European Commission

Broadband Coverage in Europe 2014

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:

Digital Agenda for Europe

This study was carried out for the European Commission by

IHS Inc.
133 Houndsditch
London EC3A 7BX
United Kingdom
http://ihs.technology.com

Valdani Vicari & Associati
Unit 116
22 Highbury Grove
N52EF London
www.vva.it

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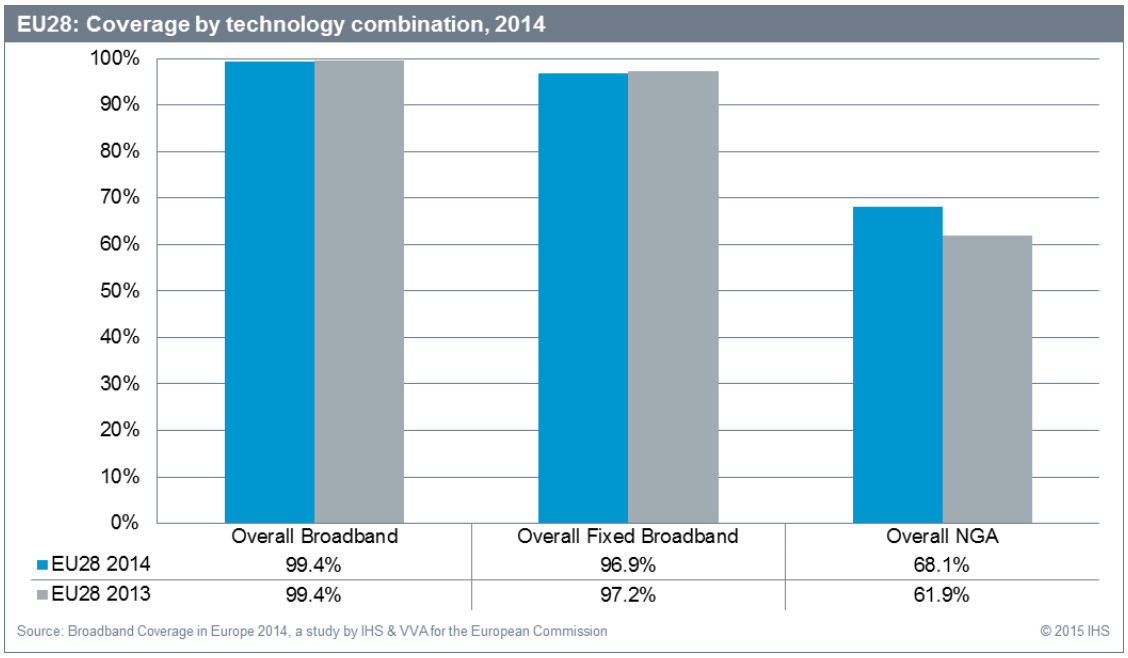
Executive Summary

- 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 by 2013' and 'Universal Broadband Coverage with speeds at least 30 Mbps'.
- 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. This document builds on this previous report and where possible, IHS & VVA adopted similar data collection and analysis methods to those implemented by Point Topic, the previous contractor, in the period 2010-2012. This was done in order to ensure comparability of datasets for the purposes of time-series assessment.
- 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, FTTP, WiMAX, HSPA, LTE and satellite) across each market, at national and rural levels. In addition, various combination categories indicating the availability of one or more forms of broadband connection are also published. These cover overall fixed and wireless broadband availability, fixed broadband availability and next generation access (NGA) availability.



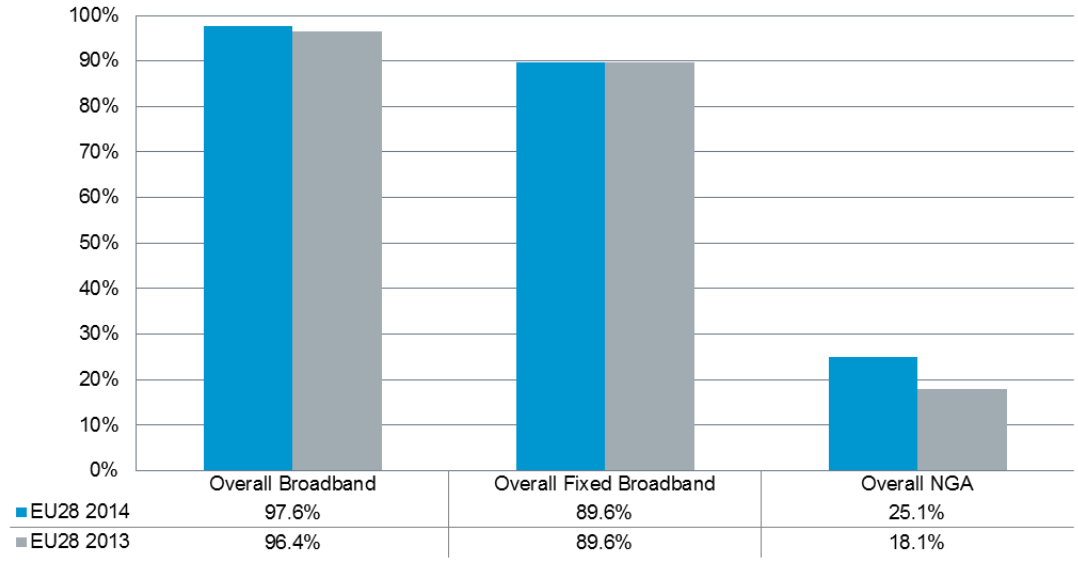
- The results show that over 216 million EU households (99.4%) had access to at least one of the main fixed or mobile broadband access technologies at the end of 2014 (excluding satellite). While the overall broadband coverage remains unchanged, an increase in the absolute coverage by over three million households has been recorded compared to 2013. This is due to the fact that in some countries and regions the number of households is growing faster than the number of homes passed by broadband networks.

- For the same reason, the overall fixed broadband coverage shows a negligible decrease from 97.2% in 2013 to 96.9% at the end of 2014. The absolute fixed broadband coverage increased during 2014 by over 2.4 million households across the study countries.

- As in the previous year, an increase in coverage was reported for next generation access services (VDSL, DOCSIS 3.0 and FTTP), which increased by 6.2 percentage points compared to the previous edition of the study, translating to 15.5 million new households gaining access to next generation broadband. By the end of 2014, 68.1% of households across the EU Member States had technical access, compared to 61.9% in 2013.

- In rural areas, access to fast broadband services remains the major priority at European level. While in 2014 at least one broadband access mechanism was available to nearly 98% of households in European rural areas, high-speed broadband services are still accessible only to a small percentage of rural households. Nevertheless, due to further investments in rural NGA deployments NGA coverage increased during 2014 by seven percentage points, reaching 25.1% of rural households (or 7.7 million rural households) by the end of the year.

EU28: Coverage by technology combination in rural areas, 2014



	Overall Broadband	Overall Fixed Broadband	Overall NGA
EU28 2014	97.6%	89.6%	25.1%
EU28 2013	96.4%	89.6%	18.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

- Satellite remains the most pervasive technology in Europe in terms of overall coverage. KA-band satellites cover all 28 EU countries and are capable of offering broadband services of at least 2 Mbps. However, satellite coverage is still limited in the Baltic countries, where satellite broadband reaches only certain parts of Estonia, Latvia and Lithuania

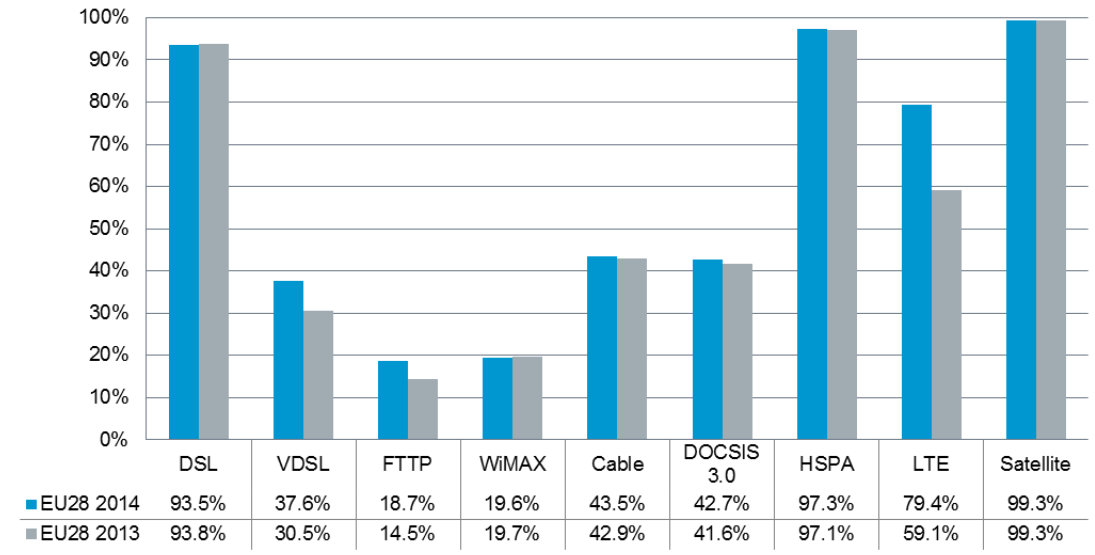
- For fixed broadband coverage, DSL is still the most widespread technology, covering 93.5% of EU households at the end of 2014.

- Cable broadband coverage increased to 43.5% from 42.9% in 2013, while WiMAX coverage remained broadly unchanged at 19.6% compared to 19.7% in 2013. This

can however be attributed to the number of households growing at a faster rate than the absolute WiMAX coverage, which has increased by over 300,000 households.

- Developments in overall NGA coverage can primarily be attributed to developments in VDSL coverage, which increased by over seven percentage points throughout 2014, reaching 37.6% of households by the end of the year. This made it the fastest growing fixed broadband technology for the third year in a row.

EU28: Coverage by technology, total



	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
EU28 2014	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%
EU28 2013	93.8%	30.5%	14.5%	19.7%	42.9%	41.6%	97.1%	59.1%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

- FTTP and DOCSIS 3.0 coverage also increased. The proportion of homes passed by FTTP networks increased by 4.3 percentage points to reach 18.7%, while DOCSIS 3.0 coverage experienced slower growth with 42.7% of households covered in 2014 compared to 41.6% the previous year. 98.2% of cable connections are now DOCSIS 3.0 capable across the EU.

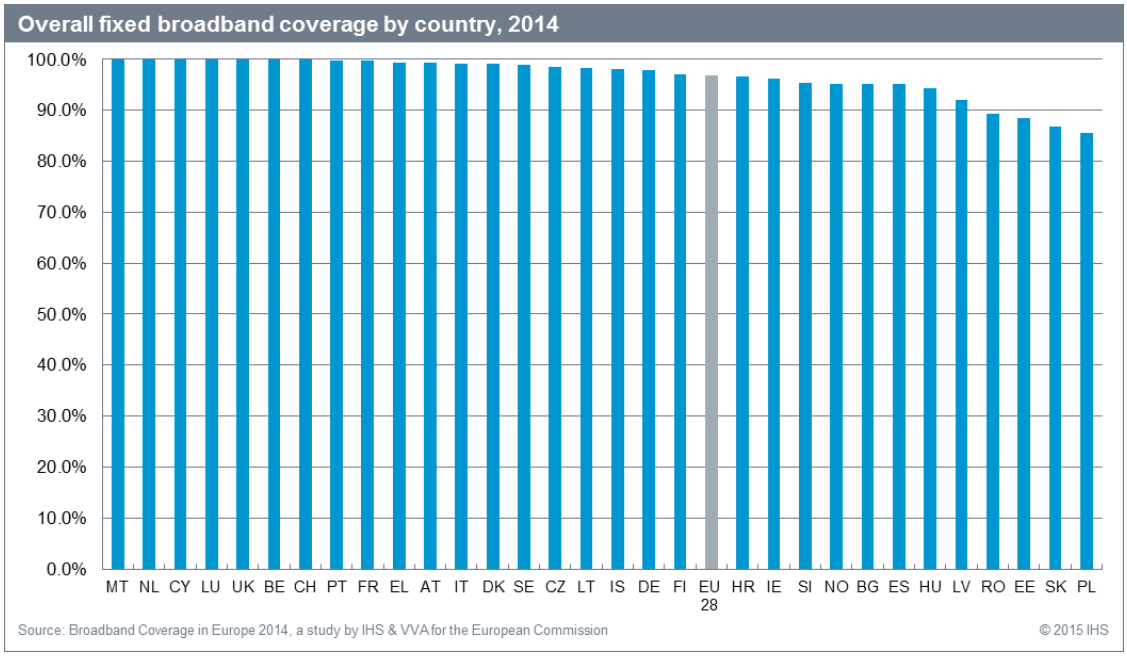
- With regards to mobile broadband technologies, HSPA provided nearly universal coverage, reaching 97.3% of EU households compared to 97.1% in 2013. By the end of 2014, LTE has been commercially launched in all Member States except for Cyprus, and overall LTE coverage has increased from 59.1% to 79.4%. This made it the fastest growing broadband access technology in terms of coverage.

- As in the previous year, rural areas remain a challenge in terms of coverage. Fixed broadband coverage of rural households lags behind national coverage (89.6% coverage at rural level, compared to 96.9% EU coverage). This pattern is even more apparent for NGA technologies (25.1% coverage at rural level versus 68.1% for all EU households).

- Nevertheless, progress with regards to ensuring fixed broadband coverage has continued as governments and operators continue efforts to close the urban-rural coverage gap. The biggest rural coverage improvements have been reported for VDSL, where coverage increased from 10.2% of rural households in 2013 to 15.1% in 2014.

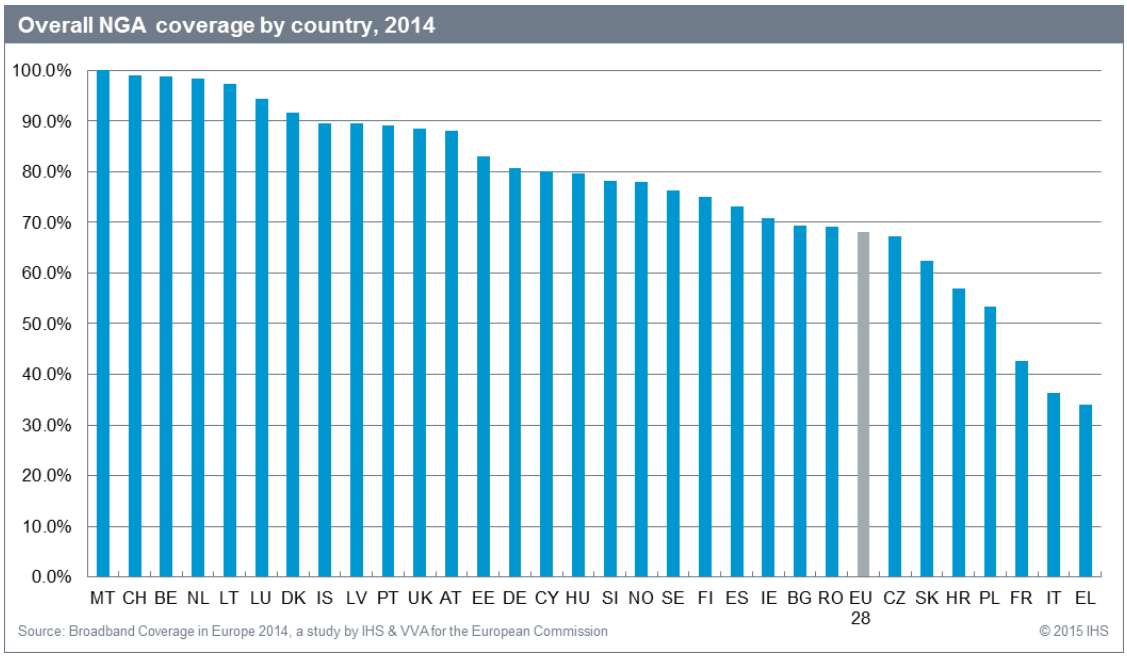
- HSPA reached almost 90% of rural households at the end of 2014, a 3.5 percentage point increase compared to 2013. As the roll-out of LTE service continued across Europe, LTE coverage recorded continued growth in rural areas, growing from 14.8% coverage in 2013 to 27% in 2014.

- Out of the 31 study countries, nineteen countries had fixed broadband coverage levels at or above the EU28 average of 96.9% at the end of 2014, 27 countries had fixed broadband covering at least 90% of their households. Fixed broadband coverage was highest in Cyprus, Luxembourg, Malta, the Netherlands and the United Kingdom and lowest in Poland, Slovakia, Estonia and Romania, where it reached between 85.4% and 89.4% of households.



- Malta remains the only country to report complete coverage for NGA technologies, followed by Belgium, Switzerland, the Netherlands, Lithuania, Luxembourg and Denmark, all above 90%.

- Out of the 31 study countries, 24 countries performed above the European average (68.1%) with regards to NGA availability, and only three countries reported NGA coverage below 50% (France, Greece and Italy). Greece faced the lowest NGA coverage, with a total availability of 34% of households.



- With regards to mobile broadband, almost all of the countries in this study reported HSPA coverage levels above 95%, with only Ireland, Germany and Slovakia reporting lower HSPA coverage (at 94.6%, 92.5% and 91.1% respectively).
- LTE coverage across Europe continued its rapid growth in 2014. While in the previous year there were two countries (Bulgaria and Cyprus) without LTE availability, in 2014 only Cyprus reported no LTE coverage. The EU28 coverage grew by 20.3 percentage points, increasing from 59.1% to 79.4%. Denmark, Netherlands and Sweden were the leaders in terms of LTE coverage in 2014, with 99% or more households covered.

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. This document builds on the previous year's report.

As in previous years, DG Connect requested the study to be 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:

- 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 30Mbps 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 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 1,362 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 as well as allowing for a year-on-year comparison with the BCE 2012 and BCE 2013 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 on an Appendix of this report.

The following table details the scope of the Broadband Coverage in Europe 2014 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 100Mbps download

Acknowledgements

It would not be possible to deliver the results of this project without the support of all involved parties. First and foremost, the IHS & VVA team would like to thank all survey respondents, both regulators and operators, who took the time to fill in the BCE questionnaire and provide us with the fundamental information and data that form the core of this study. We are very grateful for their involved and responsible approach in addressing the demanding request for information and data. While the figures in our deliverables might not always be exactly the same as those provided by respondents (due to a number of complex factors, such as different statistical bases or definitions), the research team always attempted to prioritise data received directly from respondents and reflect this information in our estimates as much as possible.

The research team is also grateful to the FTTH Council Europe and IDATE, for kindly sharing information from their research of FTTx coverage across Europe. While in most cases the team relied on data collected though the survey, IDATE's data proved to be an important additional source of information.

Last but certainly not least, we would like to thank DG Connect for their active involvement throughout all stages of the project. At the onset of the project, DG Connect provided the research team with their Europe-wide contact database of both NRAs and ISPs, which proved to be invaluable in ensuring high response rate to the survey questionnaire.

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 2014 edition of the Broadband Coverage in Europe study mirrors the approach used in the 2013 study. 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.

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, which was based on a questionnaire designed by Point Topic for the 2012 study. Using near-identical question wording enabled 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 and 2013 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 2013 and the 2014 data collection 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 study.

In a number of cases, coverage data was delivered on a more detailed geographical level than the requested NUTS 3 areas. In these cases, 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 asked 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 on a yearly basis 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 2013 and 2014 to be comparable to the 2012 dataset, the IHS & VVA research team adopted a similar approach to determine rural areas to the one used by Point Topic.

In 2012, Point Topic developed a new methodology to defining rural areas using the Corrine 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 an updated estimations of rural population in individual NUTS 3 regions. The updated data estimated that in 2014 approx. 14% of households in the study countries were rural. Combining this information with updated 2014 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 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
- Operators' (ISPs) financial reports and press releases
- Industry organisations white papers, special reports and analysis
- Industry news

IHS & VVA also contacted other relevant organisations, such as the FTTH Council Europe and Cable Europe to gain additional insight on individual access technologies deployment and coverage trends. The research team is particularly grateful to the FTTH Council Europe and IDATE, FTTH Council Europe's data provider, for kindly sharing information from their research of FTTx coverage and subscribers across Europe. While in most cases the team relied on data collected though the survey, IDATE's data proved to be an important source for cross-checking the gathered figures and estimating the final coverage results.

IHS has also utilised its close relationship with cable industry association Cable Europe. IHS has been Cable Europe's preferred research partner for the past decade and has access to

data from Cable Europe members – used in the publication of the annual 'Cable Yearbook' study. Cable Europe was very helpful in establishing initial contacts with a number of European cable providers for the purposes of this study.

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 and 2014 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 study, a varied formula was used in cases where some technologies' coverage was more complementary than overlapping. In these cases, the minimum coverage was taken as equal to the sum of the complementary technologies, if this was greater than the most-widely available single technology.

Additionally, the estimates for combination coverage at the national level were made by summing the estimates for the NUTS 3 areas rather than applying this formula at 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 2014 update of the Digital Agenda Scoreboard.

In a number of cases, new and more accurate data was provided to the research team reflecting the 2013 data and thus justifying restatement of the figures published in the Broadband Coverage in Europe 2013 study. Restatements are indicated in the data tables sections of individual country chapters.

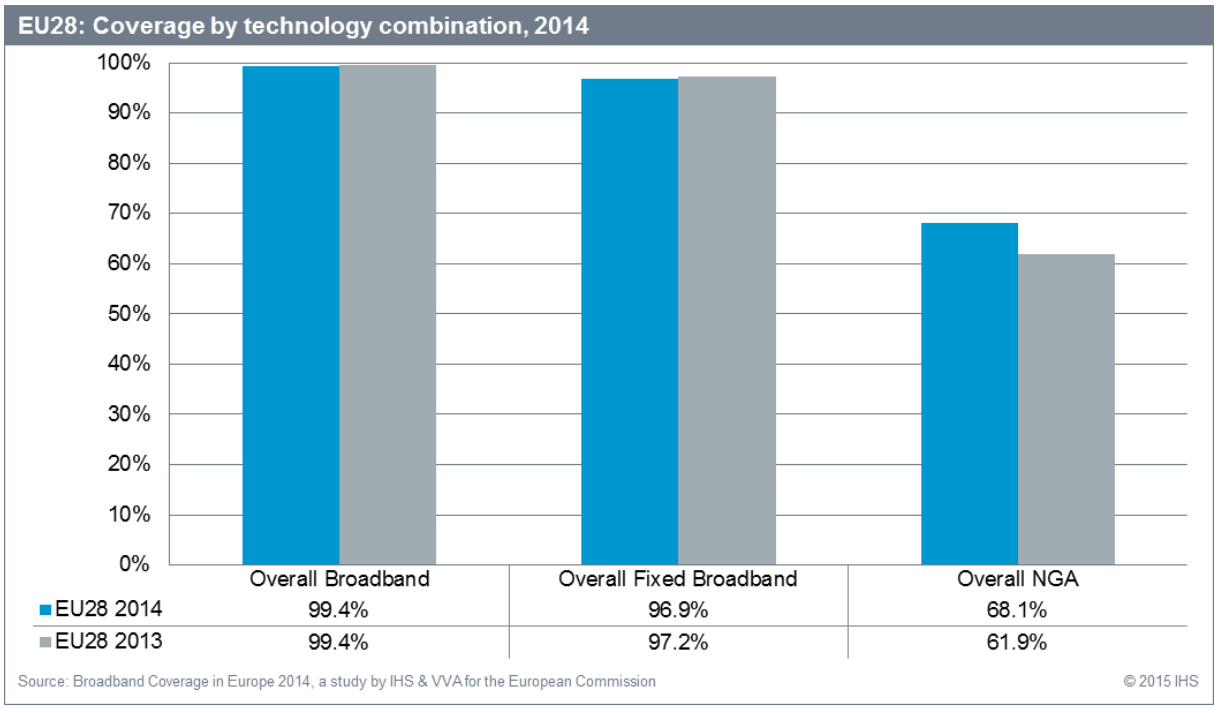
4.0 European Overview

4.1 Europe-wide coverage by technology combinations

The main objective of the 2014 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 study results show that over 216 million EU households (99.4%) had access to at least one of the main fixed or mobile broadband access technologies at the end of 2014 (excluding satellite). That means that additional three million homes were passed compared to 2013. In 2014, for the first time in the history of the BCE project, the research team observed that as broadband coverage levels across the study countries reach near saturation, increases in percentage terms become less significant or even show a slight decline. This however is not indicative of a decreasing trend in broadband coverage per se; rather it means that in some countries and regions the number of households grows faster than the number of homes passed by broadband networks.



Thus, in percentage terms the overall broadband coverage remained unchanged despite an increase in the absolute number of homes passed by either fixed or mobile broadband networks. As was the case in 2013, including satellite coverage further increased basic broadband coverage levels to encompass all households with the EU, a confirmation of the European Commission's Digital Agenda for Europe (DAE) target of basic broadband for all by 2013.

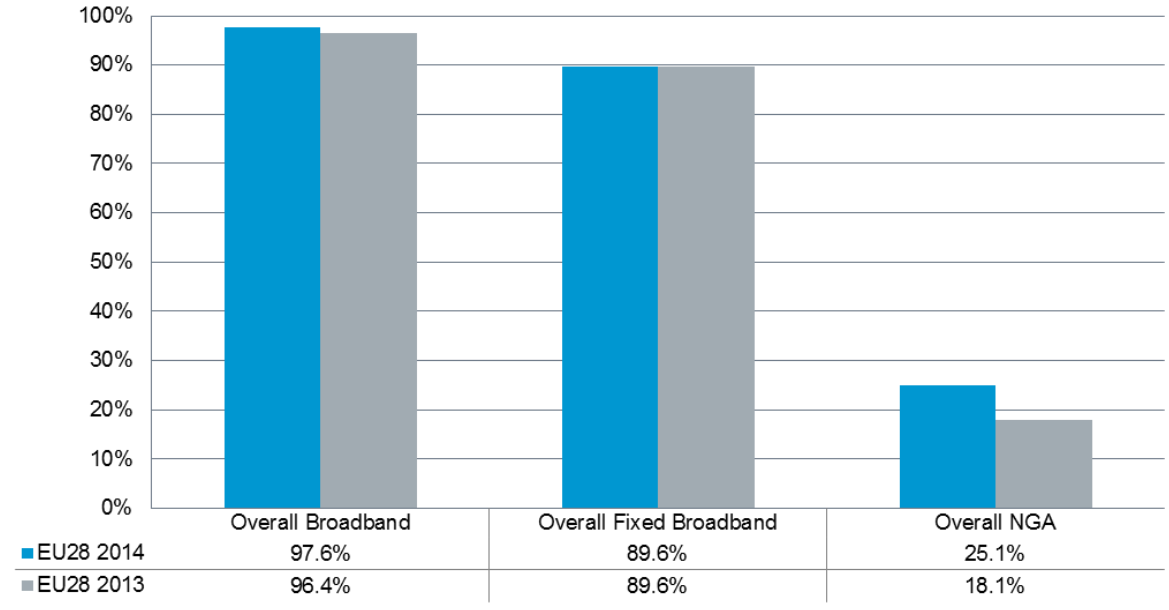
In absolute terms, the number of homes passed by fixed broadband networks (that is either DSL, cable, FTTP or WiMAX networks) increased by 2.4 million year-on-year translating to 96.9% homes passed across the study countries at the end of 2014. The overall fixed

broadband category was the one which recorded a slight and statistically insignificant percentage decrease from 97.2% homes passed in 2013 due to the aforementioned trend of household figures increasing in some areas at a faster pace than the number of homes passed by fixed broadband networks.

The biggest increase among the combination categories was recorded in coverage of Next Generation Access networks, which grew by 6.2 percentage points compared to the previous edition of the study, translating to 15.5 million new households gaining access to next generation broadband services. By the end of 2014, 68.1% of households across the EU Member States were passed by either VDSL, FTTP or cable DOCSIS 3.0 networks, compared to 61.9% in 2013.

In rural areas, access to fast broadband services remains the major priority at European level. While in 2014 at least one broadband access mechanism was available to nearly 98% of households in European rural areas, high-speed broadband services were still accessible only to a small percentage of rural households. Nevertheless, with investments in rural NGA deployments, rural NGA coverage increased during 2014 by seven percentage points, reaching 25.1% of rural households by the end of the year. This is equivalent to a total of 7.7 million rural households gaining access to NGA technologies.

EU28: Coverage by technology combination in rural areas, 2014



Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

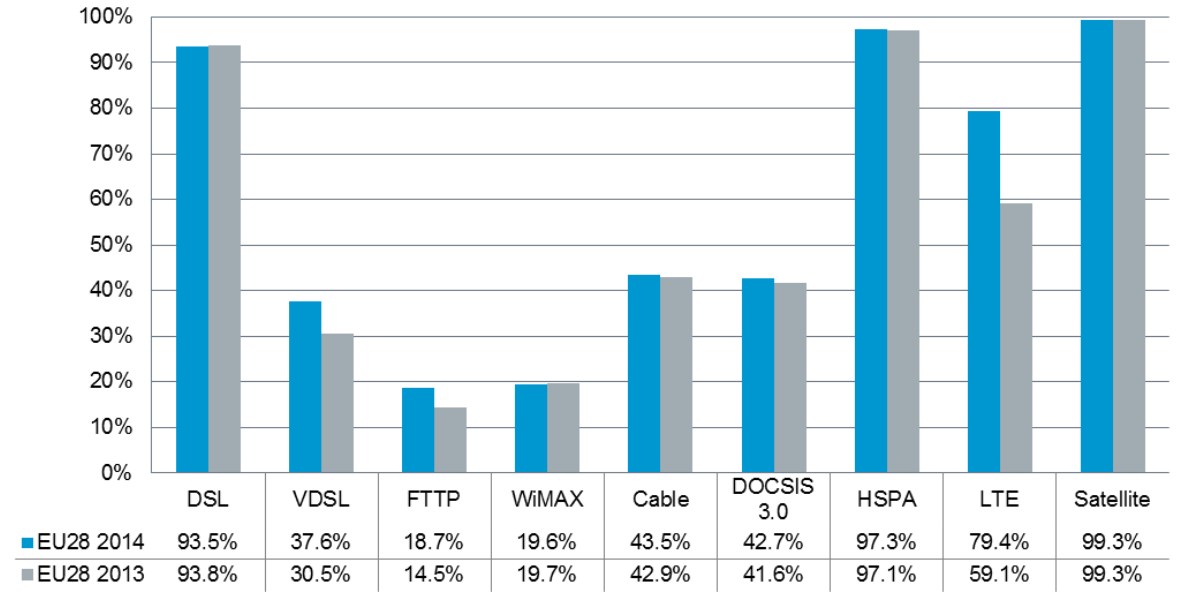
4.2 Europe-wide coverage by individual technologies

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 coverage in 2014 with 99.3% of EU households having access to satellite broadband services. No change in satellite coverage was recorded compared to 2013. The KA-band satellites covered all 28 Member States and were capable to offer broadband services of at least 2 Mbps. However, satellite coverage remained limited in the Baltic countries, where satellite reached only certain parts of Estonia, Latvia and Lithuania. There were no satellite broadband services available in Iceland.

For fixed broadband coverage, DSL continued to be the most widespread technology, covering 93.5% of EU households at the end of 2014. Cable broadband coverage increased to 43.5% from 42.9% in 2013, while WiMAX coverage remained broadly unchanged at 19.6% compared to 19.7% in 2013.

EU28: Coverage by technology, total



	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
EU28 2014	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%
EU28 2013	93.8%	30.5%	14.5%	19.7%	42.9%	41.6%	97.1%	59.1%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Positive developments in overall NGA coverage can be primarily attributed to an increase in VDSL coverage, which grew by over seven percentage points in the year, reaching 37.6% of households by the end of 2014. This in turn made it the fastest growing fixed broadband technology for third successive year. FTTP and DOCSIS 3.0 coverage also increased, with FTTP services being available to 18.7% European households in 2014, representing a 4.3 percentage point increase over the course of the year. DOCSIS 3.0 coverage recorded slower growth, with 42.7% of homes passed by the high-speed cable networks in 2014 compared to 41.6% the previous year.

Throughout the year, cable companies across the EU continued the process of upgrading their networks to DOCSIS 3.0. At the end of 2014, 98.2% of homes passed by cable networks were DOCSIS 3.0 capable: there was a negligible (1.8%) difference between standard cable and DOCSIS 3.0 coverage.

With regards to mobile broadband technologies, HSPA provided nearly universal coverage, reaching 97.3% of EU households compared to 97.1% in 2013. By the end of 2014, LTE was commercially launched in all Member States except for Cyprus, and LTE coverage rose from 59.1% in 2013 to 79.4% in 2014 as operators expanded network coverage and additional service providers launched LTE offerings.

4.2.2 Coverage by technology in rural areas

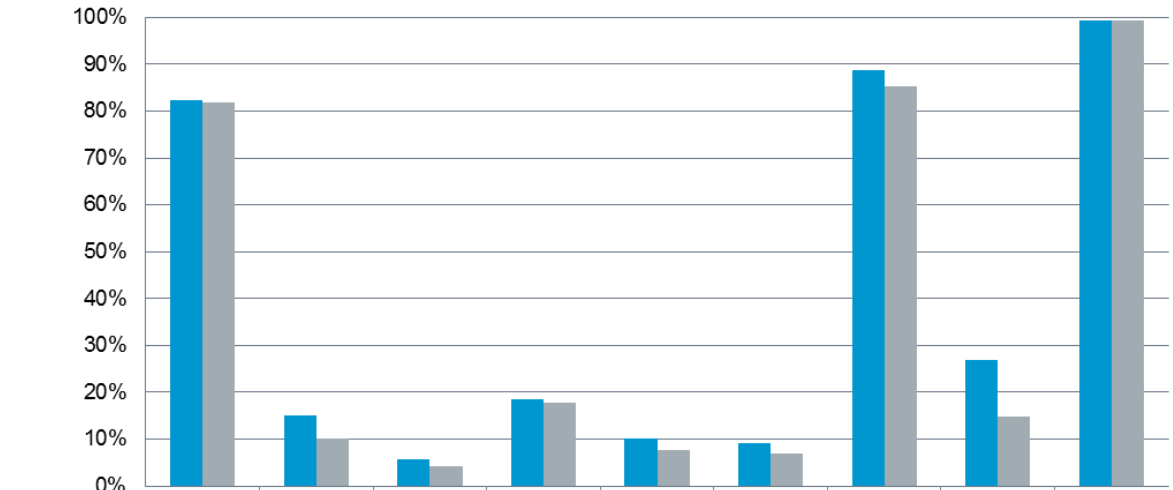
Rural areas traditionally present a challenging environment for network operators to invest in the deployment of broadband networks. Due to their low population density, it is often difficult for operators to justify investments in these economically less profitable areas. Achieving the DAE goal of universal 30 Mbps coverage by 2020 thus remains a demanding target when considering EU's rural regions.

As in the previous years, broadband coverage in rural areas lagged substantially behind total national coverage. In 2014, fixed broadband coverage at rural level reached 89.6%, compared to 96.9% homes passed at the total EU level. This pattern is even more apparent for NGA technologies (25.1% coverage at rural level versus 68.1% of all EU households).

Even though governments and network operators have focused on developing strategies for improving rural broadband availability over the last couple of years, results of our research suggest that progress in fixed rural broadband coverage has stalled during 2014. While rural DSL coverage increased by nearly six percentage points in 2013 (from 76.3% in 2012 to 81.8%), there was a nearly negligible 0.6 percentage point increase in 2014. This development indicates that network operators continue to struggle with further roll-out of broadband networks in rural areas.

The biggest rural coverage improvement among the fixed broadband technologies was reported for VDSL coverage, which increased from 10.2% of rural households in 2013 to 15.1% in 2014. However, this increase can be mostly attributed to areas already covered by DSL networks, which were upgraded to VDSL, and would not account for newly deployed networks to previously underserviced areas.

EU28: Coverage by technology, rural areas



	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
EU28 2014	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%
EU28 2013	81.8%	10.2%	4.3%	17.8%	7.7%	6.9%	85.4%	14.8%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Nevertheless, 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 (yet it covered only 18.5% of rural households), followed by cable (10%). As was the case with total cable coverage, in rural areas DOCSIS 3.0 coverage is closing the gap with standard cable coverage, with most cable households having been upgraded to DOCSIS 3.0 and reaching 9.2% rural households. Despite this, cable coverage remained only a small fraction of rural coverage. This is mostly due to the economic nature of cable network deployment, which is generally reliant on higher population densities, meaning that operators have largely avoided rural network build-out. FTTP remained the least widespread technology in rural areas, available to just under 6% of rural homes across the EU.

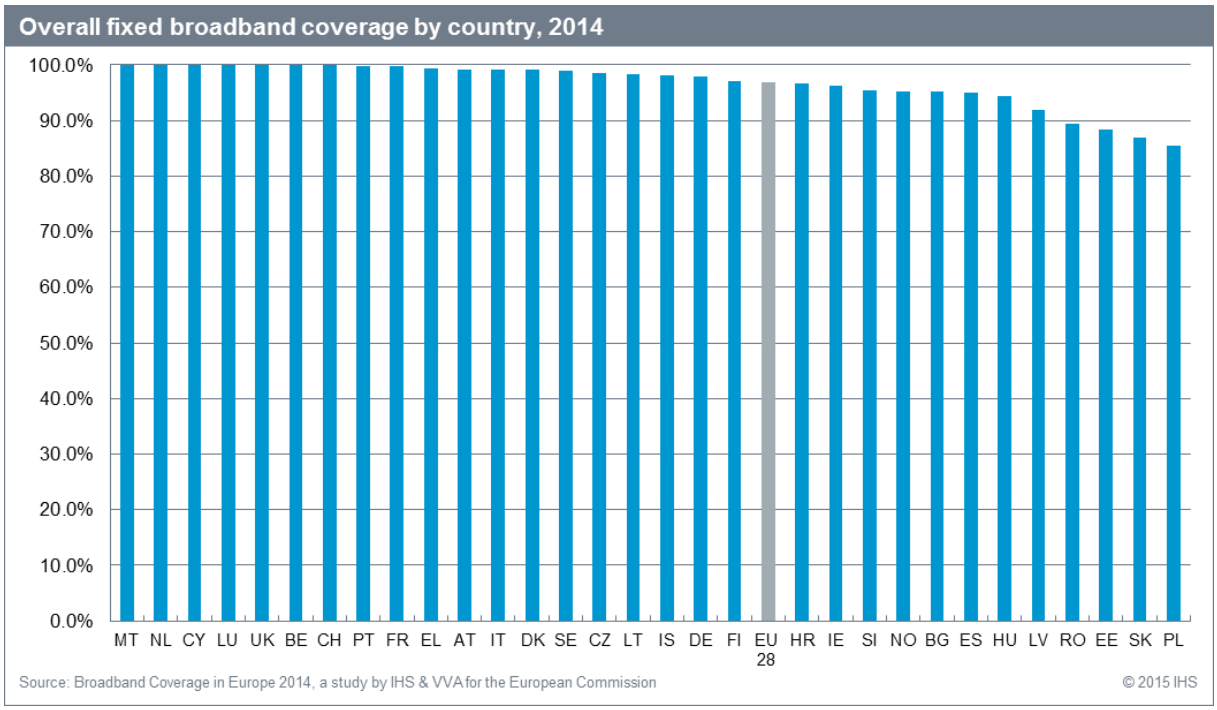
Looking at mobile technologies, HSPA reached almost 90% of rural households at the end of 2014, a 3.5 percentage point increase compared to 2013. As the roll-out of LTE service continued across Europe, LTE coverage recorded continued growth in rural areas, increasing from 14.8% in 2013 to 27% in 2014. As was the case for the entire EU28 territory, rural LTE recorded the highest growth of all of the access technologies. And with the continued growth of LTE coverage and improvements in LTE network performance, it is possible to expect a further positive impact LTE technology will have on the expansion of rural broadband availability. Many NRAs as well as network operators are hoping to boost rural broadband coverage with LTE mobile broadband in areas where fixed networks deployment is not feasible.

Due to the nature of satellite technology, satellite reached roughly the same level of coverage in rural areas as for total coverage (99.3%). In 2014, satellite remained the only option for receiving broadband access in the most sparsely populated and hard-to-reach areas.

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 2Mbps 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.



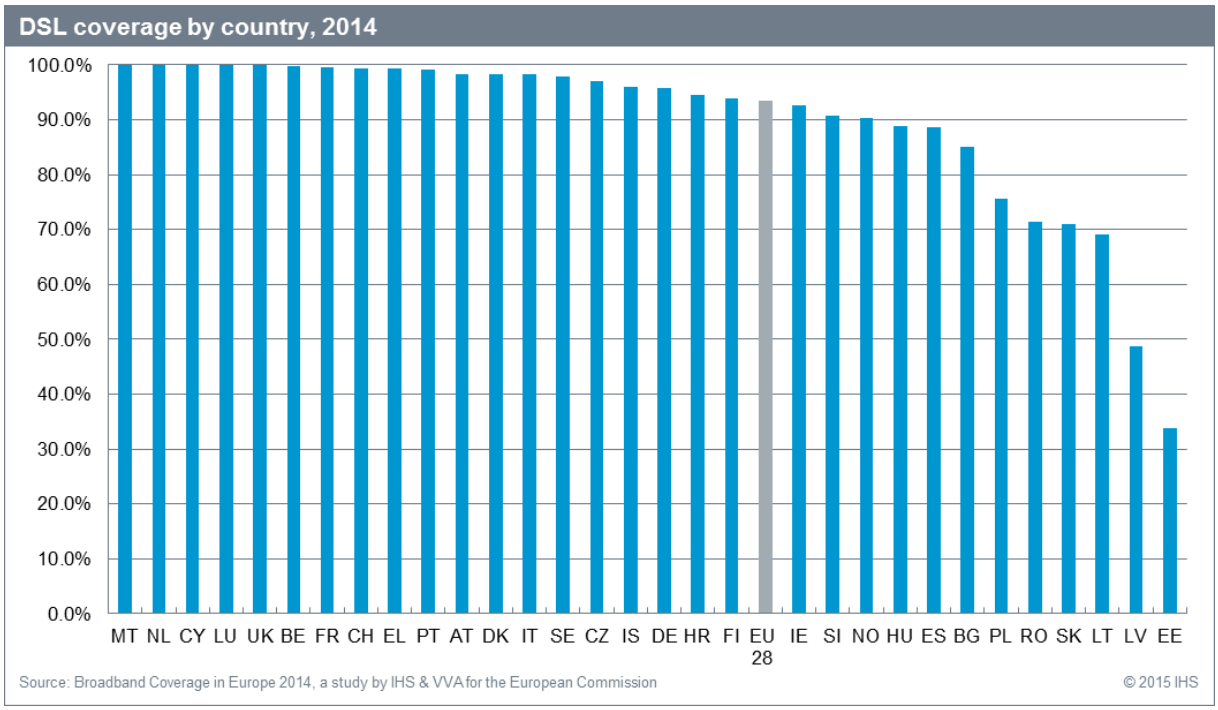
Compared to the previous year, more countries are above the European average for overall fixed broadband coverage. Out of the 31 study countries, nineteen countries had fixed broadband coverage levels at or above the EU28 average of 96.9% at the end of 2014, 27 countries had fixed broadband covering at least 90% of their households. Fixed broadband coverage was highest in Cyprus, Luxembourg, Malta, Netherlands, and the United Kingdom and lowest in Poland, Slovakia, Estonia and Romania where it reached between 85.4% and 89.4% of households. Apart from being located in Eastern Europe, all of these countries have sparsely populated and underserviced rural areas, which present coverage challenges.

4.3.1.1 Total DSL coverage by country

In line with the previous editions of the BCE study, DSL remained the leading fixed broadband technology in 2014, with 22 study countries reaching coverage rates above 90% and nineteen countries reporting coverage above the EU28 average of 93.5%

Five countries in the EU registered DSL infrastructure covering 100% of households in their territories. 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 negligible number of remote homes failing to receive DSL coverage. These countries are Luxembourg, the Netherlands, Cyprus, Malta and the United Kingdom.

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



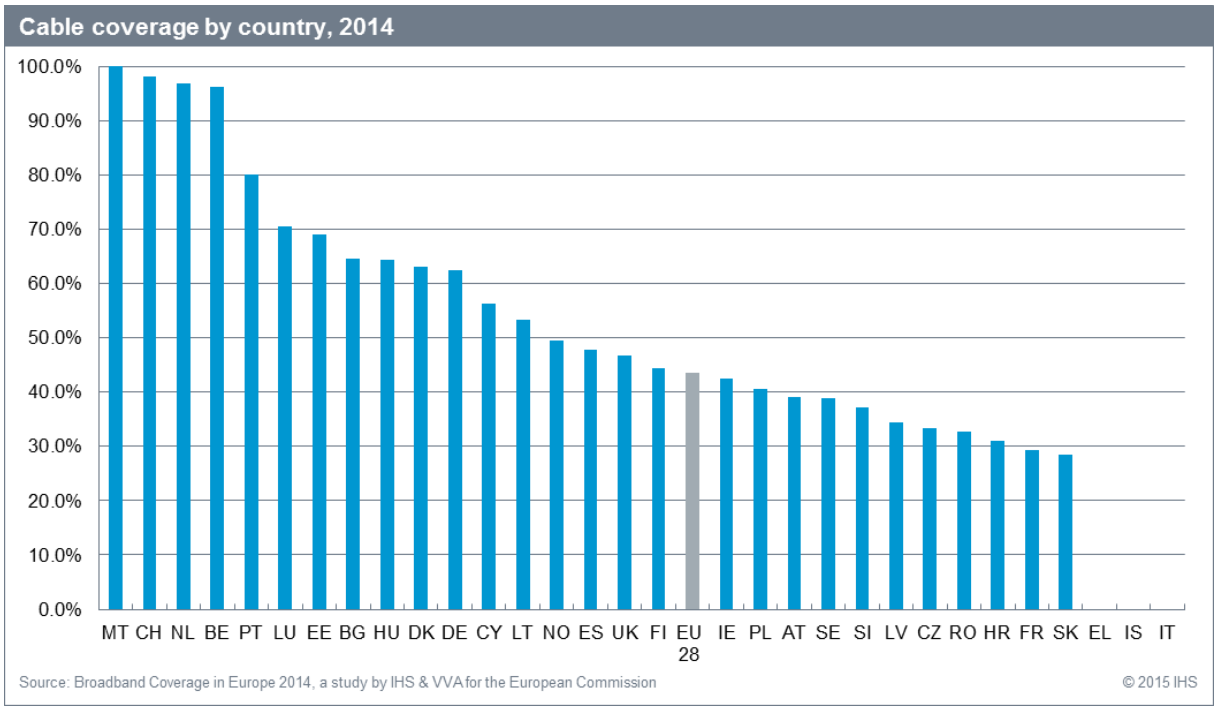
Only nine countries recorded DSL coverage below 90%: Hungary, Spain, Bulgaria, Poland, Romania, Slovakia, Lithuania, Latvia and Estonia. In a number of these countries, DSL coverage has begun to give way to NGA technologies such as FTTP, which is discussed in more detail in the individual country chapters.

4.3.1.2 Total cable coverage by country

Looking at the data on cable coverage, considerable variation between countries can be observed. Cable coverage tends to be highest in the most urbanised countries as cable companies traditionally focus on network build-up in densely-populated urban and semi-urban areas. Another important factor influencing cable coverage is the historical presence of cable companies, often originally focused on cable TV delivery. Hence, countries with strong tradition of cable TV in their respective markets show high levels of cable broadband coverage while countries in which cable companies failed (such as Italy) or entered at a later stage display an overall lower cable broadband coverage.

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.

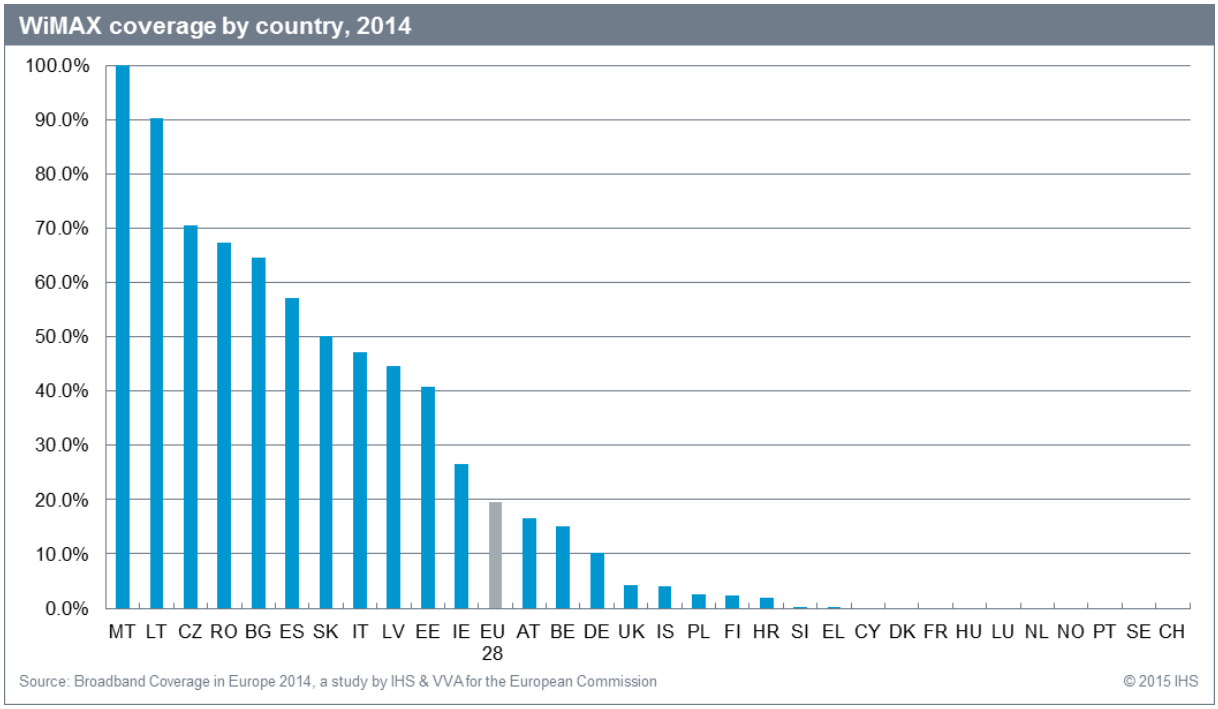
In 2014, Malta remained the only country with complete cable coverage, followed by Switzerland with 97.2% coverage, as well as Belgium and the Netherlands, both reporting over 96% cable coverage. As the chart below (“Cable coverage by country, 2014”) shows, 13 other countries recorded coverage rates above the European average of 43.5%, but out of these only in Portugal and Luxembourg did coverage exceed 70%.



Fourteen countries reported below-average coverage rates and three reported a complete absence of cable broadband technology in their territory. As in 2013, these countries were Greece, Iceland and Italy.

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.

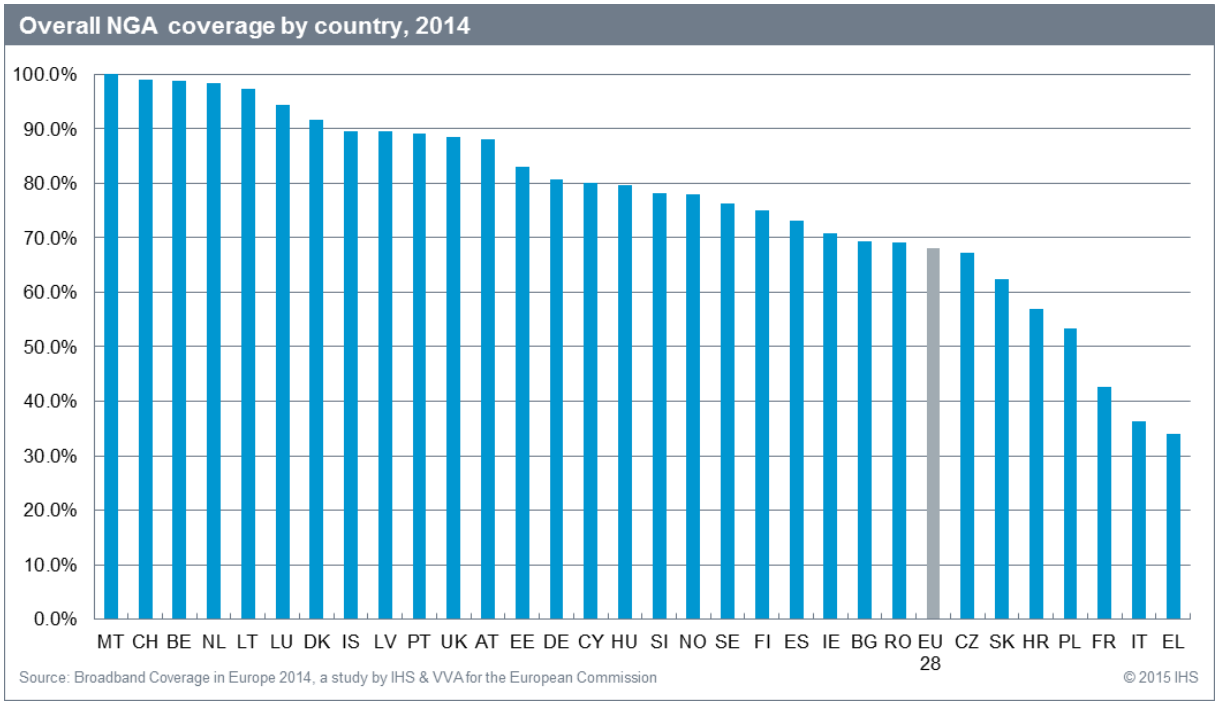


As in 2013, ten of the study countries reported no WiMAX availability (and two additional countries reported WiMAX coverage of less than 0.5% of households). Conversely, in countries such as Malta, Lithuania, Czech Republic, Romania and Bulgaria, WiMAX played an important role in contributing to broadband availability and covered more than 60% of households.

In terms of contribution of WiMAX to the fixed broadband coverage combination category, WiMAX coverage accounted for additional coverage on national level, particularly in the abovementioned markets, although its impact EU-wide remained relatively limited.

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 30Mbps (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 NGA coverage category therefore constitutes an evaluation of the roll-out of the relevant technologies and progress towards this goal.



The chart above shows that, as was the case with cable coverage, the highly urbanised countries recorded the highest NGA coverage. Malta remains the only country to report complete coverage for NGA technologies, followed by Switzerland, Belgium, the Netherlands, Lithuania, Luxembourg and Denmark, all above 90%. However, the pattern of NGA coverage varies significantly, reflecting the different strategies and approaches to high-speed broadband deployment adopted across Europe.

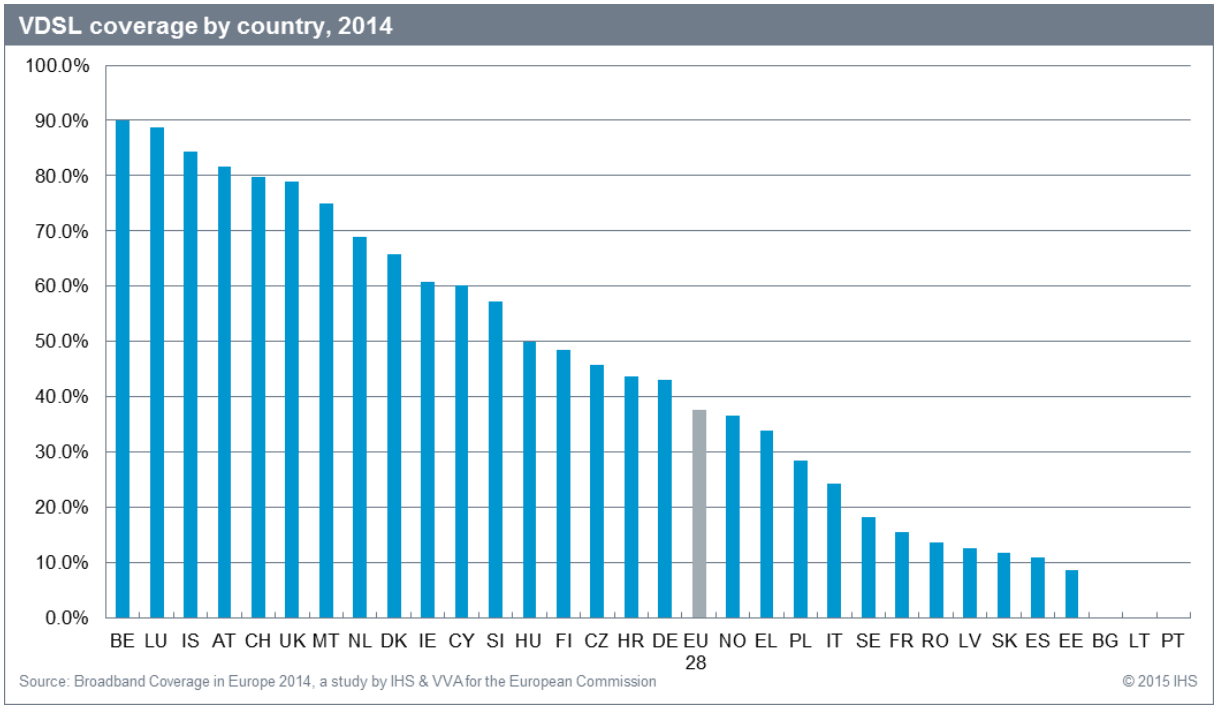
Out of the 31 study countries, 24 countries performed above the European average (68.1%) with regards to NGA availability, and only three countries reported NGA coverage below 50% (France, Greece and Italy). Greece had the lowest coverage of NGA technologies, with a total availability of 34% of households.

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

4.3.2.1 Total VDSL coverage by country

In 2014, VDSL continued to be the fastest growing NGA technology, passing over 37% of homes compared to just over 30% in 2013. The fact that VDSL continues to be the fastest growing NGA technology further solidifies the shift observed in 2013, with companies in many study countries refocusing their broadband deployment strategies towards upgrading existing copper networks rather than investing in the typically more costly (although generally longer-lived) deployment of fibre optic all the way to consumers' homes.

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



With regards to VDSL roll-out, only four countries reported coverage levels of over 80% of households. Belgium was the best performer, reporting VDSL coverage of 90%, followed by Luxembourg (88.8%), Iceland (84.3%) and Austria (81.6%). Overall, seventeen study countries achieved VDSL coverage exceeding the EU average.

As in 2013, VDSL was not available in Bulgaria, Lithuania and Portugal. While there were no new countries reporting a launch of VDSL services in 2014, VDSL coverage grew significantly in a number of markets. Most significant increases were recorded in Denmark, Austria, and Iceland, all reporting increases in VDSL coverage exceeding 30 percentage points.

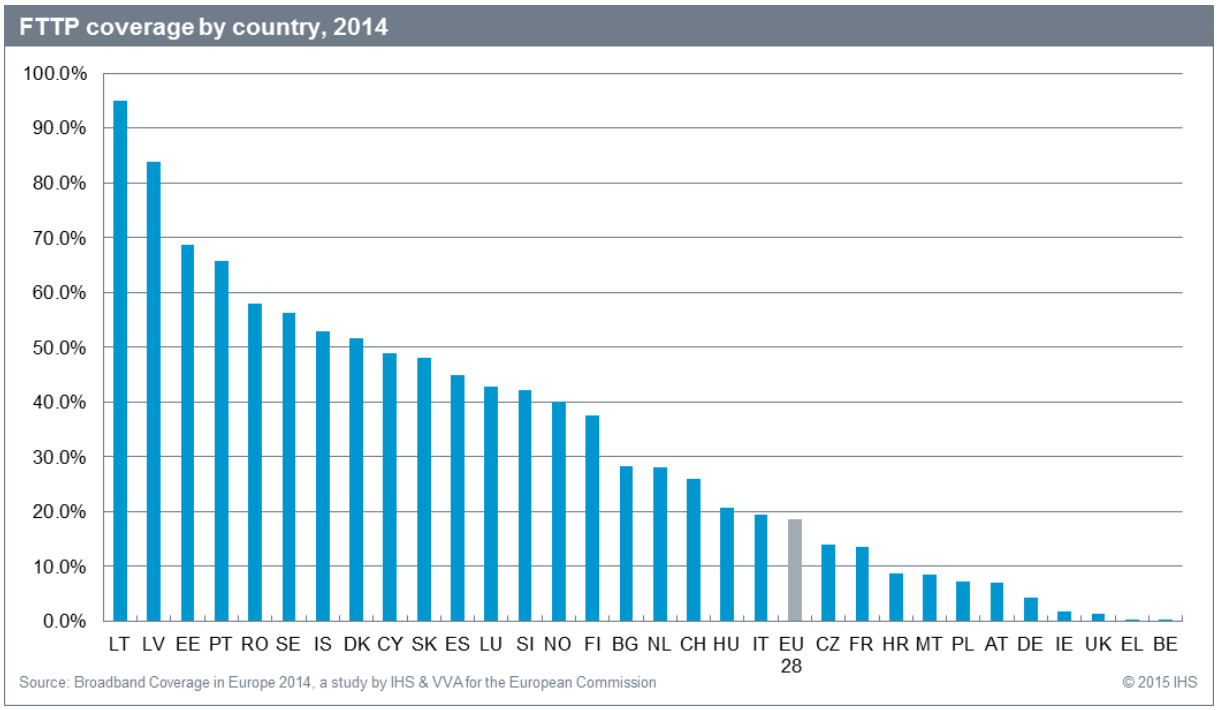
4.3.2.2 Total FTTP coverage by country

Baltic countries continued to lead the FTTP coverage category in 2014. With large complexes of blocks of flats found in almost every major city and with markets exhibiting generally less-developed telephone copper networks, Eastern European countries present strong incentives for FTTP deployment.

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

Lithuania and Latvia remained the two countries with the highest FTTP coverage, with homes passed by FTTP reaching nearly 95% of households in Lithuania and 83.9% of households in Latvia. Estonia was the third highest ranked country for FTTP coverage, with 68.7% of Estonian households being able to access FTTP networks.

However, the strongest growth in FTTP coverage compared to 2013 was recorded in Portugal and Spain, where FTTP coverage increased by 16.1 and 22.1 percentage points respectively. It is worth pointing out that in these two countries network operators in recent years introduced a new strategic model based on network sharing and cooperation on joint roll-out of FTTP networks.



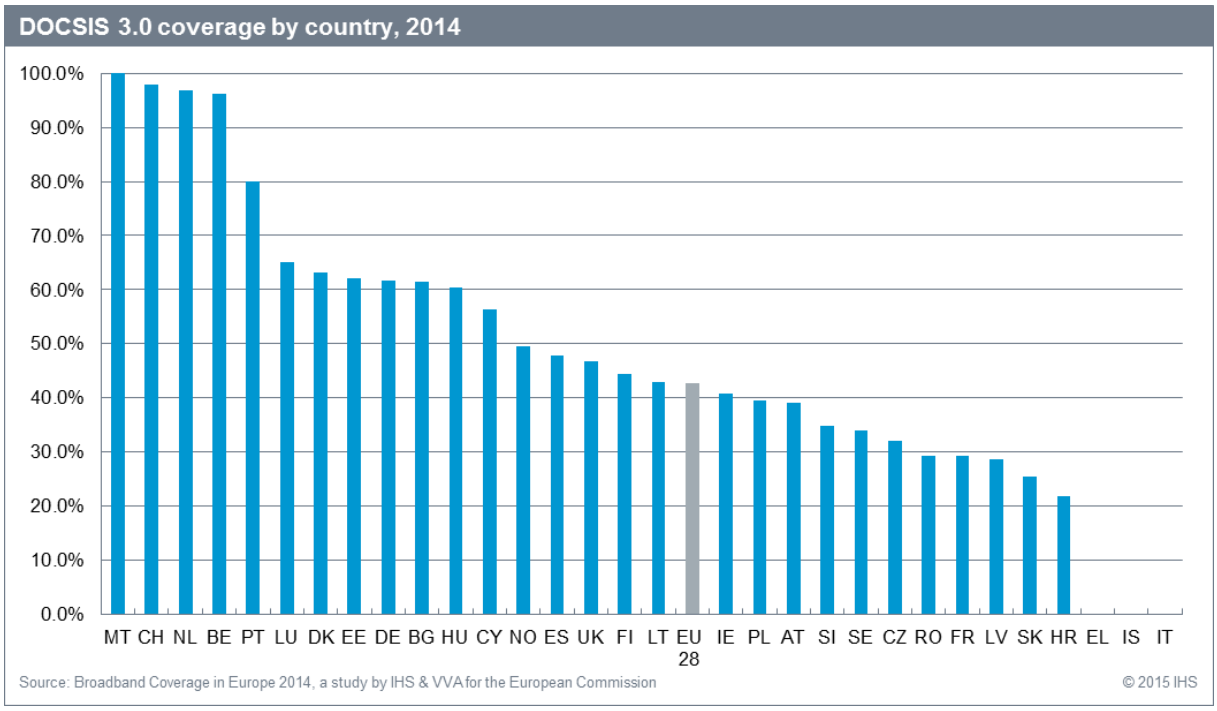
Apart from the three Baltic countries, 20 other countries reported FTTP coverage levels above the EU28 average of 18.7%. The remaining eleven countries reported coverage levels below the European average. As in 2013, Greece and Belgium reported the lowest levels of FTTP coverage, at 0.4% each.

4.3.2.3 Total DOCSIS 3.0 coverage by country

In 2014, European cable network operators continued the process of finalisation of upgrading their cable networks to DOCSIS 3.0. As a whole, 98.2% of EU's cable networks have been upgraded to DOCSIS 3.0 (compared to nearly 97% in 2013).

All study countries, with cable broadband networks, reported at least some level of upgrade of cable networks to DOCSIS 3.0. In eleven countries[3], the full upgrade was completed at the end of 2014, two more compared to 2013, and an additional seven countries reported at least 95% of cable networks being DOCSIS 3.0 capable, with the remaining countries recording ranges between 70% and 95%.

[3] Austria, Belgium, Cyprus, Denmark, Finland, France, Malta, the Netherlands, Norway, Spain, and the UK



As was the case with cable broadband coverage, Malta's DOCSIS 3.0 cable network was the most extensive in Europe in relative terms, covering 100% of Maltese households at the end of 2014. Switzerland, the Netherlands and Belgium followed closely, with coverage levels above 95%, and Portugal recorded 80% of households covered by DOCSIS 3.0.

Seventeen of the study countries performed better than the EU average (42.7% of households), but apart from the five top performers mentioned above, all reported coverage levels remained below 65% of households.

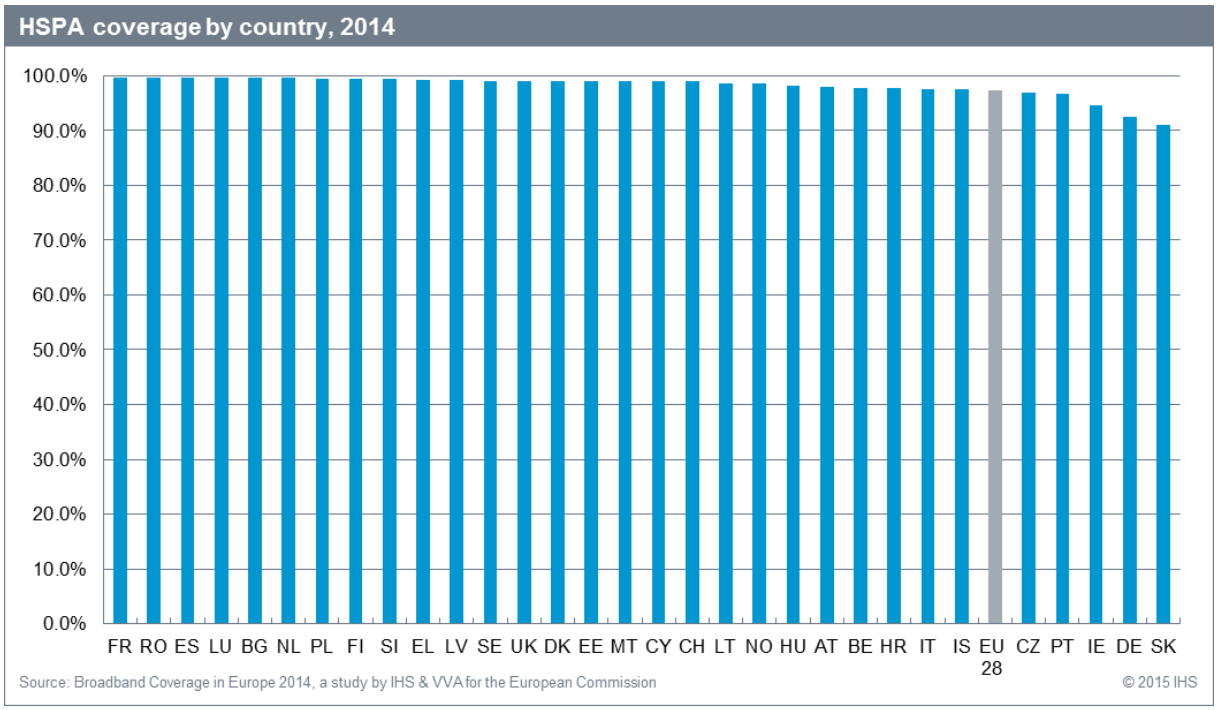
As noted in previous sections, Greece, Iceland and Italy lack cable broadband networks and thus reported no DOCSIS 3.0 coverage.

4.3.3 Mobile broadband technologies coverage by country

4.3.3.1 Total HSPA coverage by country

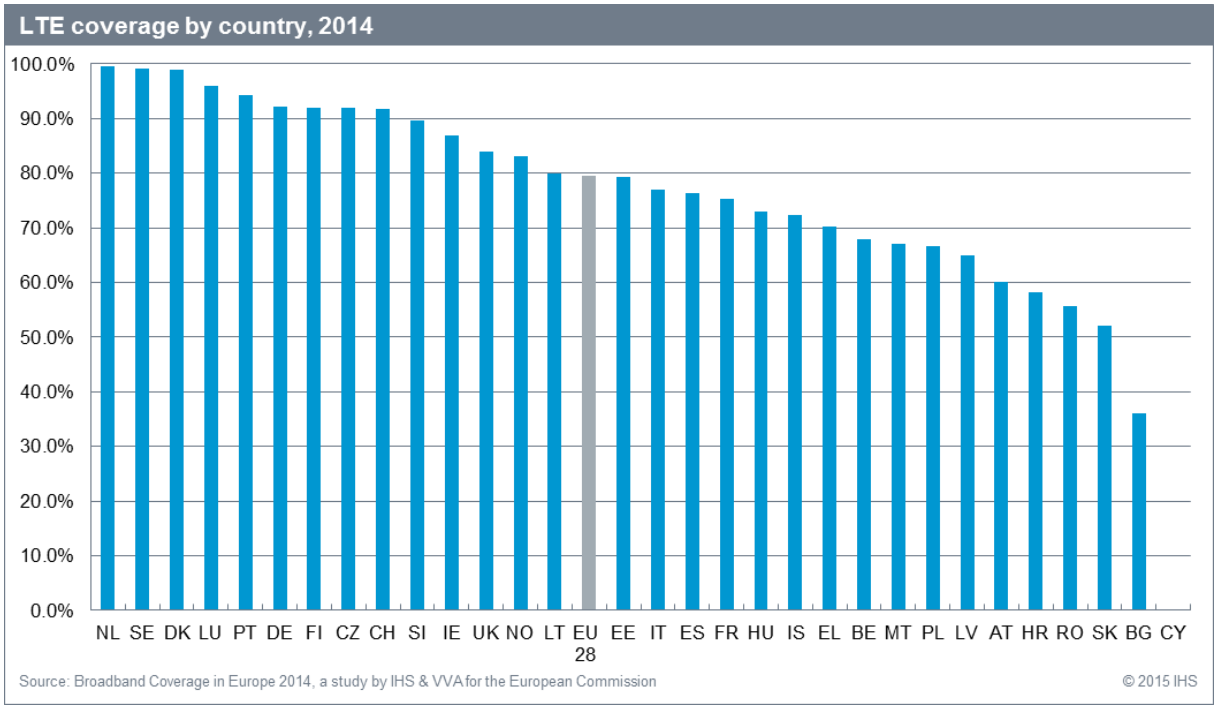
With regards to mobile broadband technologies, HSPA provided nearly universal coverage, reaching 97.3% of EU households compared to 97.1% in 2013. Almost all of the countries in this study reported HSPA coverage levels above 95%, with the only exceptions being Ireland, Germany and Slovakia (at 94.6%, 92.5% and 91.1% respectively).

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. 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 coverage across Europe continued its rapid growth in 2014. While in the previous year there were two countries (Bulgaria and Cyprus) without LTE availability, in 2014 only Cyprus reported no LTE coverage. The average EU LTE coverage level grew by 20.3 percentage points, increasing from 59.1% to 79.4%. Fourteen study countries reported coverage levels exceeding this EU average.



