1 percentage point increase) and Udine (2.0 percentage point increase).

NGA coverage in the individual regions continued to vary greatly with NGA networks absent in eight regions and another 18 regions recording NGA coverage levels lower than 10%. On the other hand, regions such as Milan, where NGA services were available to more than 99% of households, and other major urban areas such as Bologna, Genoa, Rome or Naples, enjoyed much higher NGA availability levels (between 80%-90%).

5.16.3 Regulatory and market overview

In March 2015, the Italian government issued a new national broadband plan titled "Italian Strategy for Next Generation Access Network", which set out the following objectives for the development of high-speed broadband infrastructure in the country by 2020:

- provide 85% of the population with access to broadband connection services above 100 Mbps;
- provide access to broadband connection services above 30Mbps to 100% of households;
- provide access to broadband connection services of at least 100Mbps for public institutions[95].

Under the strategy, the Italian government plans to invest approx. EUR 7 billion drawn mainly from the European Regional Development Fund (ERDF), the European Agricultural Fund for Rural Development (EAFRD), and the Cohesion Fund. The government also stipulated that in order for the funds to be released, an equal investment in modernisation of the broadband infrastructure is made by the country's network operators.[96] However, as of July 2015, the plan had not yet been approved.[97]

Italian fixed broadband market is dominated by the incumbent Telecom Italia, a DSL, VDSL and FTTP provider with a number of alternative operators being increasingly more active in the next-generation high-speed broadband segment. NGA deployment has been boosted by a number of agreements between the partly state-owned wholesale provider Metroweb and Telecom Italia, Fastweb and Vodafone Italia with extensive FTTP deployments being rolled out in Milan, Bologna, Turin, Verona, Vicenza and Genoa. In April 2015, Metroweb secured a EUR 100 million loan to expand to new cities (choosing between Florence, Parma, Verona, Brescia and Monza).[98]

In February 2015, Telecom Italia also outlined further investment of EUR 2.9 billion over three years in an upgrade of its existing networks and deployment of an FTTP network to cover 75% of the Italian population by 2017.[99] Meanwhile Fastweb (which owns a 17% stake in Metroweb) continued to extend its FTTP and VDSL networks as part of a 2014 plan brining high-speed networks to 100 new cities by 2016, extending the company's footprint to 5.5 million VDSL households and 2 million FTTP households.[100]

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[95] http://www.governo.it/GovernoInforma/Dossier/crescita_digitale/Strategy.pdf

[96] http://www.zdnet.com/article/italys-6bn-broadband-plan-spread-100mbps-far-and-wide-fill-in-the-rural-notspots/

[97] https://www.telegeography.com/products/commsupdate/articles/2015/06/25/italian-broadband-plan-hits-delays/

[98] https://www.telegeography.com/products/commsupdate/articles/2015/04/01/metroweb-looks-at-two-new-fibre-markets/

[99] http://www.telecomitalia.com/tit/en/archivio/media/comunicati-stampa/telecom-italia/corporate/economico-finanziario/2015/2015-2017-strategic-plan-approved.html

[100] http://company.fastweb.it/en/estende-piano-banda-ultralarga/

LTE coverage registered significant improvements in the first half of 2015 as a result of mobile network operators' expansion strategies. After the first launch of LTE networks in Italy in 2012 by Vodafone and Telecom Italia (TIM), which were followed by Three in 2013 and Wind in 2014, the operators led by TIM have also started to focus on improving speeds and services offered over their networks with the launch of LTE-Advanced/4G+ services throughout 2015.[101]

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[101] http://www.zdnet.com/article/italians-open-lte-a-christmas-presents-early-as-telecom-italia-showcases-superfast-4g/

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5.16.4 Data tables for Italy

Statistic	National
Population	60,782,668
Persons per household	2.4
Rural proportion	12.3%

Technology	Italy 2015		Italy 2014		Italy 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	98.4%	87.4%	98.2%	85.7%	97.1%	75.4%	94.0%	83.7%
VDSL	32.8%	0.0%	24.3%	0.0%	14.7%	0.0%	41.0%	16.9%
FTTP	19.6%	0.0%	19.5%	0.0%	12.2%	0.0%	20.8%	7.2%
WiMAX	47.0%	47.1%	47.2%	47.2%	48.0%	48.0%	19.7%	18.7%
Cable	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	43.8%	10.2%
DOCSIS 3.0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	43.1%	9.4%
HSPA	98.3%	86.3%	97.7%	81.5%	97.0%	76.5%	97.6%	90.0%
LTE	89.7%	26.8%	77.0%	16.1%	39.3%	0.7%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	99.6%	96.3%	99.4%	94.9%	98.6%	88.3%	99.8%	98.4%
Overall fixed broadband	99.3%	92.2%	99.1%	90.5%	98.5%	87.7%	97.4%	90.6%
NGA broadband	43.9%	0.0%	36.3%	0.0%	20.8%	0.0%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.17 Latvia

5.17.1 National coverage by broadband technology

Slight improvements to overall fixed and NGA broadband coverage in Latvia were recorded in the first six months of 2015. In terms of fixed broadband coverage Latvia ranked below the EU average, with 92.5% of homes passed by at least one fixed broadband network compared to 97.4% of average EU households. But with regards to NGA coverage Latvia exceeded EU average by 21.5 percentage points and high-speed broadband services were available to 90.7% of Latvian households, a 1.1 percentage point increase compared to December 2014. This also means that by mid-2015, NGA coverage in Latvia was only 1.8 percentage points below the overall fixed broadband coverage, reflecting Latvia's FTTP-oriented national broadband strategy.

A growth in broadband coverage was also observed in rural areas, yet even though rural fixed broadband coverage increased by 3.7 percentage points, at 54.9% it remained the lowest of all study countries and well below the EU average of 90.6%. On the other hand, rural NGA coverage significantly exceeded the EU average with NGA broadband services being available to 47.2% of rural households across Latvia compared to 27.8% average European households.

Latvia: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Latvia	99.6%	92.5%	90.7%	98.7%	54.9%	47.2%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
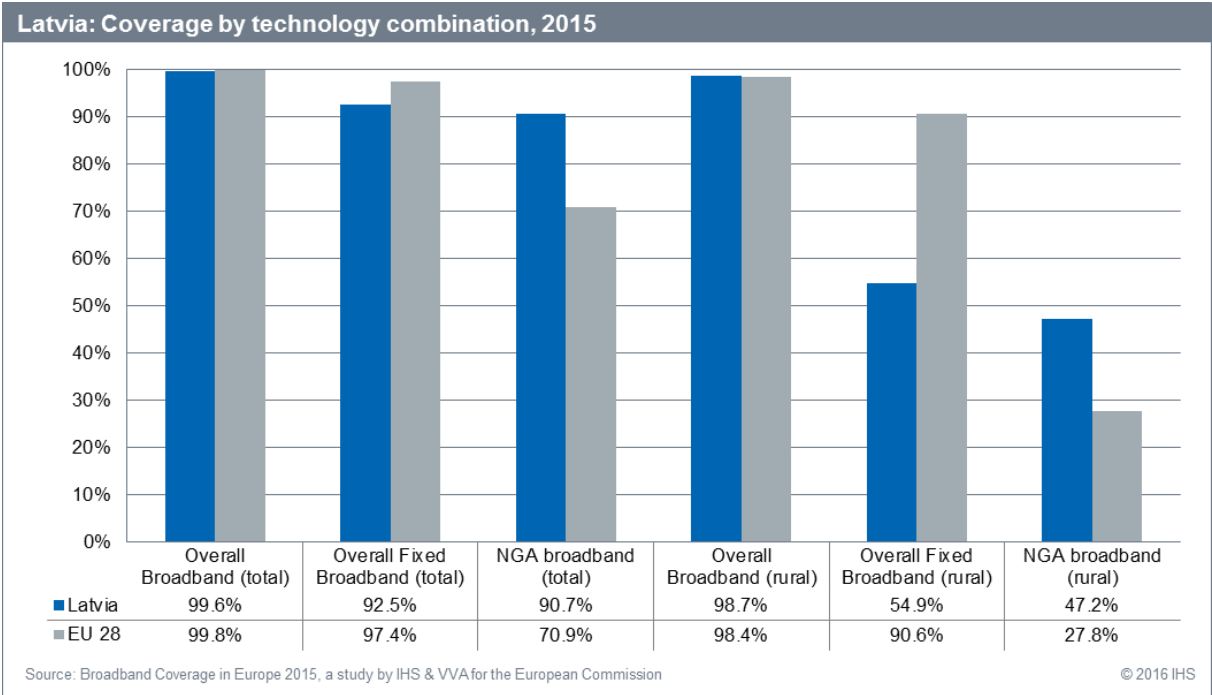
Due to a long-term preference of fibre-optic technology in broadband infrastructure, Latvia along with its Baltic neighbour, Lithuania, are the only two study countries, where FTTP coverage greatly exceeds that of DSL. At the end of June 2015, DSL coverage reached 42.3% of households compared to 85.0% homes passed by FTTP networks. Moreover, the Latvian FTTP coverage level was four times higher than the EU average of 20.8%.

LTE coverage recorded the most substantial growth out of all technologies, increasing by 24.0 percentage points and reaching 89.0% of households in the first half of 2015 primarily due to mobile operator Tele2 Latvia boosting the reach of its LTE network.[102]

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[102] https://www.telegeography.com/products/commsupdate/articles/2015/07/09/tele2-latvia-boosts-4g-coverage-with-800mhz-switch-on/

Latvia: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Latvia	42.3%	14.8%	85.0%	44.9%	34.5%	28.8%	99.2%	89.0%	20.3%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission © 2016 IHS
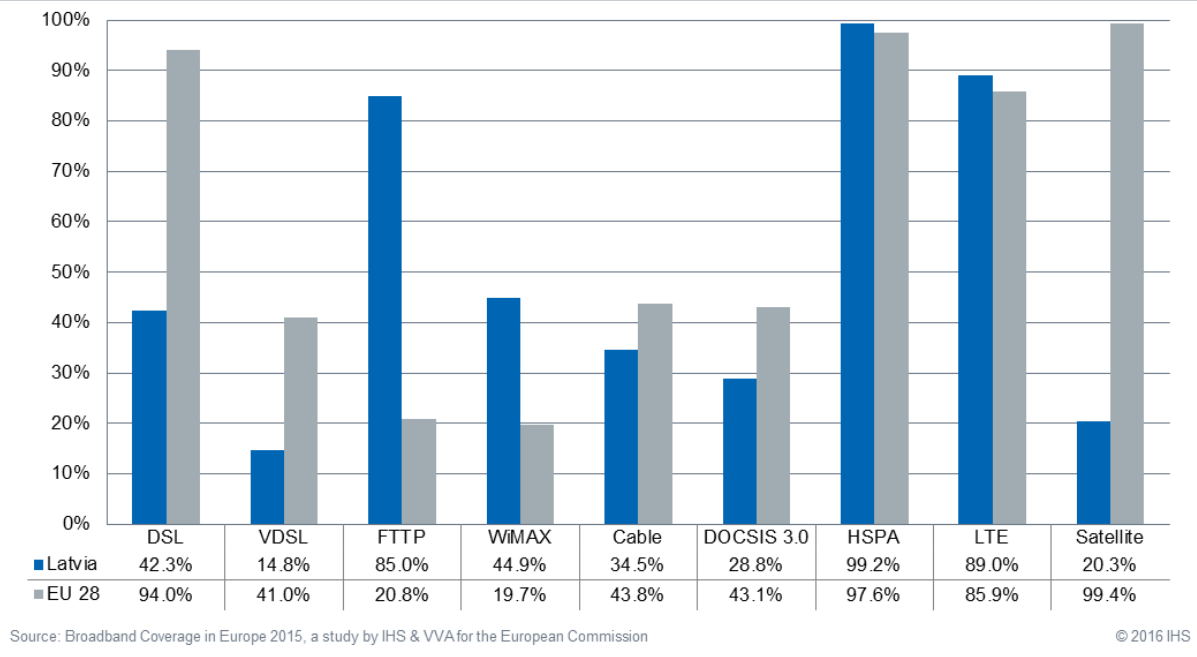
FTTP remained, alongside WiMAX, the key technology providing fixed broadband access in rural areas. At the end of June 2015, 47.2% rural households had access to FTTP broadband services, a 3.5 percentage point increase compared to December 2014. WiMAX broadband was available to little less than a fifth (19%) of rural households in Latvia while only 9% of rural homes were passed by DSL networks. As in previous years, cable and VDSL technologies remained absent in rural areas in the first half of 2015, even though the incumbent Lattelecom announced in April 2015 an upgrade programme of its rural DSL network to VDSL.[103]

In addition, LTE coverage considerably increased in the first six months of 2015, recording a growth of 57.2 percentage points reaching 61.4% of rural households.

Latvia: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Latvia	9.0%	0.0%	47.2%	19.0%	0.0%	0.0%	97.3%	61.4%	20.3%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission © 2016 IHS

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[103] http://trendwave.com/cornell/latvia--lattelecom-launches-rural-vdsl-rollout-programme---scoop.it

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5.17.2 Regional coverage by broadband technology

There is quite a lot of regional variation in terms of fixed broadband coverage ranging from little over 80% in the Eastern region of Latgale to complete coverage recorded in the capital Riga.

Latvia: Overall fixed broadband coverage, 2015

- 0% - <75%
- 75% - <90%
- 90% - <95%
- 95% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS
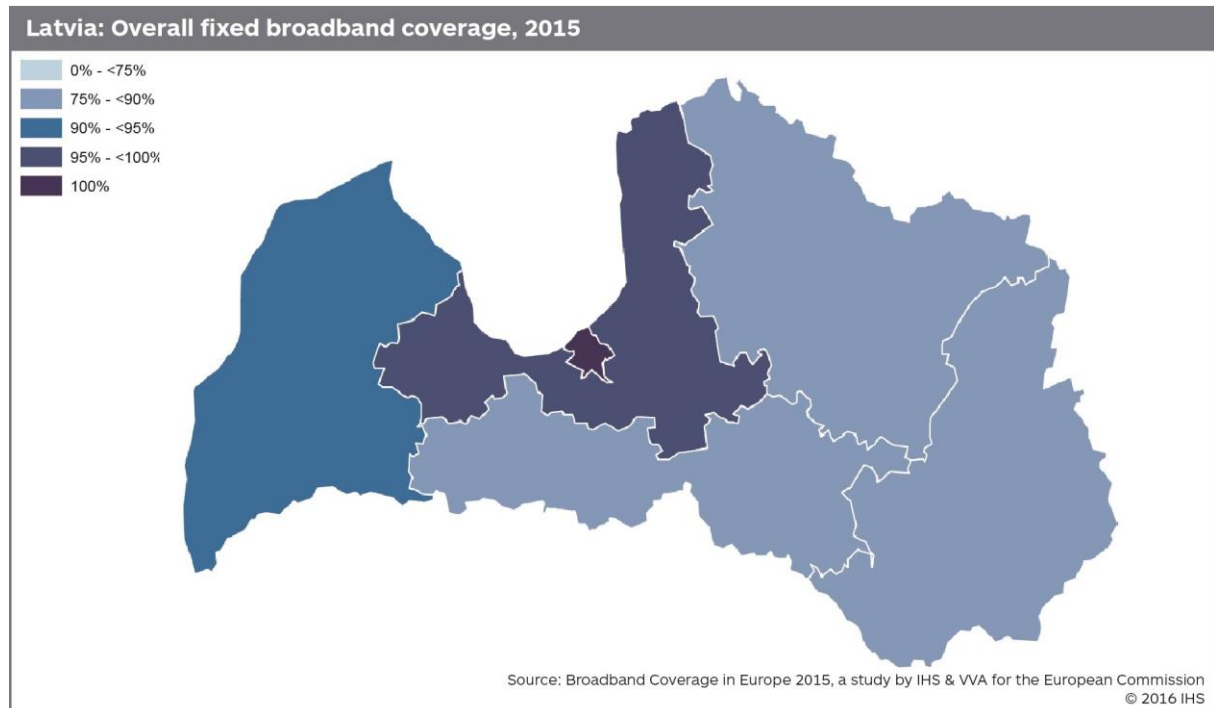
Riga was also the only region completely covered by NGA networks, while in the most Eastern region of Latgale high-speed NGA broadband was available to less than 70% of households.

Latvia: NGA broadband coverage, 2015

- 0%
- >0% - <35%
- 35% - <65%
- 65% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS
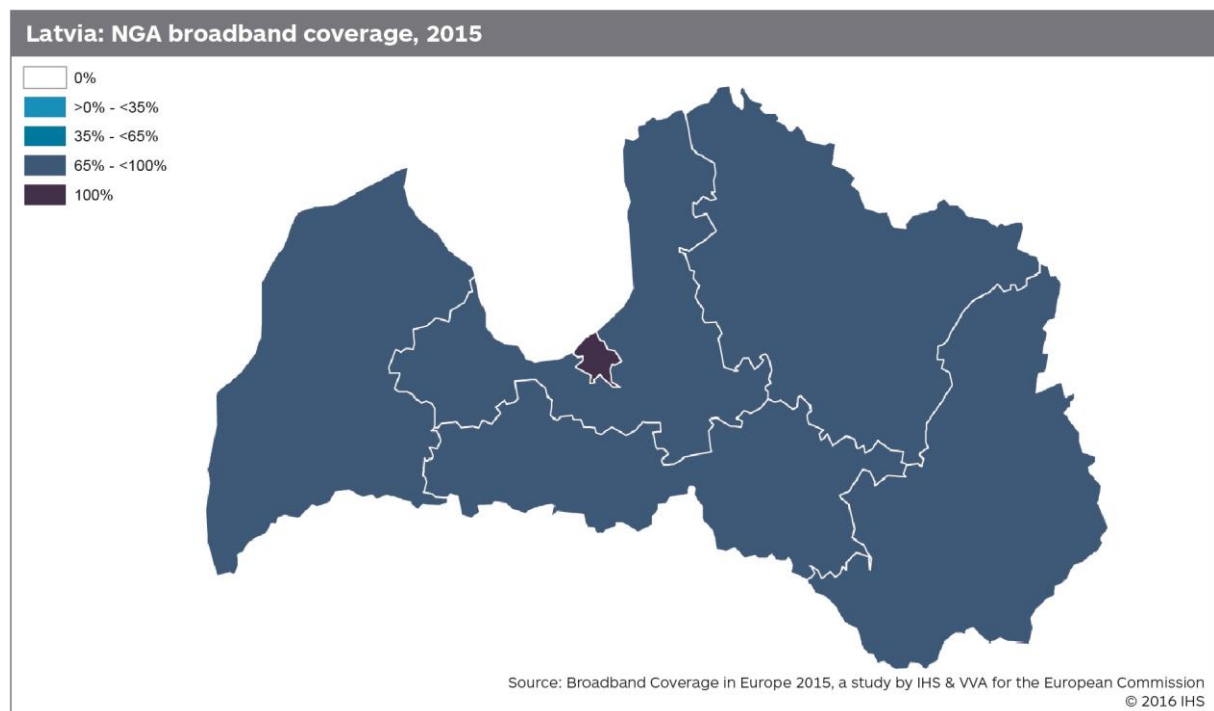
5.17.3 Regulatory and market overview

Latvian National Broadband Strategy was adopted in 2013 with objectives set out until 2020. The main goal is to expand the existing FTTP networks to be able to support high-speed services nationally by 2020, with main focus on deployment in rural areas.[104]

As part of the project, the Latvian government proposed support for the development of fibre networks in rural areas with no broadband coverage. First phase of the project postulated installation of 1,900-2,000km of optic fibre cables by 2015, with additional 5,000km deployed by 2020.[105]

The incumbent operator Lattelecom is the key player in the Latvian fixed broadband market and mostly competes with a range of smaller cable and FTTP providers. Lattelecom has been rolling out its FTTP network since 2009 and has been deploying mainly FTTP networks through their European Commission approved EUR 100 million financial support scheme[106]. Yet in April 2015, the company launched a VDSL rollout programme in primarily rural areas where FTTP deployment is not feasible, possibly boosting speeds to up to 100 Mbps for around 180,000 households within the network's footprint.[107]

Although LMT, the largest mobile operator in the country, launched its LTE network already in 2011, during the first six months of 2015 Tele2 Latvia has considerably boosted the reach of its LTE network (first rolled out in 2013) reaching its end of 2015 target of 90% population coverage six months early.[108]

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[104] http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=4855

[105] "Priorities for EU Funding 2014-2020 in ICT Sector". Presentation of Ministry of Environmental Protection and Regional Development of the Republic of Latvia

[106] http://site.lattelecom.lv/Lattelecom_group/about_Lattelecom_group/Lattelecom/?ltc_nav35826=7428

[107] https://www.lattelecom.lv/par-lattelecom/jaunumi/lattelecom-uzsak-verienigu-interneta-tikla-modernizaciju-lai-palielinatu-atrumu

[108] https://www.telegeography.com/products/commsupdate/articles/2015/07/09/tele2-latvia-boosts-4g-coverage-with-800mhz-switch-on/

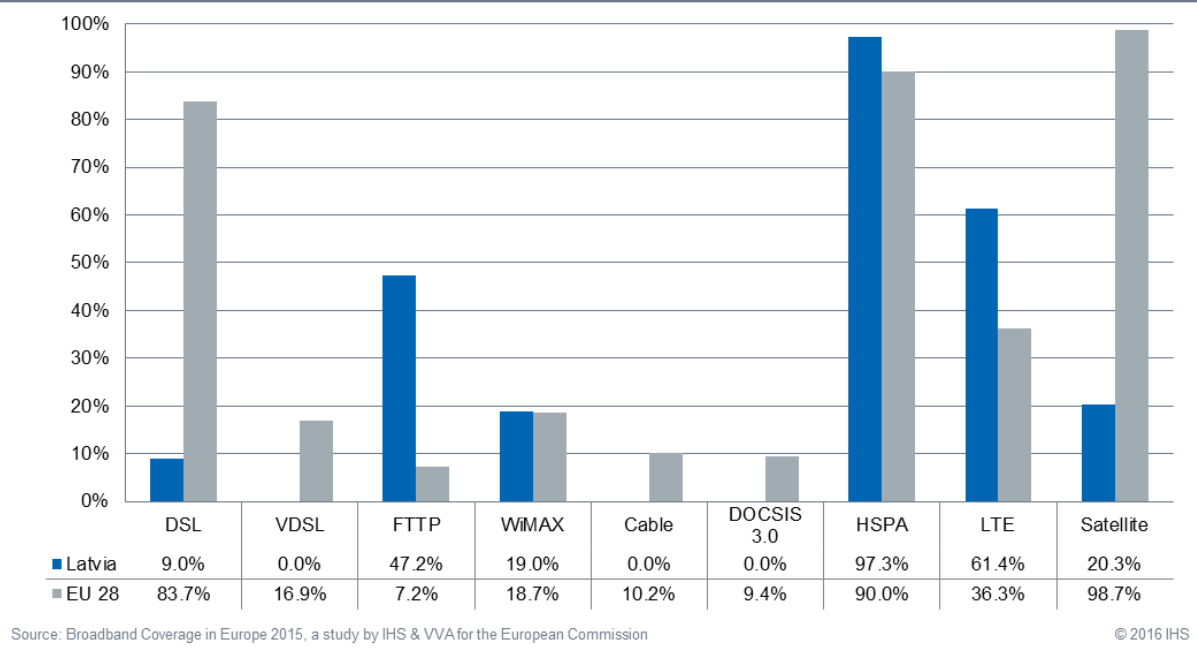IHS Global Limited, Valdani Vicari Associati

5.17.4 Data tables for Latvia

Statistic	National
Population	2,001,468
Persons per household	2.6
Rural proportion	28.5%

Technology	Latvia 2015		Latvia 2014		Latvia 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	42.3%	9.0%	42.3%	8.2%	41.5%	9.1%	94.0%	83.7%
VDSL	14.8%	0.0%	12.7%	0.0%	12.4%	0.0%	41.0%	16.9%
FTTP	85.0%	47.2%	83.9%	43.7%	82.9%	39.5%	20.8%	7.2%
WiMAX	44.9%	19.0%	44.6%	18.7%	40.4%	18.6%	19.7%	18.7%
Cable	34.5%	0.0%	34.3%	0.0%	33.9%	0.0%	43.8%	10.2%
DOCSIS 3.0	28.8%	0.0%	28.6%	0.0%	27.8%	0.0%	43.1%	9.4%
HSPA	99.2%	97.3%	99.2%	97.3%	99.0%	96.5%	97.6%	90.0%
LTE	89.0%	61.4%	65.0%	4.2%	27.5%	0.0%	85.9%	36.3%
Satellite	20.3%	20.3%	20.3%	20.3%	20.3%	20.3%	99.4%	98.7%
Overall broadband	99.6%	98.7%	99.6%	98.7%	99.5%	80.6%	99.8%	98.4%
Overall fixed broadband	92.5%	54.9%	91.9%	51.2%	91.6%	43.7%	97.4%	90.6%
NGA broadband	90.7%	47.2%	89.6%	43.7%	88.8%	34.7%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.18 Lithuania

5.18.1 National coverage by broadband technology

In the first half of 2015, broadband coverage increases in all categories were only moderate with fixed broadband coverage remaining at its 2014 level of 98.3% households having access to fixed broadband services. In rural areas, fixed broadband was available to 92.2% of rural households, a 0.3 percentage point increase compared to December 2014.

NGA networks passed 97.5% of all homes across Lithuania with coverage growing by just 0.2 percentage points. Rural NGA coverage reached 84.4% of rural households, almost three times higher than the EU average of 27.8%.

Lithuania: Coverage by technology combination, 2015					
	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Lithuania	99.5%	98.3%	97.5%	98.4%	92.2%	84.4%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
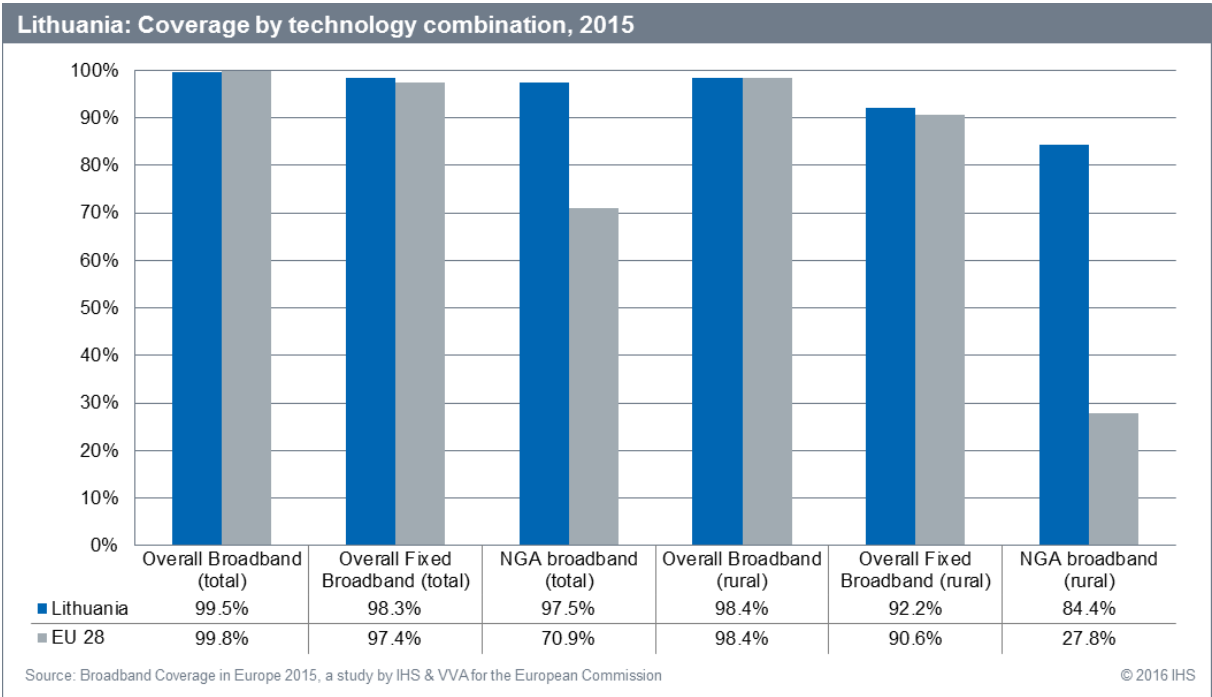
As in the other Baltic countries, Lithuanian telecoms operators have been traditionally focused on FTTP deployments rather than upgrades to VDSL, which is absent in the country. As a result, in terms of individual technologies, Lithuania is characterised by relatively low DSL coverage, with 69.3% homes passed by DSL networks compared with an average of 94.0% in the EU as a whole.

Therefore, FTTP is the key fixed broadband technology providing fixed and NGA broadband access to 95.1% of Lithuanian households by mid-2015, along with WiMAX, which was available to 9 in 10 (90.3%) households across the country.

More than half of households (53.4%) had access to cable broadband services and 45.9% of homes were passed by high-speed cable DOCSIS 3.0 networks at the end of June 2015. Both standard cable as well DOCSIS 3.0 coverage exceeded the EU average levels.

LTE coverage was the technology, which recorded the greatest growth during the first six months of 2015, improving by 10.3 percentage points and reaching 90.2% of households. This increase can be primarily attributed to mobile operator Tele2's push to expand its LTE network to 90% of the population by 2015.

Lithuania: Coverage by technology, total, 2015
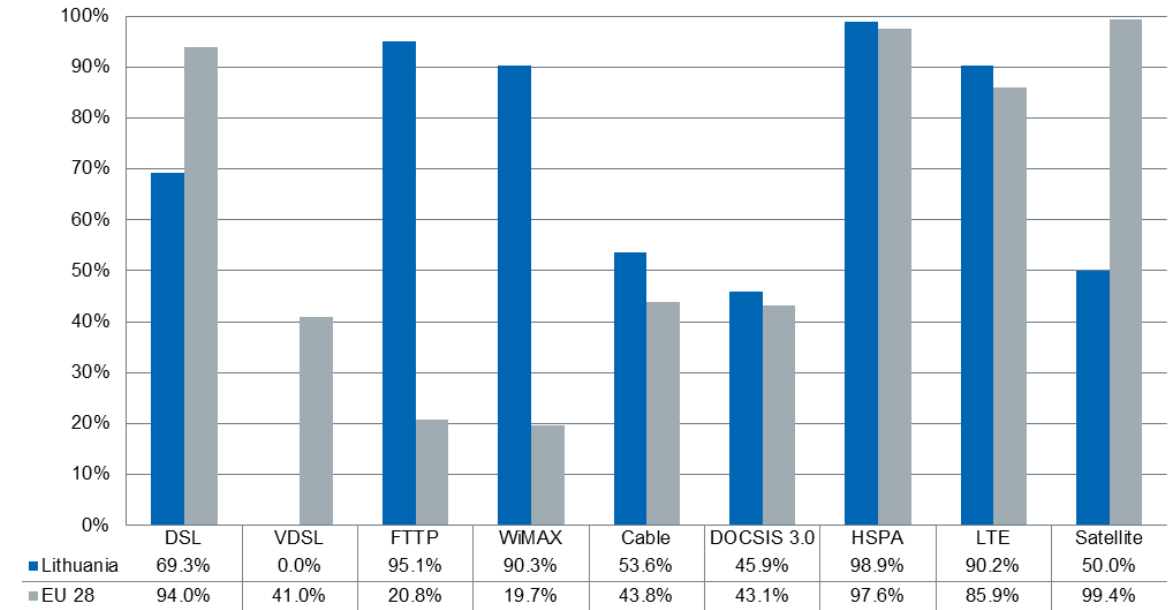
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Lithuania	69.3%	0.0%	95.1%	90.3%	53.6%	45.9%	98.9%	90.2%	50.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

WiMAX and FTTP continued to be the key technologies for rural broadband access, given the absence of cable networks and limited availability of DSL, which passed only 15.2% of rural households at the end of June 2015. Rural FTTP coverage increased by 0.6 percentage points reaching 84.4% of rural homes and slightly exceeding availability of WiMAX technology, which covered 83.9% of rural households. Both rural FTTP and rural WiMAX coverage levels remained greatly above the respective EU average levels of 7.2% and 18.7%.

After first becoming available in 2014, rural LTE coverage reached 68.8% of rural households by mid-2015, increasing by 32.8 percentage points and passing double the number of homes than the EU average (36.3%),

Lithuania: Coverage by technology, rural areas, 2015
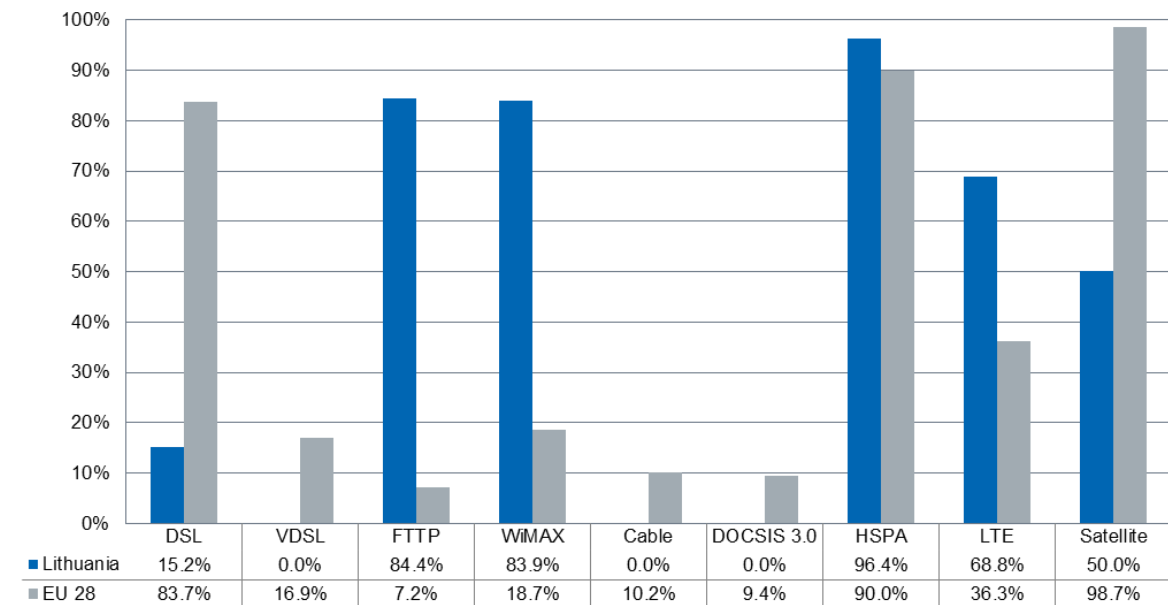
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Lithuania	15.2%	0.0%	84.4%	83.9%	0.0%	0.0%	96.4%	68.8%	50.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

5.18.2 Regional coverage by broadband technology

Fixed broadband coverage levels continued to vary between the individual regions across Lithuania in mid-2015. As in 2014, complete coverage was recorded in a half of the ten regions, including the capital Vilnius, with the remaining five regions recording levels between 94% and 95%.

Lithuania: Overall fixed broadband coverage, 2015

0% - <75%
75% - <90%
90% - <95%
95% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS
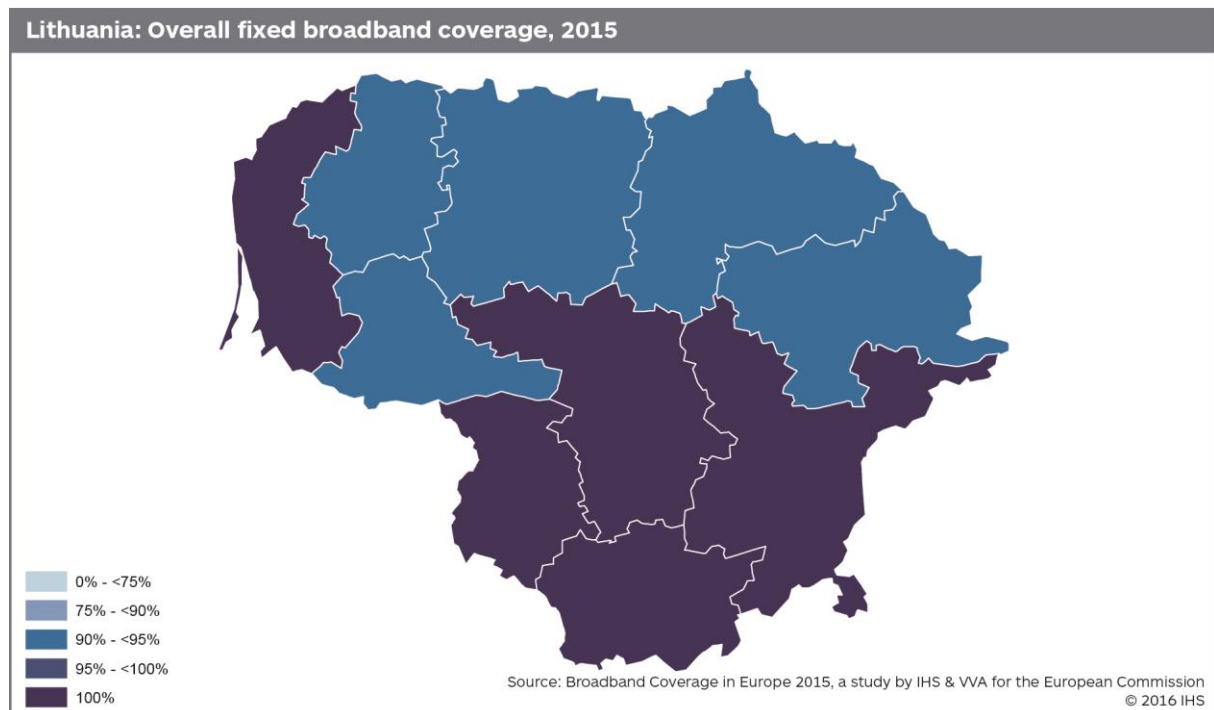
Next-generation broadband services were available to all households in five regions including Vilnius, Klaipedos, Kauno, Alytaus and Marijampoles. NGA coverage was the lowest in the Utenos regions reaching a little over 85% of households.

Lithuania: NGA broadband coverage, 2015

0%
>0% - <35%
35% - <65%
65% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS
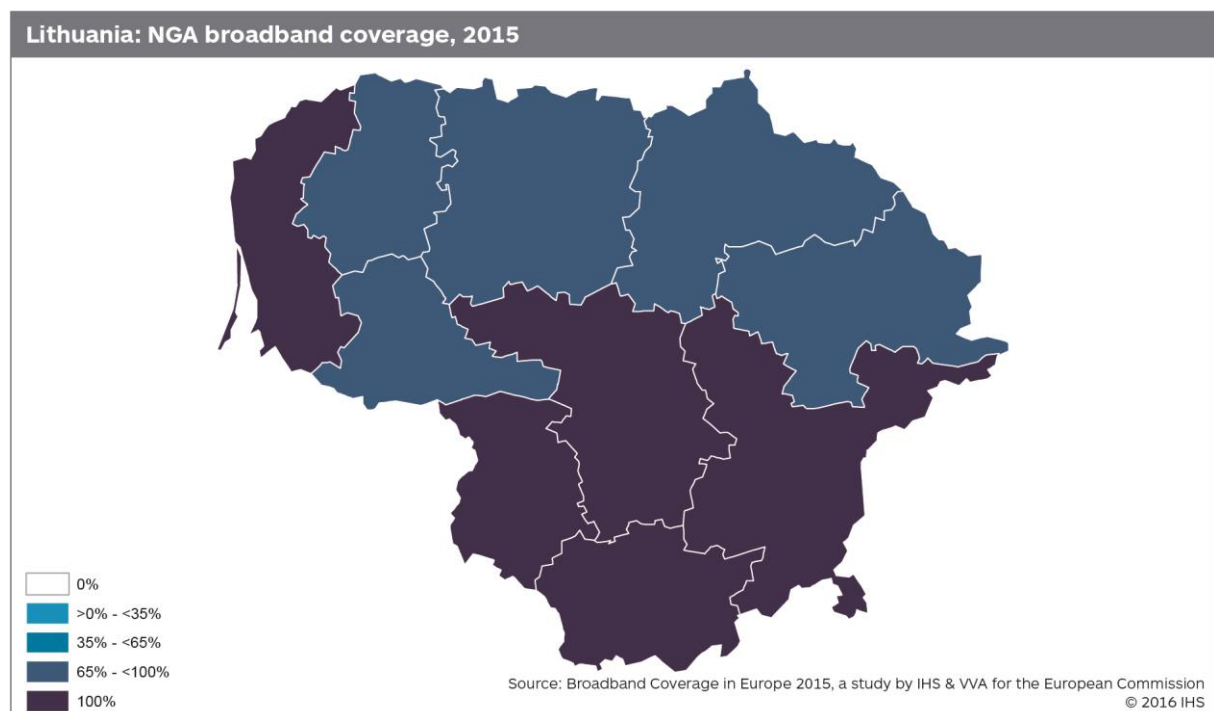
5.18.3 Regulatory and market overview

Lithuania's Digital Agenda, an outcome of a strategic review of the 2011 Lithuanian Information Society Development Programme, was approved in 2014. The Agenda's objectives largely reflect the EU's Digital Agenda targets, namely complete 30 Mbps coverage and 50% 100 Mbps coverage by 2020 [109]

Lithuania's fixed broadband market is dominated by the TeliaSonera-backed incumbent, Teo, which operates DSL and FTTP networks and competes with a number of smaller cable and FTTP providers. In 2015, Teo boosted download speeds on its premium package to 600 Mbps.[110]

In the cable broadband segment of the market a number of acquisitions led to an increased consolidation with broadband and cable TV provider Init acquiring a regional fibre-optic cable operator Dokeda in May 2015. This has been in addition to Estonian cable operator Starman acquiring first Lithuanian cableco Cgates and a regional fibre provider KAVA during the first six months of 2015.[111]

After the launch of the first LTE network by Omnitel (part of TeliaSonera group) in 2011, the company announced that the network reached 90% of Lithuanian households in June 2015, thus reaching its target six months early[112]. Tele2's begun to offer its LTE service in 2013 and by May 2015 covered 70% of the population.[113] Another provider, Bite, entered the market in 2015 with 4G LTE as well as LTE-Advanced network, which was available to 46% of the population at its April launch, and was expected to reach 75% by the end of 2015[114].

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[109] http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=467638&p_tr2=2

[110] https://www.teo.lt/en/press/13302

[111] https://www.telegeography.com/products/commsupdate/articles/2015/07/15/starman-buys-lithuanias-kava-to-strengthen-baltic-presence/

[112] http://iq.pivotl.com/2006/06/09/omnitel_launches_hsdpa_network_in_lithuania_in_partnership_w/

[113] https://www.telegeography.com/products/commsupdate/articles/2015/05/08/tele2-increases-4g-coverage-to-70-of-lithuanians/

[114] http://www.telecompaper.com/news/bite-targets-75-lte-coverage-this-year--1101913

5.18.4 Data tables for Lithuania

Statistic	National
Population	2,943,472
Persons per household	2.3
Rural proportion	31.3%

Technology	Lithuania 2015		Lithuania 2014		Lithuania 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	69.3%	15.2%	69.2%	15.1%	69.1%	15.2%	94.0%	83.7%
VDSL	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	41.0%	16.9%
FTTP	95.1%	84.4%	94.9%	*83.8%*	93.7%	*81.6%*	20.8%	7.2%
WiMAX	90.3%	83.9%	90.3%	83.8%	85.0%	82.0%	19.7%	18.7%
Cable	53.6%	0.0%	53.4%	0.0%	53.3%	0.5%	43.8%	10.2%
DOCSIS 3.0	45.9%	0.0%	42.9%	0.0%	42.8%	0.0%	43.1%	9.4%
HSPA	98.9%	96.4%	98.6%	95.6%	95.2%	91.0%	97.6%	90.0%
LTE	90.2%	68.8%	79.9%	36.0%	29.3%	0.0%	85.9%	36.3%
Satellite	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	99.4%	98.7%
Overall broadband	99.5%	98.4%	99.4%	98.1%	98.6%	95.5%	99.8%	98.4%
Overall fixed broadband	98.3%	92.2%	98.3%	91.9%	97.1%	91.0%	97.4%	90.6%
NGA broadband	97.5%	84.4%	97.3%	*83.8%*	96.7%	*81.6%*	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.19 Luxembourg

5.19.1 National coverage by broadband technology

Luxembourg maintained high levels of broadband coverage in the first six months of 2015, reporting complete coverage for overall broadband and fixed broadband on both national and rural level. Furthermore, NGA networks covered 96.1% of all households and 95.8% of rural households, thus greatly exceeding the EU average levels of 70.9% and 27.8%.

Generally, the country benefits from the fact that it covers a geographically small area in comparison to its neighbours. Therefore, extending NGA technologies such as FTTP and DOCSIS 3.0 has been somewhat easier in Luxembourg than in other European countries.

Luxembourg: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Luxembourg	100.0%	100.0%	96.1%	100.0%	100.0%	95.8%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
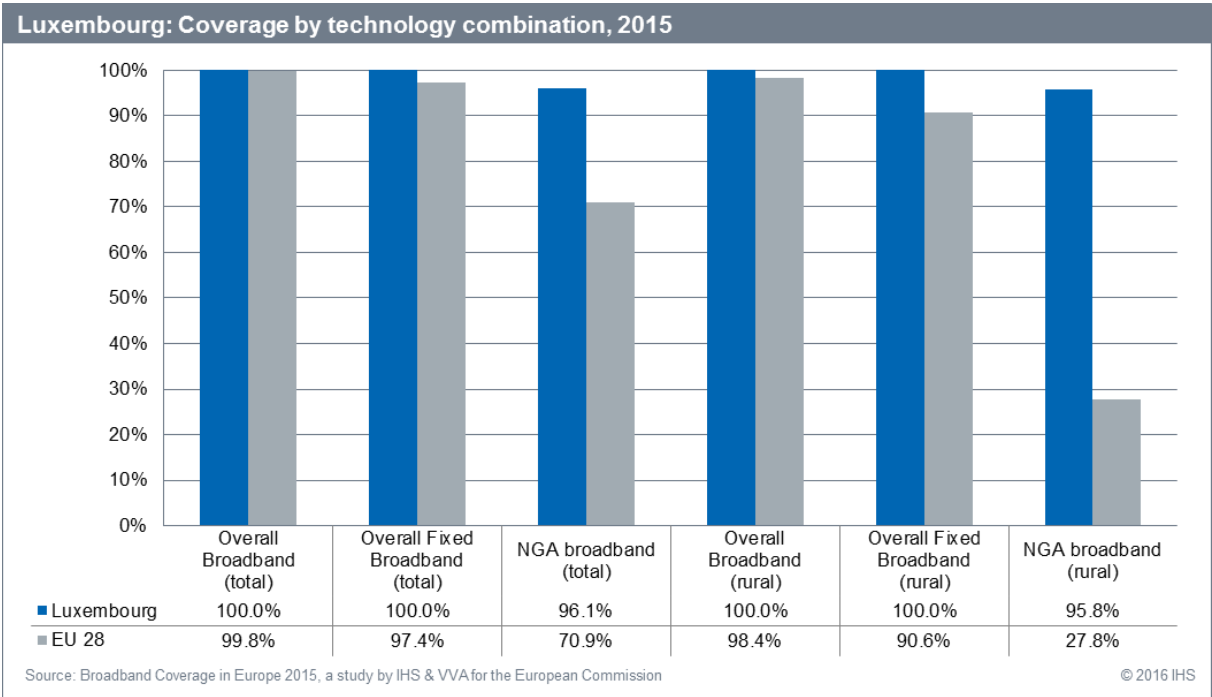
Looking at the individual technologies, Luxembourg continued to outperform the EU average levels for coverage of all technologies with the exception of WiMAX, which is not present in the country. Universal fixed broadband availability is a result of complete DSL coverage. The incumbent, P&T, as well as an alternative operator Tango, have been investing extensively in upgrading their DSL networks to VDSL leading to Luxembourg ranking the second-highest in terms of VDSL coverage after Belgium with 88.8% of households having access to VDSL services.

Additionally, improvements were recorded in the first six months of 2015 in terms of DOCSIS 3.0 coverage, which increased by 10.2 percentage points to 75.2% of households passed by the high-speed cable broadband networks, compared to the EU average of 43.1%. Cable coverage also improved, with a 10.0 percentage point increase, reaching 80.5% of households by mid-2015 compared to the EU average of 43.8%. Further gains were also observed in terms of FTTP coverage, which increased by 4.3 percentage points to 47.1%, which is more than twice the EU average (20.8%).

After substantial increases in LTE coverage recorded in 2014, availability of LTE services remained stable with 96.2% of homes passed by the high-speed mobile networks.

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Luxembourg: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Luxembourg	100.0%	88.8%	47.1%	0.0%	80.5%	75.2%	99.6%	96.2%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%
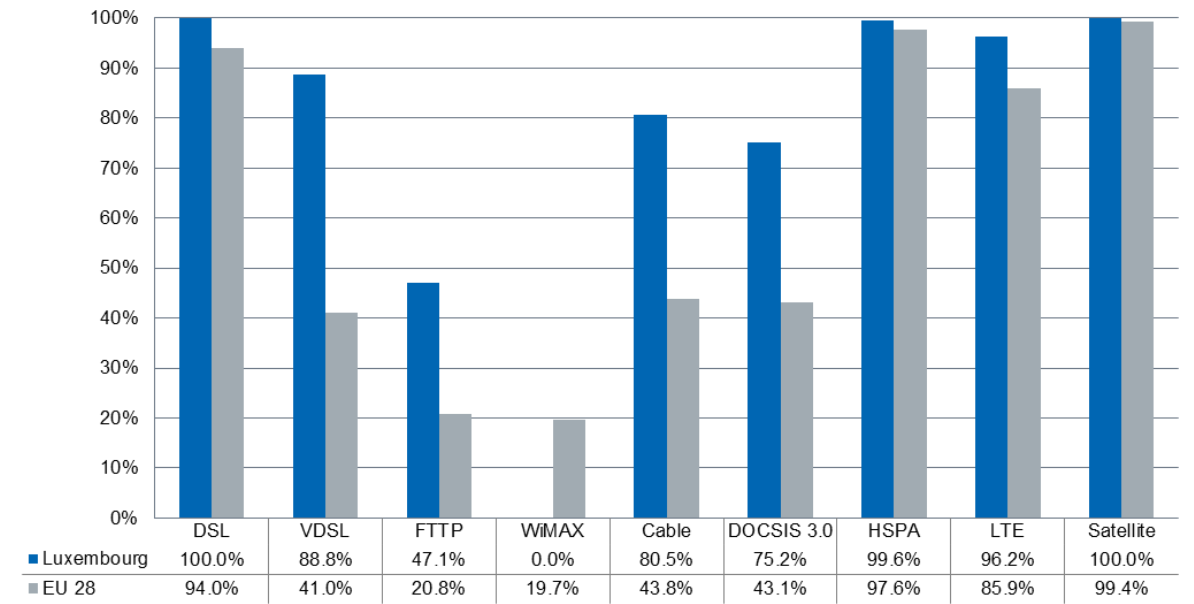
Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

As in 2014, rural areas in Luxembourg benefited from above EU average coverage levels for all technologies except for WiMAX and DOCSIS 3.0, which remained unavailable to rural households. Rural FTTP coverage recorded a 4.3 percentage point growth in the first six months of 2015 with FTTP networks passing 46.0% of rural homes, well above the EU average of 7.2%.

Rural LTE coverage continued to grow albeit at a slower pace than in 2014 improving by 1.7 percentage points leading to more than 9 in 10 (91.2%) of rural households across Luxembourg having access to mobile LTE broadband services by mid-2015.

Luxembourg: Coverage by technology, rural areas, 2015
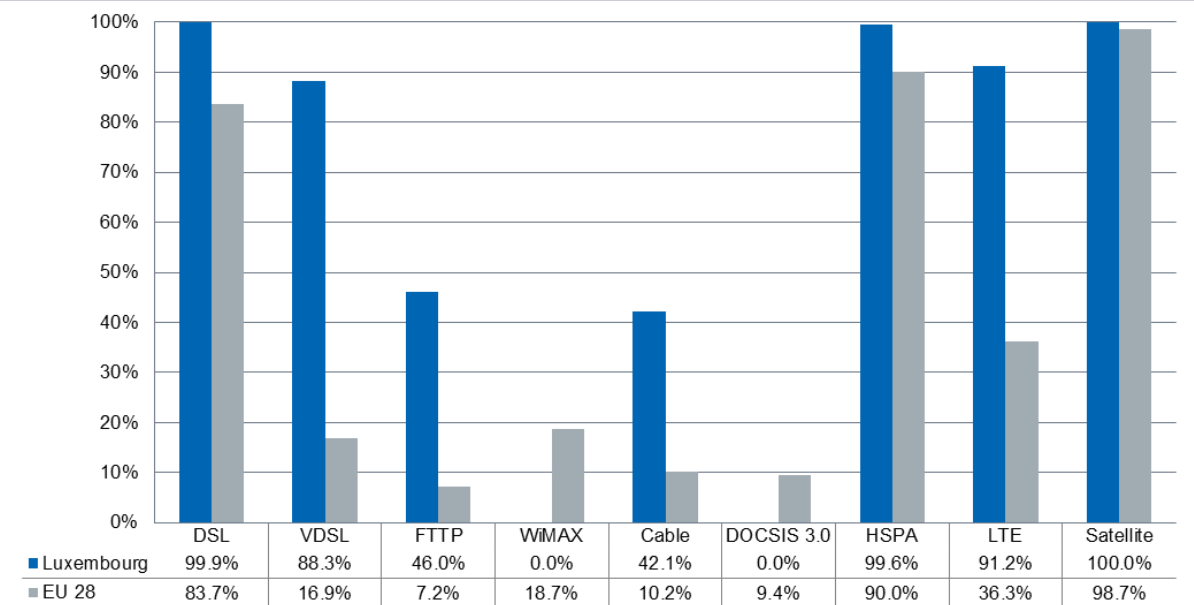
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Luxembourg	99.9%	88.3%	46.0%	0.0%	42.1%	0.0%	99.6%	91.2%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

5.19.2 Regional coverage by broadband technology

Luxembourg: Overall fixed broadband coverage, 2015

0% - <75%
75% - <90%
90% - <95%
95% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
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Luxembourg: NGA broadband coverage, 2015

0%
>0% - <35%
35% - <65%
65% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS

5.19.3 Regulatory and market overview

The government of Luxembourg introduced its national action plan for very high-speed networks in 2010, with goals set out to 2020. Its objectives exceed those of the Digital Agenda for Europe, as the government aims at 100% of the population having access to ultra-high-speed networks, i.e. minimum 1 Gbps downstream and 500 Mbps upstream by 2020.[115]

The incumbent operator in Luxembourg is P&T, which offers DSL, VDSL and since 2011 FTTP services directly competing with an alternative telco Tango, as well as cable operator Numericable, While P&T and Tango have been focusing in recent years on deploying FTTP networks and rolling out vectored VDSL services, Numericable, via its parent company Altice, is set to become the first European company to launch an advanced DOCSIS 3.1 network on a large scale increasing download speeds over its cable network to up to 10 Gbps. [116][117]

Given that LTE networks are already well-developed and LTE services offered by P&T, Tango and Orange since 2012[118], mobile operators have begun to shift their focus towards deployment of LTE-Advanced technology over their networks with Tango launching fist LTE-A network at the beginning of 2015.[119]

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[115] Gouvernment du Grand Duche du Luxembourg, 2010, *National strategy for very high-speed networks - Very high-speed broadband for all*

[116] https://www.teleste.com/news/2014/teleste-signs-significant-frame-agreement-altice-group-access-network-deliveries

[117] http://www.digitaltveurope.net/356342/altice-taps-cisco-for-docsis-3-1-and-ccap-upgrade/

[118] http://www.wort.lu/en/luxembourg/4g-lte-licences-issued-in-luxembourg-50079f80e4b096b452e29ee0

[119] http://www.tango.lu/documents/fck/file/08_Press%20release/158_PR_Tango_the_first_operator_in_Luxembourg_to_roll_out _its_4G_network.pdf

5.19.4 Data tables for Luxembourg

Statistic	National
Population	549,680
Persons per household	2.4
Rural proportion	13.5%

Technology	Luxembourg 2015		Luxembourg 2014		Luxembourg 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	100.0%	99.9%	100.0%	99.9%	100.0%	100.0%	94.0%	83.7%
VDSL	88.8%	88.3%	88.8%	88.1%	88.6%	88.2%	41.0%	16.9%
FTTP	47.1%	46.0%	42.8%	35.7%	36.0%	27.0%	20.8%	7.2%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.7%	18.7%
Cable	80.5%	42.1%	70.5%	52.8%	68.2%	50.2%	43.8%	10.2%
DOCSIS 3.0	75.2%	0.0%	65.0%	0.0%	62.7%	0.0%	43.1%	9.4%
HSPA	99.6%	99.6%	99.6%	99.6%	99.6%	99.6%	97.6%	90.0%
LTE	96.2%	91.2%	96.0%	89.5%	79.9%	58.0%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.8%	98.4%
Overall fixed broadband	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	97.4%	90.6%
NGA broadband	96.1%	95.8%	94.4%	94.0%	94.3%	94.1%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.20 Malta

5.20.1 National coverage by broadband technology

As was the case in 2014, Malta continued to be the only country with virtually complete broadband coverage across all three coverage combination categories on both national and rural level.

Malta: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Malta	100.0%	100.0%	100.0%	100.0%	100.0%	99.9%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
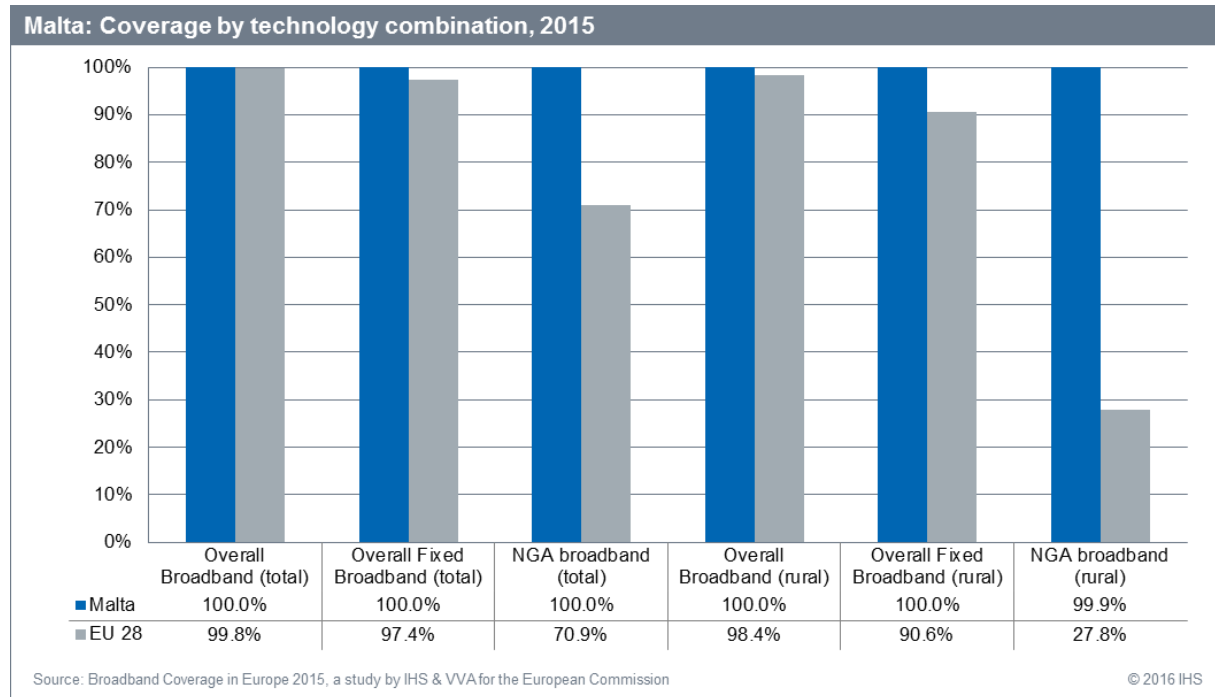
As noted in previous iterations of this study, the fact that Malta is a small, very densely populated island with minimal rural population (only 1% of households were identified as rural) present an undisputable advantage to reaching universal broadband coverage.

Malta: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Malta	100.0%	72.0%	10.4%	100.0%	100.0%	100.0%	99.0%	72.0%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
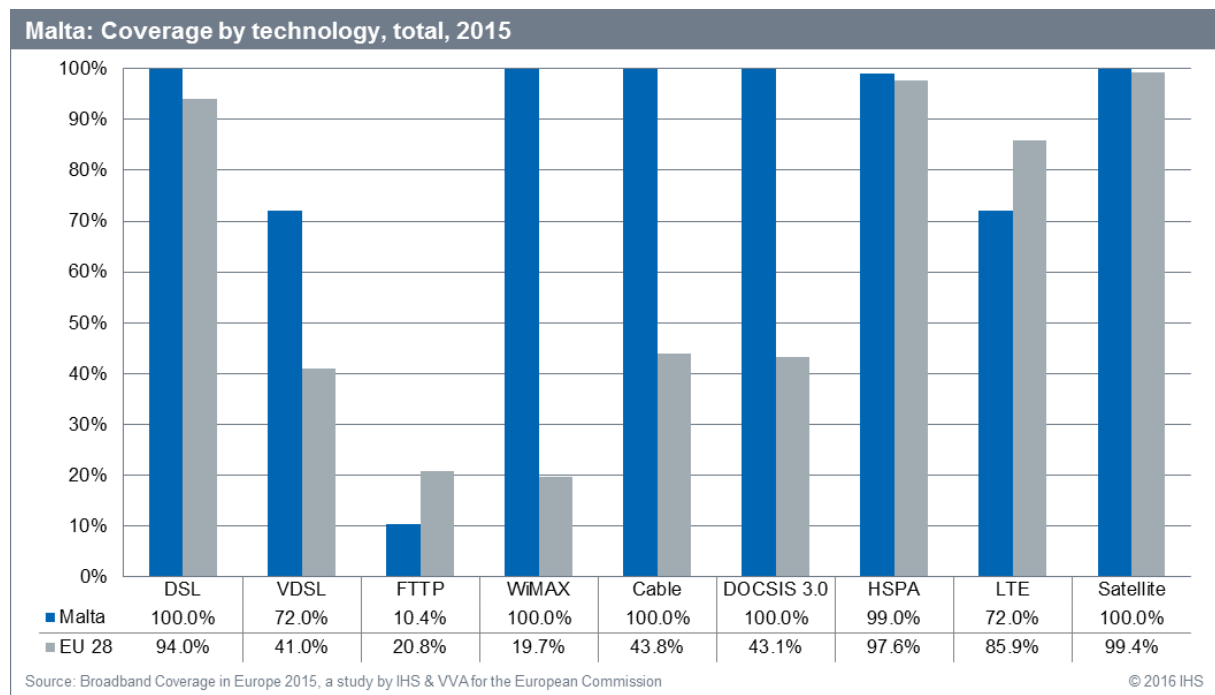
Looking at the individual technologies, Malta is also the only country to report complete coverage across a range of key technologies, namely DSL, cable and WiMAX. NGA coverage is ensured through complete DOSCIS 3.0 coverage. In addition, VDSL networks passed three quarters (75%) of households in mid-2015, unchanged from December 2014.

FTTP continued to increase in the first six months of 2015, growing by 2 percentage points, with FTTP networks passing 10.4% of homes across the island. Nevertheless, given its limited reach, FTTP remains a marginal technology in the Maltese market.

After the launch of the first LTE networks in Malta at the end of 2013 and substantial growth in LTE availability throughout 2014, LTE coverage continued to increase, recording a 5 percentage point growth and by the end of June 2015 nearly three quarters (72.0%) of Maltese households were able to connect via the high-speed mobile technology. Yet despite the increase, the level of households covered by LTE was still below the EU average of 85.9%.

Malta: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Malta	100.0%	0.0%	0.0%	100.0%	100.0%	99.9%	86.5%	0.0%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
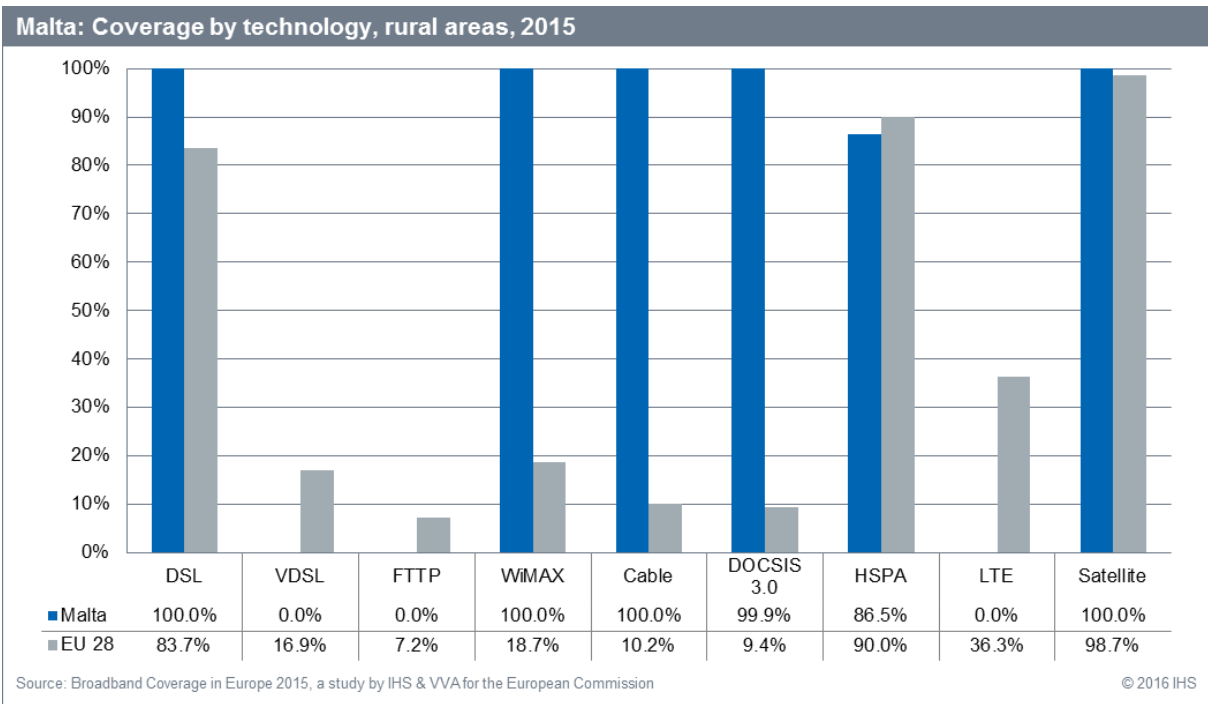
When examining rural broadband coverage in Malta, it is important to keep in mind the generally small number (less than 1%) of Maltese households considered to be rural. With this perspective, complete rural coverage was observed for DSL, WiMAX, cable and satellite technologies in rural areas, unchanged from 2014. Given the absence of VDSL and FTTP in rural areas, DOSCIS 3.0 remained the only NGA access technology available to rural households.

LTE networks are yet to be rolled out into rural areas, with primary focus for LTE networks deployment continuing to be on cities and semi-urban areas.

5.20.2 Regional coverage by broadband technology

Malta: Overall fixed broadband coverage, 2015

0% - <75%
75% - <90%
90% - <95%
95% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
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Malta: NGA broadband coverage, 2015

0%
>0% - <35%
35% - <65%
65% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS
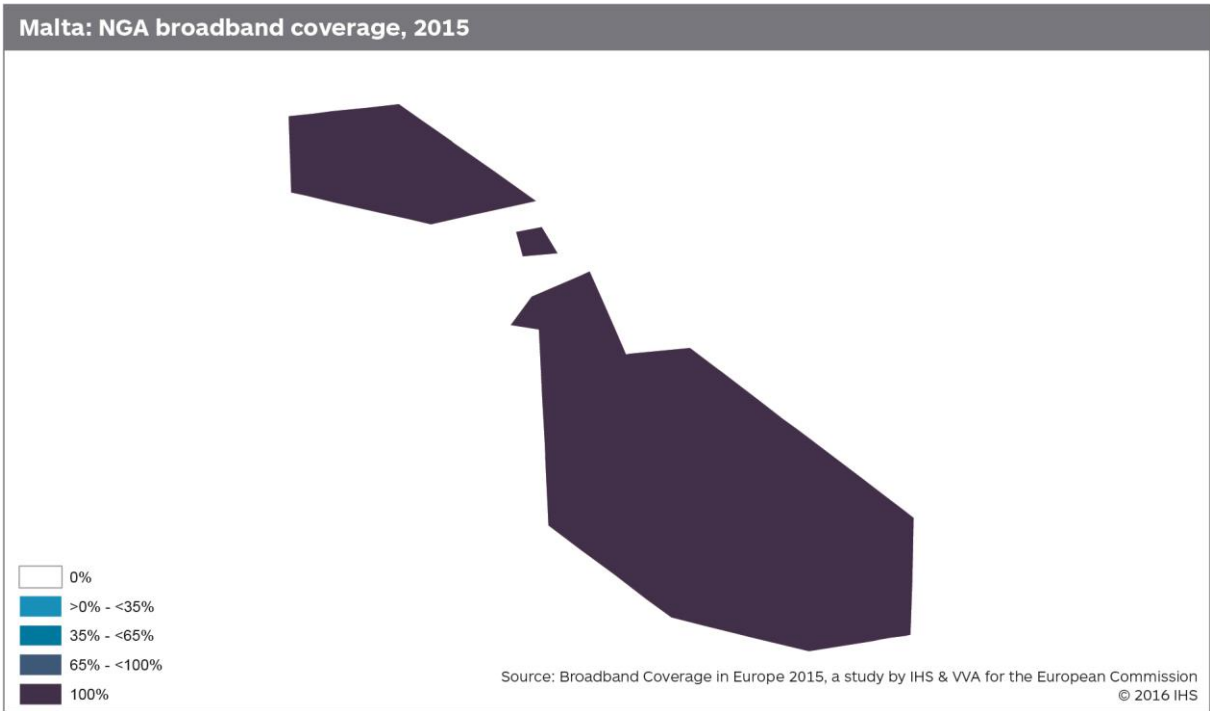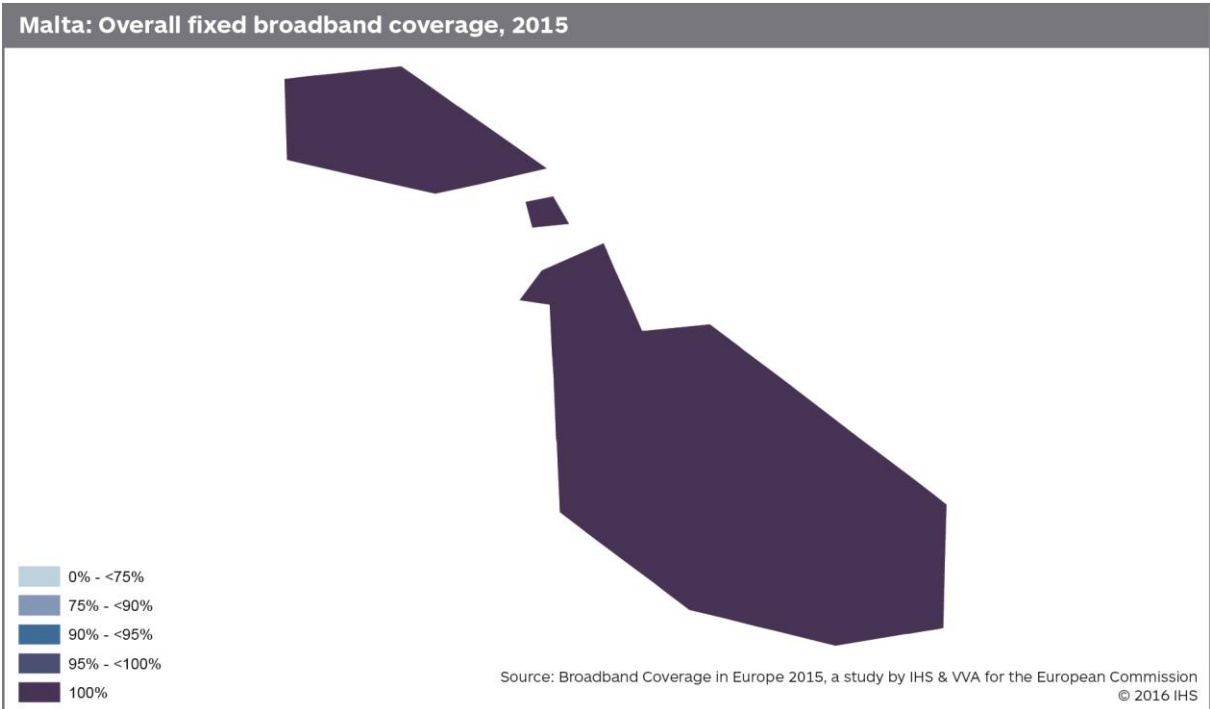
5.20.3 Regulatory and market overview

The national broadband strategy is outlined in the ICT strategy named "Digital Malta", which is set to run between 2014 and 2020.[120] As coverage in Malta is already complete for many technologies, the strategy focuses mainly on developing the latest digital services innovations and encouraging digital literacy. In addition, the plan aims to achieve complete NGA coverage by 2020, as well as further deployment of LTE networks through the assignment of the 800 MHz spectrum band.

The Maltese fixed broadband market is split between two main operators, the cable company Melita, and telecoms group GO. In May 2015, GO launched a new 500 Mbps FTTP network, expected to cover 33,000 homes by the end of 2015.[121] This is in addition to the company's VDSL upgrade roll-out of its DSL network, which has been ongoing since 2011. Melita, has also launched its DOCSIS 3.0 service in 2011 and offered speeds up to 250 Mbps during the first six months of 2015.

LTE services have been first offered by Vodafone only at the end of 2013, yet by January 2015, the operator was able to reach 70% of the Maltese population.[122] In March 2015, Vodafone was joined by GO as the second operator to launch its LTE network.[123]

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[120] http://digitalmalta.gov.mt/en/Pages/Home.aspx

[121] https://www.go.com.mt/-/go-launches-superfast-500mbps-internet#.Vu_1S_mLTIU

[122] https://www.vodafone.com.mt/Vodafone-news-details/1926

[123] https://www.telegeography.com/products/commsupdate/articles/2015/03/24/go-faster-maltese-telco-to-launch-4g-this-year/

5.20.4 Data tables for Malta

Statistic	National
Population	431,629
Persons per household	2.6
Rural proportion	0.9%

Technology	Malta 2015		Malta 2014		Malta 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	100.0%	100.0%	100.0%	100.0%	100.0%	92.5%	94.0%	83.7%
VDSL	75.0%	0.0%	75.0%	0.0%	75.0%	0.0%	41.0%	16.9%
FTTP	10.4%	0.0%	8.4%	0.0%	0.8%	0.0%	20.8%	7.2%
WiMAX	100.0%	100.0%	100.0%	100.0%	100.0%	99.9%	19.7%	18.7%
Cable	100.0%	100.0%	100.0%	100.0%	100.0%	92.5%	43.8%	10.2%
DOCSIS 3.0	100.0%	99.9%	100.0%	100.0%	100.0%	92.5%	43.1%	9.4%
HSPA	99.0%	86.5%	99.0%	95.7%	100.0%	92.5%	97.6%	90.0%
LTE	72.0%	0.0%	67.0%	0.0%	0.0%	0.0%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.8%	98.4%
Overall fixed broadband	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	97.4%	90.6%
NGA broadband	100.0%	99.9%	100.0%	100.0%	100.0%	92.5%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.21 Netherlands

5.21.1 National coverage by broadband technology

The broadband coverage levels for all combination categories in the Netherlands remained unchanged in the first six months of 2015. Complete overall broadband and fixed broadband coverage was again recorded on both national and rural level.

Availability of NGA broadband also remained high with high-speed broadband services being available to 98.3% of all households and 97.8% of rural households. Therefore, the Netherlands continued to be one of the leaders in terms of total NGA coverage and ranked second behind Malta in rural in terms of rural NGA coverage.

Netherlands: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
■ Netherlands	100.0%	100.0%	98.3%	100.0%	100.0%	97.8%
■ EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
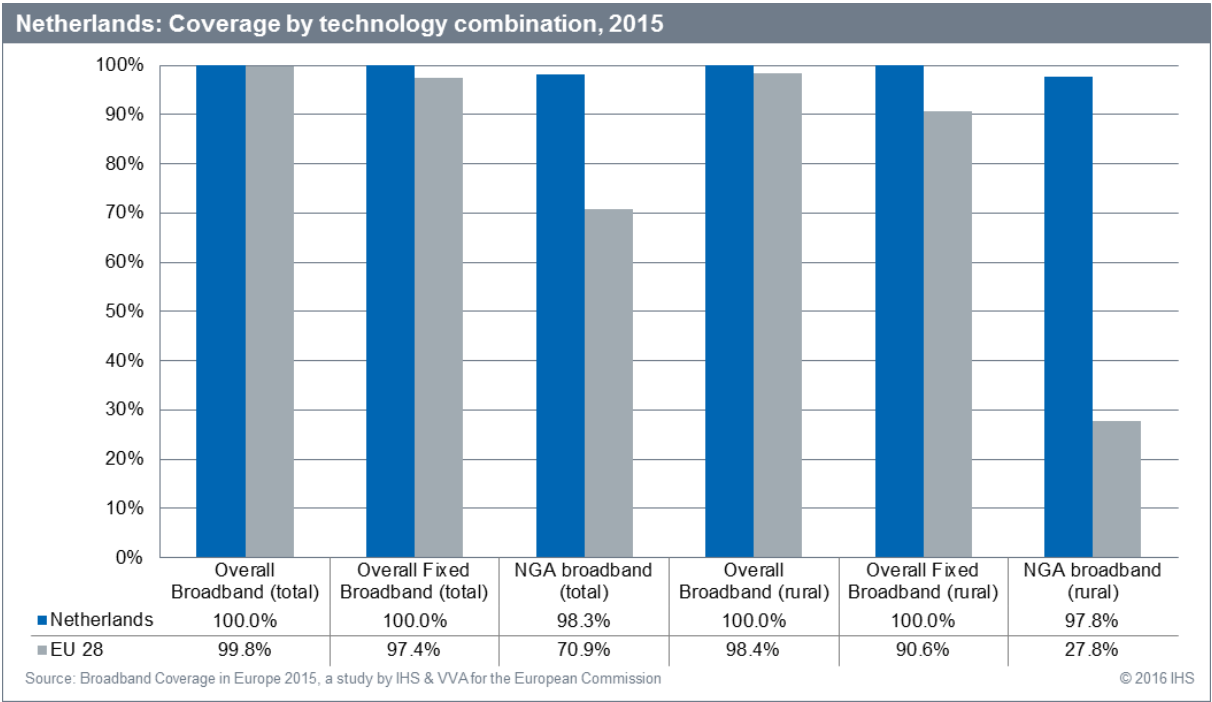
Looking at the individual technologies, the Netherlands registered coverage exceeding the EU average for all individual technologies except for WiMAX, which is not present in the country. DSL networks pass all Dutch homes and fully DOCSIS 3.0 upgraded cable broadband services are available to 95.1% of households.

VDSL coverage increased by 1 percentage point reaching 69.9% of households, while FTTP coverage grew by 1.5 percentage points, covering 29.7% of households by end of June 2015.These increases are in line with the incumbent KPN's continued deployment efforts during the first six months of 2015.

In previous years, all major mobile networks operators including KPN, T-Mobile Netherlands, Vodafone Netherlands (along with the cable company Ziggo) launched their LTE networks and by the end of 2014 the Netherlands reached nearly universal LTE coverage with 99.6% of homes being passed by the high-speed mobile network with the same coverage level reached for HSPA technology. At the end of June 2015, the Netherlands therefore continued to lead the study countries in terms of mobile coverage given the high availability levels reached in 2013 and 2014.

Netherlands: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Netherlands	100.0%	69.9%	29.7%	0.0%	95.1%	95.1%	99.6%	99.6%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%
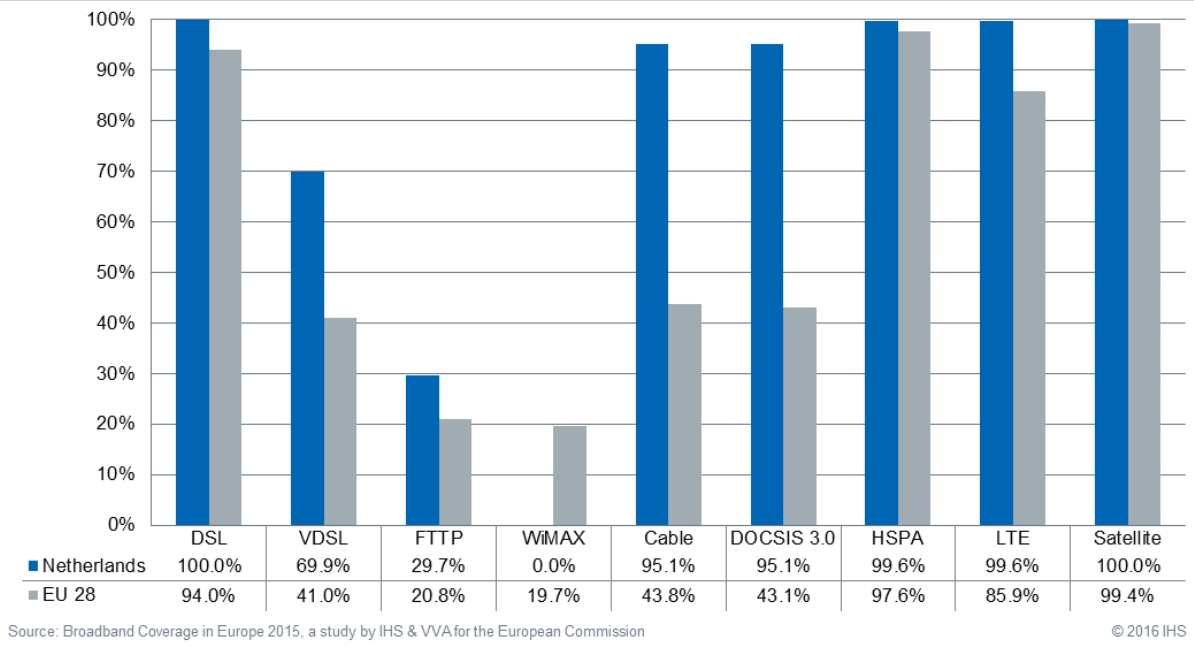
In rural areas, nearly all (99.9%) rural households had access to DSL broadband services and 92.4% of rural homes were passed by cable networks. The most substantial increase during the first half of 2015 was recorded for rural VDSL coverage, which grew by 13.6 percentage points, reaching 69.9% of rural households and largely exceeding the EU average of 41.0%. In addition, FTTP coverage also registered a considerable increase, growing by 6.6 percentage points and attaining 27.1% of rural households, almost four times higher than the EU average. Despite these increases, DOCSIS 3.0 remained the main rural NGA technology available to Dutch households.