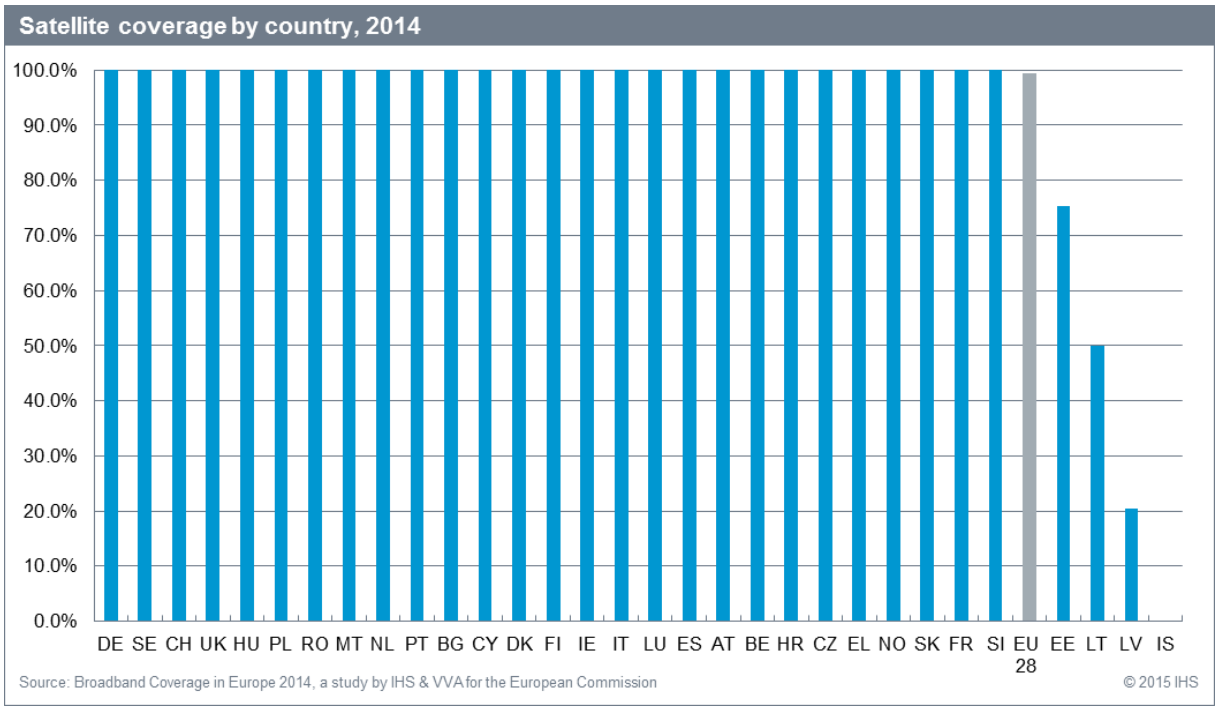
Denmark, the Netherlands and Sweden were the leaders in terms of LTE coverage in 2014, with 99% or more households covered. Like in the previous year, however, significant improvements could be observed across almost all countries.

Standout countries in 2014 include Czech Republic and Malta, which saw an increase in coverage from 12% to 91.9% and from no coverage to 67% respectively. Figures for both these countries thus show a very rapid LTE deployment throughout 2014. Significant increases in coverage were also reported in Ireland (from 35.2% to 87%) and Lithuania (from 29.3% to 79.9%).

4.3.3.3 Total satellite coverage by country

All but one of the study countries were covered by KA-band satellite capable of delivering 2 Mbps broadband services at the end of 2014. Iceland was the country with no satellite coverage and there was only partial coverage recorded in Estonia, Lithuania and Latvia.

Satellite beams are capable of reaching about 75% of Estonian households, approx. 50% of Lithuanian households and just over 20% of Latvian homes. However, 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.



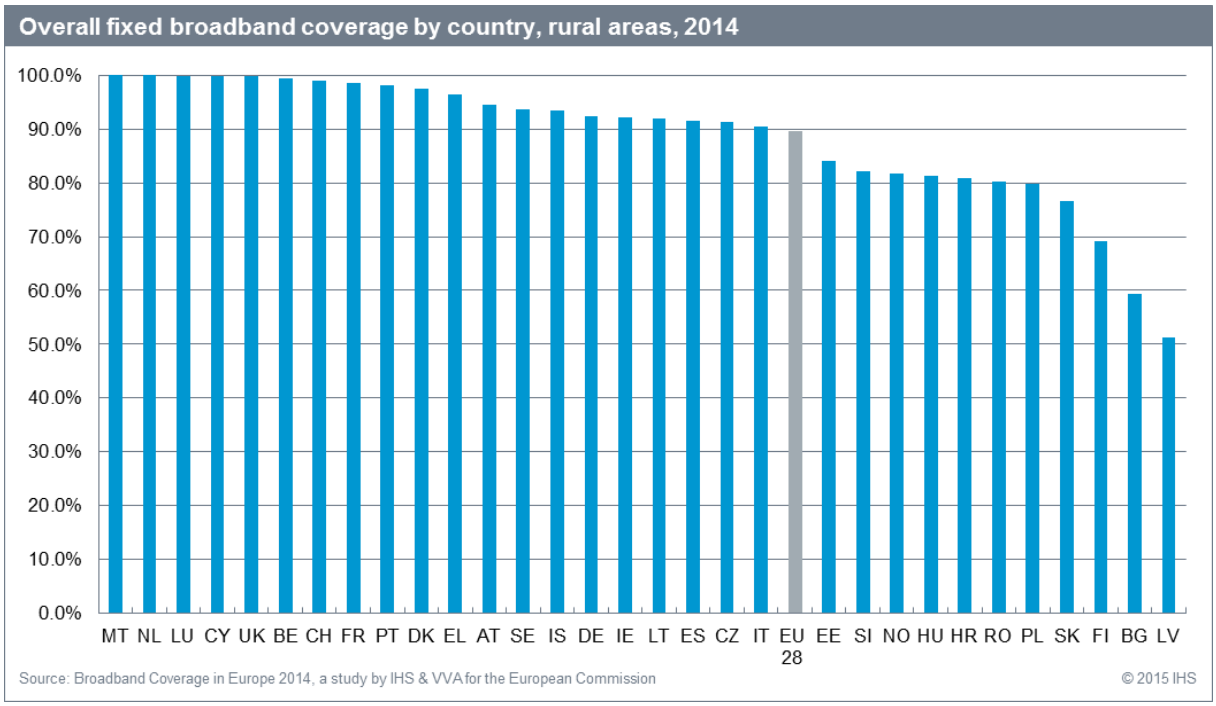
Moreover, it is important to note that while satellites are technically able to cover all households in the reach of a particular beam, the actual number of users that can be serviced by a single beam is limited by the peak average bandwidth usage, thus restricting number of serviceable homes in a particular area.

With that said, the research team was nevertheless able to estimate the total EU coverage of satellite broadband as reaching over 99% of EU households at the end of 2014. 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

As in the previous years, rural fixed coverage in most study countries lags behind national fixed coverage. Although the gap is closing at the EU level, this process appears to be slowing down. Between 2013 and 2014 the difference between total and rural fixed coverage fell from 7.6 percentage points (97.2% vs. 89.6%), to 7.3 percentage points (96.9% vs. 89.6%), while in 2012 it was still 12.3 percentage points.

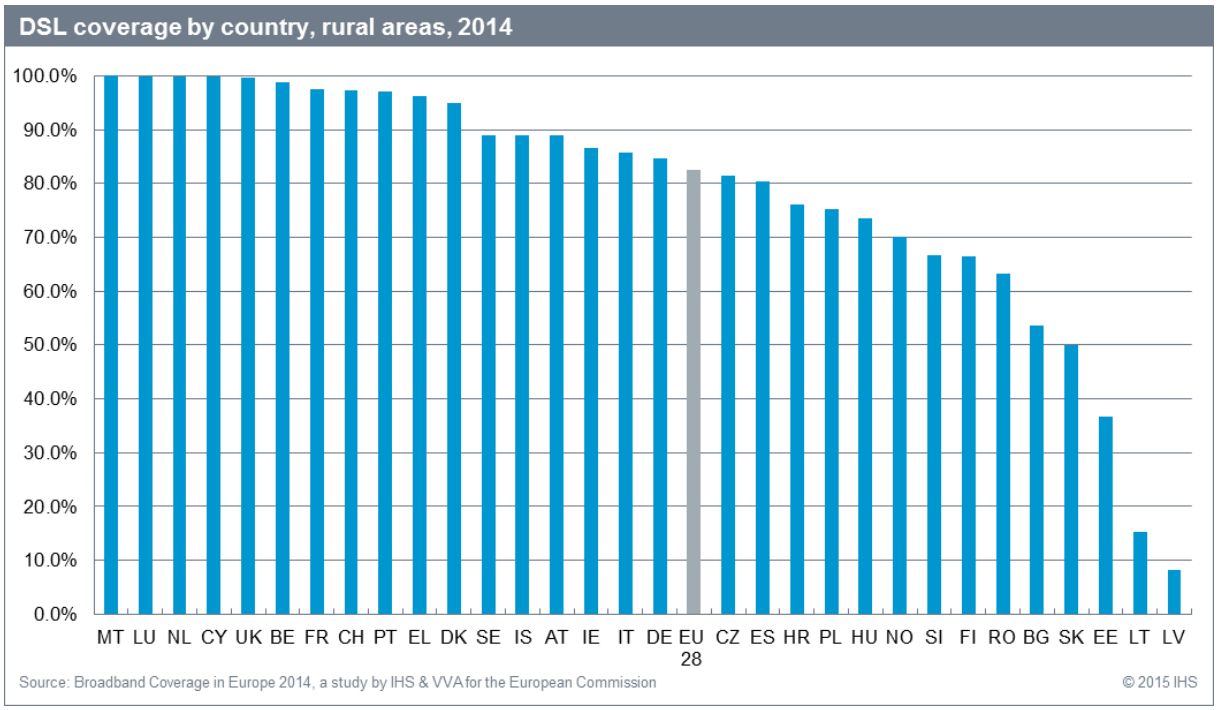


Twenty study countries reported rural fixed broadband coverage above the EU28 average. Of these, four reported complete rural fixed broadband coverage (Luxembourg, the Netherlands, Malta and Cyprus), followed by the United Kingdom at 99.8%.However, it is important to note that these are countries with some of the highest levels of urbanisation amongst the study countries. For instance, in 2014 just 1% of households in Malta were classified as rural, and under 9% in case of the Netherlands and the United Kingdom.

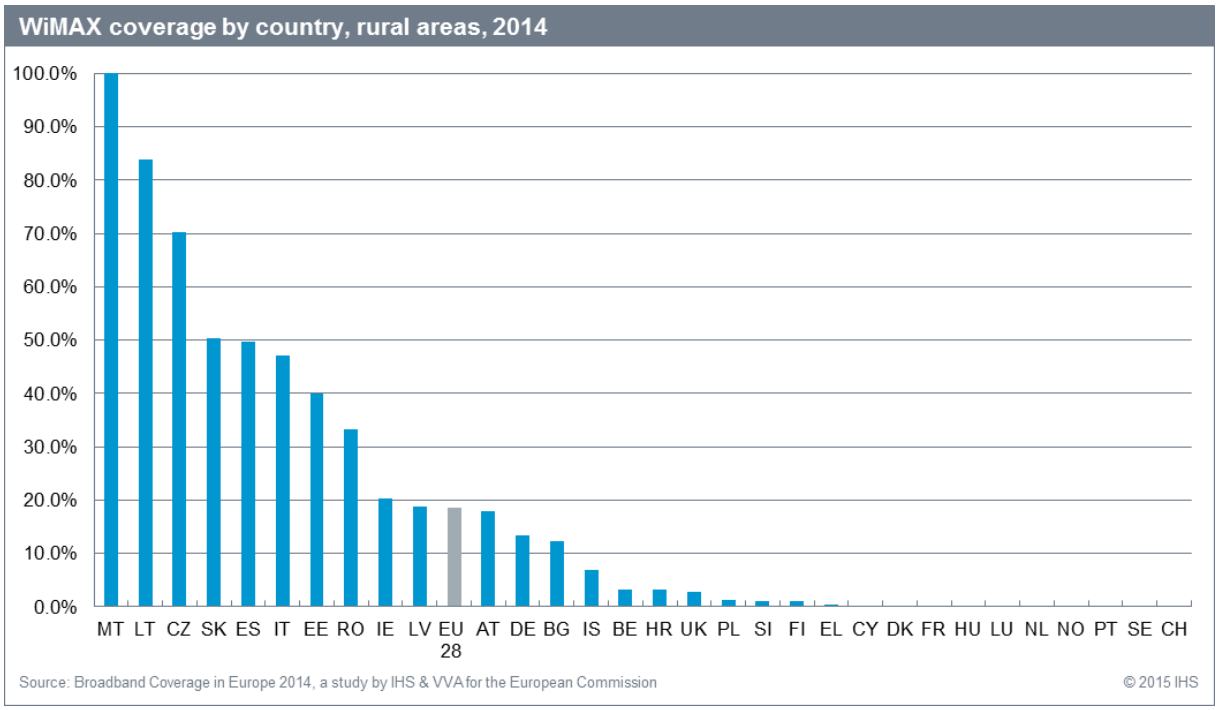
It should be noted that data on rural coverage collected from NRAs and individual operators was not always as comprehensive as total market-level data. In cases when information on rural coverage was incomplete, the research team estimated rural coverage using similar approach applied by Point Topic 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

DSL remained the fixed broadband technology with the highest rural coverage, and was widely available in almost all countries. Average rural DSL coverage reached 82.4% of rural households compared to a 93.5% total EU average. However, the difference between total and rural coverage was much larger in many countries, reaching 54 percentage points in Lithuania.

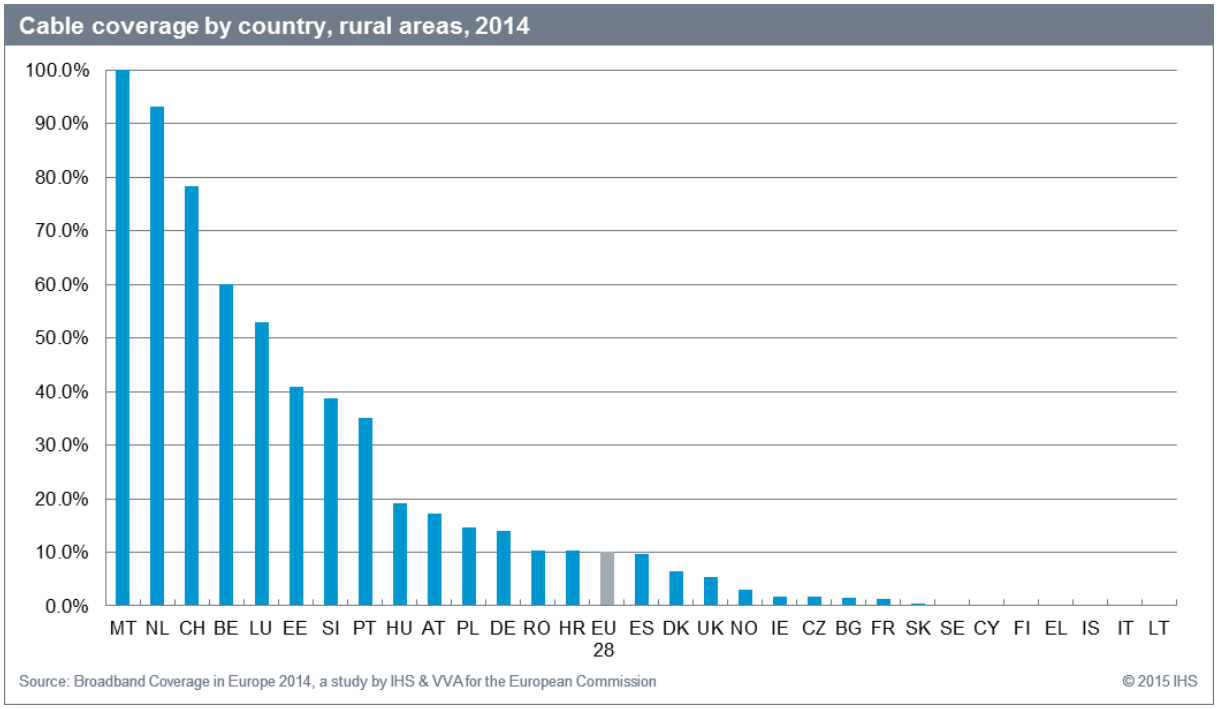


Seventeen countries reported rural DSL coverage levels exceeding the European average. As in 2014, Latvia and Lithuania were the only two countries with DSL coverage figures below 20% (with only 8.2% of rural households covered in Latvia) however both countries have more extensive fibre deployments, which have begun to erode the necessity for DSL services. Moreover, as can be seen in the figure below, in some countries other technologies such as WiMAX can offset low broadband coverage. This is in particular the case for Lithuania.



Nine countries reported that WiMAX was not available to households in rural areas, and four countries reported rural WiMAX coverage to be less than 2% of households.

Given the nature of cable network deployment discussed previously, one would expect relatively low rural cable coverage, which is reflected in the data. Only 10% of rural EU households had access to cable broadband in 2014, although coverage did increase by 2.4 percentage points from 2013. These increases were generally to cover households based in countries in which cable networks were already rolled out outside major cities. This increase can also be attributed to a large extent to developments in Poland, where coverage grew by 13.4 percentage points, which has considerable impact on the EU28 figures given the large number of rural households in Poland.

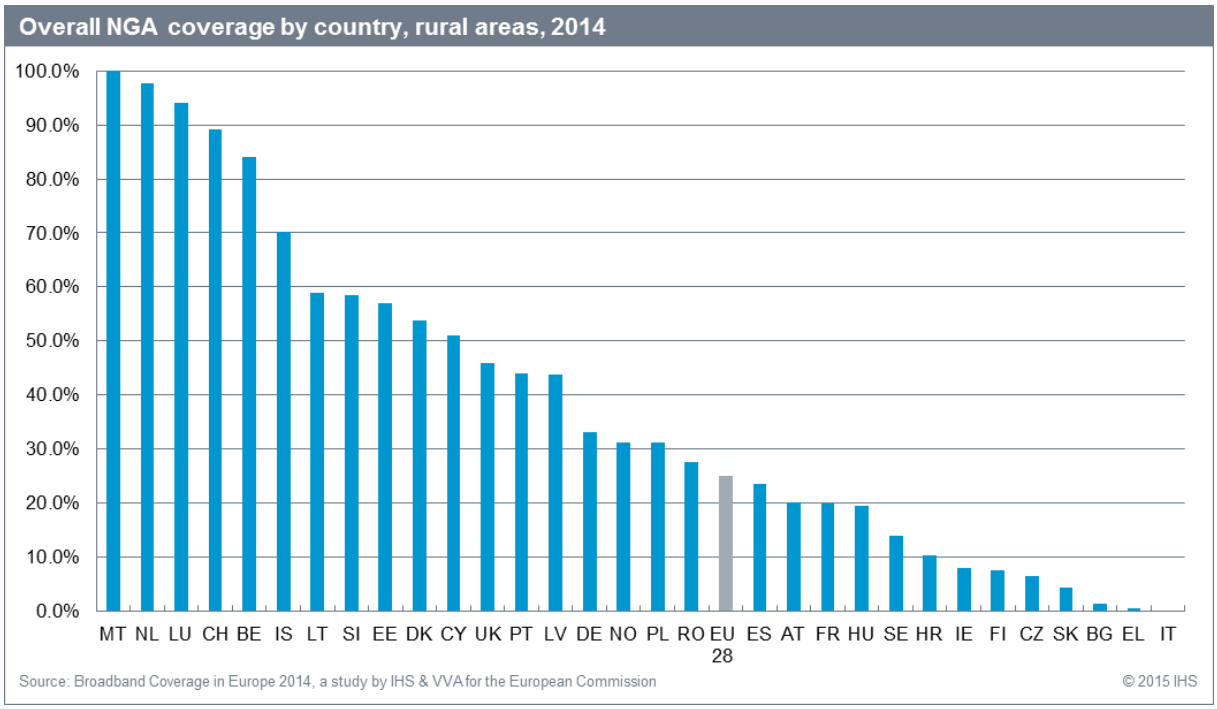


4.4.2 Rural NGA coverage by country

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.

The chart below shows that all NGA technologies combined still do not ensure widespread access to 30Mbps speeds in rural areas. None of the countries reported complete coverage. While the total NGA coverage exceeded 68% of EU households, rural EU coverage remained at 25.1% in 2014. Eighteen countries performed better than this average, and three of these countries had an NGA network reaching more than 90% of rural households (the Netherlands, Luxembourg, and Malta). Strong performance in these markets is however partly a result of a smaller number of rural households in these countries.

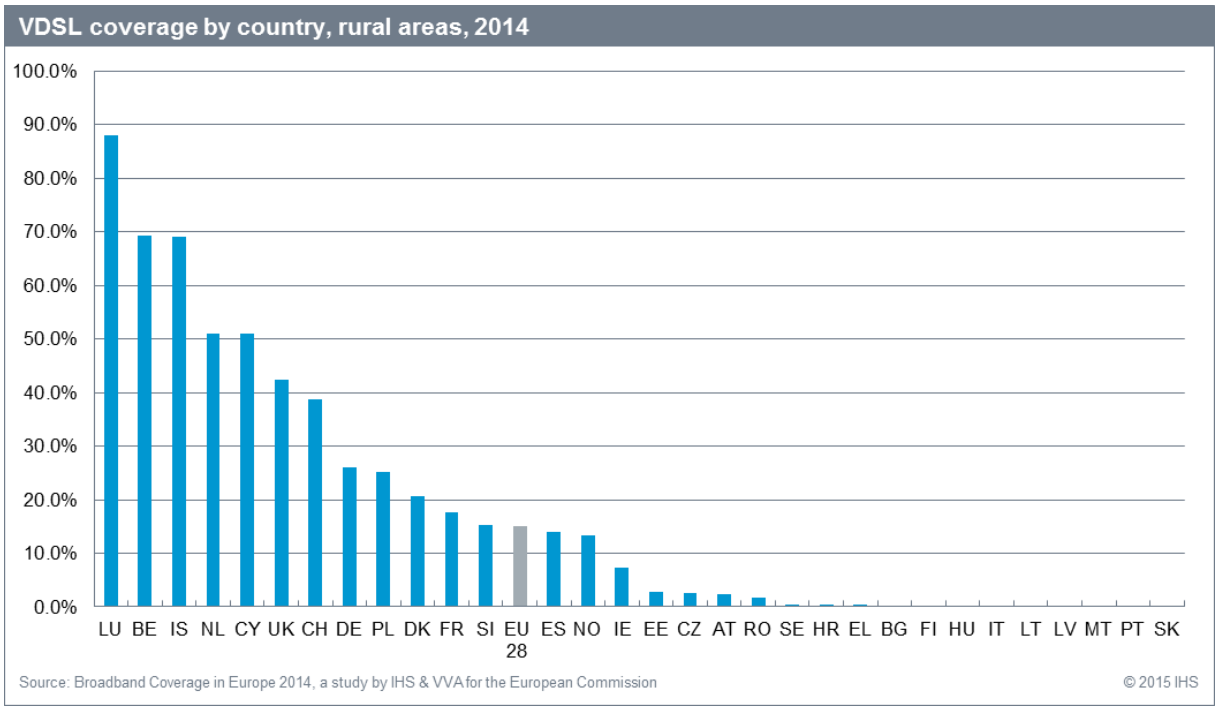
In 2014, only Italy reported no rural NGA coverage, although coverage levels below 5% were recorded for three other countries (Slovakia, Bulgaria and Greece), with the existing coverage being provided by FTTP in Slovakia, VDSL in Greece and DOCSIS 3.0 in Bulgaria. Given the availability of DSL lines in rural areas in these countries, one of the key challenges appears to be securing an upgrade of existing networks, in addition to introducing new networks.



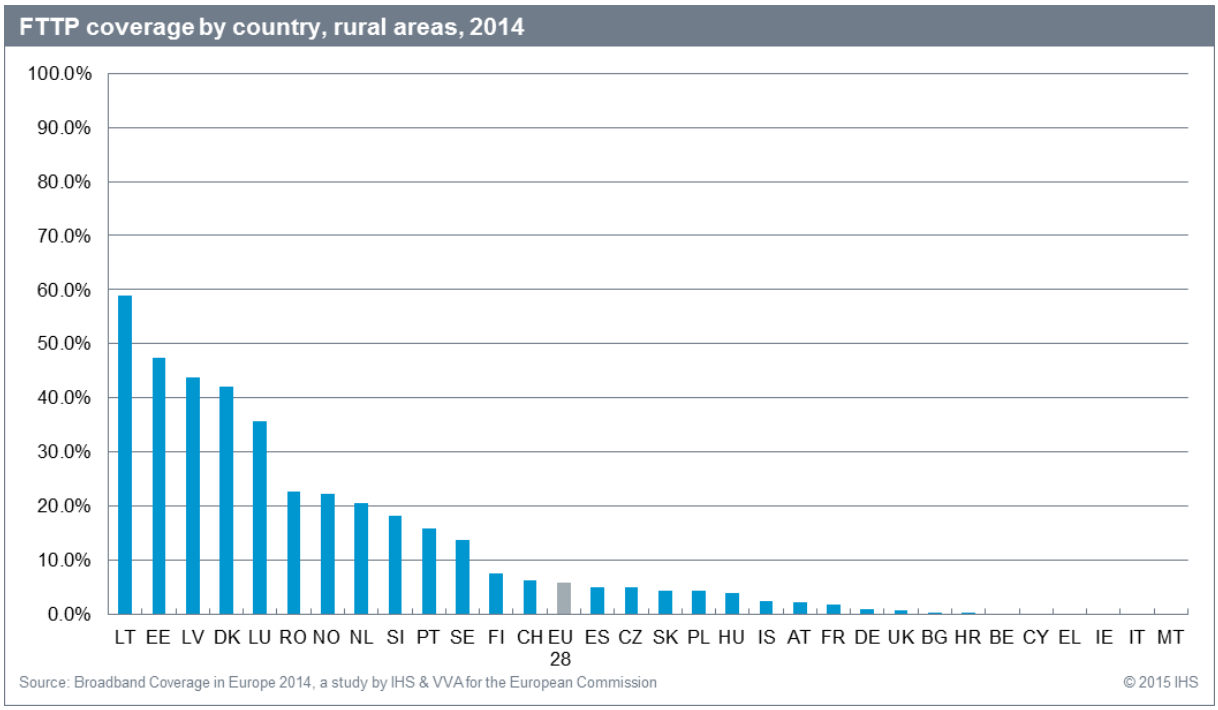
4.4.2.1 Rural VDSL, FTTP and DOCSIS 3.0 coverage by country

In 2014, VDSL remained the leading rural NGA technology, passing over 15% of rural homes in the EU compared to 10% rural homes covered by DOCSIS 3.0 and 5.8% rural homes passed by FTTP networks.

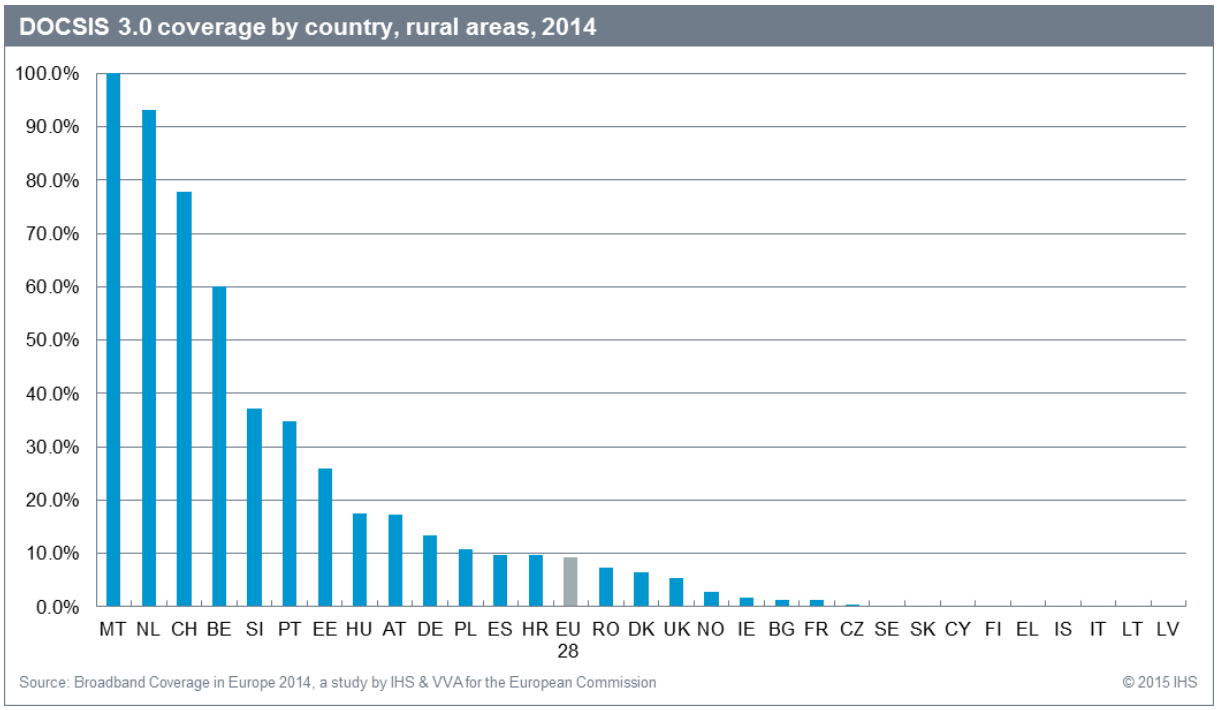
Luxembourg remained the leader in terms of rural VDSL coverage, with almost 90% of rural households covered by the technology, followed by Belgium and Iceland, both with coverage levels slightly over 69%.



With regards to FTTP, as in 2013 highest level of rural coverage was reported in Lithuania and Estonia. However, with the exception of Lithuania, coverage levels remain below 50% in all study countries. In addition, ten countries reported no rural FTTP coverage.



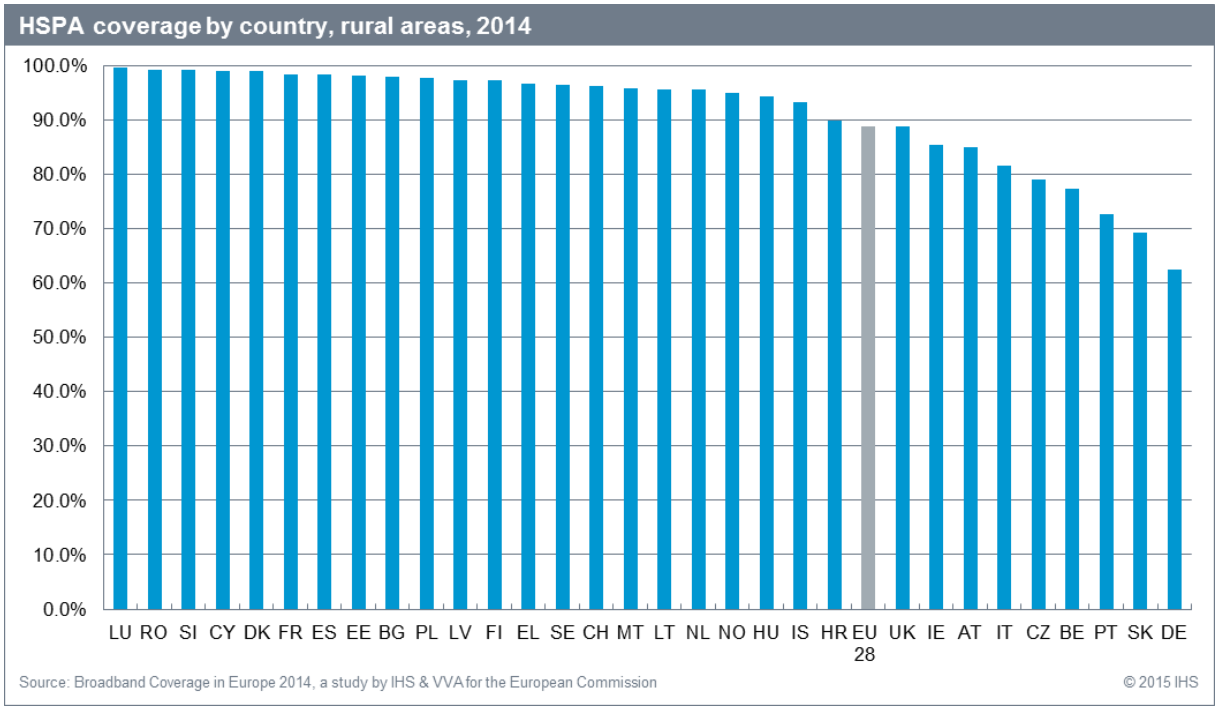
Rural DOCSIS 3.0 coverage rose from 6.9% in 2013 to 9.2% in 2015. Malta reported complete rural DOCSIS 3.0 coverage, followed by the Netherlands, at 93.2%. Seventeen study countries reported improvements in rural DOCSIS 3.0 coverage compared to 2013, showing that considerable progress was made with regard to upgrading rural Cable networks compared to 2014.



4.4.3 Rural Mobile coverage by country

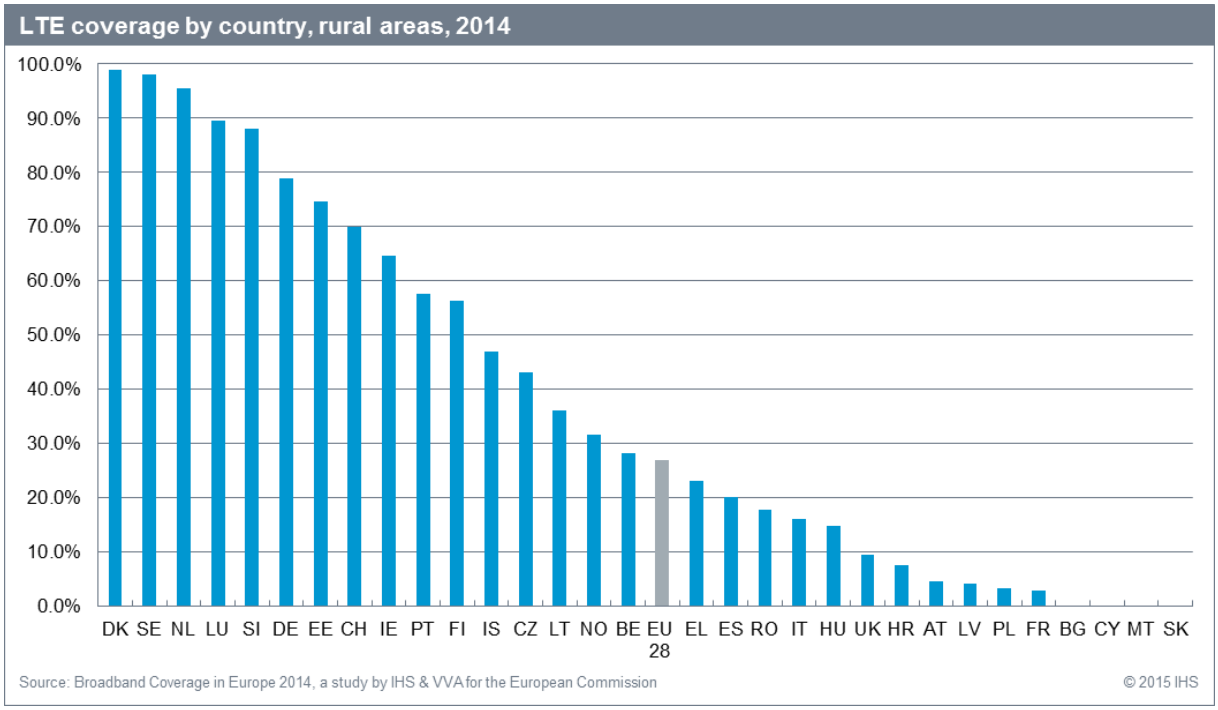
4.4.3.1 Rural HSPA coverage by country

Out of all technologies, HSPA offered the second widest rural broadband coverage in the EU after satellite broadband. Only ten countries reported rural HSPA coverage of less than 90%. The leaders included Luxembourg, Romania and Slovenia (99.6%, 99.3% and 99.1% respectively), with the lowest coverage reported in Germany (62.5%).



4.4.3.2 Rural LTE coverage by country

Rural LTE coverage has improved significantly since 2013, with total EU coverage increasing from 14.8% to 27% by the end of 2014. Nevertheless, the overall picture across the EU28 remains unbalanced, with substantial differences across countries.



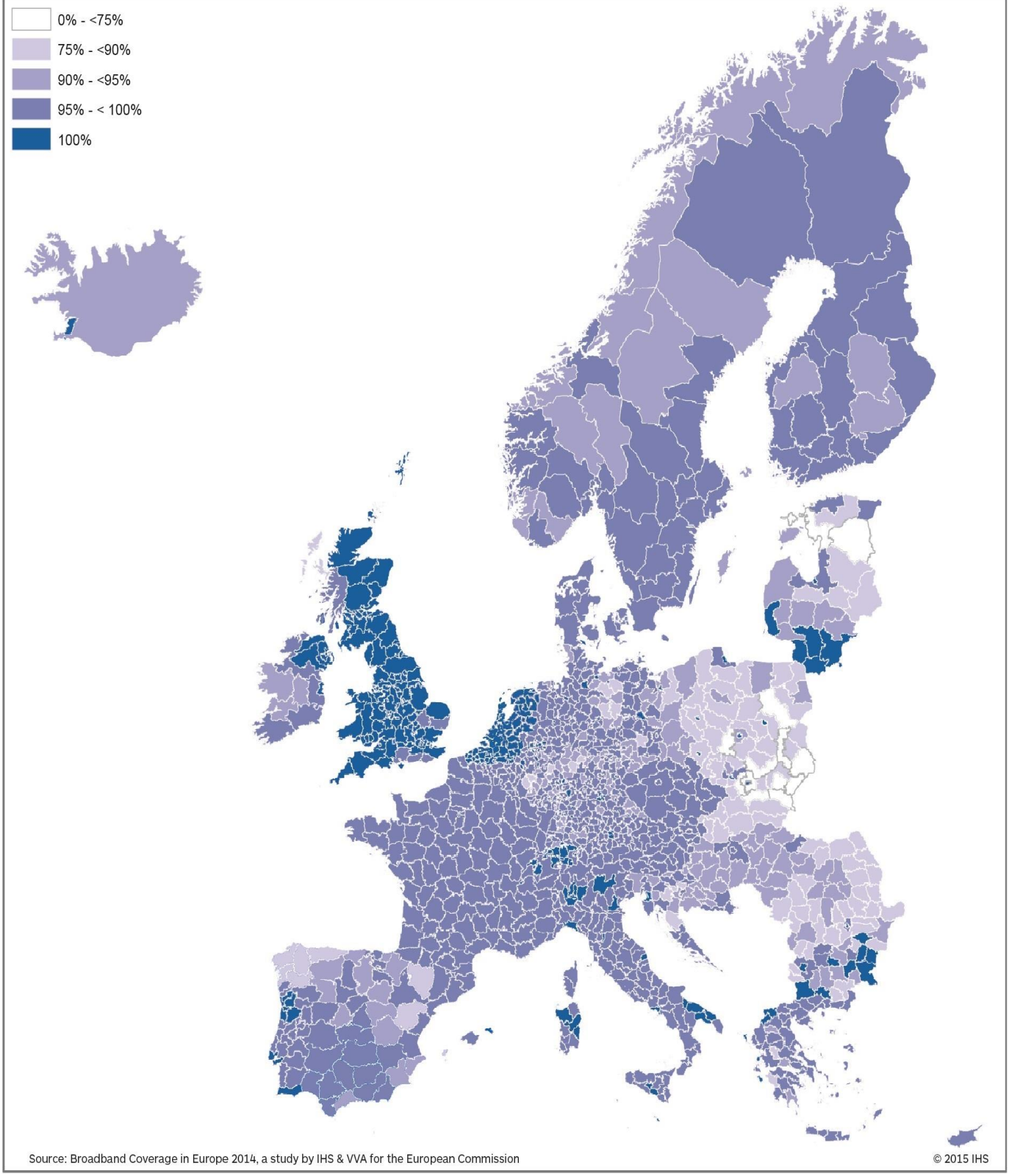
In 2013, eight countries reported a rural LTE coverage level of at least 20%. By the end of 2014, LTE covered more than 20% of rural households in eighteen countries. Denmark and Sweden were the best performers with 99% and 98% coverage respectively. Denmark also recorded the most dramatic increase in rural LTE coverage, with coverage increasing to 99% from 10% in 2013.

Other countries reporting considerable improvements in rural LTE coverage throughout 2014 included Ireland (from 2.5% to 64.6%), Switzerland (from 15.5% to 69.9%) and the Netherlands (from 42.6% to 95.5%).

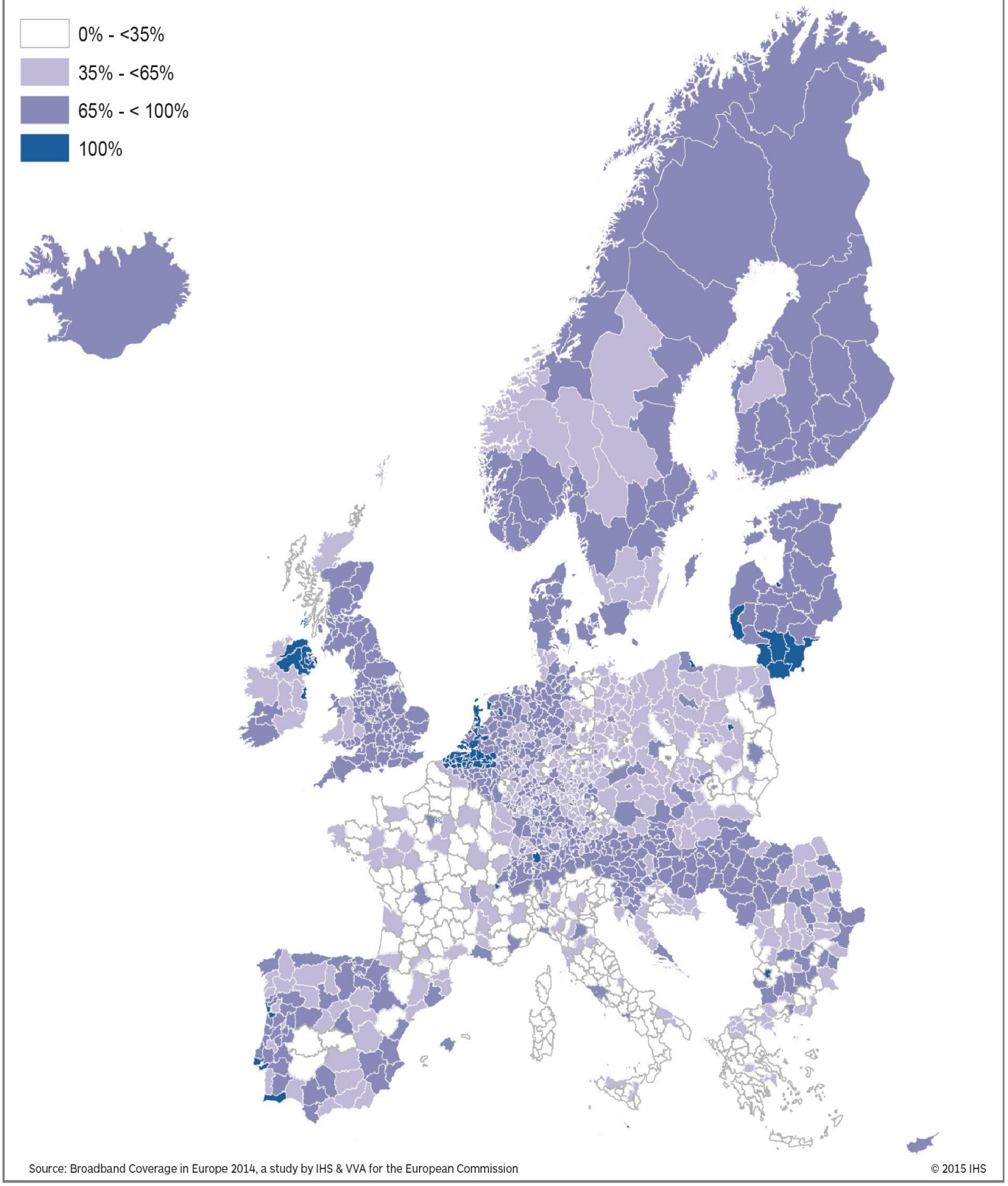
4.5 NUTS 3 level total coverage

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, 2014



Europe: NGA fixed broadband coverage, 2014



Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

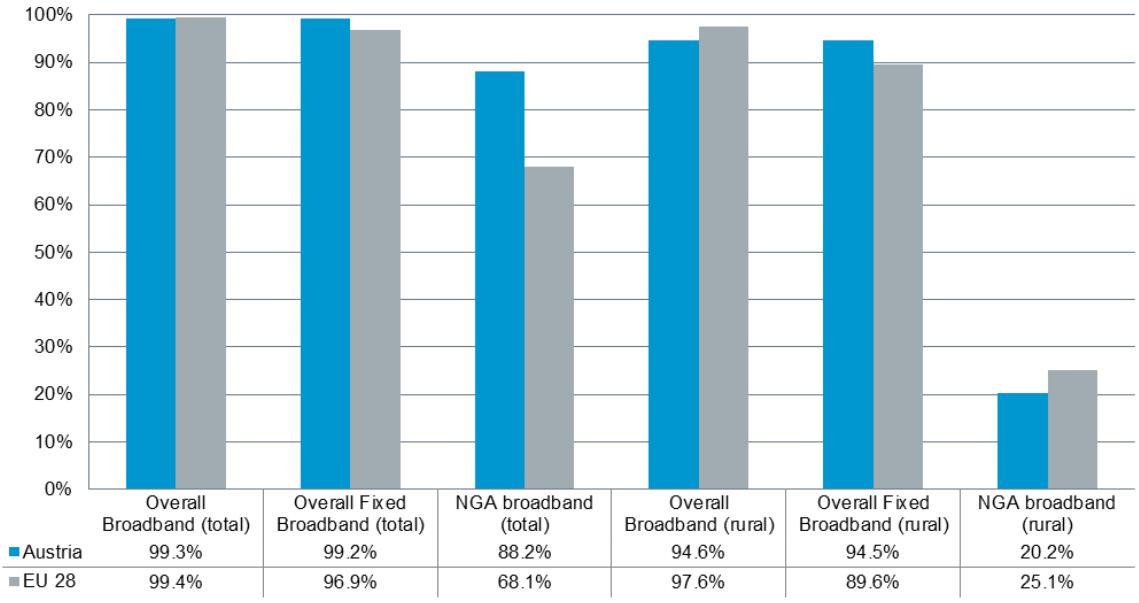
5.0 Coverage by Country

5.1 Austria

5.1.1 National coverage by broadband technology

In 2014, overall broadband coverage in Austria was broadly unchanged from 2013 (growing by only 0.1 percentage points) and remained just below the EU average. With regards to NGA coverage, an eighteen percentage point increase in coverage contributed to Austria's NGA coverage considerably exceeding the EU average. Austria, however, still lags behind the EU average in terms of rural NGA coverage.

Austria: Coverage by technology combination, 2014



	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%	88.2%	94.6%	94.5%	20.2%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

DSL remained the fixed broadband technology with the highest coverage in 2014, covering 98.4% of households, 4.9 percentage points above the EU average.

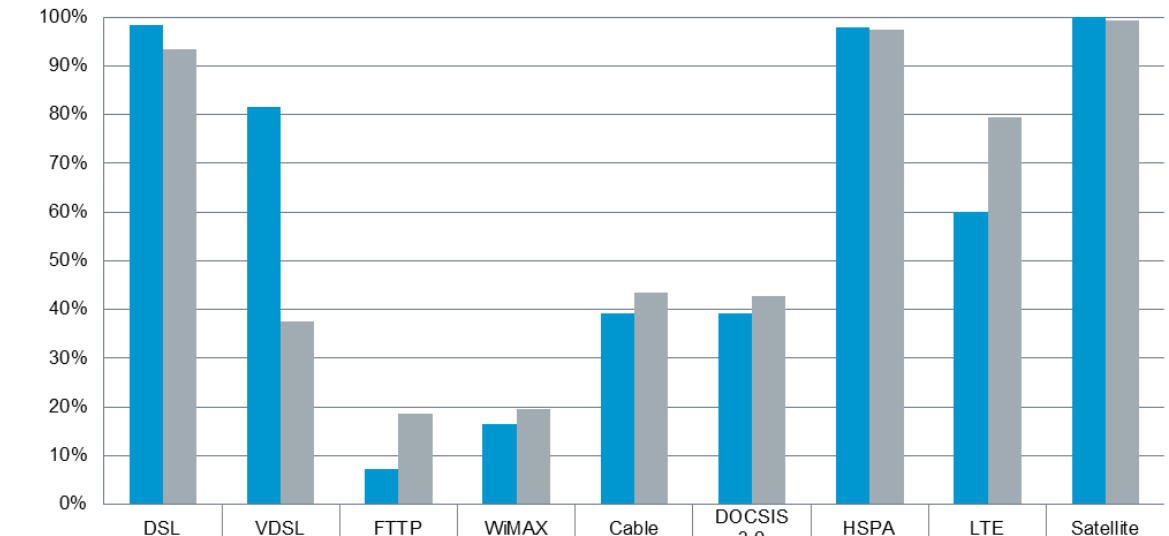
As in the previous years, standard cable coverage in Austria was lower than the EU average, with the coverage level remaining unchanged from 2013. This in turn means that the gap between Austria and the EU average increased.

Looking at NGA coverage, as in previous years, Austria performed significantly better than the EU as a whole. VDSL remained the driving NGA technology and saw a considerable increase in coverage, with 81.6% of households covered at the end of 2014 compared to 51.2% in 2013, making Austria the fourth best performer in terms of VDSL coverage among the study countries. This rather dramatic increase in VDSL coverage can be primarily attributed to the continued NGA network deployment by the incumbent operator A1 Telekom Austria.

Conversely, Austrian FTTP and DOCSIS 3.0 coverage remained under the EU average and following increases in coverage in 2013, no further gains were recorded in 2014. This broadly reflects the operators' focus on VDSL coverage.

Even though LTE coverage increased from 35.0% in 2013 to 60.1% at the end of 2014, it remained below the EU28 average of 79.4%.

Austria: Coverage by technology, total, 2014



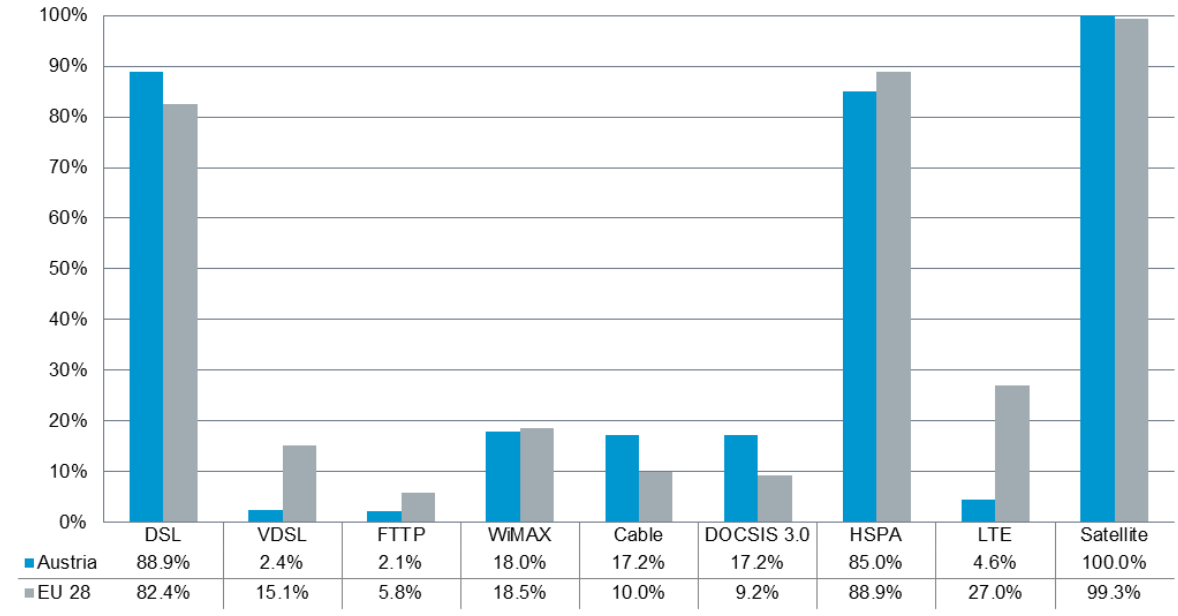
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Austria	98.4%	81.6%	7.1%	16.5%	39.1%	39.1%	98.0%	60.1%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

In rural areas, DSL was the primary broadband technology, covering 88.9% of rural households. Cable modem coverage of rural households remained at its 2013 level with 17.2% rural homes passed by technology, significantly exceeding the EU28 average (10.0%).

Compared to 2013, when rural NGA coverage grew by a modest 1.1 percentage points, in 2014 more progress was made. Rural NGA coverage increased by 4.7 percentage points during the year, with 20.2% rural households having access to high-speed broadband services at the end of 2014. Nevertheless, at 17.2% coverage, DOCSIS 3.0 remained the key technology ensuring NGA connectivity in Austria's rural areas, which was made possible by the DOCSIS 3.0 upgrades to existing cable networks throughout 2013.

Austria: Coverage by technology, rural areas, 2014

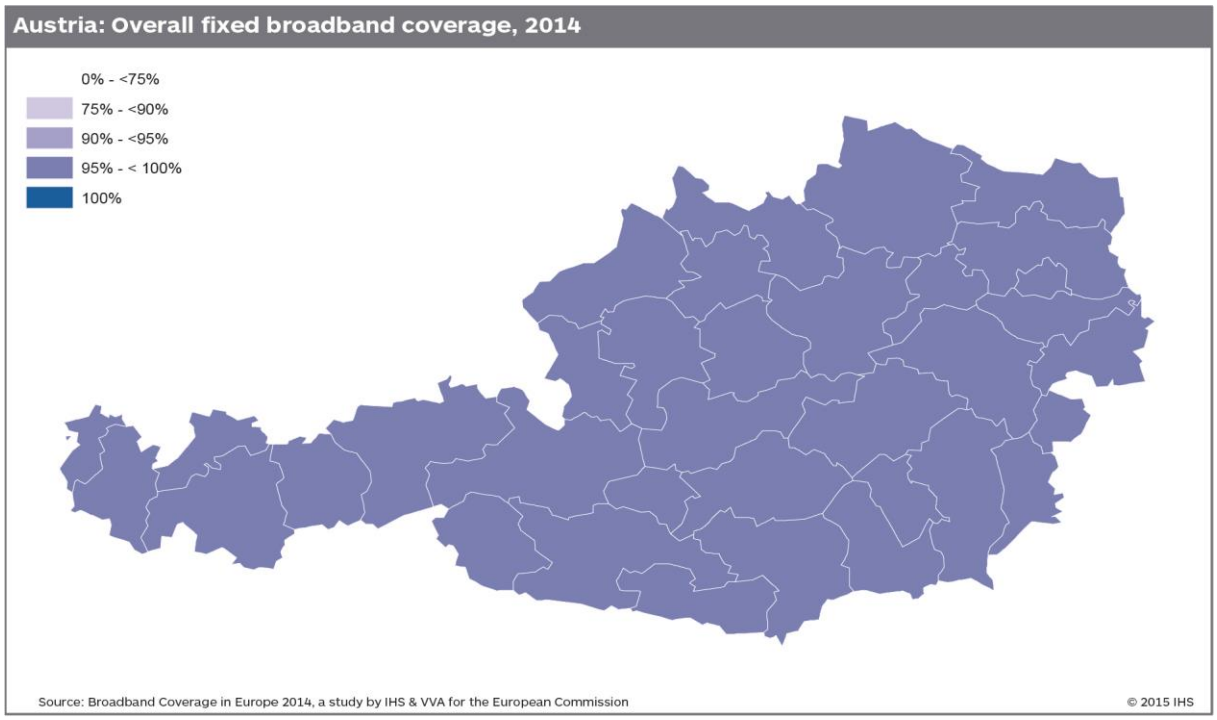


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Austria	88.9%	2.4%	2.1%	18.0%	17.2%	17.2%	85.0%	4.6%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

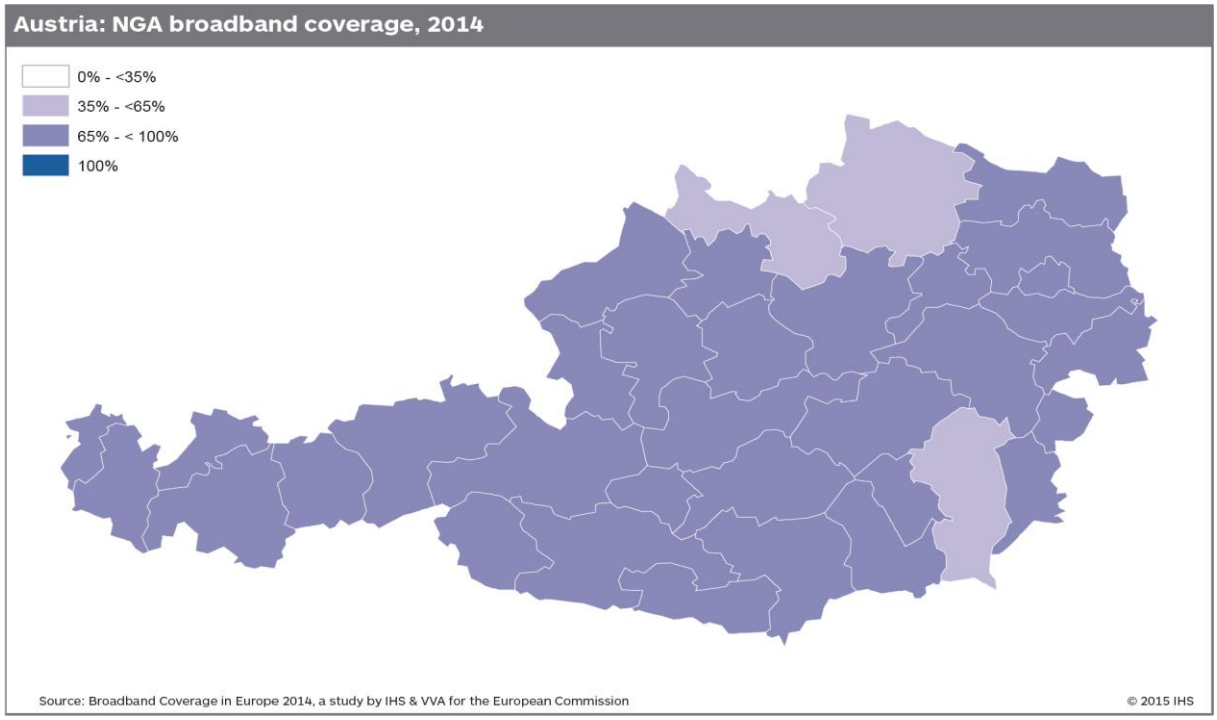
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.1.2 Regional coverage by broadband technology

Across the individual regions, improvements in overall fixed broadband coverage were modest, with only one region, Osttirol, seeing an increase exceeding one percentage point.



Regional NGA coverage improved considerably compared to 2013, with all but three regions (Mühlviertel, Waldviertel, and Oststeiermark) recording coverage higher than 65%. Most regions saw two digit percentage point increases, with the exception of Vienna and surrounding areas, where similar gains were made in the previous year and where NGA coverage was already considerably higher than the national average. In 2014 Vienna became the only region in Austria with near complete (99.98%) fixed and NGA broadband coverage.



5.1.3 Regulatory and market overview

In November 2012, Austria adopted a new broadband strategy entitled “Broadband Strategy 2020” with the Federal Ministry of Transport, Innovation and Technology (BMVIT) overseeing its implementation. The main goals outlined in the strategy were:

- Provision of broadband access of at least 25 Mbps to the whole population by 2013;
- Provision of high-speed internet access in urban areas (70% of households) by 2018;
- Provision of nearly universal (99% of households) ultra-high-speed (100 Mbps or higher) internet access by 2020.

This document remains the key policy initiative aiming at improving broadband coverage in Austria. In order to achieve the goal of near universal 100 Mbps broadband coverage, the Austrian government announced a three-phase plan utilizing funds of up to EUR 1 billion raised through the LTE frequency auction held in 2013.[4] The first phase, set to start in 2015, is aimed at preparation for NGA networks deployment by subsidising underserviced communities to insert empty cable pipes in the ground when digging for other purposes and thus avoiding trenching costs later on.[5] The government subsidy is technology agnostic but it is conditioned by equal funds being invested by network operators.

The fixed broadband market in Austria is split between two key technologies, namely DSL and cable. The incumbent, A1 Telekom Austria, and Tele 2 are the two main DSL providers. Although DSL services are also offered by the leading cable provider UPC Austria. Other major cable ISPs include the largely regionally-based Salzburg Cable, Liwest (Linz-Urfahr area) and Kabelplus (Lower Austria). A1 Telekom Austria also offers FTTP services. Most other FTTP providers are small and local companies. For example, the Wien Energy company offers its Blizznet FTTP service in the Vienna area.

In reaction to the government broadband investment strategy, A1 Telekom Austria, declared in November 2014 that it will invest EUR 400 million to expand its high-speed network over three years. Historically, A1 Telekom Austria has adopted a convergent network strategy focused largely on demand-driven mainly fibre-to-the-curb (FTTC, i.e. VDSL) network rollout with “Vectoring-Ready” hardware, while actively selecting urban and suburban areas for FTTP rollout.

The company was also among the first worldwide to field trial new technology, G.fast, in Vienna in October 2014.[6] G.fast (also called also called FTTdp standing for ‘fibre-to-the-distribution-point’) is yet another technological improvement extending the life existing copper networks. It 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. Deployment scenarios for G.fast vary significantly, but it will provide network operators with an interim step before they or the building owners are ready for fibre optic cables to be led all the way to consumers or in urban areas where replacing the internal wiring of twisted pairs with optical fibre or Ethernet cable in multi-dwelling units is too difficult and costly.

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 offered packages with speeds of up to 250 Mbps download, while Salzburg AG’s offered speeds up to 100 Mbps under its CableLink brand.

[4] http://www.bmvit.gv.at/service/publikationen/telekommunikation/downloads/breitbandoffensive.pdf
[5] http://www.telecompaper.com/news/austria-unveils-broadband-strategy-100-mbps-for-all-by-2020--1070538
[6] http://www.telekomaustria.com/en/newsroom/2014-10-15-first-ultra-broadband-customer-in-the-world-with-g-fast

5.1.4 Data tables for Austria

Statistic	National
Population	8,451,860
Persons per household	2.3
Rural proportion	13.7%

	Austria 2014		Austria 2013		Austria 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	98.4%	88.9%	98.3%	90.6%	98.0%	88.7%	93.5%	82.4%
VDSL	81.6%	2.4%	51.2%	1.3%	50.5%	0.0%	37.6%	15.1%
FTTP	7.1%	2.1%	7.1%	2.2%	6.3%	1.2%	18.7%	5.8%
WiMAX	16.5%	18.0%	17.2%	17.9%	17.2%	17.8%	19.6%	18.5%
Cable	39.1%	17.2%	39.1%	17.5%	35.6%	15.9%	43.5%	10.0%
DOCSIS 3.0	39.1%	17.2%	39.1%	17.5%	35.3%	13.4%	42.7%	9.2%
HSPA	98.0%	85.0%	97.9%	85.0%	97.6%	83.0%	97.3%	88.9%
LTE	60.1%	4.6%	35.0%	0.3%	23.5%	0.2%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	99.3%	94.6%	99.2%	95.5%	99.6%	97.0%	99.4%	97.6%
Overall fixed broadband	99.2%	94.5%	99.1%	95.5%	98.9%	93.8%	96.9%	89.6%
NGA broadband	88.2%	20.2%	70.2%	15.5%	69.5%	14.4%	68.1%	25.1%

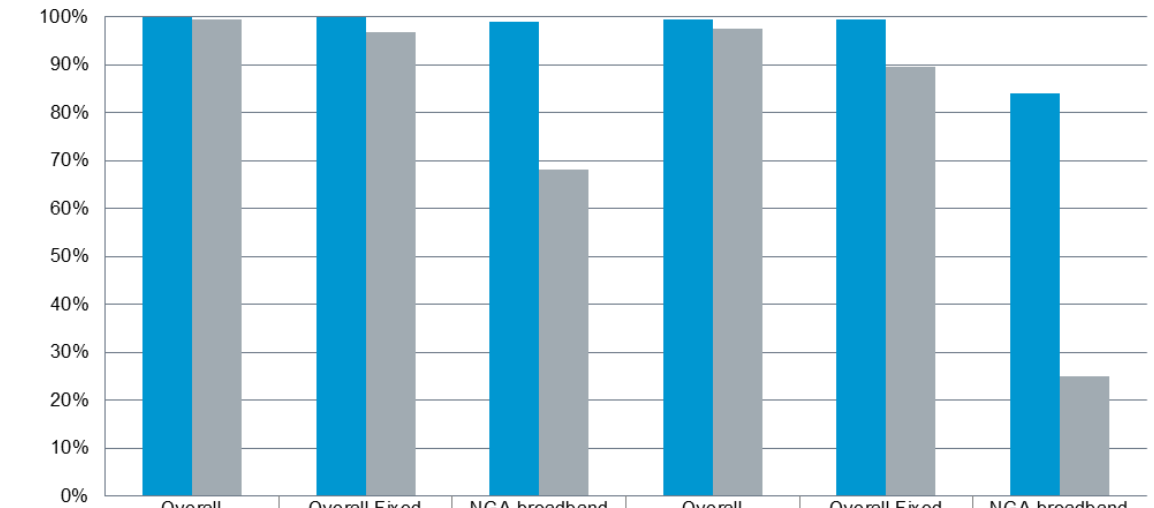
Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

5.2 Belgium

5.2.1 National coverage by broadband technology

In 2014, broadband coverage Belgium remained above the EU average, in particular with regard to NGA technologies. Belgium is one of the few countries with NGA coverage levels approaching those of the overall fixed broadband coverage. Moreover, rural NGA coverage increased significantly from 74.9% rural homes covered in 2013 to 84.0% rural households having access to high-speed broadband in 2014.

Belgium: Coverage by technology combination, 2014



	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%	98.8%	99.5%	99.4%	84.0%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

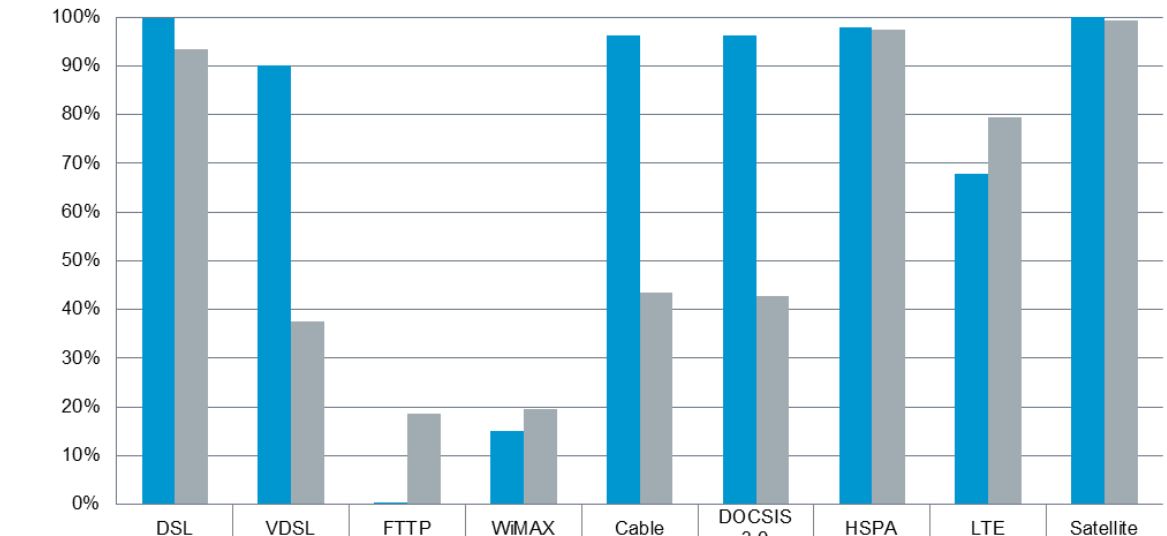
Given the high coverage levels across the leading fixed technologies recorded in previous years, no major increases were recorded in 2014. Significant improvements were reported for VDSL coverage, which increased by 1.5 percentage points and reached 90.0% of Belgian households.

Of the remaining next generation technologies, both DOCSIS 3.0 and FTTP recorded similar coverage levels to 2013. DOCSIS 3.0 networks passed 96.2% of homes across Belgium, while FTTP coverage remained negligible (0.4%).

LTE recorded the most significant coverage increase, growing 22.3 percentage points to 67.8% homes passed at the end of 2014. This reflects the continued LTE rollout in Belgium, which started with the incumbent, Belgacom, launching the first national commercial LTE network in 2012[7], followed by KPN's Base in 2013[8]. In 2014, two additional operators Mobistar and b•lite started offering their LTE services. Nevertheless, Belgian LTE coverage still remains below the EU average of 79.4%.

[7] http://www.eurocomms.com/industry-news/49-online-press/8669-belgacom-launches-commercial-4g-lte-service-in-belgium
[8] http://www.fiercewireless.com/europe/press-releases/base-belgium-launches-lte

Belgium: Coverage by technology, total, 2014

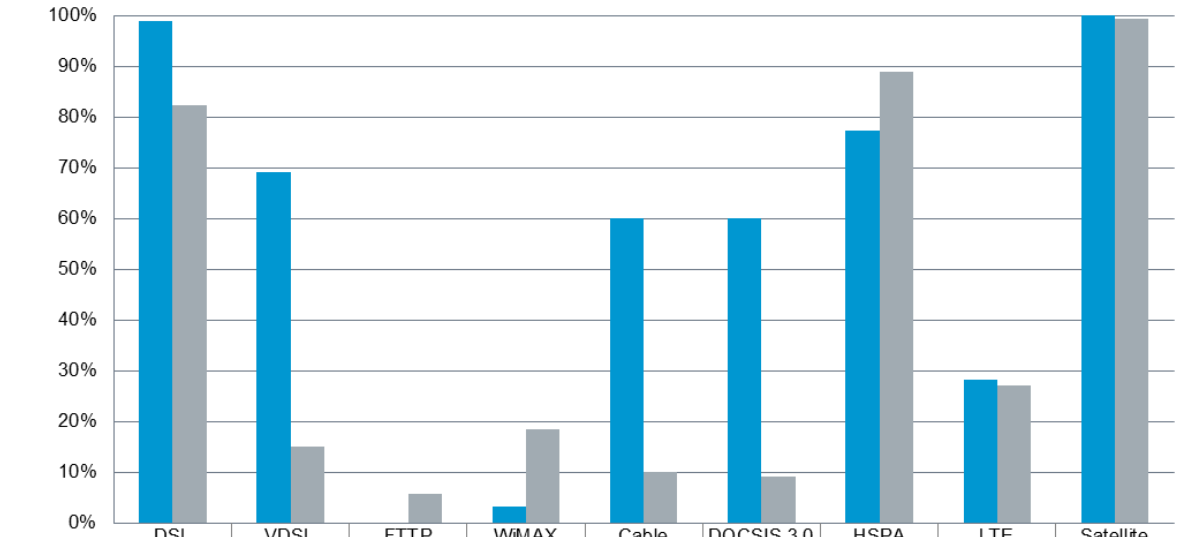


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Belgium	99.9%	90.0%	0.4%	15.1%	96.2%	96.2%	97.8%	67.8%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

In rural areas, DSL remained the main broadband access technology covering 98.8% of rural households. It was followed by VDSL, which was available to 69.2% rural households and increased by 11.4% percentage points compared to 2013. Rural DOCSIS 3.0 remained approximately the same as in 2013, passing 60.1% of homes in rural areas. As on national level, LTE coverage continued to grow rapidly in rural areas, with a 24.2 percentage point increase in coverage recorded during 2014. At the end of 2014, rural LTE coverage reached 28.2%, just above the EU average of 27%.

Belgium: Coverage by technology, rural areas, 2014

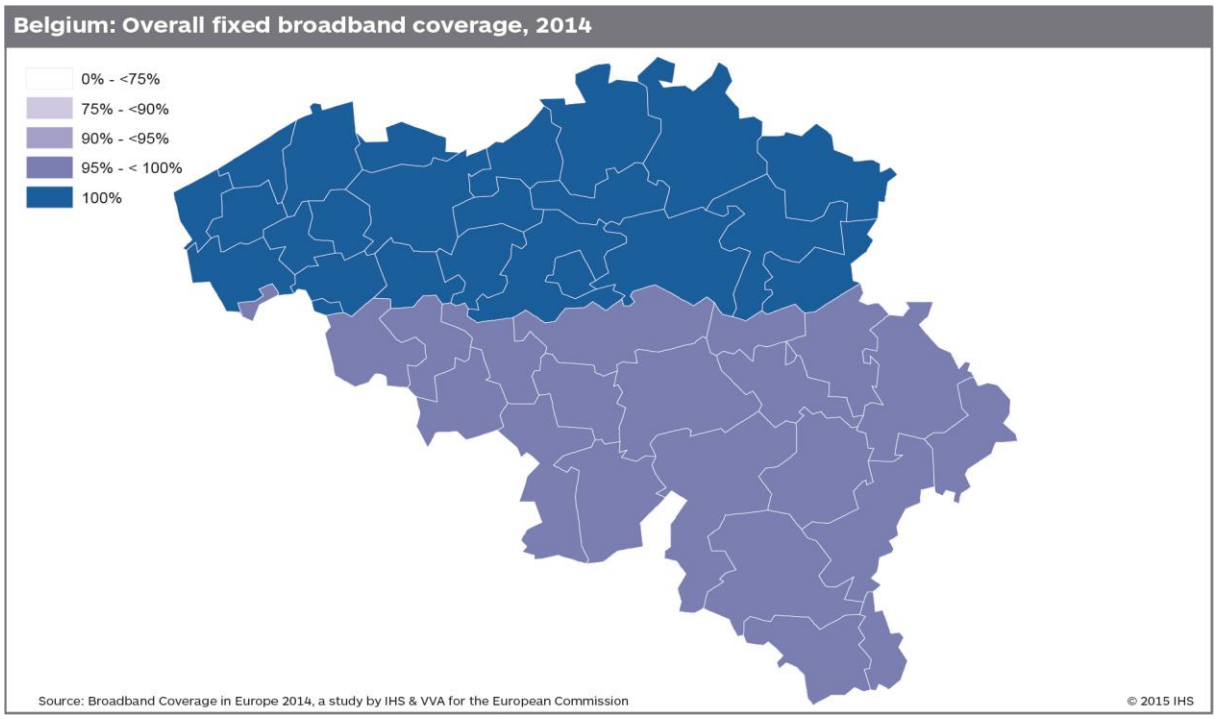


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Belgium	98.8%	69.2%	0.0%	3.3%	60.1%	60.1%	77.4%	28.2%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

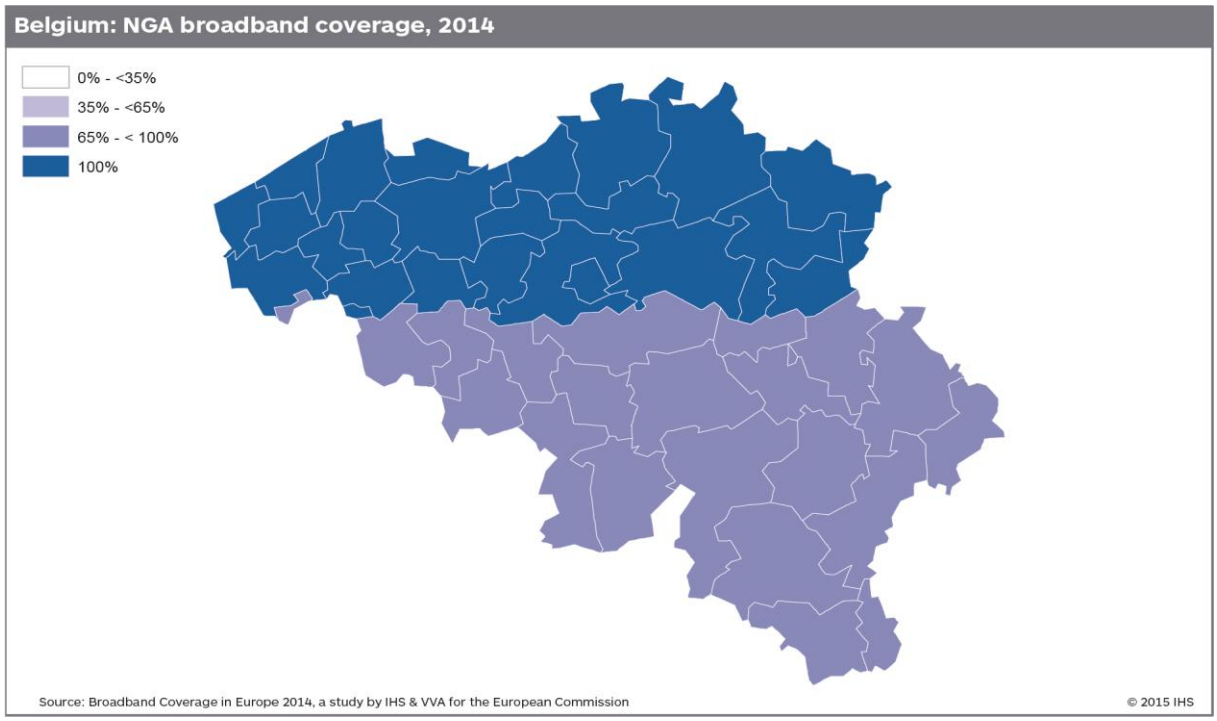
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.2.2 Regional coverage by broadband technology

Regional-level fixed broadband coverage figures show high fixed broadband coverage across the country, with no region reporting coverage levels under 99%. Similarly, no substantial changes in fixed broadband coverage were observed across any of the regions.



With regards to NGA technologies, more regional variation could be observed, although only two regions recorded NGA coverage under 80% (Bastogne and Neufchâteau). Similarly to fixed coverage, no substantial changes were reported throughout 2014, with only one region reporting an increase in NGA higher than one percentage point (1.5 percentage point increase in NGA coverage in Tongeren).



5.2.3 Regulatory and market overview

Belgian national broadband strategy 'Belgium – The digital heart of Europe (2010 – 2015)'[9], was presented in 2009 and its targets included broadband connections for 90% of the population by 2015, the provision of more than 50% of school children with a laptop or netbook (up from 12.5% in 2009) and the expansion of mobile internet use to at least 50% of the population. An updated strategy, 'Digital Belgium', was introduced in April 2015 with primary focus on lowering costs and reducing administrative burden in order to facilitate the continuous deployment of an advanced broadband infrastructure by operators[10].

Belgium's fixed broadband market is split between two main providers, the incumbent DSL provider Belgacom (operating under the Proximus brand name since September 2014) and Telenet, a cable operator, who together account for over 80% of the market. Smaller market players include Tecteo, Brutele, KPN and Orange. The former two focus on cable networks and the latter on DSL.

Since January 2014, Belgacom has focused on extensive commercial deployment of VDSL 2 vectoring infrastructure across the country and thus increasing delivery speeds from 30 Mbps to 70 Mbps on copper lines. The company aims to complete the upgrade of its entire VDSL 2 network comprising 22,000 remote cabinets by 2016.[11]

With regards to mobile broadband, further LTE deployment and network upgrades are the main priorities for national telecoms operators. Belgacom and Base, who launched LTE networks in 2012 and 2013 respectively, were followed by Mobistar and b•lite in 2014. In addition, in 2014 Belgacom[12], Mobistar[13] and Base[14] tested LTE-Advanced networks in the country.

[9] http://www.awt.be/contenu/tel/dem/DigitalBelgiumFR.pdf
[10] http://www.digitalbelgium.be/sites/default/files/downloads/adc_digital_engels.pdf
[11] http://www.proximus.com/en/news/belgacom-and-alcatel-lucent-activate-world%E2%80%99s-first-nationwide-vdsl2-vectoring-network
[12] http://www.lesoir.be/696754/article/economie/2014-11-03/proximus-lance-4g-dans-quatre-villes-belges
[13] http://telecoms.com/258172/belgiums-mobistar-trials-lte-a/
[14] http://www.basecompany.be/en/about-us/press/lte-advanced.html

5.2.4 Data tables for Belgium

Statistic	National
Population	11,161,642
Persons per household	2.4
Rural proportion	4.4%

	Belgium 2014		Belgium 2013		Belgium 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	99.9%	98.8%	99.9%	98.9%	99.8%	97.0%	93.5%	82.4%
VDSL	90.0%	69.2%	88.5%	57.8%	81.0%	55.9%	37.6%	15.1%
FTTP	0.4%	0.0%	0.4%	0.0%	0.2%	0.0%	18.7%	5.8%
WiMAX	15.1%	3.3%	15.2%	3.3%	14.7%	3.1%	19.6%	18.5%
Cable	96.2%	60.1%	95.9%	59.8%	95.9%	58.9%	43.5%	10.0%
DOCSIS 3.0	96.2%	60.1%	95.9%	59.8%	95.9%	58.9%	42.7%	9.2%
HSPA	97.8%	77.4%	98.8%	75.8%	98.7%	75.4%	97.3%	88.9%
LTE	67.8%	28.2%	45.6%	3.9%	0.0%	0.0%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	99.9%	99.5%	99.9%	99.6%	n/a	n/a	99.4%	97.6%
Overall fixed broadband	99.9%	99.4%	99.9%	99.6%	99.96%	97.3%	96.9%	89.6%
NGA broadband	98.8%	84.0%	98.3%	74.9%	96.8%	65.4%	68.1%	25.1%

Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

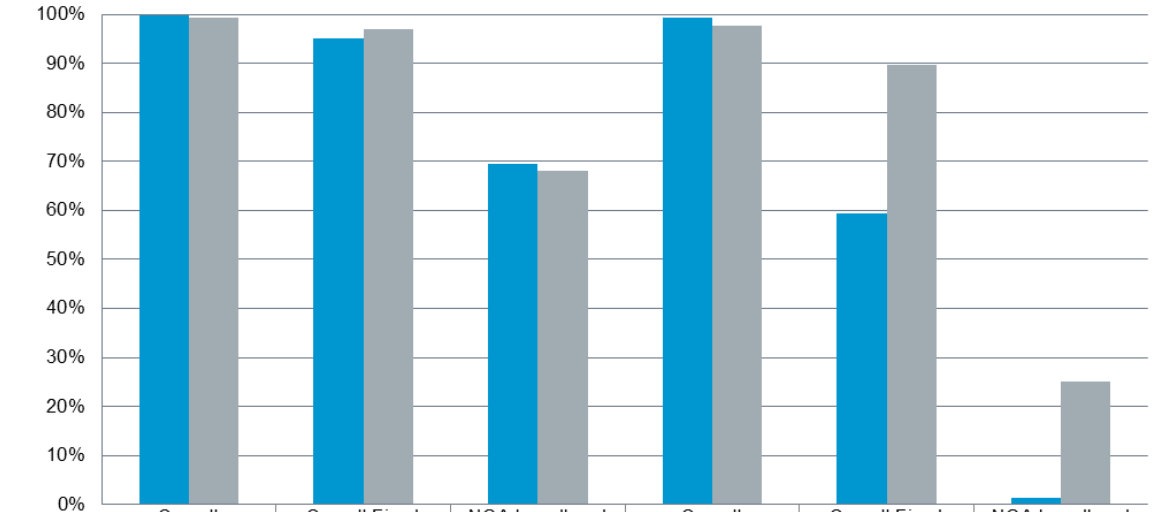
5.3 Bulgaria

5.3.1 National coverage by broadband technology

Throughout 2014, fixed broadband coverage in Bulgaria remained below the EU average on both national and rural level. On national level, fixed broadband coverage grew by 2.6 percentage points to 95.1%, a second highest growth among the study countries after Estonia. This increase resulted in narrowing of the gap between the fixed broadband coverage in Bulgaria and that in the EU (1.8 percentage points compared to a five percentage point difference in 2013). However, there continued to be a significant gap between rural fixed coverage in Bulgaria and the EU average on a rural level, which exceeded 30 percentage points with less than two-thirds (59.4%) rural Bulgarian households covered compared to nearly 9 in 10 (89.6%) rural homes passed on average across the EU.

In terms of NGA coverage, Bulgaria maintained higher than average total NGA coverage in 2014 with at least one NGA technology passing 69.4% of households, compared to EU average of 68.1%. However, the gap between the EU average and Bulgarian NGA coverage shrunk significantly from nearly 6 percentage point difference in 2013 to just 1.3 percentage points in 2014 pointing to a more rapid pace of NGA deployments across the EU than in Bulgaria, where NGA coverage grew by less than two percentage points in the course of the year. In rural areas, NGA coverage recorded minor improvements growing from 0.2% in 2013 to 1.4% rural homes passed by high-speed networks in 2014 and rural NGA coverage remained one of lowest in the EU.

Bulgaria: Coverage by technology combination, 2014



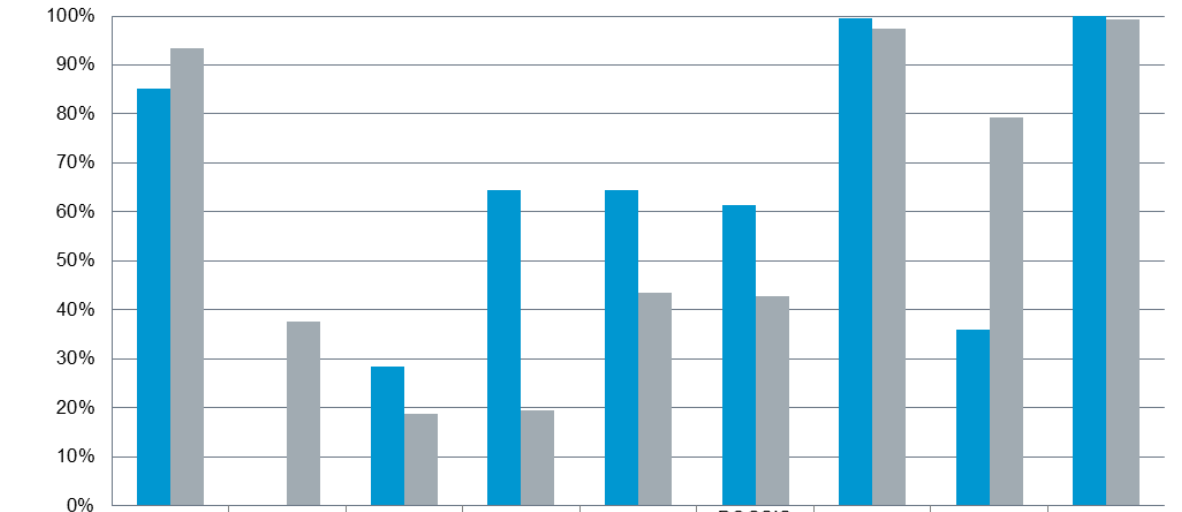
	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Bulgaria	99.9%	95.1%	69.4%	99.3%	59.4%	1.4%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

With regards to individual technologies, DSL continued to be the main driver of fixed coverage in Bulgaria, although at 85.1% it remained below the EU28 average (93.5%). While no gains in DSL coverage were recorded in 2014, cable coverage improved during the year, reaching 64.5%, the same coverage level as WiMAX networks. This increase and relatively high WiMAX coverage have however not been sufficient to offset the below-average DSL coverage, which is the main reason for the relatively low fixed broadband coverage in the country.

NGA coverage relied primarily on DOCSIS 3.0, which extended to 61.4% of households as cable networks continued to be upgraded. As in previous years, no coverage was reported for VDSL in Bulgaria. At 28.3%, FTTP coverage exceeded the EU average and also contributed to the NGA coverage in the country. The 5.5 percentage point increase in FTTP coverage can be attributed to the Bulgarian incumbent, Vivacom, which invested considerably in the deployment of FTTP technology, as well as a large number of other smaller providers, which also invested in the fibre-optic market.

Bulgaria: Coverage by technology, total, 2014



	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Bulgaria	85.1%	0.0%	28.3%	64.6%	64.5%	61.4%	99.6%	36.1%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

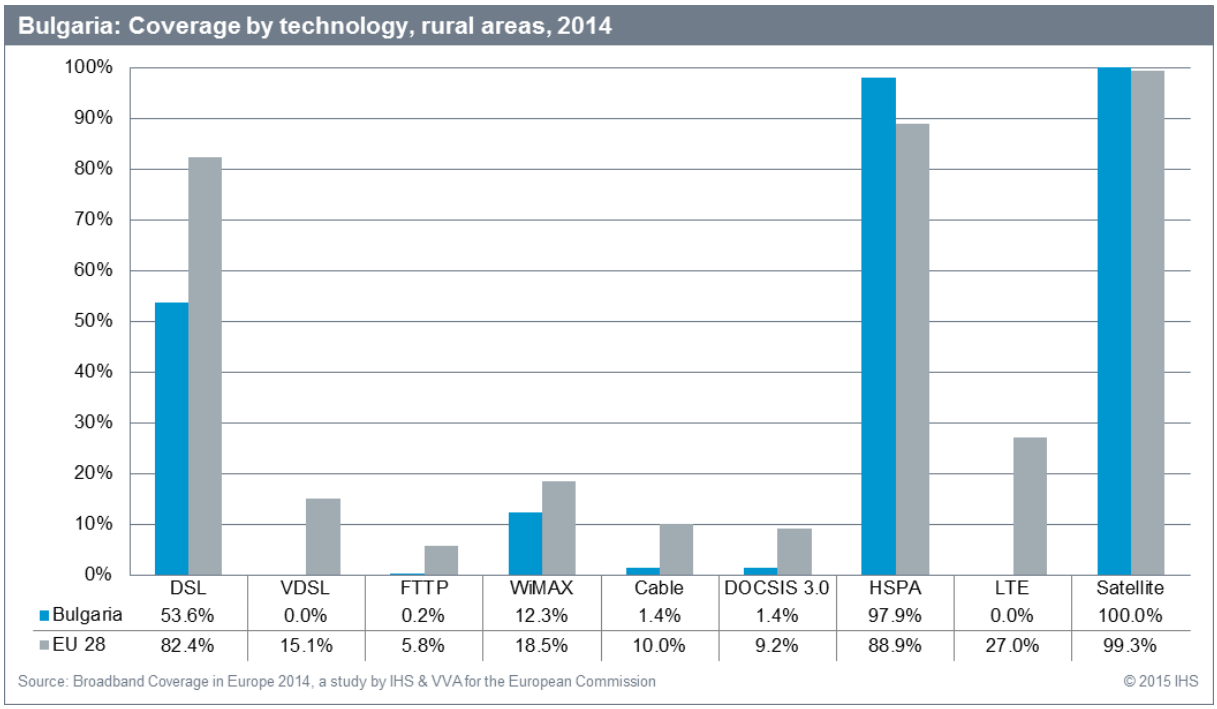
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

With regards to 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 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 the 2013 and 2014 analysis.

While in 2013 no LTE coverage was recorded in Bulgaria, the launch of LTE by Max Telecom in 2014 resulted in the technology reaching 31.6% of households by the end of the year.

Coverage in rural areas remains problematic in Bulgaria. Rural DSL coverage continued to lag behind the EU average by almost 30 percentage points, while WiMAX was the only other technology substantially contributing to fixed broadband coverage in rural areas, passing 12.3% of rural homes.

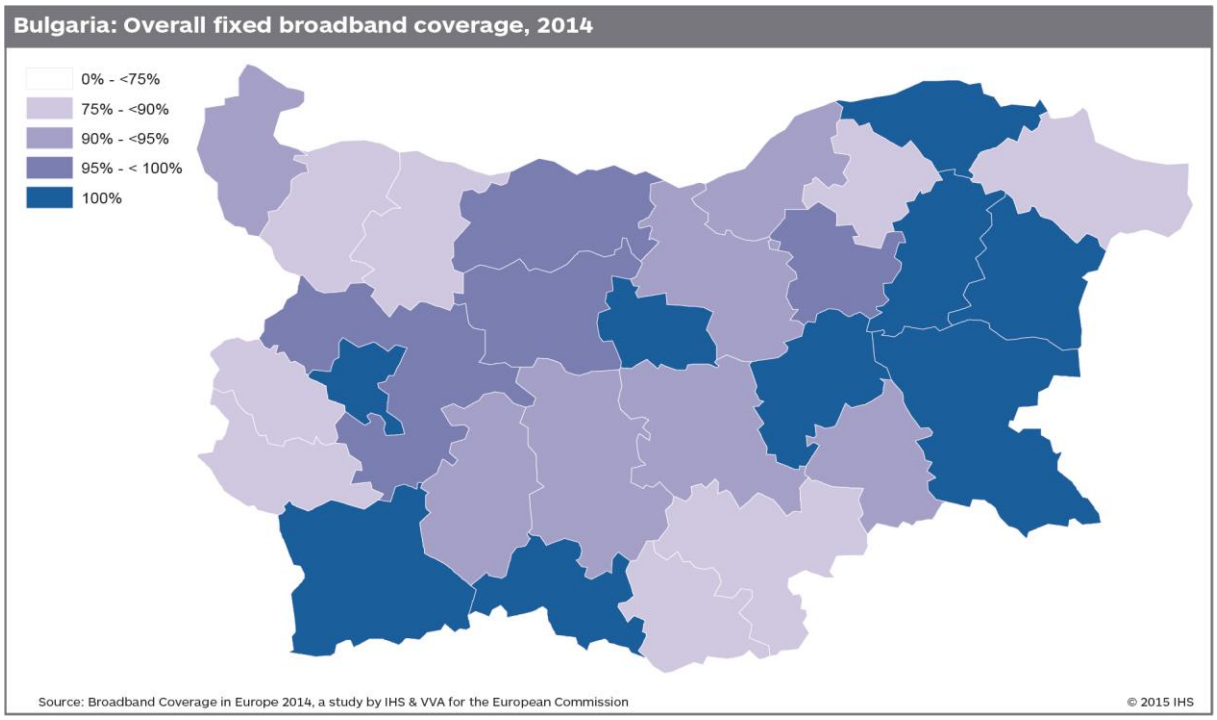
DOCSIS 3.0 is the only NGA technology available to rural population but it covered only 1.4% of households at the end of 2014. FTTP technology became available to a total of 0.2% of rural households in 2013 due to a FTTP rollout in the region surrounding the Bulgarian capital, but no further network expansion took place in 2014. While the rural NGA situation still represents an improvement over 2013, Bulgaria remains one of the three countries with the lowest NGA coverage, along with Italy and Greece.



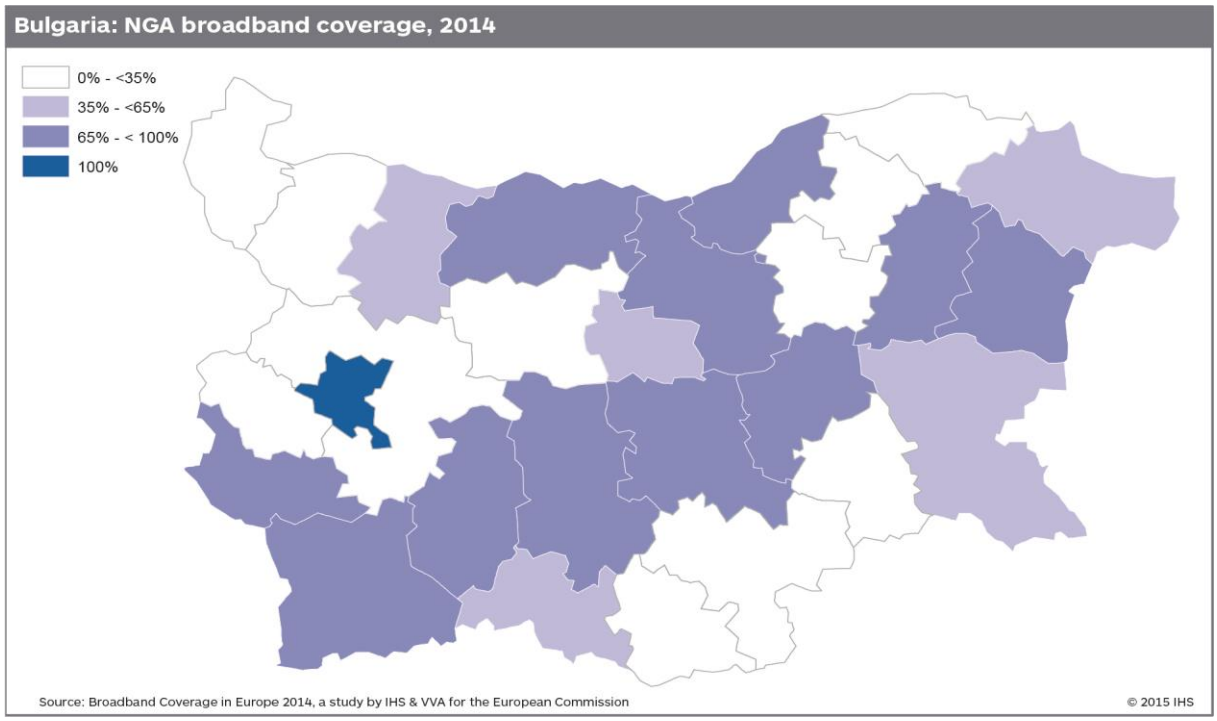
Although no LTE networks were available in rural areas in 2014, Bulgaria does benefit from relatively high HSPA coverage, which reached 97.9% of rural households, above the EU average of 88.9%.

5.3.2 Regional coverage by broadband technology

There is considerable variation in coverage levels across individual regions in Bulgaria. While there are eight regions reporting complete fixed broadband coverage, which include urban centres such as Sofia and touristic areas along the Black Sea coast, others recorded lower levels, such as around 82% in Haskovo, below both the Bulgarian and EU average.



Even greater variation in coverage levels can be observed for NGA technologies, with some regions lagging considerably behind the complete NGA coverage recorded in Sofia.



5.3.3 Regulatory and market overview

Bulgaria's national digital strategy was first articulated in 2009 and subsequently updated in 2013 laying out broadband development plans up to 2015 with an objective of universal broadband coverage and 100 Mbps downstream broadband for 50% of households by 2020[15]. The strategy remained the key document guiding Bulgarian broadband policy throughout 2014.

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. Vivacom launched its FTTP network rollout in 2011 with an objective of reaching one million households by 2014 and initial investment of EUR600 million[16]. At the end of 2014, Vivacom announced its fibre network offering up to 100 Mbps download connection speeds passed more than 800 thousand homes[17].

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

As noted above, upgrade of cable network to DOCSIS 3.0 has been a significant driver of NGA coverage in Bulgaria and in 2014 more than 95% of cable network was alerady upgraded to DOCSIS 3.0. The country's main cable operator, Blizoo, has been upgrading its network since 2011 with a EUR50 million investment[18] and begun offering connections of up to 200 Mbps, following the 2014 launch of modems supporting DOCSIS 3.0 technology[19].

One of the key market developments in Bulgaria in 2014 was the commercial launch of LTE services by Max Telecom, the first operator to introduce LTE technology in the country[20]. Despite previous trials and granting of licenses to other providers (4G Com EAD and Bulsatcom), no other providers launched an LTE network in 2014.

[15] http://ec.europa.eu/digital-agenda/en/country-information-republic-bulgaria

[16] http://www.telegeography.com/products/commsupdate/articles/2011/06/23/vivacom-to-invest-eur600-million-in-network-upgrade/

[17] http://www.vivacom.bg/en/about/about-us/company/investors/news

[18] http://www.broadbandtvnews.com/2010/05/19/leading-bulgarian-cableco-becomes-blizoo/

[19] https://www.telegeography.com/products/commsupdate/articles/2015/04/07/blizoo-upgrades-broadband-speeds-to-200mbps/

[20] http://maxtelecom.bg/en/about/news/max-telecom-announces-the-commercial-launch-of-the-first-4g-lte-network-in-bulgaria

5.3.4 Data tables for Bulgaria

Statistic	National
Population	7,245,677
Persons per household	2.4
Rural proportion	19.9%

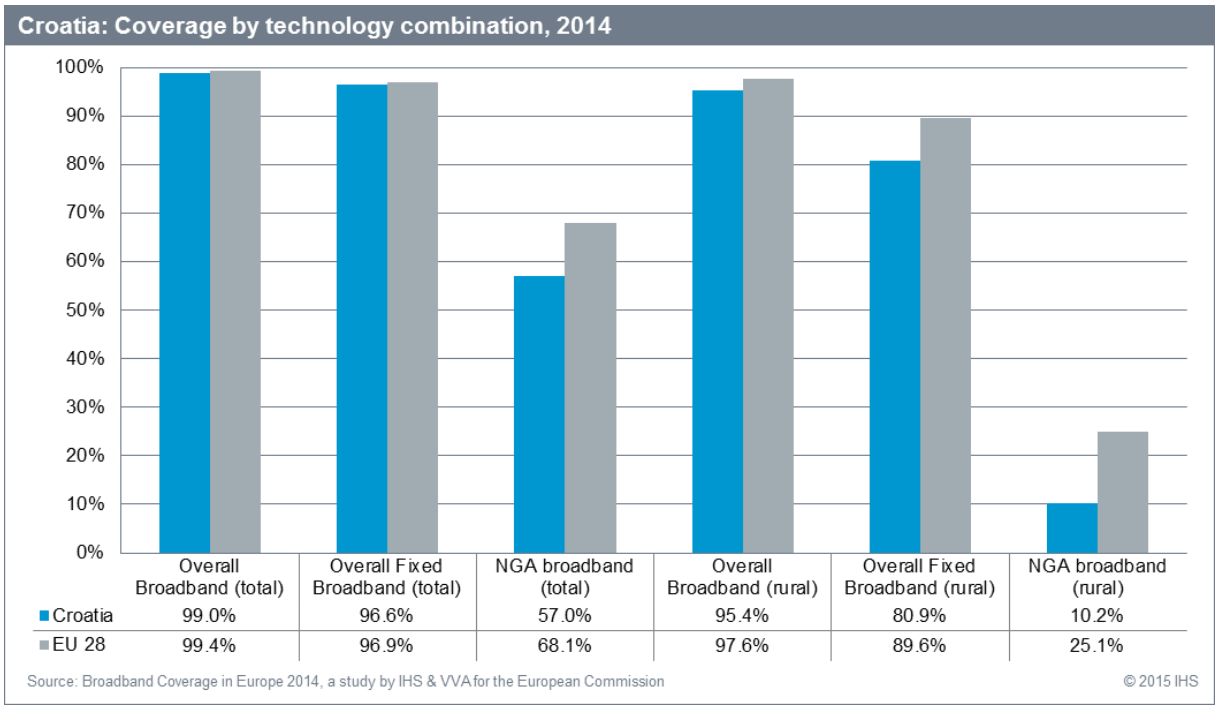
	Bulgaria 2014		Bulgaria 2013		Bulgaria 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	85.1%	53.6%	85.0%	53.5%	85.1%	53.5%	93.5%	82.4%
VDSL	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	37.6%	15.1%
FTTP	28.3%	0.2%	22.9%	0.2%	7.3%	0.0%	18.7%	5.8%
WiMAX	64.6%	12.3%	64.6%	12.3%	21.1%	11.9%	19.6%	18.5%
Cable	64.5%	1.4%	62.5%	0.0%	57.1%	0.0%	43.5%	10.0%
DOCSIS 3.0	61.4%	1.4%	57.7%	0.0%	57.1%	0.0%	42.7%	9.2%
HSPA	99.6%	97.9%	99.6%	98.5%	99.4%	97.0%	97.3%	88.9%
LTE	36.1%	0.0%	0.0%	0.0%	0.0%	0.0%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	99.9%	99.3%	99.8%	99.3%	99.8%	99.0%	99.4%	97.6%
Overall fixed broadband	95.1%	59.4%	92.5%	59.8%	89.6%	59.2%	96.9%	89.6%
NGA broadband	69.4%	1.4%	67.7%	0.2%	60.7%	0.0%	68.1%	25.1%

Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

5.4 Croatia

5.4.1 National coverage by broadband technology

In 2014, fixed broadband coverage in Croatia remained stable and just 0.4 percentage points below the EU average. Croatia however experienced considerable improvement in NGA coverage in 2014, which increased on national level by 23.7 percentage points to 57.0% homes passed and rural NGA coverage grew from zero to 10.2% rural households having access to high-speed broadband service at the end of the year.



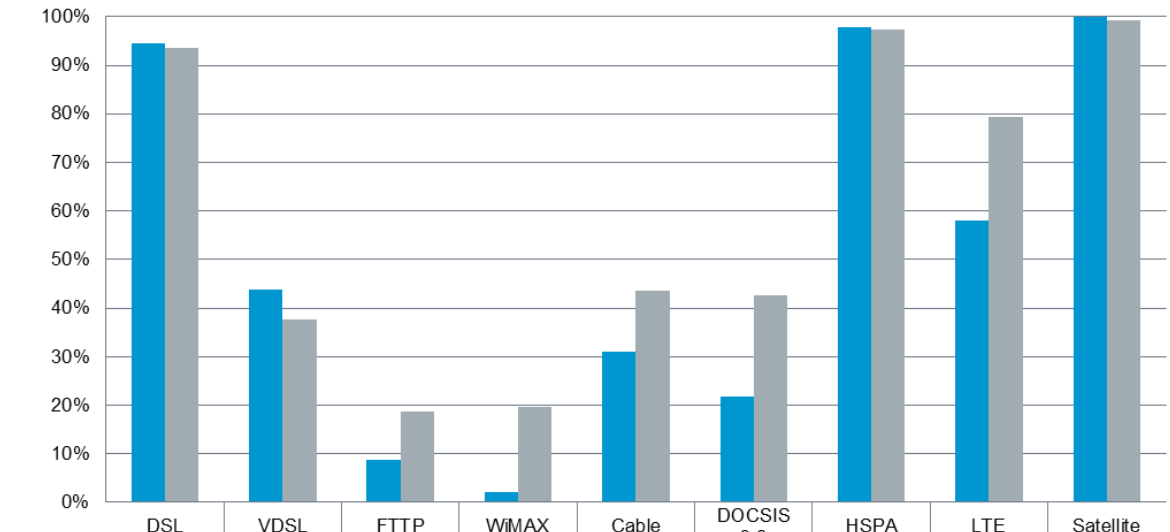
Looking at the individual technologies, DSL continued to be the leading fixed broadband technology and was available to 94.6% of households across Croatia, slightly above the EU28 average of 93.5%.

While previous gains in NGA coverage were mostly due to DOCSIS 3.0 expansion, VDSL was the main driver of NGA coverage in 2014. Due to extensive VDSL deployment primarily by the incumbent, T-Hrvatski Telekom, VDSL coverage increased by 27 percentage points and 43.8% of Croatian households were passed by the technology at the end of 2014. Coverage gains for other NGA technologies (FTTP and DOCSIS 3.0) were modest by comparison, as they did not exceed three percentage points.

As for mobile broadband technologies, LTE coverage registered significant gains and reached 58.1% households by the end of 2014 compared to 24.4% in 2013. This reflects earlier rollouts from the main mobile telecommunications providers, such as T-Hrvatski Telekom and VIPNet, which both launched LTE services in 2012. The increase in coverage can in particular be attributed to T-Hrvatski Telekom, which further expanded its LTE network to a number of cities and towns such as Karlovac, Makarska, Delnica, Pazin, Drnis and others in 2014[21].

[21] https://www.telegeography.com/products/commsupdate/articles/2014/03/25/t-ht-expands-lte-to-new-towns/

Croatia: Coverage by technology, total, 2014

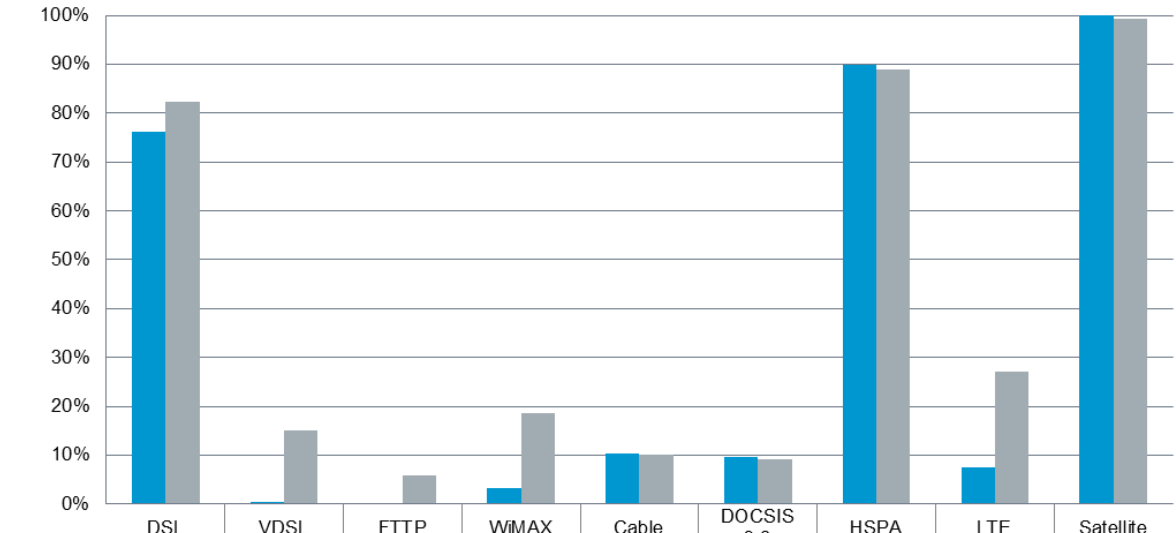


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Croatia	94.6%	43.8%	8.8%	2.0%	31.0%	21.8%	97.7%	58.1%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

In rural areas, analysis of data provided by operators showed cable coverage reached 10.2% rural households with 9.7% rural households having access to high-speed DOCSIS 3.0 cable connections. The previously unrecorded availability of DOCSIS 3.0 in rural areas also led to the aforementioned increase in in rural NGA coverage. But despite these gains, rural NGA coverage in Croatia remains considerably lower than the EU average of 25.1%.

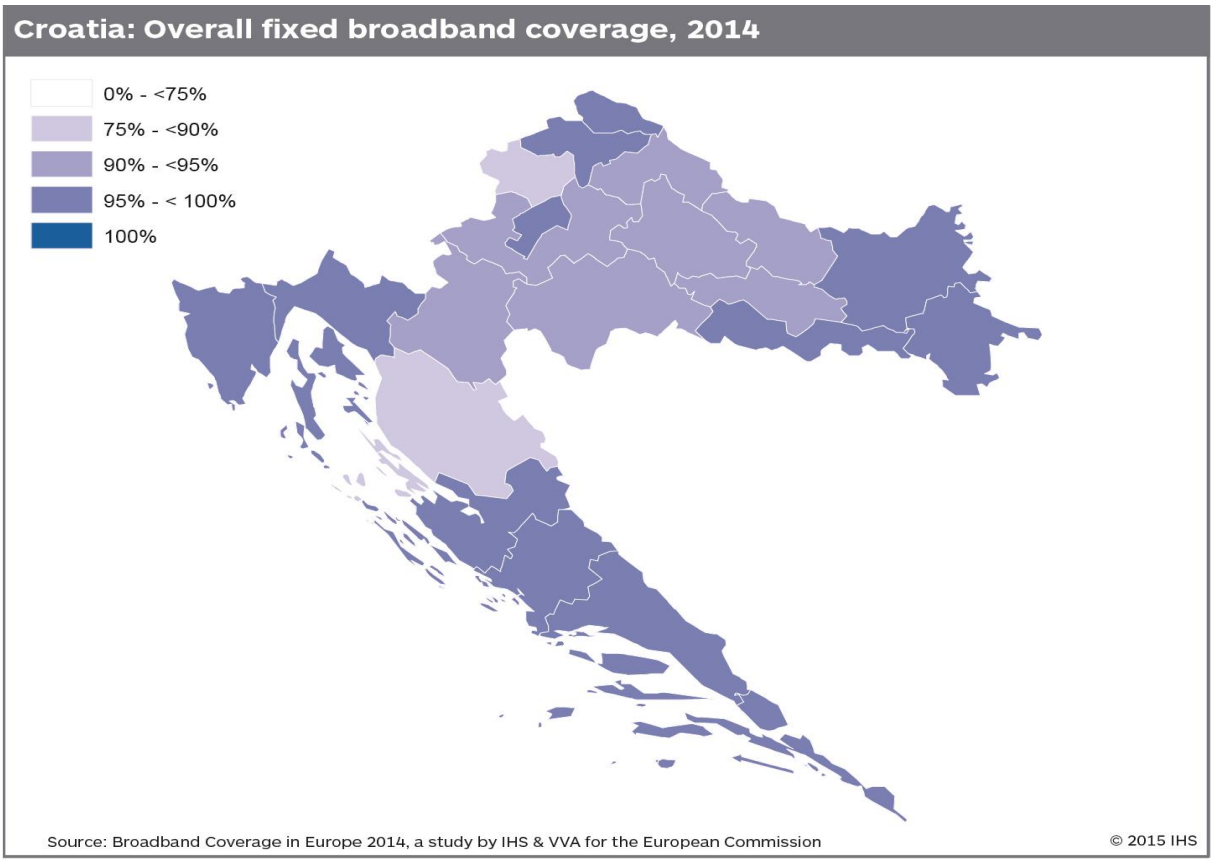
Croatia: Coverage by technology, rural areas, 2014



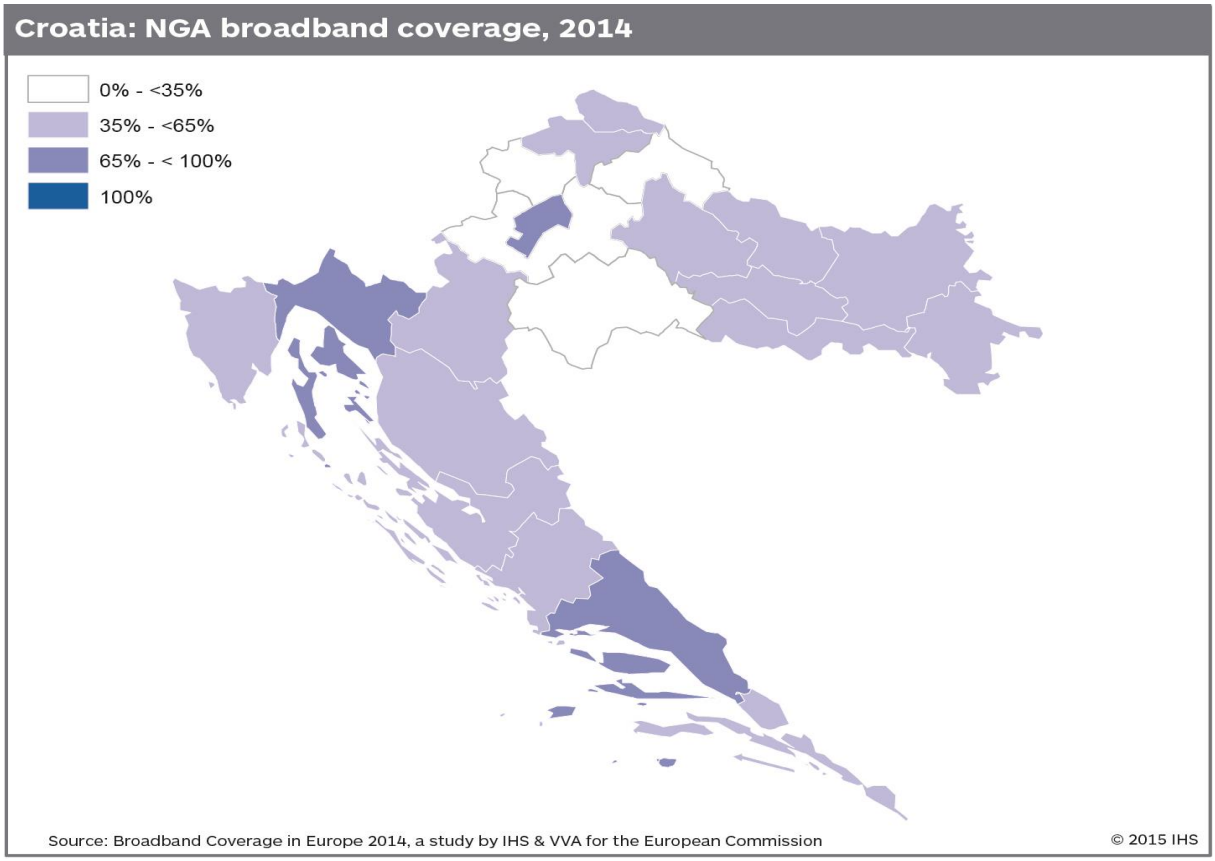
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Croatia	76.1%	0.5%	0.0%	3.2%	10.2%	9.7%	89.9%	7.5%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.4.2 Regional coverage by broadband technology



In terms of regional patterns, all regions except for two (Krapinsko-zagorska and Licko-senjska zupanija regions) recorded fixed broadband coverage levels exceeding 90%.



With regards to NGA coverage, there is considerable regional variation, with coverage levels ranging from just above 20% homes passed in Krapinsko-zagorska region to over 80% of households having access to NGA services in Zagreb. A catch-up effect can be observed, with some regions seeing a considerable increase in NGA coverage compared to 2013. For instance, in the case of Licko-senjska zupanija NGA coverage increased by 48 percentage points to reach more than half of all households at the end of 2014.

5.4.3 Regulatory and market overview

The 'Strategy for Broadband Development in the Republic of Croatia 2012 – 2015' published in 2011 remained the key element of the policy framework in the country in 2014[22]. Specific targets outlined in the strategy included 75% fixed coverage by basic broadband services (greater than 2 Mbps) by the end of 2013 and 35% fixed coverage by high-speed broadband offering connections with speeds higher than 30 Mbps by the end of 2015. Additional targets set 90% of the population to have access to fixed or mobile broadband access (greater than 2 Mbps) by the end of 2013 and 50% to have fixed or mobile access via broadband faster than 30% 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 a cable operator, Vipnet. Other alternative providers operate mostly on local basis providing FTTP and WiMAX services.

In August 2014, T-Hrvatski Telekom announced a five-year plan to outsource construction and upgrade of its telecommunications network to be capable of supporting next-generation fixed and mobile services[23].

LTE services in Croatia were launched in 2012 by T-Hrvatski Telekom and VIPNet. T-Hrvatski Telekom announced further network expansion in March 2014 resulting in the nearly 30 percentage point increase in LTE coverage[24]. Moreover, in December 2014, further frequencies were awarded to T-Hrvatski Telekom and the third largest mobile provider, Tele2, which till now has not introduced its LTE services. With Tele2 now owning its own spectrum, it is possible to expect further increases in LTE coverage across Croatia in the next couple of years.

[22] http://www.mppi.hr/UserDocsImages/w%20StrategyBB%205_12.pdf
[23] http://wire.seenews.com/news/hrvatski-telekom-ericsson-unit-sign-5-yr-managed-services-deal-434832
[24] https://www.telegeography.com/products/commsupdate/articles/2014/03/25/t-ht-expands-lte-to-new-towns/

5.4.4 Data tables for Croatia

Statistic	National
Population	4,262,140
Persons per household	2.8
Rural proportion	22.7%

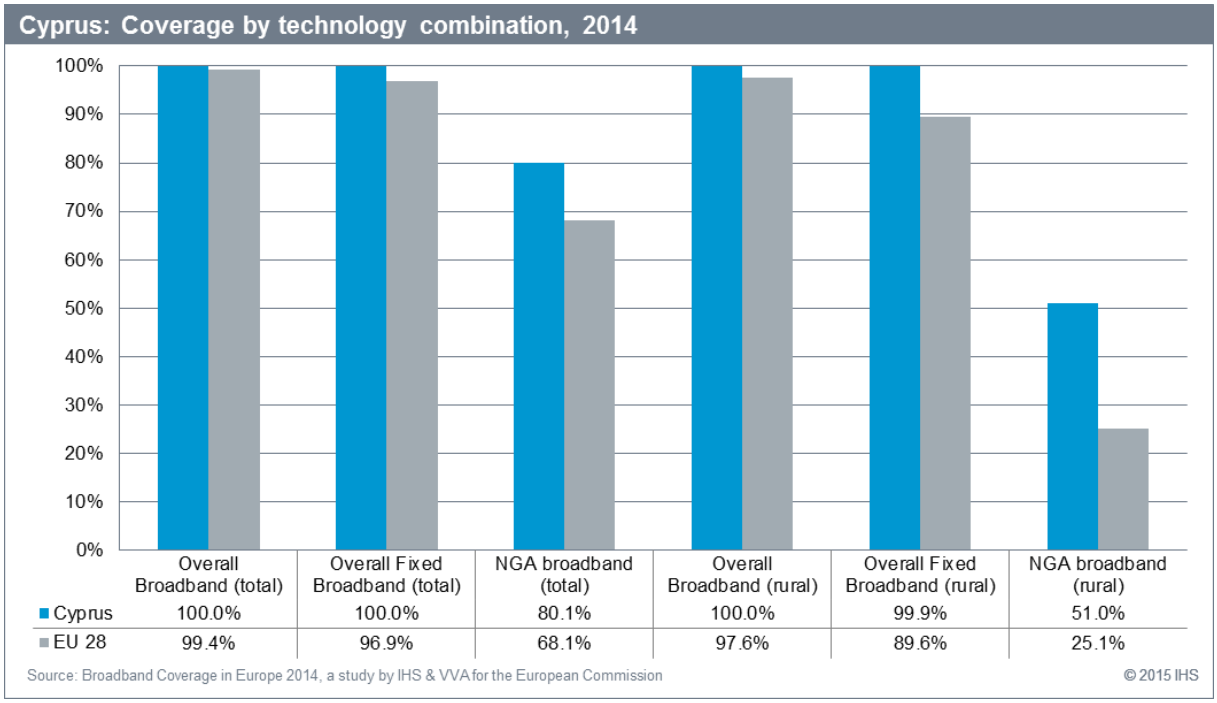
	Croatia 2014		Croatia 2013		Croatia 2012		EU28 2014	
Technology	Total	Rural	Total	Total	Total	Rural	Total	Rural
DSL	94.6%	76.1%	94.3%	74.3%	94.1%	93.5%	93.5%	82.4%
VDSL	43.8%	0.5%	16.8%	0.0%	15.9%	37.6%	37.6%	15.1%
FTTP	8.8%	0.0%	6.9%	0.0%	6.2%	18.7%	18.7%	5.8%
WiMAX	2.0%	3.2%	0.1%	0.2%	0.0%	19.6%	19.6%	18.5%
Cable	31.0%	10.2%	28.4%	4.6%	19.6%	43.5%	43.5%	10.0%
DOCIS 3.0	21.8%	9.7%	19.0%	0.0%	0.0%	42.7%	42.7%	9.2%
HSPA	97.7%	89.9%	94.1%	69.9%	93.1%	97.3%	97.3%	88.9%
LTE	58.1%	7.5%	24.4%	5.3%	25.0%	79.4%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%	99.3%
Overall broadband	99.0%	95.4%	97.6%	87.2%	97.5%	99.4%	99.4%	97.6%
Overall fixed broadband	96.6%	80.9%	97.1%	76.8%	94.1%	96.9%	96.9%	89.6%
NGA broadband	57.0%	10.2%	33.3%	0.0%	19.1%	68.1%	68.1%	25.1%

Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

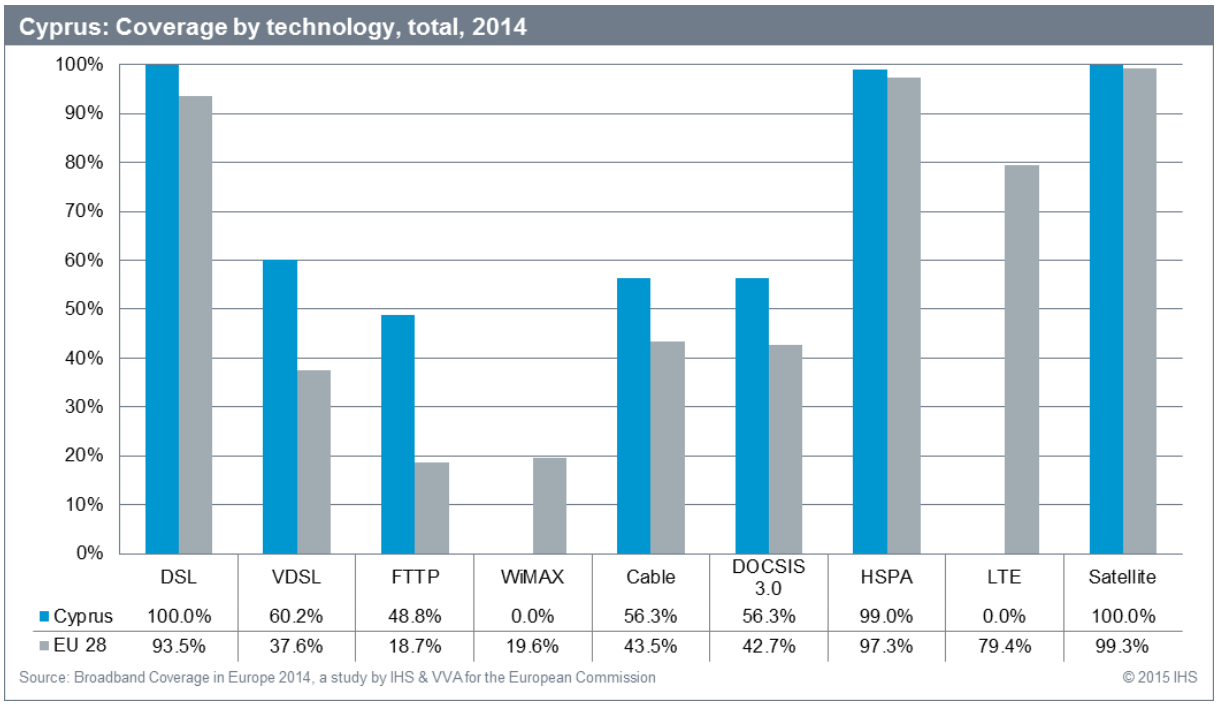
5.5 Cyprus

5.5.1 National coverage by broadband technology

In 2014, Cyprus remained one of the few countries with 100% overall broadband and fixed broadband coverage at national level. It also reported 100% overall rural broadband coverage. NGA coverage at 80.1% of households also significantly exceeded the EU28 average of 68.1%. Rural NGA coverage at 51% was also more than double the EU average.



Looking at individual technologies, coverage in Cyprus exceeded the EU average for all technologies with the exception of WiMAX and LTE, which are not present in the country.

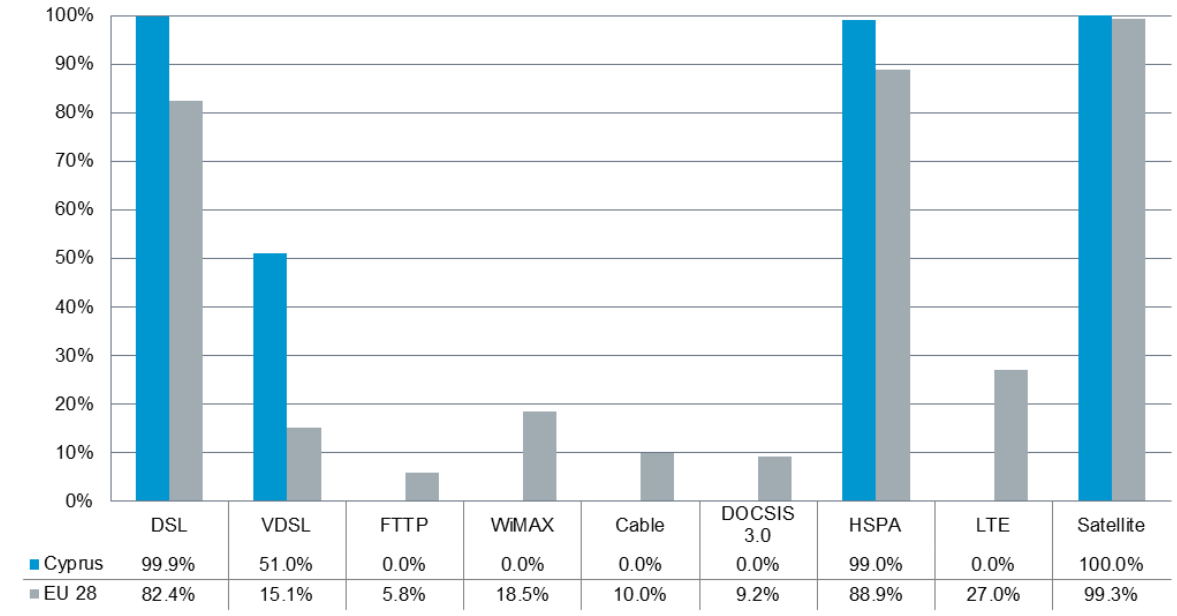


As in previous years, basic DSL registered at 100% coverage of households and thus ensuring complete fixed broadband coverage in the country. Most substantial gains were made by DOCSIS 3.0 (10.2 percentage point increase to 56.3%) and VDSL (6.2 percentage point increase to 60.2%). This reflects the investments in the respective networks by the cable operator, Cablenet, and the incumbent provider, CYTA.

As for mobile broadband technologies, while there was a nearly universal (99.0 %) HSPA coverage reported in 2014, Cyprus was the only country in the EU with no LTE coverage, yet commercial launch has been planned by mobile operators PrimeTel and MTN for early 2015[25].

DSL remained the key fixed broadband technology available to rural households, providing almost complete rural coverage. VDSL is the only NGA technology available in rural areas, with coverage increasing by six percentage points to 51% of rural households. No FTTP, WiMAX or Cable coverage was recorded in rural areas in Cyprus.

Cyprus: Coverage by technology, rural areas, 2014

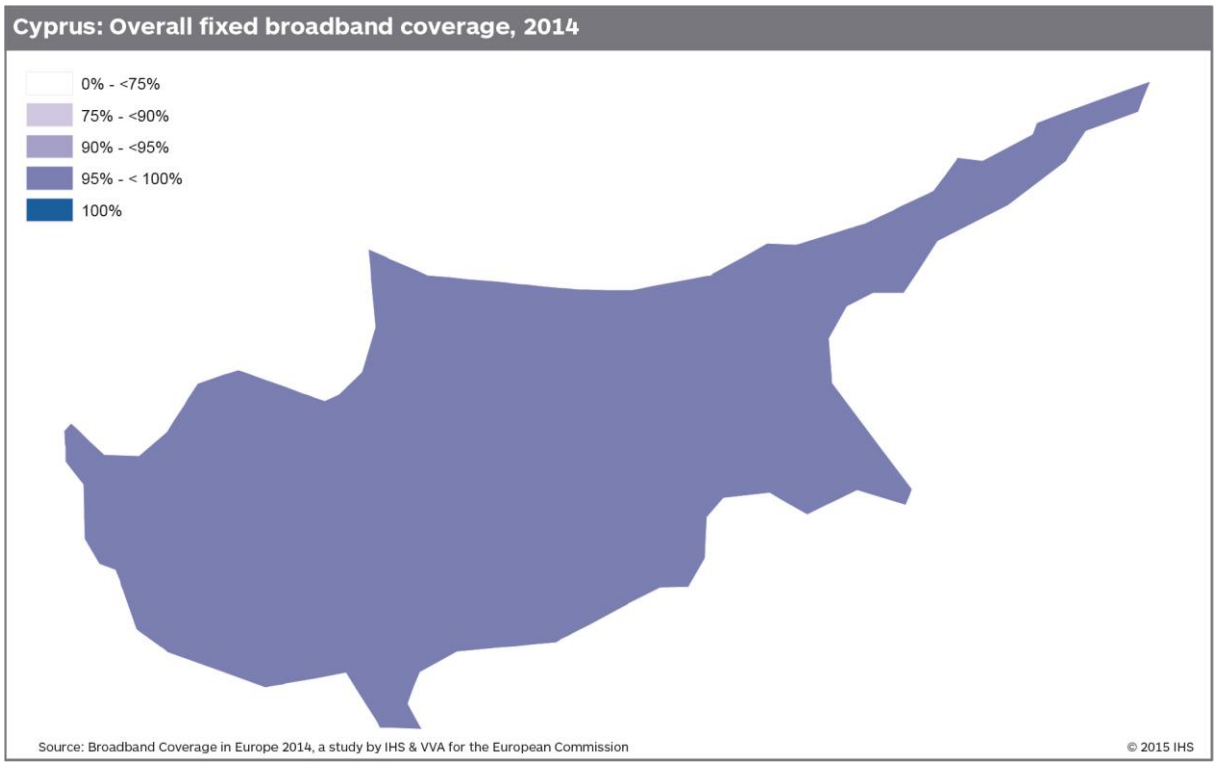


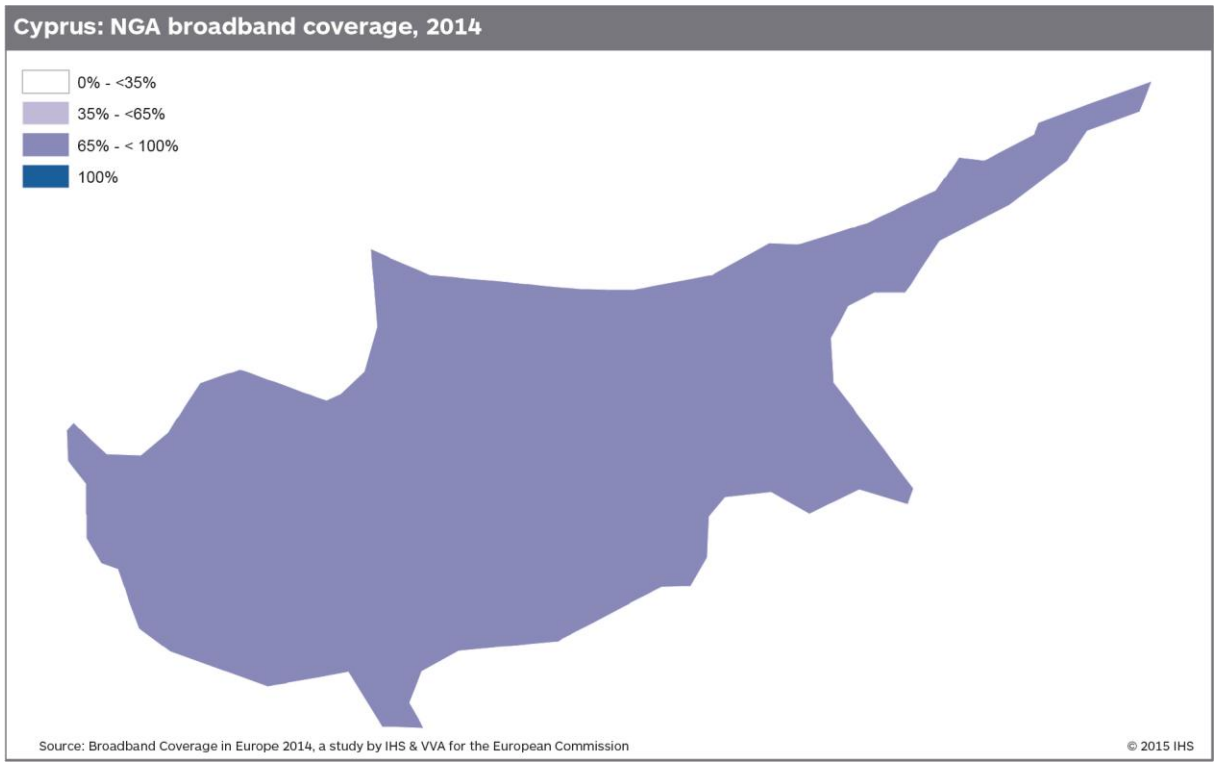
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Cyprus	99.9%	51.0%	0.0%	0.0%	0.0%	0.0%	99.0%	0.0%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

[25] http://cyprus-mail.com/2015/03/11/mtn-officially-launches-4g-network/

5.5.2 Regional coverage by broadband technology[26]





[26] 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.

5.5.3 Regulatory and market overview

The “Digital Strategy for Cyprus” was published in 2012 and remained the key strategic document in the area of broadband policy with goals set until 2020. The main targets of the strategy are in line with EU-wide objectives, and include ensuring that all households and businesses have access to the Internet with at least 30 Mbps by 2020, and that 50% of households and businesses have access to 100Mbps speeds.

With regards to the market developments, given the complete availability of basic fixed broadband services, the incumbent CYTA shifted its focus to NGA technologies and began to roll out VDSL2 services at the end of 2011, provisioning homes with advertised speeds of up to 32Mbps. Both CYTA and an alternative operator, MTN, have previously invested in FTTP networks deployment. In 2014, MTN provided speeds of up to 50Mbps.

The second largest fixed broadband provider, cable operator Cablenet, is also a key player with regard to NGA technologies, launching DOCSIS 3.0 services in 2010 and continuously expanding its now fully DOCSIS 3.0 capable network (cable coverage grew by considerable 10 percentage points in 2014). Since July 2012, Cablenet offers speeds of up to 100Mbps downstream as part of triple-play (TV, telephony, broadband) packages[27].

Given complete DSL coverage and continuous improvement in VDSL and DOCSIS 3.0 coverage, LTE remains a key priority in Cyprus. While no LTE network launches took place in 2014, telecom operators MTN and PrimeTel finally launched their LTE networks in March 2015[28].

[27] http://cablenet.com.cy/home-services-2/cable-single-play/

[28] http://www.telecompaper.com/news/mtn-primetel-launch-lte-in-cyprus--1070658

5.5.4 Data tables for Cyprus

Statistic	National
Population	865,878
Persons per household	2.8
Rural proportion	11.4%

	Cyprus 2014		Cyprus 2013		Cyprus 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	93.5%	82.4%
VDSL	60.2%	51.0%	54.0%	45.0%	52.0%	45.0%	37.6%	15.1%
FTTP	48.8%	0.0%	48.7%	0.0%	0.0%	0.0%	18.7%	5.8%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.6%	18.5%
Cable	56.3%	0.0%	46.2%	0.0%	47.4%	0.0%	43.5%	10.0%
DOCSIS 3.0	56.3%	0.0%	46.2%	0.0%	47.4%	0.0%	42.7%	9.2%
HSPA	99.0%	99.0%	99.0%	99.0%	99.0%	92.0%	97.3%	88.9%
LTE	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	97.6%
Overall fixed broadband	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	96.9%	89.6%
NGA broadband	80.1%	51.0%	77.0%	45.0%	73.1%	45.0%	68.1%	25.1%

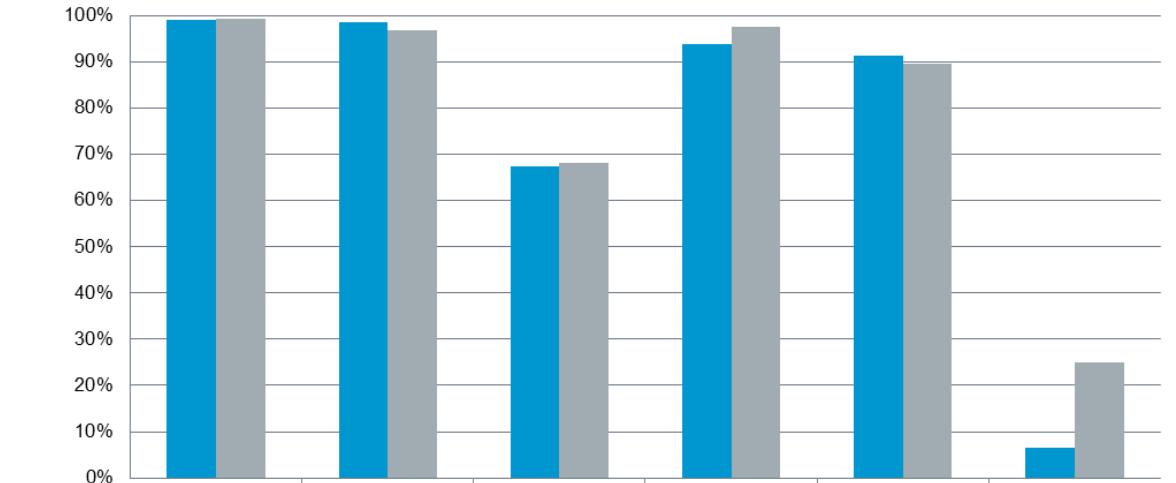
Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

5.6 Czech Republic

5.6.1 National coverage by broadband technology

After considerable coverage increases recorded in the Czech Republic in 2013, the improvements in 2014 were more modest and concentrated on expansion of NGA technologies, both nationally and in rural areas. National NGA coverage increased by 3.7 percentage points reaching 67.3% of households and rural NGA coverage grew by 2.5 percentage points ending the year with 6.5% of rural homes having access to high-speed broadband. Yet despite these improvements, both national and rural NGA coverage levels were below the EU28 average levels of 68.1% total homes passed and 25.1% rural households covered.

Czech Republic: Coverage by technology combination, 2014



	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%	67.3%	93.8%	91.3%	6.5%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

DSL and WiMAX were the two key technologies driving fixed broadband coverage, passing 97.0% and 70.6% households, respectively. The Czech broadband market is characterised by a large number of small local WiMAX providers operating in smaller cities and harder to reach areas. This is a reason for the rather high total WiMAX coverage figure (third highest among the study countries).

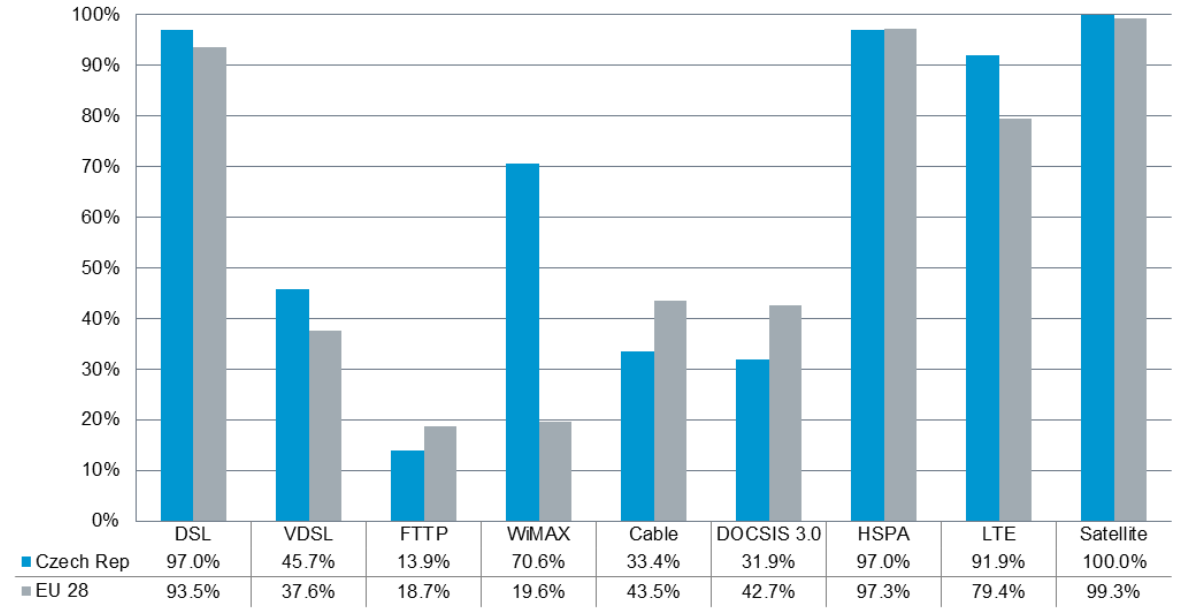
By comparison, cable coverage in the Czech Republic is largely limited to urban areas with most big cities already passed by cable networks. As a consequence, cable coverage remained largely unchanged compared to previous years, covering a third (33.4%) of Czech households.

The incumbent, O2, continued its VDSL rollout throughout 2014, albeit at a slower pace than in the previous year. VDSL coverage grew by 4.7 percentage points and reached 45.7% of households by the end of 2014. With both FTTP and DOCSIS 3.0 registering only negligible increases in coverage (reaching 13.9% and 31.9% of households, respectively), VDSL was the main driver of overall NGA coverage growth.

The most significant coverage increase was reported for LTE, with national coverage increasing throughout 2014 by 79.9 percentage points to 91.9%, making the Czech Republic one of the ten countries with LTE coverage exceeding 90%. In fact, the Czech Republic

recorded the most substantial increase in national LTE coverage in 2014. Following the finalisation of frequency auction at the end of 2013, all three mobile network operators T-Mobile CR, Vodafone CR and O2 CR, invested heavily in LTE network deployment with O2 and T-Mobile striking a network sharing agreement in order to speed up the rollout and lower deployment costs[29].