Mobile broadband coverage in rural areas improved in the first six months of 2015, with a 2.8 percentage point increase for both HSPA and LTE technologies with both networks passing 98.3% of rural homes across the Netherlands.

Netherlands: Coverage by technology, rural areas, 2015
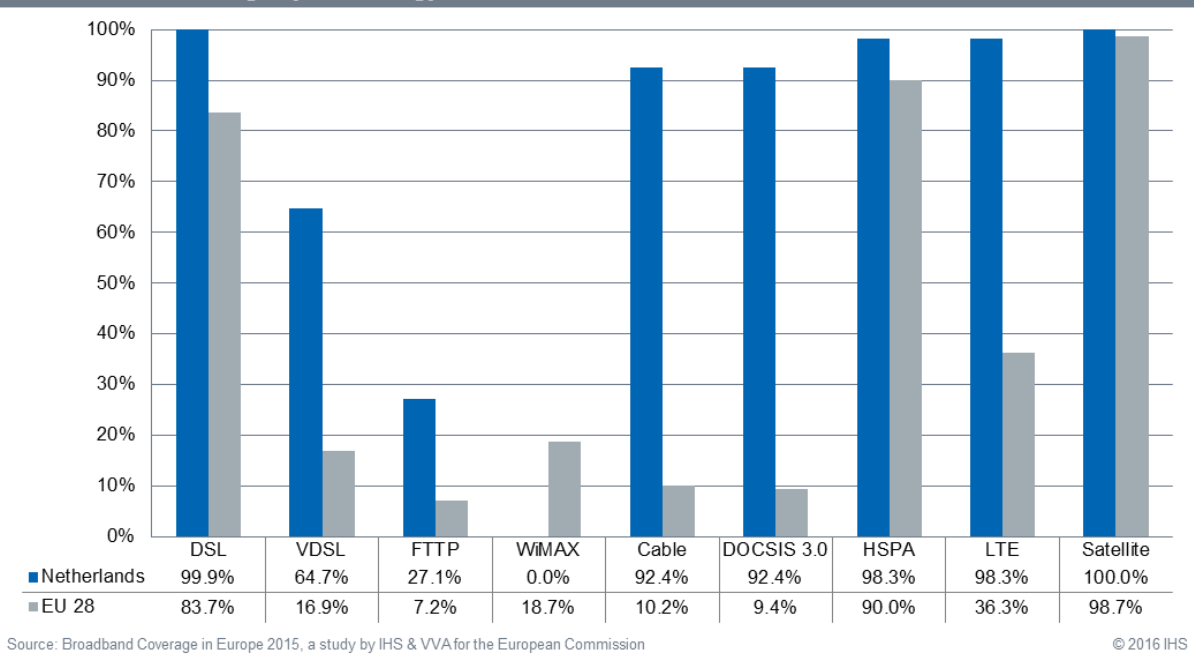
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Netherlands	99.9%	64.7%	27.1%	0.0%	92.4%	92.4%	98.3%	98.3%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

5.21.2 Regional coverage by broadband technology

Netherlands: Overall fixed broadband coverage, 2015

- 0% - <75%
- 75% - <90%
- 90% - <95%
- 95% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

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Netherlands: NGA broadband coverage, 2015

- 0%
- >0% - <35%
- 35% - <65%
- 65% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

© 2016 IHS
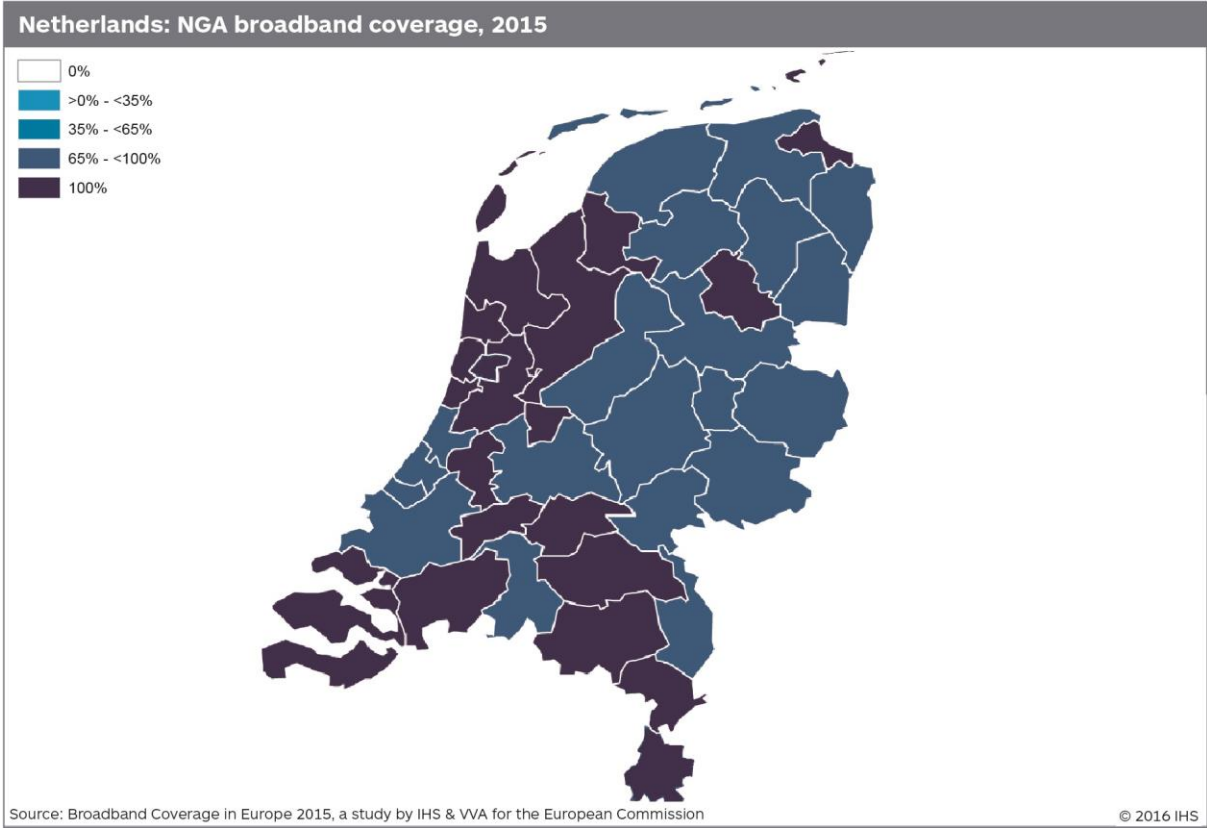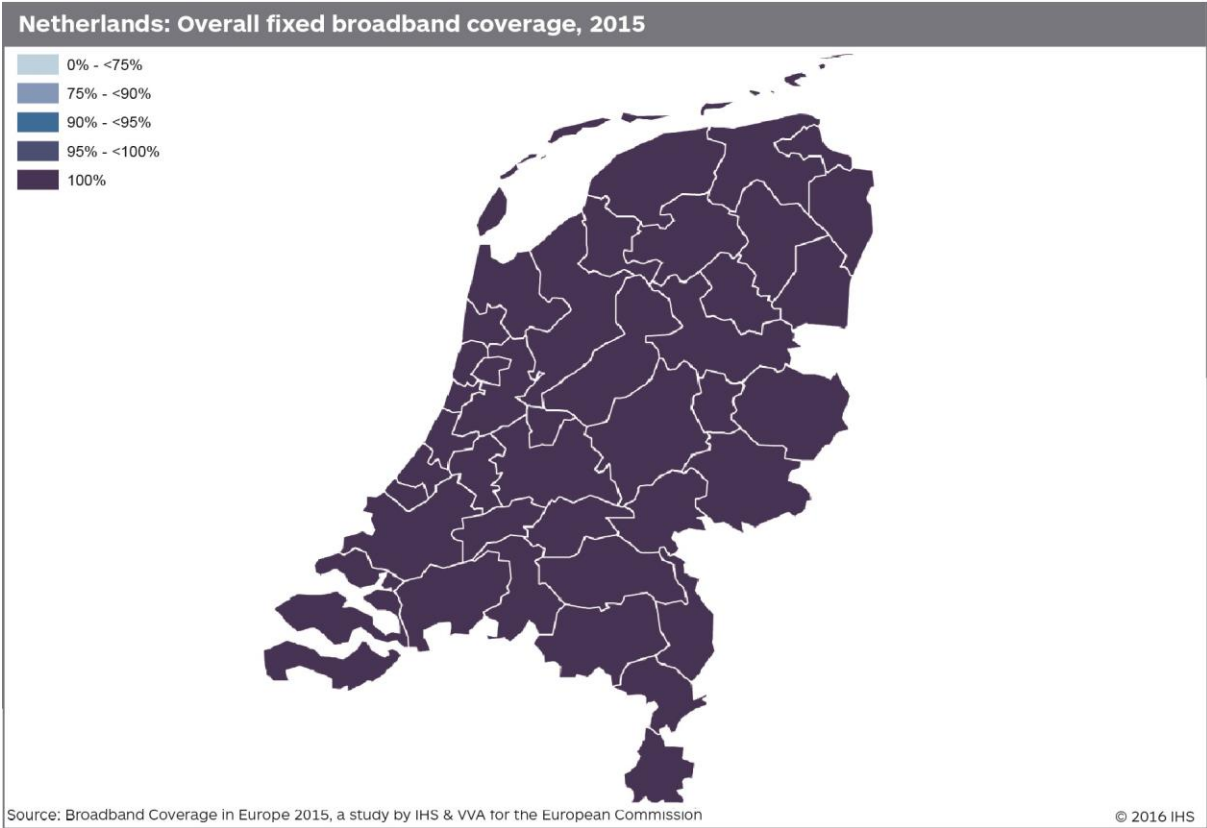
Fixed broadband coverage remained unchanged across the individual regions with all households being able to access fixed broadband services at the end of June 2015.

NGA coverage was slightly more varied in the individual regions. Eighteen regions recorded complete NGA availability, while the lowest NGA coverage was registered in Oost-Groningen region, where nearly 90% of households had access to high-speed broadband.

5.21.3 Regulatory and market overview

The "Digital Agenda for the Netherlands" was launched in 2011 and is valid until 2015. It mirrors the Digital Agenda for Europe's objectives of complete coverage with at least 30 Mbps speed and 50% of households having access to 100 Mbps broadband services by 2020 while maintaining a technology-neutral approach.[124]

In November 2014, Ziggo, the largest cable provider in the Netherlands, was acquired by Liberty Global leading to Liberty's UPC and Ziggo merging their networks under the latter's banner in April 2015, thus overtaking the incumbent KPN as the leading player in the Dutch fixed broadband market.[125] With all cable networks fully upgraded to DOCSIS 3.0, the company now looks into the implementation of DOCSIS 3.1 standards, which will enable Ziggo to provide speeds of 1Gbps downstream to consumers within the next few years.[126]

KPN has also been focusing on expanding its high-speed broadband networks through a continued VDSL roll-out with the company expecting to provide 100 Mbps VDSL services to 85% of households by the end of 2016.[127] KPN also became a sole owner of the wholesale fibre operator Reggefiber at the end of 2014 and has pushed for further extension of Reggerfiber's FTTP network throughout the first half of 2015.[128]

With five operators (KPN, T-Mobile Netherlands, Vodafone Netherlands, Tele2 and Ziggo) offering LTE services, the focus has shifted to LTE-Advanced networks, with KPN and Vodafone launching the first networks in The Hague and Amsterdam in September 2014[129] followed by Tele 2 in 2015.[130]

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[124] https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/rapporten/2011/12/13/digitale-implementatie-agenda-nl/120123-mez011-digitale-impl-agenda-finale-versie.pdf

[125] https://www.telegeography.com/products/commsupdate/articles/2015/02/18/upc-netherlands-to-rebrand-as-ziggo-from-april/

[126] http://www.digitaltveurope.net/205622/upc-netherlands-doubles-upload-speeds-for-broadband/

[127] https://www.telegeography.com/products/commsupdate/articles/2015/08/27/kpn-continues-vdsl-expansion/

[128] https://corporate.kpn.com/press/press-releases/kpn-acquires-remaining-40-stake-in-reggefiber.htm

[129] https://www.telegeography.com/products/commsupdate/articles/2014/09/19/vodafone-kpn-trumpet-lte-a-rollouts/

[130] http://www.tele2.com/media/press-releases/2015/tele2-starts-data-revolution-in-dutch-market/

5.21.4 Data tables for Netherlands

Statistic	National
Population	16,829,289
Persons per household	2.2
Rural proportion	8.1%

Technology	Netherlands 2015		Netherlands 2014		Netherlands 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	100.0%	99.9%	100.0%	99.9%	100.0%	100.0%	94.0%	83.7%
VDSL	69.9%	64.7%	68.9%	51.1%	64.4%	39.7%	41.0%	16.9%
FTTP	29.7%	27.1%	28.2%	20.5%	23.3%	19.4%	20.8%	7.2%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.7%	18.7%
Cable	95.1%	92.4%	96.8%	93.2%	95.8%	95.2%	43.8%	10.2%
DOCSIS 3.0	95.1%	92.4%	96.8%	93.2%	95.0%	94.4%	43.1%	9.4%
HSPA	99.6%	98.3%	99.6%	95.5%	99.0%	90.5%	97.6%	90.0%
LTE	99.6%	98.3%	99.6%	95.5%	90.4%	42.6%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.8%	98.4%
Overall fixed broadband	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	97.4%	90.6%
NGA broadband	98.3%	97.8%	98.4%	97.7%	97.6%	97.2%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.22 Norway

5.22.1 National coverage by broadband technology

During the first six months of 2015, overall broadband and fixed broadband coverage levels in Norway remained slightly below the respective European average levels, both nationally and in rural areas. On the other hand, NGA coverage with nearly 8 in 10 (79.6%) of all households and a third (32.2%) of rural households having access to high-speed broadband services at the end of June 2015 was well-above the total and rural EU average.

Norway: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Norway	99.5%	94.7%	79.6%	97.7%	77.4%	32.2%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
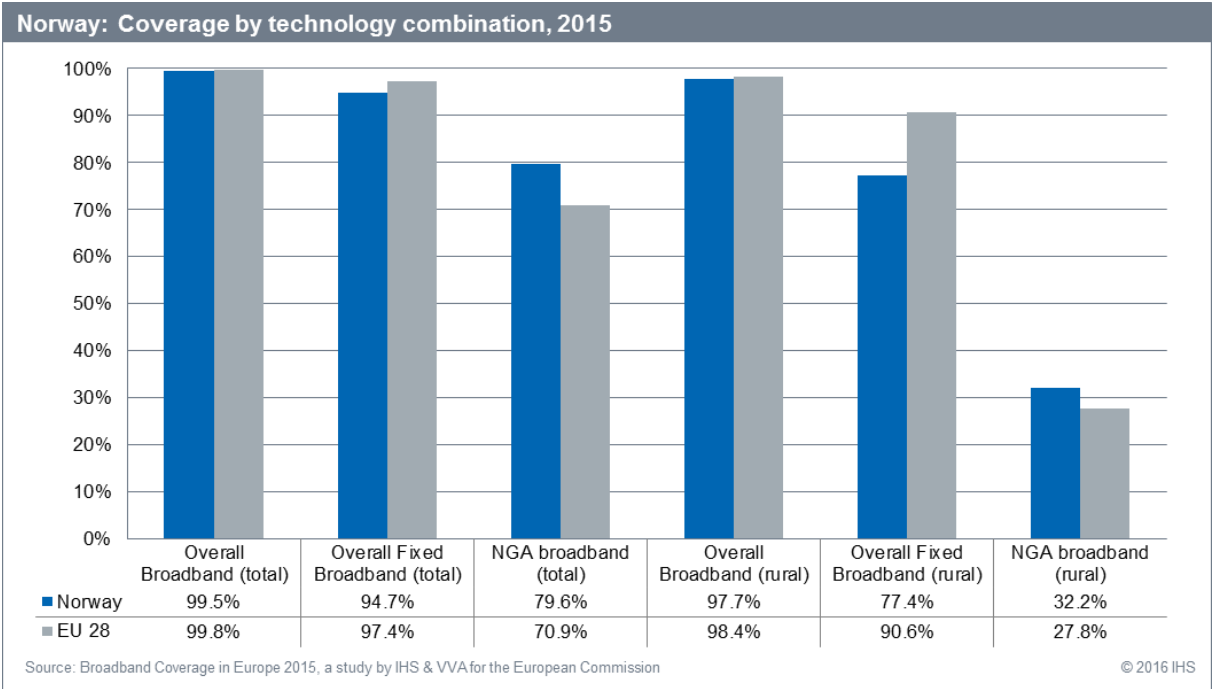
The main improvement in terms of fixed broadband technologies concerned VDSL coverage, which increased by 10.8 percentage points and by mid-2015 reached nearly a half (47.3%) of Norwegian households, thus exceeding the EU average of 41.0%.

Norway: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Norway	89.5%	47.3%	41.1%	0.0%	50.6%	50.3%	99.0%	99.6%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
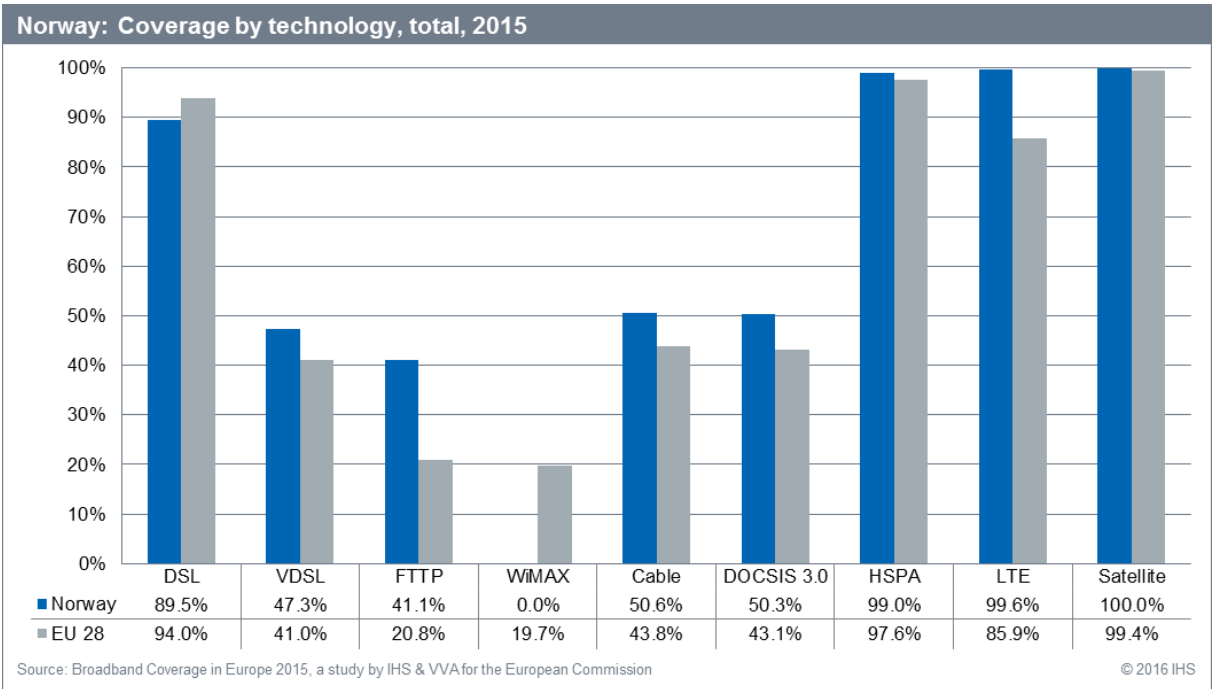
Therefore, the overall increase in NGA broadband availability can largely be attributed to the gains in VDSL coverage. Additionally, FTTP, cable and DOCSIS 3.0 coverage levels also increased slightly compared to December 2014 with FTTP networks passing 41.1% of homes (a 1.1 percentage point increase) and DOCSIS 3.0 cable broadband services being available to 50.3% of households across Norway (a 0.8 percentage point increase).

LTE coverage registered a considerable growth during the first six months of 2015, increasing by 16.6 percentage points, reaching 99.6% of Norwegian households compared to the EU average of 85.9%.

Norway: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Norway	67.4%	15.6%	18.4%	0.0%	2.7%	2.4%	95.5%	96.6%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
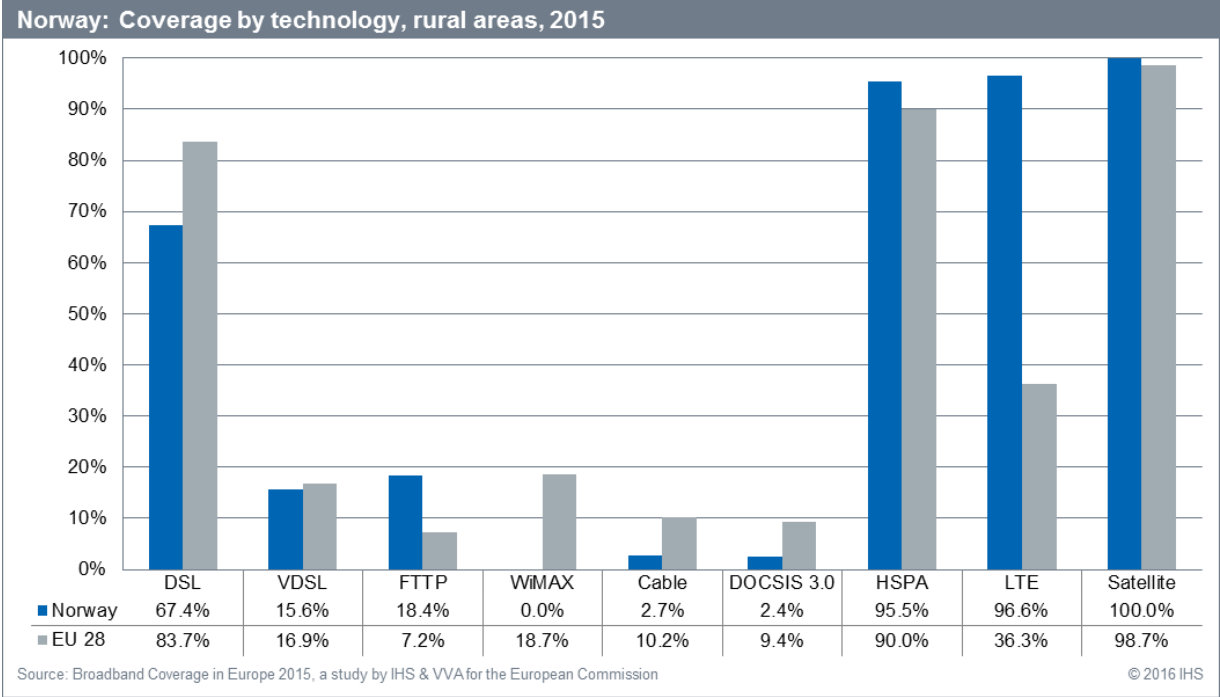
Although significantly below the EU average (83.7%), DSL remained the most wide-spread technology available in rural areas as DSL networks passed 67.4% of rural homes at the end of June 2015. Close to a fifth (18.4%) of rural households had access to FTTP services and 15.6% of rural households were able to connect to VDSL networks. At 2.4%, rural DOCSIS 3.0 networks continued to have a marginal impact on rural NGA coverage across Norway.

LTE coverage in rural areas grew considerably during the first six months of 2015, increasing by 64.9 percentage points to 96.6% of rural households, well-above the EU average of 36.3%.

5.22.2 Regional coverage by broadband technology

Norway: Overall fixed broadband coverage, 2015

- 0% - <75%
- 75% - <90%
- 90% - <95%
- 95% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

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Norway: NGA broadband coverage, 2015

- 0%
- >0% - <35%
- 35% - <65%
- 65% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

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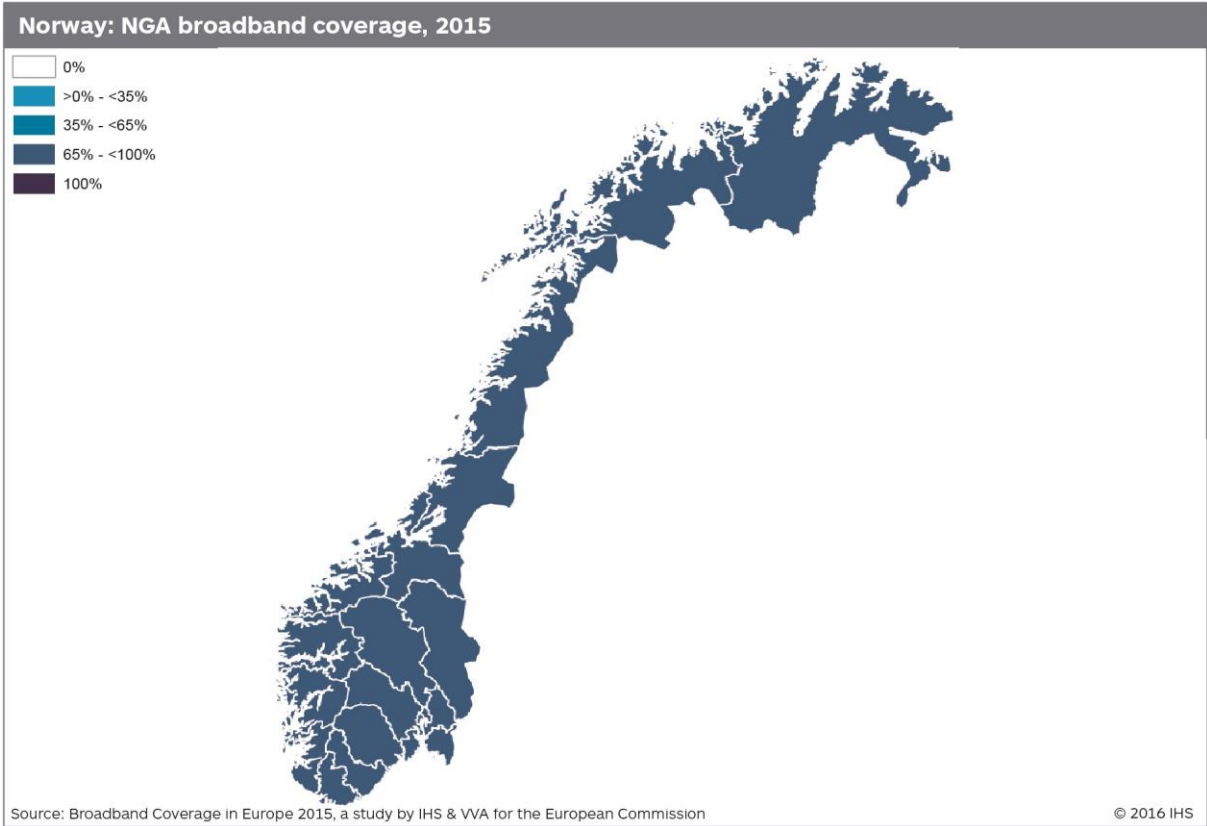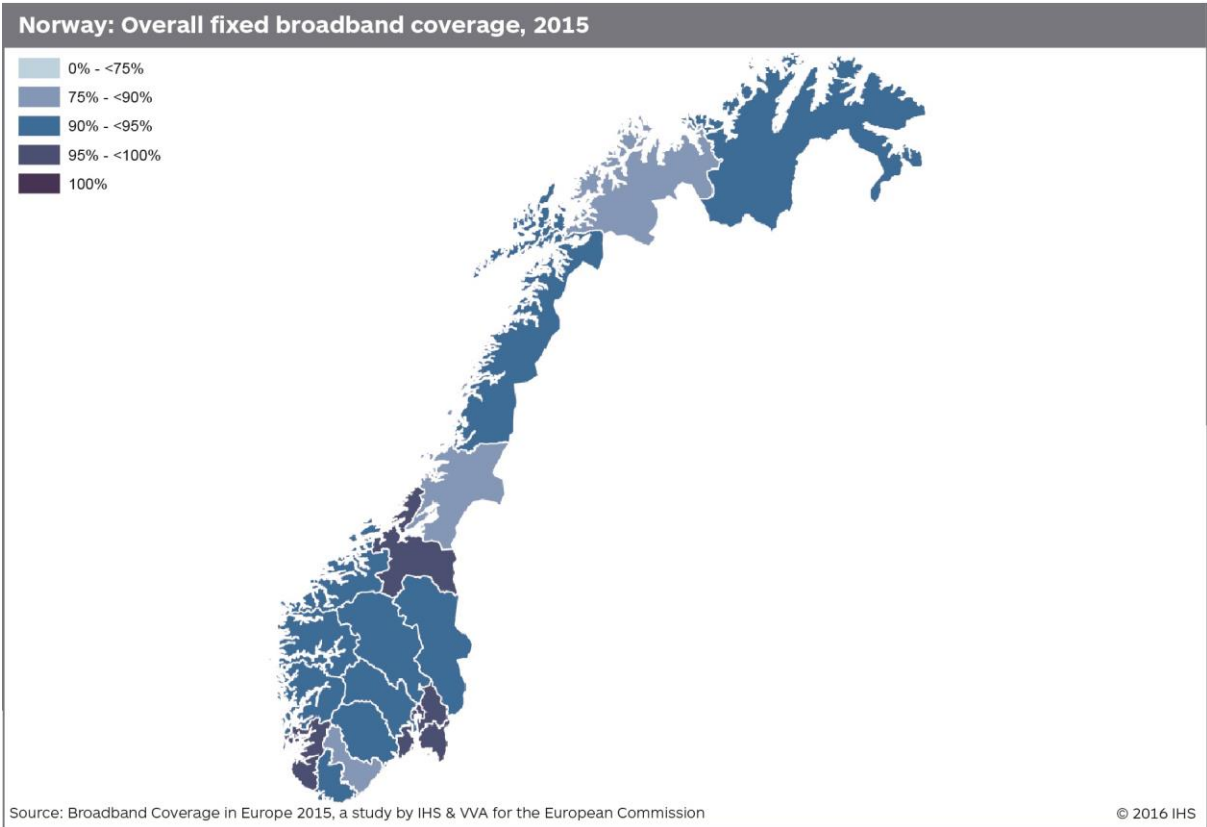
Given the country's size and population distribution, there is a degree of regional variation with regards to fixed broadband coverage. While nearly complete coverage was reported for the capital Oslo, in five regions (Aust-Agder, Finnmark, Troms, Nord-Trøndelag, and Hedmark) fixed broadband coverage remained between 90% and 91%.

There are even greater differences between regions in terms of NGA coverage, which ranged from around 65% in Sogn og Fjordane and Oppland to slightly over 95% in Oslo. However, two of the less covered regions, Sogn og Fjordane and Møre og Romsdal, registered rather considerable increases (of around 11 percentage points) in the first six months of 2015.

5.22.3 Regulatory and market overview

In 2013, the Norwegian government issued a policy agenda focused on improvement of broadband access in the country. The government set a goal of all Norwegian citizens having access to 100 Mbps connections by 2018. Funding for the infrastructure build up necessary in order to achieve this goal is supposed to be allocated from a EUR 12 billion general infrastructure fund intended for improvement of roads, railways and other infrastructure as well as broadband networks. In addition, government grants aimed at improving broadband access in rural areas and simplification of broadband rollout regulations were part of the government's plan.[131]

In May 2015, five Nordic communications regulators from Denmark, Finland, Sweden, Norway and Iceland, have agreed to formalise their cooperation efforts and stipulate an annual rotating chairperson role in order to boost regional collaboration regarding regulatory and market issues such as telecoms regulation, spectrum issues as well as broadband infrastructure improvements.[132]

The incumbent, Telenor, operates DSL, cable and FTTP networks. In the first six months of 2015, the company continued to upgrade its copper networks to VDSL2 technology, increasing available download speeds to up to 50 Mbps. However, Telenor's priority is deployment of FTTP and DOCSIS 3.0 networks and gradual migration of customers to the high-speed broadband platforms.[133]

With LTE networks now fully developed in Norway, mobile network operators have begun to look to further innovating and improving the speeds and quality of services offered over their mobile networks. As a result, both Telenor[134] and NetCom[135] launched their LTE-Advanced networks allowing for up to 300 Mbps download speeds in the spring of 2015.

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[131] http://www.zdnet.com/100mbps-broadband-and-easier-fibre-rollouts-norways-new-coalition-sets-out-its-it-priorities-7000021806/

[132] http://www.telecompaper.com/news/nordic-telecoms-watchdogs-formalise-their-cooperation--1080766

[133] https://www.telenor.com/wp-content/uploads/2015/06/04-Telenor-Norway-Seminar-London-Fixed-FINAL.pdf

[134] http://telecomist.com/2015/04/telenor-introducing-lte-a-in-more-than-200-municipalities/

[135] https://www.telegeography.com/products/commsupdate/articles/2015/03/06/netcom-launches-limited-lte-a-offering/

5.22.4 Data tables for Norway

Statistic	National
Population	5,107,970
Persons per household	2.1
Rural proportion	21.5%

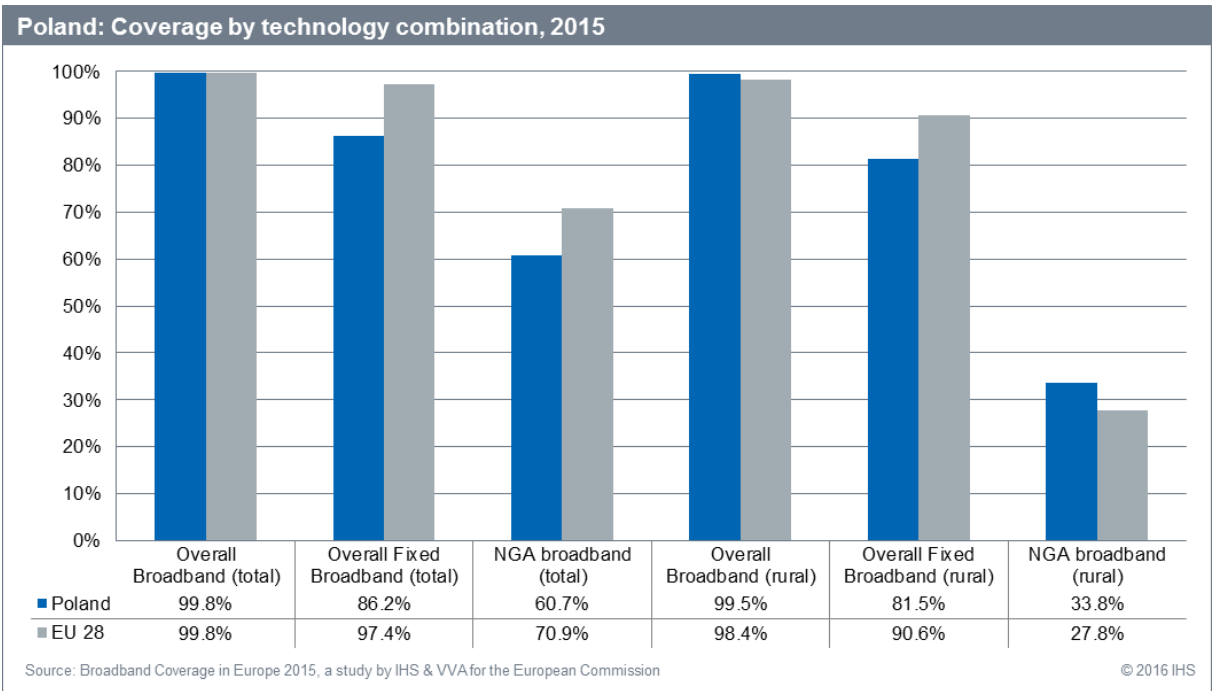| Technology	Norway 2015		Norway 2014		Norway 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	89.5%	67.4%	90.4%	70.2%	93.5%	74.1%	94.0%	83.7%
VDSL	47.3%	15.6%	36.5%	13.4%	32.1%	7.7%	41.0%	16.9%
FTTP	41.1%	18.4%	40.0%	22.3%	33.8%	10.0%	20.8%	7.2%
WiMAX	0.0%	0.0%	0.0%	0.0%	38.9%	34.1%	19.7%	18.7%
Cable	50.6%	2.7%	49.5%	2.9%	49.0%	3.2%	43.8%	10.2%
DOCSIS 3.0	50.3%	2.4%	49.5%	2.9%	48.0%	1.9%	43.1%	9.4%
HSPA	99.0%	95.5%	98.6%	95.0%	96.5%	81.8%	97.6%	90.0%
LTE	99.6%	96.6%	83.0%	31.7%	67.7%	37.1%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	99.5%	97.7%	99.3%	97.5%	98.6%	92.0%	99.8%	98.4%
Overall fixed broadband	94.7%	77.4%	95.2%	81.7%	96.7%	86.8%	97.4%	90.6%
NGA broadband	79.6%	32.2%	78.0%	31.2%	75.4%	16.2%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.23 Poland

5.23.1 National coverage by broadband technology

In Poland, fixed broadband remained below the EU average on both national and rural level. According to the reported data, 86.2% of Polish households had access to at least one fixed broadband technology, a 0.8 percentage point increase. In rural areas, fixed broadband availability increased by 1.6 percentage points reaching 81.5% of rural households. Despite these increases, fixed broadband coverage levels remained approximately 10 percentage points below the European average.

Improvements in terms of NGA coverage were recorded across Poland. At national level, a 7.3 percentage point NGA coverage increase was observed, with NGA availability growing to 60.7% of households, still lower than the 70.9% average EU households. Yet on rural level, NGA coverage exceeded the EU average for the first time with rural NGA networks passing 33.8% of rural homes compared to the EU average of 27.8%.

Poland: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Poland	99.8%	86.2%	60.7%	99.5%	81.5%	33.8%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

A detailed look at coverage levels of the individual technologies explains Poland's shortcomings in fixed broadband availability. Despite DSL being the dominant fixed broadband technology, its reach remains rather low as DSL services are available to only 76.2% of Polish households compared to 94.0% of average EU households. Both standard cable and DOCSIS 3.0 coverage also remained below the EU average. Cable networks passed 42.0% of households, a 1.5 percentage point increase compared to data reported for the 2014 study, with DOCSIS 3.0 services available to 40.0% of households.

DOCSIS 3.0 lost its leading position among NGA technologies as VDSL recorded a considerable 14.2 percentage point increase in coverage with 42.7% of households having access to VDSL services. FTTP coverage also continued to increase, gaining 1.7 percentage points by mid-2015 and reaching 9.0% of households.

LTE coverage increased substantially compared to the previous edition of the study, recording a 9.2 percentage point growth, yet at 75.9% it remained below the EU average of 85.9%.

Poland: Coverage by technology, total, 2015
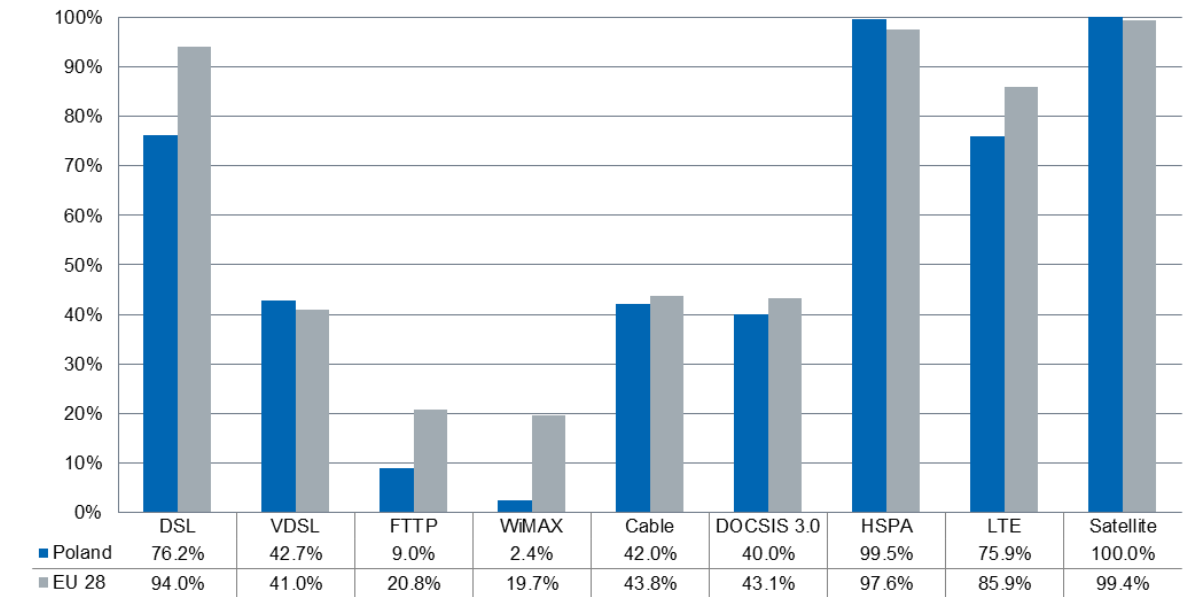
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Poland	76.2%	42.7%	9.0%	2.4%	42.0%	40.0%	99.5%	75.9%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

In rural areas, progress remained rather limited with the most significant increase recorded for FTTP coverage, which grew by 1.5 percentage points to 5.8% of rural households. Nevertheless, VDSL remained the primary NGA technology available in rural areas passing a quarter (25.8%) of rural homes. Virtually unchanged from the previous year, rural DOCSIS 3.0 coverage reached 11.1% of rural households.

Regarding mobile technologies, while HSPA networks were available to nearly all rural households (97.8%), availability of LTE networks in rural areas continued to be very limited. Despite a 2.3 percentage point increase, LTE services were available to only 5.7% of rural households by mid-2015.