Czech Republic: Coverage by technology, total, 2014

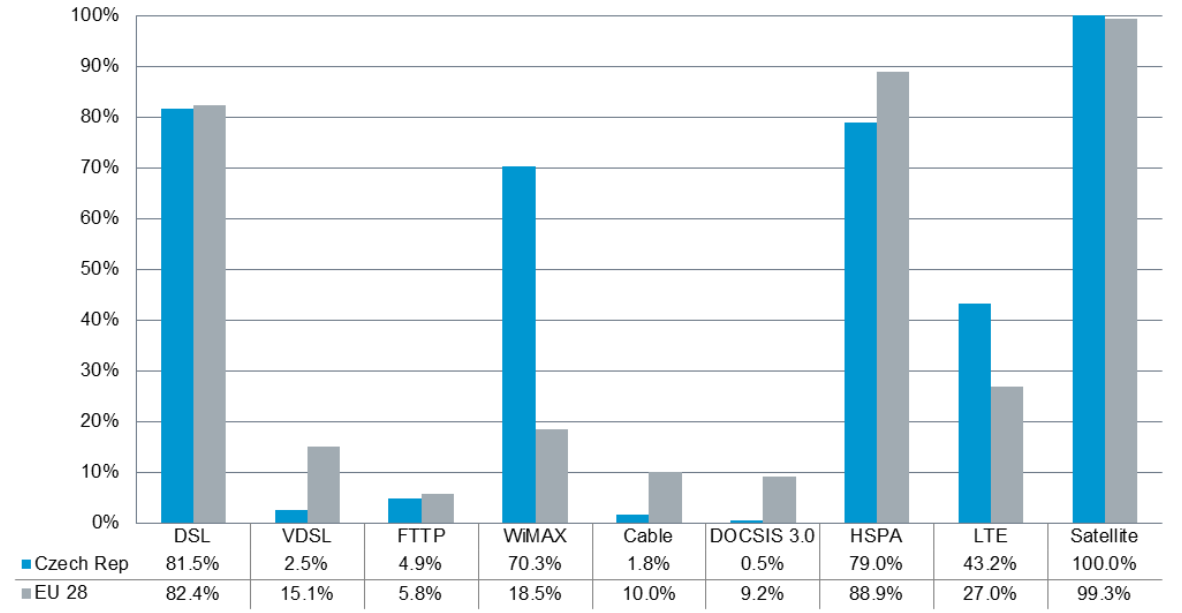


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Czech Rep	97.0%	45.7%	13.9%	70.6%	33.4%	31.9%	97.0%	91.9%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

In rural areas, coverage increases were primarily recorded for mobile technologies, with rural HSPA coverage increasing by 24 percentage points to 79% of rural homes. Rural LTE coverage grew by 43.2 percentage points, with LTE network passing 43.2% of rural households by the end of 2014, well above the EU28 average of 27.0% of rural households.

Czech Republic: Coverage by technology, rural areas, 2014



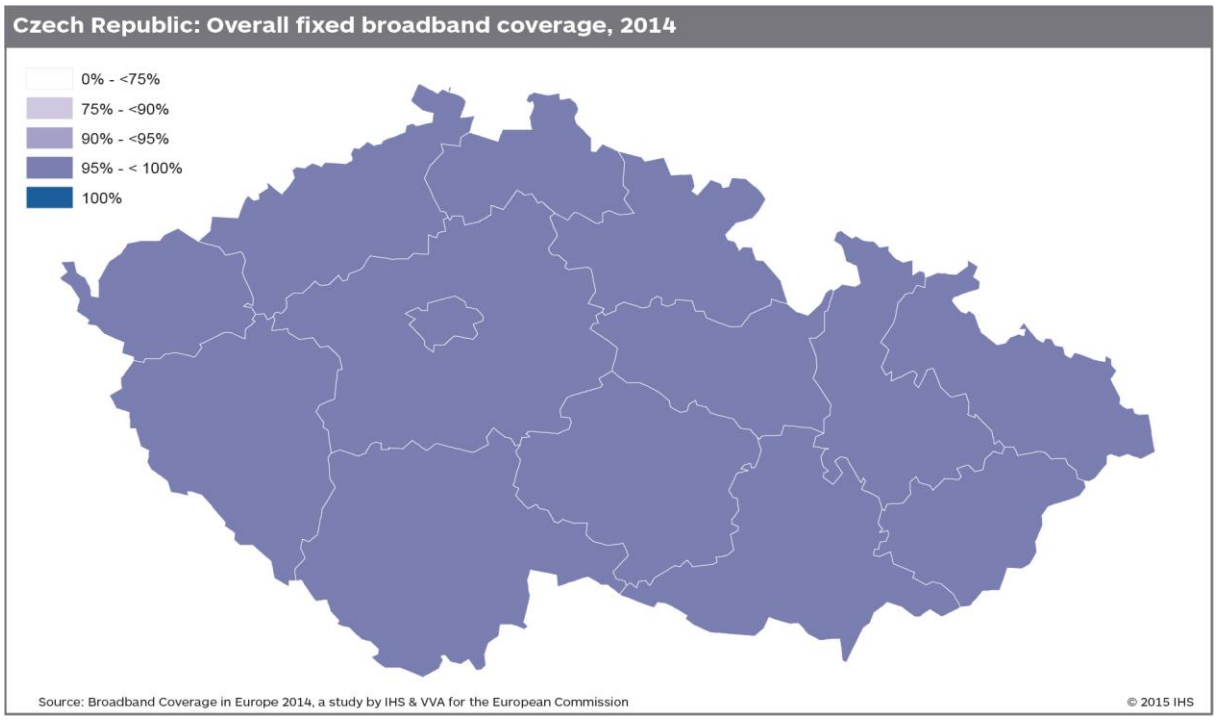
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Czech Rep	81.5%	2.5%	4.9%	70.3%	1.8%	0.5%	79.0%	43.2%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

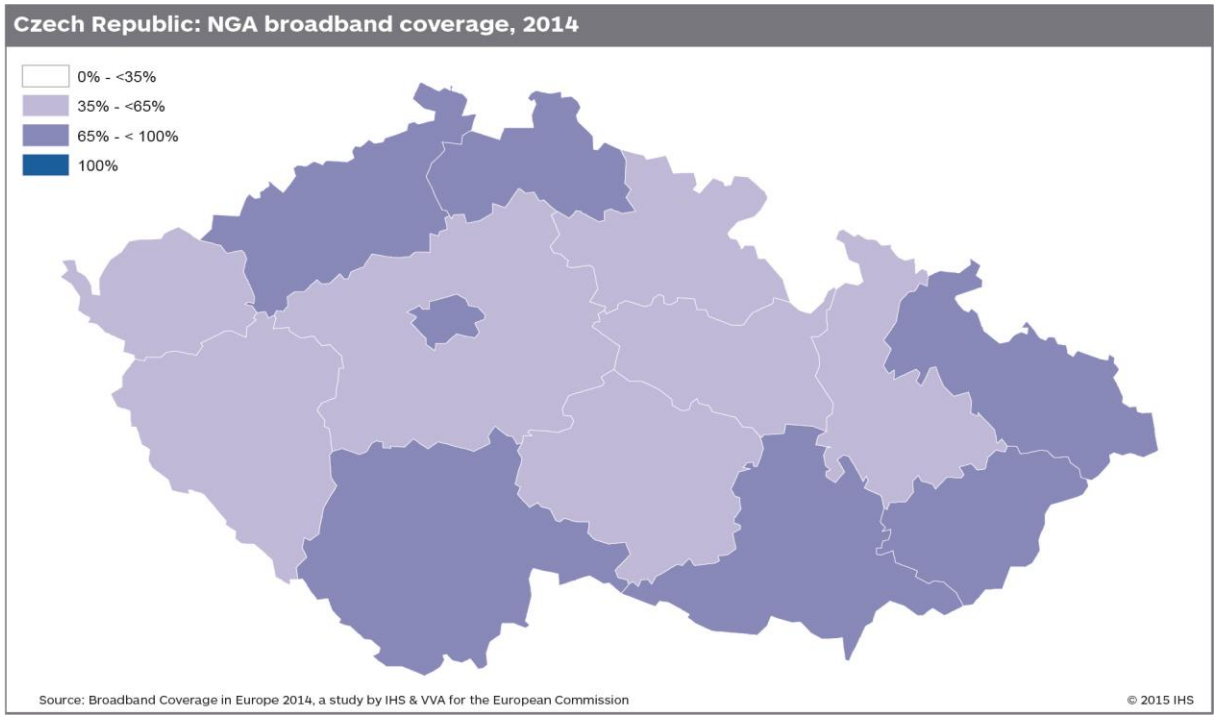
[29] https://www.telegeography.com/products/commsupdate/articles/2014/05/06/czech-cellcos-o2-and-t-mobile-ink-nationwide-4g-networking-sharing-deal/

5.6.2 Regional coverage by broadband technology

On regional level, differences in terms of fixed broadband coverage were relatively small, not exceeding two percentage points between the best performing and the worst performing region.



Regional NGA coverage was more varied, with the capital, Prague, reaching nearly 90% coverage and six other regions in North and South Bohemia and Moravia in the East of the country recording more than 65% NGA coverage. Compared to 2013, a catch-up effect could be observed, with lower-coverage regions generally recording higher increases in NGA coverage in 2014.



5.6.3 Regulatory and market overview

The Czech Republic's current national broadband strategy "Digital Czech Republic 2.0" was announced in 2013 as an updated version of a 2011 initiative. The strategy's main goals are generally in line with the Digital Agenda's targets of universal 30 Mbps coverage and100 Mbps coverage of 50% of households by 2020.

In the beginning of 2014, Telefonica completed the sale of a majority stake in its Czech and Slovak operations to investment group PPF. The group acquired 65.9% interest in Telefonica Czech Republic, which owned 100% of Telefonica Slovakia. In the course of the year, the name of the incumbent was changed to O2 Czech Republic.

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 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[30].

While O2, T-Mobile and Vodafone launched LTE networks in 2012 and 2013, 2014 finally saw considerable increase in LTE coverage as a result of completing the frequency auction held in November 2013. The original auction was cancelled by the regulator due to excessively high bids raising worries that operators would aim to recoup investment loses by imposing higher charges on end users[31]. The finalised auction specified that the operators have to cover almost half of the districts outlined in the conditions of the auction within 30 months[32], with the considerable increases in coverage indicating the progress made by the operators.

In addition, O2 and T-Mobile agreed on the abovementioned network sharing deal, which saw them sharing transmitters in order to expedite the LTE network rollout, while retaining control of their own network infrastructure and business strategies[33].

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

[31] http://www.telegeography.com/products/commsupdate/articles/2013/08/28/ctu-relaunches-4g-mobile-frequencies-auction/

[32] http://www.ctu.eu/main.php?pageid=341&page_content_id=5597

[33] https://www.telegeography.com/products/commsupdate/articles/2014/05/06/czech-cellcos-o2-and-t-mobile-ink-nationwide-4g-networking-sharing-deal/

5.6.4 Data tables for Czech Republic

Statistic	National
Population	10,516,125
Persons per household	2.4
Rural proportion	14.3%

	Czech Rep. 2014		Czech Rep. 2013		Czech Rep. 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	97.0%	81.5%	97.0%	82.3%	97.0%	78.9%	93.5%	82.4%
VDSL	45.7%	2.5%	41.0%	2.5%	25.0%	0.0%	37.6%	15.1%
FTTP	13.9%	4.9%	13.4%	2.5%	12.2%	1.3%	18.7%	5.8%
WiMAX	70.6%	70.3%	70.6%	70.6%	17.7%	17.7%	19.6%	18.5%
Cable	33.4%	1.8%	33.0%	1.8%	33.1%	1.1%	43.5%	10.0%
DOCSIS 3.0	31.9%	0.5%	31.5%	0.5%	30.2%	0.2%	42.7%	9.2%
HSPA	97.0%	79.0%	94.9%	55.0%	92.3%	49.0%	97.3%	88.9%
LTE	91.9%	43.2%	12.0%	0.0%	9.9%	0.0%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	99.2%	93.8%	98.9%	91.2%	98.3%	88.0%	99.4%	97.6%
Overall fixed broadband	98.5%	91.3%	98.5%	91.2%	98.1%	86.8%	96.9%	89.6%
NGA broadband	67.3%	6.5%	63.7%	4.0%	49.3%	1.5%	68.1%	25.1%

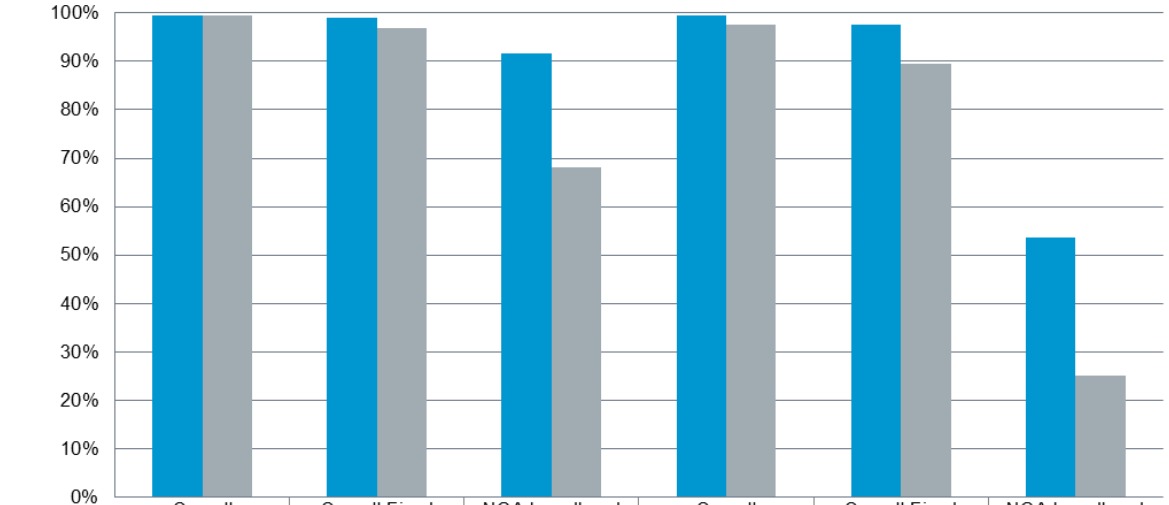
Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

5.7 Denmark

5.7.1 National coverage by broadband technology

In 2014, Denmark remained one of the best performers with regards to broadband coverage, exceeding the European average coverage levels in all monitored categories. The national regulator, the Danish Business Authority, provided the IHS and VVA research team with broadband coverage data based on an upgraded methodology, tracking broadband availability by individual technologies on an address level. This much more comprehensive data showed underestimation of especially rural NGA coverage in previous years. Due to the fact that it is not possible to replicate this level of accuracy retrospectively for previous years, year-on-year comparisons as such are not possible for Denmark as they would not represent actual trends in broadband coverage.

Denmark: Coverage by technology combination, 2014



	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Denmark	99.5%	99.1%	91.7%	99.5%	97.5%	53.7%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

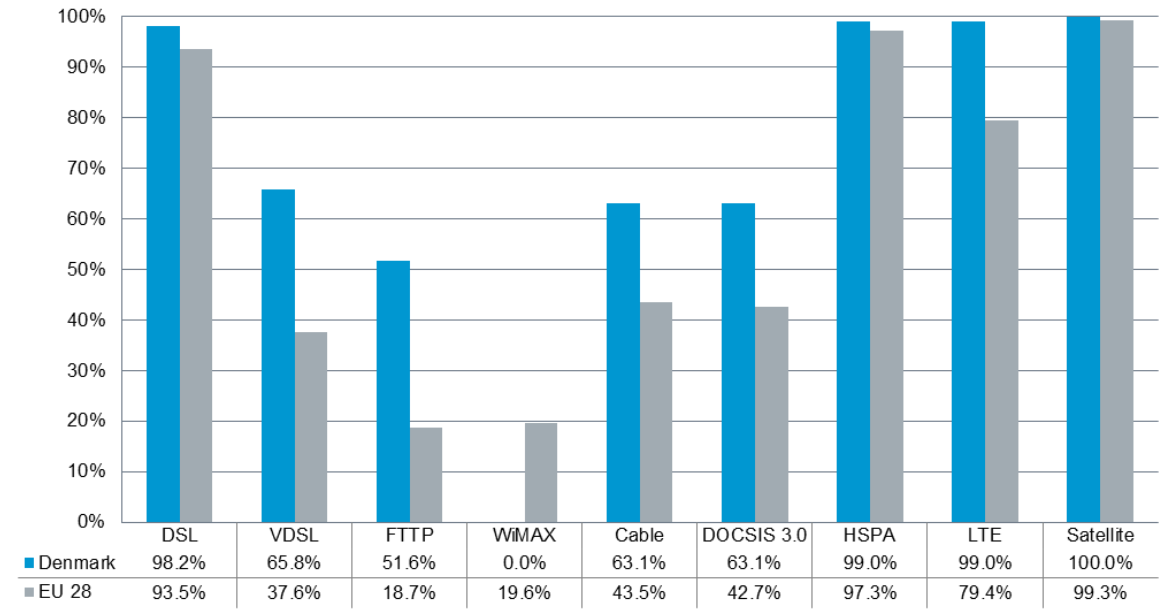
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

In terms of individual technologies, Denmark outperformed the EU average for each technology with the exception of WiMAX, which is not present on the Danish market. At 98.2% DSL was the most widespread fixed technology in 2014.

VDSL services were available to more than two-thirds (65.8%) of Danish households and, while cable networks (now completely upgraded to DOCSIS 3.0) at 63.1% passed slightly less homes. FTTP networks covered more than half (51.6%) of households at the end of 2014. Such diversification in terms of coverage of the individual NGA technologies is rather unusual among the study countries, with no one technology having a dominant position in the market but rather all of the high-speed technologies providing a good coverage across the country.

LTE technology was first commercially launched already in 2010, making Denmark one of the early adopters of the technology. By the end of 2014, LTE coverage reached 99.0% of Danish households, placing the country among the top three performers after the Netherlands and Sweden.

Denmark: Coverage by technology, total, 2014



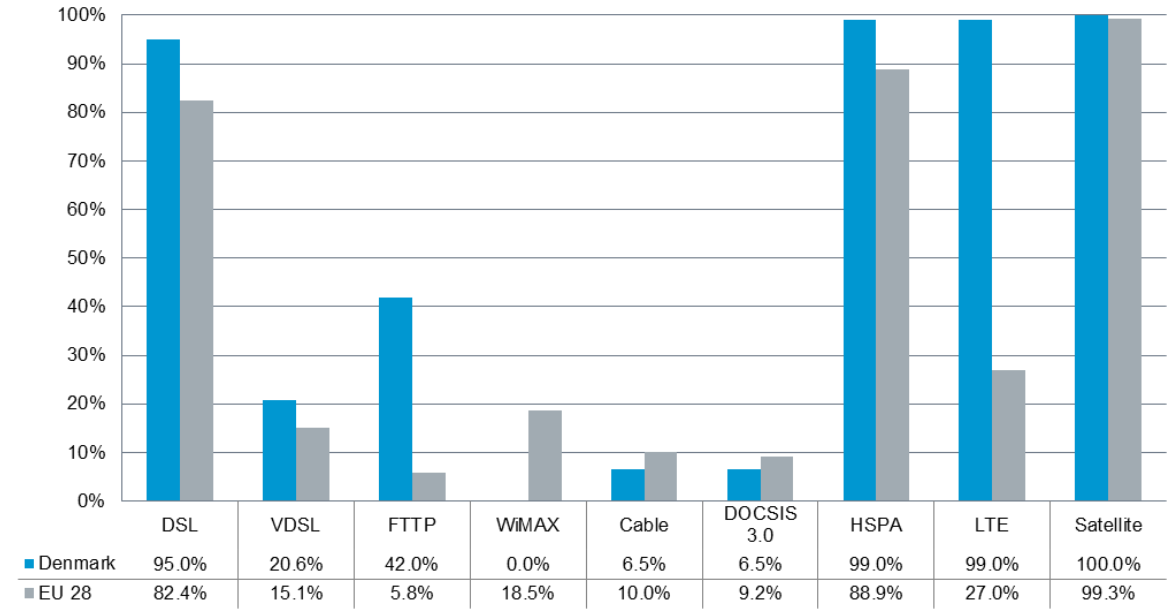
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Denmark	98.2%	65.8%	51.6%	0.0%	63.1%	63.1%	99.0%	99.0%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

DSL was the key fixed broadband technology in rural areas, passing 95% of rural households. New data provided by the Danish Business Authority, showed that in 2014 rural NGA access was secured primarily through FTTP networks, which covered 42.0% of rural households. VDSL also contributed to rural NGA coverage, with VDSL networks available to 20.6% of rural homes. By comparison, DOCSIS 3.0 coverage was considerably lower at 6.5%, below the EU average of 9.2%.

Rural LTE availability reached 99% during 2014, which made Denmark the leading country in terms of rural LTE coverage.

Denmark: Coverage by technology, rural areas, 2014

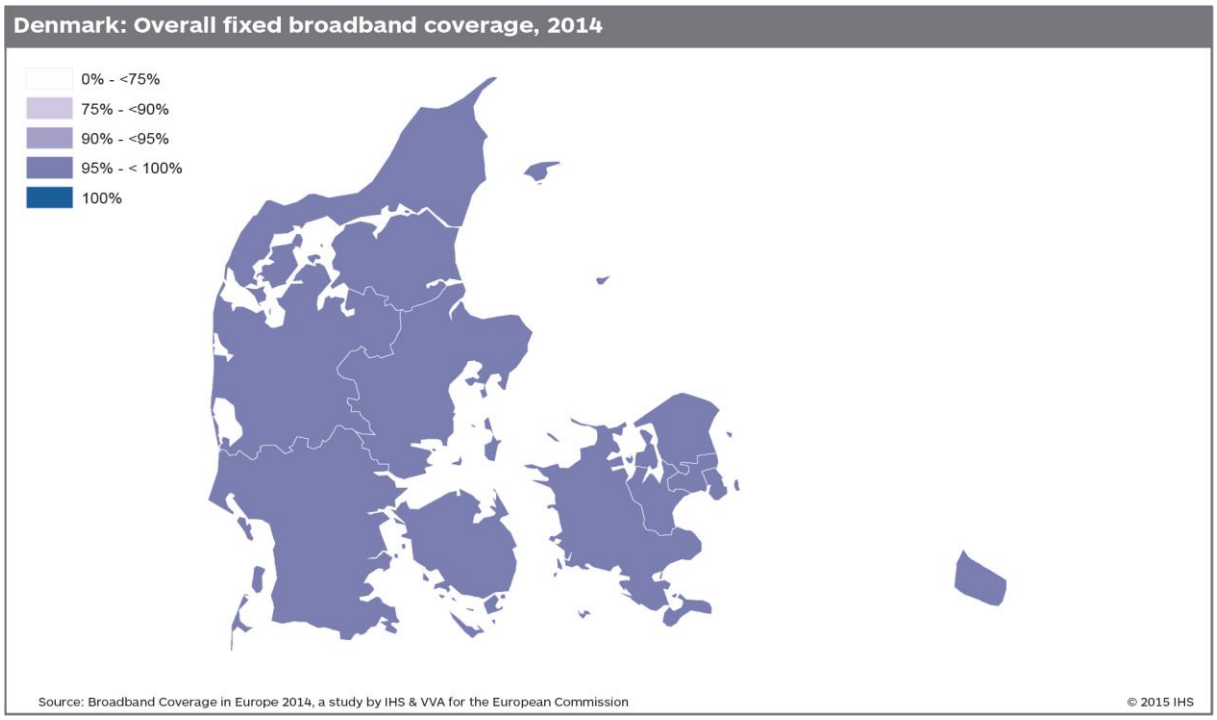


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Denmark	95.0%	20.6%	42.0%	0.0%	6.5%	6.5%	99.0%	99.0%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

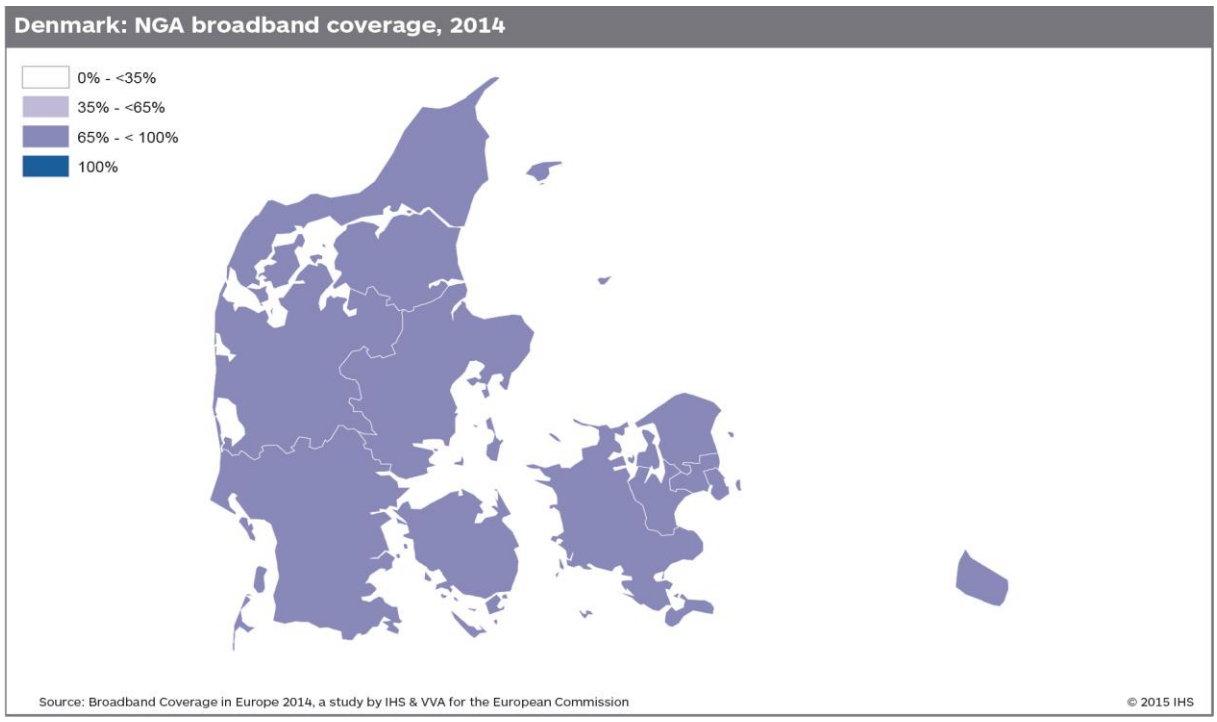
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.7.2 Regional coverage by broadband technology

Most regions in Denmark recorded similarly high fixed broadband coverage levels, with all regions reaching fixed broadband coverage levels higher than 98%.



Regional NGA coverage remained more varied, even though all regions but two recorded NGA availability higher than 85% of households, with the area surrounding Copenhagen reaching 99.9% coverage. The two least covered regions in terms of NGA networks were Fyn and Vest-og Sydsjælland in central Denmark, which both recorded NGA coverage around 82% of households.



5.7.3 Regulatory and market overview

According to the Danish national broadband strategy published in 2013, the government has set the 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.

Danish market is dominated by TDC, the incumbent operator, which operates DSL network, as well as a cable network through its subsidiary YouSee. It faces competition from a range of smaller players, including cable and DSL providers and a large number of FTTP providers. The Danish market is characterised by the involvement of utility companies in the FTTP broadband provision, although these operators tend to focus on more restricted geographic areas.

With regard to future developments, TDC plans further investment in FTTN+VDSL architecture. In its 2013-2015 strategy, it set coverage objectives of 65% eligible households for 100 Mbps and 78% eligible households for 50 Mbps download speeds[34]. It is however important to note that the investments focus on strategic build-out and up-sales and cross-sales to existing customer base rather than customer acquisition[35].

In April 2014, the European Investment Bank (EIB) announced the provision of a SEK1.8 billion loan to Hi3G (Three Denmark) which to upgrade, expand and construct its mobile networks in Sweden and Denmark. The investment will result in increased coverage and improved LTE services with peak download speeds up to 130 Mbps[36].

The EIB also announced that it would be investing EUR 500 million in an upgrade and network expansion project headed by TDC Denmark. The project, worth EUR 1 billion, will result in the provision of ultra-high speed fixed broadband services. The network rollout will include technologies such as FTTP, VDSL and DOCSIS 3.0. The project started in 2014 and will conclude in 2017[37].

[34] http://investor.tdc.com/releasedetail.cfm?ReleaseID=718793
[35] http://annualreport2012.tdc.dk/menu/annual-report/about-the-group/strategy-2013-15
[36] http://www.totaltele.com/view.aspx?ID=378136
[37] http://www.eib.org/projects/pipeline/2013/20130457.htm

5.7.4 Data tables for Denmark

Statistic	National
Population	5,659,715
Persons per household	2.1
Rural proportion	17.1%

	Denmark 2014		Denmark 2013		Denmark 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	98.2%	95.0%	*98.2%*	*89.2%*	*98.2%*	*89.0%*	93.5%	82.4%
VDSL	65.8%	20.6%	*21.7%*	*11.0%*	*20.7%*	*0.0%*	37.6%	15.1%
FTTP	51.6%	42.0%	*46.8%*	*4.2%*	*43.0%*	*3.0%*	18.7%	5.8%
WiMAX	0.0%	0.0%	*0.0%*	*0.0%*	*0.0%*	*0.0%*	19.6%	18.5%
Cable	63.1%	6.5%	*63.6%*	*0.0%*	*63.1%*	*0.0%*	43.5%	10.0%
DOCSIS 3.0	63.1%	6.5%	*61.7%*	*0.0%*	*60.2%*	*0.0%*	42.7%	9.2%
HSPA	99.0%	99.0%	*99.1%*	*94.0%*	*99.0%*	*94.0%*	97.3%	88.9%
LTE	99.0%	99.0%	*73.7%*	*10.0%*	*65.0%*	*2.2%*	79.4%	27.0%
Satellite	100.0%	100.0%	*100.0%*	*100.0%*	*100.0%*	*100.0%*	99.3%	99.3%
Overall broadband	99.5%	99.5%	*99.7%*	*97.0%*	*99.7%*	*98.2%*	99.4%	97.6%
Overall fixed broadband	99.1%	97.5%	*99.1%*	*91.3%*	*98.3%*	*89.9%*	96.9%	89.6%
NGA broadband	91.7%	53.7%	*82.6%*	*13.1%*	*73.2%*	*3.0%*	68.1%	25.1%

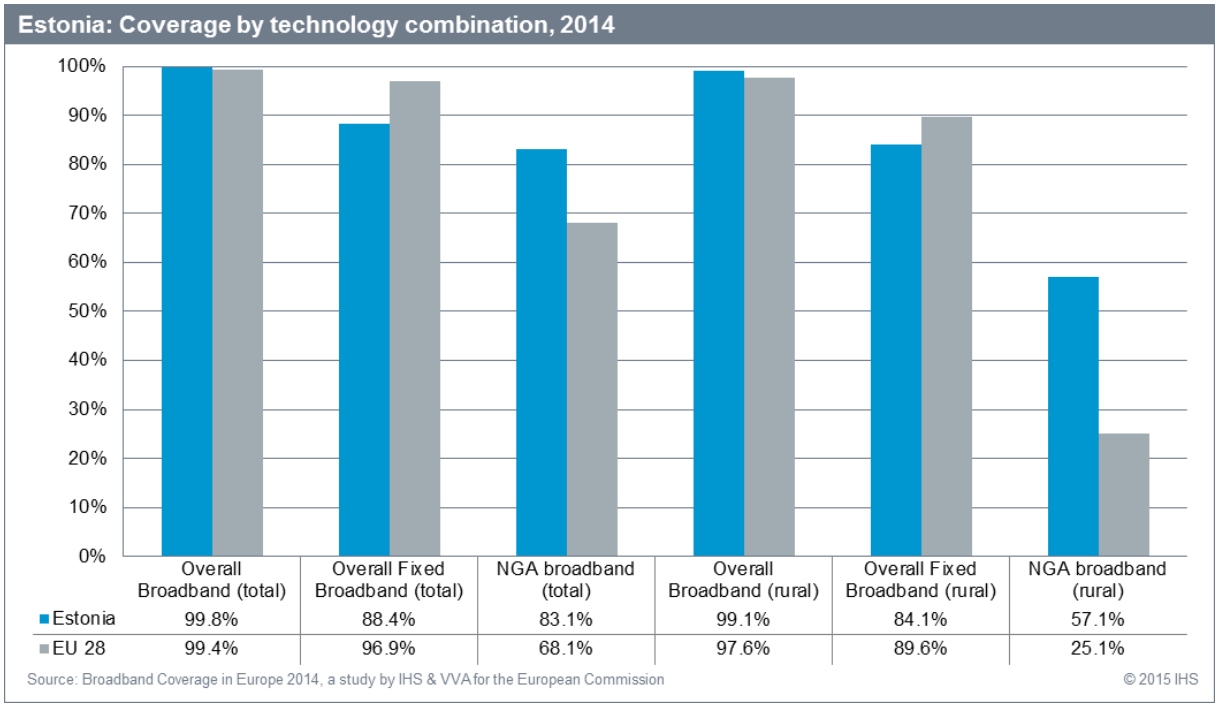
Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

Please note that due to more comprehensive methodology applied by the Danish Business Authority, data for 2014 should not be directly compared with results published in previous years.

5.8 Estonia

5.8.1 National coverage by broadband technology

National fixed broadband and NGA coverage in Estonia made further gains throughout 2014, increasing by 3.8 and 9.2 percentage points, respectively. While fixed coverage in Estonia remained below the EU average reaching 88.4% of households compared to the EU28 average of 96.9%, NGA coverage exceeded the European average by fifteen percentage points with 83.1% of Estonian homes having access to high-speed broadband compared to 68.1% of average EU households. Moreover, nearly two-thirds (57.1%) of rural households in Estonia had access to NGA broadband at the end of 2014.

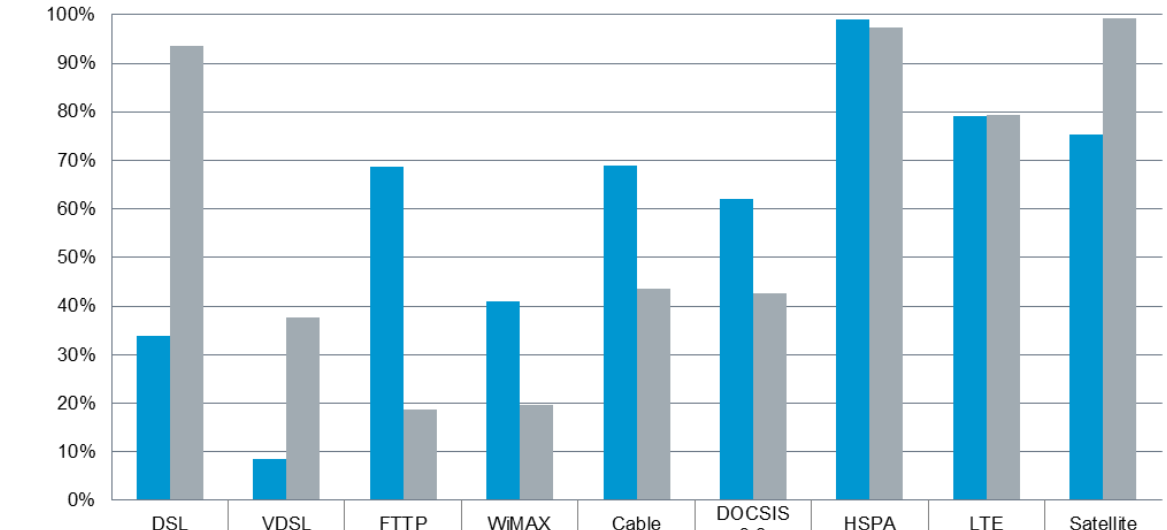


From an individual technology perspective, both DSL and VDSL coverage remained lower in Estonia compared to the EU average, although national VDSL coverage recorded a 7.3 percentage point increase in 2014.

Instead, FTTP, Cable and WiMAX technologies drive fixed broadband coverage in Estonia, with coverage for all three largely exceeding the EU average. In fact, in 2014 Estonia recorded the third highest FTTP coverage in the EU, with 68.7% homes passed by FTTP networks. FTTP and DOCSIS 3.0 are also the cornerstones of NGA coverage in Estonia. This partially reflects the rollout of FTTP networks by the major telecoms groups at the expense of DSL-based technologies.

Estonia, along with Latvia and Lithuania remained 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, 2014



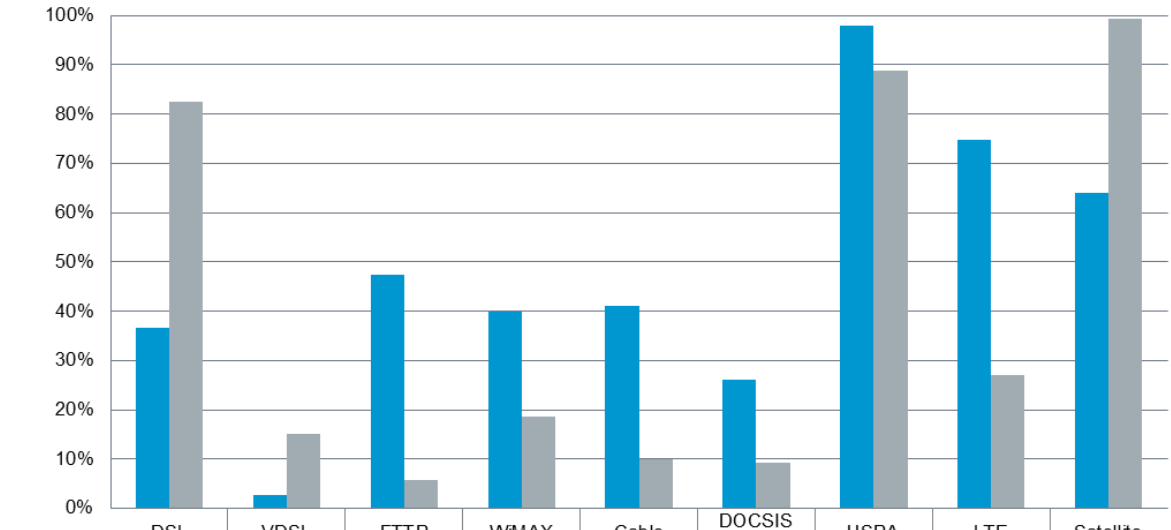
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Estonia	33.8%	8.6%	68.7%	40.9%	68.9%	62.1%	99.0%	79.2%	75.4%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

On rural level, DSL coverage was relatively low at 38.7%, which is partially offset by above-average WiMAX coverage (40% compared to the EU average of 18.5%).

The most significant progress was noted for DOCSIS 3.0, with coverage increasing by 26 percentage points from no coverage in 2013. FTTP was however the main NGA technology available to rural households, with coverage of 47.4%. This reflects the aforementioned FTTP-oriented broadband strategies adopted by Estonian operators.

Estonia: Coverage by technology, rural areas, 2014



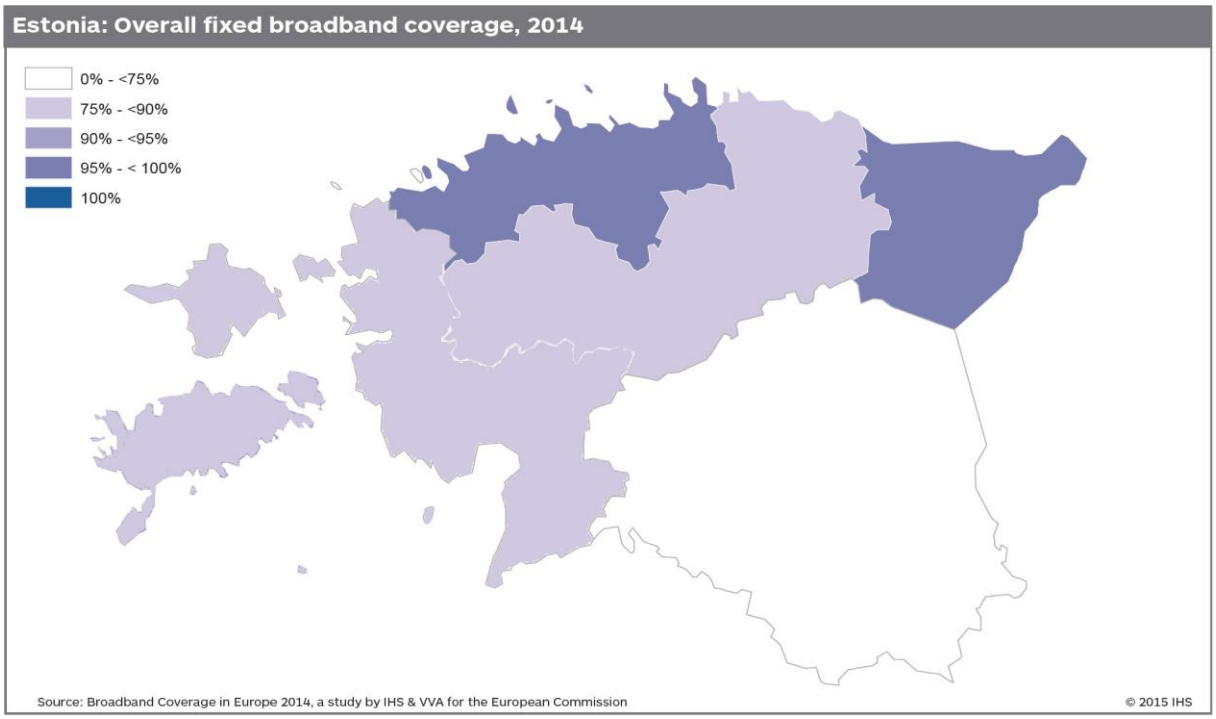
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Estonia	36.7%	2.7%	47.4%	40.0%	41.0%	26.0%	98.0%	74.7%	64.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

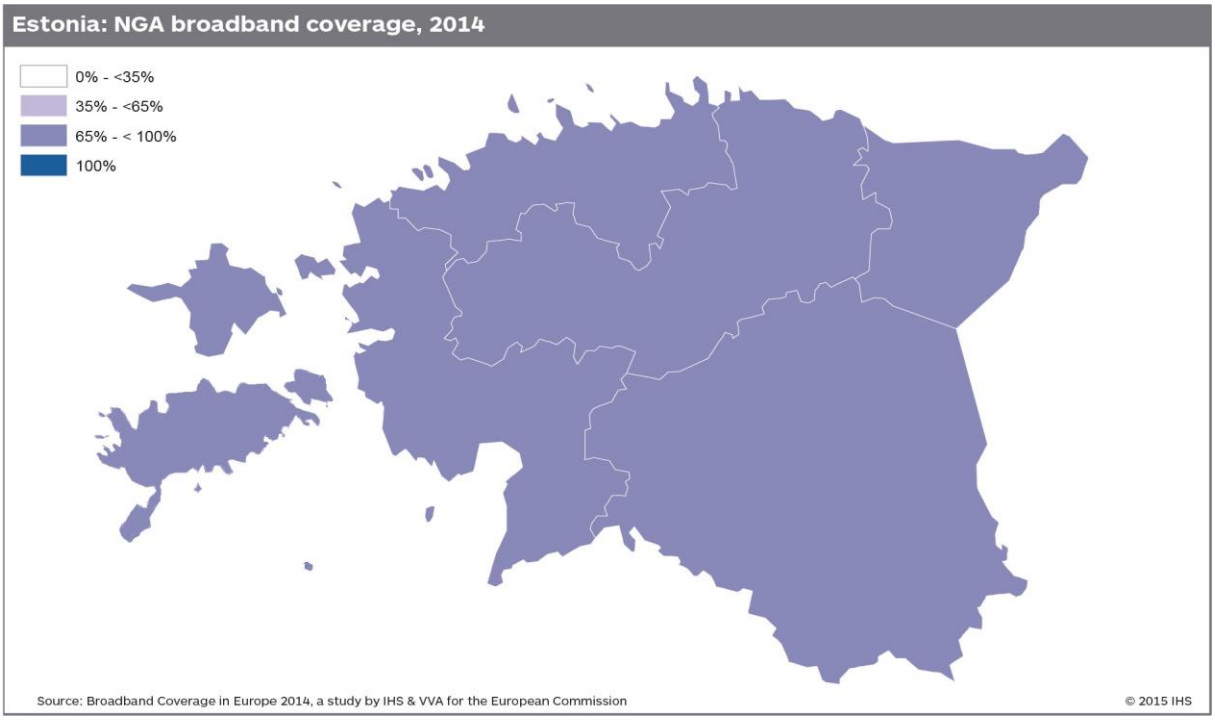
At 74.4%, rural LTE coverage also exceeded the EU average, which could be attributed to the long history of LTE networks in Estonia, with the first networks launched in 2010.

5.8.2 Regional coverage by broadband technology

Reported variation in fixed broadband coverage across individual regions was substantial in Estonia, with three of the five regions (Lääne, Kesk and Lõuna) reporting coverage levels close to 75%, and nearly complete coverage reported in the remaining two regions.



Similar variations could also be observed for NGA technologies, with some regions reporting substantial increases in NGA coverage. One example is Kesk-Eesti where NGA coverage grew by over 35 percentage points compared to 9.2 percentage point increase on national level.



5.8.3 Regulatory and market overview

The national strategy for broadband roll-out in Estonia was published in 2009. The objective of the programme is to bridge the digital gap between urban and rural areas by developing NGA infrastructure in rural areas. In 2014, the targets and measures were updated as part of the Digital Society Strategy 2020. Specific objectives 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[38].

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[39].

As can be seen in the coverage figures, the Estonian market features an unusually high FTTP penetration compared to most other European markets, reflecting both the government strategy and telecom groups' approach with regards to next-generation access, largely forgoing VDSL in favour of FTTP.

Nevertheless the incumbent, TeliaSonera owned Elion, has been boosting VDSL rollout since 2013 to diversify its services offering. In 2014, TeliaSonera decided to merge its two Estonian subsidiaries, mobile operator EMT and fixed provider Elion into Eesti Telekom, yet maintaining their respective brand names[40].

Leading cable operator, Starman, upgraded its network to DOCSIS 3.0 already in 2013 and started offering connections of up to 400 Mbps in 2014[41].

[38] https://e-estonia.com/wp-content/uploads/2014/04/Digital-Agenda-2020_Estonia_ENG.pdf
[39] http://www.elasa.ee/index.php?page=3
[40] http://www.telecompaper.com/news/emt-elion-eesti-telekom-to-merge-in-september--1017323
[41] http://www.starman.ee/teenused/internet

5.8.4 Data tables for Estonia

Statistic	National
Population	1,315,819
Persons per household	2.1
Rural proportion	21.8%

	Estonia 2014		Estonia 2013		Estonia 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	33.8%	36.7%	36.4%	35.9%	39.3%	16.2%	93.5%	82.4%
VDSL	8.6%	2.7%	1.4%	0.0%	0.6%	0.0%	37.6%	15.1%
FTTP	68.7%	47.4%	66.2%	58.3%	36.2%	0.0%	18.7%	5.8%
WiMAX	40.9%	40.0%	40.6%	38.7%	40.0%	35.9%	19.6%	18.5%
Cable	68.9%	41.0%	57.2%	16.4%	71.6%	25.1%	43.5%	10.0%
DOCSIS 3.0	62.1%	26.0%	52.6%	0.0%	51.0%	0.0%	42.7%	9.2%
HSPA	99.0%	98.0%	99.9%	99.6%	87.0%	53.6%	97.3%	88.9%
LTE	79.2%	74.7%	85.0%	84.8%	70.0%	31.2%	79.4%	27.0%
Satellite	75.4%	75.4%	75.4%	75.4%	0.0%	0.0%	99.3%	99.3%
Overall broadband	99.8%	99.1%	100.0%	99.8%	96.4%	84.8%	99.4%	97.6%
Overall fixed broadband	88.4%	84.1%	84.7%	87.2%	84.1%	52.2%	96.9%	89.6%
NGA broadband	83.1%	57.1%	73.9%	58.3%	61.0%	0.0%	68.1%	25.1%

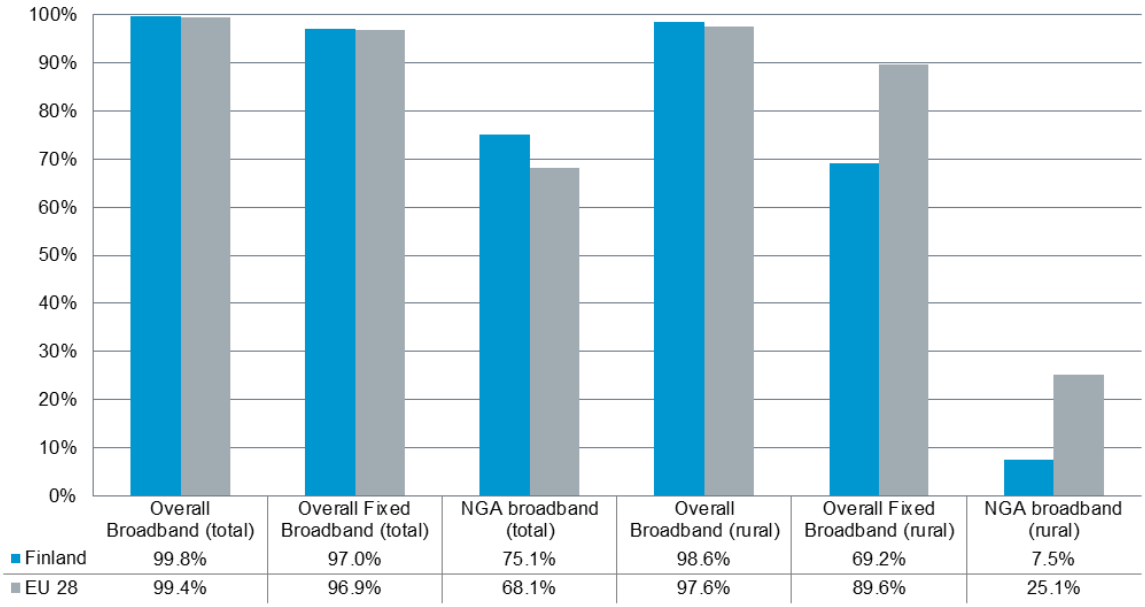
Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

5.9 Finland

5.9.1 National coverage by broadband technology

In 2014, Finland recorded above-average overall broadband, fixed broadband and NGA availability on national level, but coverage gaps could still be observed in rural areas. At 7.5%, rural NGA coverage lagged significantly behind EU average of 25.1%. Rural fixed broadband coverage increased by 5.6 percentage points, although at 69.2% it also remained below the EU average.

Finland: Coverage by technology combination, 2014



	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Finland	99.8%	97.0%	75.1%	98.6%	69.2%	7.5%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

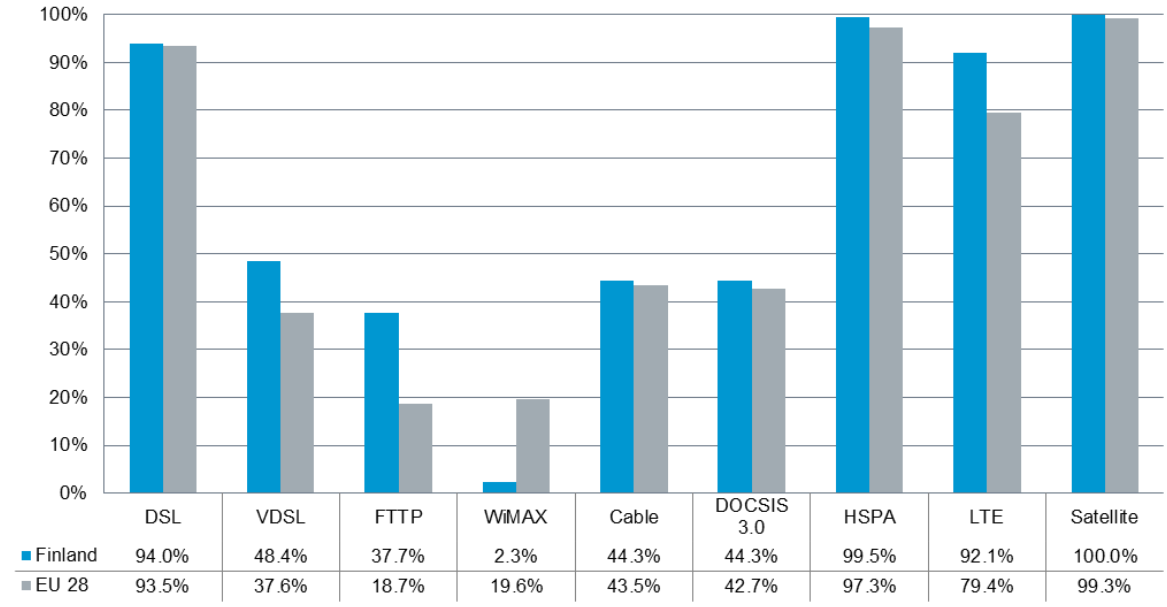
Examining individual technologies, Finland exceeded the EU28 average coverage levels for all technologies apart from WiMAX. In 2014, most substantial gains were made in the case of FTTP, with coverage increasing by 8.3 percentage points and reaching 37.7% of Finnish households by the end of the year, more than double the EU average.

Other NGA technologies registered only minor (less than three percentage points) increases compared to 2013. VDSL technology passed 48.4% of households at the end of 2014 and DOCSIS 3.0 cable broadband services were available to 44.3% of households across Finland.

At the end of 2014, Finland also had one of the highest LTE coverage levels in the EU, with 92.1% of households covered. Leading operators TeliaSonera, Elisa and DNA, which launched LTE services between 2010 and 2011, were accompanied by Ukko Mobile in 2014. The company launched the first commercial LTE 450Mhz network in Finland in November 2014 and aims to cover 99.9% of Finnish population, first offering services to businesses administrative offices primarily in rural areas[42].

[42] http://www.telecompaper.com/news/ukko-mobile-launches-lte-450mhz-network--1052761

Finland: Coverage by technology, total, 2014



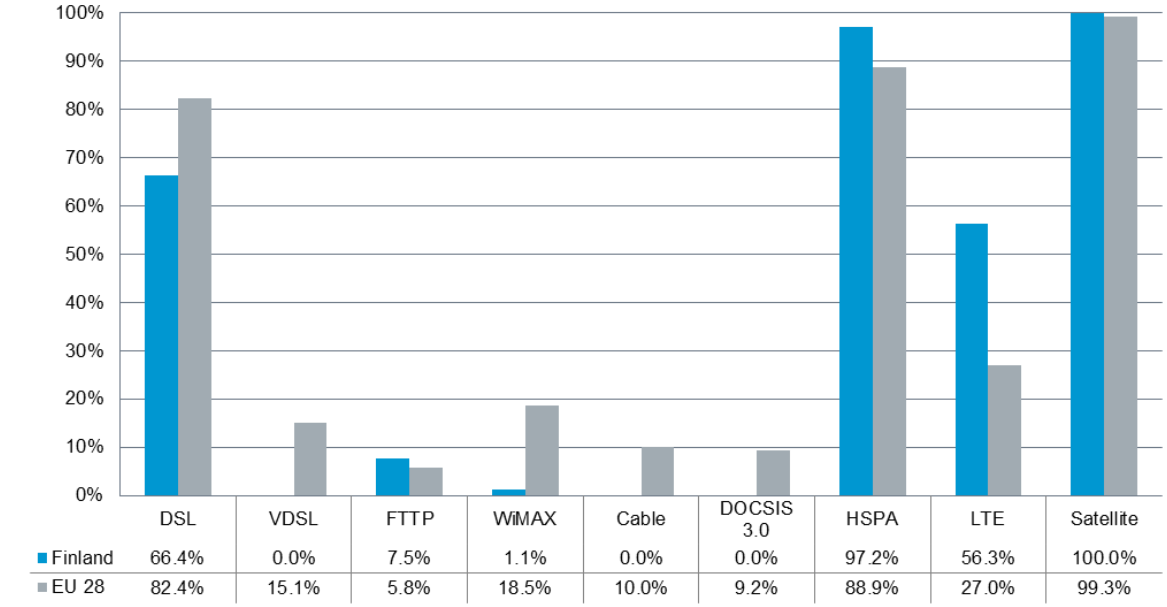
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Finland	94.0%	48.4%	37.7%	2.3%	44.3%	44.3%	99.5%	92.1%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

DSL continued to drive fixed broadband coverage in rural areas. Although DSL coverage increased by 6.4 percentage points, at 66.4% rural DSL coverage was still lower than in many other countries.

Rural NGA coverage in Finland remained at 7.5% and was therefore almost unchanged compared to 2013, which can be attributed to the continued absence of DOCSIS 3.0 and VDSL connections available to rural households, leaving FTTP services as the sole contributor to rural NGA access. FTTP coverage in rural areas increased by only 0.5 percentage points, which explains the limited progress made with regard to rural NGA coverage. Finland did however experience a 48.3 percentage point increase in rural LTE coverage, which put rural LTE coverage at 56.3%, considerably above the average EU level.

Finland: Coverage by technology, rural areas, 2014

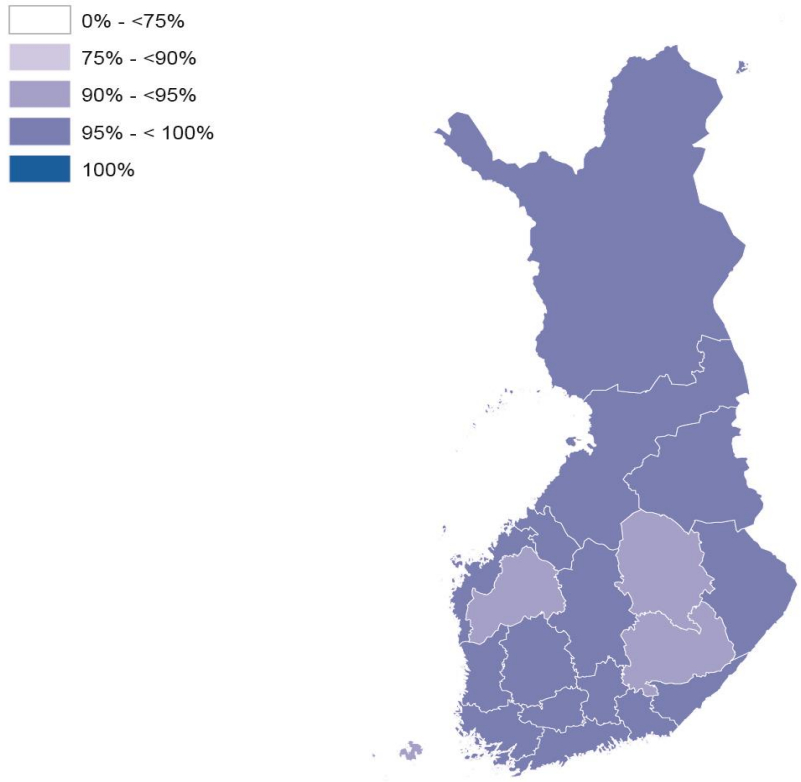


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Finland	66.4%	0.0%	7.5%	1.1%	0.0%	0.0%	97.2%	56.3%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

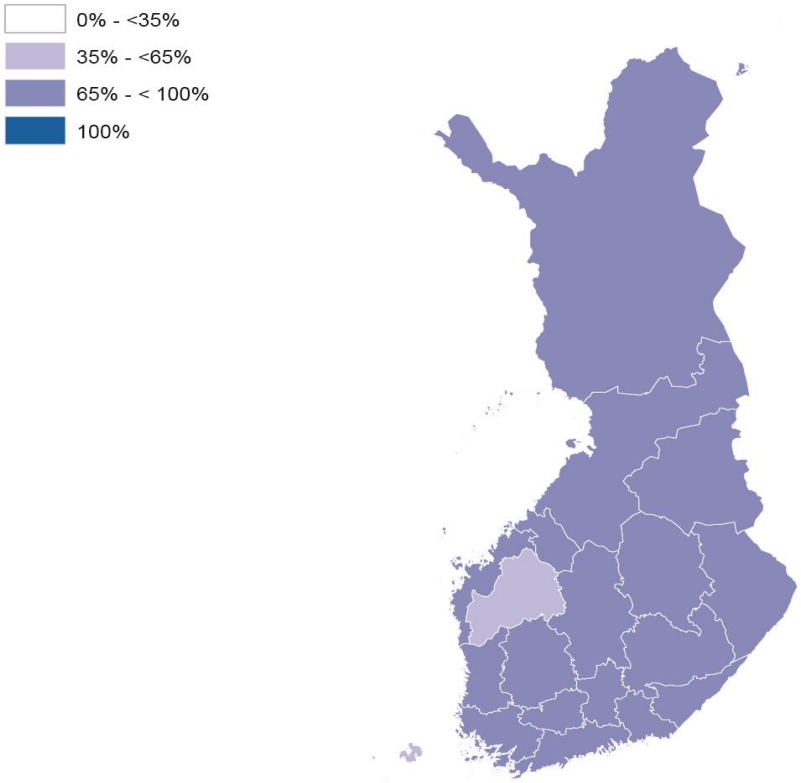
5.9.2 Regional coverage by broadband technology

Finland: Overall fixed broadband coverage, 2014



Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Finland: NGA broadband coverage, 2014



Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

In most regions in Finland, fixed broadband coverage reached levels above 95%, with only four of the nineteen regions falling short of this threshold. Compared to 2013, there have been no major changes in fixed broadband coverage in any of the regions

In terms of NGA technologies, some regions lag behind the national average. The Åland region, for instance, recorded NGA coverage of 53.5% households, and in two other regions –the Etelä-Pohjanmaa region and the Pohjois-Karjala region - NGA coverage levels were below 70%. Only the Pohjois-Savo region saw an increase in coverage of more than 10 percentage points.

5.9.3 Regulatory and market overview

Since 2010, access to a 1 Mbps broadband service has been made a legal right by the Finnish Ministry of Transport and Communications[43] with further plans extending the goal to 100 Mbps fixed or wireless connections for all households and businesses by 2015[44].

The Finnish government launched the Broadband 2015 project in December 2008 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 Broadband 2015 project, aid totalling EUR 130 million is 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[45].

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.

With regards to mobile broadband development, the LTE market in Finland is a mature one, with TeliaSonera and Elisa launching their respective LTE offers in 2010. The key recent development came at the end of 2014, when a start-up operator Ukko Mobile launched a 450MHz LTE data-only network, aiming for 99.9% coverage of the country's population[46].

[43] http://www.bbc.co.uk/news/10461048
[44] http://arstechnica.com/business/2012/10/finland-plan-for-universal-100mbps-service-by-2015-on-track/
[45] https://www.viestintavirasto.fi/en/steeringandsupervision/broadband2015subsidies.html
[46] http://telecoms.com/308472/finnish-start-up-claims-first-commercial-450mhz-lte-network/

5.9.4 Data tables for Finland

Statistic	National
Population	5,426,674
Persons per household	2.1
Rural proportion	18.0%

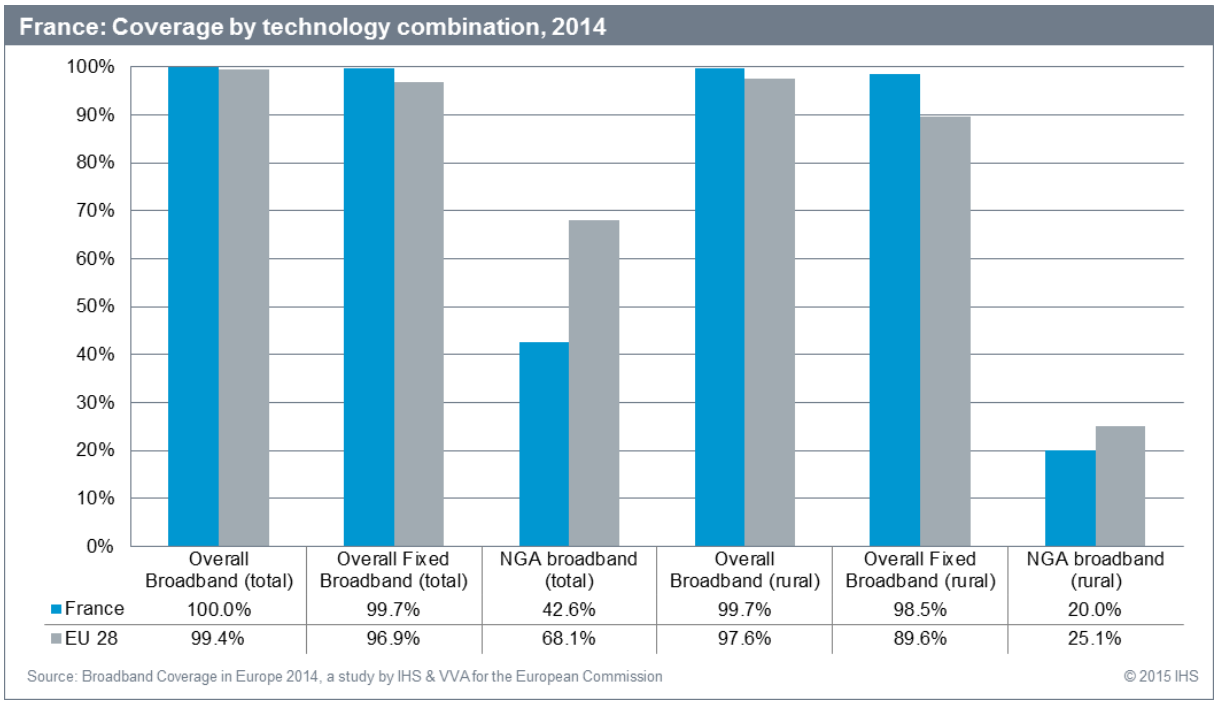
	Finland 2014		Finland 2013		Finland 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	94.0%	66.4%	93.4%	60.0%	92.5%	58.5%	93.5%	82.4%
VDSL	48.4%	0.0%	46.0%	0.0%	45.0%	0.0%	37.6%	15.1%
FTTP	37.7%	7.5%	29.4%	7.0%	33.3%	6.6%	18.7%	5.8%
WiMAX	2.3%	1.1%	2.2%	0.1%	2.4%	2.4%	19.6%	18.5%
Cable	44.3%	0.0%	42.5%	0.0%	42.0%	0.0%	43.5%	10.0%
DOCSIS 3.0	44.3%	0.0%	42.5%	0.0%	42.0%	0.0%	42.7%	9.2%
HSPA	99.5%	97.2%	99.5%	97.2%	99.5%	97.2%	97.3%	88.9%
LTE	92.1%	56.3%	85.5%	8.0%	68.5%	1.9%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	99.8%	98.6%	99.8%	98.6%	99.8%	98.6%	99.4%	97.6%
Overall fixed broadband	97.0%	69.2%	96.7%	63.5%	93.3%	62.6%	96.9%	89.6%
NGA broadband	75.1%	7.5%	72.1%	7.0%	65.5%	6.6%	68.1%	25.1%

Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

5.10 France

5.10.1 National coverage by broadband technology

By the end of 2014, overall and fixed broadband coverage in France remained above the EU28 average, both on national and rural level. NGA coverage, however, remained below the European average despite a 1.7 and 3.8 percentage point increase on national and rural level, respectively. In 2014, high-speed broadband services were available to 42.6% of all French households and 20.0% of rural households at the end of the year.



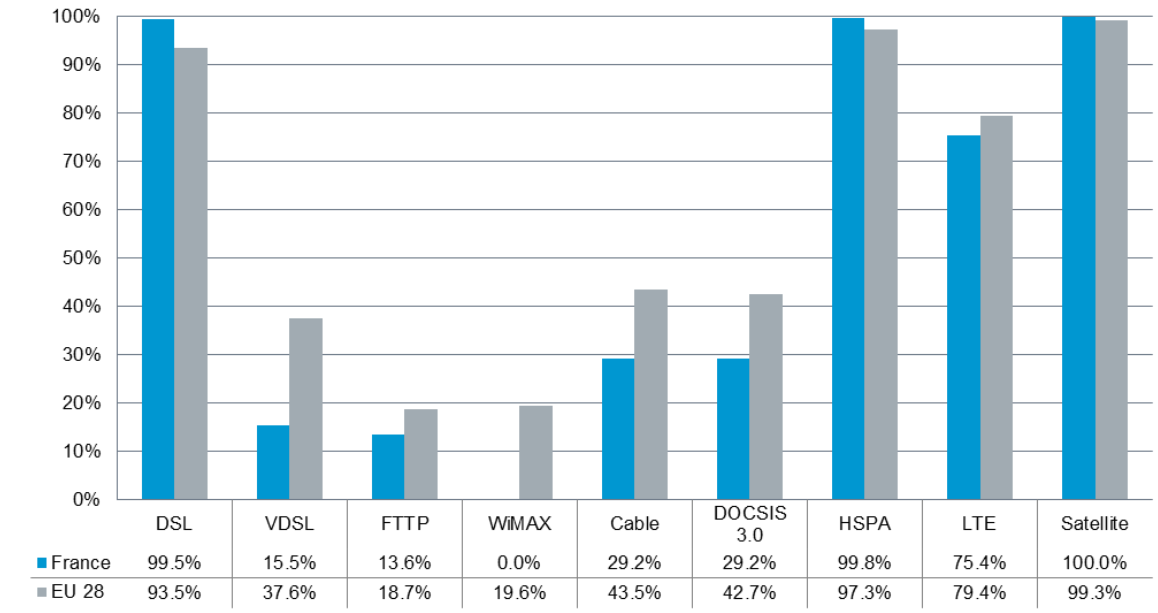
The breakdown by technology shows DSL to be the dominant fixed broadband technology in terms of coverage, with 99.5% of households covered. Although moderate gains were made with regards to VDSL coverage (a 2.1 percentage point increase compared to 2013), VDSL coverage remained relatively low at 15.5%. VDSL networks were first introduced in France in 2013, following launches by Orange France, SFR and Free in October 2013[47][48], however, the pace of rollout does not seem to have been sustained in 2014 with VDSL coverage growth slowing down in the course of the year.

FTTP coverage increased from 10.5% in 2013 to 13.6% at the end of 2014, while DOCSIS 3.0 networks at its 2013 coverage level of around 30% of French households. These minor gains in VDSL and FTTP coverage explain the rather moderate overall NGA coverage increase. Yet, the introduction of VDSL certainly contributed to a bigger diversification of the French fixed broadband market and enabled the French operators to differentiate their offering of NGA services.

While LTE coverage increased by 7.4 percentage points in 2014, these gains were slower than in many other EU countries and LTE coverage in France fell below the EU average by the end of 2014. The slower coverage growth could however also be attributed to the fact that France had one of the higher LTE coverage levels in 2013.

[47] http://www.zdnet.com/frances-sfr-and-free-go-head-to-head-on-1gbps-fibre-as-vdsl2-goes-national-7000021452/
[48] http://www.telegeography.com/products/commsupdate/articles/2013/10/17/orange-france-launches-vdsl2-service/

France: Coverage by technology, total, 2014



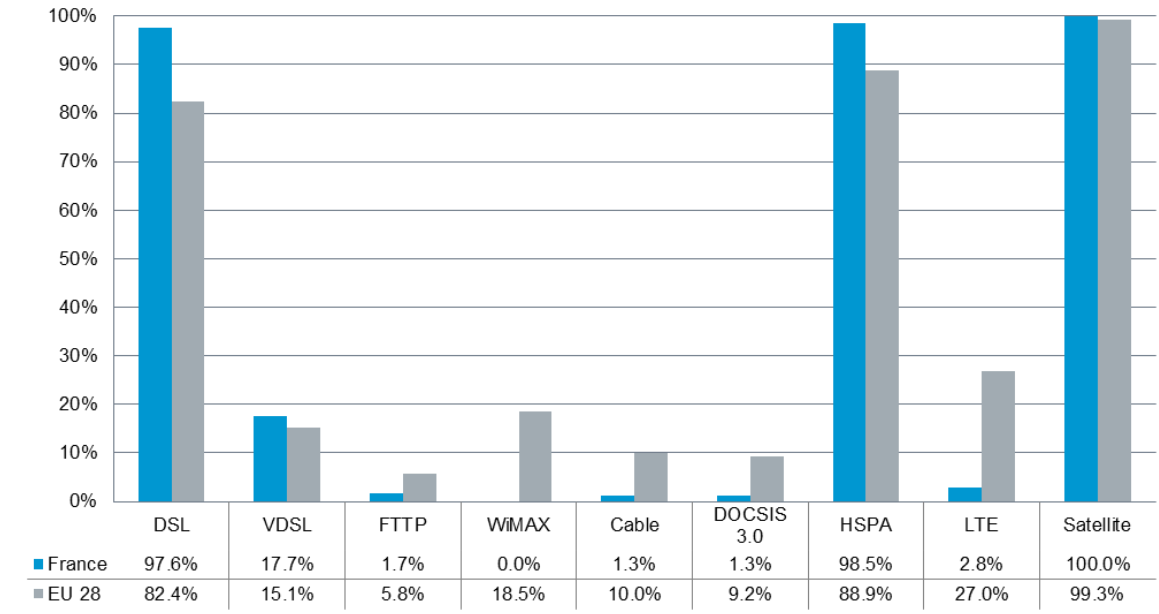
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
France	99.5%	15.5%	13.6%	0.0%	29.2%	29.2%	99.8%	75.4%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Rural areas saw limited coverage gains in 2014, with only VDSL coverage growing by more than one percentage point (a 3.8 percentage point growth) and reaching 17.7% rural homes. VDSL was the key NGA technology available to rural households, as FTTP and DOCSIS 3.0 networks were available to 1.7% and 1.3% of rural households, respectively.

LTE coverage was first introduced to rural areas in 2014, yet LTE networks expansion in rural areas remained limited with only 2.8% of rural households being able to connect to the high-speed mobile network at the end of the year.