Poland: Coverage by technology, rural areas, 2015
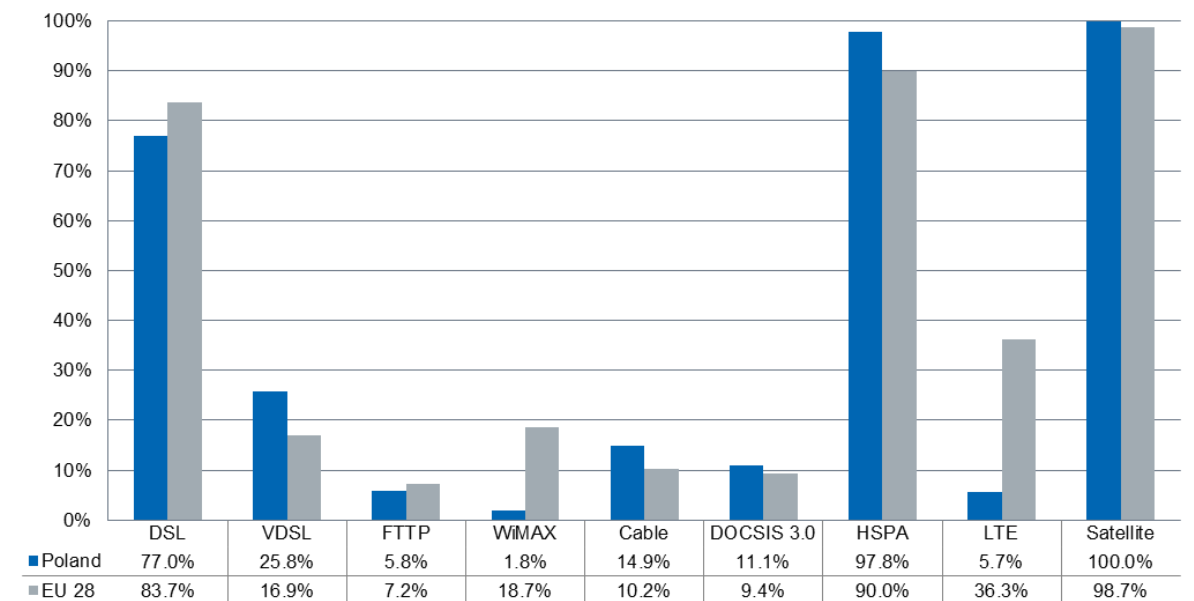
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Poland	77.0%	25.8%	5.8%	1.8%	14.9%	11.1%	97.8%	5.7%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

5.23.2 Regional coverage by broadband technology

There were considerable regional differences in terms of fixed broadband coverage in Poland. Urban centres, such as Warsaw, Lodz, Krakow, Gdansk, Szczecin, Wroclaw, or Poznan recorded complete fixed broadband coverage. But in a number of regions, such as in the Krakowski and Sandomiersko-jedrzejowski regions, fixed broadband was available to less than 70% of households.
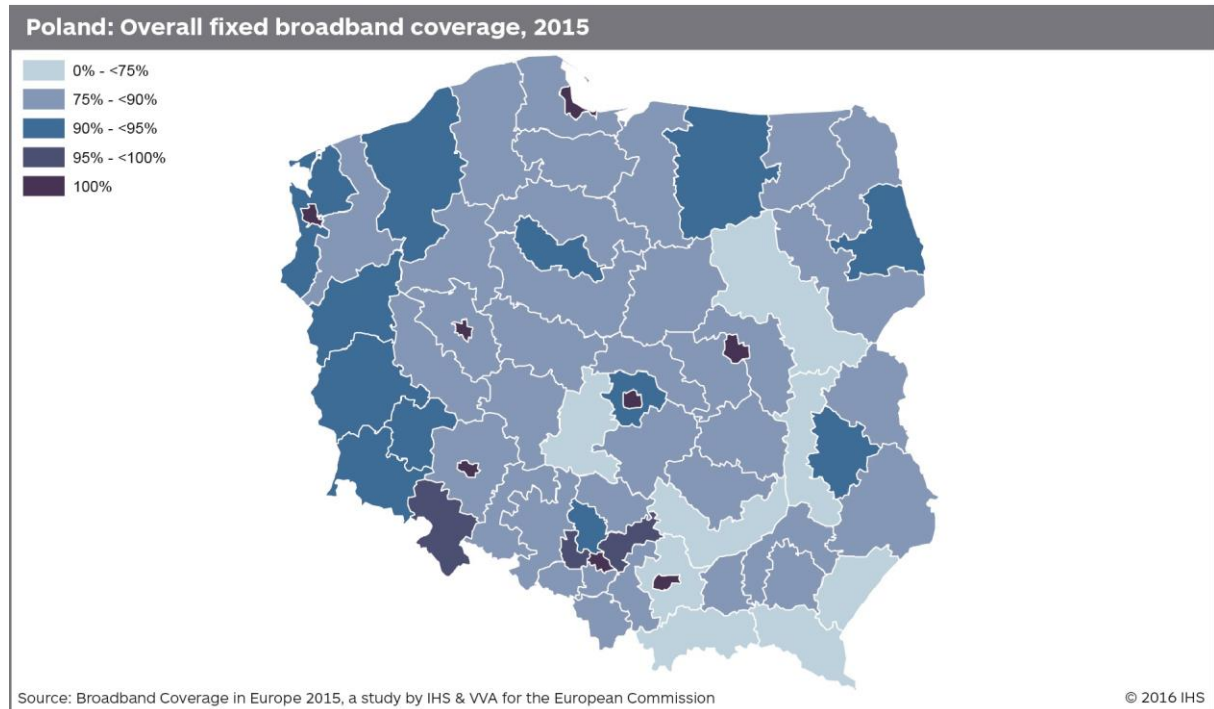
Large differences were also recorded for NGA coverage. Complete coverage was observed in the capital Warsaw, city of Lódz, and in the Trojmiejski urban regions, whereas coverage levels did not exceed 30% of households in five regions (Krakowski, Nowosadecki, Pulawski, Krosnienski and Sandomiersko-jedrzejowski).
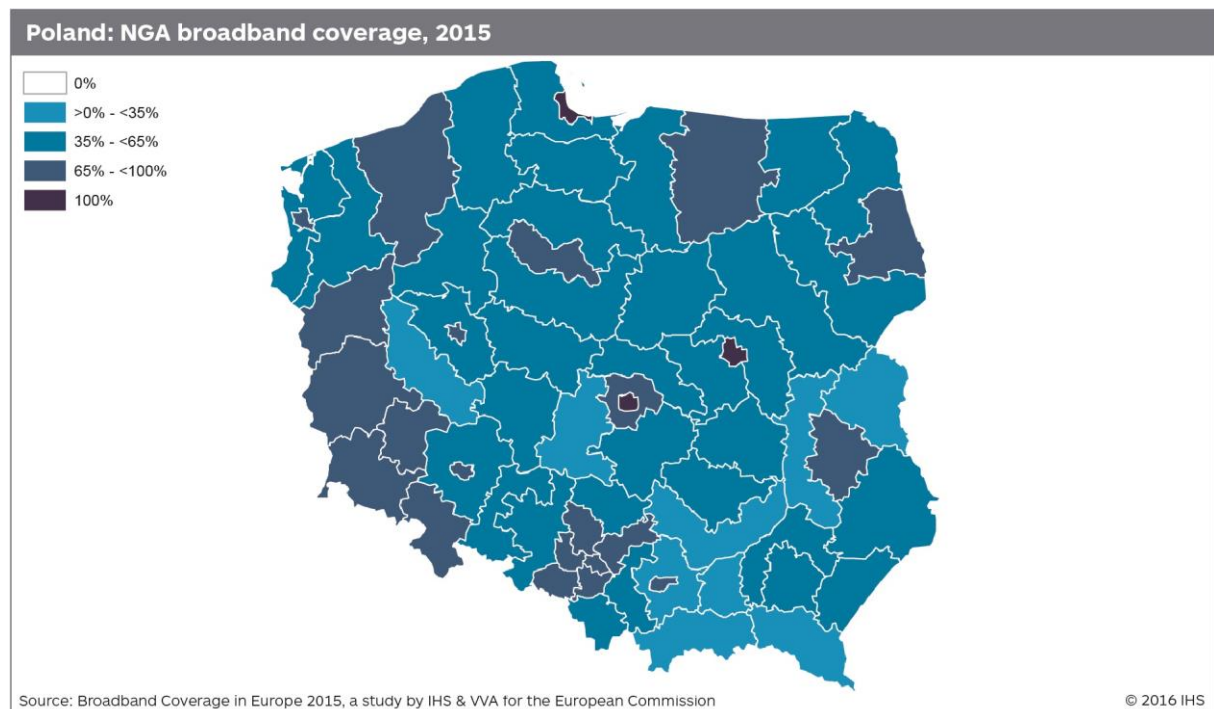
5.23.3 Regulatory and market overview

The Polish national broadband strategy was published in 2012 and is set to remain valid until the end of 2015. Its main goal aims at achieving complete coverage of at least 30 Mbps speeds by 2020.[136] In 2014, the Polish government adopted a new operational programme "Digital Poland 2014-2020" to boost investment in NGA infrastructure and deployment of high-speed mobile networks while eliminating investment barriers and promoting investment in broadband networks on a local level in underserved areas.[137] The programme entered its operational phase in March 2015 and has been awarded a total EUR 1 billion via the EU structural funds.[138]

Polish fixed broadband market is characterised by competition between the incumbent operator Orange Poland (formerly Telekomunikacja Polska) and a number of cable operators. UPC and Multimedia Polska are the main cable operators offering up to 500 Mbps high-speed broadband services in Poland. Orange Poland has been providing VDSL services since June 2011[139] but has been focusing on FTTP deployments in recent years and expanded to Bialystok, Bydgoszcz, Katowice, Lodz, Szczecin and Wroclaw in 2015.[140]

Four Polish mobile network operators offered LTE services over their network at the end of June 2015: Orange Poland, T-Mobile Poland, P4 (Play) and Polkomtel. In the beginning of 2015, the telecoms regulator UKE held a spectrum auction for additional licences in the 800MHz and 2600MHz spectrum, however it was put on hold in May 2015 as UKE considered introducing a price cap on the bidding.[141] The auction was resumed later in the year and in October 2015, it was announced that Orange was the highest bidder in the auction.[142]

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[136] http://www.en.uke.gov.pl/files/?id_plik=12164

[137] https://www.polskacyfrowa.gov.pl/media/10410/POPC_eng_1632015.pdf

[138] http://www.telecompaper.com/news/poland-to-spend-eur-1-billion-on-improving-broadband-access--989310

[139] http://www.orange.com/en/about/Group/global-footprint/Orange/countries/Group-s-activities-in-Poland

[140] https://www.telegeography.com/products/commsupdate/articles/2015/09/10/orange-continues-fibre-lte-investments-in-poland/

[141] https://www.telegeography.com/products/commsupdate/articles/2015/05/26/poland-pauses-lte-auction-again-as-it-considers-bid-cap/

[142] http://www.totaltele.com/view.aspx?ID=491499

5.23.4 Data tables for Poland

Statistic	National
Population	38,017,856
Persons per household	2.8
Rural proportion	20.7%

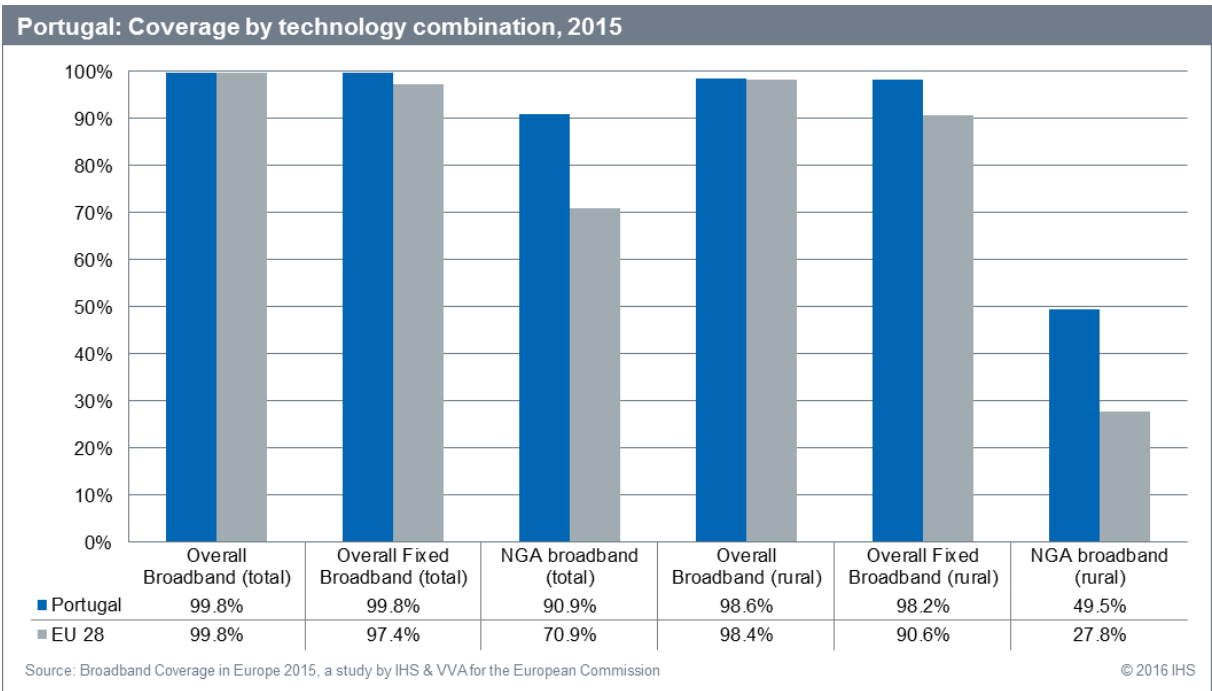| Technology	Poland 2015		Poland 2014		Poland 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	76.2%	77.0%	75.6%	75.3%	75.3%	74.9%	94.0%	83.7%
VDSL	42.7%	25.8%	28.5%	25.1%	27.8%	7.6%	41.0%	16.9%
FTTP	9.0%	5.8%	7.3%	4.3%	3.5%	0.3%	20.8%	7.2%
WiMAX	2.4%	1.8%	2.5%	1.4%	0.4%	0.5%	19.7%	18.7%
Cable	42.0%	14.9%	40.5%	14.7%	39.2%	1.2%	43.8%	10.2%
DOCSIS 3.0	40.0%	11.1%	39.5%	10.8%	39.2%	1.2%	43.1%	9.4%
HSPA	99.5%	97.8%	99.5%	97.8%	98.3%	85.0%	97.6%	90.0%
LTE	75.9%	5.7%	66.7%	3.4%	55.0%	0.5%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	99.8%	99.5%	99.8%	99.3%	98.1%	94.7%	99.8%	98.4%
Overall fixed broadband	86.2%	81.5%	85.4%	79.9%	87.6%	75.4%	97.4%	90.6%
NGA broadband	60.7%	33.8%	53.4%	31.1%	52.1%	8.4%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015 and are based on research conducted by the NRA for 2014. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

5.24 Portugal

5.24.1 National coverage by broadband technology

As was the case in 2014, Portugal performed better than most study countries with regards to all technology combination categories. Overall broadband and fixed broadband remained at the same levels of coverage during the first six months of 2015 recording almost complete fixed broadband coverage with 99.8% of all Portuguese households being passed by at least one fixed network and 98.2% of rural households having access to fixed broadband services.

As fixed broadband technologies record near universal coverage, the only room for progress remains in terms of NGA availability. In the first six months of 2015, NGA coverage increased by 1.8 percentage points and with more than 9 in 10 (90.9%) households having access to high-speed broadband services exceeded the EU average by 20 percentage points. In addition, rural NGA coverage grew by 5.5 percentage points, leading to nearly a half (49.5%) of rural households being able to connect to NGA broadband by mid-2015.

Portugal: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Portugal	99.8%	99.8%	90.9%	98.6%	98.2%	49.5%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

Looking at the coverage of individual technologies, it is possible to see that while DSL coverage is nearly universal, DSL networks have not been upgraded to VDSL. This is due to the long-term preference of Portuguese network operators to deploy FTTP networks across the country rather than rolling out VDSL upgrades. FTTP coverage already increased dramatically in 2014 and this trend continued into the first half of 2015, with nearly 10 percentage point growth resulting in three quarters (75.4%) of households having access to FTTP services and Portugal ranking among the top three countries (behind Lithuania and Latvia) in FTTP coverage.

Portugal has been able to benefit from lower labour costs and an underground duct system installed over 30 years ago, which both contribute to lowering the costs of FTTP deployment. It has thus been feasible for the incumbent Portugal Telecom and other network operators to prioritise FTTP deployment. Moreover, Portugal is one of few countries (along with Spain and to a lesser degree France), which have seen fruitful cooperation among leading ISPs on network sharing and joint FTTP networks deployment, leading to expedited rollout and cost reduction.

At 94.3%, LTE coverage remained generally unchanged compared to December 2014, yet it was still well ahead the EU average of 85.9%.

Portugal: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Portugal	99.1%	0.0%	75.4%	0.0%	79.4%	79.4%	97.1%	94.3%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
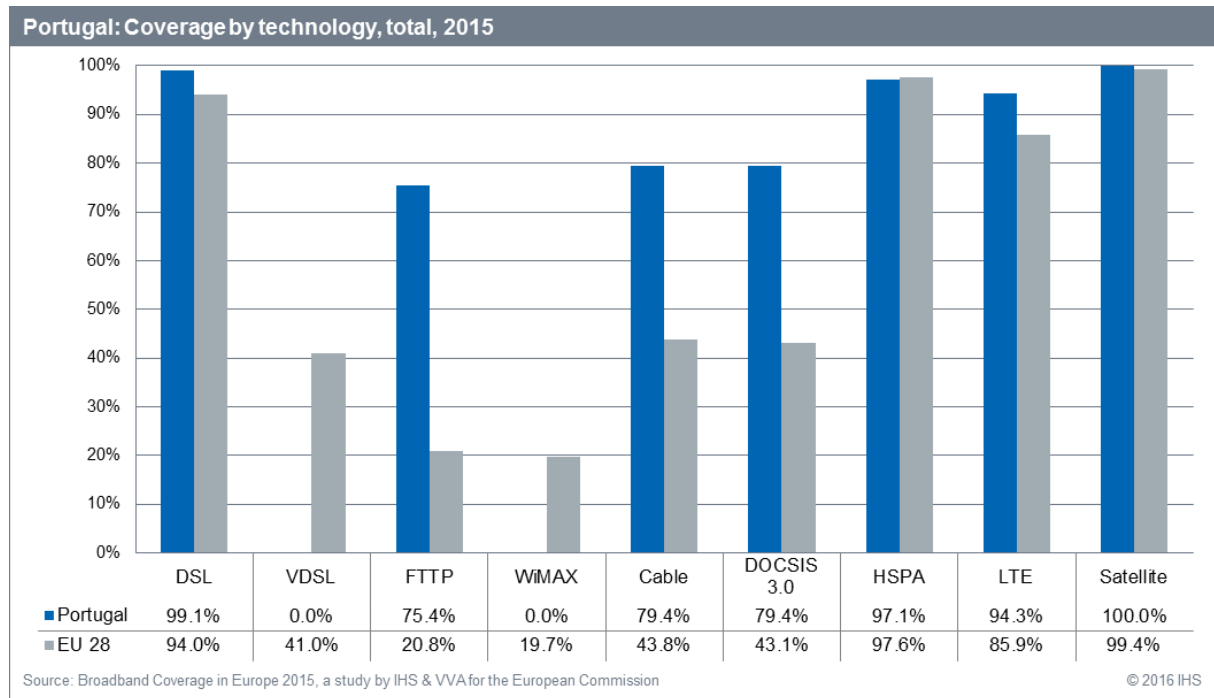
Substantial improvements were reported in terms of coverage in rural areas, where FTTP coverage increased by 7.4 percentage points and reached 23.2% of rural households (over three times the EU average). This is a result of continued rural FTTP deployment by regional indirect access providers, such as dstelecom and Fibroglobal. At nearly 37%, DOCSIS 3.0 coverage was also largely above EU average. Mobile broadband coverage in rural areas substantially improved in Portugal during the first half of 2015 with rural HSPA availability increasing by 13.4 percentage points to 86.1%. In addition, LTE networks passed 67.0% of rural homes (more than double the EU average), following a 9.4 percentage point growth.

Portugal: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Portugal	97.3%	0.0%	23.2%	0.0%	36.9%	36.9%	86.1%	67.0%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
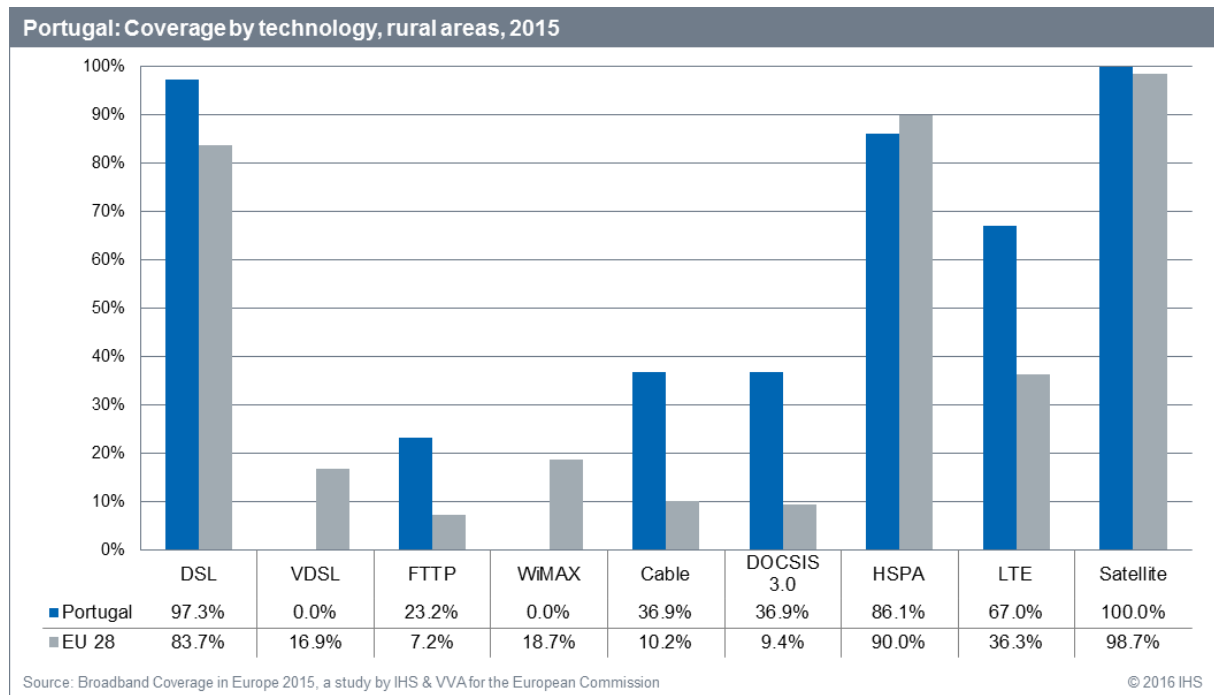
5.24.2 Regional coverage by broadband technology

In January 2015, new NUTS 3 regional division came into effect in Portugal bringing the total number of NUTS 3 regions down to 25 regions from the original 30. In terms of fixed broadband coverage there were not any substantial differences between the individual regions. Ten regions recorded complete fixed broadband coverage while in the remaining 15 regions between 98% and 99% of households had access to fixed broadband services.

Portugal: Overall fixed broadband coverage, 2015

0% - <75%
75% - <90%
90% - <95%
95% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

© 2016 IHS
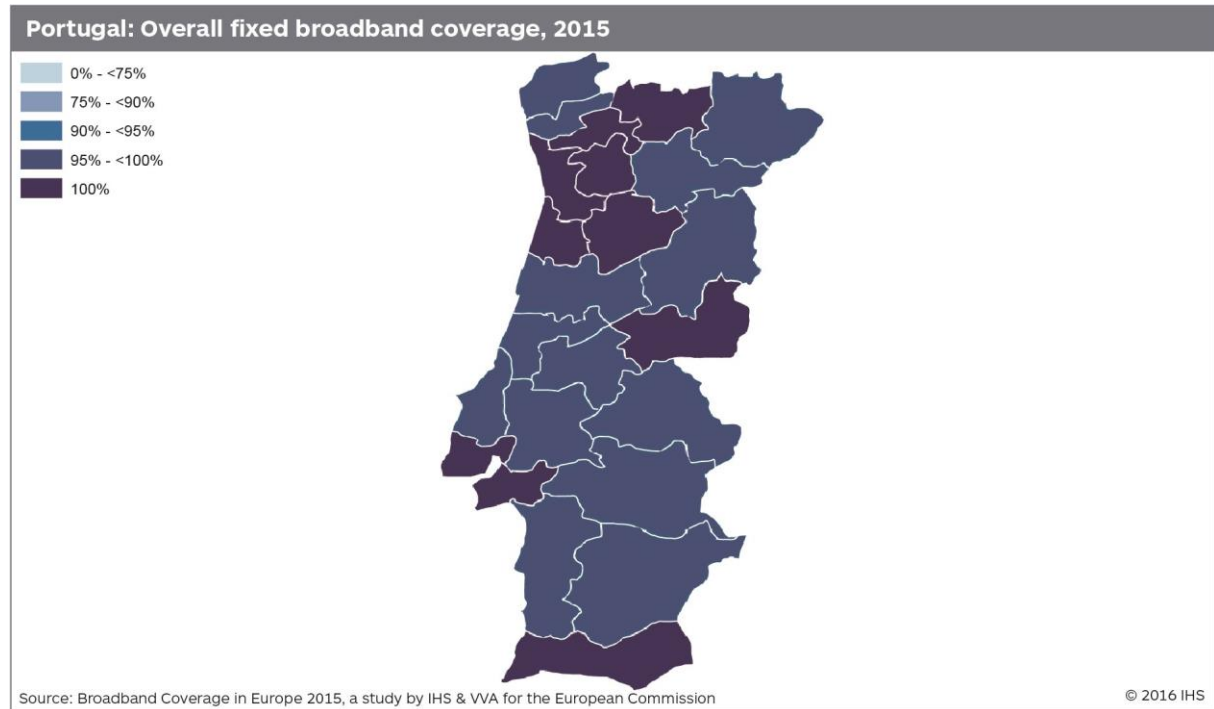
There was much more regional variation in terms of NGA coverage. Complete coverage was observed in four regions (the Lisbon and Porto metropolitan areas, Algarve, and the Beira Baixa region), while in six regions less than 70% of households had access to NGA services.

Portugal: NGA broadband coverage, 2015

0%
>0% - <35%
35% - <65%
65% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

© 2016 IHS
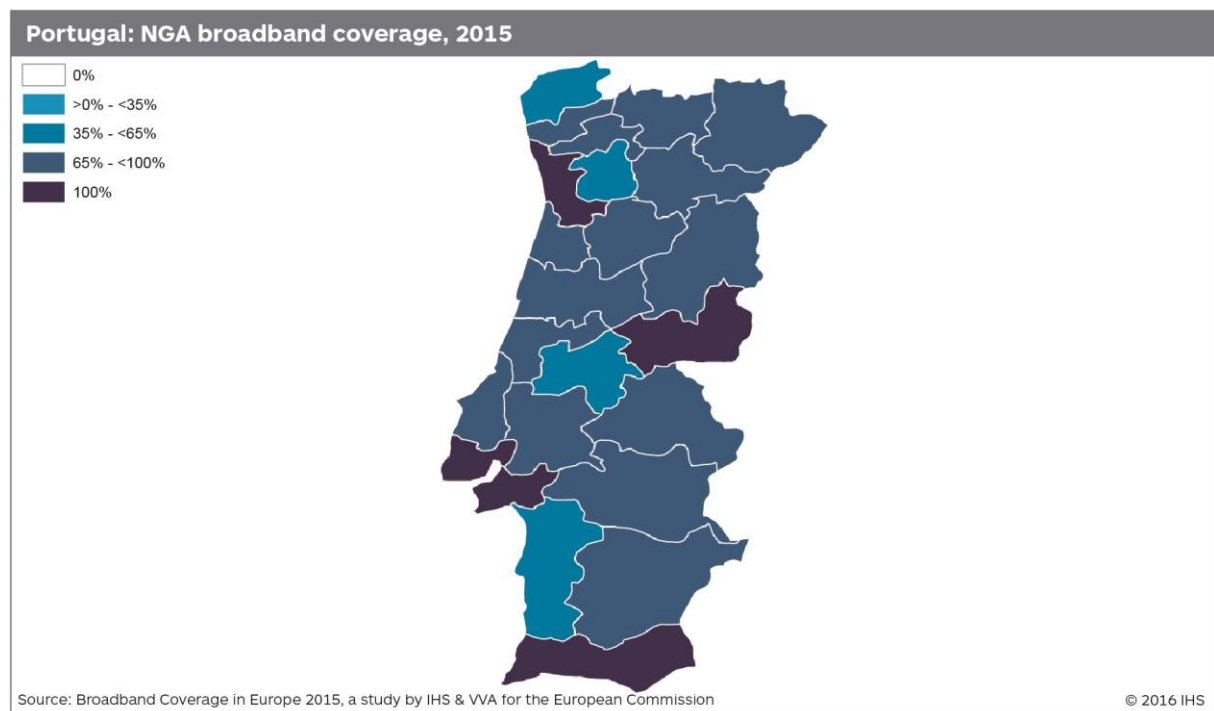
5.24.3 Regulatory and market overview

Portugal's national broadband strategy was adopted in 2012 and is set to run until 2020. The main goal of the strategy mirrors that of the Digital Agenda for Europe, i.e. complete coverage with download speeds of at least 30 Mbps by 2020. Additionally, the Digital Agenda for Portugal aims at 50% of the population having access to download speeds of at least 100 Mbps by the same time.[143]

The Portuguese broadband market is characterised by competition between the incumbent, Portugal Telecom, and a number of cable providers, including ZON (renamed to Nos in 2014) and Cabovisao. In June 2015, Luxembourg-based telecoms investment group Altice finalised its acquisition of Portugal Telecom following a conditional divestment of its original Portuguese businesses, Cabovisao and Onitelecom to a private equity firm Apax Partners.[144]

Both the Portuguese government as well as the network operators have long been proponents of fibre-optic cables being deployed directly to customers with first FTTP deployment protocols signed between the government and main telecoms operators signed already in 2008. In order to expedite FTTP networks rollout and reduce deployment costs, operators in Portugal have been cooperating on FTTP buildout. In 2010, Vodafone Portugal and Sonaecom signed an agreement regarding a shared deployment and management of a fibre optic network in Lisbon and Porto, launching the high-speed service a year later.[145] Vodafone entered into a similar agreement with Portugal Telecom in 2014 to deploy and share fibre networks reaching 900,000 households across Portugal.[146]

LTE networks were first launched in Portugal in 2013, with three operators – Meo (Portugal Telecom), Vodafone and Nos – providing LTE services over their networks. In July 2015, Vodafone Portugal trialled LTE-Advanced network in Lisbon reaching a historically fastest 600 Mbps download speed achieved on a mobile network.[147]

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[143] http://www.anacom.pt/render.jsp?contentId=1150167#.VvE5P_mLTIU

[144] http://www.ft.com/fastft/2015/09/15/altice-agrees-sale-of-portuguese-assets-apax/

[145] http://press.vodafone.pt/en/2009/12/21/sonaecom-and-vodafone-sign-cooperation-agreement-on-ngn/

[146] https://www.telegeography.com/products/commsupdate/articles/2014/07/21/vodafone-pt-ink-fibre-pact-shared-infrastructure-to-reach-900000-homes

[147] http://press.vodafone.pt/en/2015/07/27/vodafone-portugal-is-the-first-european-operator-to-achieve-speeds-of-600-mbps-on-its-mobile-network/

5.24.4 Data tables for Portugal

Statistic	National
Population	10,374,822
Persons per household	2.6
Rural proportion	14.8%

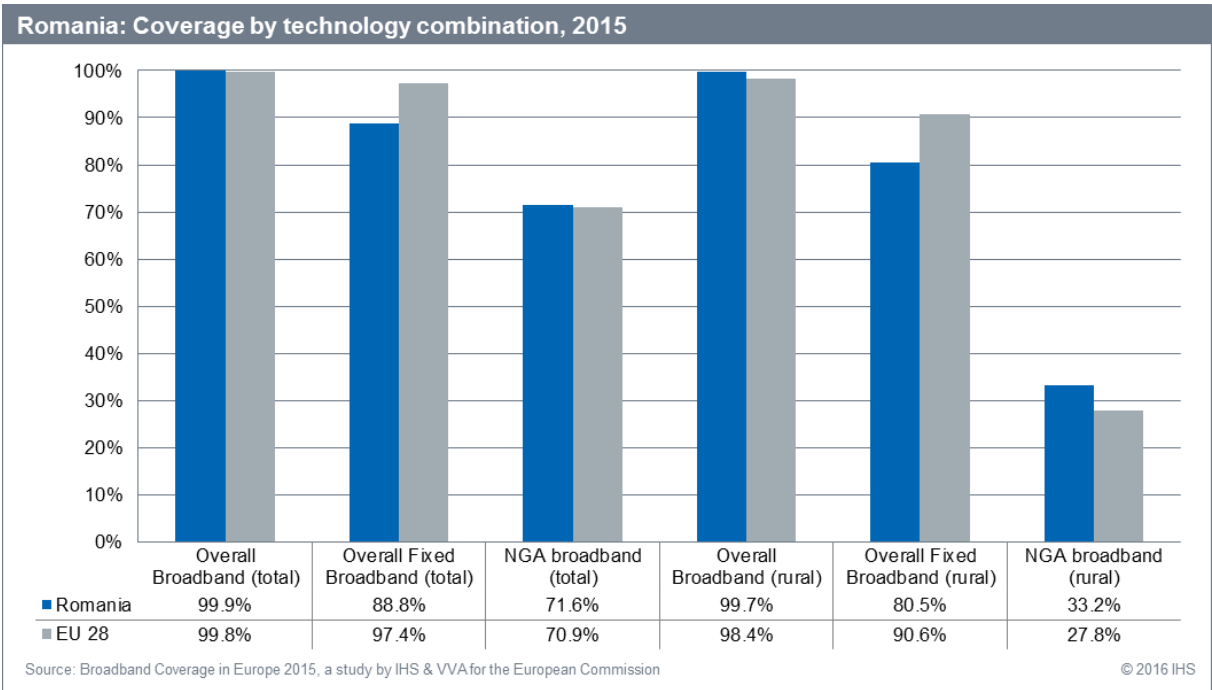| Technology	Portugal 2015		Portugal 2014		Portugal 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	99.1%	97.3%	99.1%	97.1%	99.1%	97.8%	94.0%	83.7%
VDSL	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	41.0%	16.9%
FTTP	75.4%	23.2%	65.8%	15.8%	49.6%	10.0%	20.8%	7.2%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.7%	18.7%
Cable	79.4%	36.9%	80.1%	35.0%	79.9%	32.9%	43.8%	10.2%
DOCSIS 3.0	79.4%	36.9%	80.0%	34.8%	79.5%	31.9%	43.1%	9.4%
HSPA	97.1%	86.1%	96.7%	72.7%	95.3%	70.7%	97.6%	90.0%
LTE	94.3%	67.0%	94.2%	57.6%	91.3%	47.6%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	99.8%	98.6%	99.8%	98.6%	99.7%	98.9%	99.8%	98.4%
Overall fixed broadband	99.8%	98.2%	99.8%	98.2%	99.7%	98.9%	97.4%	90.6%
NGA broadband	90.9%	49.5%	89.1%	44.0%	84.4%	37.4%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.25 Romania

5.25.1 National coverage by broadband technology

In mid-2015, Romania continued to lag behind the EU average in terms of fixed broadband coverage on both national and rural level but it once again performed better the European average with regards to NGA availability. At the end of June 2015, 88.8% of Romanian households had access to fixed broadband services compared to 97.4% of average EU households. In rural areas, fixed broadband networks passed 80.5% of rural homes, while in the EU as a whole 90.6% of rural households were able to connect to fixed broadband. Yet, it should be noted that Romania has one of the largest proportions of rural households (46%) among the study countries.

NGA broadband coverage increased by 2.4 percentage points during the first six months of 2015 and reached 71.6% of all Romanian households. Furthermore, NGA broadband services were available to a third (33.2%) of rural households, following a 5.8 percentage point increase.

Romania: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Romania	99.9%	88.8%	71.6%	99.7%	80.5%	33.2%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

Romania's below-average fixed broadband coverage can be explained with a closer look at coverage levels of the individual technologies, which shows limited availability of both DSL and cable technologies. At the end of June 2015, DSL networks passed just 68.3% of Romanian homes compared to 94.0% of average EU households and cable broadband services were available to 30.9% of households, 7 percentage points below the EU average.

However, high levels of FTTP coverage, which have been traditionally recorded in Romania somewhat balance out the shortcomings in fixed broadband availability. During the first six months of 2015, FTTP coverage increased by 3.0 percentage points with FTTP networks passing 61.0% of homes across Romania, three times the EU average. Romanian broadband providers have also been investing in upgrades of their legacy copper and cable networks in recent years. Yet, in mid-2015 VDSL coverage reached only 11.7% of households and DOCSIS 3.0 cable broadband services were available to little less than a third (28.9%) of households, thus, leaving FTTP as the key NGA technology in Romania.

LTE coverage continued to improve during the first half of 2015, growing by 10.3 percentage points, but at 66.1%, it remained below the EU average of 85.9%.

Romania: Coverage by technology, total, 2015
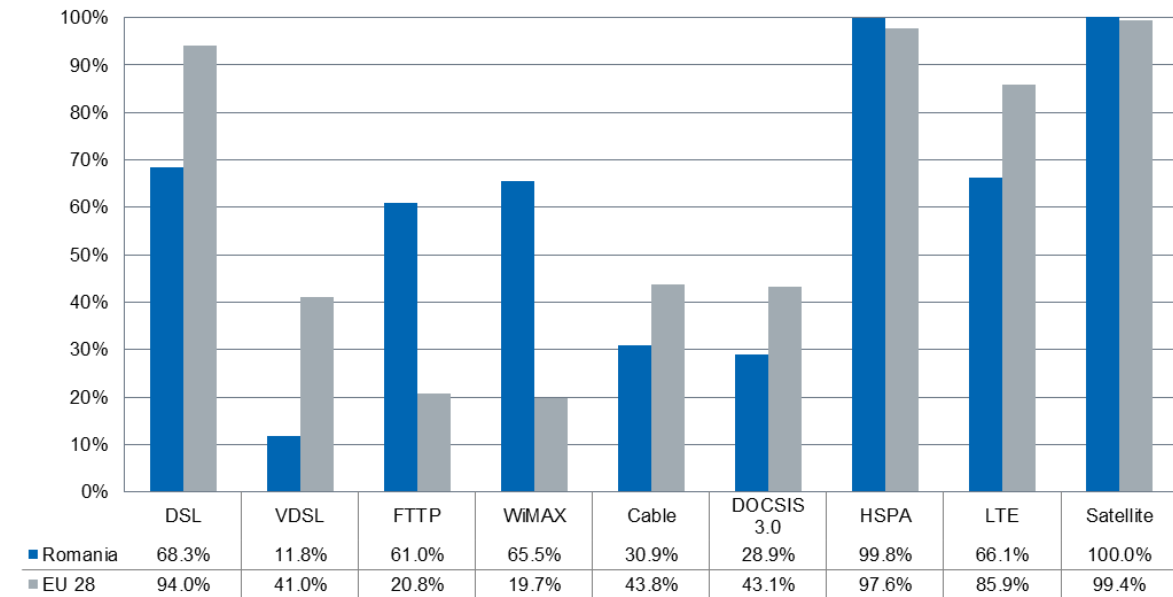
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Romania	68.3%	11.8%	61.0%	65.5%	30.9%	28.9%	99.8%	66.1%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

In rural areas, DSL remained the most widely available technology, passing 63.7% of rural homes. A third (33.2%) of households had access to WiMAX broadband. Given a negligible rural VDSL coverage (1.8%) and limited DOCSIS 3.0 coverage (7.4%), FTTP remained to be the leading NGA technology providing high-speed broadband access to rural households. Moreover, in the first six months of 2015 rural FTTP coverage increased by 6.5 percentage points and reached 28.3% of rural households, considerably exceeding the EU average of 7.2%.

At 99.5%, HSPA coverage was nearly complete in rural areas in mid-2015. Furthermore, a substantial increase of 16.0 percentage points was recorded for LTE coverage during the first six months of 2015, with LTE networks now covering a third (33.8%) of rural households.