France: Coverage by technology, rural areas, 2014

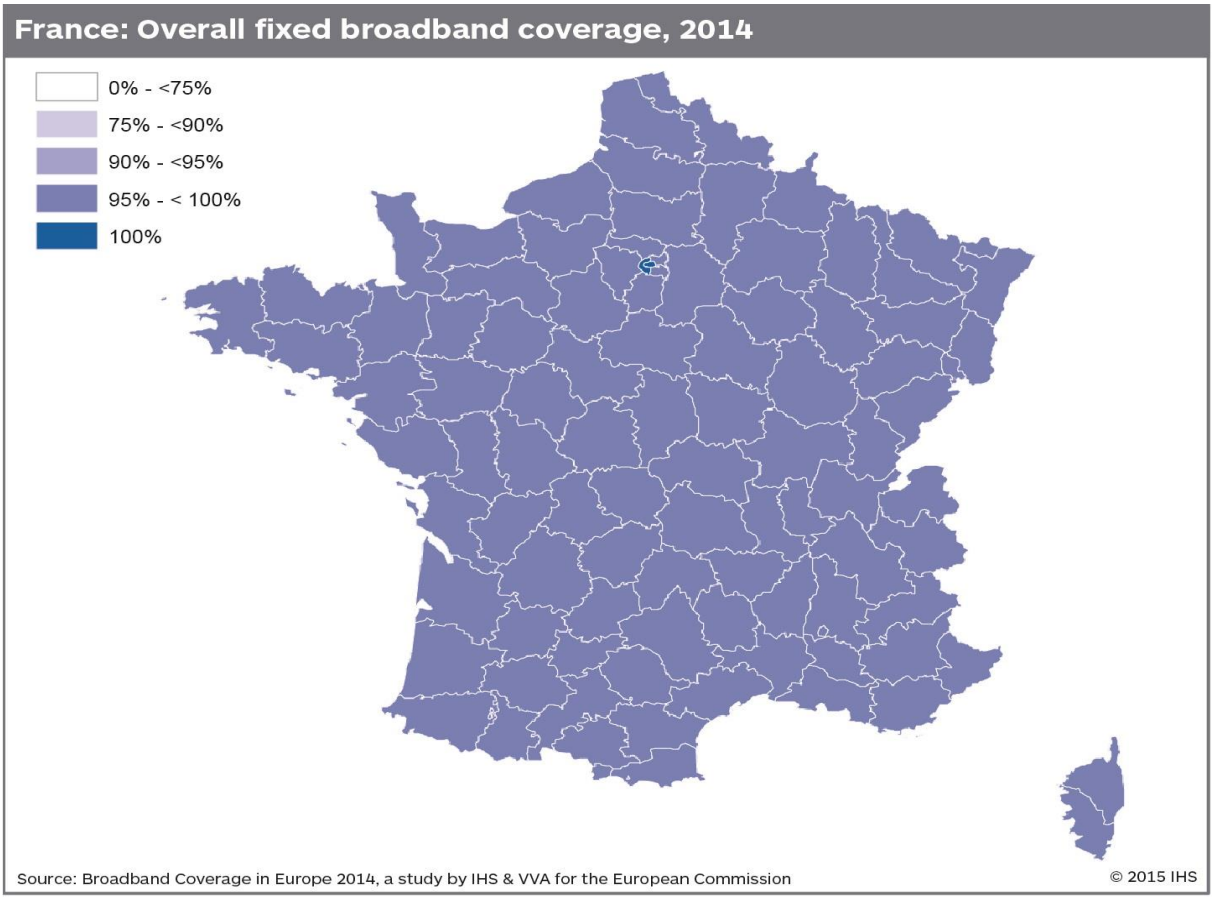


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
France	97.6%	17.7%	1.7%	0.0%	1.3%	1.3%	98.5%	2.8%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

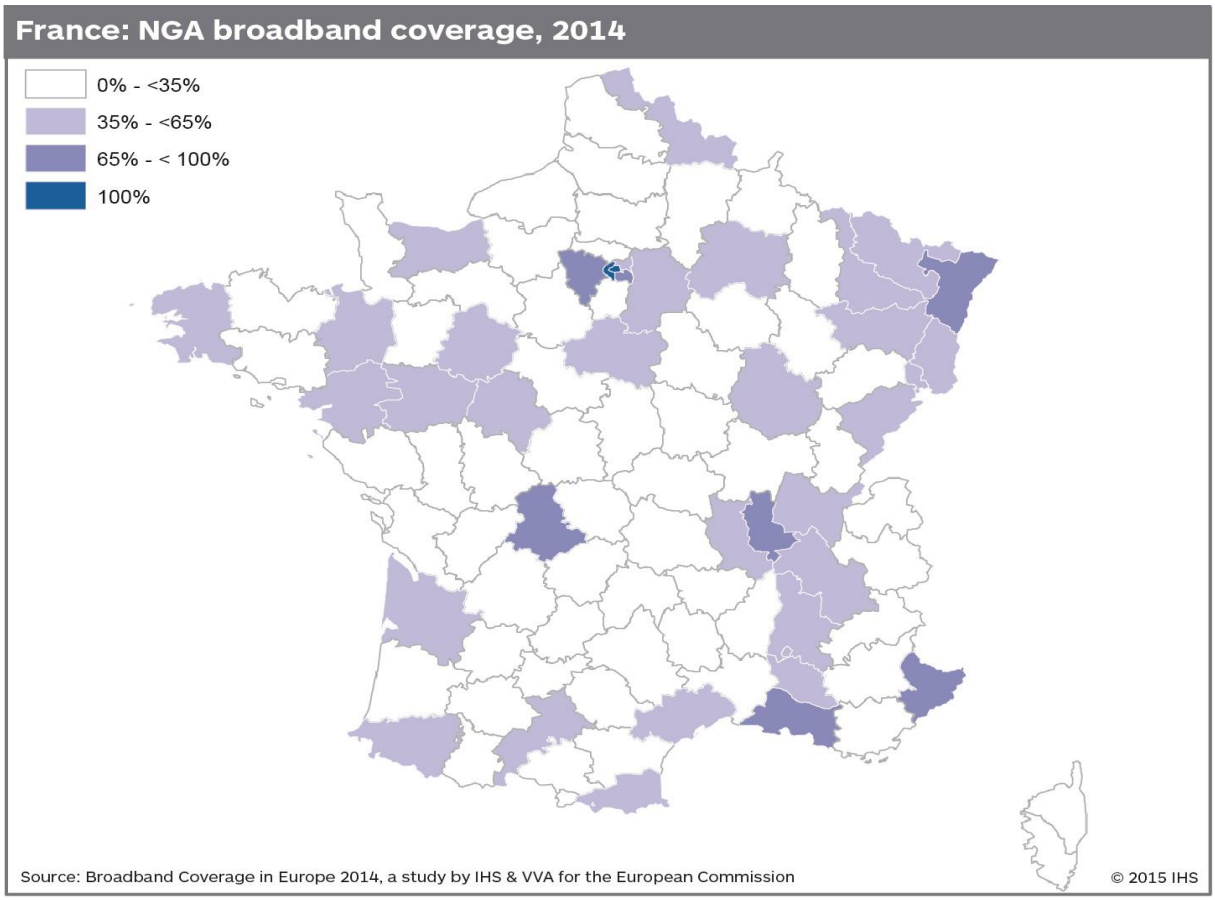
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.10.2 Regional coverage by broadband technology

France: Overall fixed broadband coverage, 2014



France: NGA broadband coverage, 2014



Most French regions recorded fixed broadband coverage rates of 100% or close to 100%, with exceptions including Rhône (97%) and overseas territories or Guadeloupe and Martinique. Similarly, increases in fixed broadband coverage remained below one percentage point across most regions.

The variation in terms of NGA coverage is significant. While no coverage was reported in some overseas territories and very low coverage in some other regions (for instance 10.5% in Meuse), 100% coverage is available in Paris and some of the surrounding areas.

5.10.3 Regulatory and market overview

The existing strategy for broadband development in France was adopted in 2011 and is set to run until 2022. The main aim is to provide high-speed access to 100% of the population, mainly via FTTH technologies.

In February 2013, the French government announced a EUR 20 billion pledge comprising public and private funds to be used for the development of high-speed fibre broadband networks[49]. The funds will be distributed in three stages of more than EUR 6 billion each. One stage will be paid by French network operators, one from a blend of operators and local governments and the last stage will be funded by the French state and local governments. Under the plan, around 50% of households should be covered by high-speed (30 Mbps) broadband by 2017 and reach all households by 2023.

The key market player in France is the incumbent Orange, which offers services based on DSL and FTTP technologies. FTTP infrastructure is one of the focus areas of French operators, with many market players investing in fibre networks. The acquisition of the telco SFR by leading cable provider Numericable at the end of 2014 created a large player in the fibre market, with a longer-term objective of further expanding the fibre-optic network[50].

In 2011, SFR entered into a network sharing agreement with Orange to avoid duplication in FTTP network deployment in less dense areas. Under the original agreement, SFR agreed to cover 20% of the outlined territory in mainland France, equalling to approx. 2.3 million households out of total 9.8 million households located in areas where the operators had redundant deployment projects. Following the merger, Numericable expressed its interest in renegotiating the agreement to an equal 50% of the covered territory. However, while Orange begun their work on network rollout, Numericable-SFR has yet to start deploying their network[51].

LTE networks have been introduced in France in 2012, with Orange and SFR lunching their networks at the end of that year, while Bouygues and Free Mobile launched their respective services in 2013[52]. All four mobile networks operators, which received authorization to deploy LTE networks in France, have already done so, explaining relatively high coverage level achieved by the end of 2013, and leading to slight decrease in the rapid pace of LTE deployment throughout 2014.

[49] http://www.zdnet.com/france-to-invest-20bn-in-high-speed-broadband-for-the-entire-country-7000011671/

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

[51] https://www.telegeography.com/products/commsupdate/articles/2015/06/02/numericable-sfr-wants-a-review-of-fibre-sharing-agreement-with-orange/index.html

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

5.10.4 Data tables for France

Statistic	National
Population	65,588,117
Persons per household	2.2
Rural proportion	15.6%

	France 2014		France 2013		France 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	99.5%	97.6%	99.4%	96.9%	99.3%	95.8%	93.5%	82.4%
VDSL	15.5%	17.7%	13.4%	14.6%	0.0%	0.0%	37.6%	15.1%
FTTP	13.6%	1.7%	10.5%	1.3%	6.5%	0.6%	18.7%	5.8%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.6%	18.5%
Cable	29.2%	1.3%	30.3%	0.6%	25.5%	0.7%	43.5%	10.0%
DOCSIS 3.0	29.2%	1.3%	30.3%	0.6%	21.4%	0.0%	42.7%	9.2%
HSPA	99.7%	98.4%	99.8%	98.5%	99.7%	98.1%	97.3%	88.9%
LTE	75.4%	2.8%	68.0%	0.0%	5.5%	0.0%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100%	100.0%	100.0%	99.3%	99.3%
Overall broadband	100.0%	99.7%	99.9%	99.2%	99.9%	99.3%	99.4%	97.6%
Overall fixed broadband	99.8%	98.5%	99.7%	97.1%	99.3%	96.1%	96.9%	89.6%
NGA broadband	42.6%	20.0%	40.9%	16.2%	24.2%	0.6%	68.1%	25.1%

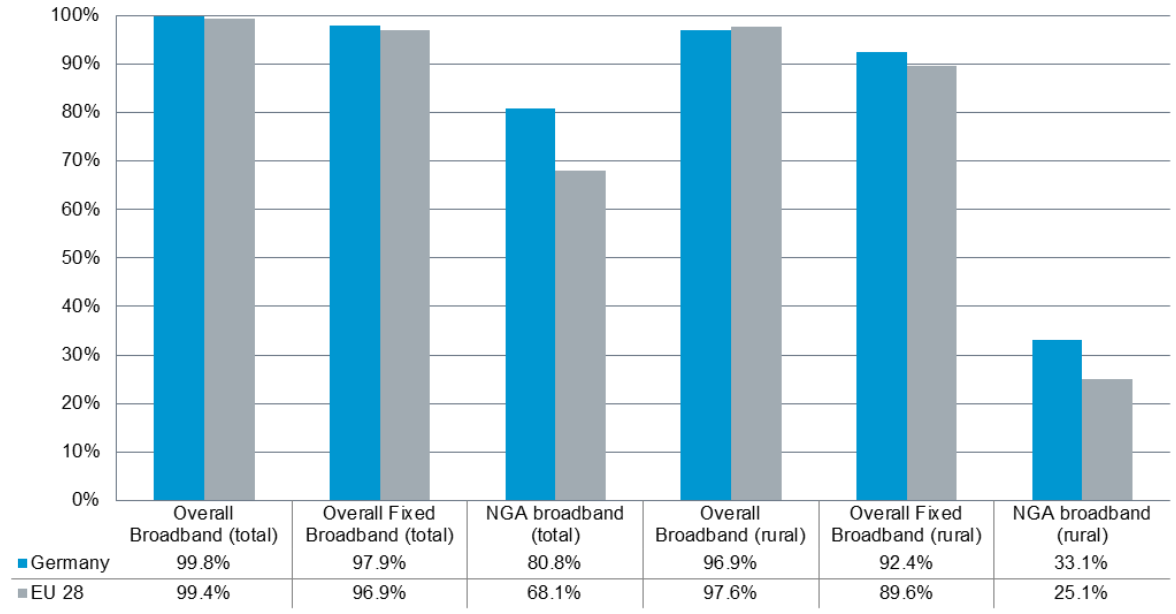
Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

5.11 Germany

5.11.1 National coverage by broadband technology

In 2014, Germany remained above the European average in all technology combinations, with the slight exception of overall rural coverage. Most substantial gains in coverage were recorded for NGA technologies, with national coverage reaching 80.8% of households (a 6.1 percentage point increase compared to 2013) and rural NGA coverage passing a third (33.1%) of rural households in Germany, a significant 11.8 percentage point growth year-on-year. These increases in turn contributed to Germany outperforming the EU28 average by almost thirteen percentage points for national NGA coverage and eight percentage points in the case of rural NGA coverage.

Germany: Coverage by technology combination, 2014



	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Germany	99.8%	97.9%	80.8%	96.9%	92.4%	33.1%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

In terms of specific technologies, DSL and cable were the main technologies contributing to fixed broadband coverage with nearly 96% households having access to DSL services and more than two-thirds (62.4%) of German homes being able to connect via cable networks. Both of these technologies registered coverage levels higher than the EU28 averages of 93.5% for DSL and 43.5% for cable.

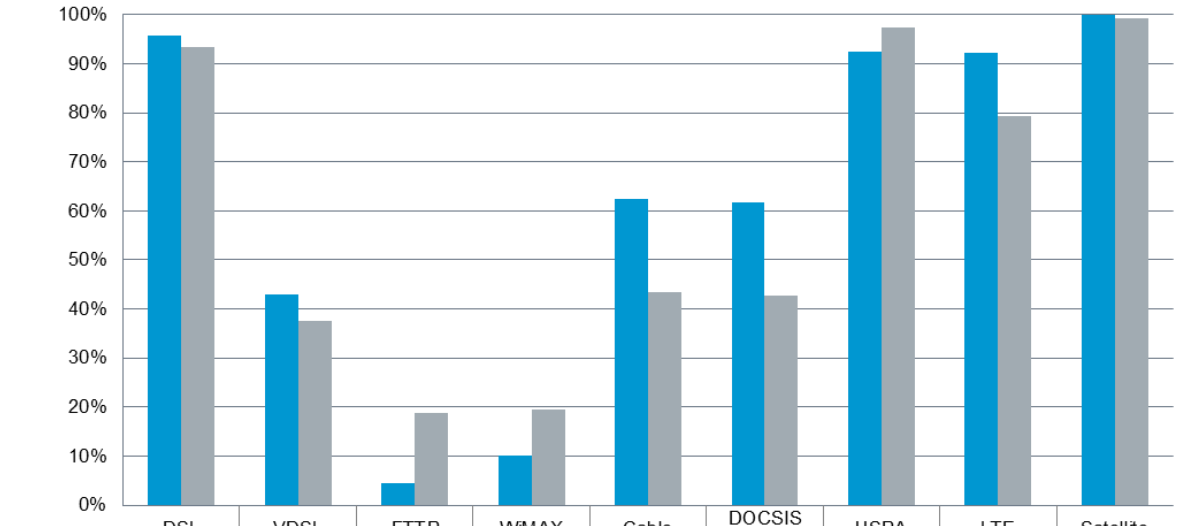
On the other hand, both WiMAX and FTTP networks were significantly underdeveloped compared to the European average levels. Only 4.4% of German households had access to FTTP services at the end of 2014. The lack of FTTP coverage partly reflects the long-term focus of leading broadband network operators on alternative technologies and upgrades to their legacy copper or coaxial cable networks rather than on new FTTP networks build-up.

This development is further supported by the gains of VDSL and DOCSIS 3.0 technologies made in 2014, with VDSL coverage increasing by 9.5 percentage points and DOCSIS 3.0 coverage increasing by 5.8 percentage points to 43.0% and 61.6% respectively. The increase in VDSL coverage in particular reflects the continued network expansion by the incumbent operator Deutsche Telekom.

With regards to mobile technologies, there is traditionally relatively low HSPA coverage. In fact, at 92.5% Germany reported the lowest HSPA coverage among the study countries in

2014. At the same time, an 11.1 percentage point increase in LTE coverage put national LTE coverage at 92.1%, just 0.4 percentage points below national HSPA coverage.

Germany: Coverage by technology, total, 2014



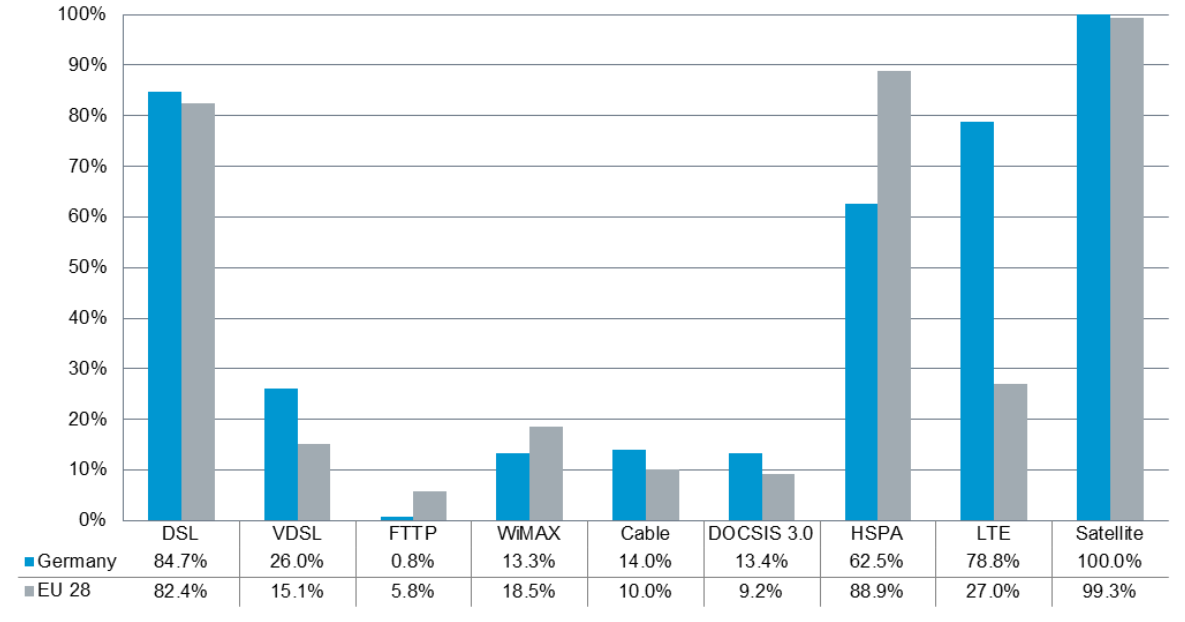
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Germany	95.8%	43.0%	4.4%	10.1%	62.4%	61.6%	92.5%	92.1%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

In rural areas, fixed broadband coverage exceeded the EU28 average, with DSL being an important driver covering 84.7% of rural households. In terms of rural NGA coverage, VDSL was the key technology in providing high-speed broadband availability to rural areas. In 2014, VDSL registered a 9.3 percentage point increase to 26.0% of rural households. DOCSIS 3.0 services were available to 13.4% of rural households.

Germany is also notable for high level of LTE coverage in rural areas, which at 78.8% exceeded the HSPA coverage (62.5%). This reflects the focus on deploying LTE networks in previously underserved rural areas rather than HSPA networks.

Germany: Coverage by technology, rural areas, 2014

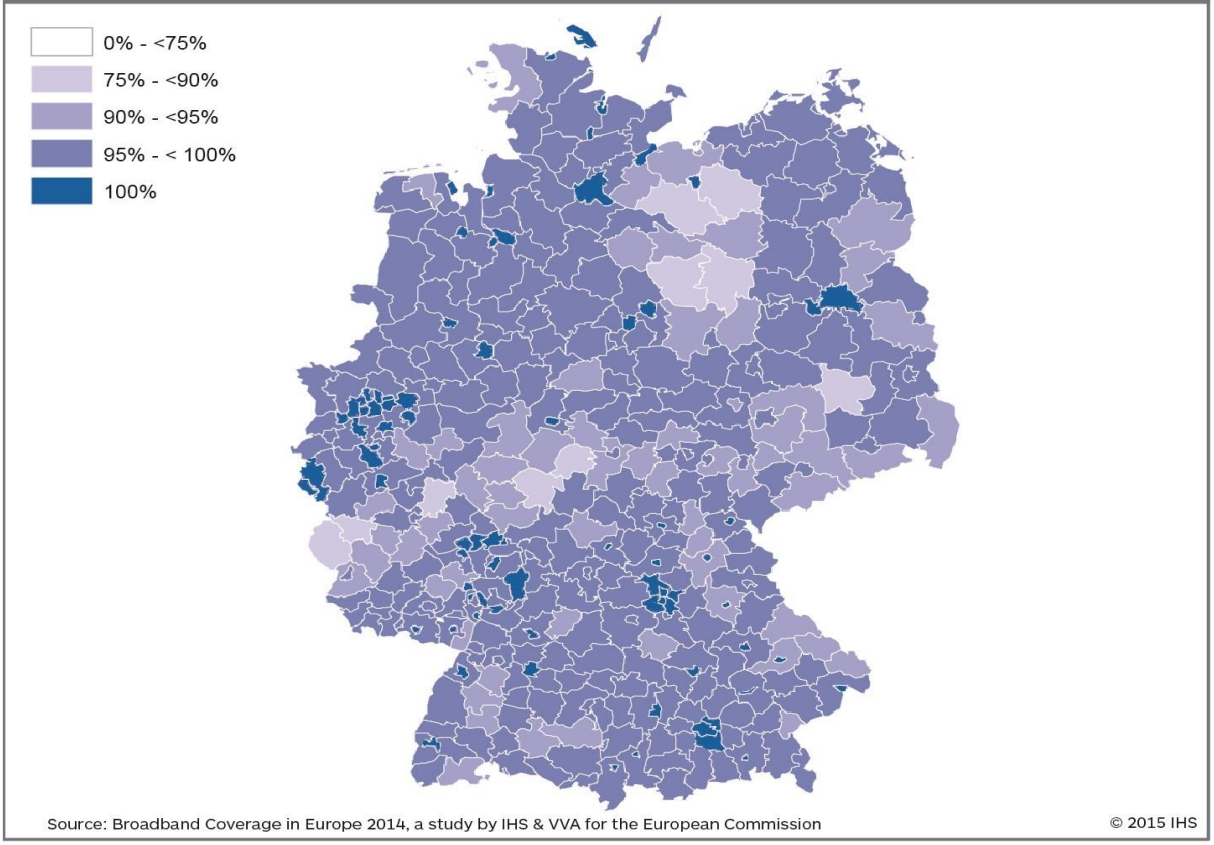


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Germany	84.7%	26.0%	0.8%	13.3%	14.0%	13.4%	62.5%	78.8%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

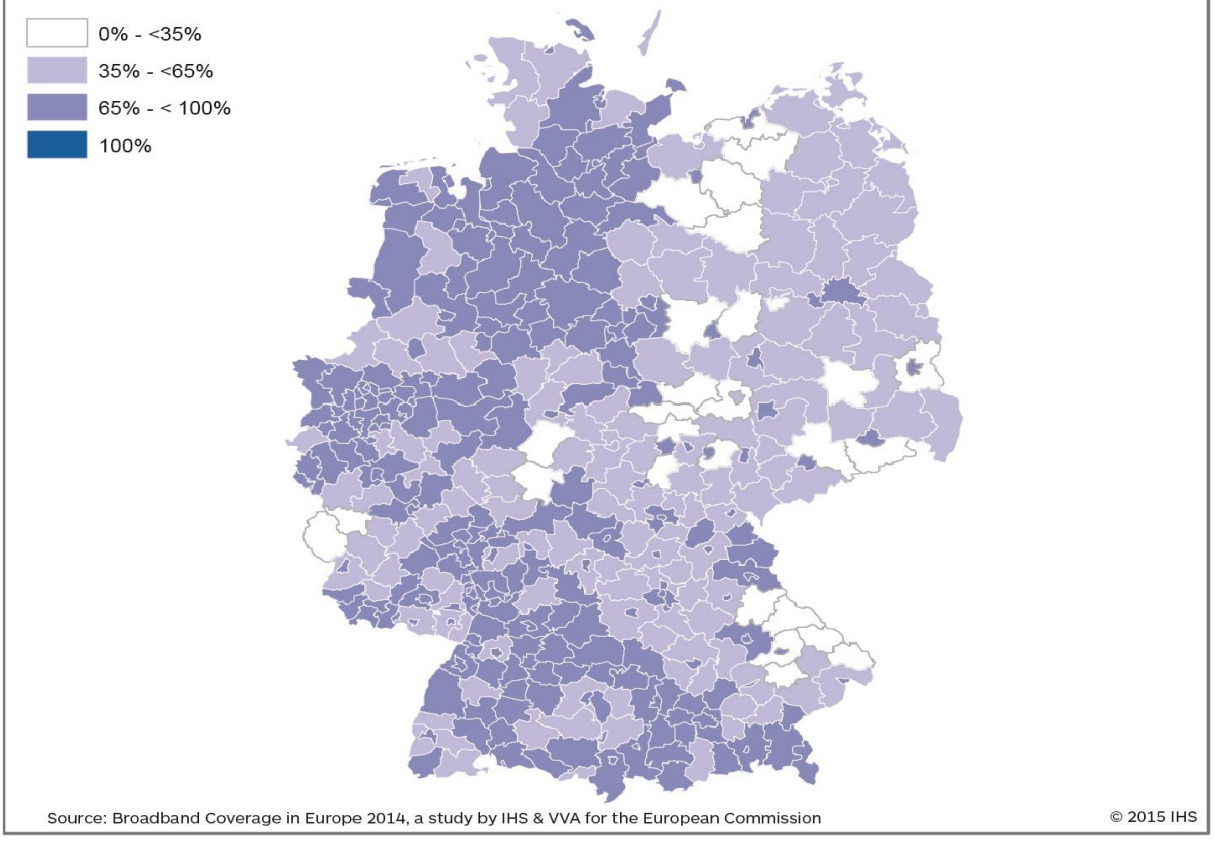
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.11.2 Regional coverage by broadband technology

Germany: Overall fixed broadband coverage, 2014



Germany: NGA broadband coverage, 2014



Given the large geographic area, significant differences among individual regions in fixed broadband can be observed, with coverage levels ranging from just under 87% in the Vulkaneifel region to 100% in metropolitan areas. The increases in fixed broadband coverage were moderate across most regions and did not exceed one percentage point.

Variations in NGA coverage are even larger than in the case of fixed broadband, with coverage in some areas being as low as 12.9% (Elbe-Elster) compared to over 95% in urban areas. Moreover, focus on NGA deployment in the Western part of the country is also clearly visible from the coverage map above.

5.11.3 Regulatory and market overview

Germany's approach to broadband rollout has historically been laid-out in The Federal Government's Broadband Strategy, published in 2009[53]. The strategy document aimed to provide additional impetus for broadband rollout, and set targets of closing broadband coverage gaps by end 2010 and ensuring that 75% of households had access to 50Mbps connections by the end of 2014. This strategy has more recently become a part of the Digital Agenda 2014-2017, which revised the targets to 100% coverage with 50Mbps connections by the end of 2018[54].

The key actor on the German fixed broadband market is the incumbent operator Deutsche Telekom, which launched VDSL services in 2006, alongside its IPTV service and more recently launched vectored VDSL, with plans to cover a further 5.9 million homes by VDSL vectoring technology by 2018[55]. Other operators also contributed to further VDSL network upgrade and deployment, with Vodafone launching its own VDSL vectoring offer in 2014[56].

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 and now represents nearly 99% of homes passed by cable broadband connections. Leading cable groups Kabel Deutschland (acquired by Vodafone in 2013) and Liberty Global's Unitymedia have in 2014 been joined by other operators, such as the regional operator Tele Columbus, in offering high-speed services up to 400 Mbps[57].

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 LTE network at the end of 2010, followed by Telefonica and Deutsche Telekom in 2011[58]. In 2014, additional commercial LTE services were offered by an alternative provider, E-plus.

Improving rural coverage now remains a priority to ensure that Germany meets its coverage targets. Deutsche Telekom has suggested alternative access means including hybrid LTE-DSL access connections, and in 2014 launched a hybrid router combining the two technologies – it intends to roll out the option to all covered households in 2015[59].

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

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

[55] http://www.fiercetelecom.com/story/deutsche-telekom-roll-out-vdsl2-vectoring-additional-59-million-homes-quick/2015-02-24

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

[57] https://www.telecolumbus.com/tele-columbus-offer-internet-speeds-400-mbits/

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

[59] http://www.telecompaper.com/news/deutsche-telekom-unveils-hybrid-dsl-lte-home-router--1035238

5.11.4 Data tables for Germany

Statistic	National
Population	82,027,411
Persons per household	2.0
Rural proportion	8.6%

	Germany 2014		Germany 2013		Germany 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	95.8%	84.7%	94.9%	82.4%	94.8%	80.6%	93.5%	82.4%
VDSL	43.0%	26.0%	33.5%	16.7%	46.3%	21.8%	37.6%	15.1%
FTTP	4.4%	0.8%	4.4%	0.5%	2.6%	0.7%	18.7%	5.8%
WiMAX	10.1%	13.3%	12.8%	13.0%	12.2%	12.0%	19.6%	18.5%
Cable	62.4%	14.0%	59.5%	11.5%	59.1%	9.3%	43.5%	10.0%
DOCSIS 3.0	61.6%	13.4%	55.8%	8.7%	52.3%	5.9%	42.7%	9.2%
HSPA	92.5%	62.5%	92.2%	59.9%	90.4%	53.6%	97.3%	88.9%
LTE	92.1%	78.8%	81.0%	65.9%	51.7%	50.0%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	99.8%	96.9%	99.9%	98.8%	99.8%	98.5%	99.4%	97.6%
Overall fixed broadband	97.9%	92.4%	97.5%	94.9%	96.6%	85.6%	96.9%	89.6%
NGA broadband	80.8%	33.1%	74.8%	21.30%	66.2%	26.4%	68.1%	25.1%

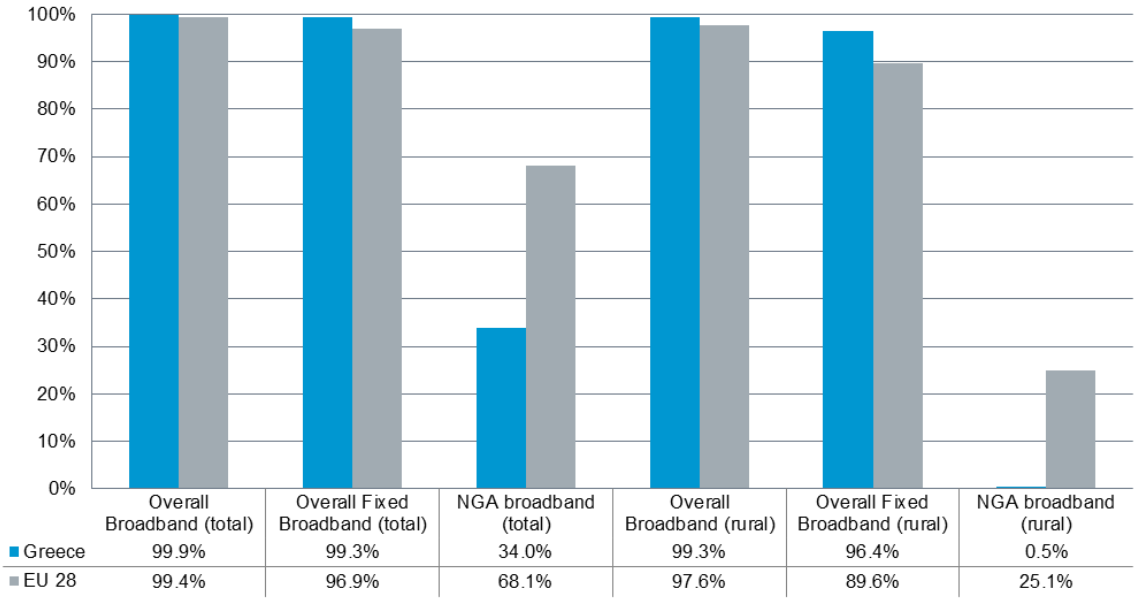
Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

5.12 Greece

5.12.1 National coverage by broadband technology

In 2014, overall and fixed broadband coverage in Greece remained just ahead of the EU average. However, with only a third (34.0%) of homes passed, NGA coverage lagged considerably behind the EU28 average (68.1%) and, at 0.5%, rural NGA coverage was second lowest in the EU. While NGA coverage did improve on national level by 7.1 percentage points compared to 2013, the very low rural NGA coverage shows that little progress was made in terms of improving the availability of NGA technologies in rural areas.

Greece: Coverage by technology combination, 2014



	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%	34.0%	99.3%	96.4%	0.5%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

As no cable networks are present in Greece, and given the very low FTTP and WiMAX coverage (0.4% and 0.1% respectively), DSL continued to the main fixed broadband technology, covering nearly all households in Greece (99.3%) at the end of 2014. Even though, the incumbent, OTE, has been heavily investing in upgrading its DSL network to VDSL[60]and despite a 7.1 percentage point increase in VDSL coverage in 2014, availability of VDSL services was at 33.8% of households still below the EU28 average of nearly 38%.

Due to the absence of DOCSIS 3.0 and only negligible FTTP availability, VDSL thus remained the only available next-generation high-speed broadband technology available to Greek households in 2014.

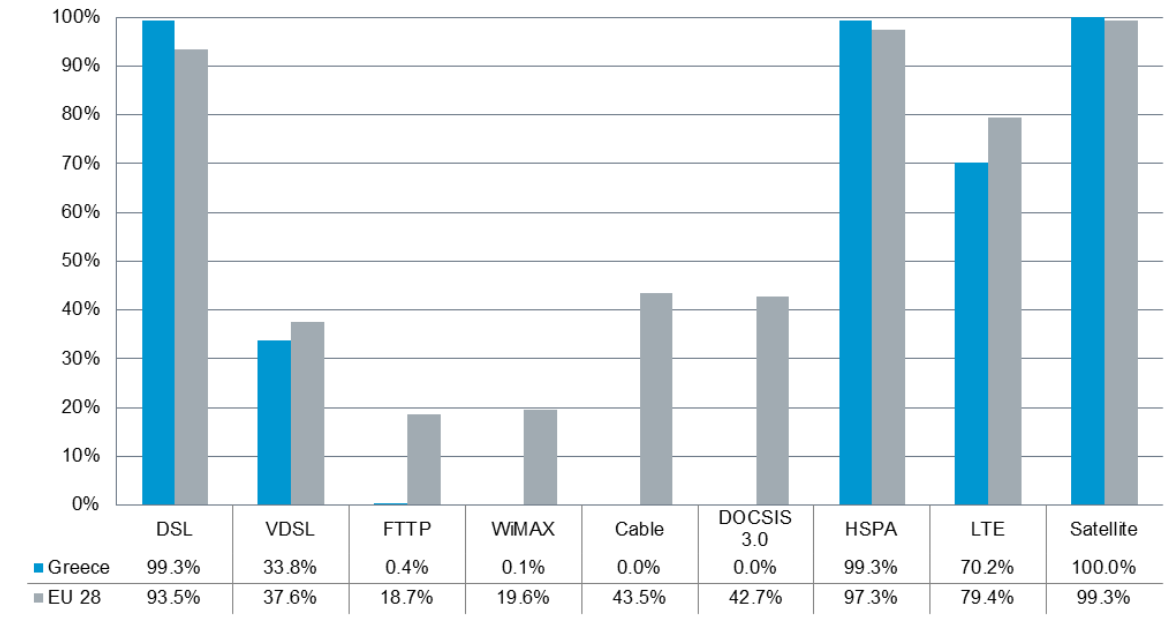
As for mobile technologies, HSPA coverage increase from 96.5% in 2013 to a near universal coverage level of 99.3% of households in 2014. As for LTE, continued deployment of LTE networks by Cosmote (OTE's mobile branch) [61] and Vodafone Greece[62] resulted in a 15.4% percentage point increase in LTE coverage and at the end of 2014, 70.2% of Greek households we able to connect to the high-speed mobile broadband service. Despite this increase, LTE coverage in Greece nevertheless remained below the EU average of 79.4%.

[60] https://www.ote.gr/en/web/cr2014/marketplace/expanding-broadband-and-mobile-internet-in-greece

[61] https://www.telegeography.com/products/commsupdate/articles/2014/07/15/ote-cosmote-expand-vdsl-lte-networks/

[62] http://www.vodafone.gr/portal/client/news/pressReleaseClient!pressReleaseDetails.action?pressReleaseId=40230&dateFrom=&dateUntil=

Greece: Coverage by technology, total, 2014



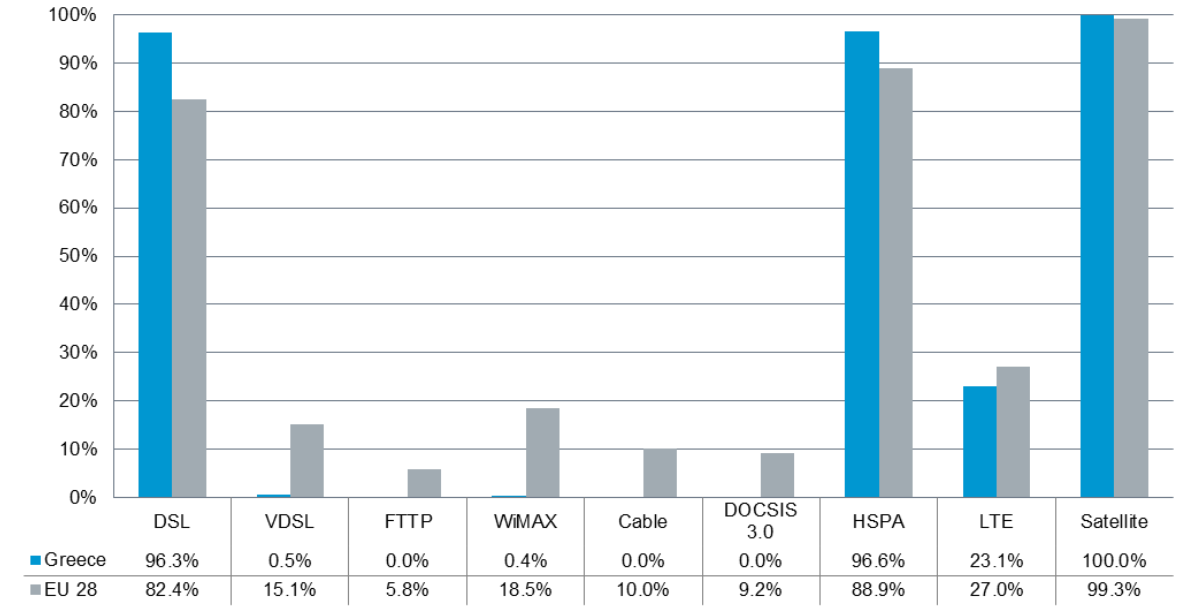
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Greece	99.3%	33.8%	0.4%	0.1%	0.0%	0.0%	99.3%	70.2%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

A key challenge in rural areas remains related to NGA coverage. Given the lack of FTTP and cable infrastructure, VDSL is the only NGA technology available to rural households and at 0.5% of homes passed, its coverage is extremely limited. Greece does however have relatively high fixed broadband coverage in rural areas compared to other study countries, due to high availability of standard DSL, which covers 96.3% of rural households, almost 14 percentage points above the EU average.

Even though rural LTE coverage improved by 11.3 percentage points, at 23.1% it is slightly below the average figure recorded for the EU (27.0%).

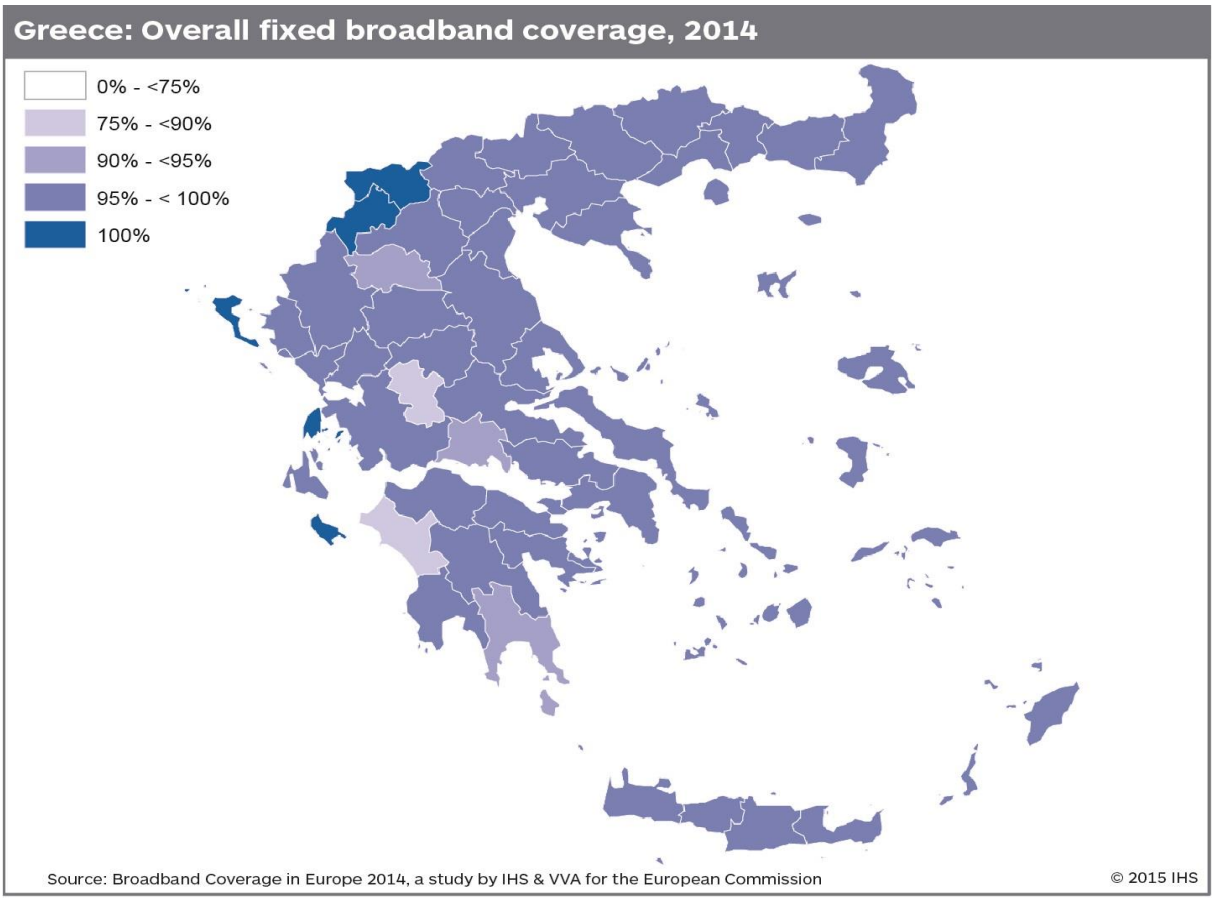
Greece: Coverage by technology, rural areas, 2014

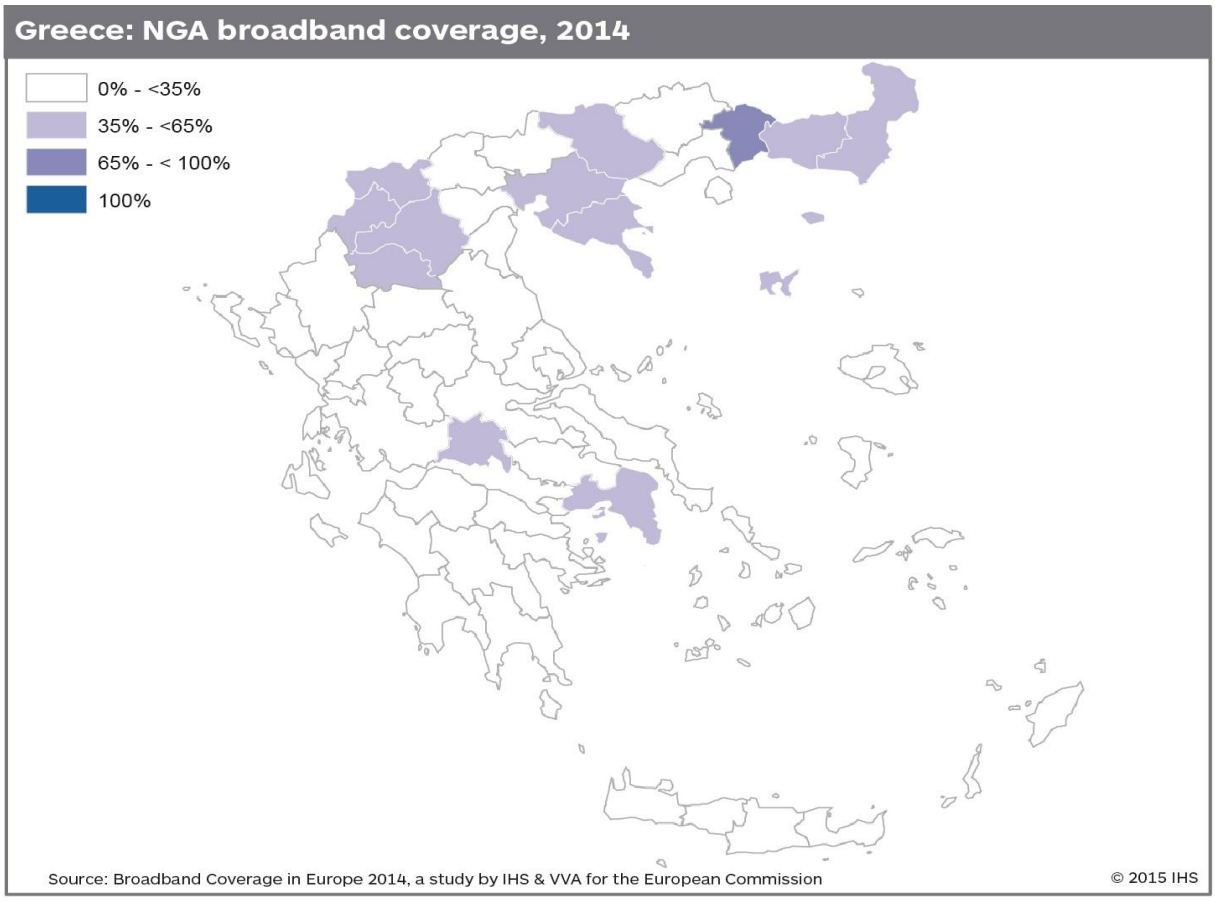


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Greece	96.3%	0.5%	0.0%	0.4%	0.0%	0.0%	96.6%	23.1%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.12.2 Regional coverage by broadband technology





While some variations can be observed when looking at fixed broadband coverage in individual regions, almost all Greek regions showed fixed broadband coverage rates of close to or above 90%, with 100% availability recorded in two northern regions (Kastoria and Florina) and in three islands – Zakynthos, Lefkada and Kerkyra.

In terms of NGA coverage, availability of high-speed broadband remained under 40% in most regions. Six regions reported NGA coverage beyond this level and only in Xanthi NGA coverage exceeded 65% of households.

5.12.3 Regulatory and market overview

The National Next Generation Broadband Access Plan 2014-2020 is the key document guiding national policy in the field of broadband coverage and replaces a previous strategy, which ran from 2008-2013. 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.

In order to achieve these goals, the government proposed steps focused on reduction of investment cost, simplification of administrative procedures and coordination of NGA networks deployment, while relying on private investments to fund NGA broadband expansion[63].

The Greek fixed broadband market is almost exclusively focused on DSL-based technologies, with DSL and VDSL access being the key priorities for the individual market players, including the incumbent OTE.

Greek market players are particularity keen to upgrade and expand their networks such that they can offer high-speed fixed broadband services. In 2014, OTE has announced further expansion of its VDSL network to cover additional 105,000 homes, with a target of 30% VDSL coverage by the end of 2014[64].

Cosmote, the mobile division of OTE first launched an LTE network in 2012, with further network expansion taking place since, with the Cosmote 4G network achieving 70% population coverage by the end 2014. Other LTE networks include one launched by Vodafone in 2012, with the latest LTE network launched by Wind Hellas in March 2015[65].

In August 2014, Vodafone Greece acquired 72.7% of Hellas Online (HOL) for EUR 72.7 million, eventually increasing its holding to 99.53% by the end of the year[66]. Together with Wind, Vodafone also put forth a joint binding bid for an alternative provider Forthnet, which if approved will lead to further consolidation of the Greek broadband market.

[63] http://www.yme.gr/getfile.php?id=6018
[64] https://www.ote.gr/en/web/cr2014/marketplace/expanding-broadband-and-mobile-internet-in-greece
[65] GSA 4G Market and Technology Update. Available for download here: http://www.gsacom.com/gsm_3g/info_papers.php4
[66] https://www.telegeography.com/products/commsupdate/articles/2015/05/18/hol-to-cease-trading-on-ase-on-28-may-2015/

5.12.4 Data tables for Greece

Statistic	National
Population	11,062,508
Persons per household	2.6
Rural proportion	20.4%

	Greece 2014		Greece 2013		Greece 2012		EU28 2014	
Technology	**Total**	**Rural**	**Total**	**Rural**	**Total**	**Rural**	**Total**	**Rural**
DSL	99.3%	96.3%	99.2%	97.7%	99.1%	95.3%	93.5%	82.4%
VDSL	33.8%	0.5%	26.7%	0.0%	21.7%	0.0%	37.6%	15.1%
FTTP	0.4%	0.0%	0.4%	0.0%	0.4%	0.0%	18.7%	5.8%
WiMAX	0.1%	0.4%	0.0%	0.2%	0.0%	0.2%	19.6%	18.5%
Cable	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	43.5%	10.0%
DOCSIS 3.0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	42.7%	9.2%
HSPA	99.3%	96.6%	99.5%	96.5%	99.4%	96.8%	97.3%	88.9%
LTE	70.2%	23.1%	54.8%	11.8%	42.4%	2.3%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	99.9%	99.3%	99.9%	98.8%	99.8%	98.9%	99.4%	97.6%
Overall fixed broadband	99.3%	96.4%	99.6%	97.8%	99.1%	95.3%	96.9%	89.6%
NGA broadband	34.0%	0.5%	26.9%	0.0%	21.9%	0.0%	68.1%	25.1%

Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

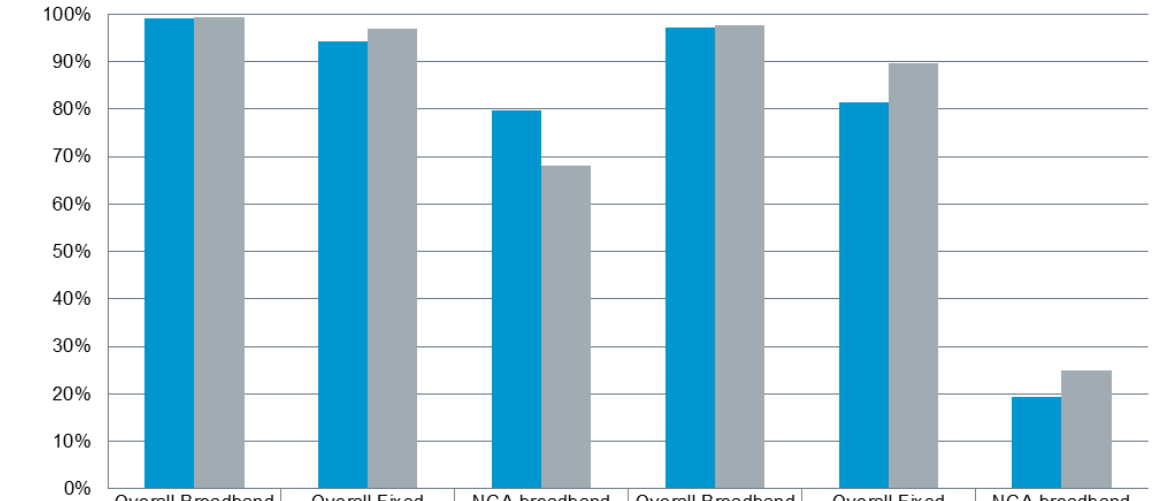
5.13 Hungary

5.13.1 National coverage by broadband technology

In 2014, fixed broadband coverage did not register any increases compared to 2013. Both national and rural fixed broadband coverage levels remained below the EU28 average, reaching 94.4% of total households and 81.4% rural households compared to EU averages of 96.9% and 89.6%, respectively.

After considerable improvements in total and rural NGA coverage in 2013, progress made in 2014 was more modest. National NGA coverage increased by 4.0 percentage points and nearly 8 in 10 (79.7%) Hungarian households had access to high-speed broadband at the end of 2014. Rural NGA coverage, at 19.4%, improved by 1.6 percentage points and while NGA broadband coverage on national level exceeded the EU average, this was not the case for rural NGA coverage, which remained below the 25.1% recorded for EU as a whole.

Hungary: Coverage by technology combination, 2014



	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Hungary	99.1%	94.4%	79.7%	97.1%	81.4%	19.4%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

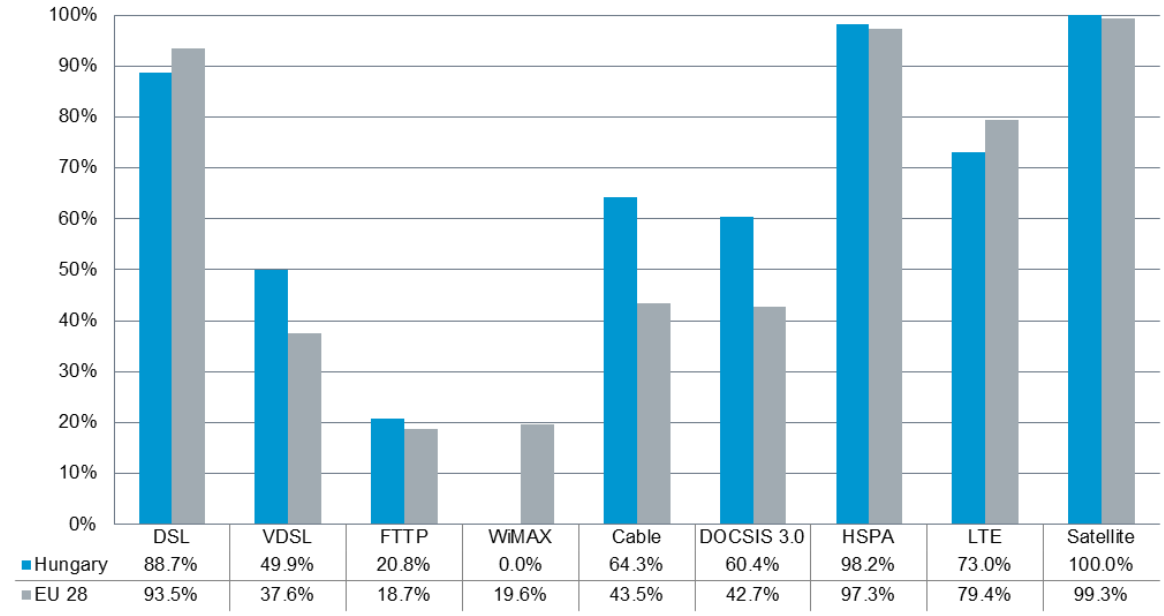
Examining individual technologies, VDSL saw the most significant gains, continuing a growth trend registered in 2013 with a 25.9 percentage point increase in 2014. Compared to 2013, Hungarian VDSL coverage exceeded the EU average, with almost 50% of homes passed, compared to an EU28 average of 37.6%. Continued growth in VDSL coverage can be attributed to the incumbent operator, Magyar Telecom taking steps to ensure complete high-speed broadband coverage by 2018[67].

DSL and Cable remained to be the two most prevalent technologies, covering 88.7% and 64.3% of households respectively. DOCSIS 3.0 continued to be the primary NGA technology in Hungary, covering 60.4% of households, although the aforementioned developments in VDSL rollout and limited growth in DOCSIS 3.0 coverage suggest a closing gap between the two technologies.

[67] https://www.telegeography.com/products/commsupdate/articles/2014/12/24/mtel-beefs-up-portfolio-with-further-cableco-acquisitions-in-2014/

Considerable progress was achieved with regards to LTE coverage, which grew by 33.9 percentage points in 2014. However, at 73% it is still below the EU average of 79.4%.

Hungary: Coverage by technology, total, 2014

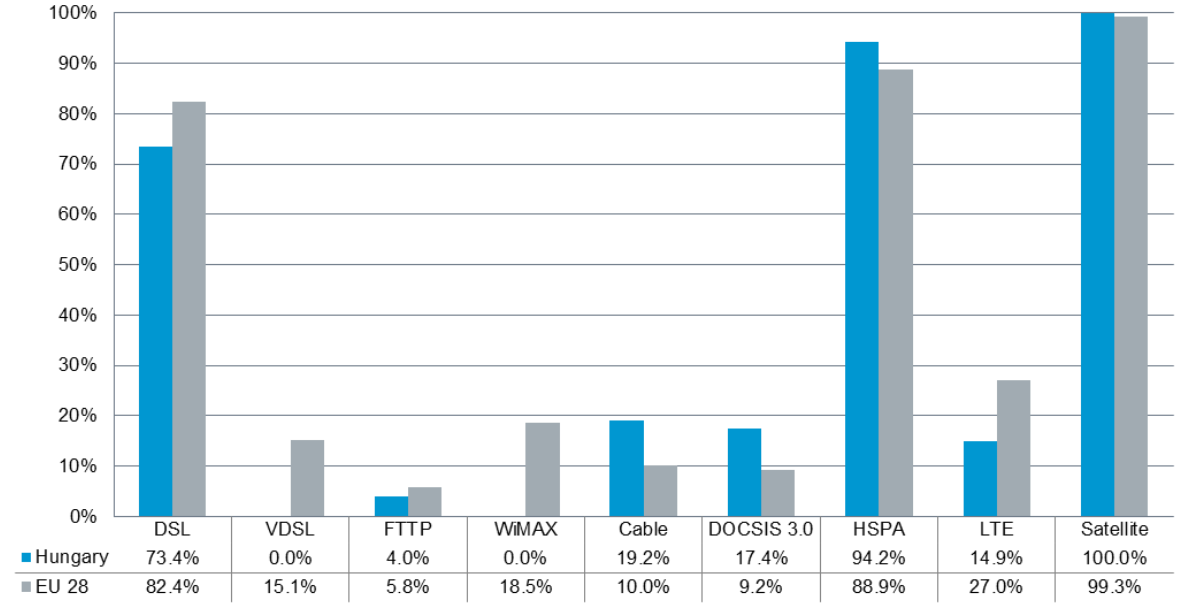


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Hungary	88.7%	49.9%	20.8%	0.0%	64.3%	60.4%	98.2%	73.0%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission © 2015 IHS

Rural areas across Hungary registered only limited growth in broadband coverage in 2014. The only area where more substantial gains were identified was cable coverage, which increased by 1.7 percentage points and networks passed nearly one in five (19.2%) rural homes.

Hungary: Coverage by technology, rural areas, 2014



	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Hungary	73.4%	0.0%	4.0%	0.0%	19.2%	17.4%	94.2%	14.9%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

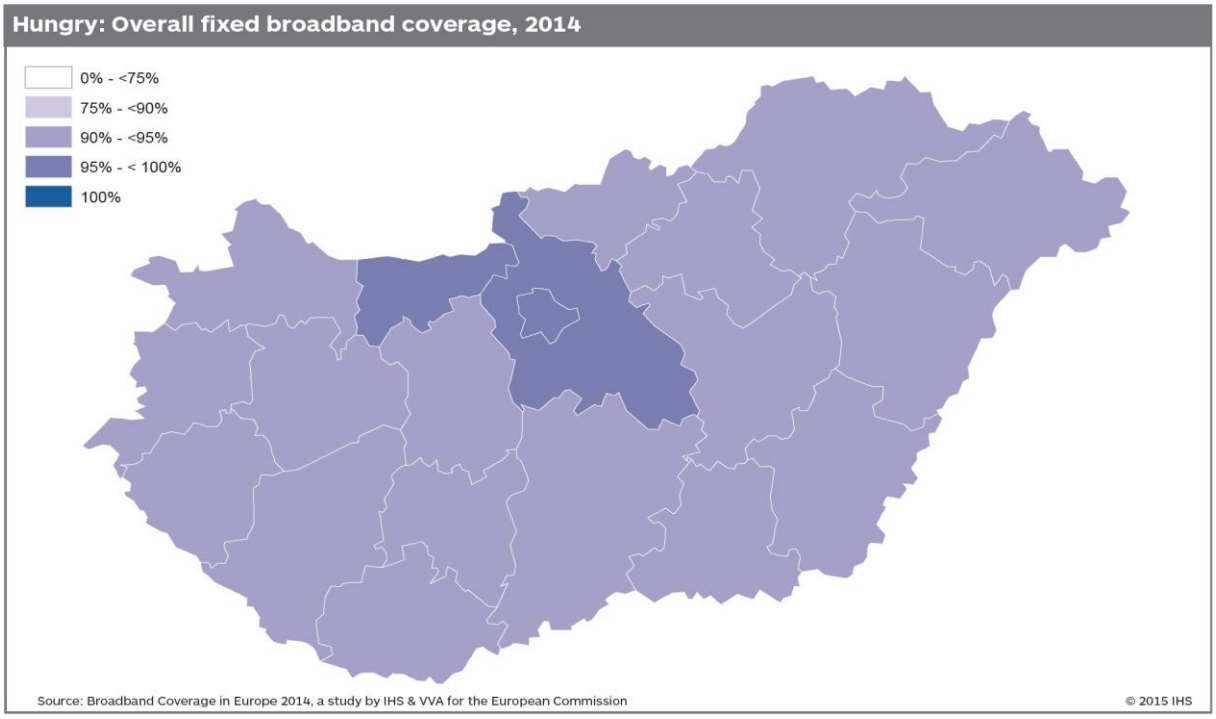
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission © 2015 IHS

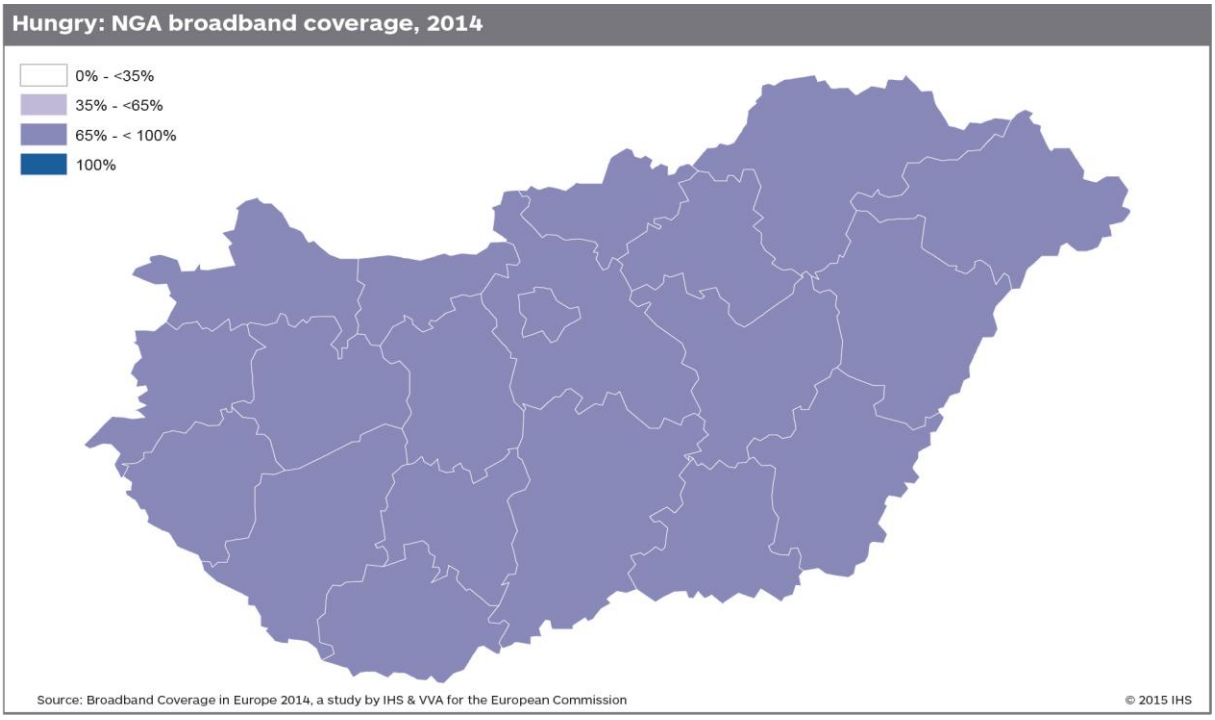
Hungary also outperformed the EU with regard to rural DOSCIS 3.0 coverage, which at 17.4% exceeded the average EU coverage of 9.2%. Given the absence of VDSL in rural areas and low availability of FTTP (4.0% compared to 5.8% EU average), DOCSIS 3.0 was the only technology contributing to rural NGA coverage in the country.

While LTE coverage in rural areas increased by five percentage points, this is relatively little compared to gains observed in other countries. Subsequently, rural LTE coverage in Hungary remains below the EU average.

5.13.2 Regional coverage by broadband technology

On regional level, fixed broadband coverage is distributed quite uniformly with all regions registering fixed broadband coverage levels higher than 90%. In three regions - Budapest, Pest and the Komárom-Esztergom region – fixed broadband coverage reached more than 95% of households





With regards to NGA coverage, while all regions registered NGA coverage levels higher than 65%, there was quite a lot of variations between the individual regions, with the lowest coverage recorded in the Somogy region (nearly 67%) and highest in Budapest (almost 90%).

5.13.3 Regulatory and market overview

The newly adopted Hungarian national broadband strategy for the period 2014-2019 is based on the Digital Agenda targets, and hence aims to secure complete broadband coverage of at least 30 Mbps by 2020 and 50% coverage offering speeds of at least 100 Mbps in the same time frame. 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 areas[68].

Fixed broadband market in Hungary is split primarily between two operators, the incumbent Magyar Telecom and Liberty Global-backed UPC, the cable provider. Magyar Telecom was one of the first operators to launch VDSL services in Hungary, introducing the technology in 2008[69].

Recently, 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[70]. 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[71].

Invitel, an alternative broadband provider, has also vowed to invest EUR 30 million expand its high-speed VDSL broadband network to 98 largest cities in Hungary by mid-2015.

Magyar Telekom was also the first operator to launch an LTE network in Hungary at the beginning of 2012, followed by Telenor Hungary. Network deployment by Vodafone is currently in the pipeline, with a fourth operator, Digi, also securing spectrum allocation and hence expected to also launch a fourth LTE network[72].

[68] http://www.vus.sk/broadband/nbbs/hu_nbbs.pdf

[69] http://www.telegeography.com/products/commsupdate/articles/2009/09/03/mtel-slows-ftth-deployment-as-economic-downturn-bites/

[70] http://www.broadbandtvnews.com/2014/12/22/magyar-telekom-buys-cablecos/

[71] http://www.telekom.hu/about_us/press_room/press_releases/2014/february_21

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

5.13.4 Data tables for Hungary

Statistic	National
Population	9,877,365
Persons per household	2.2
Rural proportion	31.0%

	Hungary 2014		Hungary 2013		Hungary 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	88.7%	73.4%	88.7%	73.5%	89.4%	73.1%	93.5%	82.4%
VDSL	49.9%	0.0%	24.0%	0.0%	2.8%	0.0%	37.6%	15.1%
FTTP	20.8%	4.0%	19.8%	3.9%	21.6%	3.5%	18.7%	5.8%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.6%	18.5%
Cable	64.3%	19.2%	63.5%	17.5%	62.9%	16.1%	43.5%	10.0%
DOCSIS 3.0	60.4%	17.4%	59.7%	15.9%	55.3%	7.3%	42.7%	9.2%
HSPA	98.2%	94.2%	97.0%	90.0%	95.7%	86.5%	97.3%	88.9%
LTE	73.0%	14.9%	39.1%	9.9%	35.5%	7.3%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	99.1%	97.1%	98.5%	95.0%	98.0%	93.7%	99.4%	97.6%
Overall fixed broadband	94.4%	81.4%	94.4%	84.2%	91.8%	77.5%	96.9%	89.6%
NGA broadband	79.7%	19.4%	75.7%	17.9%	59.7%	10.1%	68.1%	25.1%

Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

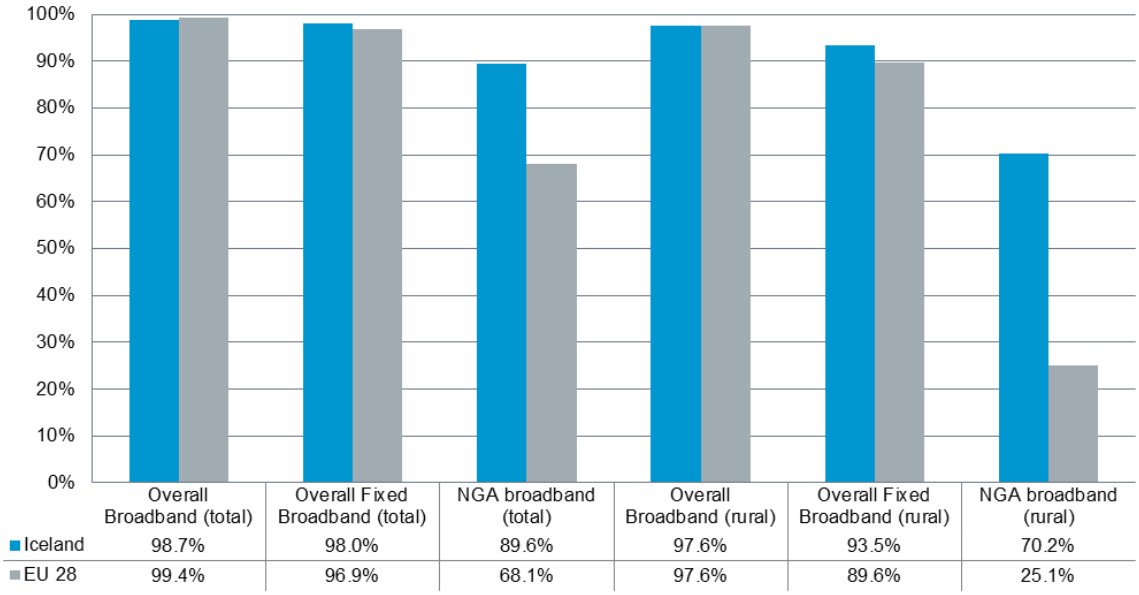
5.14 Iceland

5.14.1 National coverage by broadband technology

Iceland recorded substantial improvement in broadband coverage in 2014. While fixed broadband coverage increased by only 1.4 percentage points, in rural areas the increase was 8.9 percentage points. By the end of the year, national fixed broadband coverage was 98.0%, compared to the EU average of 96.9%, while rural fixed broadband coverage was 93.5% compared to the EU average of 89.6%.

Much more significant gains were reported with regard to NGA coverage, which increased by 29.1 percentage points on national level and at the end of 2014 nearly nine in ten (89.4%) Icelandic households had access to high-speed broadband services. Moreover, rural NGA coverage grew from no coverage in 2013 to 70.2% of rural households being able to connect to high-speed broadband by the end of 2014. Both these increases were the largest observed among the study countries and have contributed to NGA coverage in Iceland considerably exceeding the EU average of 68.1% total NGA coverage and 25.1% rural NGA coverage.