Romania: Coverage by technology, rural areas, 2015
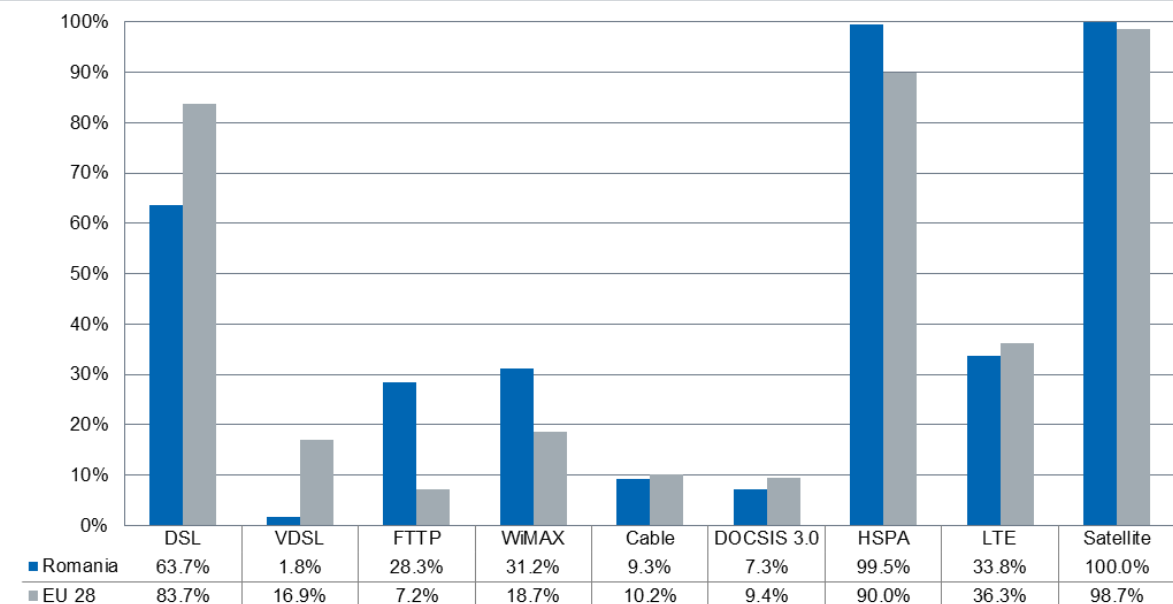
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Romania	63.7%	1.8%	28.3%	31.2%	9.3%	7.3%	99.5%	33.8%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

5.25.2 Regional coverage by broadband technology

Fixed broadband coverage across the Romanian regions ranged from less than 80% in Vrancea to complete coverage in the capital Bucharest.
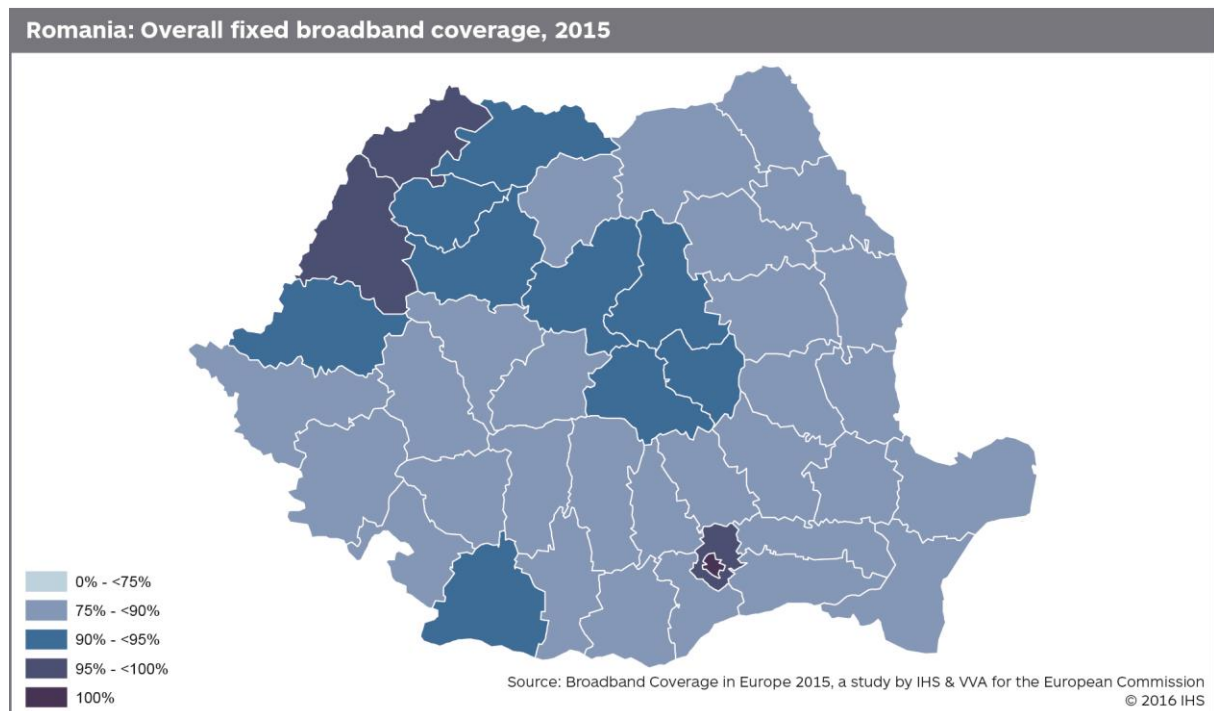
Regional NGA coverage also remained very varied as it ranged from little over 35% in the Vâlcea region to nearly 98% in Bucharest. Bucharest also continued to be the only region to record NGA coverage levels higher than 91%.
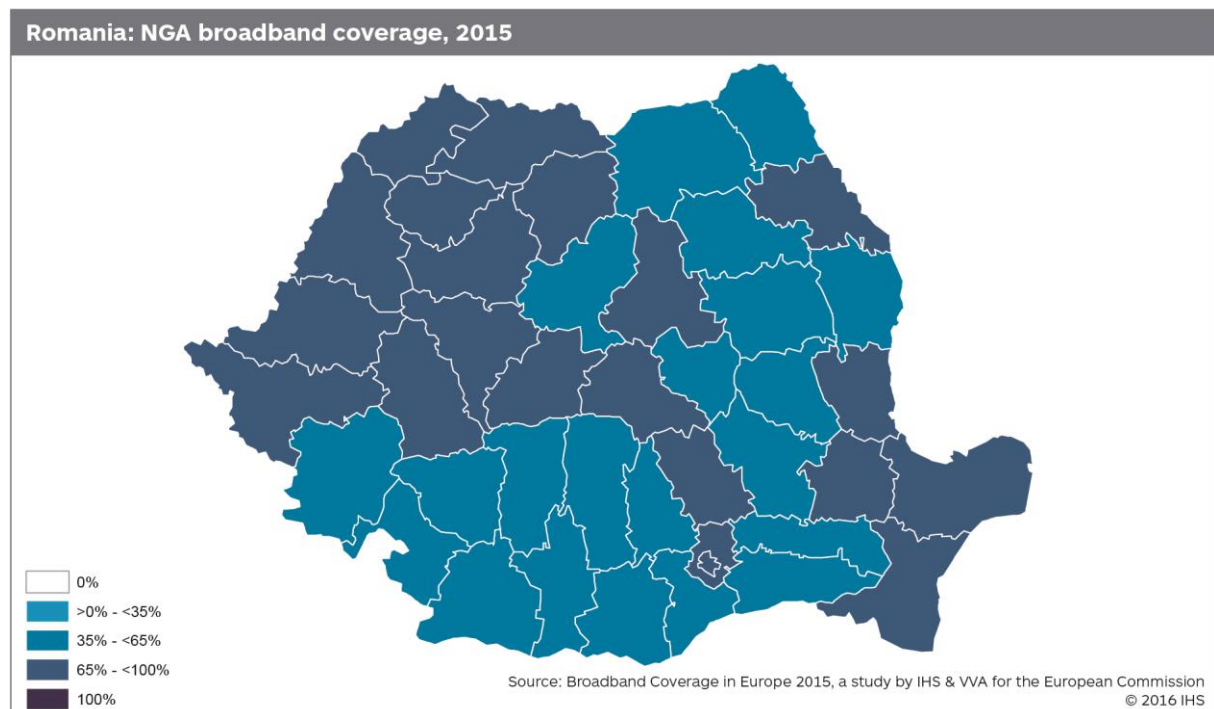
5.25.3 Regulatory and market overview

A new "National Strategy on the Digital Agenda" for Romania was approved by the government in April 2015 with a specific "National Plan for Next Generation Network (NGN) Infrastructure Development" included as part of the strategy.[148] The objectives set out by the strategy are aligned with those of the Digital Agenda for Europe, i.e. reaching complete coverage of at least 30 Mbps speeds by 2020, with half of the population accessing speeds of at least 100 Mbps by the same time.

At the beginning of 2015, the Romanian government awarded a contract worth EUR 84 million to the incumbent Telekom Romania to connect 783 localities in disadvantaged and mostly rural areas under the Ro-NET project. The investment project is financed through the European Fund for Regional development and has been set to run throughout 2015.[149]

The leading providers of fixed broadband services are the aforementioned DSL and FTTP incumbent operator Telekom Romania and cable operators RCS&RDS and UPC Romania, with all companies recently investing in technology upgrades and network expansion. In November 2014, Telekom Romania began to offer 1Gbps FTTP connections originally in 13 major cities across Romania after investing EUR 85.4 million into its fixed network infrastructure.[150] By mid-2015, the number of locations, where 1 Gbps services were available, grew to 23 cities.[151]

RCS&RDS has been offering 1 Gbps broadband services on its FTTP network since 2013, while UPC has been offering 500 Mbps broadband services over its DOCSIS 3.0 network since 2014.

LTE services were first launched by Vodafone Romania and Orange Romania in 2012, with Telekom Romania following suit in 2013 and RCS&RDS in 2015. In March 2015, Orange Romania announced a EUR 500 million investment plan aimed at network expansion and upgrade over a three-year period.[152]

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[148] http://gov.ro/en/government/cabinet-meeting/national-strategy-on-the-digital-agenda-for-romania-2020
[149] http://www.telecompaper.com/news/romania-gives-green-light-to-ro-net-broadband-project--1060031
[150] http://www.csimagazine.com/csi/Telekom-Romania-deploys-1Gbps-broadband.php
[151] https://www.telekom.ro/fix/net-1-gbps.html
[152] https://www.telegeography.com/products/commsupdate/articles/2015/03/20/orange-romania-investing-half-a-billion-euros-in-three-years/

5.25.4 Data tables for Romania

Statistic	National
Population	19,947,311
Persons per household	2.7
Rural proportion	21.0%

Technology	Romania 2015		Romania 2014		Romania 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	68.3%	63.7%	71.4%	63.3%	75.8%	62.9%	94.0%	83.7%
VDSL	11.8%	1.8%	13.7%	1.8%	15.9%	1.5%	41.0%	16.9%
FTTP	61.0%	28.3%	58.0%	22.7%	54.7%	21.5%	20.8%	7.2%
WiMAX	65.5%	31.2%	67.4%	33.2%	60.7%	25.2%	19.7%	18.7%
Cable	30.9%	9.3%	32.7%	10.4%	28.8%	6.2%	43.8%	10.2%
DOCSIS 3.0	28.9%	7.3%	29.3%	7.4%	26.2%	4.4%	43.1%	9.4%
HSPA	99.8%	99.5%	99.7%	99.3%	99.7%	99.3%	97.6%	90.0%
LTE	66.1%	33.8%	55.8%	17.8%	25.0%	2.4%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	99.9%	99.7%	99.8%	99.6%	99.9%	99.7%	99.8%	98.4%
Overall fixed broadband	88.8%	80.5%	89.4%	80.2%	90.0%	78.2%	97.4%	90.6%
NGA broadband	71.6%	33.2%	69.2%	27.4%	65.9%	24.6%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.26 Slovakia

5.26.1 National coverage by broadband technology

At the end of June 2015, Slovakia continued to lag behind the EU average in all coverage combination categories on both national and rural levels. NGA coverage levels increased considerably, growing by 4.6 percentage points on a national level and by 9.8 percentage points in rural areas so that by mid-2015, 67.1% of all Slovak households and 14.1% or rural households had access to high-speed broadband services.

Slovakia: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Slovakia	95.9%	86.3%	67.1%	91.6%	83.0%	14.1%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
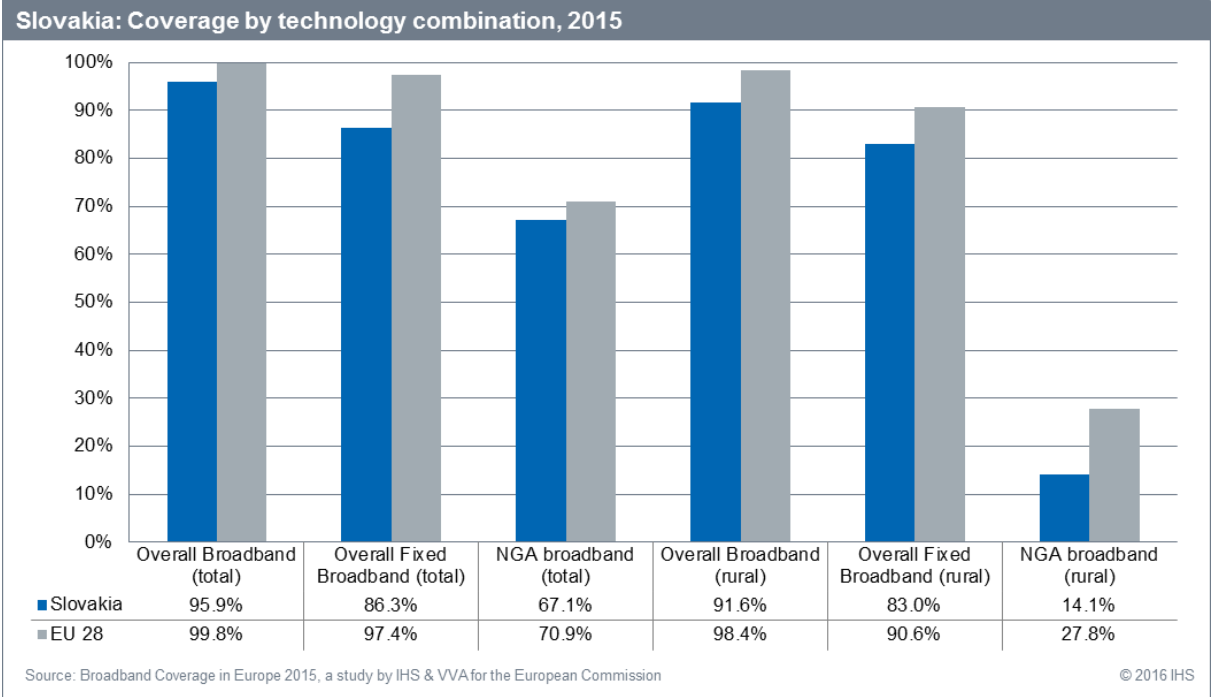
A closer look at the individual technology coverage profiles provides an explanation for fixed broadband coverage in Slovakia falling behind the EU average. Both DSL and cable coverage recorded below-average levels with DSL networks passing 71.2% of homes, nearly 23 percentage points below the European average, and cable broadband services being available to 28.8% of households, compared to 43.8% of households across the EU.

On the other hand both WiMAX and FTTP continued to show relatively high, above-average coverage levels in mid-2015. Both FTTP and WiMAX services were available to a half of Slovak households, with FTTP coverage registering a 2.4 percentage growth compared to December 2014.

In the first half of 2015, VDSL coverage experienced a considerable 5.2 percentage growth, yet at 16.9%, VDSL's reach remained limited. DOCSIS 3.0 cable broadband services were available to a quarter (25.3%) of Slovak households, unchanged from 2014, meaning that FTTP continued to be the most widely available NGA technology. This is a result of the strategies of both the incumbent Slovak Telekom and an alternative provider Orange Slovakia, which have focused extensively on FTTP deployments in recent years.

LTE coverage continued to grow during the first half of 2015, recording a 9.0 percentage point increase. However, given the significant progresses in LTE availability observed in the other study countries, with 61.2% of households covered by LTE networks Slovakia lags behind the EU average of 85.9%.

Slovakia: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ Slovakia	71.2%	16.9%	50.4%	50.0%	28.8%	25.3%	91.8%	61.2%	100.0%
■ EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
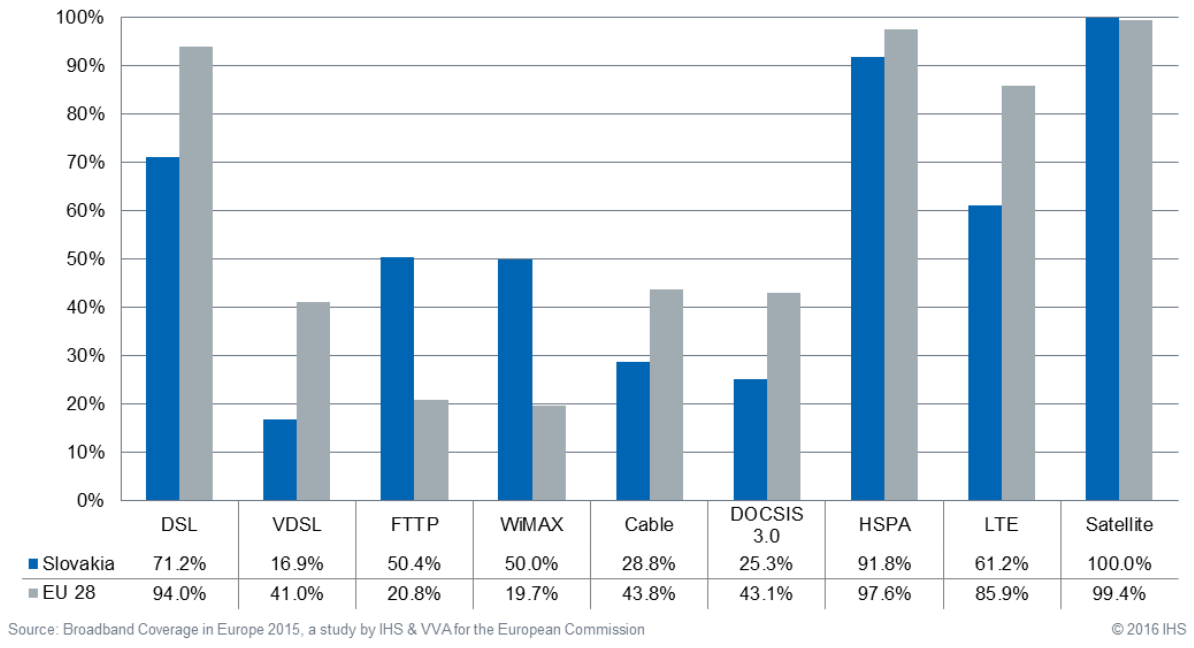
In rural areas, DSL and WiMAX are the two most widespread technologies. At the end of June 2015, 66.1% of rural homes were passed by DSL networks and a half of rural households had access to WiMAX services. For the first time, VDSL services became available to rural households with VDSL networks passing 11.9% rural homes by mid-2015.

LTE services were also newly available in rural areas across Slovakia in the first half of 2015 with rural LTE networks covering 8.5% of rural households by end of June 2015. This can be attributed to the expansion of Orange Slovakia's LTE network in May 2015[153], as well as the launch of SWAN's LTE network in March 2015.[154]

Slovakia: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ Slovakia	66.0%	11.9%	4.4%	50.0%	0.6%	0.0%	71.7%	8.5%	100.0%
■ EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

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[153] https://www.telegeography.com/products/commsupdate/articles/2015/05/07/orange-slovensko-adds-three-new-lte-markets/
[154] http://telecomist.com/page/102/
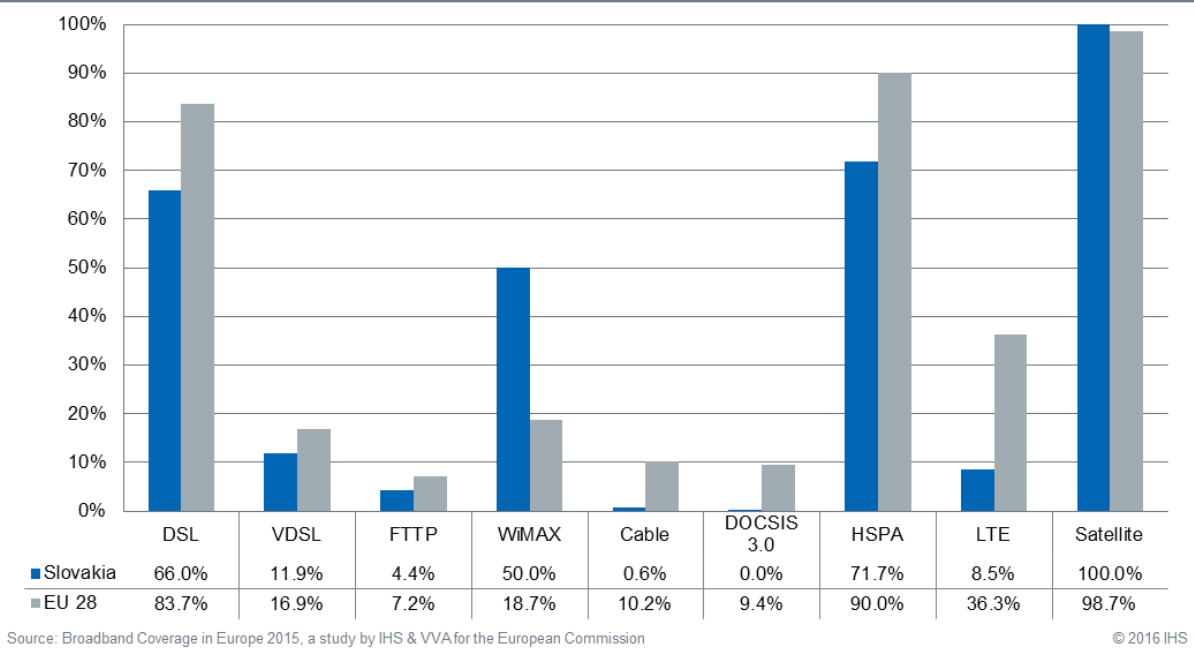
5.26.2 Regional coverage by broadband technology

Besides the area surrounding the capital Bratislava, fixed broadband coverage in individual regions remained between 80% and 90%. Even in Bratislava, fixed broadband coverage was around 95%, which is lower than in many other urban centres across Europe.

Slovakia: Overall fixed broadband coverage, 2015

0% - <75%
75% - <90%
90% - <95%
95% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS
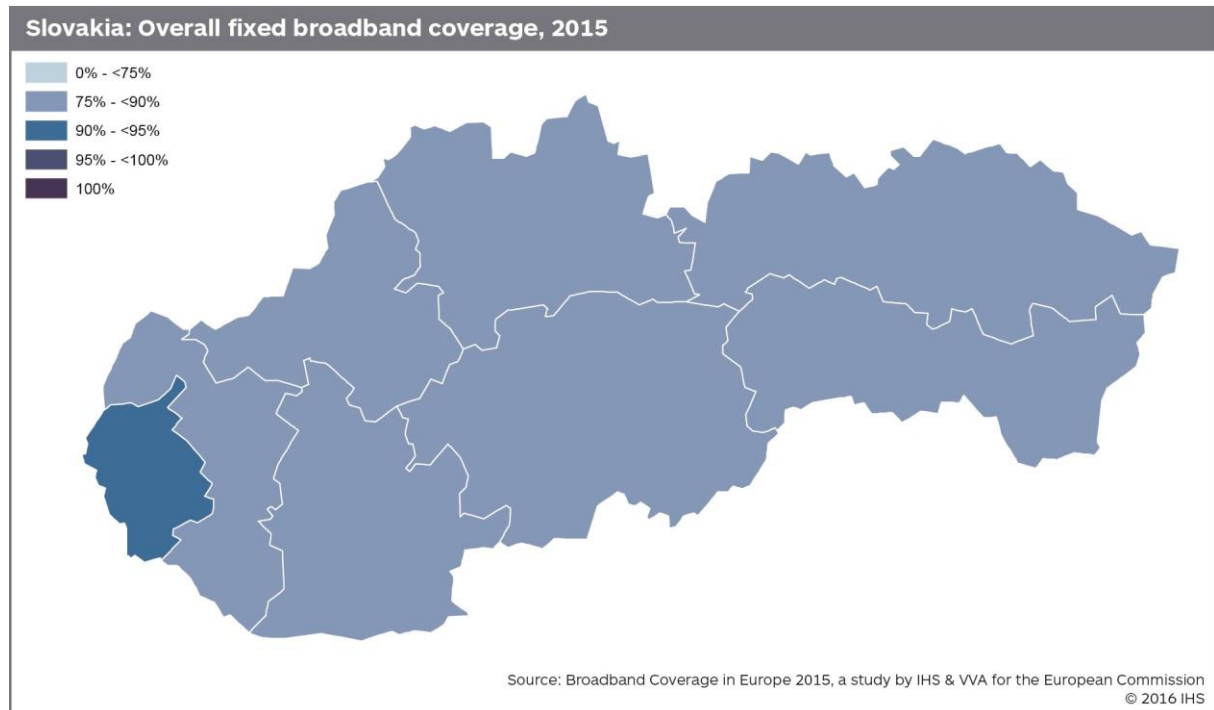
NGA coverage across the Slovak regions ranged from little less than 50% in Trenciansky region to close to 95% in Bratislava and 81% in Kosicky region. In addition, in Banskobystrický region NGA coverage increased by 16 percentage points and reached 80% of households during the first six months of 2015.

Slovakia: NGA broadband coverage, 2015

0%
>0% - <35%
35% - <65%
65% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
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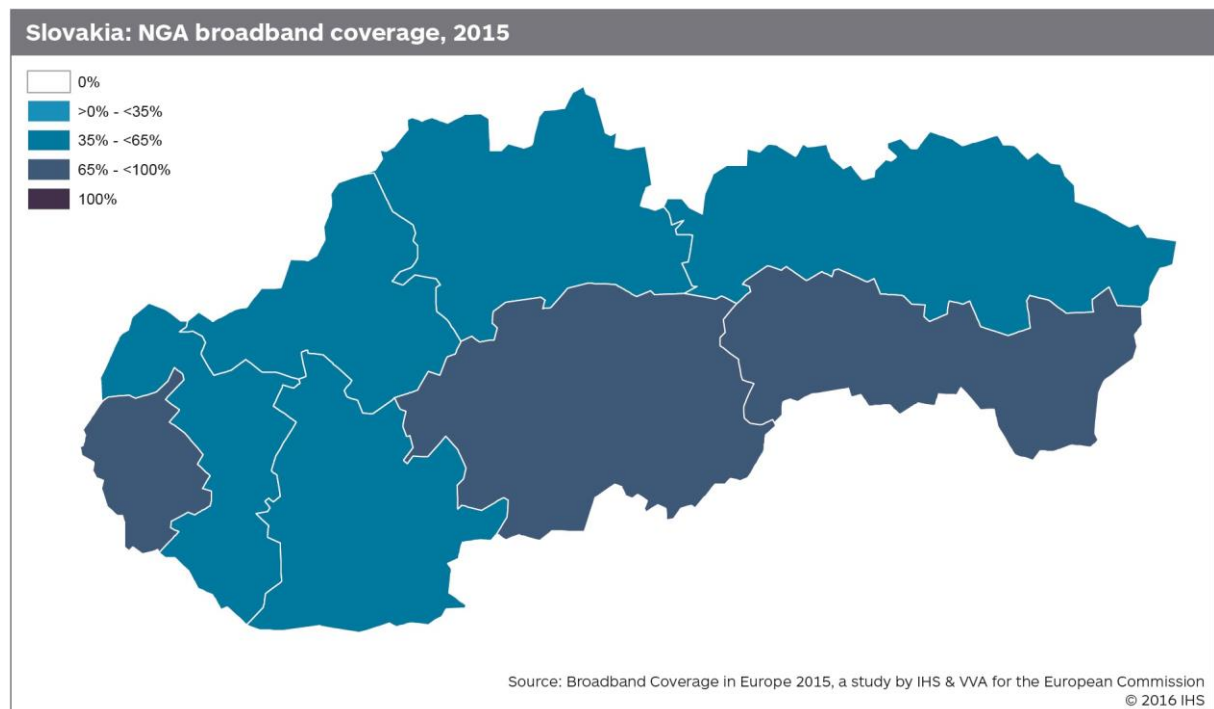
5.26.3 Regulatory and market overview

Slovakia's national broadband strategy is set out in the Strategic Document for Digital Growth and Next Generation Access Infrastructure (2014 – 2020). The main goal of the strategy is to meet the Digital Agenda targets of 100% coverage of 30 Mbps high-speed broadband and 50% coverage of high-speed broadband above 100 Mbps.[155]

The incumbent, Slovak Telekom, made a decision to focus on FTTP network deployment already in 2007 with an initial goal of countrywide coverage. In recent years, the company also decided to invest into upgrades of its legacy copper network and in September 2013 began to offer VDSL services of up to 50 Mbps download speeds. Since June 2014 the highest download speed offered by the operator has been 300 Mbps on its premium package. In May 2015, Deutsche Telekom group acquired the remaining 49% share in the incumbent from the Slovak government and became the sole owner of the company.[156]

Orange Slovakia has also been investing in rolling out its FTTP network across Slovakia since 2007 and was present in 19 cities covering 341 thousand homes at the end of June 2015.[157] Cable network operators have traditionally responded to the telcos' FTTP deployments by upgrading their networks to DOCSIS 3.0. UPC, the leading cable provider has been upgrading its network since 2011 and in mid-2015, 99% of its network, which spans 43 cities, was DOCSIS 3.0 capable. In 2015, UPC also increased the maximum connection speed on its network to 500 Mbps compared to the 300 Mbps downstream connection speeds offered in the previous year.

LTE networks were not launched on a large scale until 2014, when Slovak Telekom begun a wide scale deployment which continued in the first half of 2015 with Slovak Telekom network's being available in 109 cities.[158] Orange Slovakia launched its LTE network in 2014 and a year later announced a EUR 85 million investment plan aimed at LTE network expansion. In March 2015, SWAN became the fourth LTE operator in Slovakia when it began offering LTE services over its own LTE network.[159] In addition, O2 revealed in May 2015 that it would launch its own LTE network, despite having a previous deal with Orange, and expected to cover 25% of the population at the end of the year.[160]

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[155] http://informatizacia.sk/strategicky-dokument/16604s

[156] http://www.ft.com/cms/s/0/79434d06-fe29-11e4-8efb-00144feabdc0.html#axzz44yddsEc4

[157] https://www.orange.sk/onas/tlacove-centrum/tlacove-spravy/detail-tlacovej-spravy/browse/9/article/na-mape-pokrytia-optikou-od-orangeu-pribudlo-dalsie-mesto/?tx_ttnews%5BbackPid%5D=1319&cHash=05eae83b07f039aa3048dbf190dea8eb

[158] https://www.telekom.sk/o-spolocnosti-telekom/press-centrum/tlacove-spravy/flash-news-telekom-pokryva-lte-sietou-uz-57-8-populacie-slovenska

[159] http://telecomist.com/2015/03/swan-launches-as-fourth-mno-with-unlimited-4g-data-offer-still-lacks-voiceroaming/

[160] http://www.gtigroup.org/news/ind/2015-05-12/6247.html

5.26.4 Data tables for Slovakia

Statistic	National
Population	5,415,949
Persons per household	2.8
Rural proportion	28.8%

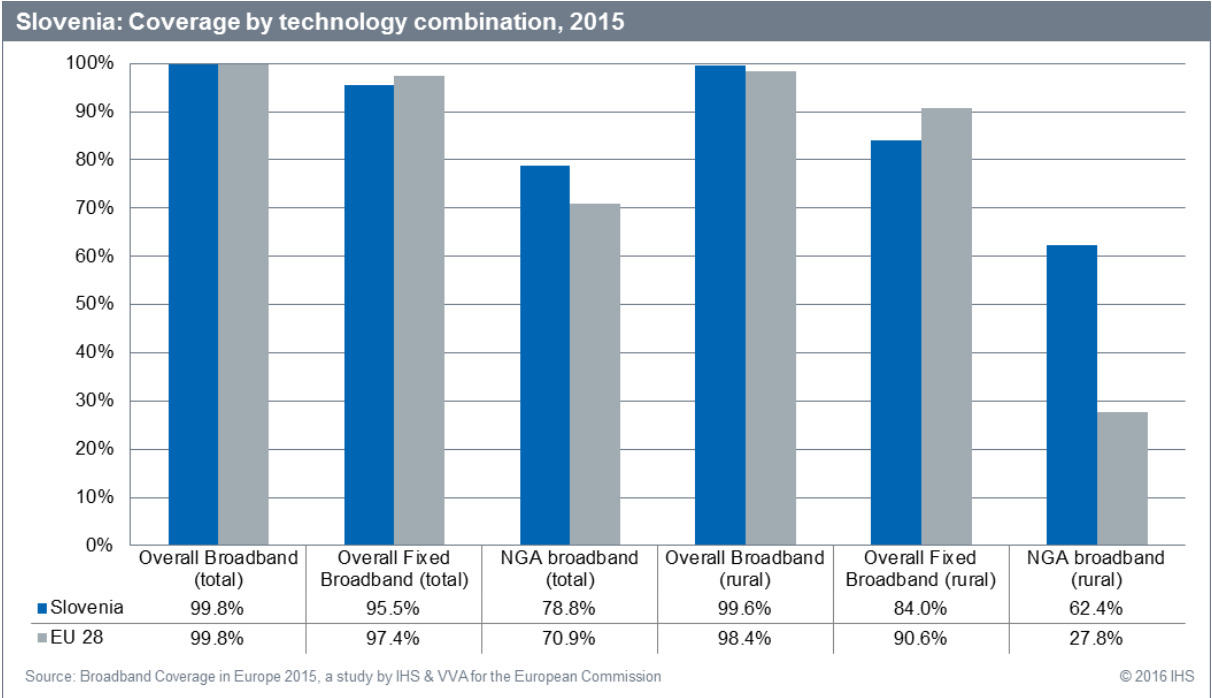| Technology	Slovakia 2015		Slovakia 2014		Slovakia 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	71.2%	66.0%	70.9%	50.1%	70.5%	38.4%	94.0%	83.7%
VDSL	16.9%	11.9%	11.7%	0.0%	10.3%	0.0%	41.0%	16.9%
FTTP	50.4%	4.4%	48.0%	4.3%	38.9%	3.6%	20.8%	7.2%
WiMAX	50.0%	50.0%	50.1%	50.4%	49.9%	50.4%	19.7%	18.7%
Cable	28.8%	0.6%	28.4%	0.4%	27.7%	0.4%	43.8%	10.2%
DOCSIS 3.0	25.3%	0.0%	25.4%	0.0%	24.8%	0.0%	43.1%	9.4%
HSPA	91.8%	71.7%	91.1%	69.3%	86.1%	68.9%	97.6%	90.0%
LTE	61.2%	8.5%	52.2%	0.0%	24.0%	0.0%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	95.9%	91.6%	95.9%	89.1%	93.3%	84.5%	99.8%	98.4%
Overall fixed broadband	86.3%	83.0%	86.8%	76.6%	86.5%	71.8%	97.4%	90.6%
NGA broadband	67.1%	14.1%	62.5%	4.3%	53.8%	3.6%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.27 Slovenia

5.27.1 National coverage by broadband technology

In mid-2015, Slovenia reported higher than EU average levels of overall broadband coverage and NGA coverage. Yet, the country remained slightly below the European average in terms of fixed broadband coverage. National NGA coverage registered a 0.6 percentage point increase with 78.8% of households having access to high-speed broadband services at the end of June 2015.

In rural areas, improvements were recorded in terms of fixed broadband coverage (1.9 percentage point increase) and NGA (4.0 percentage point increase). By mid-2015, 84% of rural homes were passed by at least one fixed network and 62.4% of rural households were able to connect to NGA broadband, thus largely exceeding the EU average of 27.8%.

Slovenia: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Slovenia	99.8%	95.5%	78.8%	99.6%	84.0%	62.4%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

At the end of June 2015, DSL continued to be the key fixed broadband technology available to 90.9% of households. Cable networks passed 37.3% of Slovenian homes and were largely upgraded to DOCSIS 3.0, with high speed cable broadband services being available to 36% of households. While cable coverage remained virtually unchanged compared to December 2014, DOCSIS 3.0 coverage increased by 1.2 percentage points pointing to the continued network upgrade efforts of Slovenian cable network operators.

Slovenia exceeded the EU average levels in both VDSL and FTTP coverage with VDSL services being available to 57.5% of households and FTTP networks passing 45.0% of Slovenian homes, recording a 2.8 percentage point increase in the first six months of 2015.

LTE deployment efforts continued in the first half of 2015 with LTE coverage increasing by 8.0 percentage points and reaching 97.7% of households, thus exceeding the EU average of 85.9%.

Slovenia: Coverage by technology, total, 2015
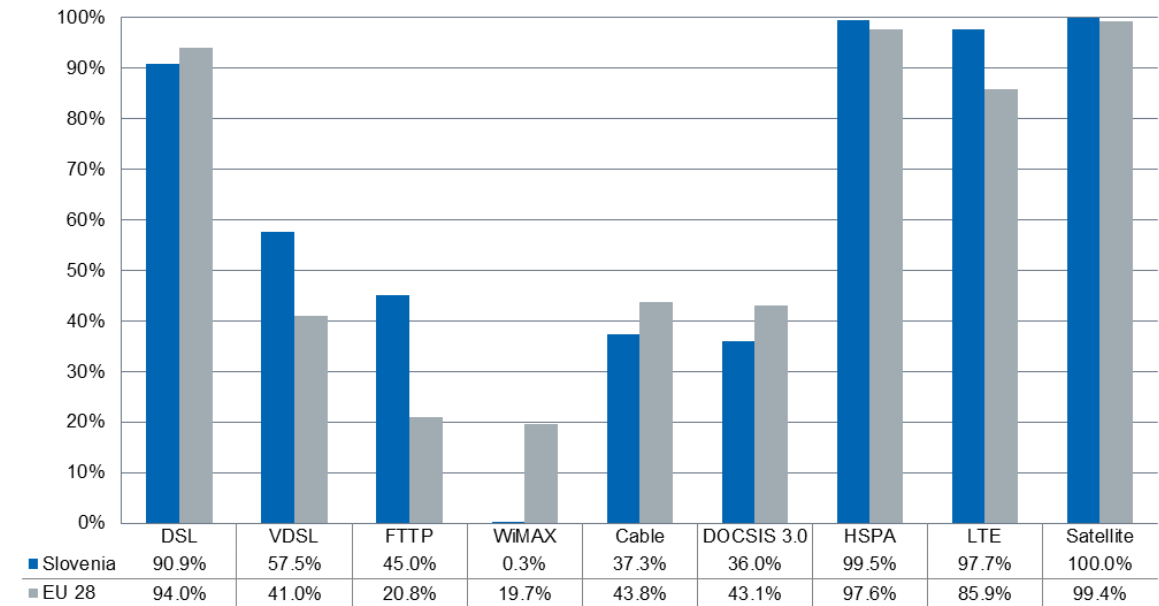
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ Slovenia	90.9%	57.5%	45.0%	0.3%	37.3%	36.0%	99.5%	97.7%	100.0%
■ EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
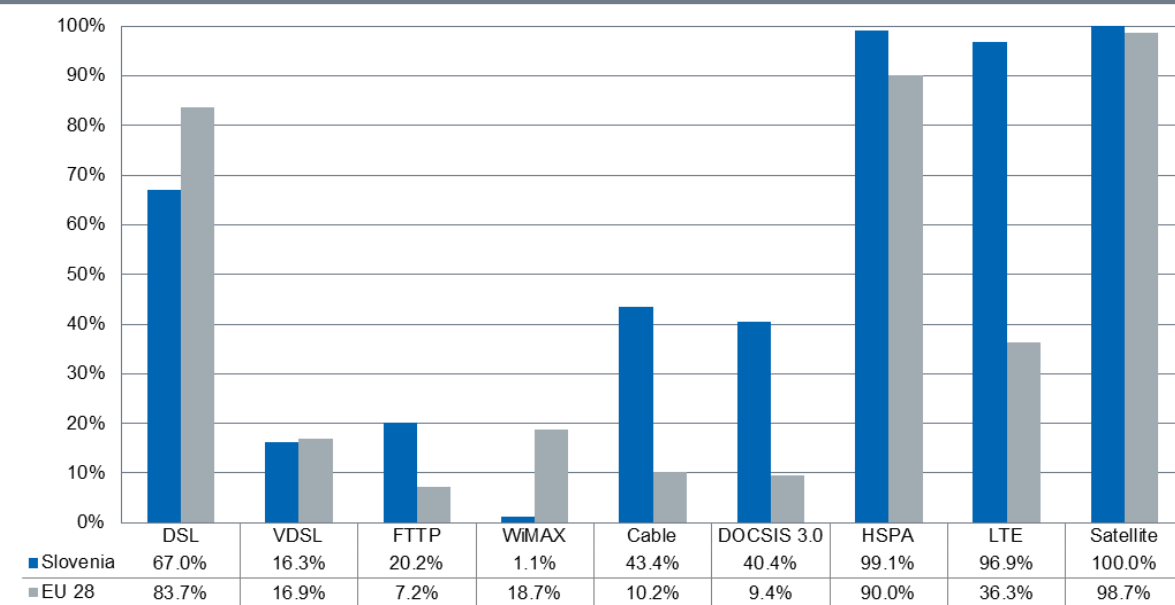
Characteristic for Slovenia is a rather high presence of cable networks in rural areas, which continued to grow by nearly five percentage points in the first half of 2015 leading to 43.4% of rural homes being passed by cable networks, more than four times the EU average. In addition, due to ongoing network upgrades rural DOCSIS 3.0 coverage grew by 3.2 percentage points with 4 in 10 (40.4%) rural households having access to high-speed cable broadband services, thus making DOCSIS 3.0 the most widespread NGA technology across rural Slovenia. Nevertheless, rural FTTP coverage also continued to reach a considerably high level with a fifth (20.2%) of rural homes passed by FTTP networks compared to 7.2% of average rural homes across the EU.

Rural LTE coverage recorded an 8.7 percentage point increase and by mid-2015, 96.9% of rural households had access to high-speed mobile broadband, well-above the EU average of 36.3%.