Iceland: Coverage by technology combination, 2014



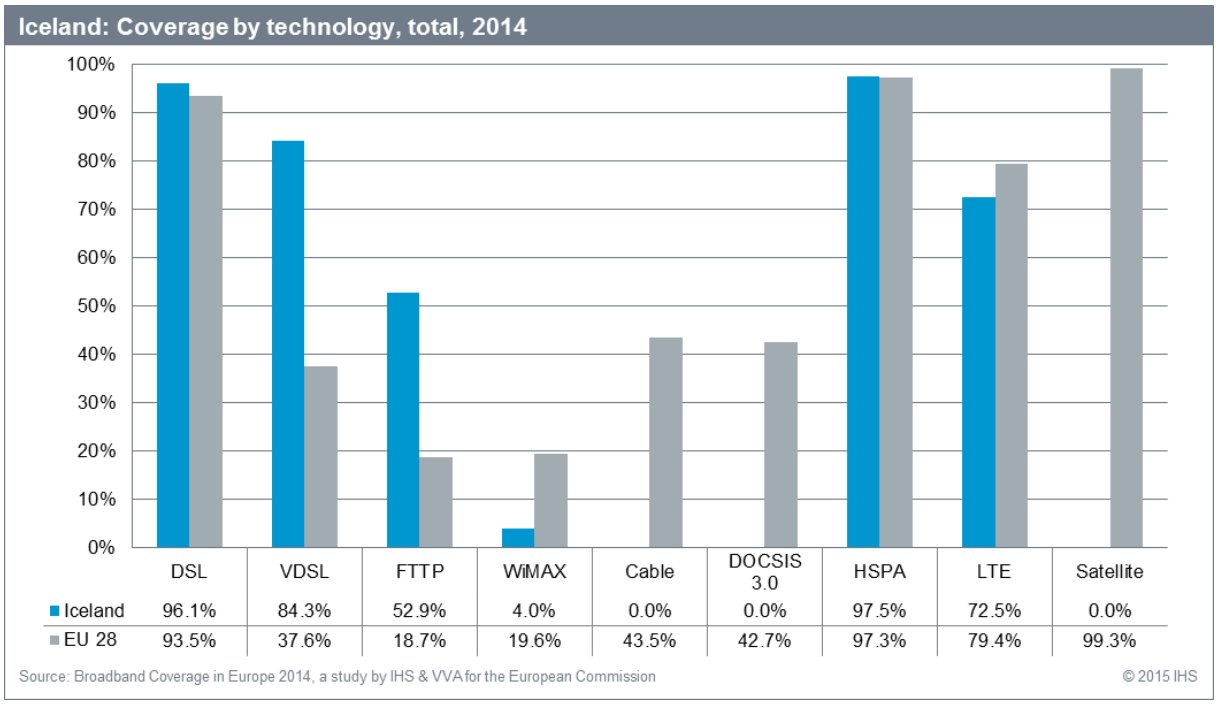
	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Iceland	98.7%	98.0%	89.6%	97.6%	93.5%	70.2%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

The considerable NGA coverage improvements can be almost fully attributed to VDSL, with VDSL coverage increasing by 37.8 percentage points on national scale. This is due to further network deployment and upgrade efforts led by the incumbent Siminn's infrastructure subsidiary, Míla.

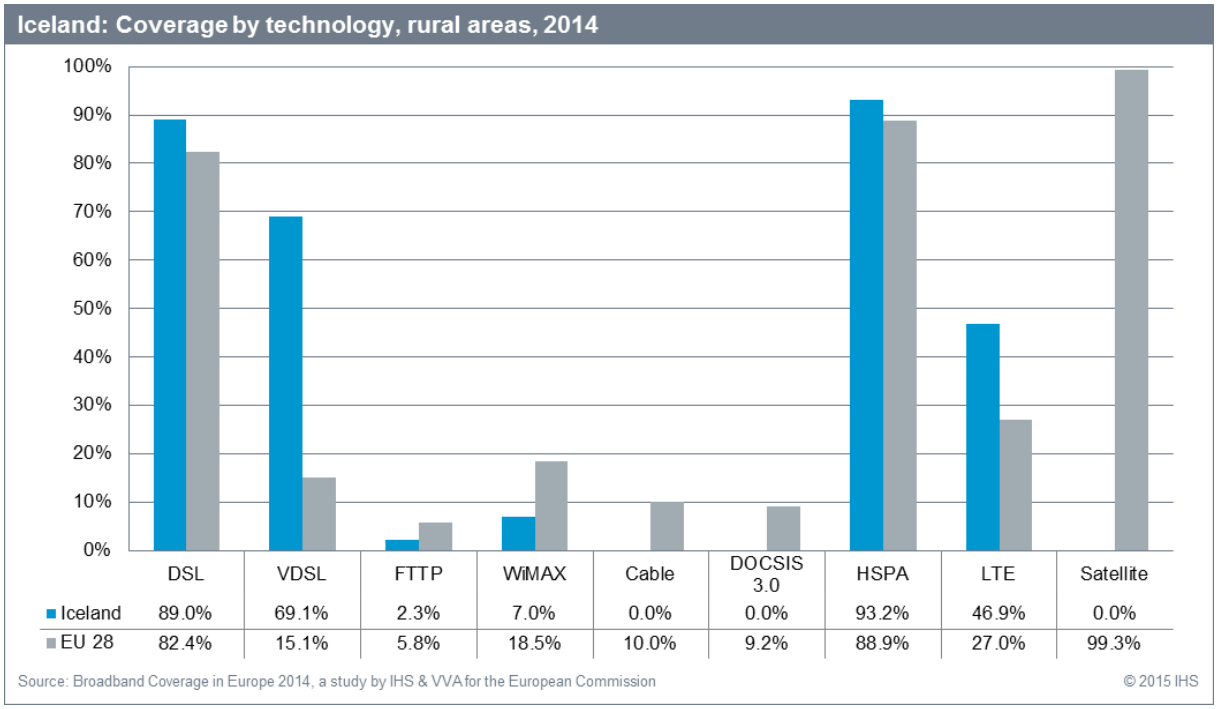
While cable connections are absent in Iceland, FTTP availability is rather high. At 52.9%, FTTP coverage was considerably above the EU average, although it has remained broadly unchanged after improvements made in previous years.

LTE also registered significant growth and increased by 24.5 percentage points throughout the course of the year to cover nearly three-quarters (72.5%) of households at the end of 2014. In January 2014, Simmin launched its LTE network accompanying Nova and Vodafone Iceland, which started offering LTE services the year prior.

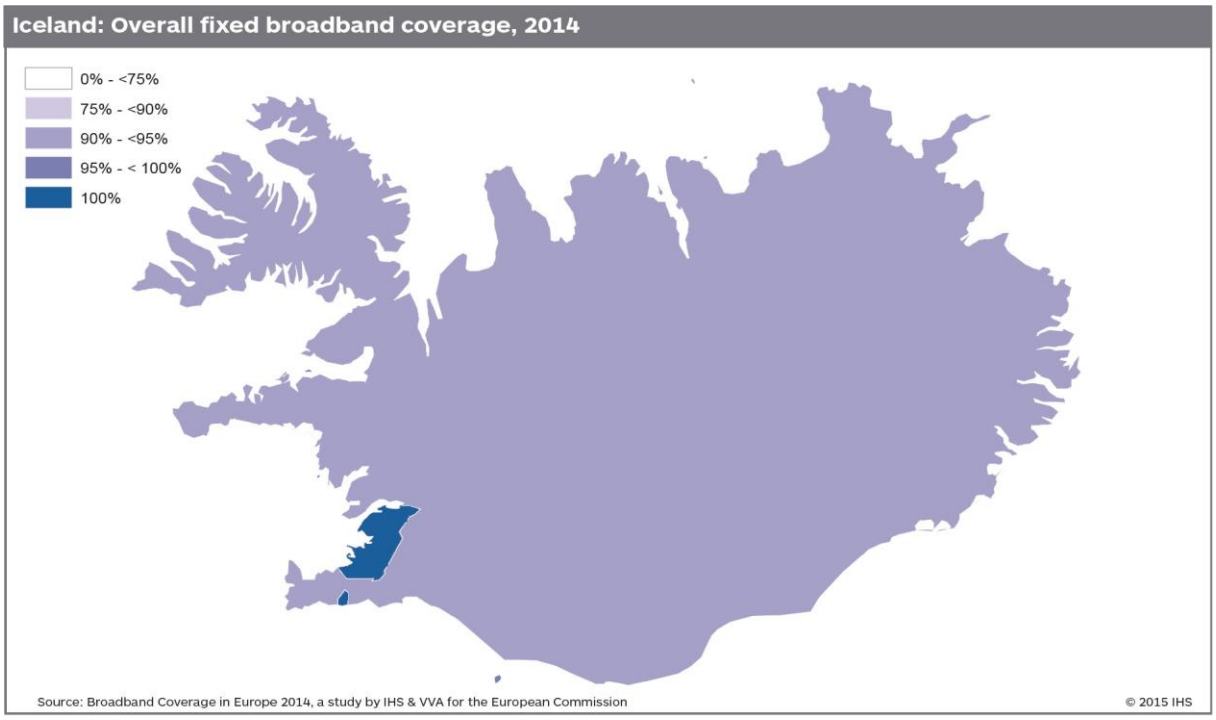


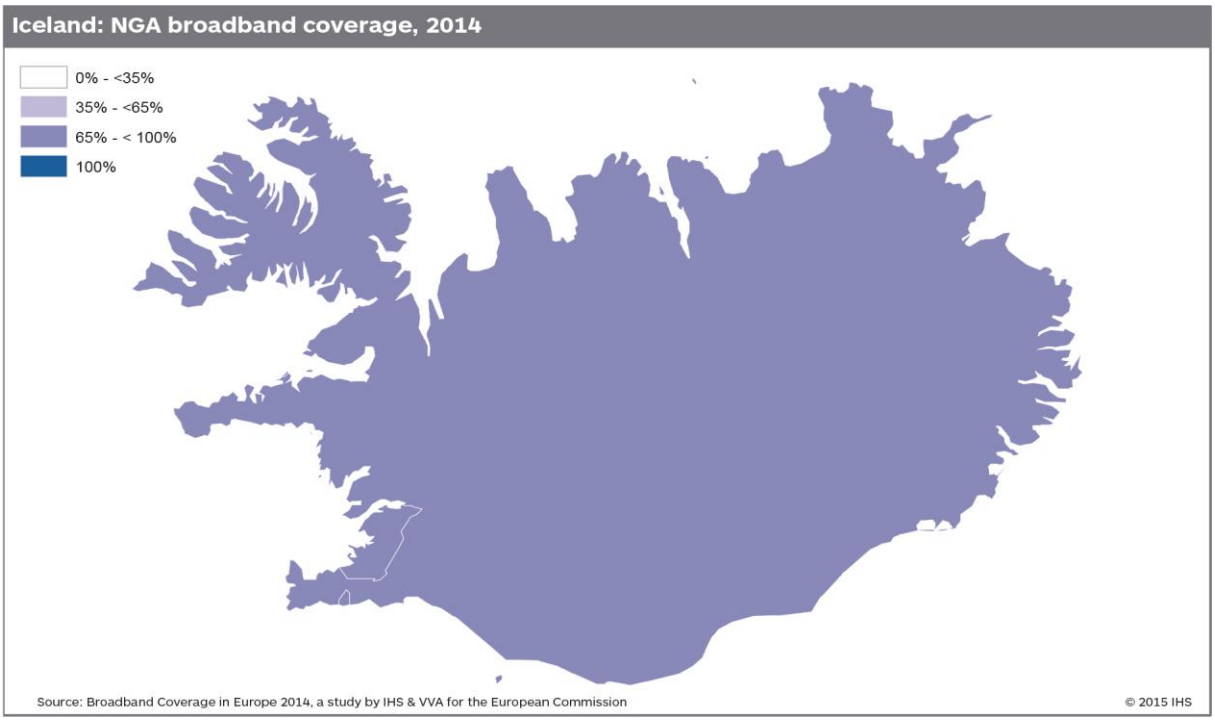
The development in rural areas mirrored those on national level, with a 69.1 percentage point increase in rural VDSL coverage, which grew from no coverage in 2013. As of the end of 2014, Iceland had the third-highest rural VDSL coverage among the study countries, behind Luxembourg and Belgium.

LTE coverage also increased significantly from no rural availability in 2013 to 46.9% of rural households being able to connect to the high-speed mobile broadband network at the end of 2014.



5.14.2 Regional coverage by broadband technology





5.14.3 Regulatory and market overview

The most comprehensive description of Icelandic governmental policy on IT and broadband was published in 2008, in "Iceland the e-nation"[73], with aims including improved service, efficiency of public service administration and participation of citizens in ecommerce, education and democracy.

Fixed broadband market is dominated by the incumbent operator Siminn, which, in addition to its DSL focus, started trialling FTTP networks in 2008. This mixed approach has been adopted across all of Iceland's telecom's groups with regards to provisioning next-generation access, using both VDSL and FTTH technologies to provide fixed NGA coverage. Currently Siminn deploys FTTH networks in new housing developments and VDSL across other areas.

In 2014, both Simmin as well as Vodafone Iceland, number two in the Icelandic broadband market, invested in access to additional bandwidth capacity on international submarine cables[7475].

Another important market player in Iceland is the power company Reykjavik Energy. It began to develop a fibre access network in 2005[76], which a range of ISPs rely on via an open-access model. Providers using the network include Vodafone Iceland, 365 and Simafelagid.

LTE services made their debut in Iceland in 2013, with two operators, Nova and Vodafone, launching operations. Siminn followed at the beginning of 2014 with its own network[77]. A new entrant, 365 Media, is expected to launch LTE network in 2015, aiming at 99.5% population coverage[78].

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

[74] https://www.telegeography.com/products/commsupdate/articles/2013/10/17/siminn-to-increase-capacity-on-three-submarine-cables/

[75] https://www.telegeography.com/products/commsupdate/articles/2013/08/19/vodafone-iceland-purchases-extra-capacity-on-emerald-express-cable/

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

[77] http://gvpublication.com/siminn-launches-lte/

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

5.14.4 Data tables for Iceland

Statistic	National
Population	329,050
Persons per household	2.5
Rural proportion	35.6%

	Iceland 2014		Iceland 2013		Iceland 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	96.1%	89.0%	93.2%	81.3%	93.2%	81.3%	93.5%	82.4%
VDSL	84.3%	69.1%	46.6%	0.0%	44.7%	0.0%	37.6%	15.1%
FTTP	52.9%	2.3%	53.7%	0.0%	45.1%	0.0%	18.7%	5.8%
WiMAX	4.0%	7.0%	4.0%	6.6%	4.0%	6.6%	19.6%	18.5%
Cable	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	43.5%	10.0%
DOCSIS 3.0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	42.7%	9.2%
HSPA	97.5%	93.2%	97.3%	93.0%	96.0%	89.1%	97.3%	88.9%
LTE	72.3%	46.9%	47.8%	0.0%	0.0%	0.0%	79.4%	27.0%
Satellite	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	99.3%	99.3%
Overall broadband	98.7%	97.6%	98.7%	96.5%	98.2%	95.0%	99.4%	97.6%
Overall fixed broadband	98.0%	93.5%	96.6%	84.6%	94.4%	84.6%	96.9%	89.6%
NGA broadband	89.6%	70.2%	60.5%	0.0%	54.1%	0.0%	68.1%	25.1%

Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

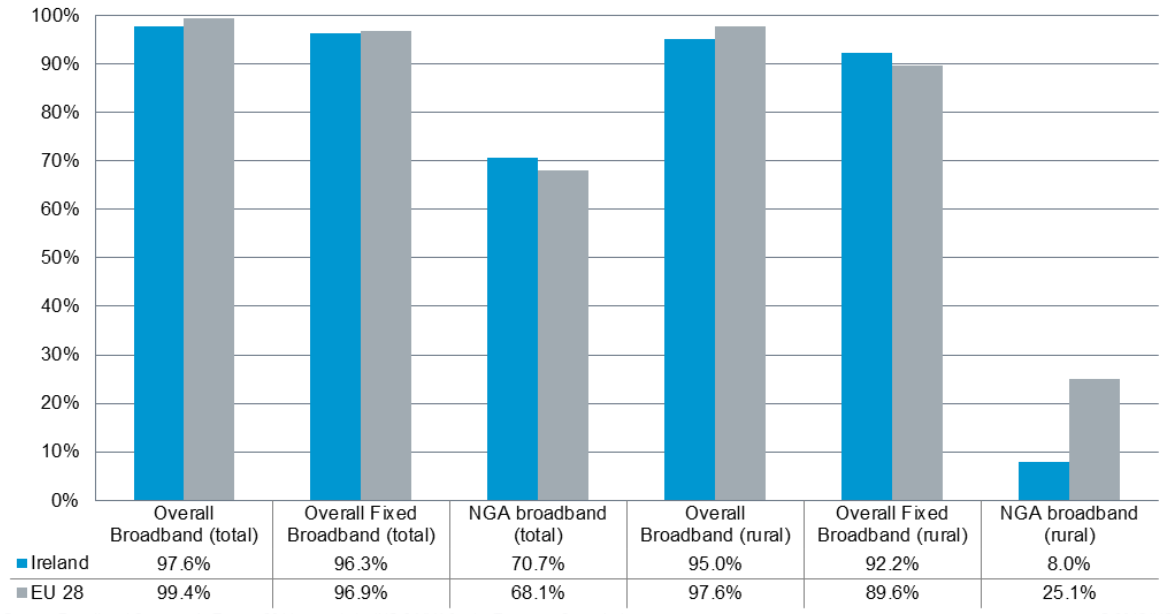
5.15 Ireland

5.15.1 National coverage by broadband technology

In 2014, fixed broadband coverage in Ireland remained at the same level of 96.3% of homes passed recorded in the previous year and slightly below the EU28 average of 96.9%. However, biggest gains were registered for NGA coverage, which increased by 16.7 percentage points and reached 70.7% of Irish households by the end of the year, exceeding the EU average of 68.1%.

However, most investment in NGA infrastructure continued to focus on urban and semi-urban areas, as rural NGA availability increased by a more modest 2.2 percentage points with just eight percent of rural homes having access to high-speed broadband, a figure far below the EU28 average of 25.1%.

Ireland: Coverage by technology combination, 2014



	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%	70.7%	95.0%	92.2%	8.0%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Looking at the individual technologies, VDSL was the only fixed technology that registered a significant increase in 2014, with coverage growing by 27.6 percentage points to 60.8% of households, considerably above the EU average of 37.6%. This could be attributed to the continued VDSL roll-out by the incumbent operator Eircom[79].

Cable coverage remained 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. So far, FTTP deployment has been minimal in Ireland with FTTP availability remaining at 1.7%, considerably below the EU average of 18.7%. However, both Eircom as well as Vodafone Ireland in cooperation with state-owned utility company ESB have commenced works on FTTP networks deployment that will see commercial launch of the competing services in 2015[80].

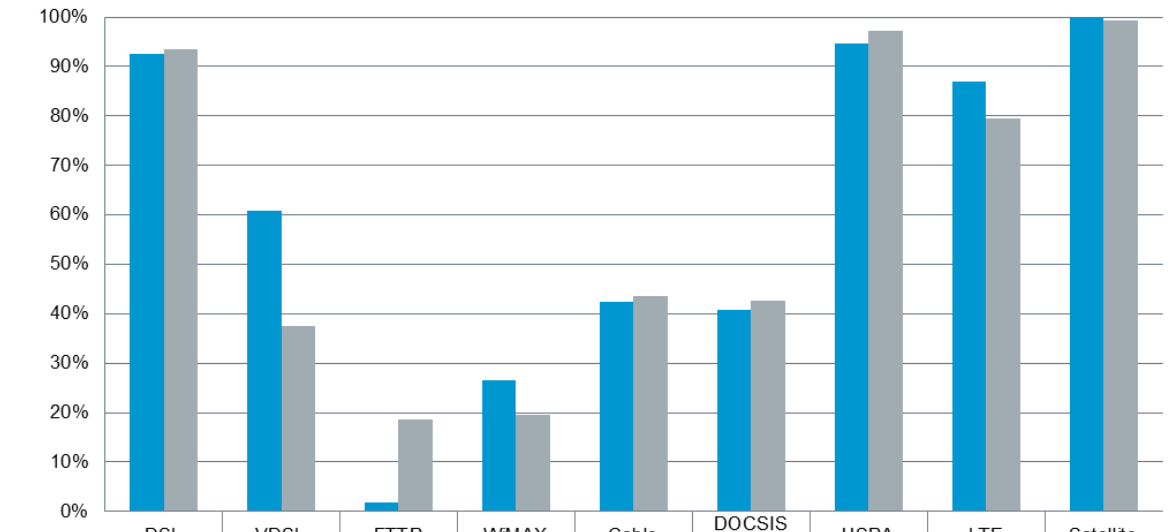
In 2014, Ireland saw a significant progress with regards to LTE coverage. Overall LTE coverage increased by 51.8 percentage points to reach 87% compared to EU average of

[79] https://www.telegeography.com/products/commsupdate/articles/2014/03/20/eircom-unveils-first-phase-vectoring-rollout/

[80] https://www.siliconrepublic.com/comms/2014/10/28/eircom-reveals-rival-fibre-to-the-home-service-to-compete-with-vodafoneesb-jv

79.4%. Three Ireland launched its LTE network in 2014, which along with further expansion of existing LTE networks operated by Eircom and Vodafone, helps explain the rapid growth.

Ireland: Coverage by technology, total, 2014

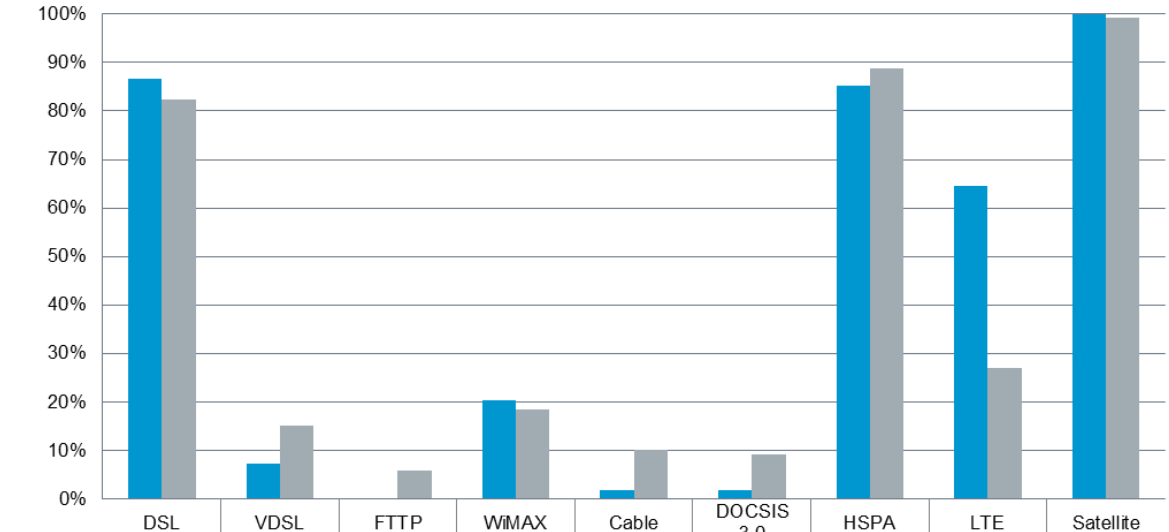


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Ireland	92.5%	60.8%	1.7%	26.6%	42.4%	40.7%	94.6%	87.0%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

As mentioned above, most NGA deployments have so far been focused on urban areas. With no FTTP coverage, negligible availability of DOCSIS 3.0 (1.7%), the only technology providing high-speed broadband services in rural areas was VDSL. However, it still covered only 7.3% of rural households, compared to the EU28 average of 15.1% rural households.

Ireland: Coverage by technology, rural areas, 2014



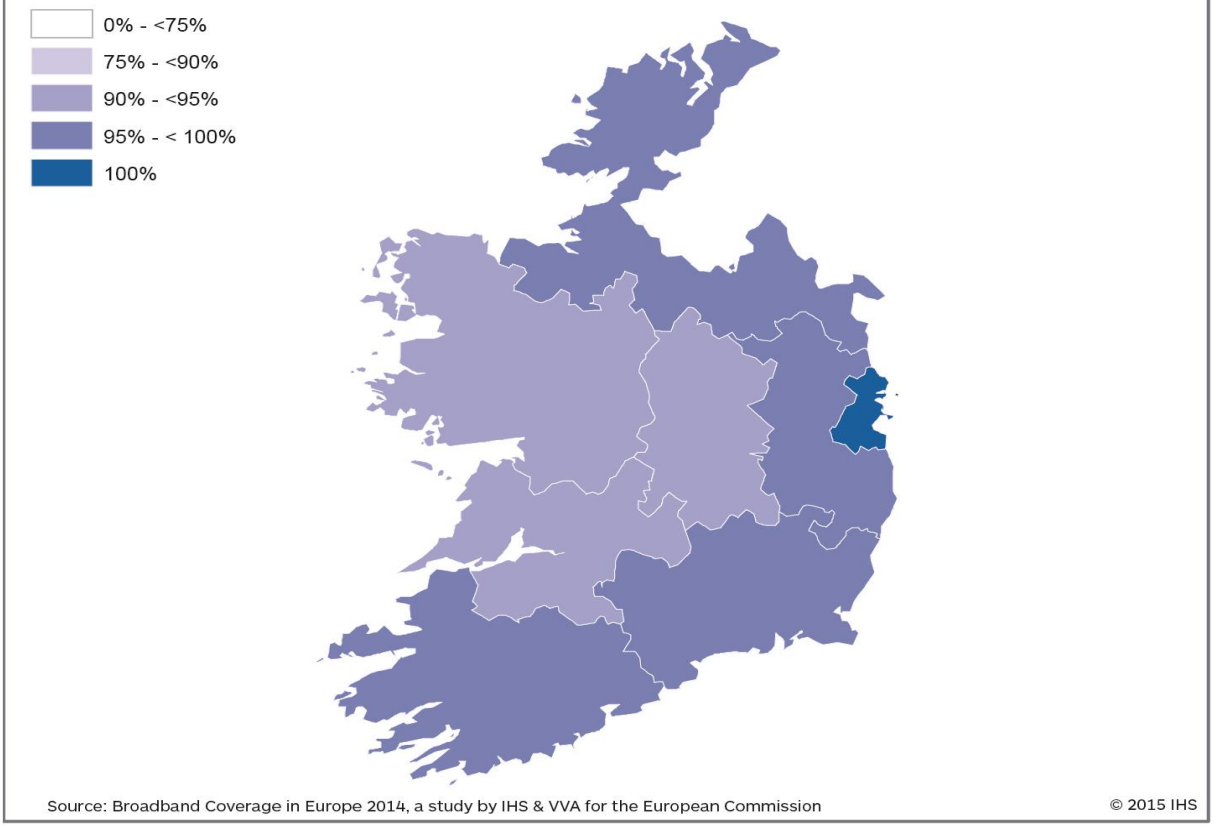
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Ireland	86.6%	7.3%	0.0%	20.4%	1.8%	1.7%	85.3%	64.6%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

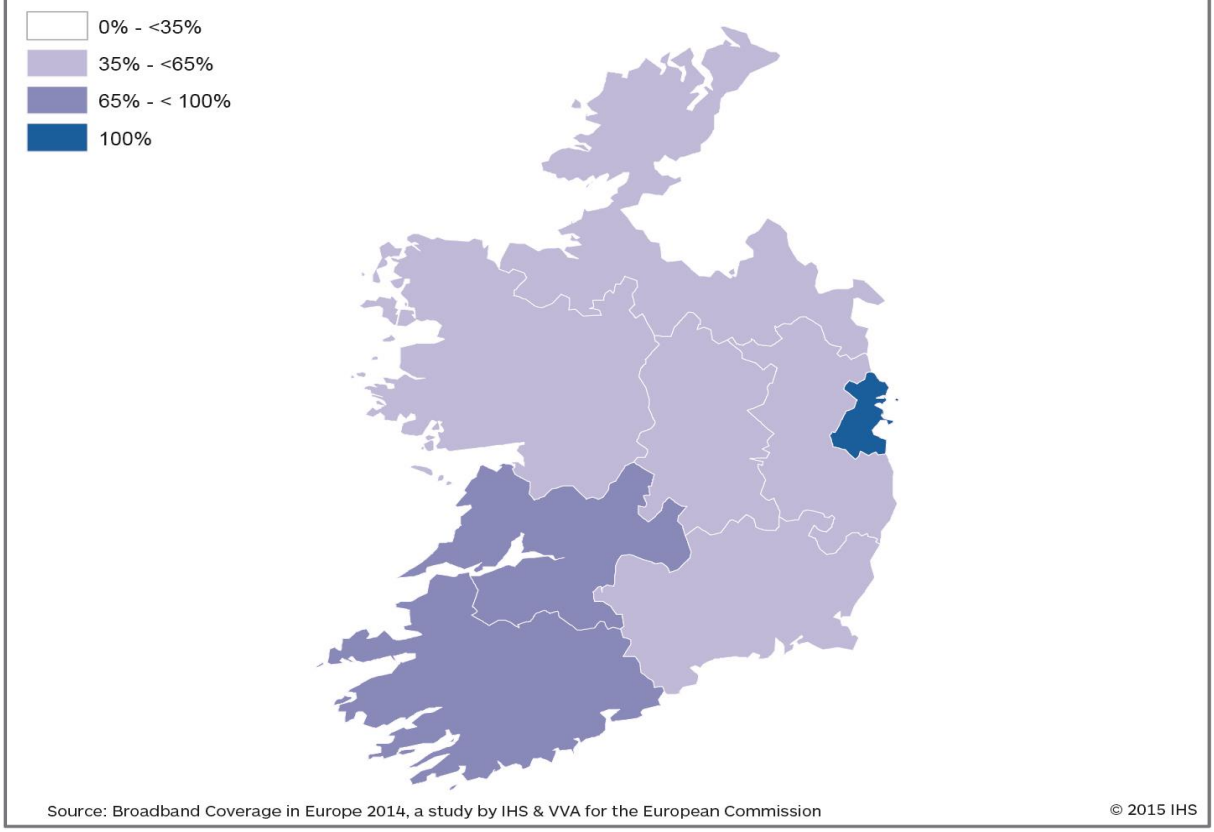
Rural LTE coverage in Ireland increased considerably, growing by 62.1 percentage points from only 2.5% the previous year. This was the second largest increase in rural LTE coverage recorded in the study countries and it resulted in rural LTE coverage in Ireland reaching 64.6% or rural households, more than twice the EU average of 27%.

5.15.2 Regional coverage by broadband technology

Ireland: Overall fixed broadband coverage, 2014



Ireland: NGA broadband coverage, 2014



Fixed broadband coverage in Ireland remained broadly unchanged throughout 2014 across all regions. Some regional variation could however be observed with regard to coverage levels. While 100% fixed broadband coverage was reported in Dublin, in the West of Ireland this was 92.1%.

NGA coverage increased in all regions except for Dublin, where it was already at 100%. Most significant increase was noted in the Mid-West (31.6 percentage points), with coverage levels outside of Dublin ranging from nearly 49% in the Border region to almost 85% in the Mid-West.

5.15.3 Regulatory and market overview

The National Broadband Plan published in 2012 remains valid until 2020, and outlines the government policy on the delivery of high speed broadband services and specifies targets for delivery and roll-out. In 2015, the Department of Communications, Energy and National resources issued a public consultation on National Broadband Plan Intervention Strategy, which sets out key elements on state intervention in the broadband sector[81]. 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.

As in many countries, fixed broadband market is largely split between the incumbent telecoms operator offering DSL-based service, in this case Eircom, and the leading cable provider, namely the Liberty Global-backed UPC Ireland. Both operators have committed substantial resources to network upgrade, with Eircom introducing vectoring technology[82], while UPC network upgrades allowed it to offer 240 Mbps residential broadband service in 2014[83].

In order to achieve the goals set by the National Broadband Plan, and especially boosting rural broadband infrastructure in previously unserved areas, both Eircom and Vodafone Ireland commenced rollout of FTTP networks. In 2014, Vodafone Ireland announced a EUR 450 million agreement with state-owned electricity provider ESB for the construction of a 100% FTTP network capable of supporting speeds up to 1Gbps. The 50:50 joint venture will utilise ESB's electricity infrastructure for network deployment initially covering 500,000 premises (representing 30% of all Irish households) across 50 towns[84].

In a rival move, Eircom unveiled its own plan of connecting 66 towns across Ireland with up to 1Gbps speeds, investing EUR 400 million over a period of five years[85].

LTE technology was first introduced in 2013, with Meteor (Eircom's mobile branch) and Vodafone launching their respective networks in September and October 2013. They were followed by Hutchinson's Three Ireland, which launched its network in July 2014 after completing an acquisition of O2 Ireland in May 2014 for EUR 850 million[86].

[81] http://www.dcenr.gov.ie/communications/en-ie/Pages/Consultation/NBP-Strategy-Intervention-Public-Consultation.aspx
[82] https://www.telegeography.com/products/commsupdate/articles/2014/03/20/eircom-unveils-first-phase-vectoring-rollout/
[83] https://www.telegeography.com/products/commsupdate/articles/2015/01/07/upc-unveils-240mbps-download-speeds-claims-irelands-fastest-connections/
[84] http://www.vodafone.com/content/index/media/vodafone-group-releases/2014/esb-vodafone-ireland.html
[85] https://www.siliconrepublic.com/comms/2014/10/28/eircom-reveals-rival-fibre-to-the-home-service-to-compete-with-vodafoneesb-jv
[86] http://www.siliconrepublic.com/business/item/33180-telef-nica-agrees-to-sell-o

5.15.4 Data tables for Ireland

Statistic	National
Population	4,591,087
Persons per household	2.6
Rural proportion	36.9%

	Ireland 2014		Ireland 2013		Ireland 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	92.5%	86.6%	92.5%	85.4%	94.3%	85.3%	93.5%	82.4%
VDSL	60.8%	7.3%	33.2%	4.9%	0.5%	0.0%	37.6%	15.1%
FTTP	1.7%	0.0%	1.7%	0.0%	1.7%	0.0%	18.7%	5.8%
WiMAX	26.6%	20.4%	26.6%	20.4%	26.6%	20.4%	19.6%	18.5%
Cable	42.4%	1.8%	42.4%	1.6%	42.4%	1.4%	43.5%	10.0%
DOCSIS 3	40.7%	1.7%	40.6%	1.6%	41.8%	1.4%	42.7%	9.2%
HSPA	94.6%	85.3%	94.8%	86.2%	94.6%	86.0%	97.3%	88.9%
LTE	87.0%	64.6%	35.2%	2.5%	0.0%	0.0%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	97.6%	95.0%	97.6%	93.1%	97.8%	94.4%	99.4%	97.6%
Overall fixed broadband	96.3%	92.2%	96.3%	92.7%	97.1%	92.5%	96.9%	89.6%
NGA broadband	70.7%	8.0%	54.0%	5.7%	42.1%	1.4%	68.1%	25.1%

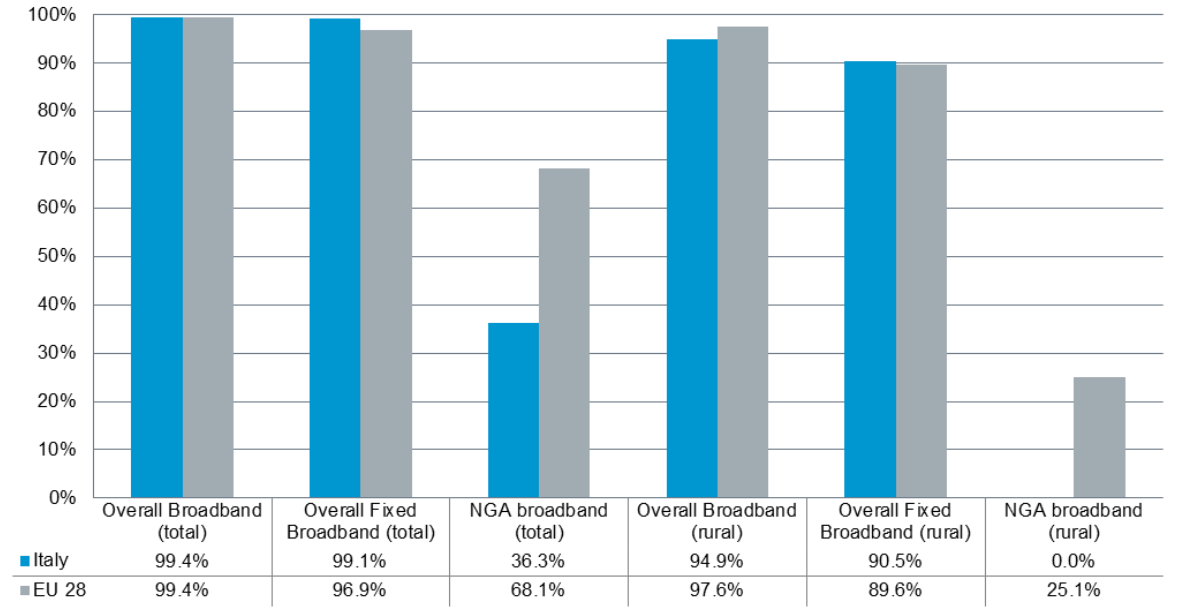
Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

5.16 Italy

5.16.1 National coverage by broadband technology

In 2014, overall broadband coverage and fixed broadband coverage in Italy exceeded the EU average. Despite NGA coverage increasing by 15.5 percentage points throughout the year and reaching 36.3% of Italian households, it remained below the EU average. In rural areas, progress was made with regard to fixed broadband coverage, which increased by 2.8 percentage points to 90.5%, almost one percentage point above the EU average of 89.6%. However, Italy was the only country with no rural NGA coverage in 2014.

Italy: Coverage by technology combination, 2014



	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Italy	99.4%	99.1%	36.3%	94.9%	90.5%	0.0%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Two technologies accounting for the increase in national NGA coverage are VDSL and FTTP. Along with Greece and Iceland, Italy is one of the countries with no cable infrastructure, meaning that any NGA investment is directed towards these two technologies.

Compared to 2013, VDSL coverage increased by 9.6 percentage points and reached close to a quarter (24.3%) of Italian households at the end of 2014. Despite this increase, boosted by both the incumbent Telecom Italia's and Fastweb's investments in upgrading their networks, VDSL availability remained below the EU28 average of 37.6%[87].

FTTP coverage grew by 7.3 percentage points, making high-speed FTTP connections available to nearly one in five (19.5%) Italian households at the end of the year and thus slightly exceeding the EU28 average of 18.7%. FTTP networks were primarily deployed in Northern Italy in the cities of Milan, Bologna, Turin, Verona, Vicenza and Genoa by a partly state-owned wholesale provider Metroweb (internet service provider Fastweb also holds a stake in the company). Vodafone Italy also deployed its own FTTP networks in Milan and Bologna in the course of 2014[88].

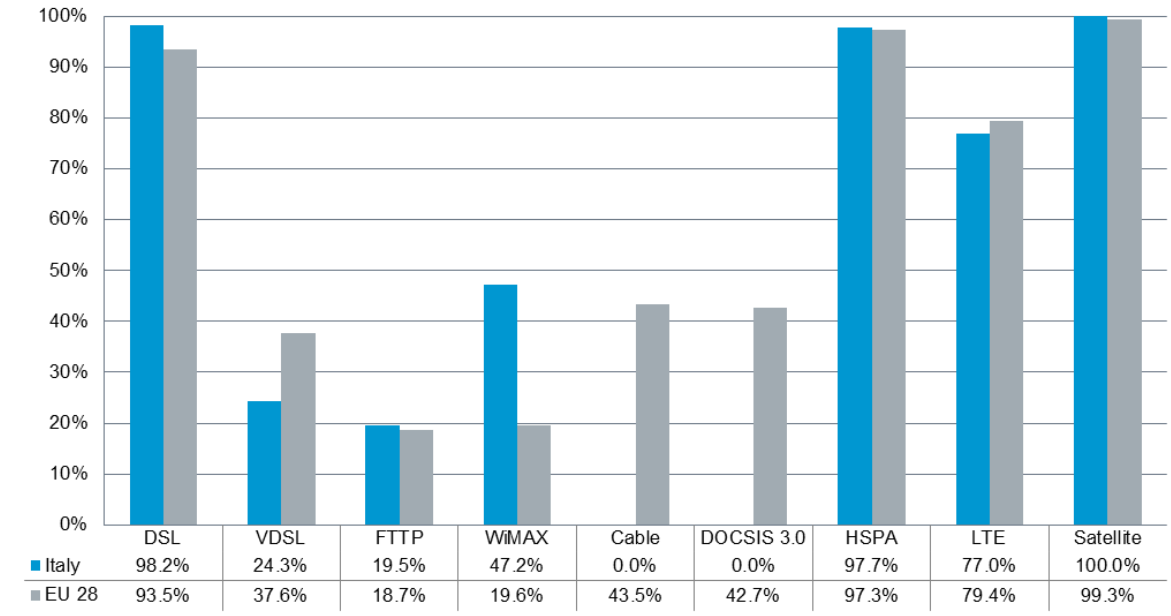
Further progress was also made with regards to LTE coverage, which grew by 37.7 percentage points to 77.0%. It is however still lower than the EU average of 79.4%. Wind was the fourth operator to launch LTE network at the beginning of 2014, joining Vodafone

[87] https://www.telegeography.com/products/commsupdate/articles/2014/09/29/fastweb-to-extend-fttx-to-100-new-cities-by-2016/

[88] http://www.zdnet.com/article/bologna-shows-italy-how-to-get-in-the-fibre-broadband-fast-lane-with-300mbps/

Italia, TIM (Telecom Italia's mobile branch), and Three, which started offering LTE services in previous years.

Italy: Coverage by technology, total, 2014

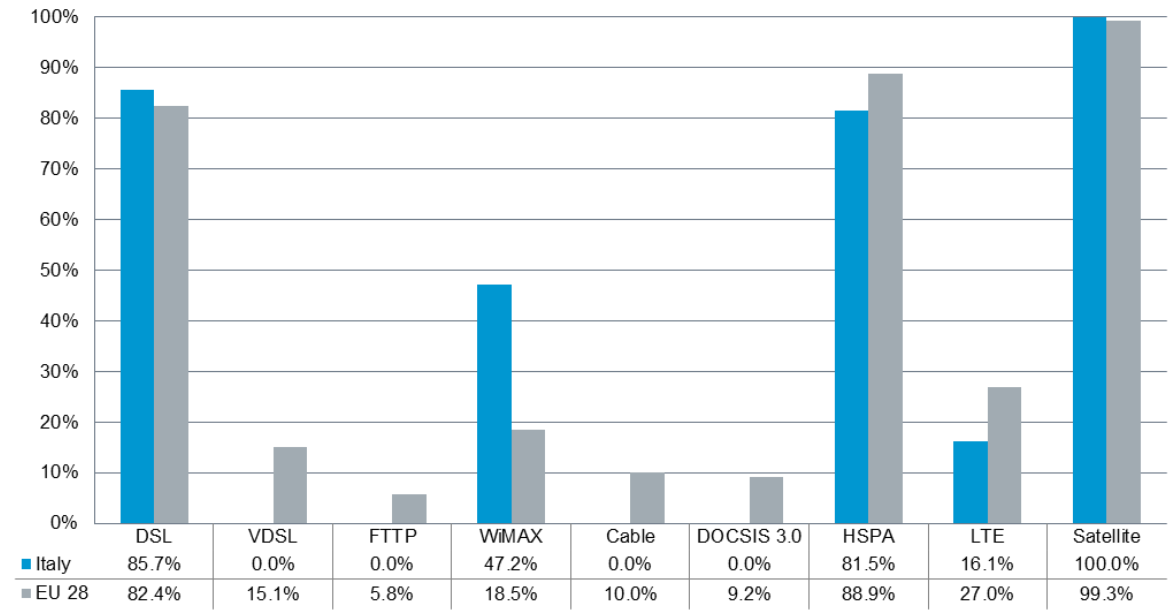


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Italy	98.2%	24.3%	19.5%	47.2%	0.0%	0.0%	97.7%	77.0%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

DSL continued to be the main technology providing fixed broadband access in rural areas across Italy, reaching 85.7% of rural households and slightly exceeding the EU average of 82.4%. Rural areas in Italy were also characterised by relatively high WiMAX availability, with WiMAX networks reaching 47.2% of households. Due to the fact that most investment in NGA deployment in Italy has so far been focused on urban areas, no NGA coverage was recorded in 2014.

Italy: Coverage by technology, rural areas, 2014



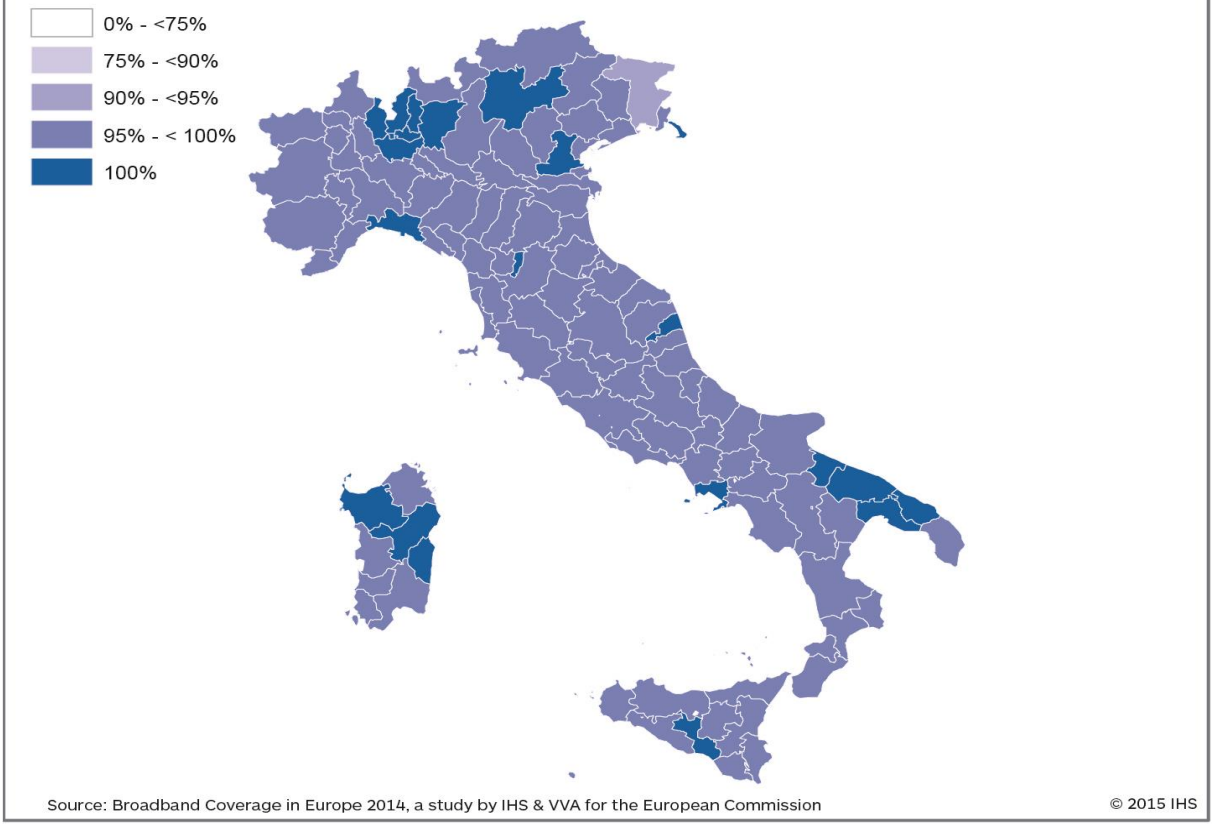
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Italy	85.7%	0.0%	0.0%	47.2%	0.0%	0.0%	81.5%	16.1%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Rural LTE coverage increased by 15.4 percentage points and reached 16.1% of rural households in Italy at the end of 2014. However, given the low coverage level at the beginning of 2014 it remained below the EU28 average of 27%.

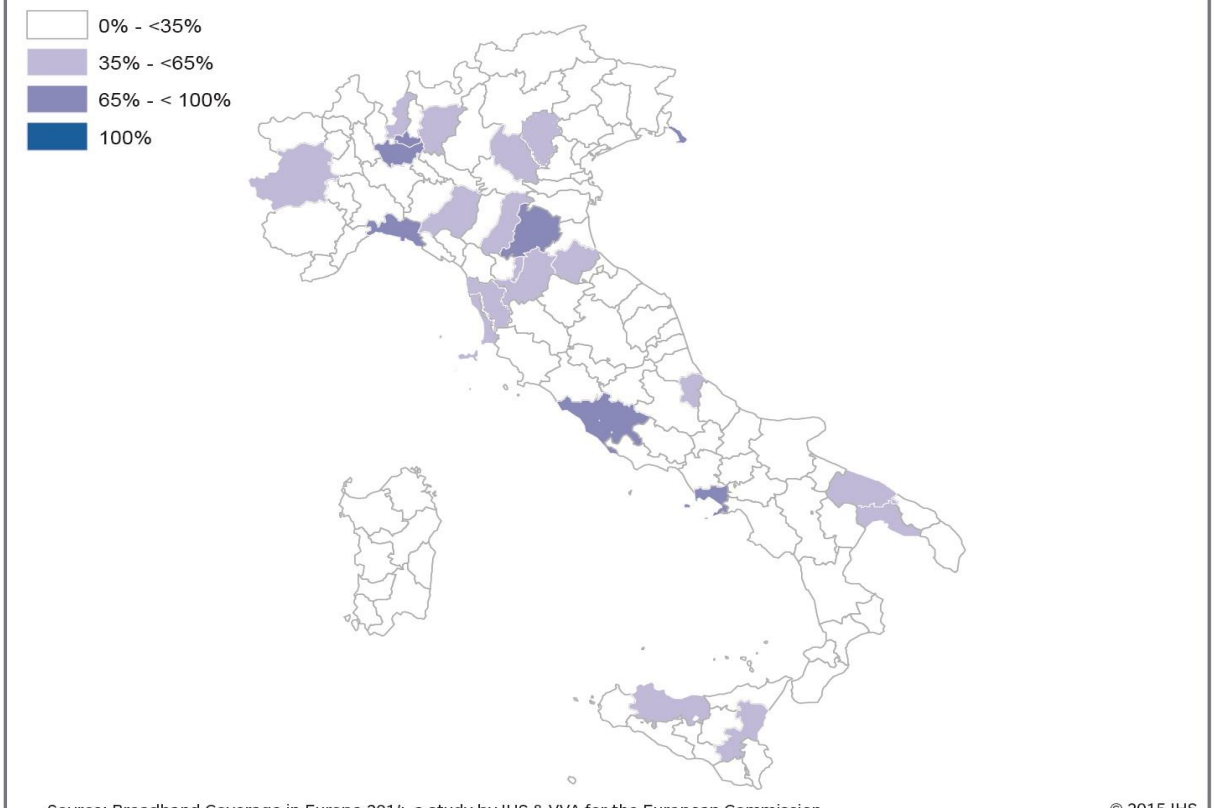
5.16.2 Regional coverage by broadband technology

Italy: Overall fixed broadband coverage, 2014



Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Italy: NGA broadband coverage, 2014



Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

There was relatively little regional variation in terms of fixed broadband coverage in 2014 with vast majority of regions registering coverage levels higher than 97% (only four out 110 regions recorded lower coverage). A number of regions around major cities, such as Milan, Bologna, Rome, Naples, etc. recorded complete fixed broadband coverage.

On the other hand, NGA coverage in individual regions was extremely varied, with 26 regions reporting virtually no NGA coverage, while in some regions NGA availability is much higher. In Milan, which was among the first to see FTTP and VDSL deployments, NGA coverage reached little over 98% at the end of 2014. Other regions which recorded higher NGA availability again include major urban areas around Bologna, Genoa, Rome and Naples.

5.16.3 Regulatory and market overview

Italy adopted its strategy, National Broadband Plan for Italy, in 2011, with goals set until 2020. An updated iteration of the plan was issued in March 2015 under the title Italian Strategy for Next Generation Access Network[89]. The Strategy put forth the following goals:

- Providing 85% of population with access to broadband connection services above 100 Mbps;
- Provide access to broadband connection services above 30Mbps to 100% of population;
- Provide access to broadband connection services of at least 100Mbps for public institutions.

Under the strategy, the Italian government plans to invest EUR 6 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[90].

Italian fixed broadband market is characterised by the lack of cable providers, resulting in a focus on DSL and fibre technologies. While the roll-out of next-generation networks in Italy has been slow, a number of agreements have paved the way to further NGA deployment between the partly state-owned wholesale provider Metroweb and the incumbent Telecom Italia and Vodafone Italia.

Thanks to these agreements, extensive FTTP deployments have been rolled out in Milan, Bologna, Turin, Verona, Vicenza and Genoa. At the end of 2014, Vodafone Italia begun to offer 300 Mbps connections in Milan and Bologna and announced plans to expand its fibre-optic network to 7 million households, a quarter of the Italian population, by 2016[91]. Telecom Italia also outlined further investment of EUR 2.9 billion over three years in upgrade of existing networks and expansion FTTP networks to cover 75% of the Italian population by 2017[92]. Meanwhile Fastweb (which owns a 17% stake in Metroweb) announced plans to extend its FTTP and VDSL networks to 100 new cities by 2016, extending its footprint to 5.5 million VDSL households and 2 million FTTP households[93].

LTE networks in Italy were first launched in 2012 by Vodafone and Telecom Italia, with Three following in 2013. Fourth operator, Wind, launched its LTE network in the beginning of 2014.

[89] http://www.governo.it/GovernoInforma/Dossier/crescita_digitale/Strategy.pdf
[90] http://www.zdnet.com/article/italys-6bn-broadband-plan-spread-100mbps-far-and-wide-fill-in-the-rural-notspots/
[91] http://www.telecompaper.com/news/vodafone-italia-unveils-300-mbps-ftth-network-in-milan--1053749
[92] http://www.telecomitalia.com/tit/en/archivio/media/comunicati-stampa/telecom-italia/corporate/economico-finanziario/2015/2015-2017-strategic-plan-approved.html
[93] https://www.telegeography.com/products/commsupdate/articles/2014/09/29/fastweb-to-extend-fttx-to-100-new-cities-by-2016/

5.16.4 Data tables for Italy

Statistic	National
Population	59,685,227
Persons per household	2.4
Rural proportion	12.3%

	Italy 2014		Italy 2013		Italy 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	98.2%	85.7%	97.1%	75.4%	96.9%	75.3%	93.5%	82.4%
VDSL	24.3%	0.0%	14.7%	0.0%	4.5%	0.0%	37.6%	15.1%
FTTP	19.5%	0.0%	12.2%	0.0%	11.8%	0.0%	18.7%	5.8%
WiMAX	47.2%	47.2%	48.0%	48.0%	45.0%	45.0%	19.6%	18.5%
Cable	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	43.5%	10.0%
DOCSIS 3.0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	42.7%	9.2%
HSPA	97.7%	81.5%	97.0%	76.5%	96.5%	74.9%	97.3%	88.9%
LTE	77.0%	16.1%	39.3%	0.7%	17.0%	0.3%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	99.4%	94.9%	98.6%	88.3%	98.9%	91.1%	99.4%	97.6%
Overall fixed broadband	99.1%	90.5%	98.5%	87.7%	98.4%	87.5%	96.9%	89.6%
NGA broadband	36.3%	0.0%	20.8%	0.0%	14.0%	0.0%	68.1%	25.1%

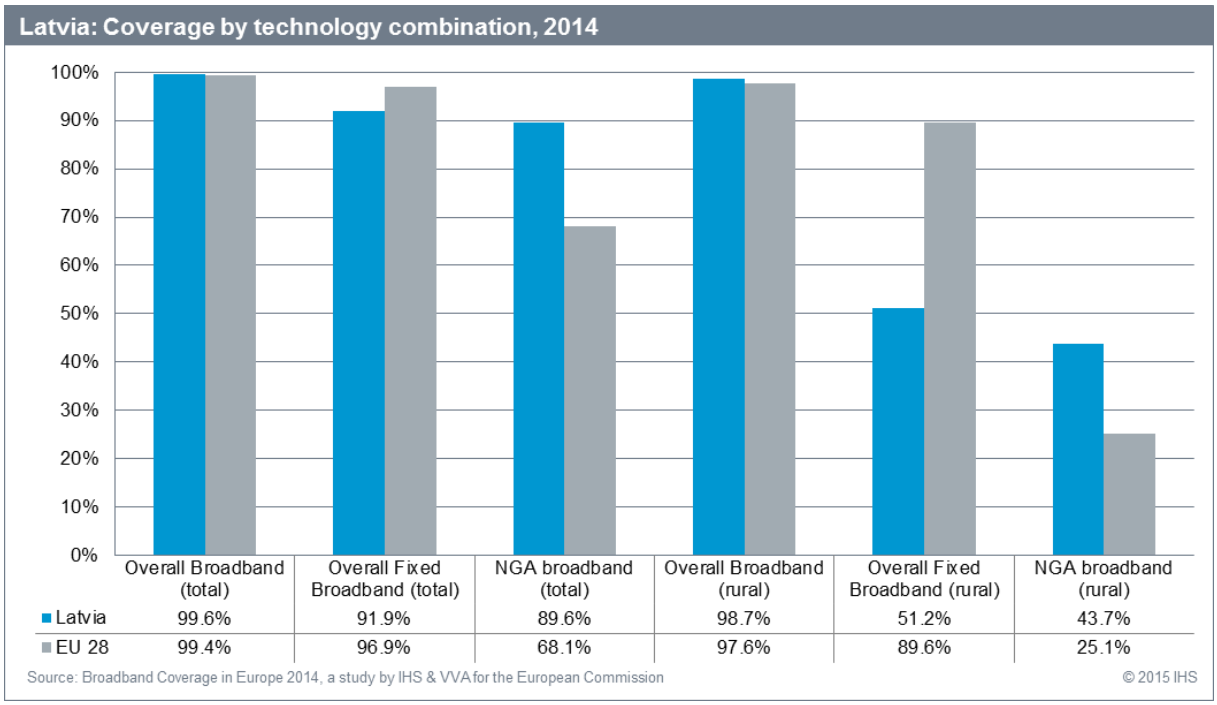
Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

5.17 Latvia

5.17.1 National coverage by broadband technology

In 2014, there were no significant improvements in terms of fixed and NGA broadband coverage in Latvia. At the end of the year, almost 92% of Latvia households had access to fixed broadband services, below the European average of 96.9%. Considerable progress was made in rural areas, with rural fixed broadband coverage increasing by 7.5 percentage points. Yet despite this increase, rural fixed broadband coverage in Latvia was the lowest in the EU at 51.2% compared to an EU average of 89.6%.

On the other hand, NGA coverage exceeded the EU28 average by over twenty percentage points, reaching 89.6% compared to the EU average of 68.1%. This also means that by the end of 2014, NGA coverage in Latvia was only 2.3 percentage points below overall fixed broadband coverage, reflecting Latvia's FTTP-oriented national broadband strategy. Rural NGA coverage grew by 9.0 percentage points and reached 43.7% of rural households by the end of the year compared to 25.1% of average EU households.

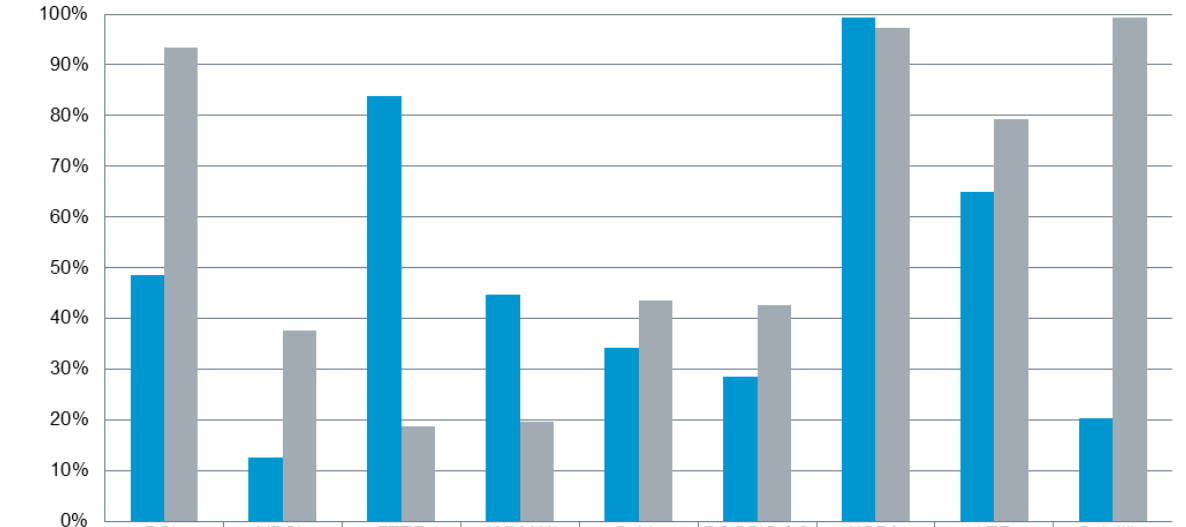


Latvia is characterised by a focus on FTTP technologies as opposed to VDSL, which explains the particularly high FTTP coverage, which at 83.9% is the second highest in the EU (only behind the neighbouring Lithuania) and more than four times the EU average (18.7%). By comparison, DSL networks passed only 48.6% of Latvia households compared to an EU28 average of 93.5%.

Like in many other Member States in 2014, LTE increased substantially, with coverage increasing by 37.5 percentage points to 65% of households. The mobile operator LMT launched LTE services in Latvia in 2011[94] and was followed in late 2013 by Tele2. Both operators invested intensively into expansion of their networks resulting in the increased availability of LTE services across the country.

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

Latvia: Coverage by technology, total, 2014



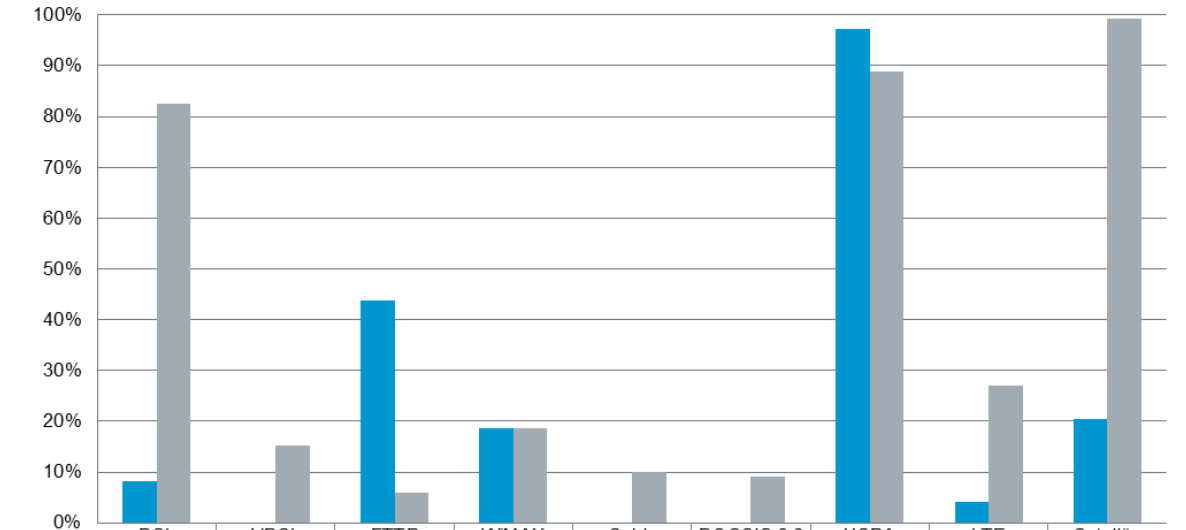
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Latvia	48.6%	12.7%	83.9%	44.6%	34.3%	28.6%	99.2%	65.0%	20.3%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

FTTP remained, alongside WiMAX, the key technology providing fixed broadband access in rural areas. In 2014, 43.7% rural households were able to connect to an FTTP service, a 4.2 percentage point increase compared to 2013. WiMAX networks covered 18.7% of rural households and DSL services were available to less than 10% of rural homes. Given the absence of both VDSL and DOCSIS 3.0 in rural areas, FTTP was also the only technology providing high-speed access to rural areas across Latvia.

Despite the deployment of LTE networks in Latvia since 2011, rural areas started to be covered by LTE networks for the first time in 2014. However, with only 4.2% of rural homes passed, rural LTE coverage in Latvia remains far below the EU average of 27%.

Latvia: Coverage by technology, rural areas, 2014

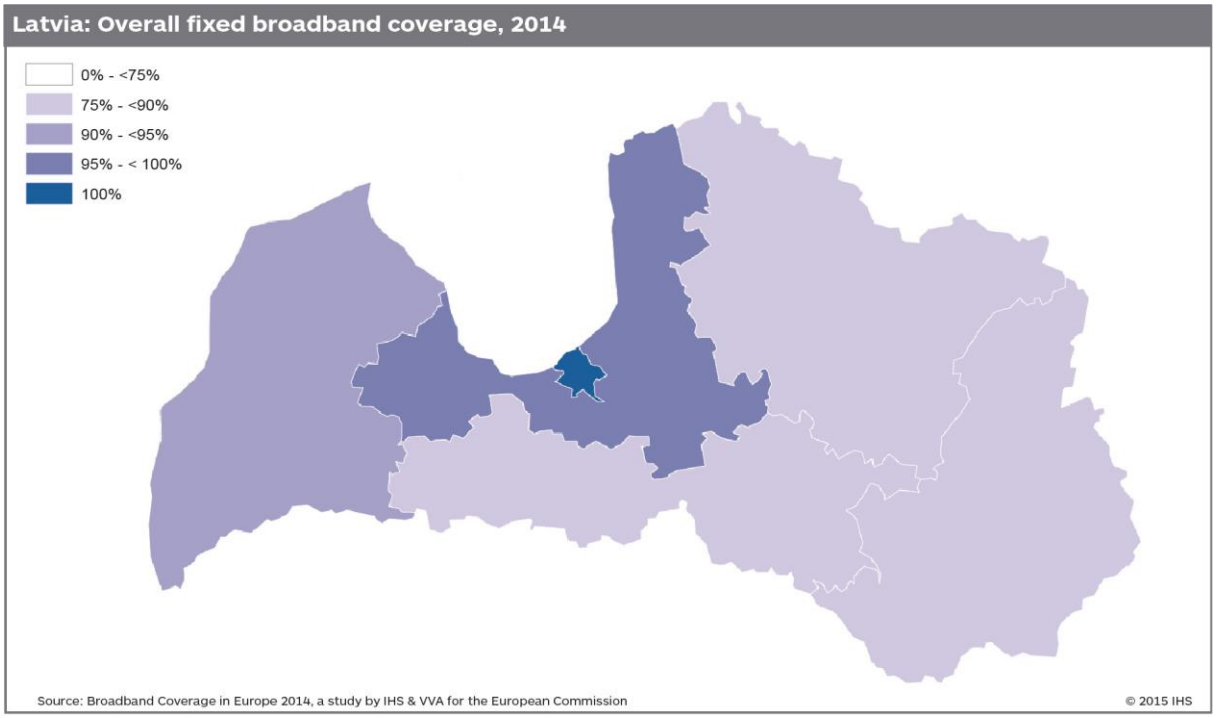


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Latvia	8.2%	0.0%	43.7%	18.7%	0.0%	0.0%	97.3%	4.2%	20.3%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

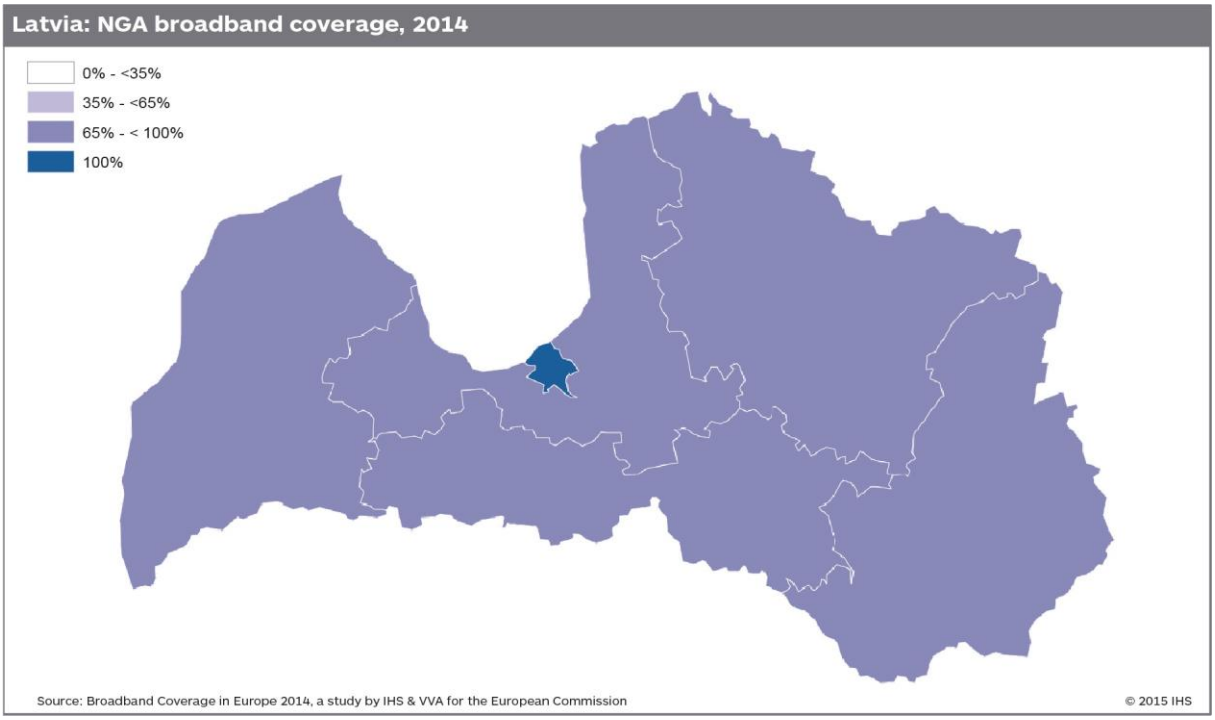
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.17.2 Regional coverage by broadband technology

There is quite a lot of regional variation in terms of fixed broadband coverage with complete coverage in the capital, Riga, but less than 90% coverage in the Eastern regions of the country.



Complete NGA coverage was again recorded in Riga and lowest NGA coverage was registered in the most Eastern region of Latgale, where NGA coverage networks passed little over 65% of households.



5.17.3 Regulatory and market overview

Latvia's national broadband strategy was adopted in 2013 with goals set until 2020. The main objective 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[95].

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[96].

In 2011, the EC approved a financial support scheme worth EUR 102 million for the deployment of next generation networks in the country capable of supporting speeds ranging from 30 to 100 Mbps[97].

The incumbent operator Lattelecom is the key player on the Latvian fixed broadband market and competes mostly with a range of smaller cable and FTTP providers. Lattelecom has been rolling out its FTTP network since 2009[98]. More recently, the company announced investment in upgrading its legacy copper network to VDSL in primarily rural areas, where FTTP rollout is not feasible. Lettelecom plans to increase connection speeds to up to 60Mbps for around 180,000 households within its footprint[99].

LMT, the largest mobile operator in Latvia, launched first LTE services in August[100]. In addition to LMT, Tele2 launched an LTE network in 2013 and aims to achieve 90% population coverage by the end of 2015. Further network launches are expected from Lattelecom and Bite[101].