Slovenia: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ Slovenia	67.0%	16.3%	20.2%	1.1%	43.4%	40.4%	99.1%	96.9%	100.0%
■ EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

5.27.2 Regional coverage by broadband technology

Fixed broadband coverage in Slovenia remained relatively stable across the twelve regions, ranging from less than 90% in the Spodnjeposavska region to complete coverage in the coastal Obalno-kraska region.
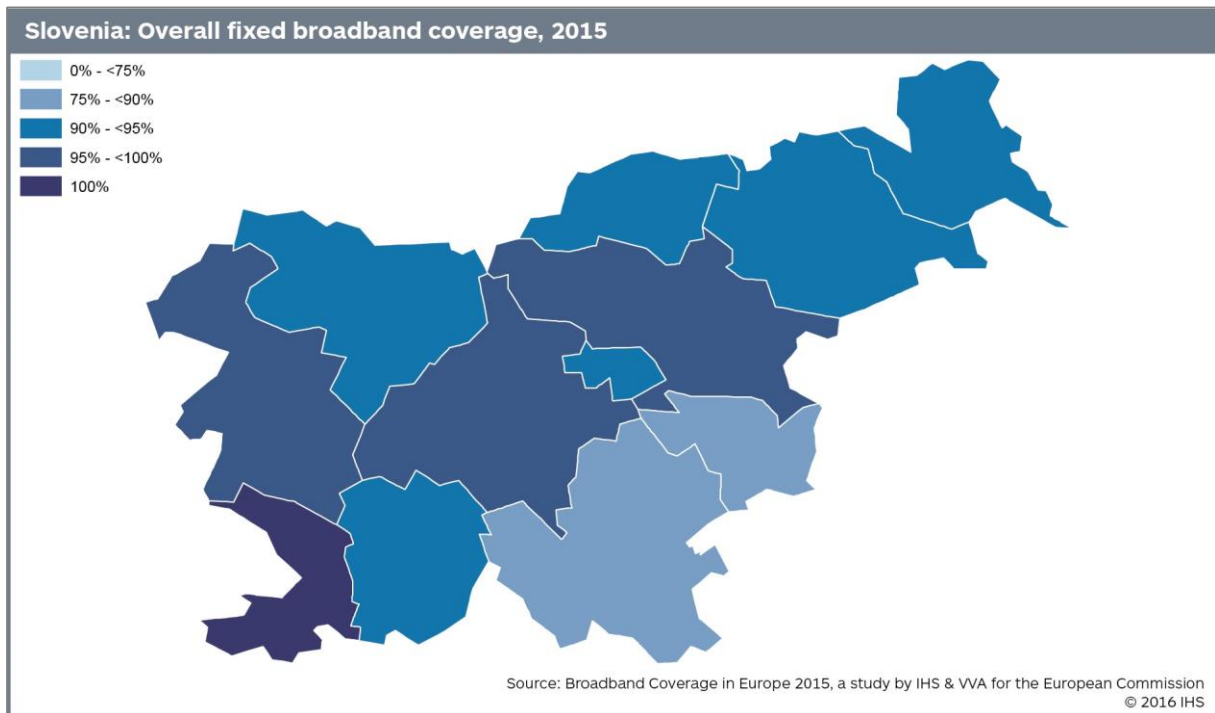
NGA coverage ranged from less than 50% in the Spodnjeposavska region to nearly 87% in the Obalno-kraska region. In nine out of twelve regions NGA coverage recorded NGA coverage levels higher than 75%.
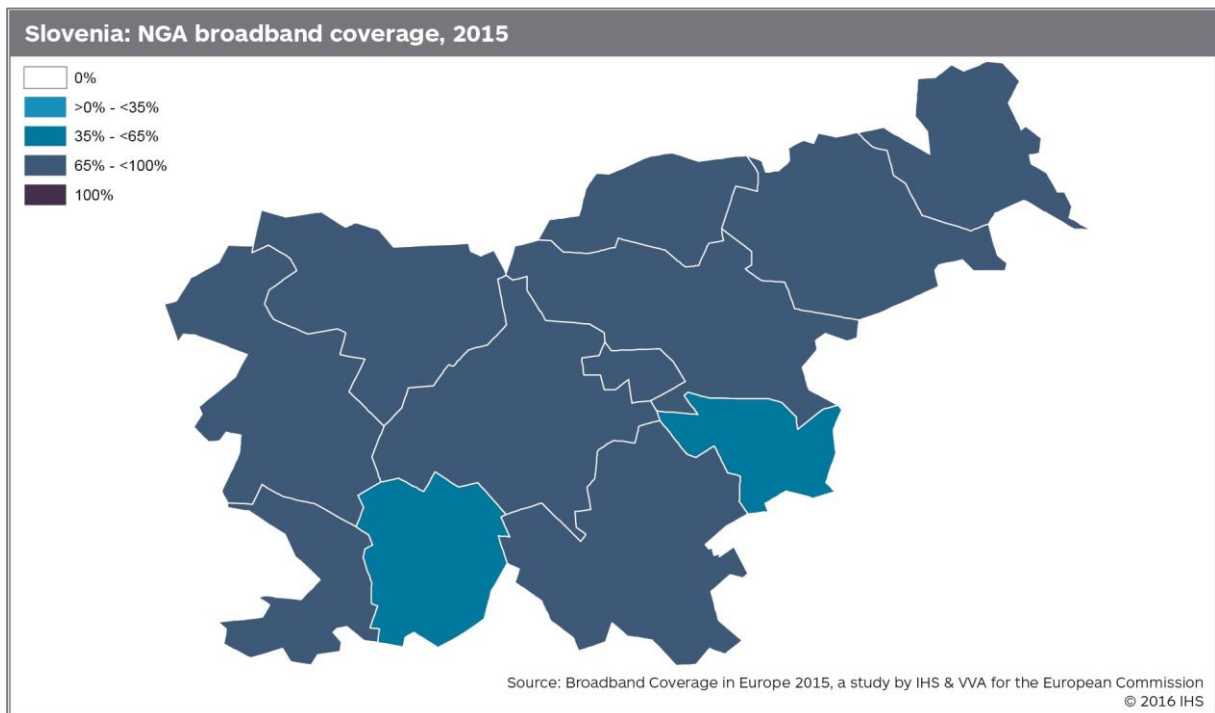
5.27.3 Regulatory and market overview

New national broadband strategy, Digital Slovenia 2020 finalised a public consultation stage in March 2015. As part of the strategy, the Slovenian government also adopted an updated plan for the development of next generation networks, which sets a goal of 96% of households covered by at least 100 Mbps download speeds and the remaining 4% of households to be covered by at least 30 Mbps speeds by 2020.[161]

The incumbent operator, Telekom Slovenije, utilizes both FTTP as well VDSL technologies in its network infrastructure and has been rolling out these NGA networks since 2007.[162] Since September 2014, the company provides 1Gbps connections in ten selected cities including the capital Ljubljana, Nova Gorica, Kranj, Grosuplje and others.[163]

Telekom Slovenije faces competition primarily from fibre provider T-2 and cable operator Telemach. Telemach started with DOCSIS 3.0 upgrades of its network in 2009, while T-2 has been deploying its FTTP network since 2006. In direct competition to Telekom Slovenije, T-2 has also been offering connections of up to 1Gbps symmetrical speeds on its FTTP network. However, T-2 has been experiencing financial struggles during 2014 and the first half of 2015, and has been forced into bankruptcy after failing to follow its restructuring plan.[164]

In the mobile segment of Slovenia's broadband market, Si.mobil's first began offering LTE services in 2012 and in April 2015 its LTE network reached 80% of the population, with a long-term aim to cover 95% of the population by mid-2017.[165] Telekom Slovenije's LTE network, launched in 2013, hit an 80% population coverage mark in March 2015, while aiming at covering 92% of the population by the end of the year.[166] In May 2015, a third operator, following its acquisition by Telemach, Tušmobil launched its own LTE network planning to cover 75% of households by December 2015.[167]

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[161] Final version of the strategy 'Digital Slovenia 2020 – Strategy for development of information society until 2020' was adopted in March 2016 - http://www.mizs.gov.si/si/delovna_podrocja/direktorat_za_informacijsko_druzbo/digitalna_slovenija_2020/

[162] http://www.telekom.si/en/company/history

[163] http://www.telecompaper.com/news/telekom-slovenije-introduces-1-gbps-broadband--1038148

[164] https://www.telegeography.com/products/commsupdate/articles/2016/03/08/slovenias-t-2-forced-back-into-bankruptcy/

[165] http://www.alert-komunikacije.com/si-mobil-hits-80-4g-coverage/

[166] https://www.telegeography.com/products/commsupdate/articles/2015/03/06/telekom-slovenije-passes-80-lte-coverage-aims-for-92-in-2015/

[167] https://www.telegeography.com/products/commsupdate/articles/2015/05/21/tusmobil-begins-lte-rollout/

5.27.4 Data tables for Slovenia

Statistic	National
Population	2,061,085
Persons per household	2.5
Rural proportion	24.8%

Technology	Slovenia 2015		Slovenia 2014		Slovenia 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	90.9%	67.0%	90.8%	66.7%	90.6%	63.8%	94.0%	83.7%
VDSL	57.5%	16.3%	57.2%	15.2%	56.4%	12.6%	41.0%	16.9%
FTTP	45.0%	20.2%	42.2%	18.3%	36.6%	17.0%	20.8%	7.2%
WiMAX*	0.3%	1.1%	0.3%	1.1%	0.3%	1.1%	19.7%	18.7%
Cable	37.3%	43.4%	37.2%	38.6%	35.2%	28.7%	43.8%	10.2%
DOCSIS 3.0	36.0%	40.4%	34.8%	37.2%	32.9%	27.1%	43.1%	9.4%
HSPA	99.5%	99.1%	99.4%	99.1%	99.1%	98.9%	97.6%	90.0%
LTE	97.7%	96.9%	89.7%	88.2%	63.4%	56.3%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	99.8%	99.6%	99.6%	99.5%	99.5%	99.5%	99.8%	98.4%
Overall fixed broadband	95.5%	84.0%	95.4%	82.1%	95.2%	77.7%	97.4%	90.6%
NGA broadband	78.8%	62.4%	78.2%	58.4%	76.1%	46.8%	70.9%	27.8%

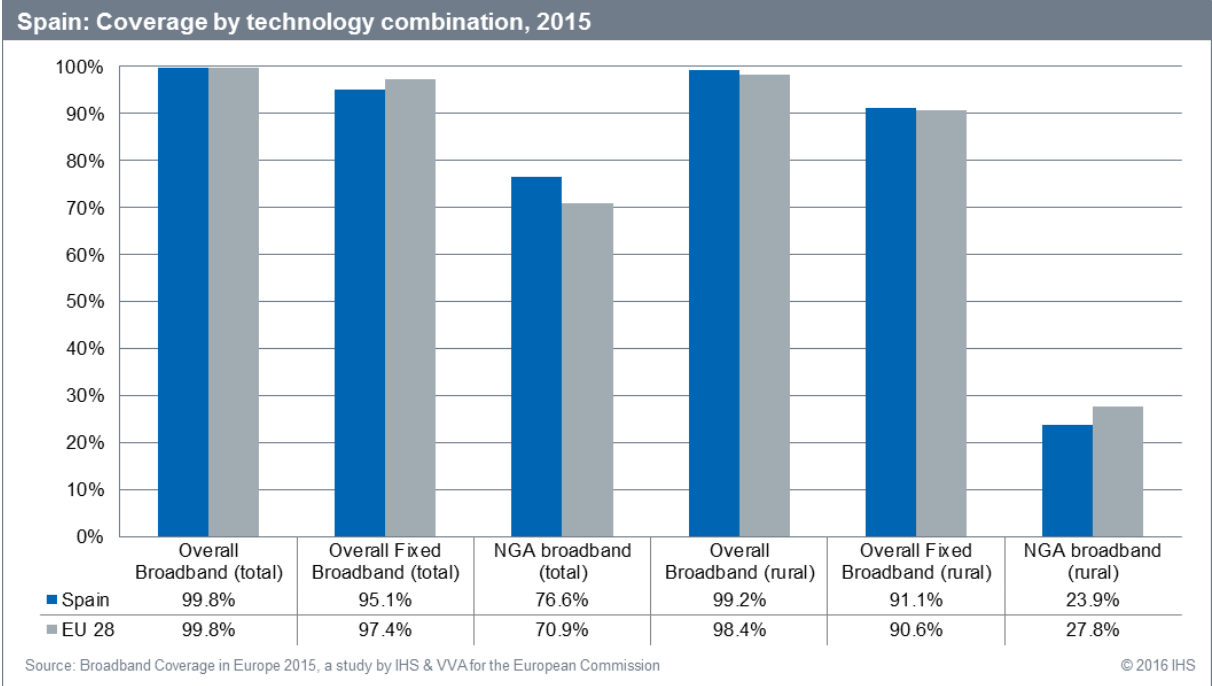Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

*There is no national WiMAX provider present in Slovenia and WIMAX technology is only used in small, mostly rural areas as part of an Open Access Network initiative aimed at increasing coverage of white spot areas.

5.28 Spain

5.28.1 National coverage by broadband technology

During the first half of 2015, overall broadband and fixed broadband coverage in Spain remained unchanged on both national and rural level. Total NGA coverage grew by 3.4 percentage points to 76.6% of households, further increasing its lead on the EU average and exceeding it by nearly seven percentage points. However, progress in NGA deployment was slower in rural areas, where NGA coverage increased by only 0.5 percentage points reaching 23.9% of rural households by the end of June 2015, almost four percentage points below the EU average of 27.8%.

Spain: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Spain	99.8%	95.1%	76.6%	99.2%	91.1%	23.9%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

Examining the individual technologies, coverage levels for all technologies with the exception of FTTP remained unchanged compared to December 2014. DSL continued to be the main fixed broadband technology in Spain, although at 88.5% it was below the EU average of 94.0%. However, FTTP plays an increasingly more important role for broadband availability in Spain. FTTP coverage continued to grow in the first six months of 2015 with more than a half (52.8%) of homes passed by FTTP networks at the end of June, an eight percentage point increase and more than double the EU average.

This reflects the strategy of major Spanish operators, such as the incumbent Telefonica España, Vodafone Spain, Orange Spain and Jazztel, to prioritise FTTP networks deployment over upgrades of their legacy networks to VDSL. Moreover, in the last couple of years the operators have also entered into a number of network sharing agreements in order to reduce cost and expedite the rollout.

Given the focus on FTTP deployment among the leading operators, VDSL rollout has been frozen and there are not any plans to upgrading the existing copper infrastructure neither to VDSL nor to VDSL2 vectoring. As a result, VDSL covered only 11.0% of Spanish homes in mid-2015, a figure unchanged for the last four years.

In terms of mobile technologies, LTE coverage grew by 3.2 percentage points in the first half of 2015, yet with 79.1% of homes passed by LTE networks, Spain remained below the EU average of 85.9%.

Spain: Coverage by technology, total, 2015
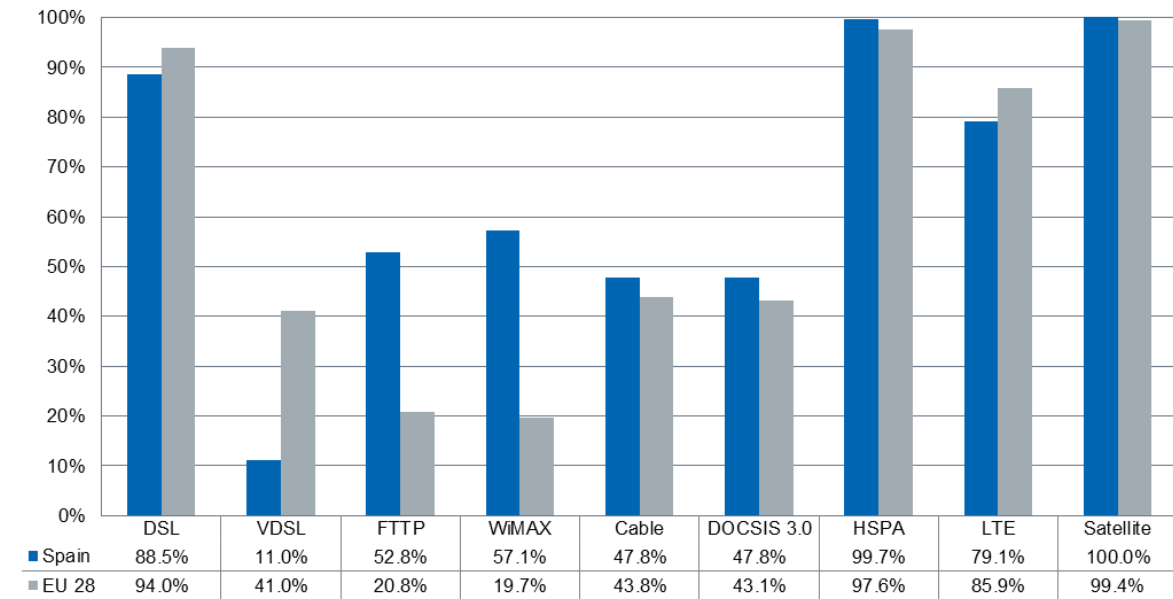
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Spain	88.5%	11.0%	52.8%	57.1%	47.8%	47.8%	99.7%	79.1%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

As in 2014, DSL continued to be the key fixed broadband technology available to rural households with 80.5% of rural homes passed by DSL networks. WiMAX also remained considerably high reaching nearly a half (49.8%) of rural households, almost three times more than the EU average. Even though FTTP coverage has been increasing on a national level, due to the fact that FTTP network deployments have been so far limited to mainly urban areas, availability of FTTP services in rural areas was low reaching only 5.6% of rural homes. Less than 10% of rural households had access to DOCSIS 3.0 cable broadband services leaving VDSL as the most wide-spread NGA technology in rural Spain, although its coverage also remained rather low at 14.1% of rural households.

Rural LTE coverage grew considerably, increasing by 6.7 percentage points and reaching 26.8% of rural households. However, it remained nearly ten percentage points below the EU average.

Spain: Coverage by technology, rural areas, 2015
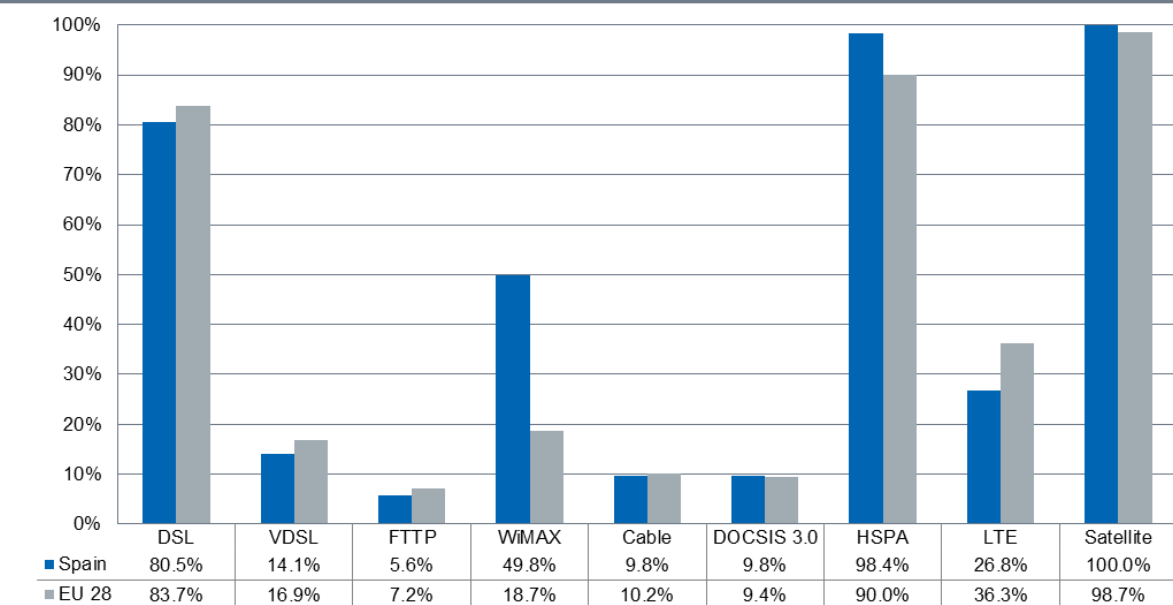
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Spain	80.5%	14.1%	5.6%	49.8%	9.8%	9.8%	98.4%	26.8%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

5.28.2 Regional coverage by broadband technology

Fixed broadband coverage levels continued to vary quite significantly between the individual regions. Out of the 59 Spanish regions, 56 regions recorded fixed coverage higher than 80%, lowest fixed broadband coverage was reported in the Canary Islands (around 50% in El Hierro and La Gomera), while Menorca, continued to be the only region with complete fixed coverage (due to 100% WiMAX coverage across the island).

Spain: Overall fixed broadband coverage, 2015

Legend:
0% - <75%
75% - <90%
90% - <95%
95% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

In terms of NGA coverage, the northern regions continue to lead along with the coastal regions. On the other hand, the overseas provinces and the Mediterranean Islands recorded lower availability of NGA services.

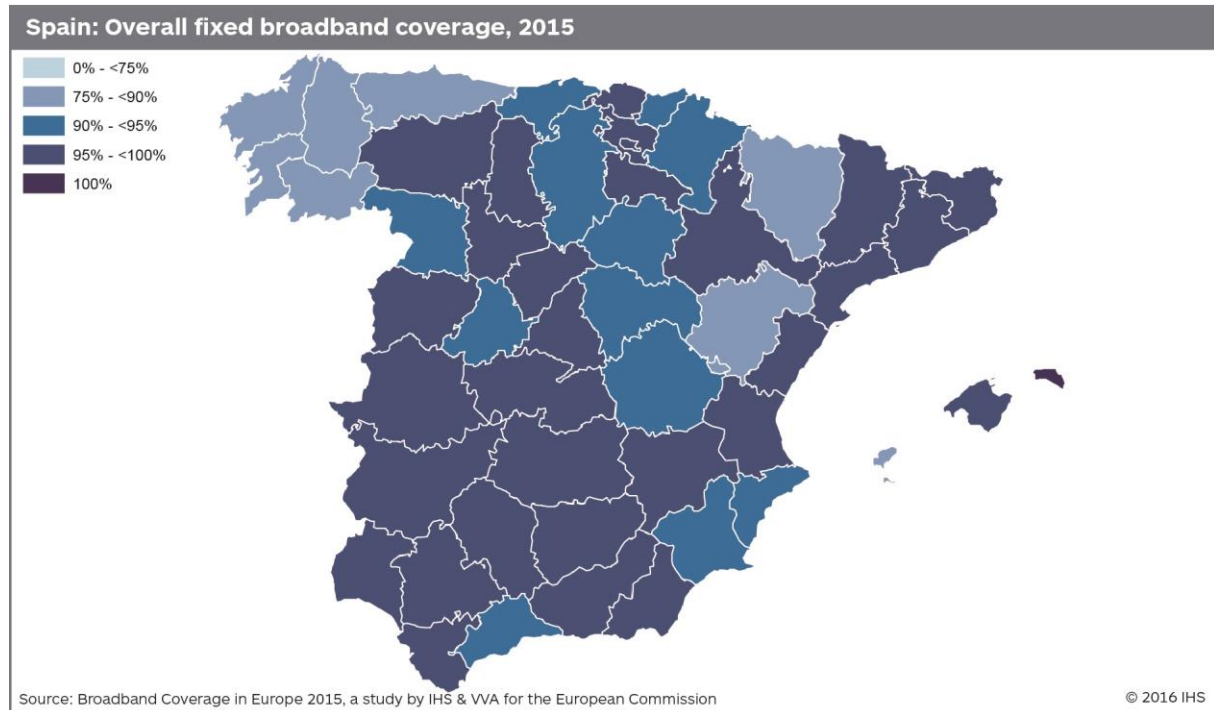Spain: NGA broadband coverage, 2015

Legend:
0%
>0% - <35%
35% - <65%
65% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
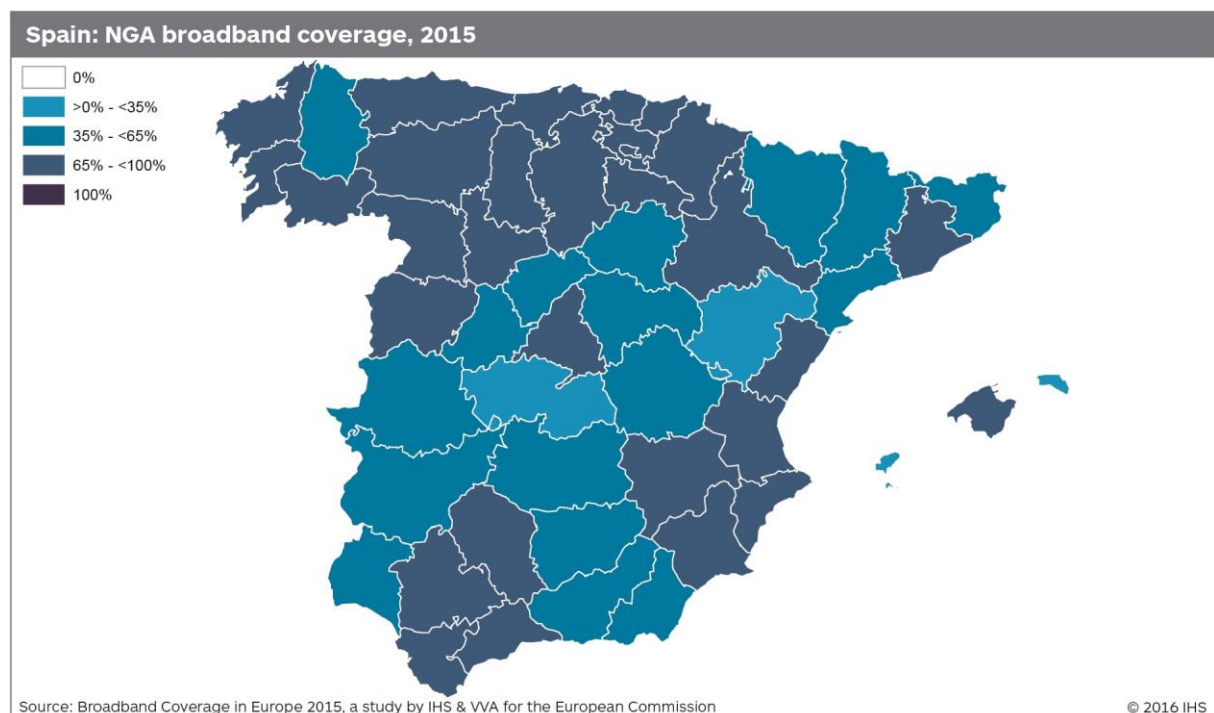
The following broadband coverage levels were recorded in Spanish regions outside mainland Europe:

Coverage data for Spanish NUTS 3 areas outside mainland Europe			
NUTS 3	Description	Overall fixed broadband coverage	NGA broadband coverage
ES630	Ceuta (ES)	93.4%	93.4%
ES640	Melilla (ES)	100.0%	100.0%
ES703	El Hierro	48.7%	5.4%
ES704	Fuerteventura	92.1%	13.8%
ES705	Gran Canaria	88.6%	76.5%
ES706	La Gomera	53.9%	15.8%
ES707	La Palma	74.3%	7.3%
ES708	Lanzarote	91.6%	54.6%
ES709	Tenerife	91.7%	70.4%

5.28.3 Regulatory and market overview

The "Digital Agenda for Spain" was published in 2013 and sets out the objectives and strategy to guarantee a widespread broadband access in line with the goals of the Digital Agenda for Europe. The national strategy comprises of nine specific plans, including a Telecommunications and Ultra-fast Networks plan. Part of the plan includes measures for the provision of ultrafast fixed access and mobile access networks.[168].

In 2013, the General Telecommunications Act was adopted to facilitate the expansion of next generation networks. This includes easy access to civil works infrastructure and network sharing. Moreover, the government introduced simplified legislation and policies aimed at streamlining the administrative processes and reduction of deployment costs. Spanish network operators have also been able to obtain funds from the European Regional Development Fund (ERDF) for the rollout of NGA networks in underserved areas.

The leader in the Spanish fixed broadband market, the incumbent, Telefonica, faces competition from a range of telcos and cable providers, such as Vodafone Spain and Orange Spain. Given the investment costs involved in a nationwide network expansion and deployment, Spanish operators have been turning to cooperation agreements in order to reduce costs of NGA expansion.

Vodafone Spain and Orange Spain have been deploying a joint FTTP network since 2013, in addition to their own fibre networks rolled out in complimentary areas while facilitating mutual infrastructure access.[169] The same year, Telefonica and the Vodafone/Orange joint venture stroke an agreement to allow access to Telefonica's fibre infrastructure within multiple dwelling buildings, such as tower blocks (vertical fibre infrastructure), while Telefonica received access to Vodafone/Orange's network in areas where its FTTP network was not present.[170]

In January 2015, Telefonica announced that it was slowing the deployment of its FTTP network in order to avoid having to lease access to the network at regulated prices to competitors as suggested by the national anti-trust body, CNMC.[171] On the other hand, Telefonica boosted download speeds offered over its FTTP network to 300 Mbps in May

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[168] http://www.agendadigital.gob.es/digital-agenda/Documents/digital-agenda-for-spain.pdf

[169] https://technology.ihs.com/484420/vodafone-launching-joint-fibre-service-in-spanish-market

[170] http://www.reuters.com/article/2013/07/02/us-spain-fibre-optic-idUSBRE9610ZW20130702

[171] http://uk.reuters.com/article/uk-spain-telefonica-idUKKBN0L60U120150202

2015.[172] In response, both Telefonica's rival cable operator Telecable[173] as well as Vodafone Spain also increased the download speed of their network to 300 Mbps.[174]

The Spanish broadband market also witnessed a number of high-stake acquisitions at the end of 2014 and during the first half of 2015 with Vodafone purchasing cable operator ONO while another cable and FTTP provider, Jazztel, was scooped up by Orange Spain.[175] Furthermore, Orange Spain plans to bolster its investments in further networks deployment and began to test 1 Gbps fibre services over its FTTP network.[176]

The first LTE network was introduced in Spain by Vodafone in 2013, followed by networks from Orange, Yoigo, and Telefonica during that same year. At the end of 2014, Vodafone Spain and Telefonica began rolling out their LTE-Advanced networks and continued the LTE-A expansion into 2015.[177]

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[172] https://www.telegeography.com/products/commsupdate/articles/2015/05/08/movistar-boosting-maximum-ftth-speeds-to-300mbps/

[173] http://www.telecompaper.com/news/telecable-increases-top-ftth-speed-to-300-mbps--1085068

[174] http://www.digitaltveurope.net/371281/vodafone-spain-to-launch-300mbps/

[175] http://europa.eu/rapid/press-release_MEMO-15-4998_en.htm

[176] https://www.telegeography.com/products/commsupdate/articles/2015/08/19/orange-espana-tests-1gbps-fibre-service-as-parent-company-completes-jazztel-shares-buy-out/

[177] http://www.telecompaper.com/news/vodafone-spain-launches-volte--1091282

5.28.4 Data tables for Spain

Statistic	National
Population	47,129,783
Persons per household	2.6
Rural proportion	18.5%

Technology	Spain 2015		Spain 2014		Spain 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	88.5%	80.5%	88.5%	80.5%	91.0%	86.2%	94.0%	83.7%
VDSL	11.0%	14.1%	11.0%	14.1%	11.0%	16.0%	41.0%	16.9%
FTTP	52.8%	5.6%	44.8%	5.0%	22.7%	2.5%	20.8%	7.2%
WiMAX	57.1%	49.8%	57.1%	49.8%	55.2%	51.7%	19.7%	18.7%
Cable	47.8%	9.8%	47.8%	9.8%	48.5%	8.8%	43.8%	10.2%
DOCSIS 3.0	47.8%	9.8%	47.8%	9.8%	48.5%	8.8%	43.1%	9.4%
HSPA	99.7%	98.4%	99.7%	98.4%	99.1%	95.1%	97.6%	90.0%
LTE	79.1%	26.8%	76.3%	20.1%	47.1%	2.2%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	99.8%	99.2%	99.8%	99.2%	99.6%	97.8%	99.8%	98.4%
Overall fixed broadband	95.1%	91.1%	95.1%	91.6%	96.5%	94.3%	97.4%	90.6%
NGA broadband	76.6%	23.9%	73.2%	23.6%	64.9%	23.1%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.29 Sweden

5.29.1 National coverage by broadband technology

In the first six months of 2015, Sweden continued to outperform most of the EU with regards to all broadband coverage combination categories, with the only exception being rural NGA coverage which at 13.9% remained below the EU average of 27.8%

Sweden: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Sweden	99.5%	99.0%	76.4%	98.2%	93.6%	13.9%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
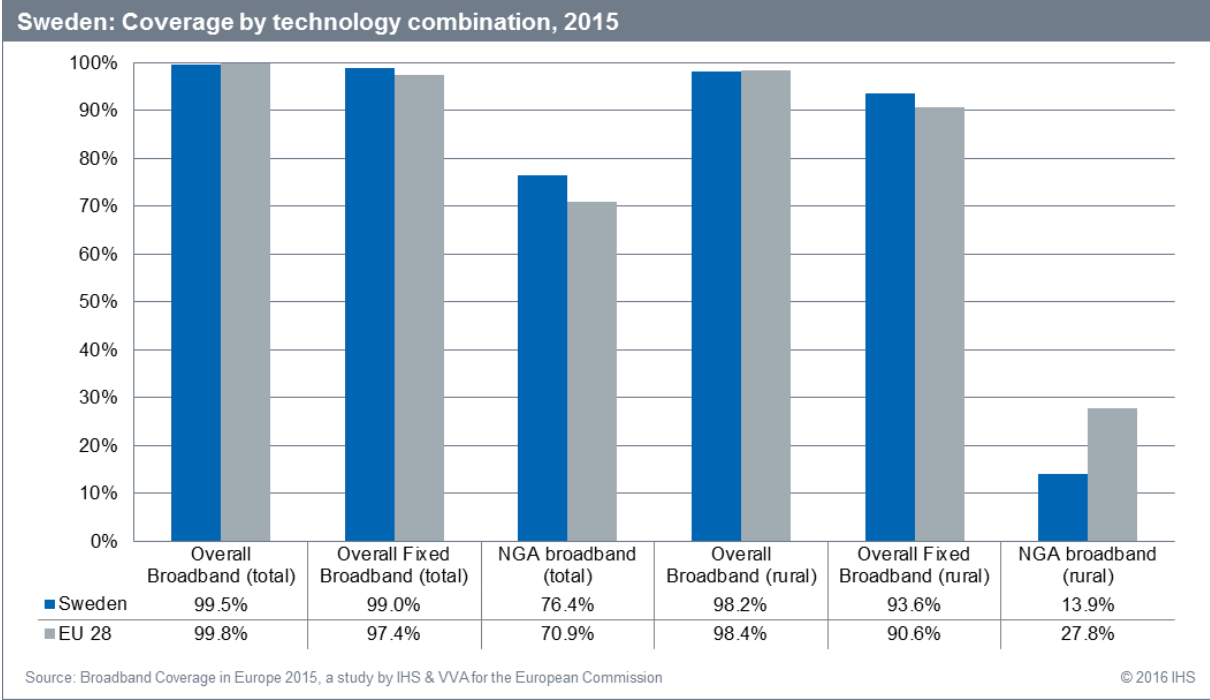
DSL continued to be the key fixed broadband technology and was available to 97.9% of households. Among NGA technologies, FTTP has been traditionally preferred by Swedish network operators in their next-generation networks deployments and was therefore the most prevalent with FTTP networks passing 56.4% of Swedish homes, compared to 20.8% of average EU households.

Sweden: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Sweden	97.9%	18.3%	56.4%	0.0%	38.8%	34.0%	99.1%	99.2%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
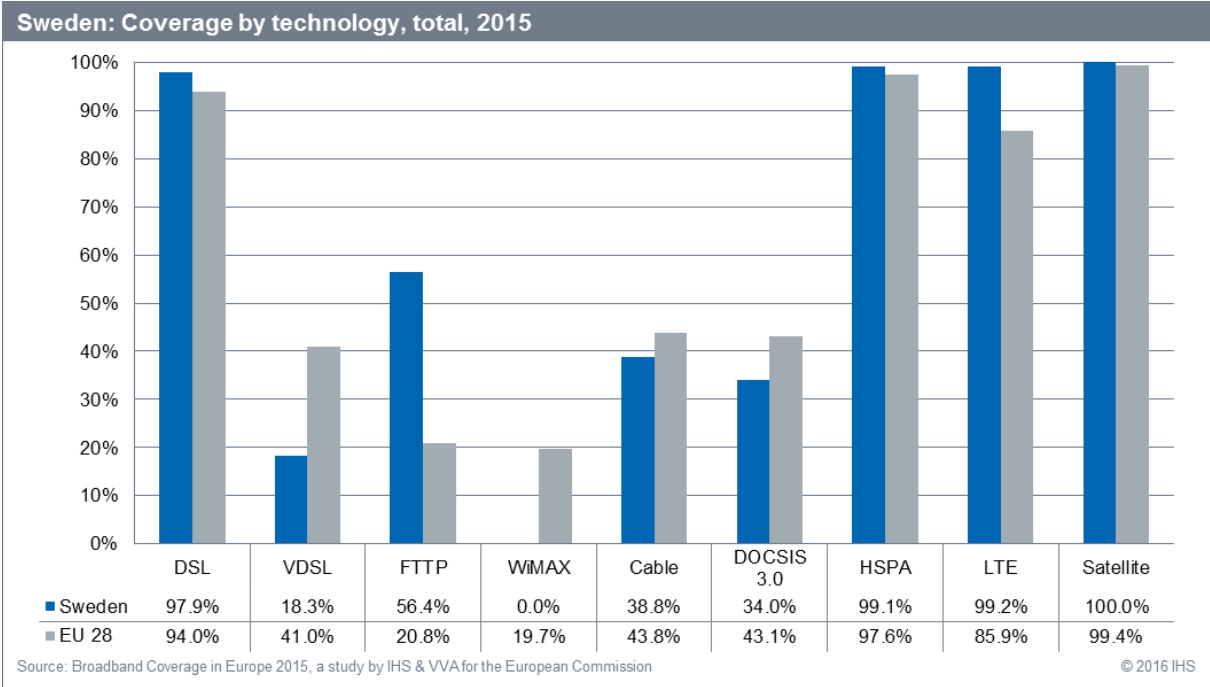
While in some parts of the country DSL network has been upgraded to VDSL, its reach remained limited as it covered only 18.3% of households. High-speed DOCSIS 3.0 cable services were available to little over a third (34.0%) of Swedish households. In total, approximately 88% of cable networks were upgraded to DOCSIS 3.0 across Sweden.

Both HSPA and LTE networks reached nearly all households in Sweden, covering 99.1% and 99.2% of households, respectively.

Sweden: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Sweden	89.0%	0.5%	13.7%	0.0%	0.1%	0.0%	96.5%	98.0%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
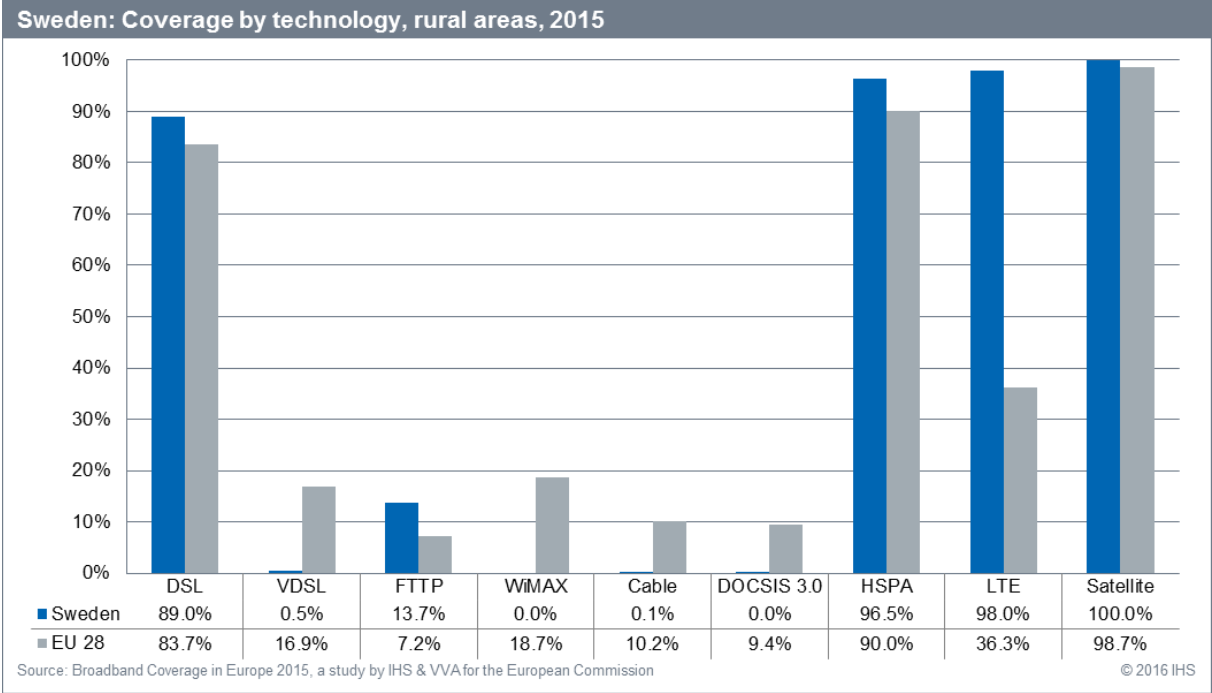
Rural areas across Sweden rely on only two technologies providing them with fixed broadband access, DSL and FTTP. DSL services were available to 89.0% of rural households, compared to the EU average of 83.7%. Even though FTTP coverage was at 13.7% higher than the EU average, given the virtual absence of both VDSL and DOCSIS 3.0 in rural areas, it alone cannot ensure substantial rural NGA coverage.