[95] https://ec.europa.eu/digital-agenda/en/news/latvia-next-generation-network-rural-areas

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

[97] http://www.telegeography.com/products/commsupdate/articles/2011/11/10/ec-approves-latvian-support-scheme-for-superfast-broadband-infrastructure/

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

[99] https://www.lattelecom.lv/en/about-lattelecom/news/lattelecom-initiates-major-internet-network-upgrade-to-boost-speed

[100] http://nsn.com/news-events/press-room/press-releases/latvijas-mobilais-telefons-customers-first-in-latvia-to-enjoy-ultra-fast-4g-services

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

5.17.4 Data tables for Latvia

Statistic	National
Population	2,023,825
Persons per household	2.6
Rural proportion	28.6%

	Latvia 2014		Latvia 2013		Latvia 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	48.6%	8.2%	41.5%	9.1%	47.9%	9.4%	93.5%	82.4%
VDSL	12.7%	0.0%	12.4%	0.0%	7.1%	0.0%	37.6%	15.1%
FTTP	83.9%	43.7%	82.9%	39.5%	78.5%	24.4%	18.7%	5.8%
WiMAX	44.6%	18.7%	40.4%	18.6%	39.4%	13.3%	19.6%	18.5%
Cable	34.3%	0.0%	33.9%	0.0%	41.4%	0.0%	43.5%	10.0%
DOCSIS 3.0	28.6%	0.0%	27.8%	0.0%	33.1%	0.0%	42.7%	9.2%
HSPA	99.2%	97.3%	99.0%	96.5%	99.0%	96.5%	97.3%	88.9%
LTE	65.0%	4.2%	27.5%	0.0%	21.8%	0.0%	79.4%	27.0%
Satellite	20.3%	20.3%	20.3%	20.3%	0.0%	0.0%	99.3%	99.3%
Overall broadband	99.6%	98.7%	99.5%	80.6%	99.5%	98.3%	99.4%	97.6%
Overall fixed broadband	91.9%	51.2%	91.6%	43.7%	82.9%	39.8%	96.9%	89.6%
NGA broadband	89.6%	43.7%	88.8%	34.7%	78.5%	24.4%	68.1%	25.1%

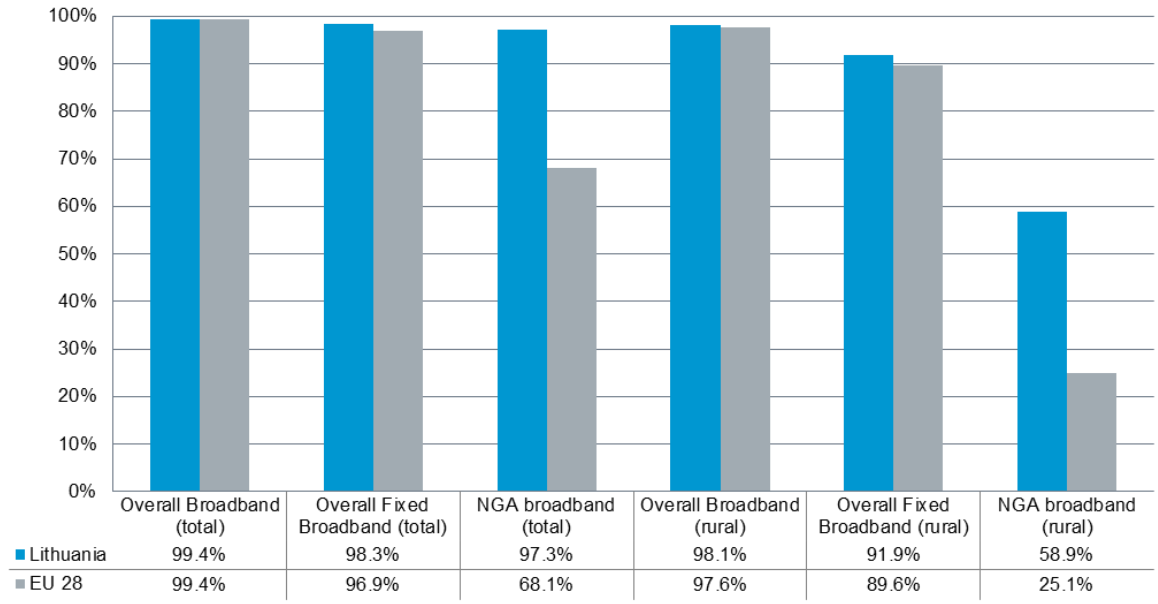
Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

5.18 Lithuania

5.18.1 National coverage by broadband technology

After coverage increases across all technology combinations in 2013, additional coverage gains made in 2014 were more moderate. Fixed broadband coverage increased by 1.6 percentage points to reach 98.3% of Lithuanian households, compared to the EU28 average of 96.9%. While national NGA broadband coverage did not register a substantial increase, rural NGA coverage grew by 3.6 percentage points. By the end of 2014, national NGA coverage reached 97.3% of household and in rural areas, NGA services were available to 58.9% of rural households. Both levels thus considerably exceeded the respective EU28 averages of 68.1% and 25.1%.

Lithuania: Coverage by technology combination, 2014



	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Lithuania	99.4%	98.3%	97.3%	98.1%	91.9%	58.9%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

As in the other Baltic countries, 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 69.2% homes passed by DSL networks compared with an average of 93.5% in the EU as a whole.

Fixed broadband coverage is thus secured primarily through FTTP and WiMAX networks. FTTP coverage in Lithuania reached 94.9% of households by the end of 2014, the highest in the EU, while WiMAX coverage at 90.3% was second highest behind Malta. Both standard cable and DOCSIS 3.0 coverage at 53.4% and 42.9%, respectively also exceeded the EU average.

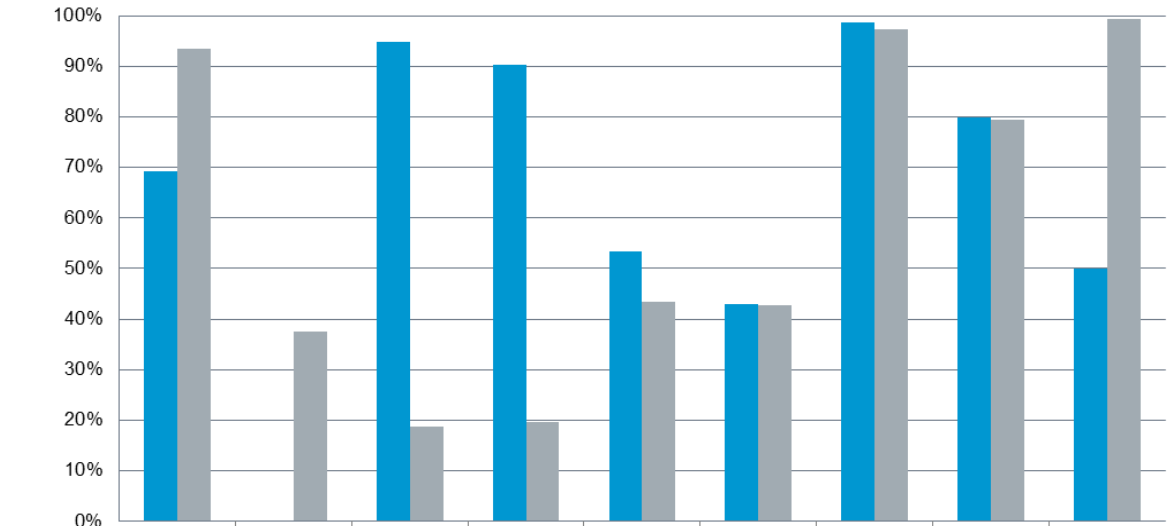
WiMAX is another area that has been seeing continued investment and network expansion, driven by operators such as LRTC[102]. Compared to 2013, WiMAX coverage increased by 5.3 percentage points.

In 2014, LTE coverage increased by 50.6 percentage points and passed 79.9% of Lithuanian households, just above the EU average of 79.4%. This reflects continued deployment of LTE

[102] https://www.telegeography.com/products/commsupdate/articles/2013/09/11/lrtc-extends-wimax-network-to-rural-areas/

networks by operators, such as Omnitel, which has been offering LTE services since 2011 or Tele2, which launched its LTE network in March 2013 with an aim to cover 90% of the country's population by 2015[103].

Lithuania: Coverage by technology, total, 2014

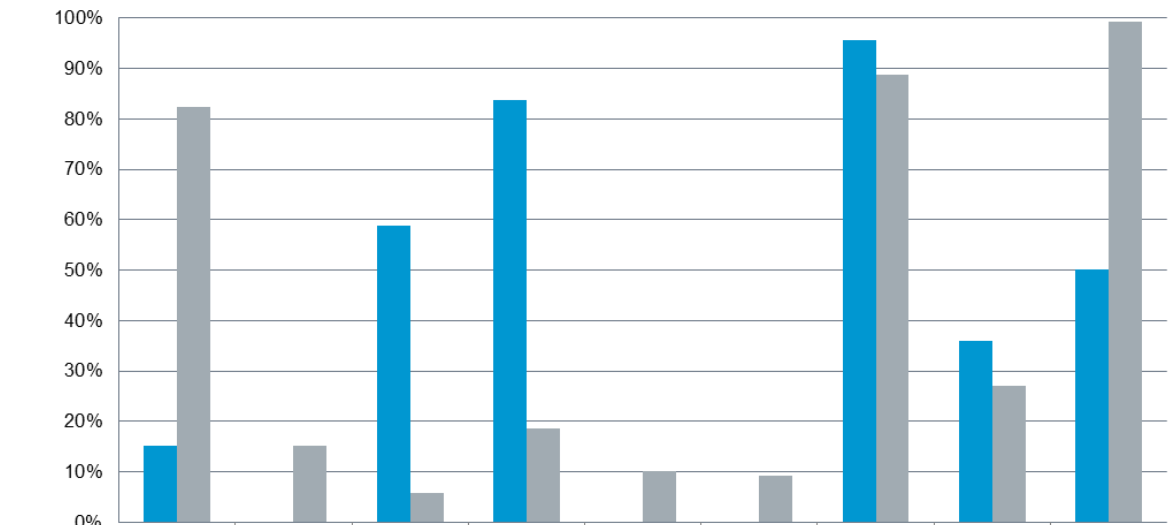


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Lithuania	69.2%	0.0%	94.9%	90.3%	53.4%	42.9%	98.6%	79.9%	50.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

In rural areas, WiMAX and FTTP are key technologies for rural broadband access, given the absence of cable networks and limited availability of DSL, which passed only 15.1% of rural households at the end of 2014. Rural FTTP coverage increased by 3.5 percentage points and passed 58.9% homes in rural areas, while WiMAX coverage increased by 1.8 percentage points reaching 83.8% of rural households. In 2014 LTE networks became available in rural areas and by the end of the year they reached 36% of households, compared to the EU average of 27%.

Lithuania: Coverage by technology, rural areas, 2014



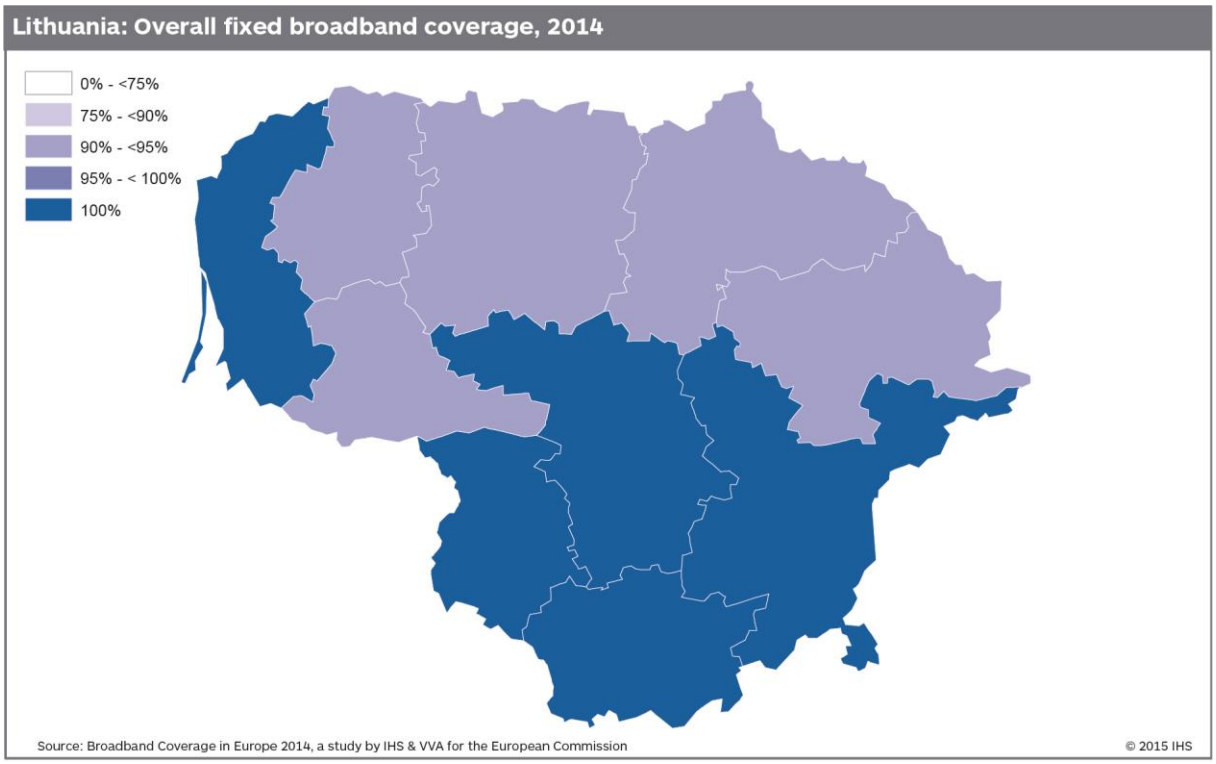
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Lithuania	15.1%	0.0%	58.9%	83.8%	0.0%	0.0%	95.6%	36.0%	50.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

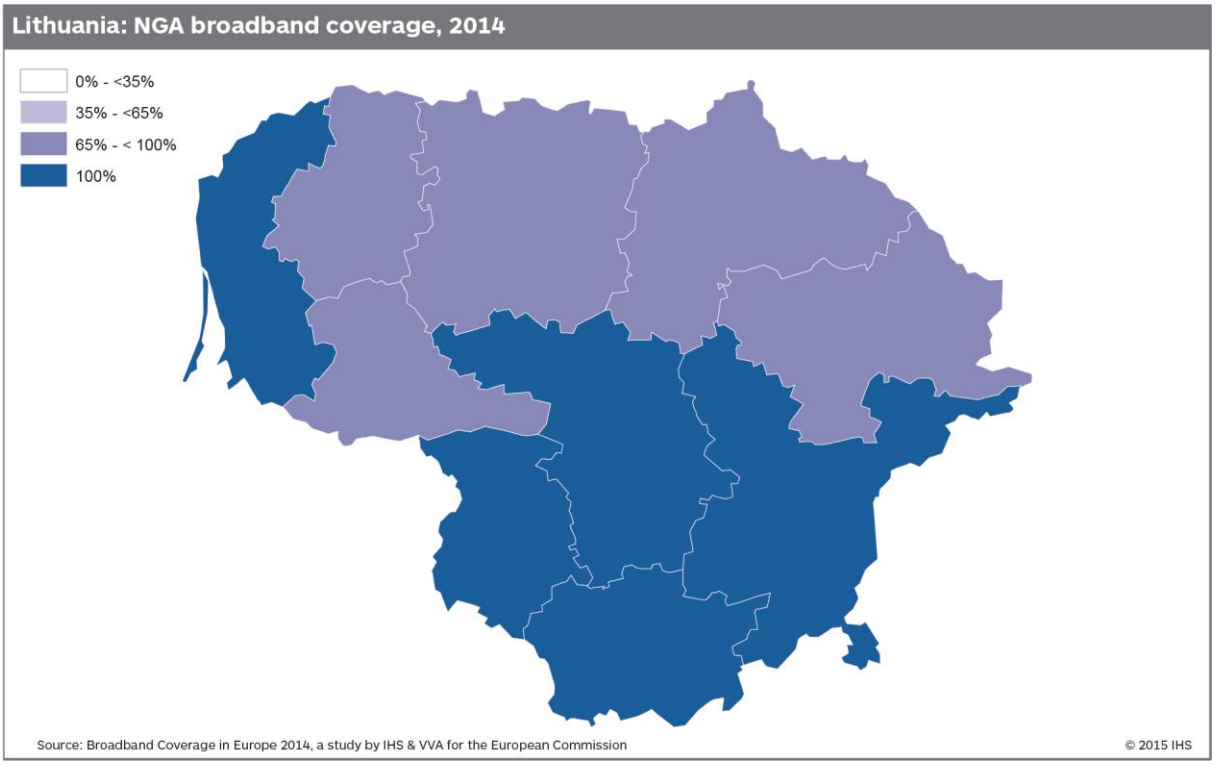
[103] GSA 4G Market and Technology Update

5.18.2 Regional coverage by broadband technology

Regional fixed broadband coverage varies between half for the regions, including the capital Vilnius, having complete coverage, while the in the other half of regions fixed coverage reached between 94% and 95% of households.



Due to the prevalence of FTTP among fixed broadband technologies, regional NGA coverage displays a similar pattern to that of fixed broadband availability, with all households covered in half of the regions including Vilnius, Klaipedos, Kauno, Alytaus and Marijampoles.



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[104].

In order to increase broadband coverage, Lithuanian government previously implemented two projects aiming specifically at the provision of broadband services in rural areas, name. The "Development of Rural Area Information Technology Broadband Network" (RAIN) ran from 2005 - 2008 followed by RAIN-2 from 2009 – 2013.[105] The funding valued at EUR 60.5 million, EUR 51 million supplied by the ERDF and the rest supplied by the government[106].

The Lithuanian fixed broadband market is dominated by the incumbent, TeliaSonera-backed Teo, which competes with smaller cable and FTTP providers. Since 2007, Teo has invested EUR 157 million in the expansion and upgrade of its FTTP network and has been providing connections of up to 500Mbps throughout 2014[107].

LTE has been launched in Lithuania by Omnitel (part of TeliaSonera's group) in 2011, with Tele2 following suit in 2013, with an aim to achieve 90% population coverage by the end of 2015. A third provider, Bite entered LTE market in April 2015 already and expects to cover 75% of Lithuanian population by the end of 2015[108].

[104] http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=467638&p_tr2=2
[105] http://nmhh.hu/dokumentum/2504/03___rain_tvaronavicius.pdf
[106] http://www.mir.gov.pl/aktualnosci/fundusze_europejskie/Documents/RAIN_Varsuva_20100519_final.pdf
[107] https://www.teo.lt/en/press/FTTH/12308
[108] http://www.bite.lt/lt/apie/ziniasklaidai/show/2015/5541

5.18.4 Data tables for Lithuania

Statistic	National
Population	2,971,905
Persons per household	2.3
Rural proportion	31.4%

	Lithuania 2014		Lithuania 2013		Lithuania 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	69.2%	15.1%	69.1%	15.2%	68.8%	15.1%	93.5%	82.4%
VDSL	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	37.6%	15.1%
FTTP	94.9%	58.9%	93.7%	55.3%	80.0%	42.2%	18.7%	5.8%
WiMAX	90.3%	83.8%	85.0%	82.0%	84.9%	81.4%	19.6%	18.5%
Cable	53.4%	0.0%	53.3%	0.5%	53.0%	0.3%	43.5%	10.0%
DOCSIS 3.0	42.9%	0.0%	42.8%	0.0%	42.2%	0.0%	42.7%	9.2%
HSPA	98.6%	95.6%	95.2%	91.0%	95.1%	85.7%	97.3%	88.9%
LTE	79.9%	36.0%	29.3%	0.0%	18.7%	0.0%	79.4%	27.0%
Satellite	50.0%	50.0%	50.0%	50.0%	0.0%	0.0%	99.3%	99.3%
Overall broadband	99.4%	98.1%	98.6%	95.5%	97.8%	93.5%	99.4%	97.6%
Overall fixed broadband	98.3%	91.9%	97.1%	91.0%	96.8%	90.7%	96.9%	89.6%
NGA broadband	97.3%	58.9%	96.7%	55.3%	80.0%	42.2%	68.1%	25.1%

Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

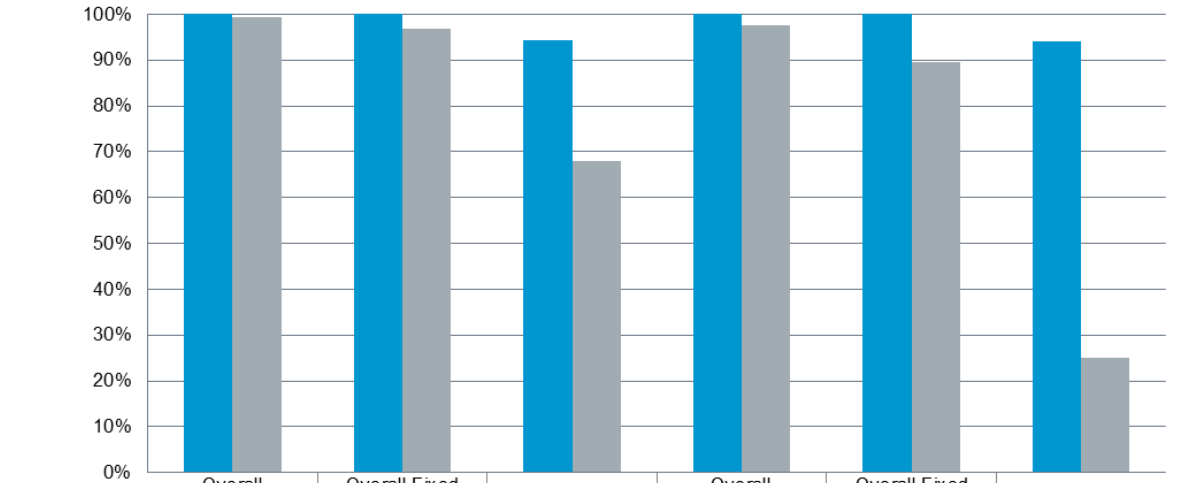
5.19 Luxembourg

5.19.1 National coverage by broadband technology

In 2014, Luxembourg remained one of the top performers with regards to broadband coverage across all of the different technology combinations. As in previous years, complete coverage was recorded for overall broadband and fixed broadband coverage on both national level and in rural areas.

The country also continued to rank high in terms of NGA coverage, which 94.4% of households on a national level and 94.0% in rural areas, considerably higher than the EU average (68.1% and 25.1% respectively). The country benefits from the fact that it geographically covers a 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, 2014



	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%	94.4%	100.0%	100.0%	94.0%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

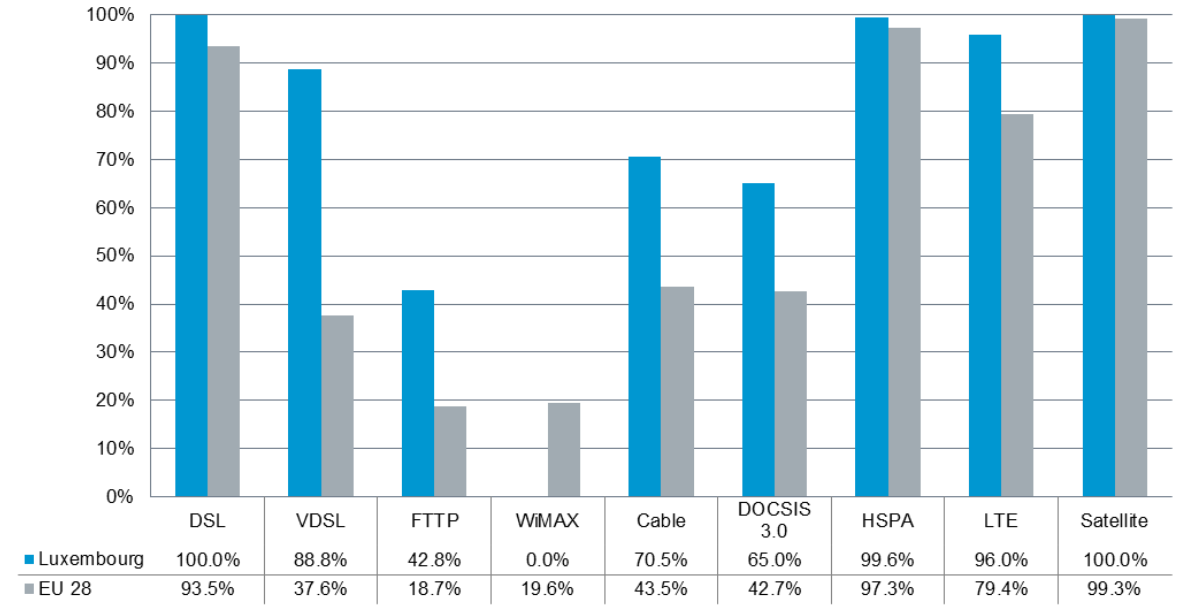
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Looking at individual technologies, with the exception of WiMAX (absent in the country), Luxembourg outperforms the EU average for all other individual technology categories. The universal broadband availability has been achieved due to complete coverage of DSL networks, which have been continuously upgraded to VDSL by both the incumbent P&T as well alternative operator, Tango. In 2014, Luxembourg reported second-highest VDSL coverage in the EU after Belgium reaching 88.8% of households.

DOCSIS 3.0 networks passed 65.0% of households at the end of the year, compared to EU average of 42.7%. Substantial growth was noted with regards to FTTP, with coverage increasing by 6.7 percentage points to 42.8%. This reflects continued investment by leading operators in further deployment of FTTP networks.

Gains were also made with regards to LTE, which recorded a 16.1 percentage point increase to reach 96% of households, compared to the EU average of 79.4%.

Luxembourg: Coverage by technology, total, 2014



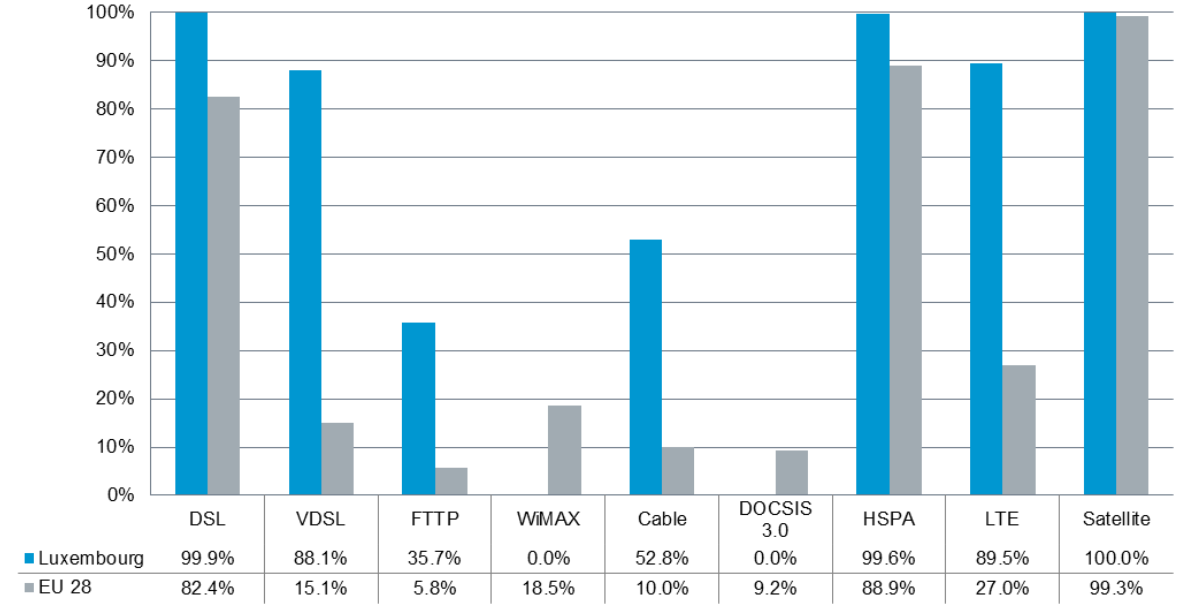
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Luxembourg	100.0%	88.8%	42.8%	0.0%	70.5%	65.0%	99.6%	96.0%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

In rural areas, Luxembourg reported above-average coverage levels for all technologies, with the exception of WiMAX and DOSCIS 3.0, which are not available to rural households. Mirroring the nation-wide pattern, FTTP saw the most substantial increase, with coverage growing by 8.7 percentage points to 35.7% or rural households. Rural cable networks increased by a more modest 2.6 percentage points, yet at the end of 2014, more than half (52.8%) of rural households in Luxembourg had access to cable broadband services.

Rural LTE coverage increased substantially in 2014, growing by 31.5 percentage points to 89.5%, making Luxembourg one of the leaders with regards to rural LTE coverage.

Luxembourg: Coverage by technology, rural areas, 2014

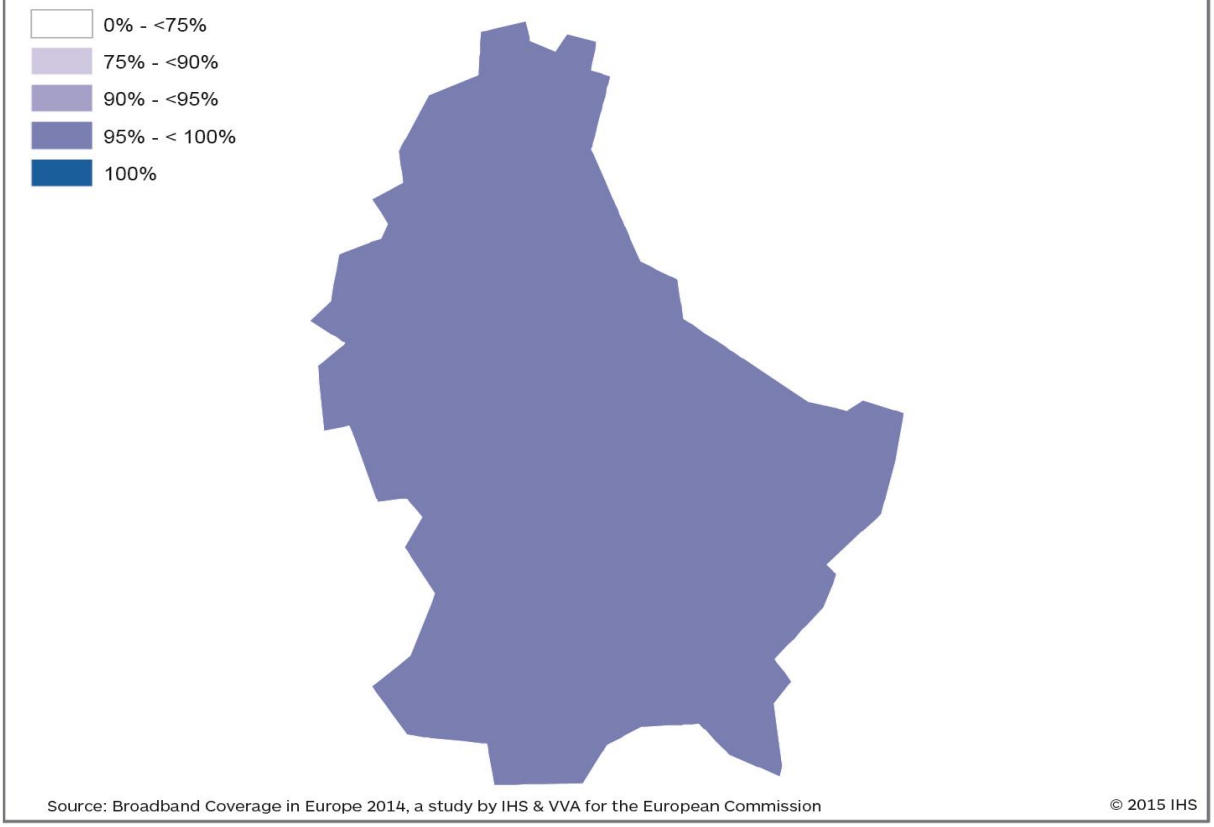


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Luxembourg	99.9%	88.1%	35.7%	0.0%	52.8%	0.0%	99.6%	89.5%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

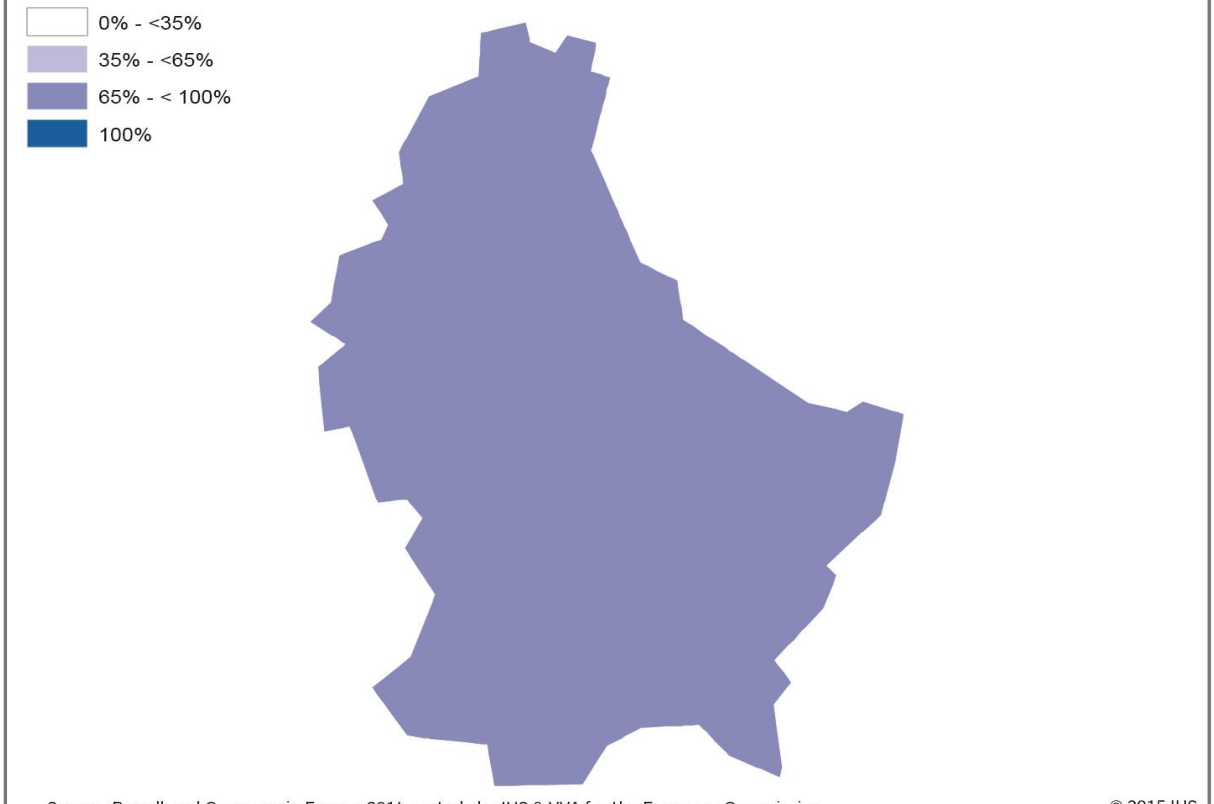
5.19.2 Regional coverage by broadband technology

Luxembourg: Overall fixed broadband coverage, 2014



Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Luxembourg: NGA broadband coverage, 2014



Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.19.3 Regulatory and market overview

The “National action plan for very high-speed networks” was published in April 2010 by the Luxembourg government and is set to run until 2020[109]. The main objectives include the provision of broadband access at the minimum speed of 100 Mbps downstream and 50 Mbps upstream to 100% of the population by 2015. In addition, 50% of the population is set to have access to a minimum 1Gbps downstream speed and 500 Mbps upstream speed by 2015, extending to national availability by 2020.

P&T is the incumbent operator traditionally operating DSL-based networks. However, since 2011 it has also been offering FTTP services, along with a rival operator Tango[110]. P&T has been investing in VDSL upgrades of their network resulting in increased VDSL coverage. Since 2013, P&T has been testing the use of vectored VDSL2 as a way of delivering high-speed services[111].

In July 2012, three LTE licences were issued to P&T, Tango and Orange[112], and in October 2012 Tango and Orange Luxembourg launched the first LTE services in the country[113]. Since then, Tango initiated plans to expand its network to 90% of Luxembourg’s population and Orange announced increased coverage to 85% by the end of 2014[114]. In December 2014, Tango launched the first LTE-Advanced network in the country[115].

[109] http://ict.investinluxembourg.lu/ict/sites/ict.investinluxembourg.lu/files/High-speed-for-all.pdf

[110] http://www.lightwaveonline.com/articles/2011/08/pt-luxembourg-readies-september-launch-for-luxfibre-ftth-internet-access-127449893.html

[111] http://www.fiercetelecom.com/story/pt-luxembourg-test-drives-alcatel-lucents-vectoring-solution/2013-02-28

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

[113] http://www.totaltele.com/view.aspx?ID=476833

[114] https://www.telegeography.com/products/commsupdate/articles/2014/12/15/orange-luxembourg-4g-network-reaches-85-coverage/

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

5.19.4 Data tables for Luxembourg

Statistic	National
Population	549,680
Persons per household	2.5
Rural proportion	14.0%

	Luxembourg 2014		Luxembourg 2013		Luxembourg 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	100.0%	99.9%	100.0%	100.0%	99.8%	98.1%	93.5%	82.4%
VDSL	88.8%	88.1%	88.6%	88.2%	87.7%	82.5%	37.6%	15.1%
FTTP	42.8%	35.7%	36.0%	27.0%	31.8%	24.2%	18.7%	5.8%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.6%	18.5%
Cable	70.5%	52.8%	68.2%	50.2%	69.6%	0.0%	43.5%	10.0%
DOCSIS 3.0	65.0%	0.0%	62.7%	0.0%	61.0%	0.0%	42.7%	9.2%
HSPA	99.6%	99.6%	99.6%	99.6%	99.6%	96.9%	97.3%	88.9%
LTE	96.0%	89.5%	79.9%	58.0%	64.0%	0.0%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	100.0%	100.0%	100.0%	100.0%	99.9%	99.1%	99.4%	97.6%
Overall fixed broadband	100.0%	100.0%	100.0%	100.0%	99.9%	99.1%	96.9%	89.6%
NGA broadband	94.4%	94.0%	94.3%	94.1%	93.8%	91.3%	68.1%	25.1%

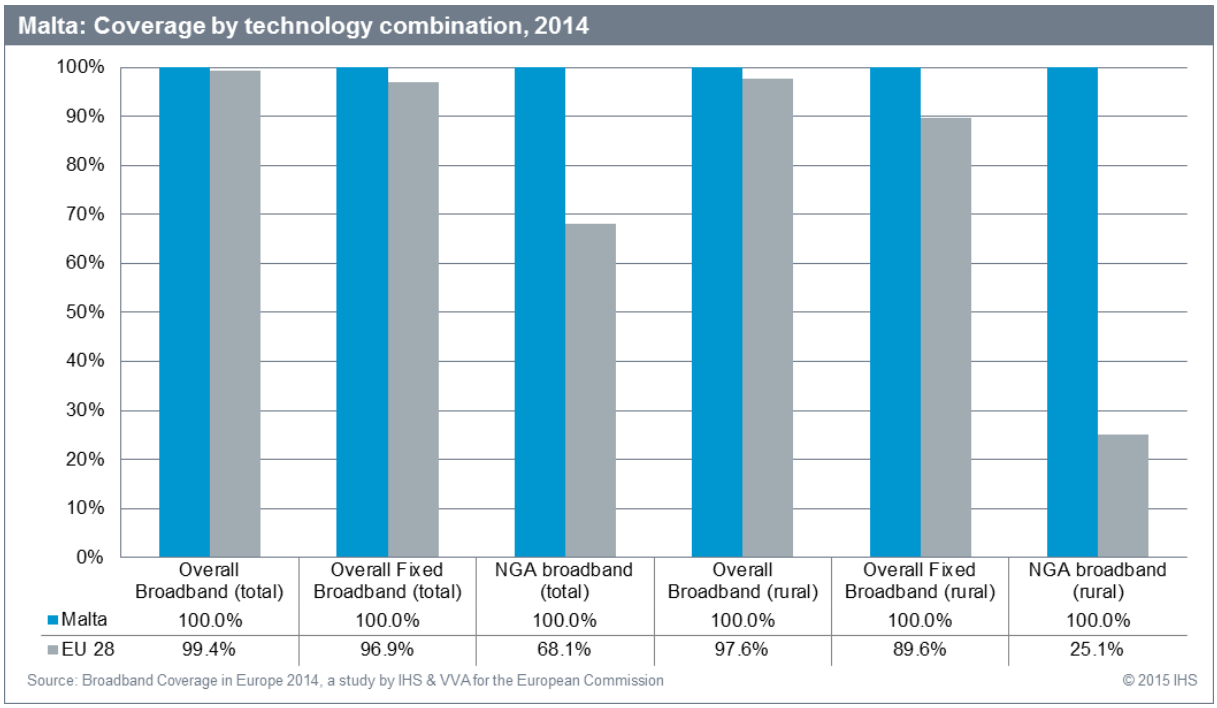
Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

5.20 Malta

5.20.1 National coverage by broadband technology

In 2014, Malta was the only country to report virtually complete broadband coverage across the different technology combinations on both rural and national level. Both the geographic and demographic nature of the country being 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.

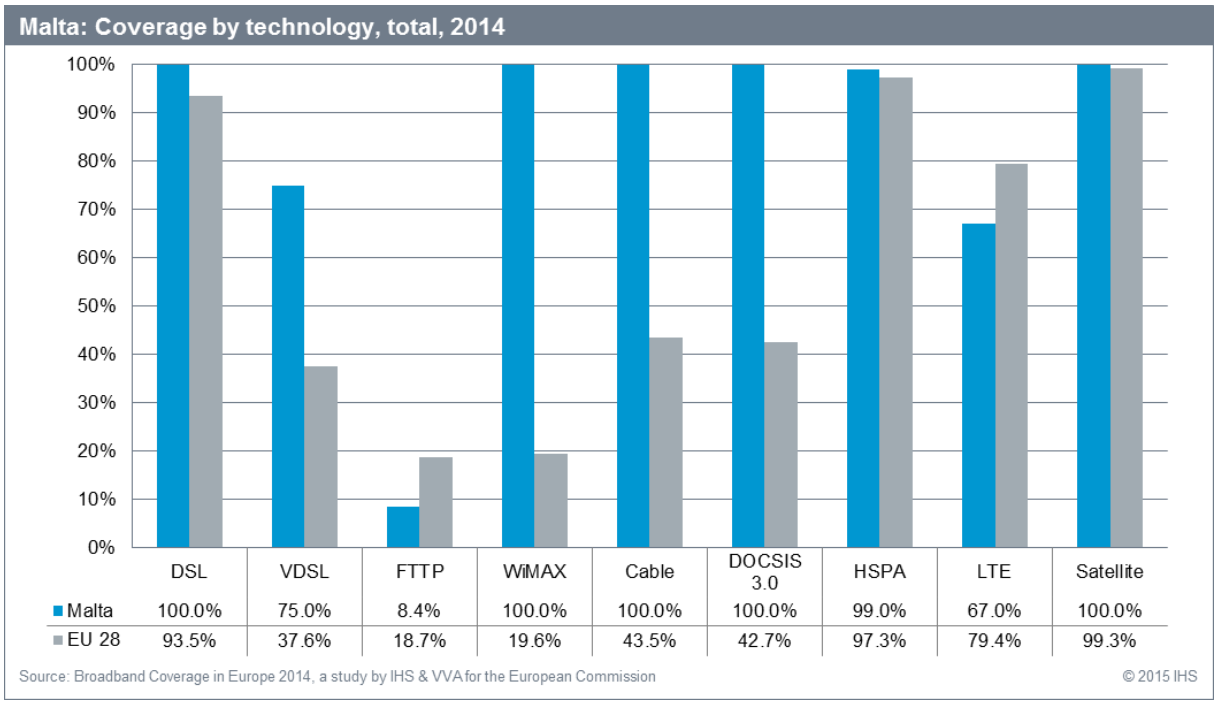
Compared to 2013, NGA networks rollout reached all households in Malta, with rural NGA coverage increasing by 7.5 percentage points and all rural households being able to connect to high-speed broadband at the end of 2014.



Examining 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 2014. Given that this high level of coverage was already achieved in 2013, the only fixed broadband technology to register substantial coverage growth was FTTP, with a coverage increase of 7.6 percentage points. However, at 8.4% national coverage, FTTP remained marginal technology in the Maltese market, although recent investments by GO, one of the two leading operators in Malta, is likely to contribute to further coverage growth[116].

The most significant market development in 2014 regarded further roll-out of LTE services, which were first introduced in Malta in October 2013. At the end of 2014, Vodafone's LTE network covered 67.0% of households across the country. Nevertheless, being a relative late-adopter means that Maltese LTE coverage level registered below the EU average of 79.4%.

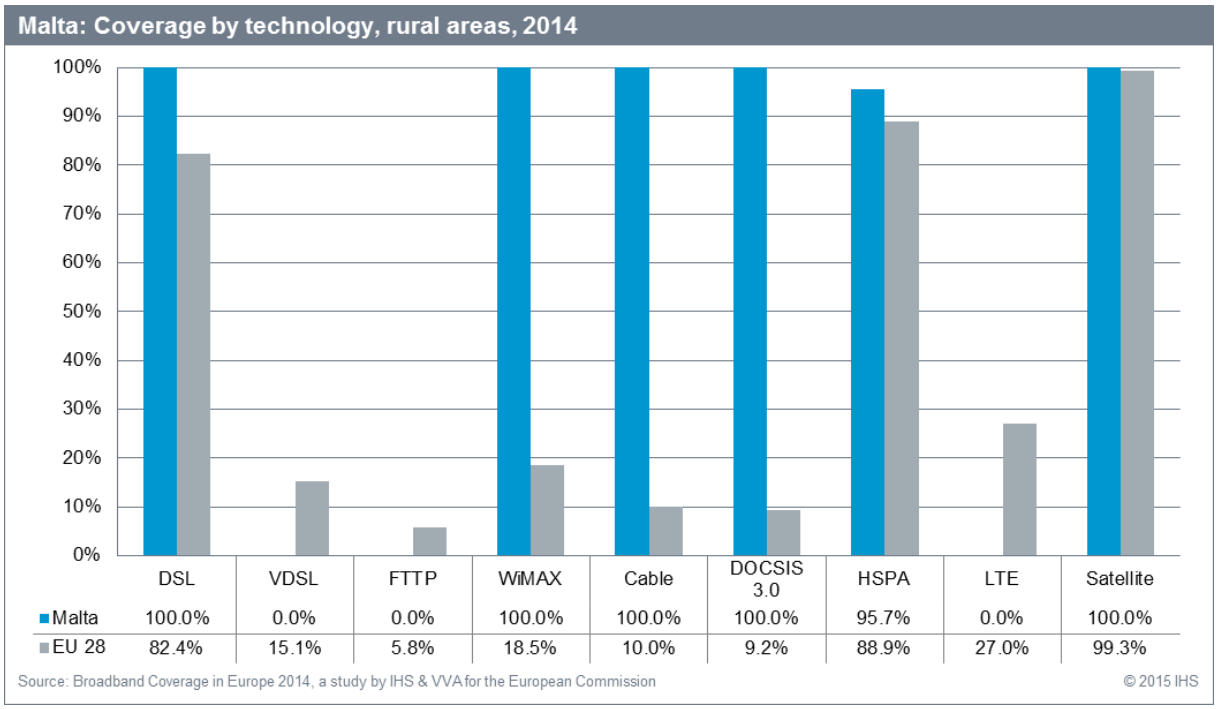
[116] https://www.telegeography.com/products/commsupdate/articles/2015/05/19/go-malta-launches-new-500mbps-fibre-service/



For 2014, Malta Communications Authority (the country's telecoms regulator) reported complete rural coverage for both DSL and cable networks, a 7.5 percentage point increase in coverage compared to 2013.

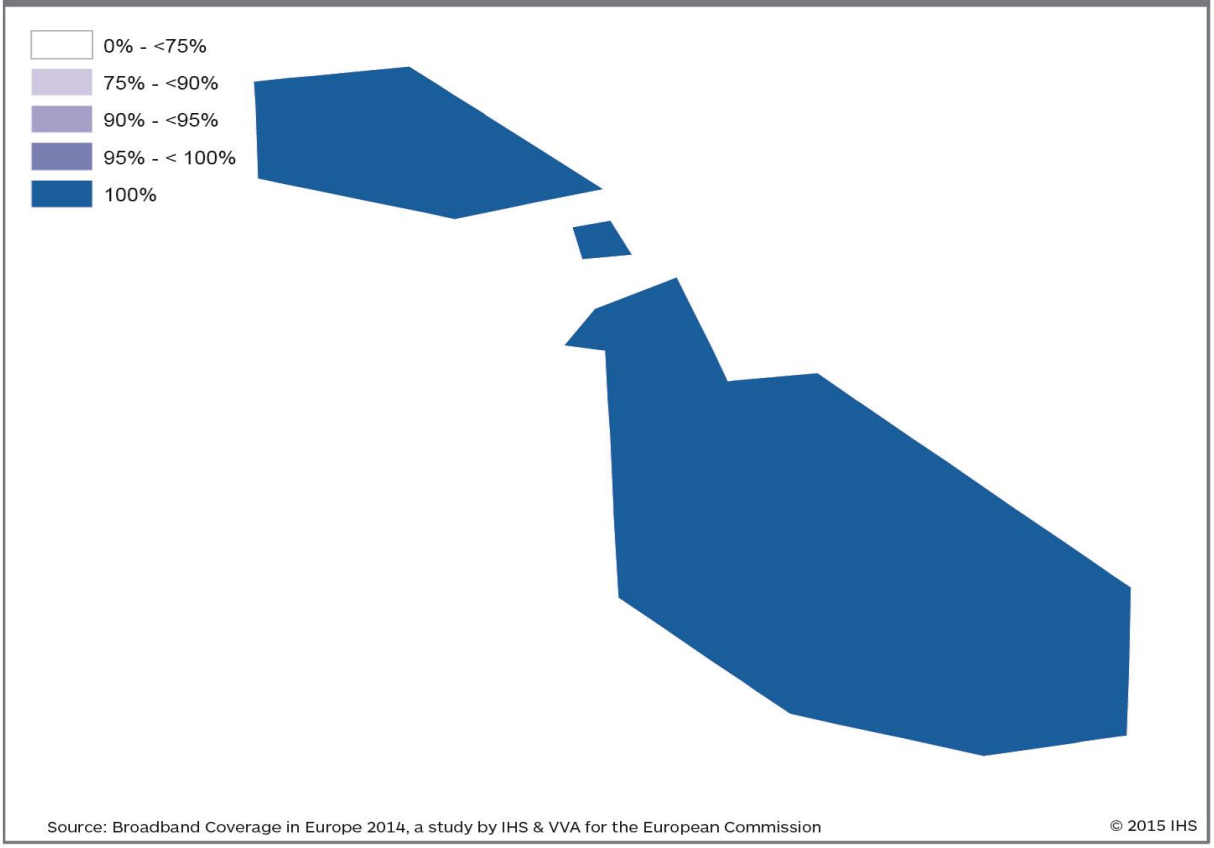
Given absence of VDSL and FTTP in rural areas, DOSCIS 3.0 is the only NGA access technology available to rural households.

LTE networks have not yet been extended to cover rural areas, with deployment focusing initially on urban areas.



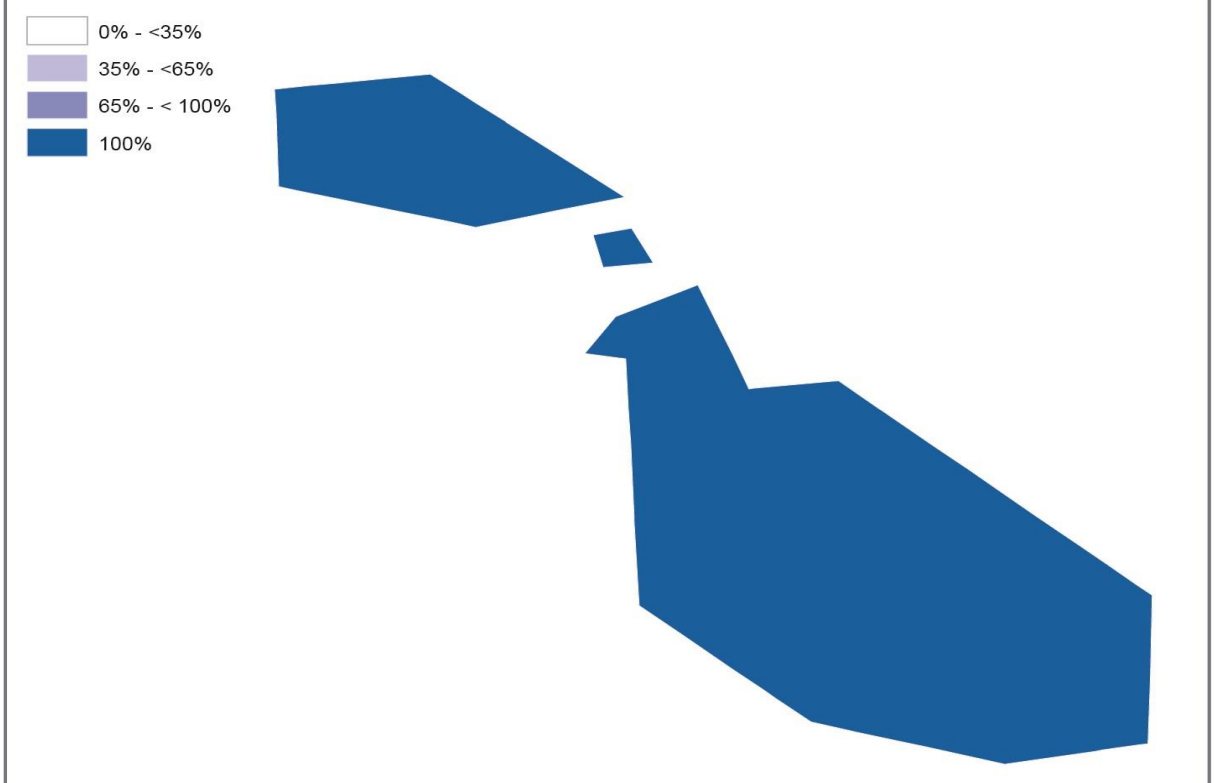
5.20.2 Regional coverage by broadband technology

Malta: Overall fixed broadband coverage, 2014



Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Malta: NGA broadband coverage, 2014



Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.20.3 Regulatory and market overview

The Maltese government's objectives are captured in 'Digital Malta' – a strategy designed to run from 2014-2020. Given the already very high availability of broadband services – both basic fixed and NGA – the objectives of the plan revolve primarily around mechanisms which can be used for encouraging the development of digital literacy and taking advantage of the latest ICT and digital service innovations. The strategy focuses on citizens and businesses, and looks at skills investment, regulation as well as underlying infrastructure.

The Maltese fixed broadband market is split between two main operators, the cable company Melita, and telecoms group Go. Go began to roll out VDSL2 services in 2011, competing with the high-speed cable broadband launches in the same year. More recently it has invested in fibre networks, launching a 500 Mbps service in May 2015[117]. Cable company Melita launched DOCSIS 3.0 services offering >100Mbps speeds in 2011. Melita also offers 250Mbps packages to customers.

LTE network launch took place relatively late in Malta, with Vodafone being the first provider to launch LTE services in the country, announcing nationwide rollout in 2014[118]. GO is likely to join Vodafone in offering LTE-capable network in 2015 and the plans by the Malta Communication Agency (MCA) to auction spectrum in the 800, 1800 MHz, and 2.6 GHz bands may attract further market entrants[119].

[117] https://www.telegeography.com/products/commsupdate/articles/2015/05/19/go-malta-launches-new-500mbps-fibre-service/
[118] http://www.totaltele.com/view.aspx?ID=483683
[119] GSA 4G Market and Technology Update. . Available for download here: http://www.gsacom.com/gsm_3g/info_papers.php4

5.20.4 Data tables for Malta

Statistic	National
Population	425,384
Persons per household	2.8
Rural proportion	0.9%

	Malta 2014		Malta 2013		Malta 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	100.0%	100.0%	100.0%	92.5%	99.9%	89.5%	93.5%	82.4%
VDSL	75.0%	0.0%	75.0%	0.0%	75.0%	0.0%	37.6%	15.1%
FTTP	8.4%	0.0%	0.8%	0.0%	0.9%	0.0%	18.7%	5.8%
WiMAX	100.0%	100.0%	100.0%	99.9%	99.9%	99.9%	19.6%	18.5%
Cable	100.0%	100.0%	100.0%	92.5%	99.9%	89.5%	43.5%	10.0%
DOCSIS 3.0	100.0%	100.0%	100.0%	92.5%	99.9%	89.5%	42.7%	9.2%
HSPA	99.0%	95.7%	100.0%	92.5%	99.9%	89.5%	97.3%	88.9%
LTE	67.0%	0.0%	30.0%	0.0%	0.0%	0.0%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	97.6%
Overall fixed broadband	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	96.9%	89.6%
NGA broadband	100.0%	100.0%	100.0%	92.5%	99.9%	89.5%	68.1%	25.1%

Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

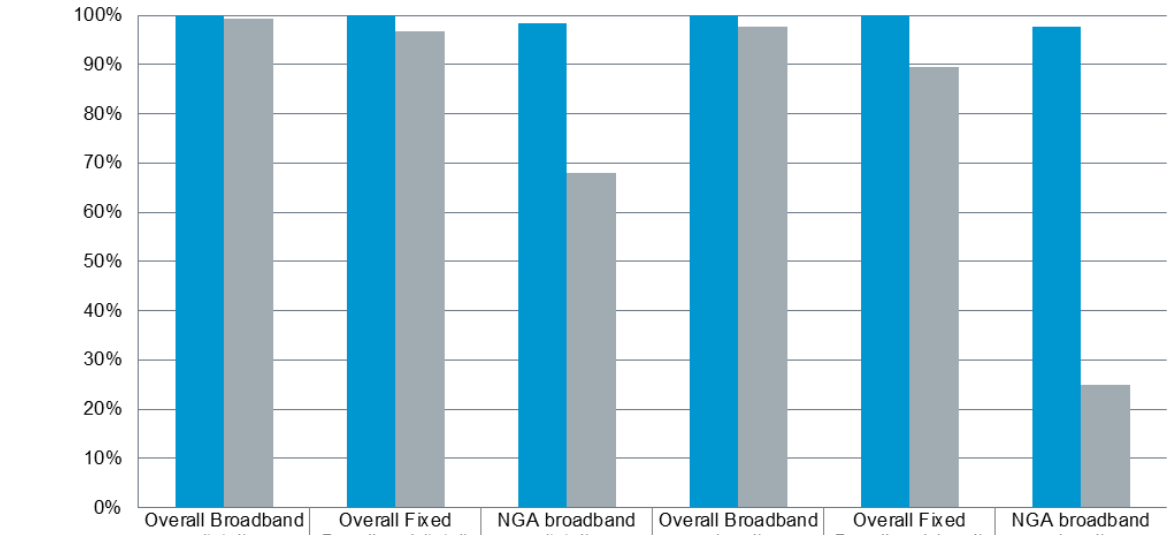
5.21 Netherlands

5.21.1 National coverage by broadband technology

In 2014, the Netherlands remained one of the top performers with regards to broadband coverage, recording complete overall broadband and fixed broadband coverage, both on national and rural level.

While national and rural NGA coverage remained broadly unchanged, registering increases of less than one percentage point, at 98.4% and 97.7% respectively, the Netherlands is one of the leaders in terms of national NGA coverage and second only to Malta in terms of rural NGA coverage.

Netherlands: Coverage by technology combination, 2014



	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%	98.4%	100.0%	100.0%	97.7%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

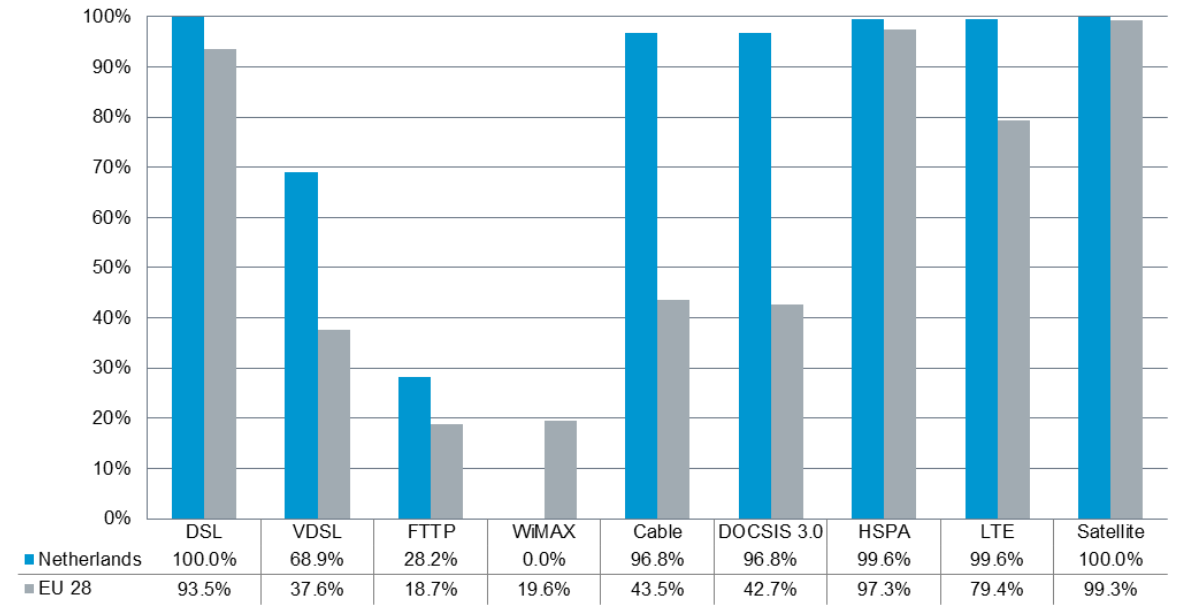
Looking at the specific technologies, the Netherlands recorded coverage exceeding the EU average for all individual technologies except for WiMAX, which is not present in the country. It reported complete DSL coverage and 96.8% cable coverage, with all cable connections now upgraded to DOSCIS 3.0 technology.

The only significant coverage increases were made with respect to other NGA access technologies. VDSL coverage was estimated to grow by 4.5 percentage points to 68.9%[120], while FTTP coverage increased by 4.9 percentage points to pass 28.2% of households by the end of 2014. These developments can be attributed to further efforts of the incumbent telecoms group KPN, which is a key player in terms of deployment of both technologies[121].

After LTE network launches of 2013, when all major operators started offering LTE services, including KPN, T-Mobile Netherlands, Vodafone Netherlands (along with the cable company Ziggo), the Netherlands became one of the leaders in terms of LTE coverage. In 2014 a further 9.1 percentage point increase put national LTE coverage at 99.6% of households, the highest among the study countries.

[120] Newly available data for 2014 suggested that the original 2013 data for VDSL coverage was overestimated. For this reason and upon a discussion with the NRA, the research team decided to restate the 2013 VDSL coverage figures.
[121] http://corporate.kpn.com/investor-relations/publications.htm

Netherlands: Coverage by technology, total, 2014



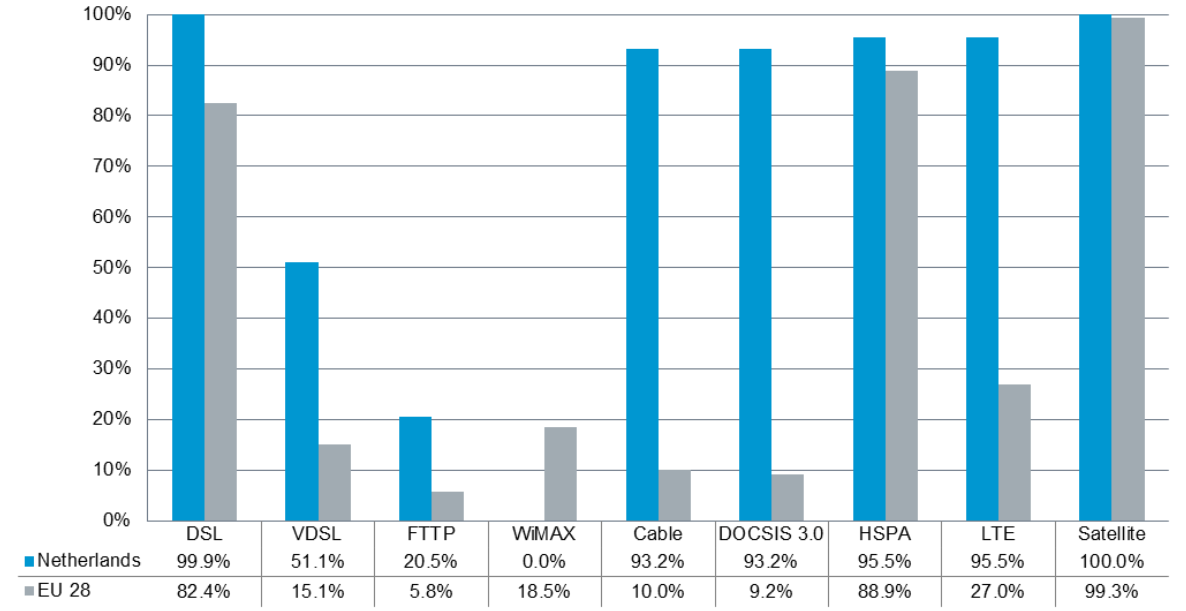
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Netherlands	100.0%	68.9%	28.2%	0.0%	96.8%	96.8%	99.6%	99.6%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

In rural areas, there was almost complete DSL coverage and DOCSIS 3.0 networks passed 93.2% of rural homes, more than ten times the EU average of 9.2%. VDSL and FTTP were also the two fixed technologies seeing an increase in rural coverage, with rural VDSL coverage growth exceeding 11 percentage points and reaching more than a half (51.1%) of rural households at the end of 2014. Nevertheless, as was the case on national level, DOSCIS 3.0 remained the key NGA technology in rural areas.

An important development in rural areas was the further deployment of LTE networks, with a 52.9 percentage point increase in coverage resulting in rural LTE coverage of 95.5%, one of the highest among the study countries.

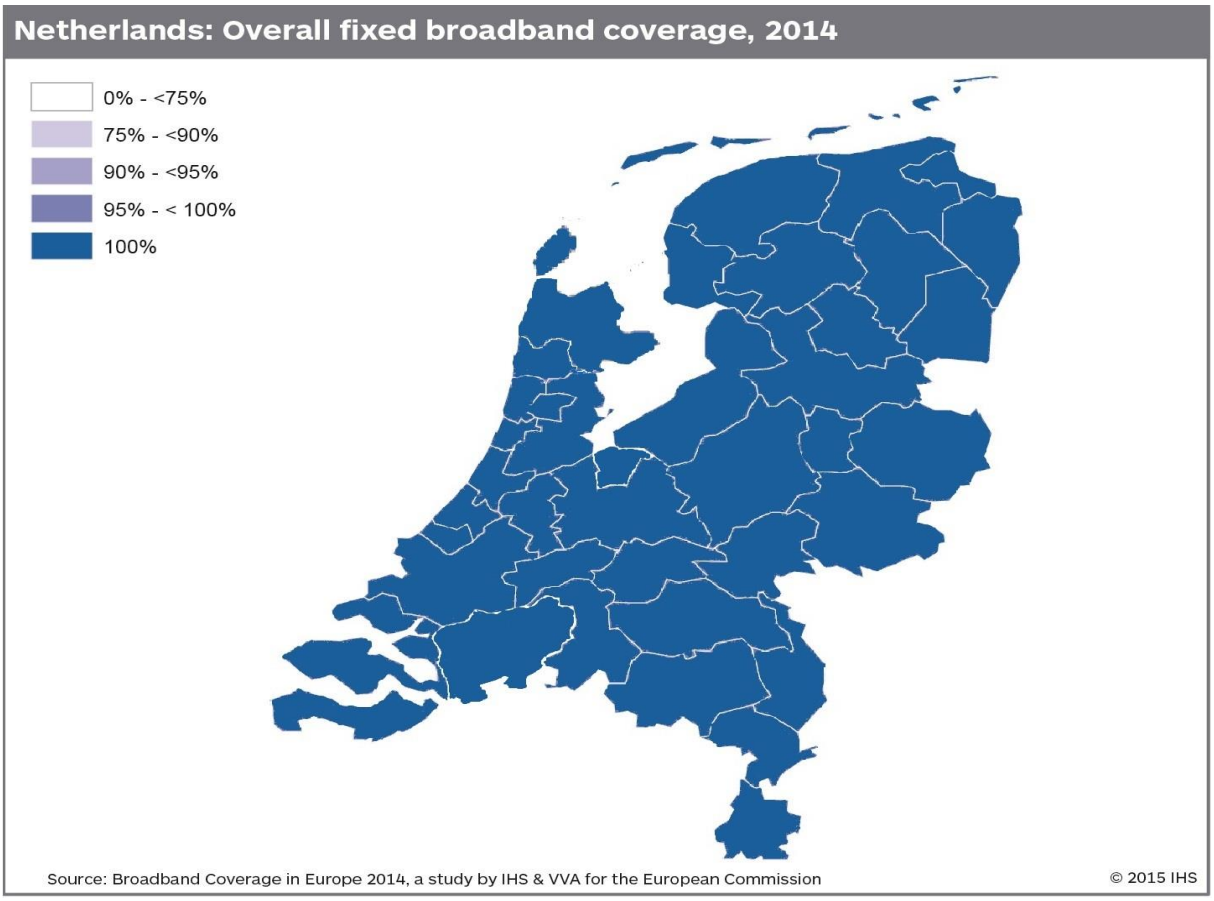
Netherlands: Coverage by technology, rural areas, 2014

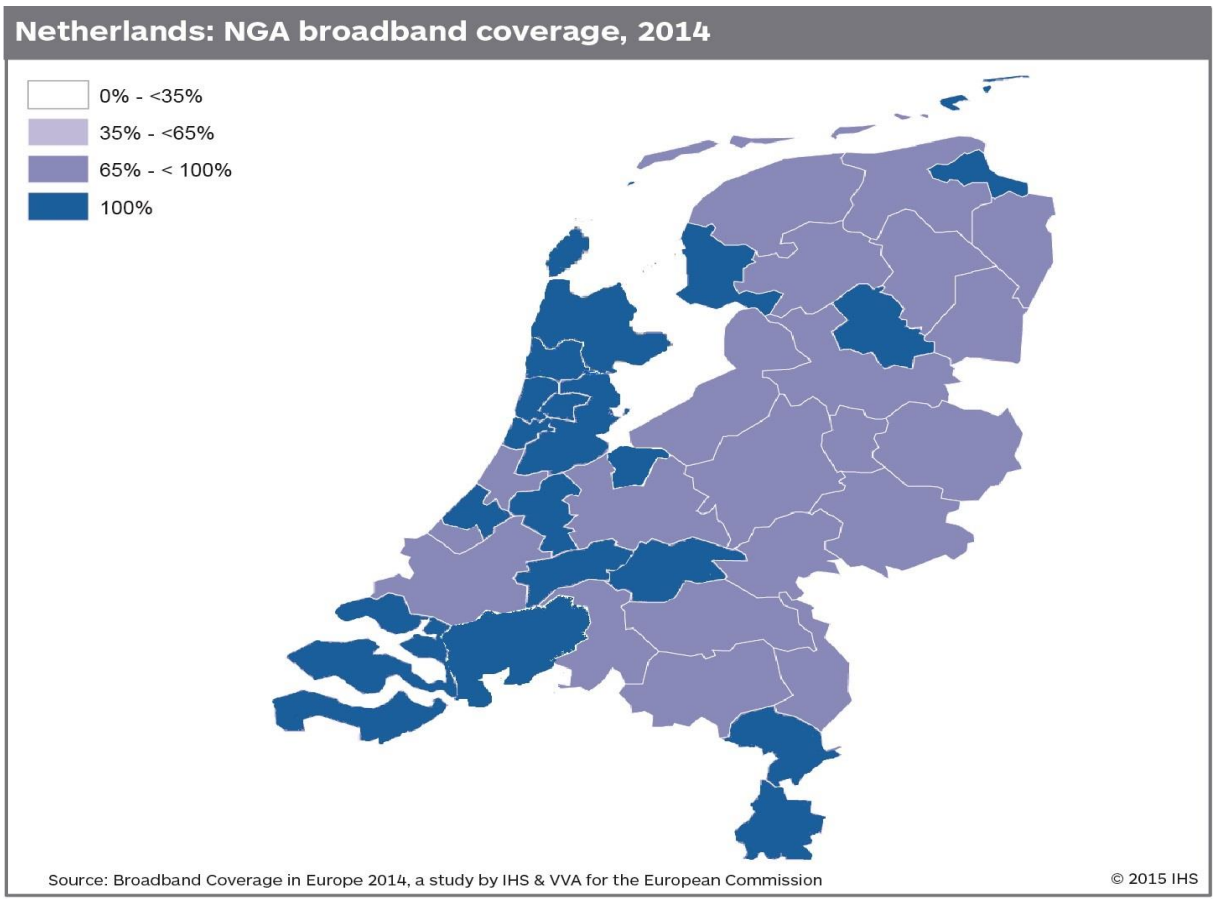


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Netherlands	99.9%	51.1%	20.5%	0.0%	93.2%	93.2%	95.5%	95.5%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.21.2 Regional coverage by broadband technology





Fixed broadband coverage remained unchanged across the individual regions with all households being able to access fixed broadband services at the end of 2014.

NGA coverage was slightly more varied in the individual regions. Eighteen regions recorded complete NGA availability, while the lowest NGA coverage was registered in Zuidoost-Friesland region, where nearly 93% of households had access to high-speed broadband.

5.21.3 Regulatory and market overview

The Netherlands' broadband strategy is outlined in "Digital Agenda for the Netherlands[122] (launched in 2011, and covering the period to 2015) and focuses on the conditions required to achieve full coverage as per the European Digital Agenda objectives as well as creating a better regulatory framework for improving usage of digital services by businesses and citizens.

With NGA coverage already high, Dutch ISPs are set to go beyond the EU's Digital Agenda targets. In 2014, the incumbent KPN has taken control of wholesale fibre operator Reggefiber, which connected over two million consumers to the FTTH network by the end of the year[123]. Moreover, KPN began to rollout VDSL bonded vectoring, which will allow it to increase maximum speeds to 200Mbps.