Nevertheless, rural areas across Sweden benefit from very high level of LTE coverage with 98.0% of rural households being able to connect to the high-speed mobiles network, thus partially offsetting the low rural NGA availability.

5.29.2 Regional coverage by broadband technology

Sweden: Overall fixed broadband coverage, 2015

0% - <75%
75% - <90%
90% - <95%
95% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

© 2016 IHS

Sweden: NGA broadband coverage, 2015

0%
>0% - <35%
35% - <65%
65% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

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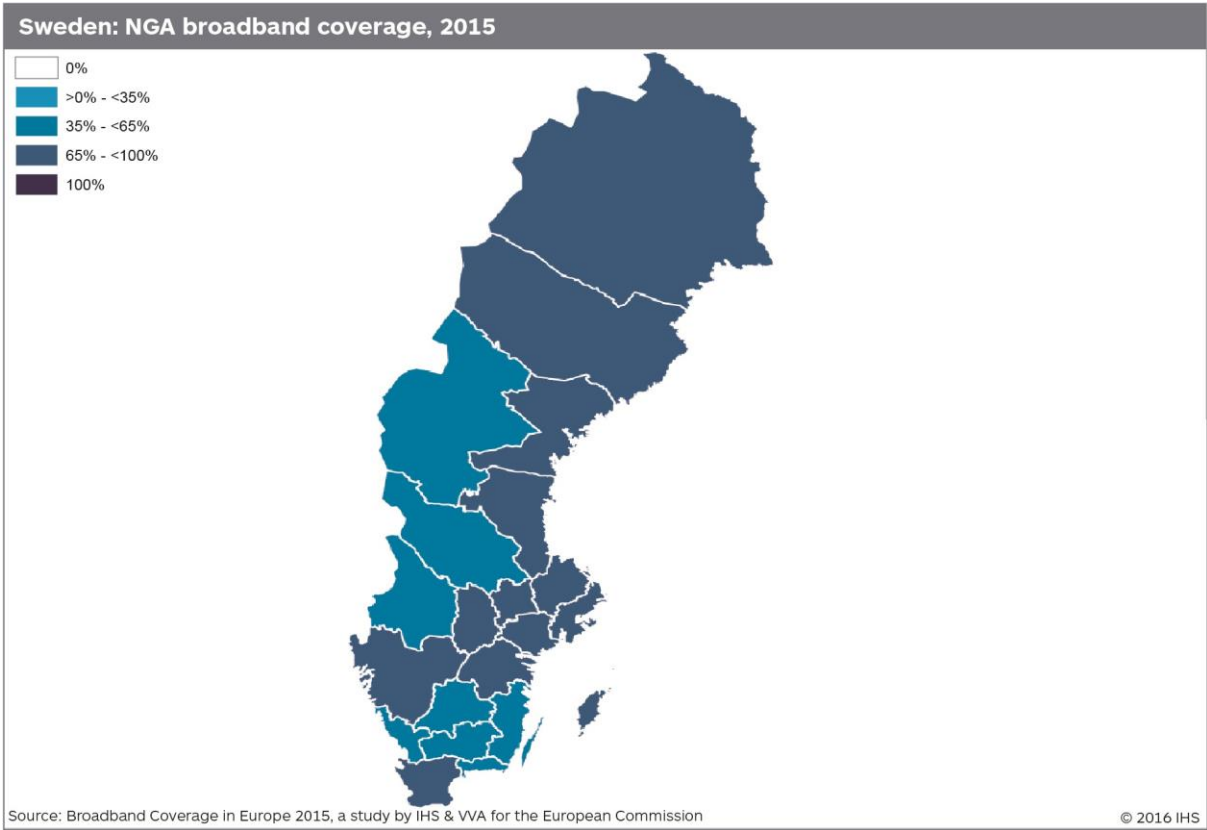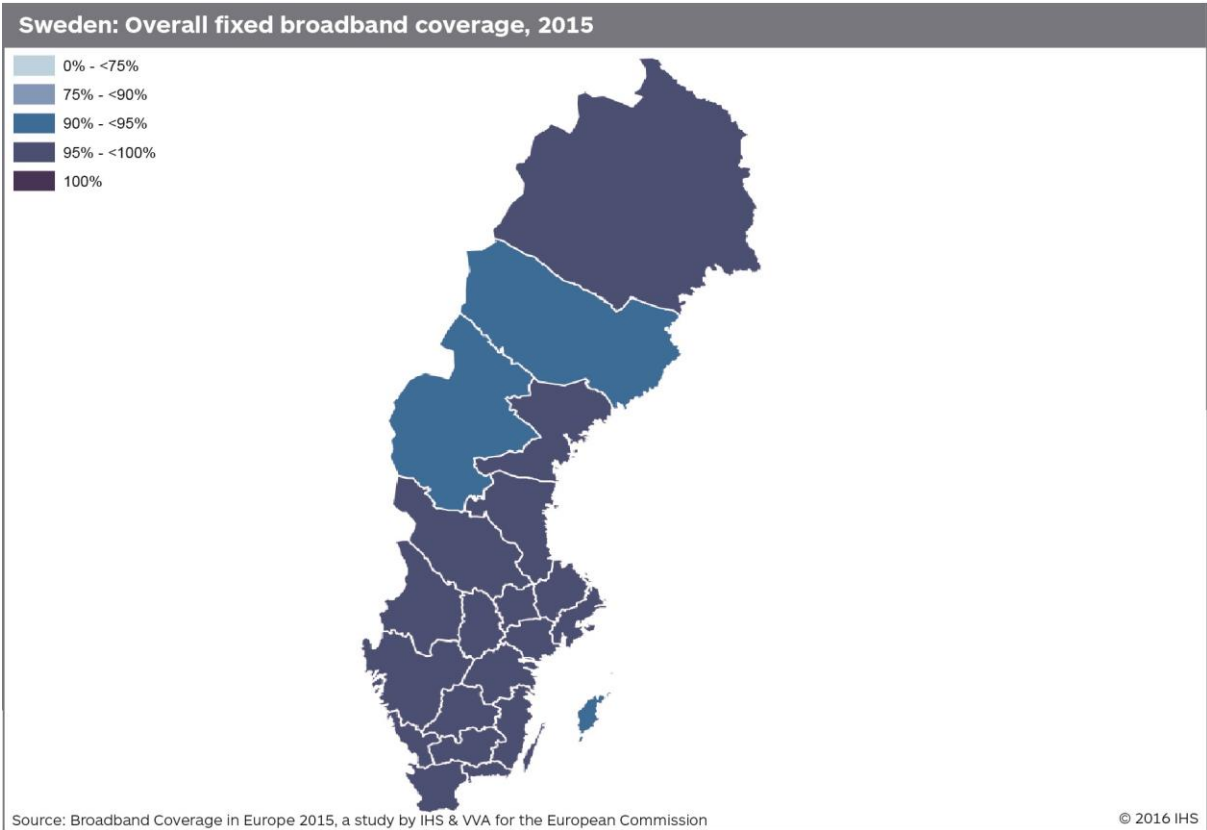
Overall fixed broadband coverage in Sweden was high across all regions, ranging from more than 94% (Jämtlands län) to 99.7% (Stockholms län).. While no region reported complete coverage, 12 of the 21 regions recorded fixed broadband coverage levels exceeding 99%.

NGA coverage across regions was more varied, with the lowest NGA coverage recorded in Dalarnas län (52.6%) whilewo regions, Stockholm and Västerbottens reported NGA coverage close to 90%.

5.29.3 Regulatory and market overview

Sweden's national broadband strategy is outlined in the 2009 document "Broadband Strategy for Sweden", which is valid until 2020. Key targets outlined in the strategy aim at providing access of minimum download speeds of 100 Mbps to 40% of all households and business by the end of 2015, and achieving a 90% coverage by 100 Mbps speeds by 2020.[178]

In June 2015, the European Commission approved Sweden's rural broadband programme for the period 2014-2020, in which the government plans to invest EUR 350 million towards high speed internet expansion across underserved regions where next-generation networks deployment is not commercially feasible.[179]

Swedish fixed broadband market is driven to a large extent by FTTP deployment, with the main players, the incumbent TeliaSonera and Telenor both increasingly shifting focus to FTTP services. In October 2014, TeliaSonera announced a EUR 1 billion investment in the expansion of its fibre network, with the aim of connecting 1.9 million households to its FTTP network by 2018.[180] This was in addition to a previous EUR 530 million investment announced in 2011. In January 2015, TeliaSonera announced acquisition of a local FTTP network provider Transit Bredband, leading to a greater consolidation of the Swedish fixed broadband market.[181]

Swedish cable operators face stiff competition from the FTTP market and as such are under pressure to keep up with the high-speed services offered by competitors such as Telenor and TeliaSonera. In September 2013, Com Hem launched a new broadband service capable of achieving downstream speeds up to 500 Mbps supported using DOCSIS 3.0. In March 2014, the company launched its flagship 1 Gbps service in order to compete with its rivals' FTTP offers.[182]

LTE networks have been in operation already since 2009, when TeliaSonera first began to offer LTE services, followed by Tele2 and Telenor in 2010 and Three in 2011. At the beginning of 2015, the Swedish regulator ordered a joint venture between Tele2 and Telenor named Net4Mobility (N4M) to roll out the LTE network to a list of specific rural locations previously identified as lacking any broadband access.[183]

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[178] http://www.government.se/content/1/c6/13/49/80/112394be.pdf

[179] https://www.telegeography.com/products/commsupdate/articles/2015/06/11/usd393m-rural-broadband-strategy-approved-national-secretariat-to-support-regions/

[180] http://www.telia.se/media/2014/10/05/telia-satsar-nio-miljarder-p-fiber/066cb492-9c96-4d31-8eb5-144da57ee8af

[181] https://www.telia.se/media/2015/01/07/telia-forvrvar-transit-bredband-ab/ad0ced25-fac9-4e54-8de0-46cb71dcdaab

[182] http://www.digitaltveurope.net/157472/com-hem-launches-1gbps-internet/

[183] https://www.telegeography.com/products/commsupdate/articles/2015/01/16/pts-reiterates-800mhz-coverage-order-to-tele2-telenor/

5.29.4 Data tables for Sweden

Statistic	National
Population	9,644,864
Persons per household	2.3
Rural proportion	11.4%

Technology	Sweden 2015		Sweden 2014		Sweden 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	97.9%	89.0%	97.9%	89.0%	98.0%	88.2%	94.0%	83.7%
VDSL	18.3%	0.5%	18.3%	0.5%	17.8%	0.2%	41.0%	16.9%
FTTP	56.4%	13.7%	56.4%	13.7%	51.8%	8.8%	20.8%	7.2%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.7%	18.7%
Cable	38.8%	0.1%	38.8%	0.1%	39.3%	0.1%	43.8%	10.2%
DOCSIS 3.0	34.0%	0.0%	34.0%	0.0%	34.3%	0.0%	43.1%	9.4%
HSPA	99.1%	96.5%	99.1%	96.5%	99.7%	97.9%	97.6%	90.0%
LTE	99.2%	98.0%	99.2%	98.0%	99.2%	96.5%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	99.5%	98.2%	99.5%	98.2%	99.8%	98.7%	99.8%	98.4%
Overall fixed broadband	99.0%	93.6%	99.0%	93.6%	99.0%	91.8%	97.4%	90.6%
NGA broadband	76.4%	13.9%	76.4%	13.9%	71.2%	8.9%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

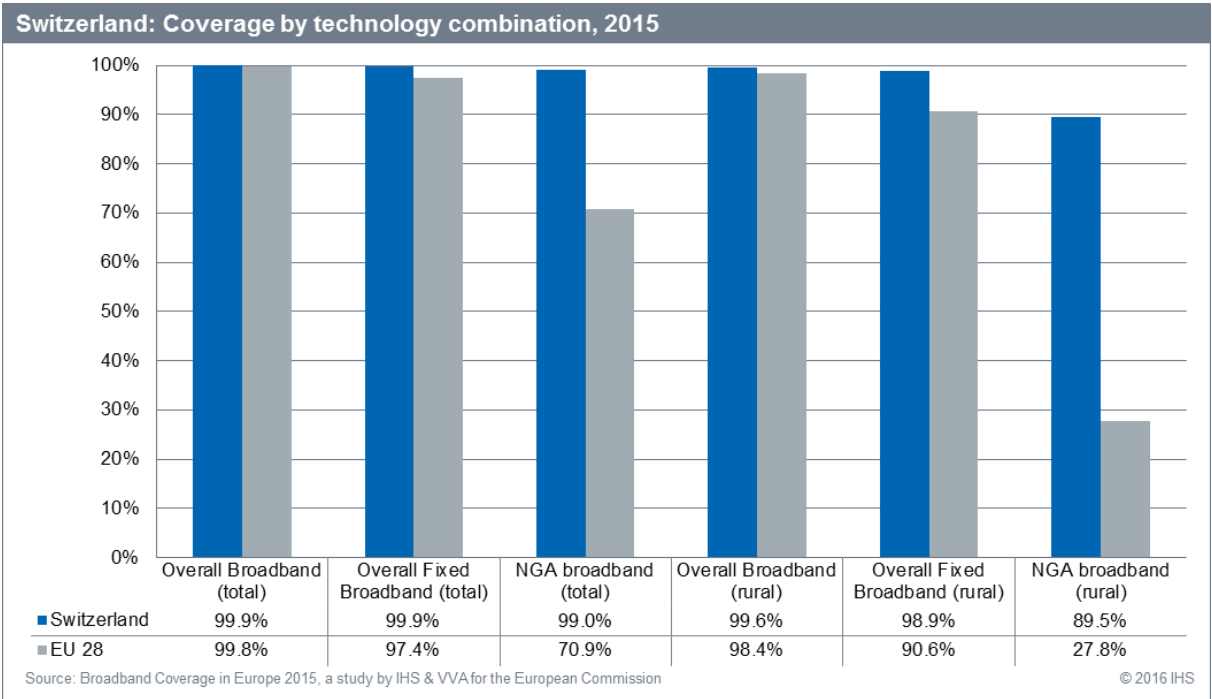IHS Global Limited, Valdani Vicari Associati

5.30 Switzerland

5.30.1 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 Glasfasernetz Schweiz, a Swiss fibre optic industry association.

At the end of June 2015, Switzerland remained one of the top performers with regards to broadband coverage, reporting above-average coverage levels for all coverage combination categories. Given the high broadband coverage levels achieved already in previous years, it is not surprising that no substantial changes were reported in the first half of 2015.

In mid-2015, almost complete coverage has been reported for the overall broadband technology combination on national and rural level (99.9% and 99.4%, respectively), as well as fixed broadband on national level (99.9%). NGA broadband services were available to 99.0% of all households in Switzerland and to nearly 9 in 10 (89.5%) rural households.

Switzerland: Coverage by technology combination, 2015

	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Switzerland	99.9%	99.9%	99.0%	99.6%	98.9%	89.5%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
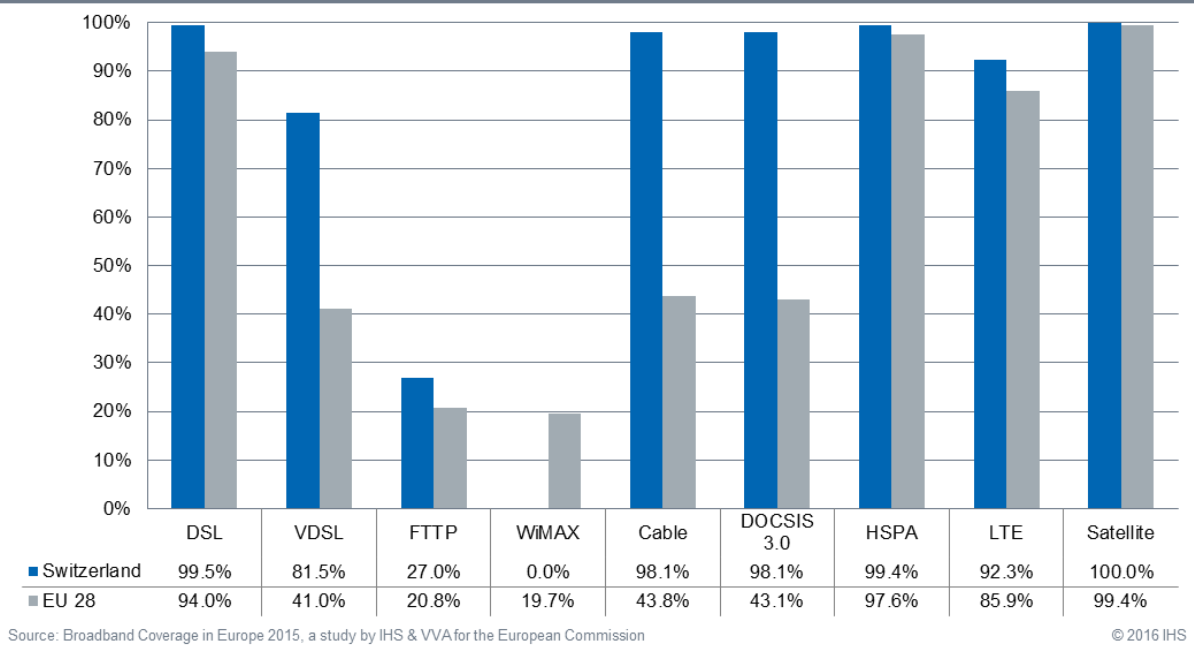
Switzerland continued to rank ahead of the EU average in each category with the exception of WiMAX, which is absent in the Swiss market. Of particular importance is very high reach of cable networks (98.1% household coverage), which have now been completely upgraded to DOCSIS 3.0 meaning that cable networks also serve as the key NGA technology.

VDSL and FTTP coverage levels however continue to grow, with VDSL services being available to 81.5% of households, a 1.8 percentage point growth, and FTTP networks passing 27% of Swiss homes, increasing by 1.1 percentage points in the first six months of 2015. 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.

Following a dramatic increase in LTE coverage recorded in 2014, the pace of LTE deployment has slowed down in the first half of 2015. Nevertheless, 92.3% of Swiss households were able to connect to LTE services by mid-2015, compared to 85.9% of average EU households.
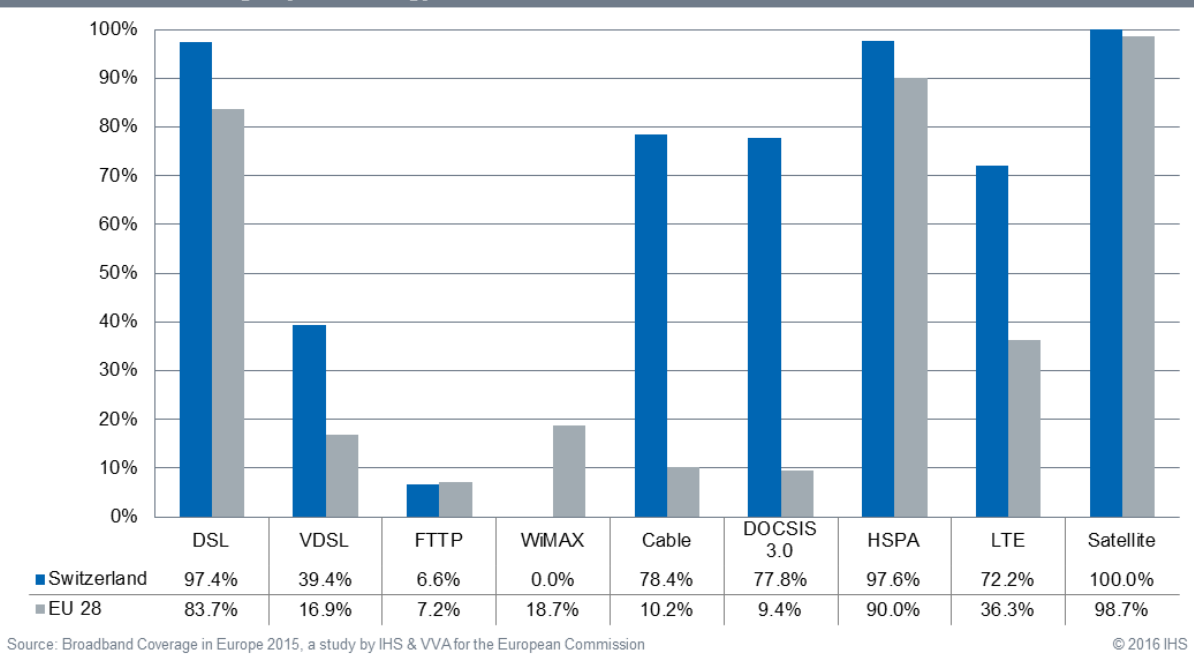
Switzerland: Coverage by technology, total, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Switzerland	99.5%	81.5%	27.0%	0.0%	98.1%	98.1%	99.4%	92.3%	100.0%
EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission © 2016 IHS

Switzerland has been traditionally characterised by very high rural cable coverage compared to the EU average. Cable networks pass 78.4% rural homes, and due to network upgrades, 77.8% of rural households are also covered by DOCSIS 3.0 technology, unchanged from 2014. High rural DOCSIS 3.0 also greatly attributes to the high overall levels of rural NGA availability in Switzerland. At the end of June 2015, VDSL services were available to 39.4% of rural households, a slight 0.7 percentage point increase, while 6.6% of rural households had access to FTTP broadband.

Rural LTE coverage increased by 2.3 percentage points and by mid-2015, 72.2% of rural households could connect to the high-speed mobile network, nearly double the EU average.

Switzerland: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Switzerland	97.4%	39.4%	6.6%	0.0%	78.4%	77.8%	97.6%	72.2%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission © 2016 IHS
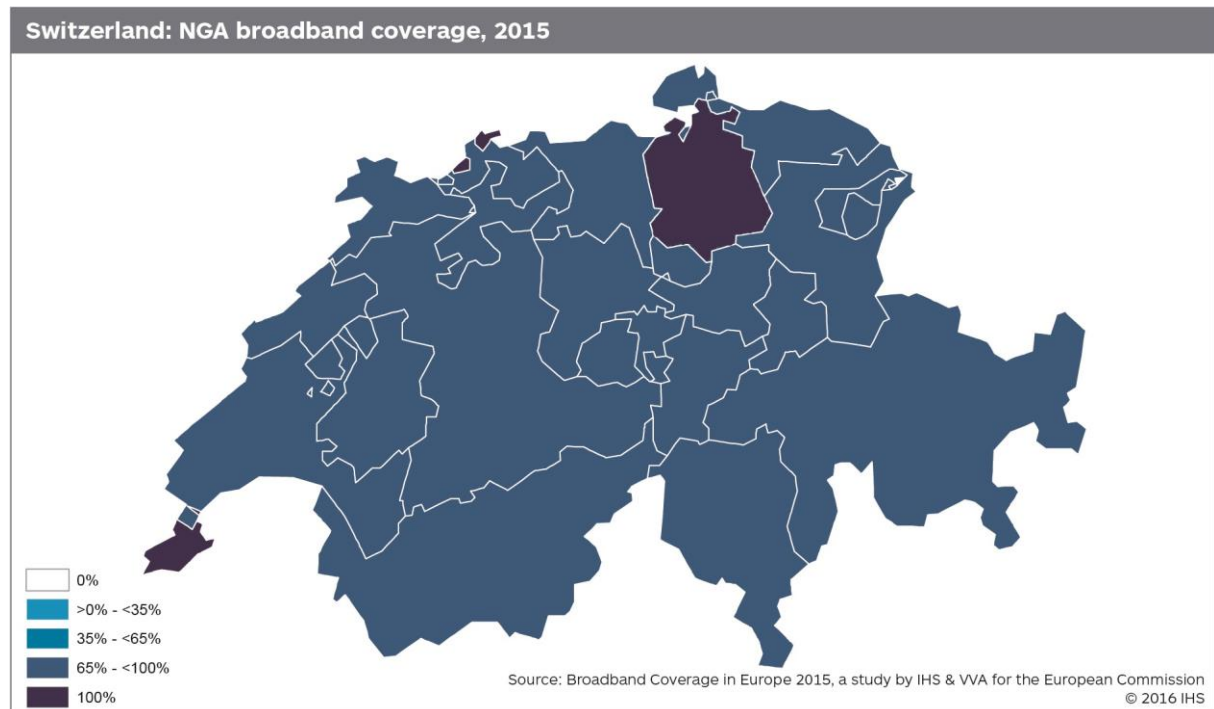
5.30.2 Regional coverage by broadband technology

Sixteen out of the 26 Swiss regions reported virtually complete fixed broadband coverage, with fixed coverage in all of the remaining regions exceeding 95%. Lowest coverage was recorded in the Jura and Uri regions, reaching 97.1% of households.

Switzerland: Overall fixed broadband coverage, 2015

0% - <75%
75% - <90%
90% - <95%
95% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
© 2016 IHS
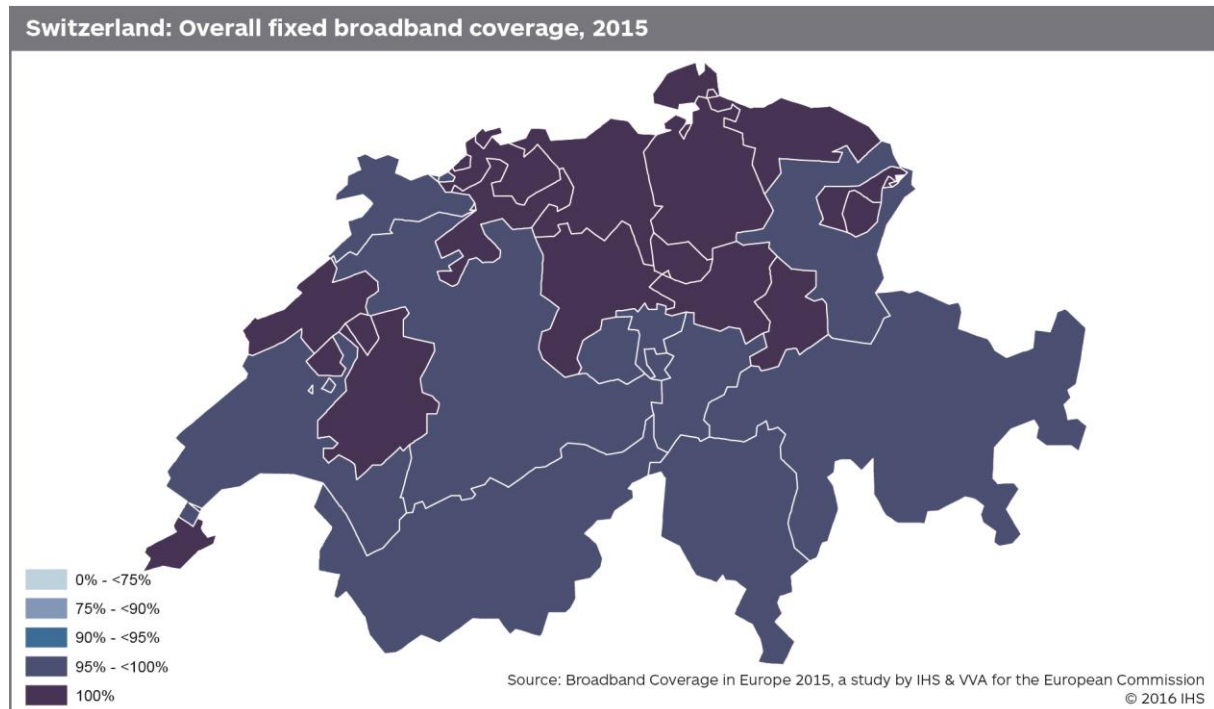
Complete NGA coverage was recorded in Geneva, Basel and Zürich, with over 90% of homes passed by NGA networks in majority of the remaining regions. There were only two regions, where NGA coverage was lower than 90% - Valais and Graubünden.

Switzerland: NGA broadband coverage, 2015

0%
>0% - <35%
35% - <65%
65% - <100%
100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission
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5.30.3 Regulatory and market overview

The Swiss broadband market is characterised by heavy infrastructure-based competition between cable operators and the incumbent, Swisscom, with a number of smaller FTTP providers active on a regional and local level. Since 2011, Switzerland has been the leading investor in telecommunications infrastructure (on per capita bases) among OECD countries.[184]

Swisscom has been investing extensively in deployment of fibre networks across the country with CAPEX levels highly exceeding its European telco counterparts (3.6 times more on average). The company has adopted a varied approach to its network upgrade, starting with VDSL trials in 2006 and announcing a FTTP network deployment plan in 2008.[185] By mid-2015, Swisscom's FTTP network passed 975 thousand homes across Switzerland capable of up to 1Gbps downstream speeds.[186] In May 2015, the company was the first to trial G.fast technology among its active customers, increasing download speeds to up to 500 Mbps over the copper network and bringing yet another technology into its network infrastructure footprint.[187]

Swiss cable operators, led by Liberty-Global backed Cablecom, have been investing heavily in network upgrades since 2006 and by mid-2015 all cable networks were upgraded to the DOCSIS 3.0 standard, with Cablecom increasing its download speeds to up to 500 Mbps in June 2015[188] with the company looking to roll out 1 Gbps speeds in the near future.[189]

At the end of 2012, Swisscom rolled out the first LTE network in Switzerland, followed by Orange and Sunrise in 2013[190]. Both Orange and Swisscom launched LTE-Advanced networks in Switzerland already in 2014.

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[184] OECD Digital Economy Outlook 2015.
185 http://www.swisscom.ch/en/about/medien/press-releases/2008/12/20081209_01_Mit_fibre_suisse_in_die_Glasfaserzukunft.html
186 https://www.swisscom.ch/content/dam/swisscom/de/about/investoren/documents/2015/2015_Q2_Praesentation_en.pdf
187 https://www.swisscom.ch/en/about/medien/press-releases/2015/05/20150504-MM-Netzausbau.html
[188] http://www.upc-cablecom.ch/en/internet/products/
[189] https://www.telegeography.com/products/commsupdate/articles/2014/07/25/cablecom-rollout-brings-250mbps-broadband-to-2m-homes/
[190] http://www.zdnet.com/sunrise-joins-switzerlands-4g-crowd-with-lte-launch-in-26-towns-7000017004/

5.30.4 Data tables for the Switzerland

Statistic	National
Population	8,039,060
Persons per household	2.3
Rural proportion	12.8%

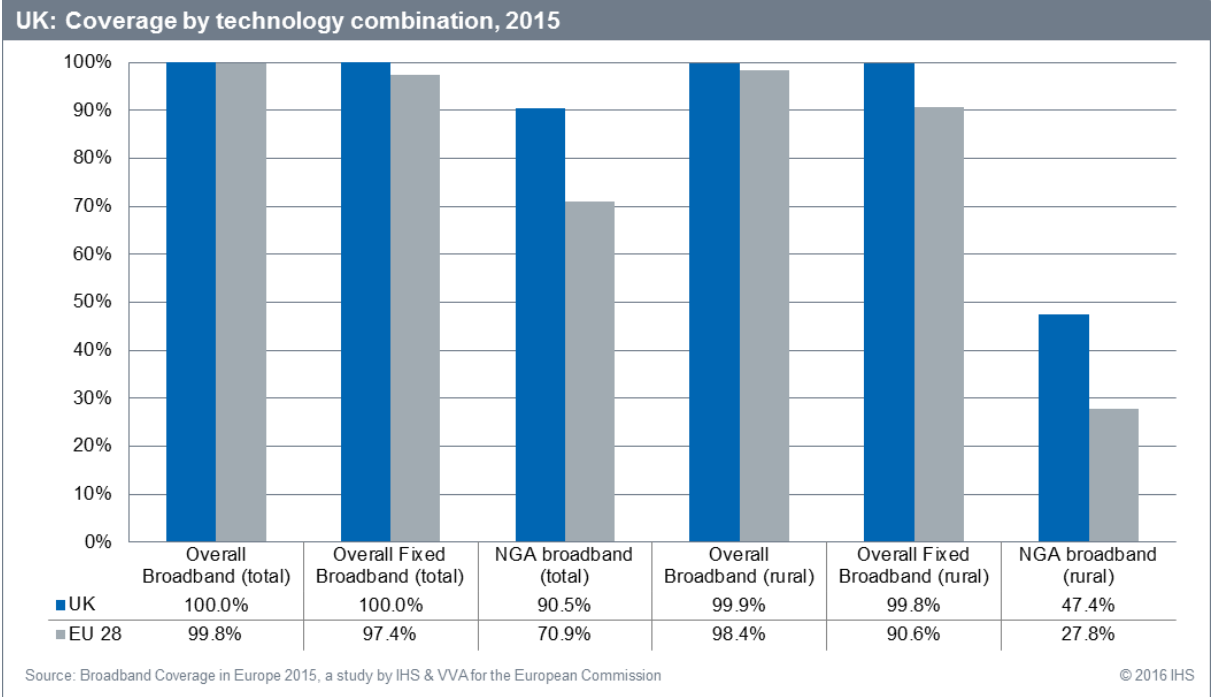| Technology	Switzerland 2015		Switzerland 2014		Switzerland 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	99.5%	97.4%	99.4%	96.8%	99.4%	97.3%	94.0%	83.7%
VDSL	81.5%	39.4%	79.7%	38.7%	72.3%	29.1%	41.0%	16.9%
FTTP	27.0%	6.6%	25.9%	6.2%	21.1%	3.7%	20.8%	7.2%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.7%	18.7%
Cable	98.1%	78.4%	98.1%	78.4%	97.2%	66.3%	43.8%	10.2%
DOCSIS 3.0	98.1%	77.8%	98.0%	77.8%	97.1%	60.4%	43.1%	9.4%
HSPA	99.4%	97.6%	99.0%	96.1%	98.8%	94.2%	97.6%	90.0%
LTE	92.3%	72.2%	91.8%	69.9%	67.7%	15.5%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	99.9%	99.6%	99.9%	99.3%	99.9%	99.3%	99.8%	98.4%
Overall fixed broadband	99.8%	98.9%	99.8%	99.0%	99.8%	98.9%	97.4%	90.6%
NGA broadband	99.0%	89.5%	99.0%	89.2%	98.7%	76.4%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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5.31 United Kingdom

5.31.1 National coverage by broadband technology

The United Kingdom remained among the top performers in terms of overall broadband coverage and fixed broadband technology combination in the first half of 2015 recording complete coverage on national level and nearly complete coverage in rural areas, values unchanged compared to 2014.

NGA coverage continued to improve with national NGA coverage increasing by 2.0 percentage points to 90.5% by mid-2015, which is almost twenty percentage points above the EU average (70.9%). In rural areas, following a 1.5 percentage point growth, NGA networks passed 47.4% or rural homes compared to 27.8% of average EU homes.

UK: Coverage by technology combination, 2015					
	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
UK	100.0%	100.0%	90.5%	99.9%	99.8%	47.4%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission © 2016 IHS
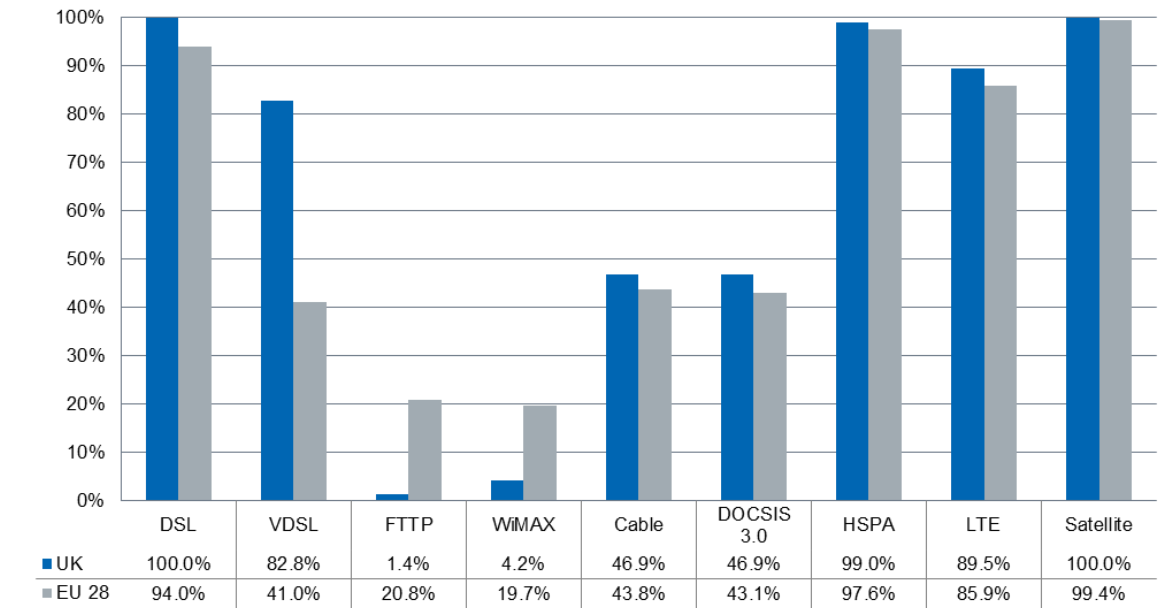
Looking in more detail at coverage levels of the individual technologies, the UK broadband coverage continued to be driven by DSL technology, with VDSL being the dominant NGA technology. VDSL was also the only technology to register a significant increase in coverage compared to the end of December 2014, growing by 3.9 percentage points and reaching 82.8% of households by the end of June 2015. With VDSL coverage level being more than double the EU average, the UK continued to be the European leaders in terms of VDSL availability. The continued VDSL coverage increases can be attributed to investments made primarily by the incumbent telecommunications group, BT, which has covered over 23 million premises with its VDSL-based next-generation access infrastructure by mid-2015.[191]

Other NGA technologies remained at their 2014 coverage levels, with DOCSIS 3.0 cable broadband services being available to 46.9% of households and FTTP's reach remaining limited with only 1.4% of UK homes passed by FTTP networks.

LTE deployment continued in the first half of 2015, with coverage increasing by 5.5 percentage points to 89.5%, above the EU average of 85.9%.

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[191] http://www.telegraph.co.uk/finance/newsbysector/mediatechnologyandtelecoms/telecoms/11772541/BT-forced-to-pay-back-129m-in-broadband-subsidies-to-local-councils.html

UK: Coverage by technology, total, 2015

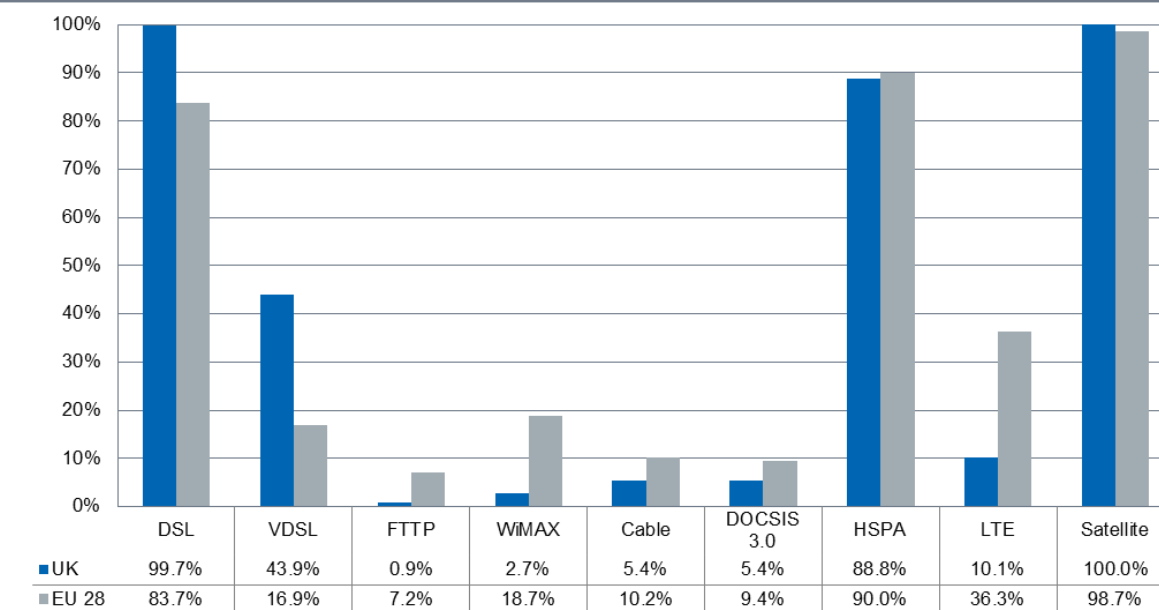|	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ UK	100.0%	82.8%	1.4%	4.2%	46.9%	46.9%	99.0%	89.5%	100.0%
■ EU 28	94.0%	41.0%	20.8%	19.7%	43.8%	43.1%	97.6%	85.9%	99.4%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

At the end of June 2015, rural areas continued to depend on DSL technology to receive broadband access with WiMAX and cable networks passing only 2.7% and 5.4% of homes, respectively. Yet, with 99.7% of rural households covered by DSL networks, vast majority of UK's rural homes has access to fixed broadband services. In terms of rural NGA availability, VDSL is the most widely available NGA technology reaching 43.9% of rural households, following a 1.5 percentage point increase in the first half of 2015. Despite recent efforts by local companies and initiatives such as B4RN or Gigacler to improve rural FTTP availability, FTTP networks passed less than 1% of rural homes by mid-2015.

LTE availability in UK's rural areas remains problematic, with only 10.1% of rural households covered by LTE compared to the EU average of 36.3%.

UK: Coverage by technology, rural areas, 2015

	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
■ UK	99.7%	43.9%	0.9%	2.7%	5.4%	5.4%	88.8%	10.1%	100.0%
■ EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	98.7%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

5.31.2 Regional coverage by broadband technology

United Kingdom: Overall fixed broadband coverage, 2015

- 0% - <75%
- 75% - <90%
- 90% - <95%
- 95% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

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United Kingdom: NGA broadband coverage, 2015

- 0%
- >0% - <35%
- 35% - <65%
- 65% - <100%
- 100%

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission

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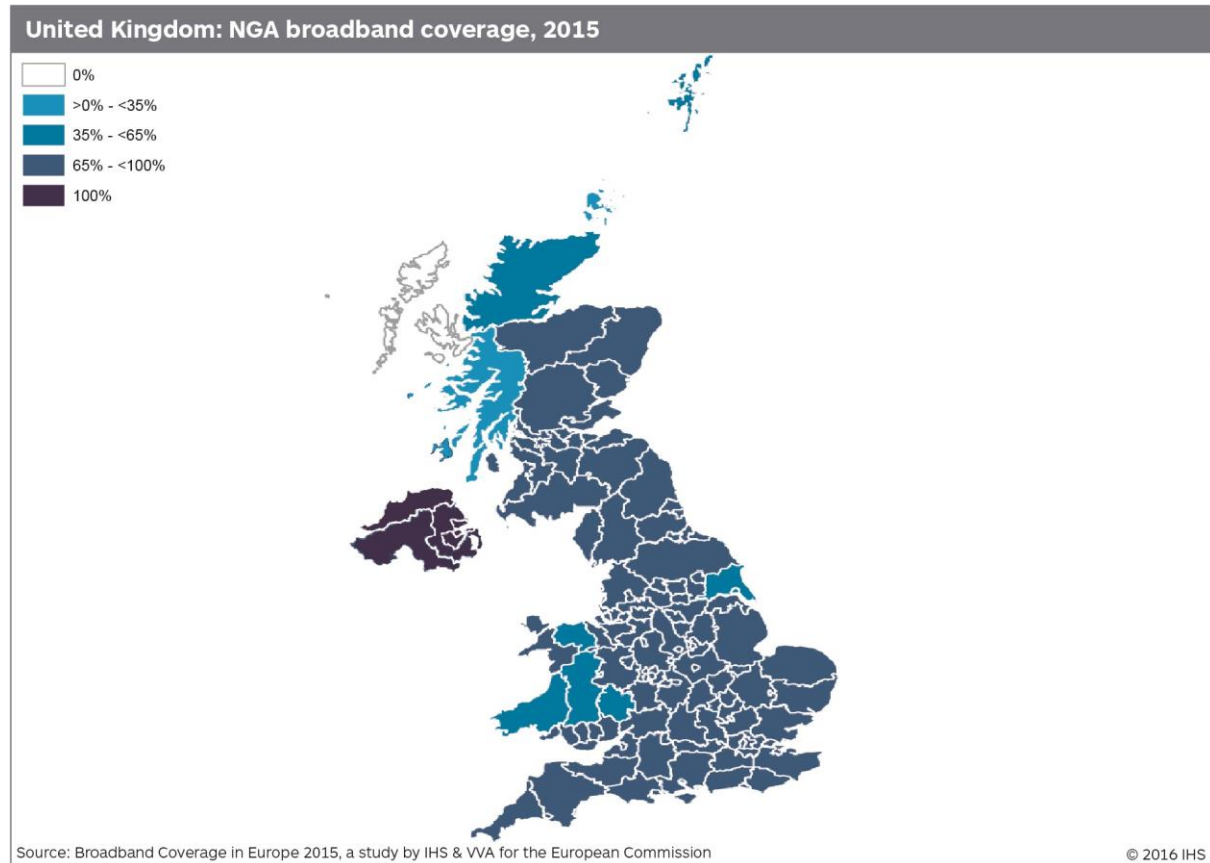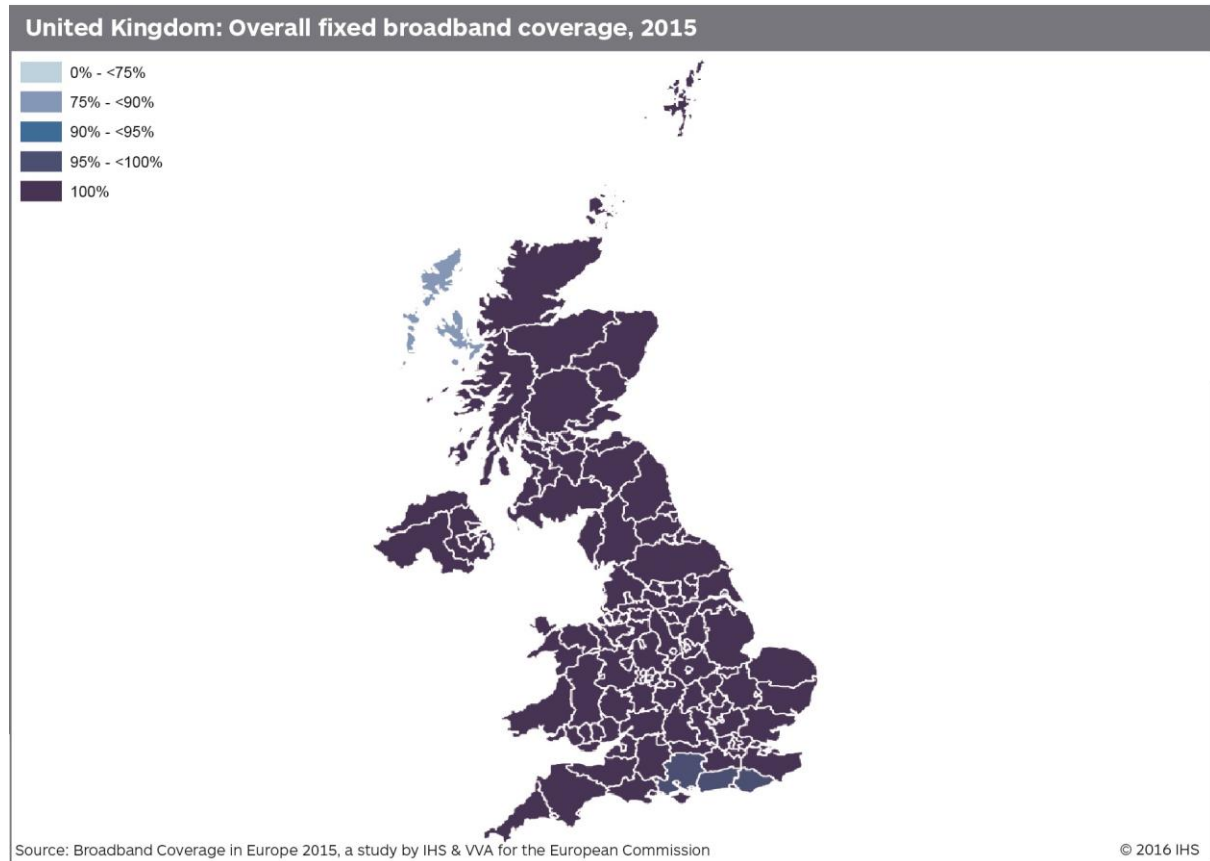
Complete fixed broadband coverage was reported in almost all of the regions in the UK, with only four out of 139 regions having lower coverage. Most of these were the very rural regions of Northern Scotland. The Western Islands (Ilean Siar) were the only region, where fixed broadband coverage was less than 90%

Regional NGA coverage was much more varied and while most regions reach NGA coverage levels above 80%, a number of rural regions in Wales, Yorkshire and Scotland show much lower availability of NGA services. On the other hand, a state-funded infrastructure investment in Northern Ireland has resulted in complete coverage of the whole province, despite its vast rural areas.

5.31.3 Regulatory and market overview

The UK Government set out its strategy for development of next-generation broadband in a document titled "Britain´s Superfast Broadband Future", published in 2010 and planned to run until 2017. The strategy's objectives were broadly in line with those of the Digital Agenda for Europe and in 2013 were amended to include universal, at least 2 Mbps, broadband availability to be achieved by 2015 and 95% of households to have access to at least 24Mbps broadband by 2017.[192]

In order to promote high-speed networks deployment in rural and most difficult-to-reach areas of the UK a specialist unit belonging to the UK's Department for Media, Culture & Sport, Broadband Delivery UK (BDUK), was put in place, able to grant funding totalling at approx. EUR 700 million to local authorities or other bodies to assist in the procurement of next-generation broadband services. Nine companies aiming to participate in supplying broadband infrastructure services qualified for tender submission, although initially only two suppliers were granted a qualifying status – BT and Fujitsu. In 2015, an alternative FTTP provider, Gigaclear, won three BDUK contracts to deploy FTTP networks in Cotswolds, Epping Forrest in Essex and West Berkshire.[193]

On top of the EUR 700 million funding dedicated to improve rural coverage, the UK Government so far committed to invest (via the National Infrastructure Plan) over EUR 1 billion funding for superfast broadband, plus EUR 390 million split between the creation of super-connected cities and improvement of mobile voice quality and coverage. A EUR 13 million competitive fund was also put in place, aiming at encouraging firms to develop solutions to deliver superfast broadband in the most remote areas.

The Broadband Connection Vouchers Scheme ran from 2013 to 2015, and was responsible for the distribution of around 55,000 vouchers to SMEs to support their growth, including 37,000 since April 2015.[194] Regarding rural area coverage, BDUK is currently carrying out seven Market Test Pilots so as to better understand the bottlenecks in covering remote areas of the UK. These tests will run until March 2016.[195]

All of the major fixed operators in the UK now offer commercial NGA services. Services are primarily provided through BT's VDSL network (with wholesale access to other providers) and Virgin Media's DOCSIS 3.0 network. Operators Sky and Talk Talk created a joint venture in 2014, in conjunction with FTTP network owner CityFibre, and in March 2015 launched their first 1 Gbps commercial service in the city of York.[196] In February 2015, Virgin Media announced plans to invest EUR 4 billion in extending its high-speed broadband network,

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[192] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/78096/10-1320-britains-superfast-broadband-future.pdf

[193] http://www.computerweekly.com/news/4500249351/Gigaclear-wins-third-BDUK-superfast-broadband-contract

[194] https://www.connectionvouchers.co.uk/

[195] https://www.gov.uk/government/publications/superfast-broadband-programme-phase-3

[196] http://www.cityfibre.com/news/2015/3/26/cityfibre-announces-completion-of-first-phase-fttp-roll-out-in-york-with-joint-venture-partners-sky-and-talktalk

increasing its reach by almost a third as well as rolling out the first trials of DOCSIS 3.1 technology.[197]

In reaction to its competitors and government's pressure to improve its services, BT launched first G.fast field trials in 2015 and put forth a 5-year plan to upgrade suitable parts of its copper network to the technology.[198]

Regarding LTE networks, all main mobile network operators (EE, Vodafone, Three and O2) provided LTE services by mid-2015 and Vodafone and EE began offering LTE-Advanced commercial services already at the end of 2014 in Birmingham, Manchester and London.[199]

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[197] https://technology.ihs.com/524497/virgin-media-invests-3-billion-to-boost-broadband-coverage-by-a-third

[198] http://www.btplc.com/News/Articles/ShowArticle.cfm?ArticleID=1F647C20-6F61-4E0F-A545-E23443E128AB

[199] https://www.telegeography.com/products/commsupdate/articles/2014/10/16/vodafone-uk-rolling-out-lte-a-in-birmingham-manchester-and-london/

5.31.4 Data tables for the United Kingdom

Statistic	National
Population	63,905,297
Persons per household	2.3
Rural proportion	8.6%

Technology	UK 2015		UK 2014		UK 2013		EU28 2015	
	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	100.0%	99.7%	100.0%	99.7%	100.0%	98.6%	94.0%	83.7%
VDSL	82.8%	43.9%	78.9%	42.4%	67.9%	25.6%	41.0%	16.9%
FTTP	1.4%	0.9%	1.4%	0.8%	0.9%	0.5%	20.8%	7.2%
WiMAX	4.2%	2.7%	4.2%	2.7%	4.2%	2.7%	19.7%	18.7%
Cable	46.9%	5.4%	46.8%	5.4%	47.1%	5.4%	43.8%	10.2%
DOCSIS 3.0	46.9%	5.4%	46.8%	5.4%	47.1%	5.4%	43.1%	9.4%
HSPA	99%	88.8%	99.0%	88.8%	98.5%	85.1%	97.6%	90.0%
LTE	89.5%	10.1%	84.0%	9.4%	63.0%	0.0%	85.9%	36.3%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	98.7%
Overall broadband	100.0%	99.9%	100.0%	99.9%	100.0%	99.3%	99.8%	98.4%
Overall fixed broadband	100.0%	99.8%	100.0%	99.8%	100.0%	99.3%	97.4%	90.6%
NGA broadband	90.5%	47.4%	88.5%	45.9%	81.8%	26.0%	70.9%	27.8%

Note: The 2015 figures represent state of broadband coverage as of end of June 2015. The 2014 and 2013 (end of year) figures are drawn from the previous studies conducted by IHS and VVA.

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6.0 Appendices

6.1 Broadband coverage by speed categories

In addition to individual technology coverage and combination technology coverage, DG Connect required coverage by download speed to be included in the study from 2013. The following speed categories were thus added 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

By including the additional metric, it is possible to obtain an additional analytical layer to evaluate the study countries' progress towards the Digital Agenda goals. While some of the technology coverage might be reported as relatively high, it is also important to determine the actual speeds consumers will be able to receive on those particular networks.

Even though, this metric was included already in the 2013 edition of the study, the research team found that it was still a somewhat unfamiliar concept to some operators and NRAs and hence, the quality of received data continued to vary quite substantially across participant responses. For this reason and with approval from DG Connect, the research team decided to include information on speed categories in the form on an Appendix of this report, with the hope that the metric will become a standard component of the report in future iterations.

6.1.1 Methodology for determining 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), 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, and DOCSIS 3.0 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 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.

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 downstream speed connections if the connection's broadband speed was capable of achieving a minimum of 2, 30, or 100 Mbps downstream speed (respectively) for the majority of the time. 'Majority of time' was understood to mean actual download speeds achieved by a household for at least 75% of the time.

As this was a new metric, and speed information can be generally hard to decode, even for the NRAs and ISPs themselves, the IHS & VVA team also relied in addition to the collected survey data, on sector knowledge regarding deployments to make informed estimates of achievable speeds to gain complete picture of coverage by the speed 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 available such information at future points in time.

6.1.2 Broadband coverage by speed categories results

Comparing data on fixed broadband coverage with information gathered on actual download speed of at least 2 Mbps show that in most countries, the vast majority of homes passed were also able to receive connections with at least 2 Mbps download speeds. On the EU level, 97.4% of households had access to fixed broadband and 96.9% of homes were reached by networks providing them with actual download speeds of at least 2 Mbps.

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS
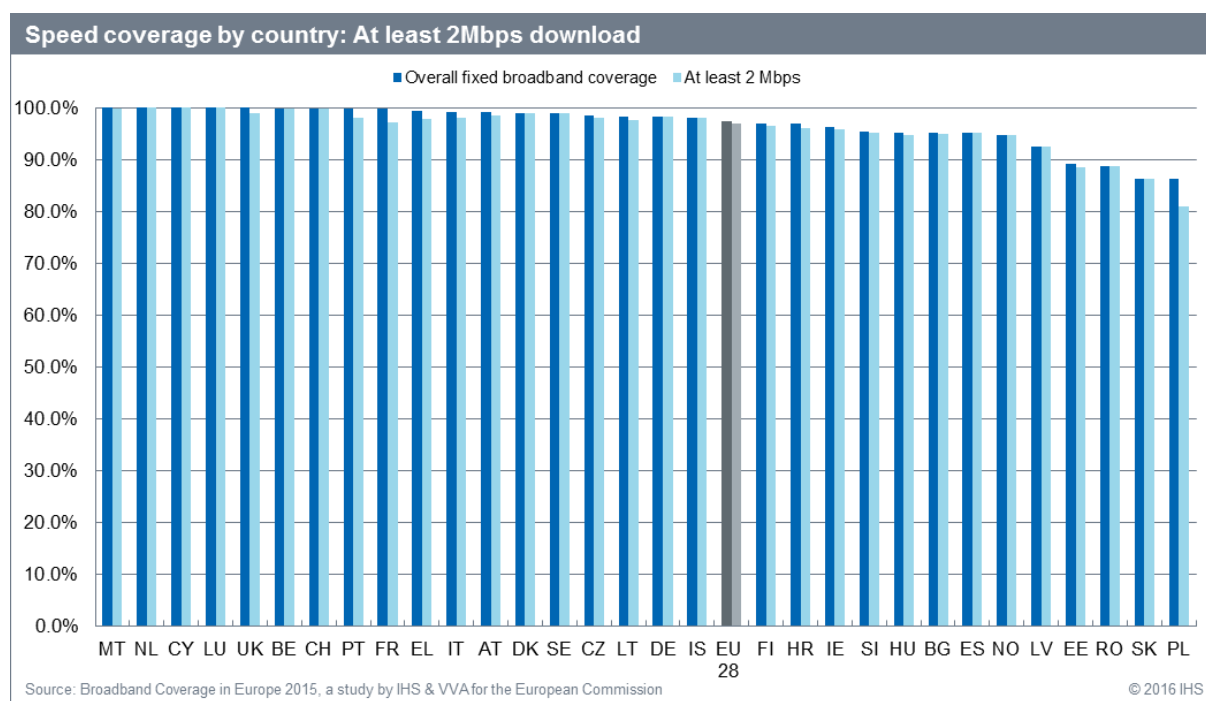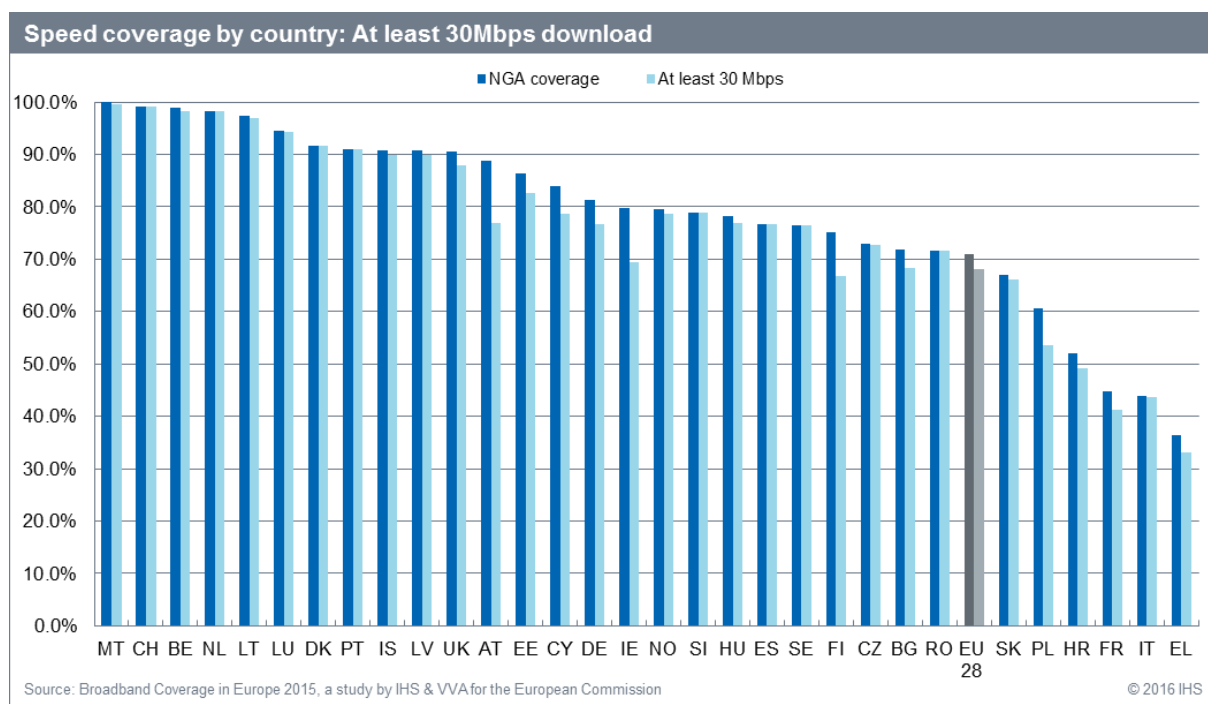
Among the study countries, bigger gaps between fixed broadband coverage and availability of at least 2 Mbps broadband connections could be seen for countries with higher proportion of DSL or WiMAX networks in the make-up of fixed broadband coverage, as traditionally DSL

(and WiMAX) networks tend to be less reliable in sustaining actual speeds at peak times compared to cable and FTTP networks.

The biggest difference was registered in the case Poland, which relies mostly on DSL networks to provide fixed broadband coverage. It was estimated that 81.0% of households in Poland had access to actual 2 Mbps download speed connections, while 86.2% of Polish homes were passed by fixed broadband networks.

More variation can be observed when looking at the NGA coverage figures in comparison with data on at least 30 Mbps actual download speeds. While the study treats NGA coverage to be able to provide technology coverage of at least 30 Mbps, data on actual speeds available to consumers shows gaps between the two categories in some of the countries. In the EU as whole, there was a 2.8% percentage difference between NGA coverage (70.9%) and availability of at least 30 Mbps broadband services, which were accessible to 68.1% of average EU households.

Speed coverage by country: At least 30Mbps download

Source: Broadband Coverage in Europe 2015, a study by IHS & VVA for the European Commission   © 2016 IHS

Among the individual countries, the biggest inconsistencies appear to be in 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 include Austria and Ireland, for which differences of more than 10 percentage points between NGA coverage and at least 30 Mbps actual download speed availability were recorded in mid-2015. Poland and Finland also showed significant differences of 7 and 8 percentage points, respectively, between NGA coverage and at least 30 Mbps actual download speed.

Looking at the availability of at least 100 Mbps download speeds, it is possible to see that EU as whole is very close to reaching the Digital Agenda goal of 50% of households having access to 100 Mbps broadband services by 2020 with 49.4% of European households estimated to be able to receive such speed at the end of June 2015. 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.
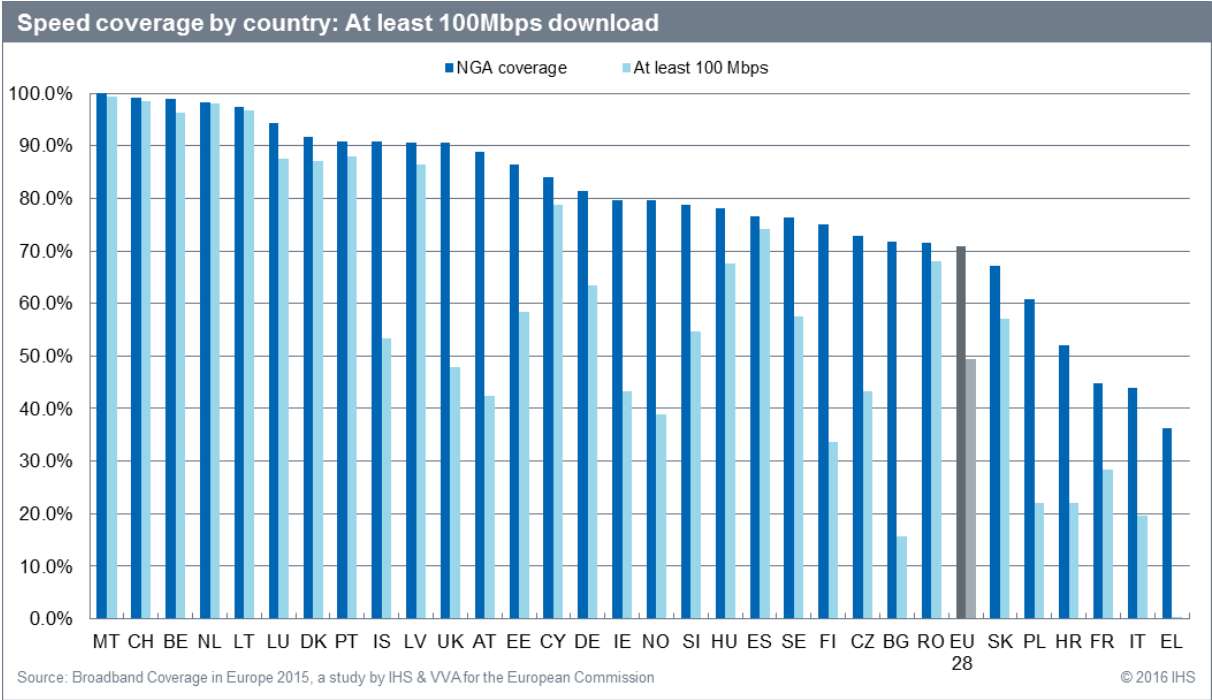
The chart above also clearly demonstrates that high NGA coverage does not necessarily mean high levels of availability of at least 100 Mbps speeds. Countries such as the UK, Austria and Poland, where VDSL networks make up significant portion of the overall NGA coverage show some of the biggest differences.

However, also countries with high FTTP contributions in NGA coverage, such as Bulgaria, Norway, or Estonia, reported quite low levels of availability of at least 100 Mbps broadband services. This might be due to the fact that even though FTTP networks have been deployed across those countries, operators are not utilizing their full potential at the moment.

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Broadband coverage by speed data table

	Broadband coverage (>2Mbps)	Broadband coverage (>30Mbps)	Broadband coverage (>100Mbps)
AT	98.5%	76.9%	42.3%
BE	99.8%	98.1%	96.4%
BG	94.9%	68.4%	15.7%
HR	96.1%	49.1%	22.0%
CY	100.0%	78.7%	78.7%
CZ	98.0%	72.7%	43.3%
DK	99.0%	92.0%	87.0%
EE	88.4%	82.6%	58.4%
FI	96.5%	66.8%	33.7%
FR	97.1%	41.3%	28.4%
DE	99.9%	76.7%	63.5%
EL	97.7%	33.2%	0.4%
HU	94.8%	76.9%	67.7%
IS	98.0%	89.9%	53.4%
IE	95.9%	69.5%	43.3%
IT	98.1%	43.6%	19.6%
LT	97.5%	97.0%	96.7%
LV	92.5%	89.8%	86.4%
LU	100.0%	94.4%	87.6%
MT	99.8%	99.5%	99.4%
NL	100.0%	98.2%	98.1%
NO	95.3%	78.6%	39.0%
PL	81.0%	53.5%	22.0%
PT	98.1%	90.9%	88.0%
RO	99.9%	73.1%	68.0%
SK	86.3%	66.1%	57.0%
SI	95.3%	87.7%	54.7%
ES	95.1%	76.6%	74.2%
SE	99.0%	76.4%	57.5%
CH	99.9%	99.0%	98.5%
UK	98.9%	87.9%	47.9%
EU 28	96.9%	68.2%	49.4%

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6.2 Broadband coverage definitions

6.2.1 Technology definitions

The table below indicates the definitions of the individual broadband access technologies studied by this project. These definitions were included in the survey questionnaire.

Please note that the definitions are not designed to be rigorous definitions from an engineering point of view, but rather are intended to reflect practical definitions used by NRAs and ISPs.

Technology	Technology definition
DSL	DSL (for Digital Subscriber Line) is the basic technology used to provide broadband over conventional telephone lines. The types of DSL used for standard fixed broadband (mainly ADSL or ADSL2+) deliver download speeds of at least 2 Mbps. Not all DSL connections are capable of download speeds of 2Mbps and higher, these connections should not be reported in the survey, but we ask you to note this fact in STEP 4 - Technology definitions of the survey.
VDSL	VDSL (also called FTTC+VDSL for example) is a "Very-high-speed" version of DSL. VDSL is usually provisioned from a street cabinet which has fibre backhaul or directly from the telephone exchange in areas which are close to the exchange. Actual VDSL download speeds can vary and we ask you to note the typical VDSL connection speeds in STEP 4 - Technology definitions of the survey. This definition does not include implementations where fibre is provisioned to a large building, such as a block of flats, and the final connections are provided by VDSL within the building, which are defined as FTTP.
FTTP	FTTP (fibre-to-the-premises) is broadband provided over fibre optic cables going all the way to the home or business premises. This definition also includes "FTTB", where fibre terminates at a large building and broadband distribution within the building, to different flats for example, is by a different non-fibre technology such as VDSL.
WiMAX	WiMAX is a wireless service using one of the IEEE standards 802.16d, for fixed users and 802.16e for mobile.
Cable Modem	Cable Modem broadband is delivered over a fixed cable TV network using coaxial cable according to the earlier cable broadband standards such as DOCSIS 1, usually providing download speeds up to about 20Mbps.
DOCSIS 3.0	DOCSIS 3.0 broadband is delivered over a fixed cable TV network using coaxial cable according to the DOCSIS 3.0 standard, providing download speeds of 30Mbps and above.
HSPA	HSPA (High Speed Packet Access) is the upgraded version of 3G mobile networks capable of providing mobile broadband at a maximum download speed of at least 21.1Mbps.
LTE	LTE (Long Term Evolution) is the next-generation mobile service standardised by the 3rd Generation Partnership Project which requires separate spectrum from 3G mobile and which supports maximum downstream speeds up to at least 100Mbps.

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6.2.2 Coverage definitions

The definitions included in the table below were used to determine whether households are within the coverage reach of the individual broadband technologies. These definitions were included in the survey questionnaire.

Please note that the definitions are not designed to be rigorous definitions from an engineering point of view, but rather are intended to reflect practical definitions used by NRAs and ISPs.

Technology	Coverage definition
DSL	A household has DSL coverage if it is a telephone exchange area fully enabled for DSL.
VDSL	A household has VDSL coverage if it is close enough to a VDSL-enabled cabinet or exchange to get a high-speed broadband signal.
FTTP	A household has FTTP coverage if it can be connected now to a fibre service without requiring the construction of new fibre infrastructure.
WiMAX	A household has WiMAX coverage for broadband if it can receive at least 2Mbps downstream from an existing service without requiring the construction of new WiMAX infrastructure.
Cable Modem	A household has cable modem coverage if it can be connected now to a broadband service without requiring the construction of new cable TV network infrastructure.
DOCSIS 3.0	A household has DOCSIS 3.0 coverage if it can be connected now to a DOCSIS 3.0 service without requiring the construction of new cable TV network infrastructure.
HSPA	A household has HSPA coverage if it is in the stated coverage area for at least one HSPA-upgraded 3G mobile network.
LTE	A household has LTE coverage if it is in the stated coverage area for at least one LTE mobile network.

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6.3 Broadband coverage data tables

6.3.1 Total and rural coverage by combination categories for each country

	TOTAL			RURAL		
	Overall broadband coverage	Overall fixed broadband coverage*	Overall NGA coverage**	Overall broadband coverage	Overall fixed broadband coverage*	Overall NGA coverage**
AT	99.3%	99.2%	88.8%	94.8%	94.7%	20.8%
BE	99.9%	99.9%	98.9%	99.4%	99.4%	86.4%
BG	100.0%	95.2%	71.8%	99.9%	60.0%	2.7%
HR	99.1%	96.9%	52.0%	95.9%	81.5%	9.8%
CY	100.0%	100.0%	84.0%	100.0%	100.0%	56.6%
CZ	99.2%	98.5%	72.9%	94.2%	90.2%	5.7%
DK	99.5%	99.0%	91.7%	99.5%	97.0%	54.7%
EE	100.0%	89.3%	86.4%	100.0%	84.5%	60.7%
FI	100.0%	97.0%	75.1%	100.0%	70.5%	7.6%
FR	100.0%	99.8%	44.8%	99.7%	98.2%	23.0%
DE	99.9%	98.3%	81.4%	97.4%	93.0%	36.4%
EL	99.9%	99.3%	36.3%	99.3%	96.5%	0.5%
HU	99.1%	95.2%	78.2%	97.3%	85.4%	20.3%
IS	99.3%	98.1%	90.8%	98.0%	93.5%	71.3%
IE	97.6%	96.3%	79.7%	95.0%	92.1%	24.9%
IT	99.6%	99.3%	43.9%	96.3%	92.2%	0.0%
LT	99.5%	98.3%	97.5%	98.4%	92.2%	84.4%
LV	99.6%	92.5%	90.7%	98.7%	54.9%	47.2%
LU	100.0%	100.0%	94.4%	100.0%	100.0%	94.1%
MT	100.0%	100.0%	100.0%	100.0%	100.0%	99.9%
NL	100.0%	100.0%	98.3%	100.0%	100.0%	97.8%
NO	99.5%	94.7%	79.6%	97.7%	77.4%	32.2%
PL	99.8%	86.2%	60.7%	99.5%	81.5%	33.8%
PT	99.8%	99.8%	90.9%	98.6%	98.2%	49.5%
RO	99.9%	88.8%	71.6%	99.7%	80.5%	33.2%
SK	95.9%	86.3%	67.1%	91.6%	83.0%	14.1%
SI	99.8%	95.5%	78.8%	99.6%	84.0%	62.4%
ES	99.8%	95.1%	76.6%	99.2%	91.1%	23.9%
SE	99.5%	99.0%	76.4%	98.2%	93.6%	13.9%
CH	99.9%	99.9%	99.0%	99.6%	98.9%	89.5%
UK	100.0%	100.0%	90.5%	99.9%	99.8%	47.4%
EU 28	99.8%	97.4%	70.9%	98.4%	90.6%	27.8%

* Fixed broadband coverage includes DSL, VDSL, FTTP, DOCSIS 1.0/2.0, DOCSIS 3.0, WiMax
** NGA coverage includes VDSL, FTTP, DOCSIS 3.0

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6.3.2 Total coverage by technology for each country

	DSL***	VDSL	FTTP	WiMAX	Cable***	DOCSIS 3.0	HSPA	LTE	Satellite
AT	98.4%	82.1%	7.1%	16.1%	40.6%	40.6%	98.0%	89.5%	100.0%
BE	99.9%	90.4%	0.4%	15.0%	96.3%	96.3%	97.9%	85.6%	100.0%
BG	85.1%	0.0%	32.2%	64.6%	64.9%	62.9%	99.9%	48.1%	100.0%
HR	94.7%	35.9%	10.1%	2.0%	32.7%	23.0%	98.0%	68.9%	100.0%
CY	100.0%	68.0%	49.3%	0.0%	57.5%	57.5%	99.0%	60.2%	100.0%
CZ	97.0%	52.0%	17.3%	70.6%	33.7%	33.3%	97.0%	93.8%	100.0%
DK	98.0%	63.0%	57.0%	3.0%	65.0%	65.0%	99.0%	99.0%	100.0%
EE	35.0%	8.9%	73.1%	43.9%	72.9%	66.1%	100.0%	84.3%	75.4%
FI	94.0%	48.4%	37.4%	2.3%	44.4%	44.4%	100.0%	92.1%	100.0%
FR	99.5%	16.7%	15.5%	0.0%	29.5%	29.5%	99.8%	77.5%	100.0%
DE	96.6%	48.5%	6.6%	10.4%	63.2%	62.7%	91.5%	94.0%	100.0%
EL	99.3%	36.1%	0.4%	0.1%	0.0%	0.0%	99.3%	79.8%	100.0%
HU	90.5%	28.0%	21.5%	0.0%	66.1%	63.2%	98.3%	95.0%	100.0%
IS	96.2%	85.8%	53.4%	4.0%	0.0%	0.0%	98.6%	85.0%	0.0%
IE	92.5%	70.6%	4.5%	26.6%	42.7%	42.0%	94.6%	90.1%	100.0%
IT	98.4%	32.8%	19.6%	47.0%	0.0%	0.0%	98.3%	89.7%	100.0%
LT	69.3%	0.0%	95.1%	90.3%	53.6%	45.9%	98.9%	90.2%	50.0%
LV	42.3%	14.8%	85.0%	44.9%	34.5%	28.8%	99.2%	89.0%	20.3%
LU	100.0%	88.8%	47.1%	0.0%	80.5%	75.2%	99.6%	96.2%	100.0%
MT	100.0%	72.0%	10.4%	100.0%	100.0%	100.0%	99.0%	72.0%	100.0%
NL	100.0%	69.9%	29.7%	0.0%	95.1%	95.1%	99.6%	99.6%	100.0%
NO	89.5%	47.3%	41.1%	0.0%	50.6%	50.3%	99.0%	99.6%	100.0%
PL	76.2%	42.7%	9.0%	2.4%	42.0%	40.0%	99.5%	75.9%	100.0%
PT	99.1%	0.0%	75.4%	0.0%	79.4%	79.4%	97.1%	94.3%	100.0%
RO	68.3%	11.8%	61.0%	65.5%	30.9%	28.9%	99.8%	66.1%	100.0%
SK	71.2%	16.9%	50.4%	50.0%	28.8%	25.3%	91.8%	61.2%	100.0%
SI	90.9%	57.5%	45.0%	0.3%	37.3%	36.0%	99.5%	97.7%	100.0%
ES	88.5%	11.0%	52.8%	57.1%	47.8%	47.8%	99.7%	79.1%	100.0%
SE	97.9%	18.3%	56.4%	0.0%	38.8%	34.0%	99.1%	99.2%	100.0%
CH	99.5%	81.5%	27.0%	0.0%	98.1%	98.1%	99.4%	92.3%	100.0%
UK	100.0%	82.8%	1.4%	4.2%	46.9%	46.9%	99.0%	89.5%	100.0%
EU 28	94.0%	41.0%	20.9%	19.7%	43.8%	43.2%	97.6%	85.9%	99.4%

*** DSL figures include VDSL coverage; Cable figures include DCOSIS 3.0 coverage

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6.3.3 Rural coverage by technology for each country

	DSL***	VDSL	FTTP	WiMAX	Cable***	DOCSIS 3.0	HSPA	LTE	Satellite
AT	88.9%	3.0%	2.1%	18.0%	17.4%	17.4%	85.2%	25.6%	100.0%
BE	98.8%	71.9%	0.0%	3.3%	64.6%	64.6%	81.0%	38.0%	100.0%
BG	53.6%	0.0%	0.7%	12.3%	2.2%	2.2%	99.6%	0.0%	100.0%
HR	76.7%	0.0%	0.0%	3.2%	10.9%	9.8%	91.0%	10.7%	100.0%
CY	100.0%	56.6%	0.0%	0.0%	0.0%	0.0%	99.0%	0.0%	100.0%
CZ	80.6%	0.0%	5.2%	69.9%	1.5%	0.6%	79.0%	56.1%	100.0%
DK	94.0%	16.0%	46.0%	4.0%	6.0%	6.0%	99.0%	99.0%	100.0%
EE	38.1%	2.8%	50.7%	43.1%	43.5%	27.8%	100.0%	72.5%	75.4%
FI	67.9%	0.0%	7.6%	1.1%	0.0%	0.0%	100.0%	60.1%	100.0%
FR	97.6%	21.1%	2.0%	0.0%	0.7%	0.7%	98.4%	5.3%	100.0%
DE	86.0%	28.5%	1.4%	14.2%	14.8%	14.4%	59.6%	82.5%	100.0%
EL	96.3%	0.5%	0.0%	0.5%	0.0%	0.0%	96.6%	32.3%	100.0%
HU	74.1%	0.0%	4.2%	0.0%	19.8%	18.2%	94.6%	84.1%	100.0%
IS	89.1%	70.2%	2.3%	7.0%	0.0%	0.0%	96.1%	57.5%	0.0%
IE	86.7%	24.0%	0.0%	20.4%	2.6%	2.4%	85.4%	73.0%	100.0%
IT	87.4%	0.0%	0.0%	47.1%	0.0%	0.0%	86.3%	26.8%	100.0%
LT	15.2%	0.0%	84.4%	83.9%	0.0%	0.0%	96.4%	68.8%	50.0%
LV	9.0%	0.0%	47.2%	19.0%	0.0%	0.0%	97.3%	61.4%	20.3%
LU	99.9%	88.3%	46.0%	0.0%	42.1%	0.0%	99.6%	91.2%	100.0%
MT	100.0%	0.0%	0.0%	100.0%	100.0%	99.9%	86.5%	0.0%	100.0%
NL	99.9%	64.7%	27.1%	0.0%	92.4%	92.4%	98.3%	98.3%	100.0%
NO	67.4%	15.6%	18.4%	0.0%	2.7%	2.4%	95.5%	96.6%	100.0%
PL	77.0%	25.8%	5.8%	1.8%	14.9%	11.1%	97.8%	5.7%	100.0%
PT	97.3%	0.0%	23.2%	0.0%	36.9%	36.9%	86.1%	67.0%	100.0%
RO	63.7%	1.8%	28.3%	31.2%	9.3%	7.3%	99.5%	33.8%	100.0%
SK	66.0%	11.9%	4.4%	50.0%	0.6%	0.0%	71.7%	8.5%	100.0%
SI	67.0%	16.3%	20.2%	1.1%	43.4%	40.4%	99.1%	96.9%	100.0%
ES	80.5%	14.1%	5.6%	49.8%	9.8%	9.8%	98.4%	26.8%	100.0%
SE	89.0%	0.5%	13.7%	0.0%	0.1%	0.0%	96.5%	98.0%	100.0%
CH	97.4%	39.4%	6.6%	0.0%	78.4%	77.8%	97.6%	72.2%	100.0%
UK	99.7%	43.9%	0.9%	2.7%	5.4%	5.4%	88.8%	10.1%	100.0%
EU 28	83.7%	16.9%	7.2%	18.7%	10.2%	9.4%	90.0%	36.3%	99.4%

*** DSL figures include VDSL coverage; Cable figures include DCOSIS 3.0 coverage

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