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 in 2015[124], thus overtaking KPN as the leading player in the Dutch fixed broadband market. With all cable networks fully updated to DOCSIS 3.0, the company will look into implementation of DOCSIS 3.1 standards, which will enable to provide speeds of 1Gbps downstream to consumers within the next few years[125]. Already in mid-2014, Ziggo increased headline speeds for its customers, beginning to offer consumers 180Mbps packages[126].

With five operators (KPN, T-Mobile Netherlands, Vodafone Netherlands, Tele2 and Ziggo) offering LTE services, the focus has shifted to LTE-Advanced networks, with Vodafone launching the first network in Amsterdam in September 2014[127].

[122] http://www.rijksoverheid.nl/documenten-en-publicaties/notas/2011/05/17/digitale-agenda-nl-ict-voor-innovatie-en-economische-groei.html
[123] https://www.telegeography.com/products/commsupdate/articles/2014/11/18/kpn-to-increase-reggefiber-stake-to-100/
[124] https://www.telegeography.com/products/commsupdate/articles/2015/02/18/upc-netherlands-to-rebrand-as-ziggo-from-april/
[125] http://www.digitaltveurope.net/205622/upc-netherlands-doubles-upload-speeds-for-broadband/
[126] https://www.ziggo.com/resources/documents/Quarterly_Reports/140717_Ziggo_Q2_2014_Results_Presentation.pdf
[127] GSA 4G Market and Technology Update. . Available for download here: http://www.gsacom.com/gsm_3g/info_papers.php4

5.21.4 Data tables for Netherlands

Statistic	National
Population	16,779,575
Persons per household	2.2
Rural proportion	8.2%

	Netherlands 2014		Netherlands 2013		Netherlands 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	100.0%	99.9%	100.0%	100.0%	100.0%	100.0%	93.5%	82.4%
VDSL	68.9%	51.1%	*64.4%*	*39.7%*	59.9%	28.4%	37.6%	15.1%
FTTP	28.2%	20.5%	23.3%	19.4%	17.7%	8.5%	18.7%	5.8%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.6%	18.5%
Cable	96.8%	93.2%	95.8%	95.2%	98.8%	86.0%	43.5%	10.0%
DOCSIS 3.0	96.8%	93.2%	95.0%	94.4%	97.5%	79.7%	42.7%	9.2%
HSPA	99.6%	95.5%	99.0%	90.5%	99.0%	88.1%	97.3%	88.9%
LTE	99.6%	95.5%	90.4%	42.6%	0.0%	0.0%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.4%	97.6%
Overall fixed broadband	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	96.9%	89.6%
NGA broadband	98.4%	97.7%	97.6%	97.2%	98.4%	84.5%	68.1%	25.1%

Note: Newly available data for 2014 suggested that the original 2013 data for VDSL coverage was overestimated. For this reason and upon a discussion with the NRA, the research team decided to restate the 2013 VDSL coverage figures (highlighted in italics).

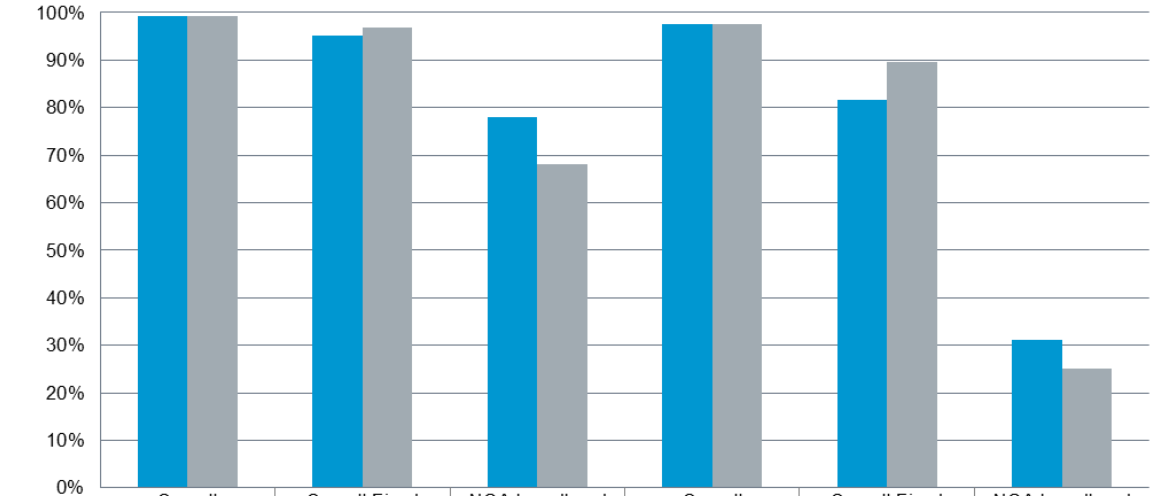
Unless restated, the 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

5.22 Norway

5.22.1 National coverage by broadband technology

In 2014, overall broadband and fixed broadband coverage levels in Norway were slightly below the European average, both nationally and in rural areas. NGA coverage, on the other hand, reached higher than EU28 average values at the end of the year. National NGA coverage grew by 2.6 percentage points, with 78.0% of households across Norway having access to high-speed broadband services. Even more significant gain was recorded in terms of rural NGA coverage, which increased by 15.1 percentage points and NGA networks passed almost a third (31.2%) of rural homes.

Norway: Coverage by technology combination, 2014



	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Norway	99.3%	95.2%	78.0%	97.5%	81.7%	31.2%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Looking at coverage levels of the individual technologies, it is possible to see that in 2014 Norway slightly lagged the EU in terms of both DSL and VDSL coverage. DSL network passed 90.4% of homes, compared to EU28 average of 93.5%, and VDSL services were available to 36.5% of households, as opposed to 37.6% average EU households.

These shortcomings were partially offset by above-average FTTP and cable availability. FTTP coverage increased by 4.4 percentage points and reached 40.0% of households (compared to 18.7% EU28 average). Cable networks passed almost a half (49.5%) of Norwegian households, a 1.5 percentage point increase compared to 2013.

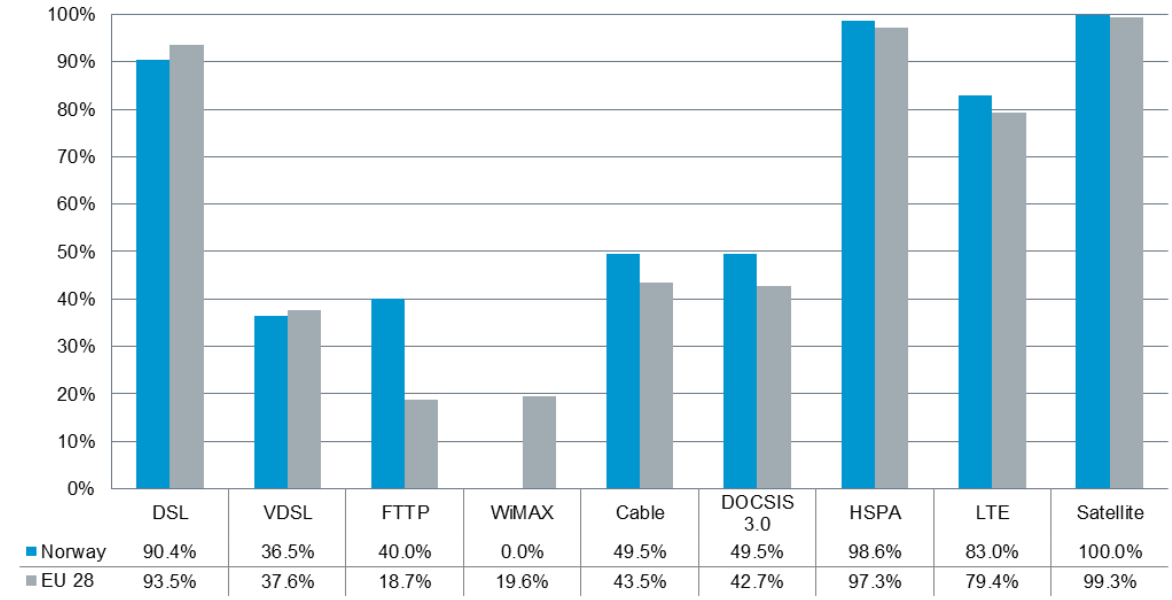
In 2014, cable network upgrades to DOCSIS 3.0 were completed, making DOCSIS 3.0 the main NGA technology followed by FTTP and VDSL. Norwegian ISPs have been investing extensively in upgrade and expansion of their networks in recent years. Among cable companies, Get launched 200Mbps products in 2011 and tested 1Gbps speeds in 2013[128]. Meanwhile, the incumbent Telenor Norge announced in March 2014 a large-scale upgrade of its copper network to VDSL2 technology[129].

[128] http://www.get.no/get/about-get

[129] https://www.telegeography.com/products/commsupdate/articles/2014/03/06/telenor-norge-contract-alca-lu-for-broadband-network-technology-upgrade/

Following substantial increases in 2013, LTE coverage growth was, at 15.3 percentage points, more modest than in many other study countries. Nevertheless, at the end of 2014 LTE coverage reached 83.0% of households, exceeding the EU28 average of 79.4%.

Norway: Coverage by technology, total, 2014

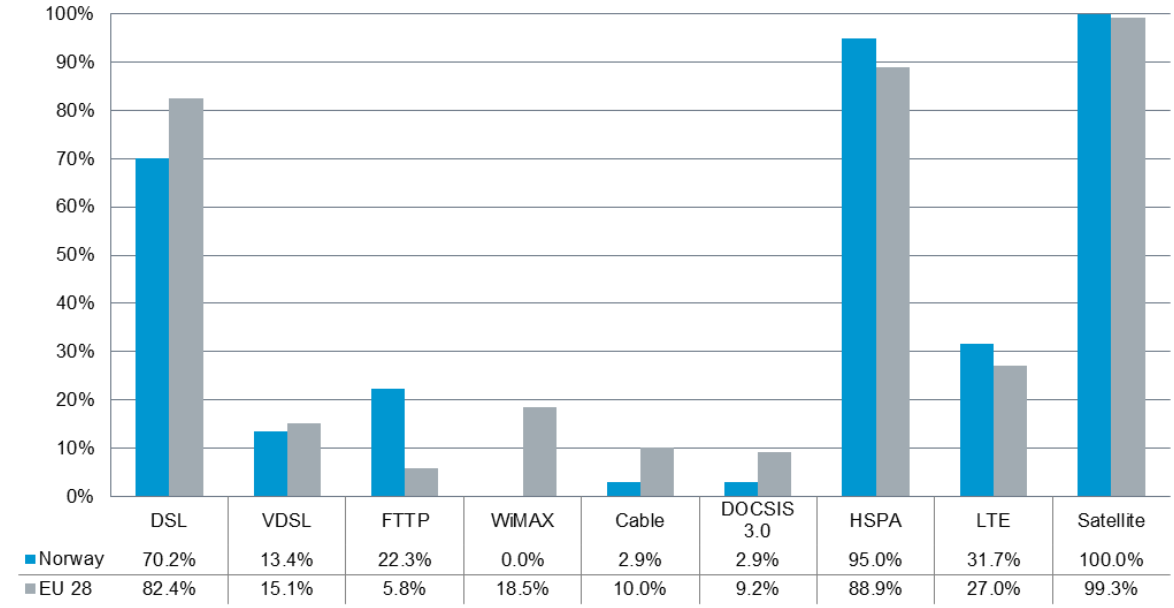


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Norway	90.4%	36.5%	40.0%	0.0%	49.5%	49.5%	98.6%	83.0%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Key developments in rural areas concerned NGA coverage, with rural FTTP coverage growing by 12.3 percentage points to 22.3%, almost four times the EU average. VDSL coverage increased by 5.7 percentage points and VDSL networks passed 13.4% of rural households at the end of 2014, compared to the EU28 average of 15.1%. At 2.9%, rural DOCSIS 3.0 networks continued to have a marginal impact on rural NGA coverage across Norway.

Norway: Coverage by technology, rural areas, 2014

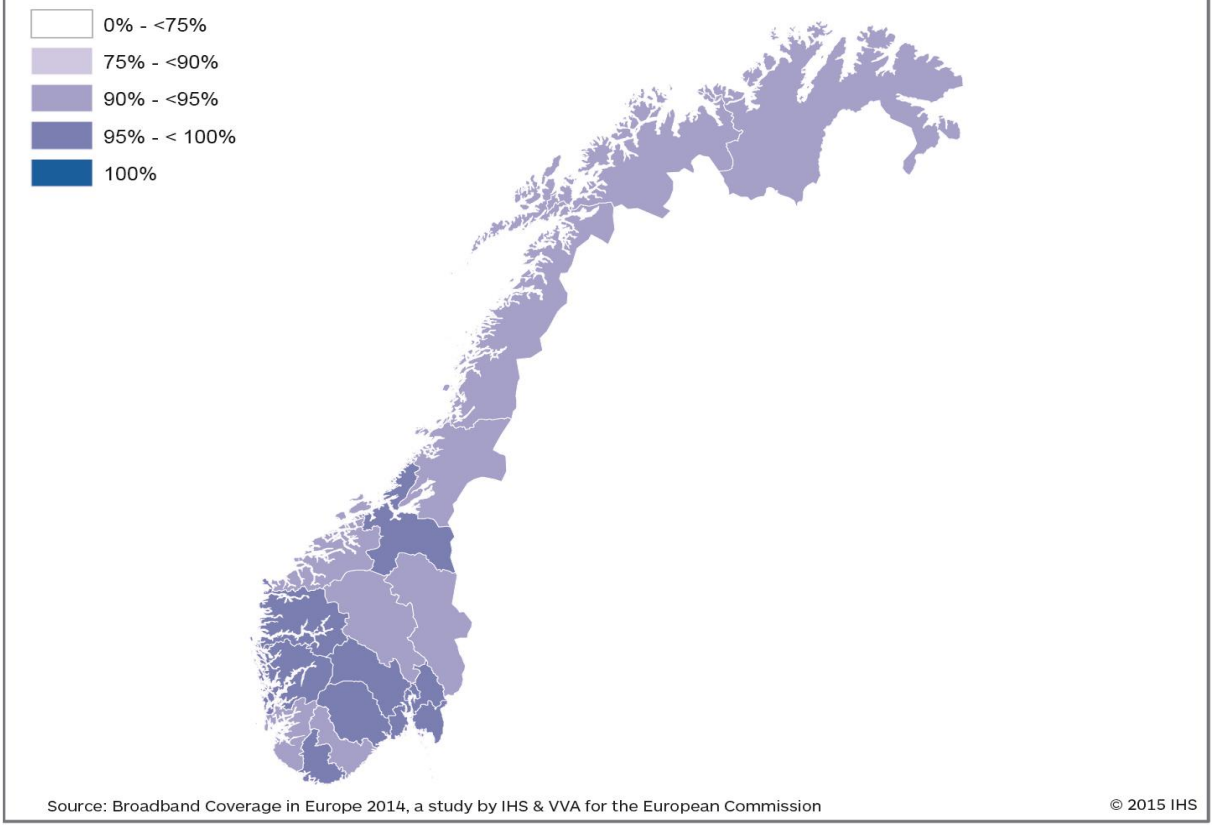


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Norway	70.2%	13.4%	22.3%	0.0%	2.9%	2.9%	95.0%	31.7%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

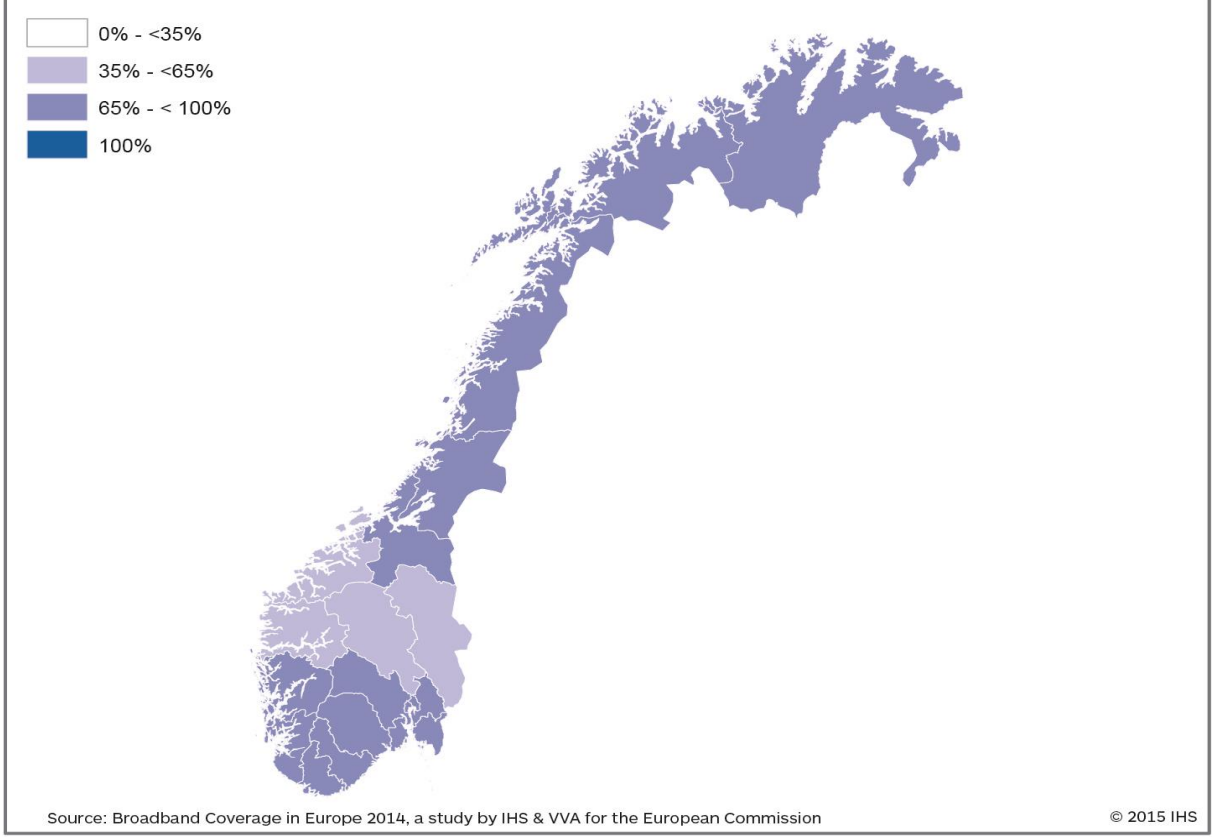
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.22.2 Regional coverage by broadband technology

Norway: Overall fixed broadband coverage, 2014



Norway: NGA broadband coverage, 2014



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

NGA coverage in individual regions was more varied. Two regions (Oppland and Sogn og Fjordane) recorded NGA coverage levels under 60% and only Oslo registered NGA broadband availability exceeding 90%.

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 infrastructure investments totalling at EUR 12 billion over a 5-year period was proposed to be used for improvement of roads, railways and other infrastructure as well as broadband. Grants ensuring the development of broadband access in rural areas and simplification of broadband rollout regulations were also part of the agenda[130].

The incumbent, Telenor, operates DSL, cable and FTTP networks. In 2014, the company began to upgrade its copper networks to VDSL2 technology, with download speeds increasing to up to 50 Mbps[131]. However, Telenor's priority is deployment of FTTP and DOCSIS 3.0 networks and gradual migration of customers to the high-speed broadband platforms[132]. Moreover, in May 2013, the company announced a EUR 500 million investment in FTTP infrastructure in order to meet the demand for cloud and VPN services in the business sector[133].

Among the alternative operators, triple-play provider Altibox introduced connections with speeds of up to 10 Gbps in May 2014[134].

Norway has been one of the front-runners with regards to LTE network deployment with TeliaSonera launching its LTE services via its mobile company NetCom already in 2009. Telenor then began to offer its LTE services in 2012[135]. In May 2014, third operator Tele2 announced launch of its LTE network[136].

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

[131] https://www.telegeography.com/products/commsupdate/articles/2014/10/16/telenor-norge-boosts-possible-broadband-speeds-for-250000-subscribers/

[132] http://www.telenor.com/wp-content/uploads/2012/09/05_CMD-2012-Telenor-Norway_FINAL.pdf

[133] http://www.businesscloudnews.com/2013/05/30/telenor-to-invest-e500m-in-fibre-broadband/

[134] https://www.telegeography.com/products/commsupdate/articles/2014/05/15/altibox-unveils-plans-to-introduce-10gbps-ftth-broadband-this-august/

[135] http://www.zdnet.com/4g-coverage-on-the-up-in-norway-as-netcom-telenor-boost-lte-networks-7000017449/

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

5.22.4 Data tables for Norway

Statistic	National
Population	5,051,275
Persons per household	2.1
Rural proportion	21.6%

	Norway 2014		Norway 2013		Norway 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	90.4%	70.2%	93.5%	74.1%	94.5%	75.8%	93.5%	82.4%
VDSL	36.5%	13.4%	32.1%	7.7%	32.7%	5.5%	37.6%	15.1%
FTTP	40.0%	22.3%	33.8%	10.0%	29.6%	9.3%	18.7%	5.8%
WiMAX	0.0%	0.0%	38.9%	34.1%	18.6%	14.3%	19.6%	18.5%
Cable	49.5%	2.9%	49.0%	3.2%	46.1%	9.4%	43.5%	10.0%
DOCSIS 3.0	49.5%	2.9%	48.0%	1.9%	45.1%	9.2%	42.7%	9.2%
HSPA	98.6%	95.0%	96.5%	81.8%	96.0%	81.9%	97.3%	88.9%
LTE	83.0%	31.7%	67.7%	37.1%	60.2%	3.7%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	99.3%	97.5%	98.6%	92.0%	98.1%	91.4%	99.4%	97.6%
Overall fixed broadband	95.2%	81.7%	96.7%	86.8%	96.3%	83.7%	96.9%	89.6%
NGA broadband	78.0%	31.2%	75.4%	16.2%	67.3%	19.0%	68.1%	25.1%

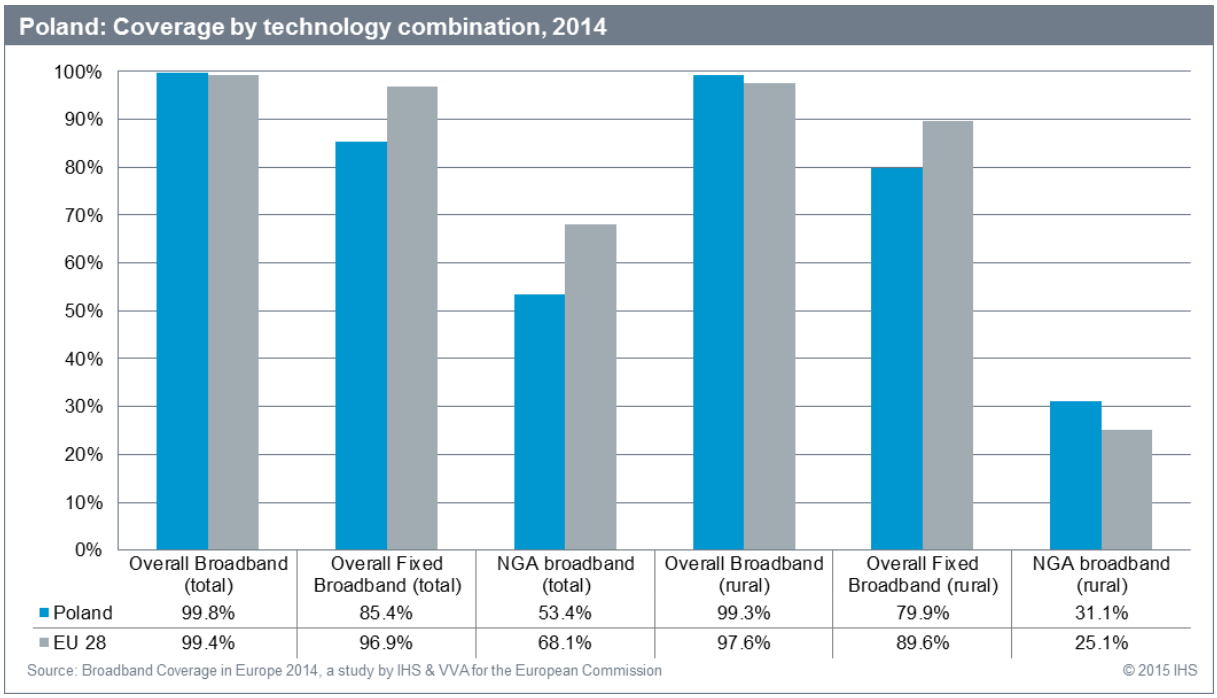
Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

5.23 Poland

5.23.1 National coverage by broadband technology

In 2014, fixed broadband coverage in Poland remained below EU28 average both on national level, as well as in rural areas. National fixed broadband coverage reached 85.4% of households, more than 10 percentage points less compared to the EU as a whole. In rural areas, 79.9% of households had access to fixed broadband services compared to the nearly 9 in 10 (89.6%) average rural EU households.

Poland also lagged the EU in terms of national NGA broadband coverage, which increased by 1.2 percentage points to 53.4% of households. But in rural areas, NGA broadband availability increased by impressive 22.7 percentage points and at the end of 2014 NGA networks covered 31.1% of rural households, thus exceeding the EU average of 25.1%.

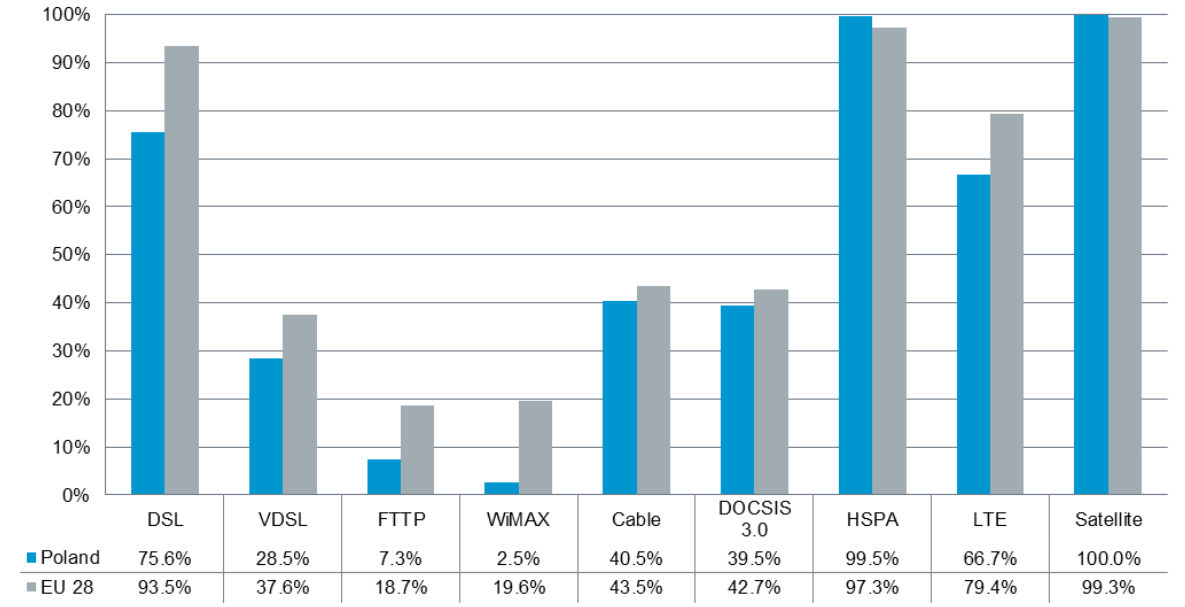


Looking at the individual technologies explains Poland's shortcomings in fixed broadband coverage. Even though DSL was the key fixed technology, it was available to only 75.6% of Polish households at the end of 2014. Cable broadband services were available to 40.5% of households, a 2.1 percentage point increase compared to 2013. WiMAX coverage remained negligible at 2.5%.

FTTP availability grew by 3.8 percentage points, with 7.3% of households having access to FTTP services in 2014. Yet, DOCSIS 3.0 with 39.5% of homes remained the main driver of NGA coverage and was followed by VDSL, which reached 28.5% of households.

HSPA was the only technology reaching coverage level (99.5%) above the EU28 average (97.3%) in 2014. Due to the long-running and still ongoing LTE frequency auction, Poland continued to lag behind the European average (79.4%) in terms of LTE availability, despite an 11.7 percentage point increase, which saw 66.7% of households being able to connect to the high-speed mobile broadband network at the end of 2014.

Poland: Coverage by technology, total, 2014



	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Poland	75.6%	28.5%	7.3%	2.5%	40.5%	39.5%	99.5%	66.7%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

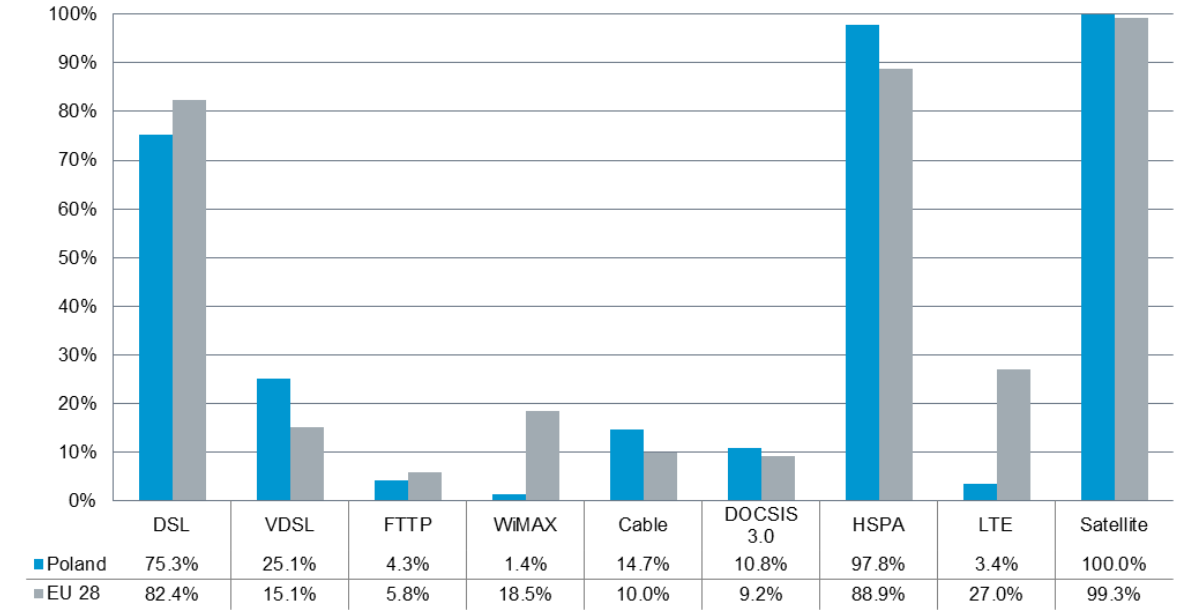
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

In 2014, most progress could be observed in rural areas. Rural VDSL coverage increased by 17.5 percentage points and at 25.1% was ten percentage points above the EU average. This growth resulted in VDSL being the primary NGA access technology available to rural households.

Both cable and DOCSIS 3.0 technologies also recorded significant gains in rural areas and reached 14.7% and 10.8% of rural households, respectively. FTTP remained the least spread rural NGA technology, covering less than 5% of rural households.

Regarding mobile technologies, HSPA coverage grew by 12.8 percentage points and at 97.8% exceeded the EU average. However, rural LTE coverage remained very low and was available to only 3.4% of rural households at the end of 2014.

Poland: Coverage by technology, rural areas, 2014



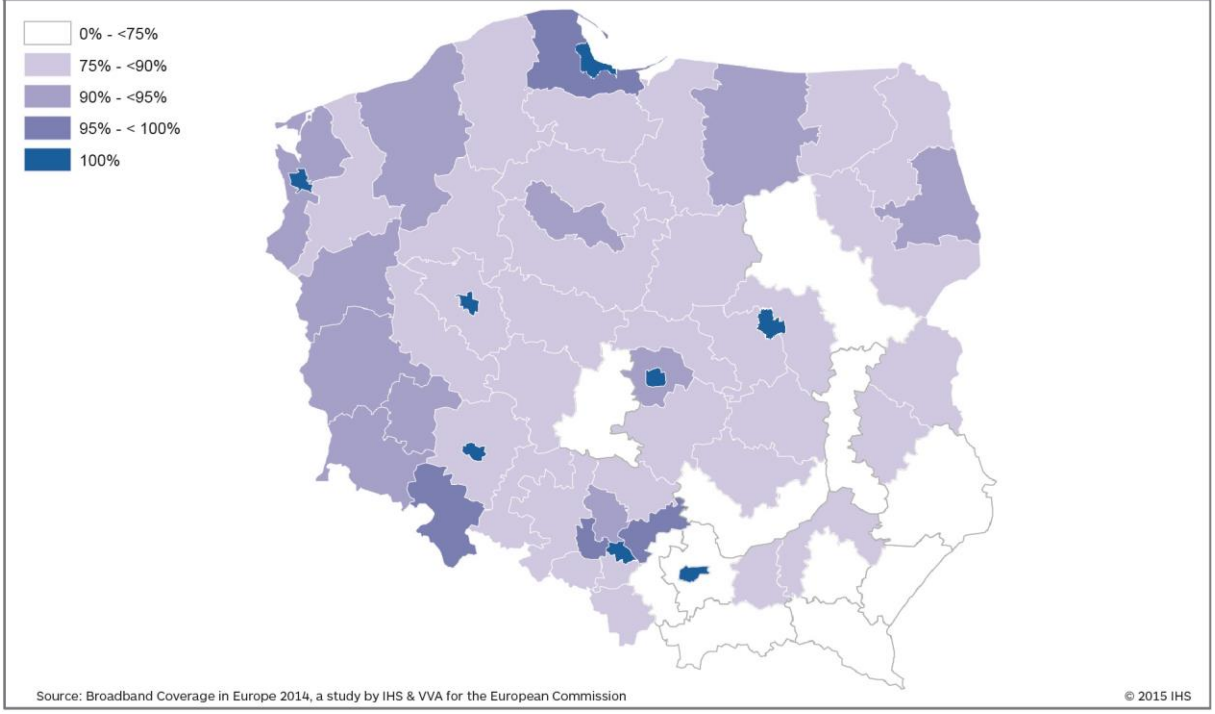
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Poland	75.3%	25.1%	4.3%	1.4%	14.7%	10.8%	97.8%	3.4%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.23.2 Regional coverage by broadband technology

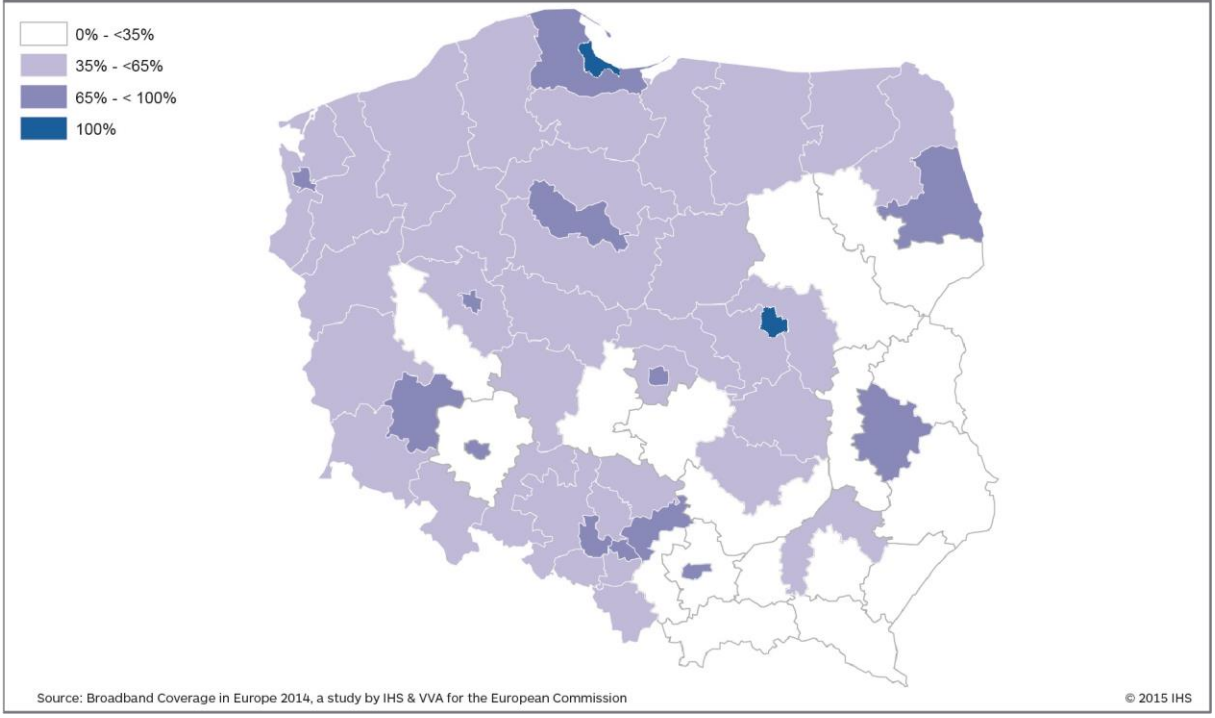
Regional fixed broadband coverage is very varied across the country. Urban centres, such as Warsaw, Lodz, Krakow, Gdansk, Szczecin, Wroclaw, or Poznan recorded complete fixed broadband coverage. But in a number of regions, such as in the Krakowski and Sandomiersko-jedrzejowski regions, fixed broadband was available to less than 60% of households.

Poland: Overall fixed broadband coverage, 2014



Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission © 2015 IHS

Poland: NGA broadband coverage, 2014



Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission © 2015 IHS

Even more variation can be observed with regards to NGA coverage. On one hand Warsaw and the Trojmiasto urban region reported complete NGA coverage, followed by seven other regions reporting coverage levels over 90%. On the other hand, in four of the 66 Polish regions (Krakowski, Nowosadecki, Pulacki, and Sandomiersko-jedrzejowski) less than 20% of households had access to high-speed NGA services.

5.23.3 Regulatory and market overview

The Polish regulatory strategy was published in 2012 and is valid until 2015[137]. There are three indicators used to evaluate the progress of broadband access development incorporated in the strategy: 85% population coverage at 2 Mbps by mid-2014, 30% population coverage at 30 Mbps by end-2015 and 100% coverage at 30 Mbps by end 2020.

From 2007-2013, the Polish government ran the Polish Eastern Broadband Network Programme, which included construction of a regional broadband network covering the 5 administrative regions (voivodeships) in Eastern Poland[138]. The programme was extended in 2014, when Polish government announced the deployment of a fibre-optic network in the voivodeship of Swietokrzyskie as part of the programme[139]. The government initiated similar projects in the Podlaskie, Lublin and Waarmian-Masurian voivodeships and will be launching a project in the Podkarpackie province. The project, worth PLN 1.2 billion, has been jointly funded by the Polish government and the EU. Moreover, additional EU funding of PLN 4 billion was announced in mid-2015 to deploy broadband networks in unserved areas[140].

Polish fixed broadband market is characterised primarily by competition between the incumbent operator Orange Poland (formerly Telekomunikacja Polska) and a number of cable operators. UPC is one of the main cable operators offering high-speed broadband services in Poland. In May 2013, UPC Poland launched services with speeds up to 250 Mbps and in April 2014 it announced the trial of a 500 Mbps broadband service in Krakow, Luk, Lodz, Pultusk, Zakopane and Warsaw[141]. Orange Poland launched VDSL services in June 2011 and its high-speed services with up to 80 Mbps were available in 76 districts across Poland at the end of 2014[142].

Poland's LTE market saw further developments in 2014, with a launch of T-Mobile's LTE network[143], as well as an additional network upgrades by Orange, which were completed in September 2014[144]. A spectrum auction in the 800 MHz and 2.6 GHz bands was re-launched in 2015, following an earlier cancellation, although bidding was paused again by the regulator in May 2015 as it considers implementing a price cap[145].

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

[138] http://www.polskawschodnia.gov.pl/english/Strony/Introduction.aspx

[139] http://www.telegeography.com/products/commsupdate/articles/2014/05/14/eastern-poland-to-benefit-from-fibre-broadband-project/

[140] https://www.telegeography.com/products/commsupdate/articles/2015/06/03/eu-pumps-usd1-1bn-into-polands-broadband-rollout/

[141] http://antyweb.pl/krotko-upc-testuje-internet-o-predkosci-500-mbs-mozna-sie-zglosic-do-testow/

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

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

[144] http://www.orange.pl/lepszy_zasieg.phtml

[145] http://www.telecompaper.com/news/polish-lte-auction-takes-a-second-break--1076145

5.23.4 Data tables for Poland

Statistic	National
Population	38,533,299
Persons per household	2.8
Rural proportion	20.7%

	Poland 2014		Poland 2013		Poland 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	75.6%	75.3%	75.3%	74.9%	60.5%	37.3%	93.5%	82.4%
VDSL	28.5%	25.1%	27.8%	7.6%	25.7%	0.0%	37.6%	15.1%
FTTP	7.3%	4.3%	3.5%	0.3%	2.9%	0.0%	18.7%	5.8%
WiMAX	2.5%	1.4%	0.4%	0.5%	0.3%	0.3%	19.6%	18.5%
Cable	40.5%	14.7%	39.2%	1.2%	32.4%	0.7%	43.5%	10.0%
DOCSIS 3.0	39.5%	10.8%	39.2%	1.2%	30.5%	0.7%	42.7%	9.2%
HSPA	99.5%	97.8%	98.3%	85.0%	96.5%	83.1%	97.3%	88.9%
LTE	66.7%	3.4%	55.0%	0.5%	50.0%	0.2%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	99.8%	99.3%	98.1%	94.7%	98.4%	92.3%	99.4%	97.6%
Overall fixed broadband	85.4%	79.9%	87.6%	75.4%	69.1%	37.7%	96.9%	89.6%
NGA broadband	53.4%	31.1%	52.1%	8.4%	44.5%	0.7%	68.1%	25.1%

Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

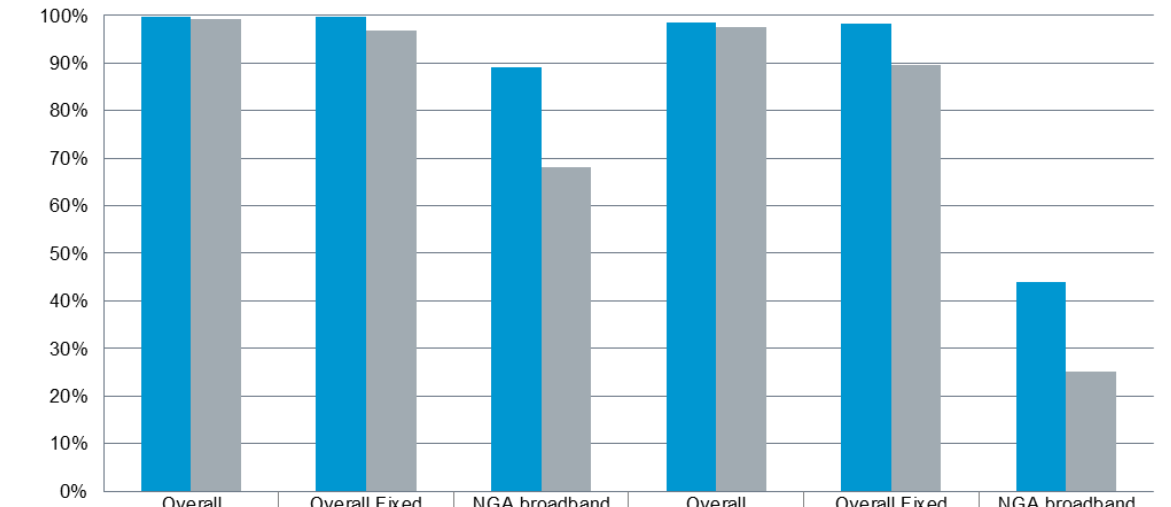
5.24 Portugal

5.24.1 National coverage by broadband technology

In 2014, Portugal performed better than most study countries with regards to all technology combinations. Fixed broadband coverage was almost complete at 99.8% and rural fixed broadband coverage reached 98.2% of rural households, considerably above the European average of 89.6%.

Given the already high levels of fixed broadband coverage recorded in previous, the only significant gains made in 2014 concerned NGA coverage. Availability of NGA networks increased by 4.7 percentage points, with nearly 9 in 10 (89.1%) of all homes having access to high-speed broadband services, over twenty percentage points above the EU28 average. Rural NGA coverage grew by 6.6 percentage points in this period, reaching 44% of rural homes compared to 25.1% of rural households across the EU.

Portugal: Coverage by technology combination, 2014



	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%	89.1%	98.6%	98.2%	44.0%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

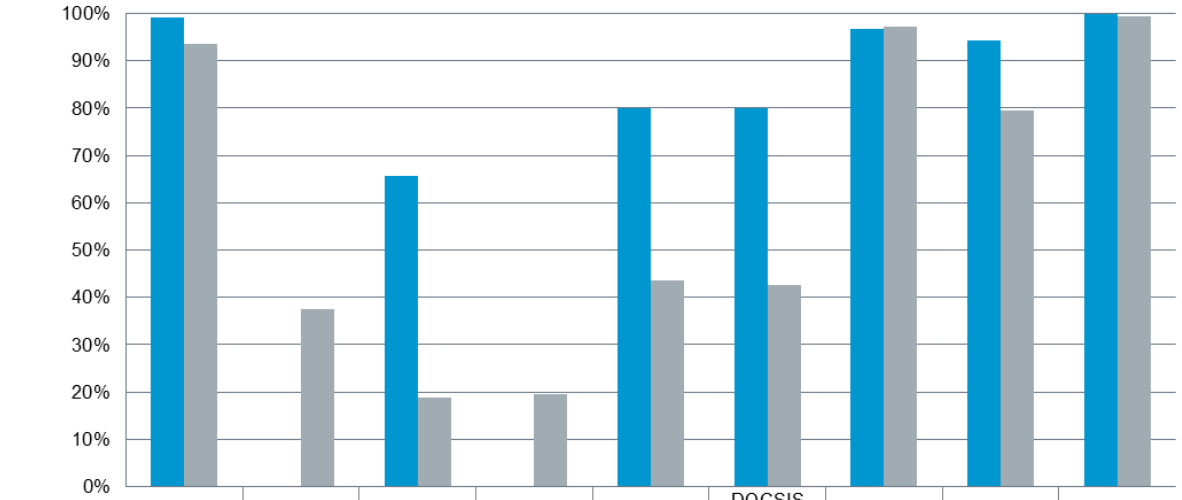
The breakdown by individual technologies shows absence of VDSL in Portugal, which is a result of a long-term preference of FTTP over VDSL among Portuguese operators. In 2014, FTTP networks reached 65.8% of households after experiencing a substantial 16.1 percentage point coverage increase compared to 2013.

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.

Cable coverage has also been traditionally high in Portugal, and with nearly all cable networks upgraded to the DOCSIS 3.0 standard, 8 in 10 Portuguese households had access to high-speed cable services at the end of 2014. This also meant that DOCSIS 3.0 was the key NGA technology, especially due to a relatively high overlap between FTTP and DOCSIS 3.0 networks.

Growth in LTE coverage was, at 2.9 percentage points, more modest than in many other countries, which could be explained by the fact that Portugal was already one of the leaders in terms of LTE coverage at the end of 2013 and with 94.2% of households passed continued to be well above the EU28 average of 79.4%.

Portugal: Coverage by technology, total, 2014

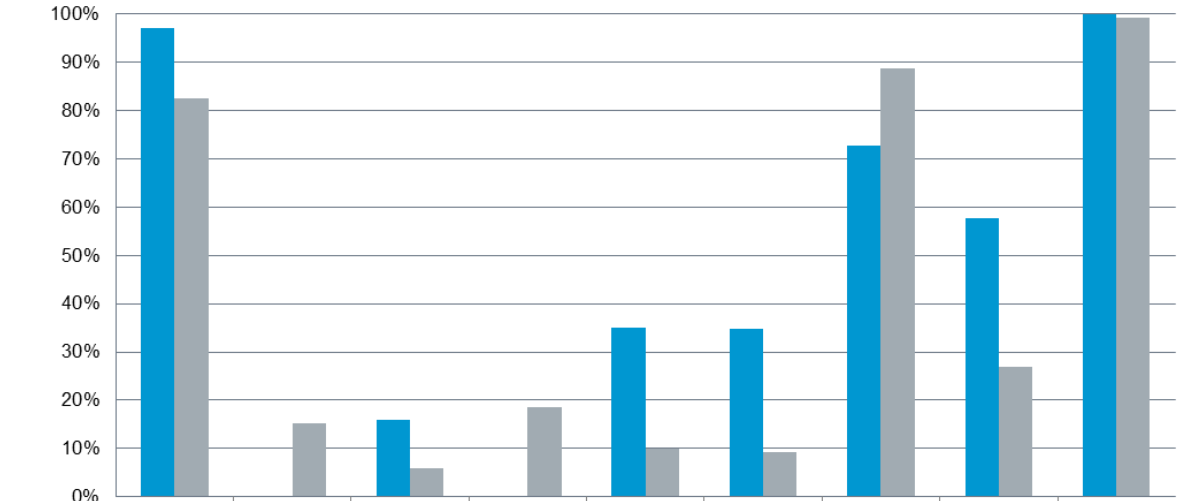


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Portugal	99.1%	0.0%	65.8%	0.0%	80.1%	80.0%	96.7%	94.2%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Developments in rural areas mirrored those on national level, with a 5.8 percentage point increase in FTTP coverage. The fact that nearly 16% of rural households had access to FTTP services can be attributed to a number of investment projects by regional indirect access providers, such as dstelecom and Fibroglobal rolling out open FTTP networks in rural and previously unserved areas.

Portugal: Coverage by technology, rural areas, 2014



	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Portugal	97.1%	0.0%	15.8%	0.0%	35.0%	34.8%	72.7%	57.6%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

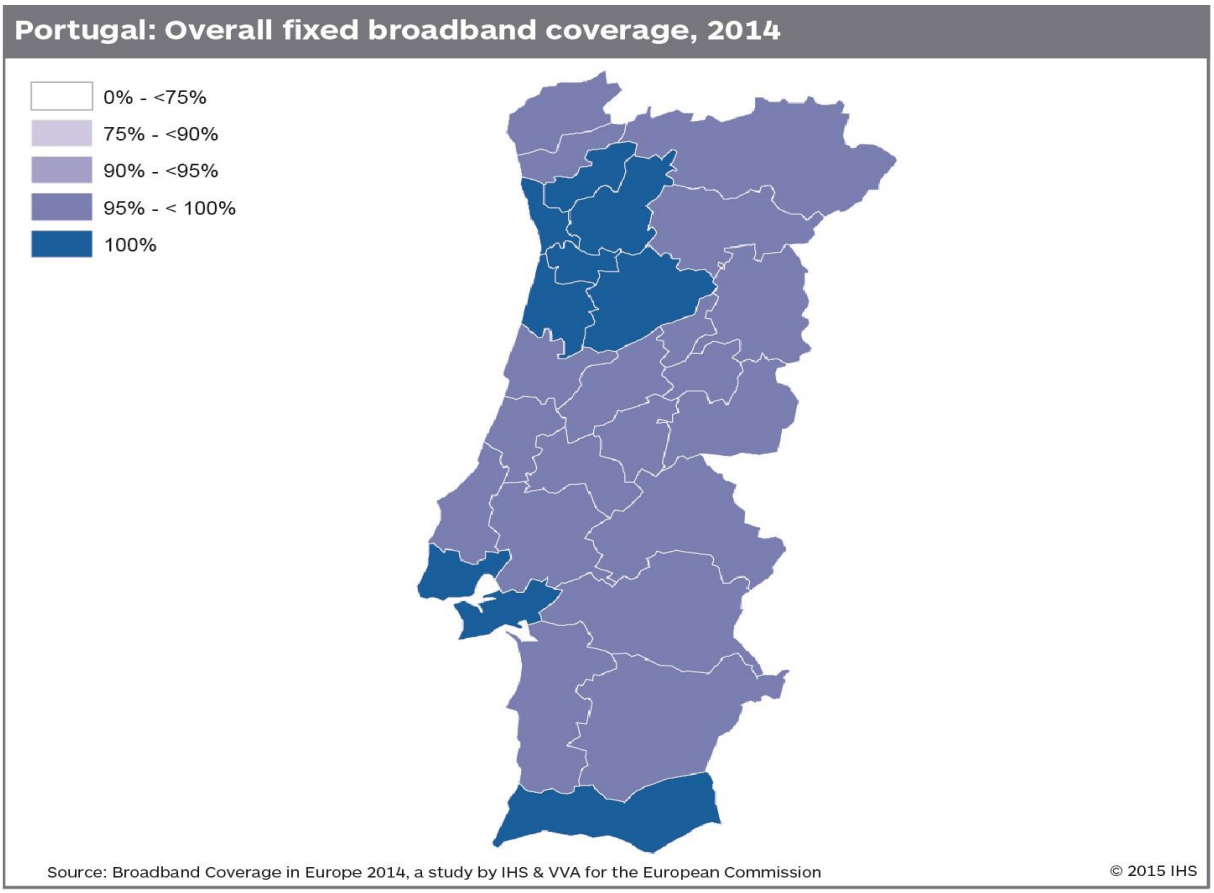
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Dstelecom has been deploying networks in Northern Portugal and in the southern regions of Alentejo and Algarve[146], while Fibroglobal's initiatives have been focused on regions in Central Portugal and the Azores and Madeira[147].

Rural LTE coverage increased by 10.1 percentage points and at 57.6% of homes passed, rural households in Portugal had better access to LTE networks than the average EU household.

5.24.2 Regional coverage by broadband technology

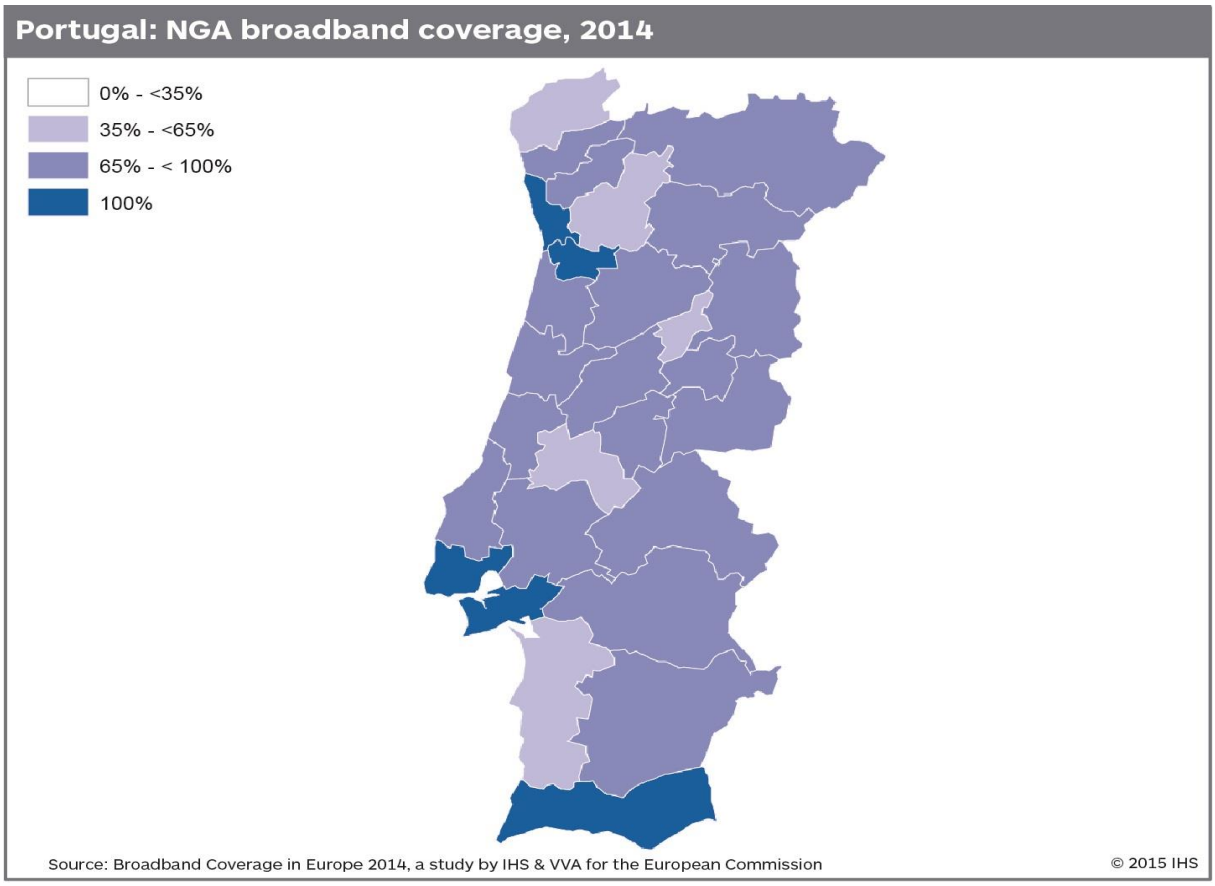
Given the near universal DSL availability, fixed broadband coverage levels were very high across all regions in Portugal. In seven regions including the capital Lisbon, Porto and their surrounding areas as well as the southern providence of Algarve, all households had access to fixed broadband services.



There was much more regional variation in terms of NGA coverage, with five regions (Porto and its surrounding region Entre Douro e Vouga, Lisbon, the Setubal peninsula region and Algarve) registering complete NGA coverage at the end of 2014.

On the other hand, in four regions (Alto Minho and Tâmega in Northern Portugal, Serra da Estrela in Central Portugal and Alentejo Litoral, coastal region in Southen Portugal) less than 60% of households were covered by NGA networks. Yet, significant improvements in regional NGA availability could be observed with a number of regions experiencing double digit growth compared to 2013, direct result of the abovementioned infrastructure investment projects.

[146] http://www.norte.dstelecom.pt/rede/mapa-da-rede/
[147] http://www.fibroglobal.com/content-zona-centro.aspx?pid=3&cid=9



5.24.3 Regulatory and market overview

The Portuguese National Broadband strategy was adopted in 2014 with long-term goals set until 2020. Its short-term goal of providing universal basic broadband was met in 2013. Another target of providing broadband services with download speeds of at least 40 Mbps to 50% of rural municipalities was also pronounced as achieved in 2014 by the government (with the help of LTE networks)[148]. The strategy's long-term goal is in line with EU's Digital Agenda target complete 30 Mbps coverage by 2020.

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. Operators in the Portuguese market are increasingly focusing on FTTP technologies. In 2008, government reached an agreement with three of the country's main telecoms operators, Portugal Telecom, Sonaecom and Oni Communications, which defined a protocol for fibre deployment. A year later, the Portuguese government announced a line of credit to be used for the construction and expansion of new fibre networks in co-operation with operators active in the market[149].

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 for the sharing deployment and management of a fibre-optic network in Lisbon and Porto. They launched high-speed services a year later in 2011[150].

[148] https://ec.europa.eu/digital-agenda/en/news/portugal-national-broadband-strategy
[149] http://www.samknows.com/news/portuguese-prime-minister-promises-fibre-for-everyone-10476.html
[150] http://press.vodafone.pt/en/2009/12/21/sonaecom-and-vodafone-sign-cooperation-agreement-on-ngn/

Similar agreements continued into 2014, with Vodafone Portugal and Portugal Telecom agreeing to deploy and share fibre networks reaching 900,000 households[151].

Three operators – Meo (Telecom Portugal brand), Vodafone and Nos – launched LTE networks in Portugal in March 2013 following a spectrum auction by the regulator ANACOM. No addition operators begun to offer LTE services in 2014[152].

[151] https://www.telegeography.com/products/commsupdate/articles/2014/07/21/vodafone-pt-ink-fibre-pact-shared-infrastructure-to-reach-900000-homes/
[152] GSA 4G Market and Technology Update. Available for download here: http://www.gsacom.com/gsm_3g/info_papers.php4

5.24.4 Data tables for Portugal

Statistic	National
Population	10,487,289
Persons per household	2.6
Rural proportion	14.9%

	Portugal 2014		Portugal 2013		Portugal 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	99.1%	97.1%	99.1%	97.8%	99.0%	94.6%	93.5%	82.4%
VDSL	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	37.6%	15.1%
FTTP	65.8%	15.8%	49.6%	10.0%	46.1%	6.0%	18.7%	5.8%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.6%	18.5%
Cable	80.1%	35.0%	79.9%	32.9%	77.4%	30.8%	43.5%	10.0%
DOCSIS 3.0	80.0%	34.8%	79.5%	31.9%	76.0%	29.8%	42.7%	9.2%
HSPA	96.7%	72.7%	95.3%	70.7%	94.4%	68.6%	97.3%	88.9%
LTE	94.2%	57.6%	91.3%	47.6%	89.7%	45.8%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	99.8%	98.6%	99.7%	98.9%	99.7%	98.4%	99.4%	97.6%
Overall fixed broadband	99.8%	98.2%	99.7%	98.9%	99.6%	97.5%	96.9%	89.6%
NGA broadband	89.1%	44.0%	84.4%	37.4%	77.8%	31.8%	68.1%	25.1%

Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

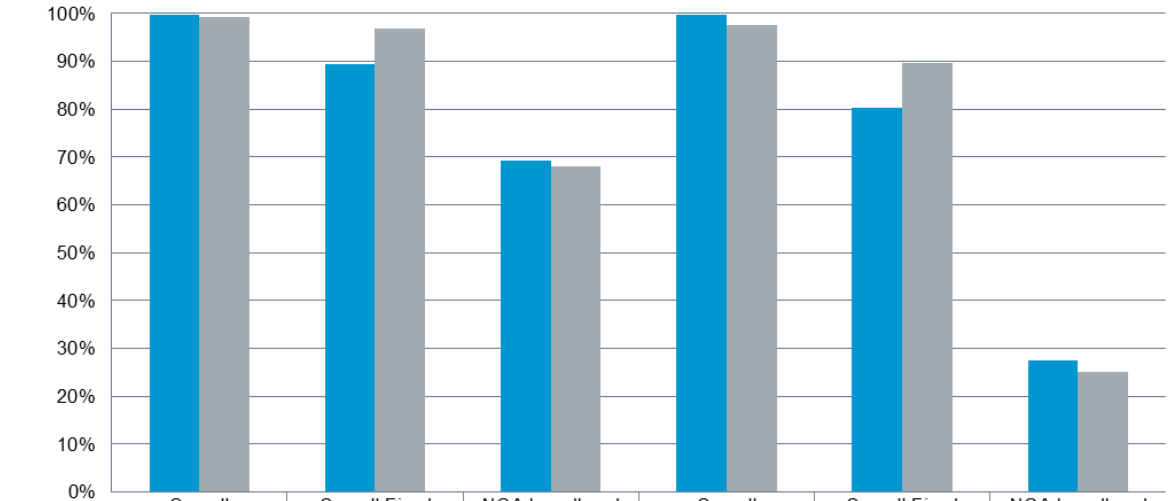
5.25 Romania

5.25.1 National coverage by broadband technology

In 2014, Romania lagged behind the EU28 average in terms of overall fixed broadband coverage on national and rural level, but performed better than the average with regards to availability of NGA technologies. Overall fixed broadband coverage in Romania remained broadly unchanged in 2014 and stood at 89.4% at the end of the year, compared to the EU28 average of 96.9%. In rural areas, fixed broadband coverage services were available to 80.2% of rural households, compared to 89.6% rural homes passed on European level.

NGA coverage increased by 3.3 percentage points and reached 69.2% of all households in Romania, one percentage point above the European average. In rural areas, NGA networks covered 27.4% of rural households, compared to 25.1% of rural households across the EU.

Romania: Coverage by technology combination, 2014



	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
Romania	99.8%	89.4%	69.2%	99.6%	80.2%	27.4%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

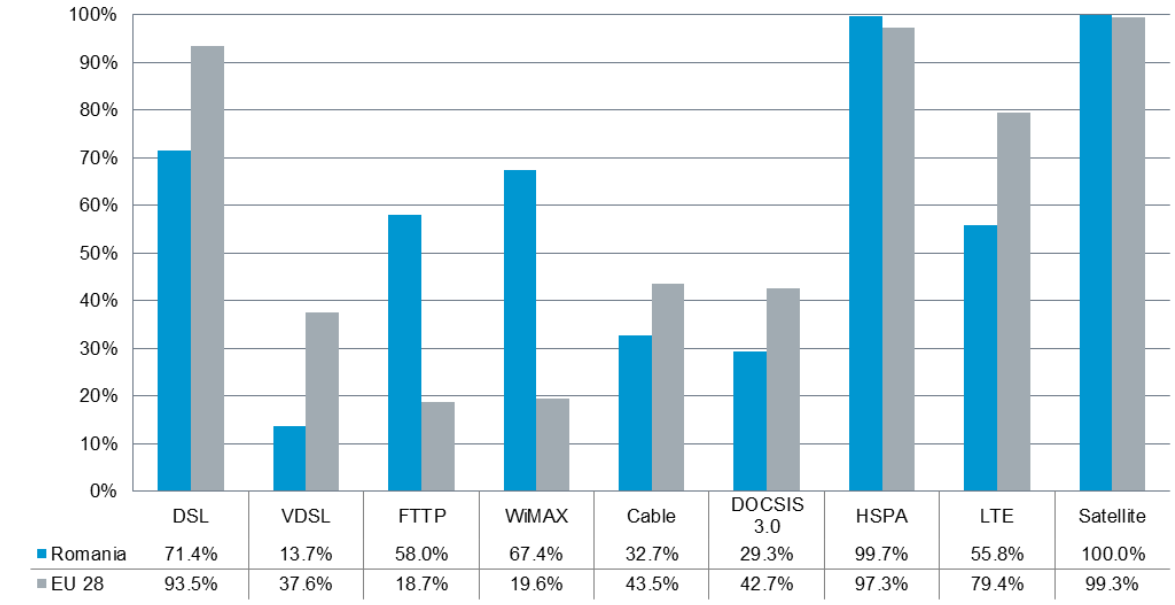
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Closer look at coverage of individual technologies shows that there continued to be a rather limited reach of DSL networks with only 71.4% of homes passed at the end of 2014, a more than 20 percentage point gap compared to the EU28 average of 94.5%. Combined with below-average cable coverage (32.7% of households compared to 43.5% EU28 average), this provides an explanation for Romania falling behind the EU in fixed broadband coverage, despite having the third largest WiMAX network in the EU, passing 67.4% of households.

Romania has also been traditionally benefiting from high FTTP coverage, which reached 58.0% of households in 2014 and considerably exceeded the EU28 average of 18.7%. Even though Romanian broadband providers have invested in upgrades of their legacy copper and cable networks in recent years, VDSL coverage reached only 13.7% of households and DOCSIS 3.0 cable broadband services were available to little less than a third (29.2%) of households. Thus, FTTP continued to be the key NGA technology in Romania.

LTE coverage registered quite significant, 30 percentage point increase compared to 2013 following network expansion by both Vodafone Romania as well as Orange Romania. Yet at 55.8%, availability of LTE services remained below the EU28 average of 79.4%.

Romania: Coverage by technology, total, 2014



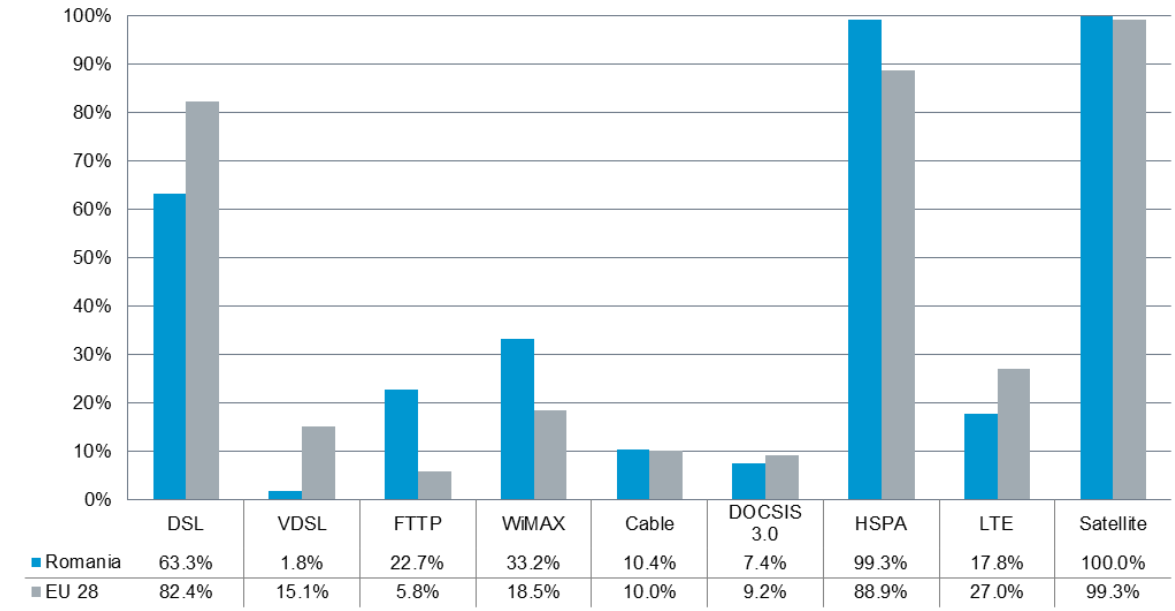
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Romania	71.4%	13.7%	58.0%	67.4%	32.7%	29.3%	99.7%	55.8%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

In rural areas, DSL remained the most widely available technology, passing 63.3% of rural homes. A third (33.2%) of households had access to WiMAX broadband. Negligible rural VDSL coverage (1.5%) and very small DOCSIS 3.0 coverage (7.4%), FTTP was the leading technology providing rural NGA access, passing 22.7% of rural homes.

While Romania had one of the highest rural HSPA coverage levels (99.3%) among the study countries, LTE availability in rural areas remained limited, with only 17.8% of rural households covered compared to the EU average of 27.0%.

Romania: Coverage by technology, rural areas

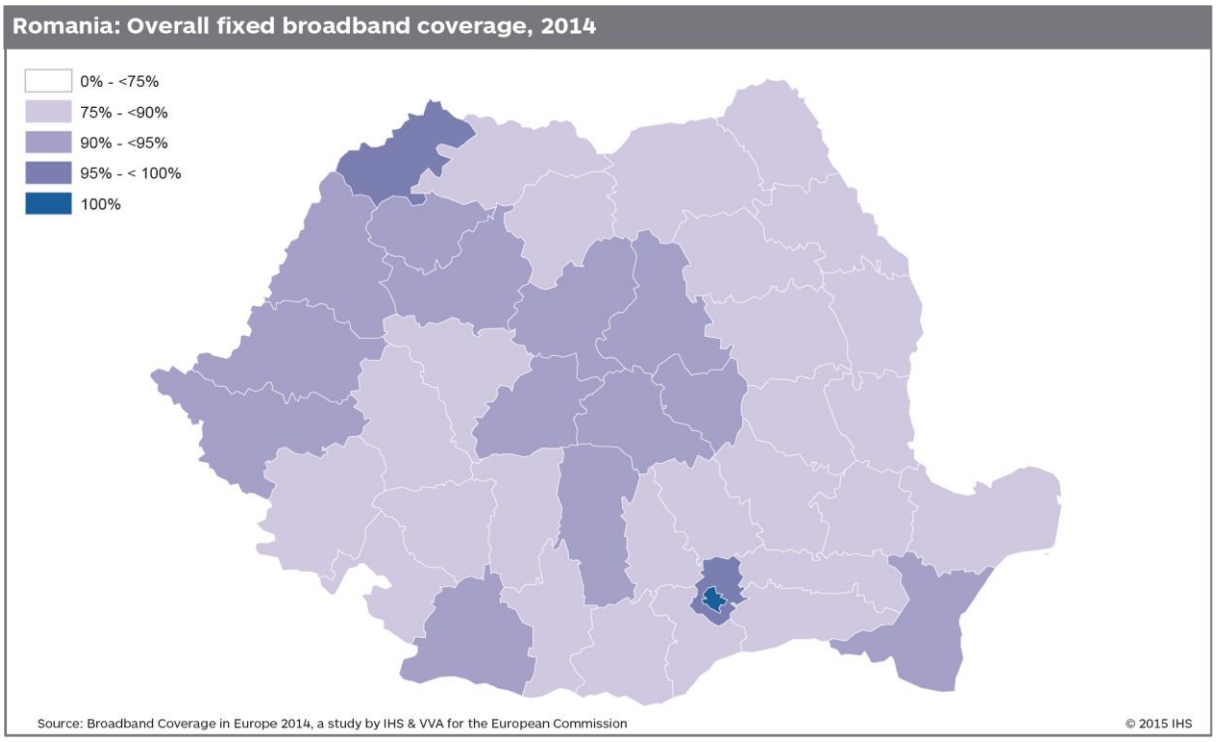


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Romania	63.3%	1.8%	22.7%	33.2%	10.4%	7.4%	99.3%	17.8%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

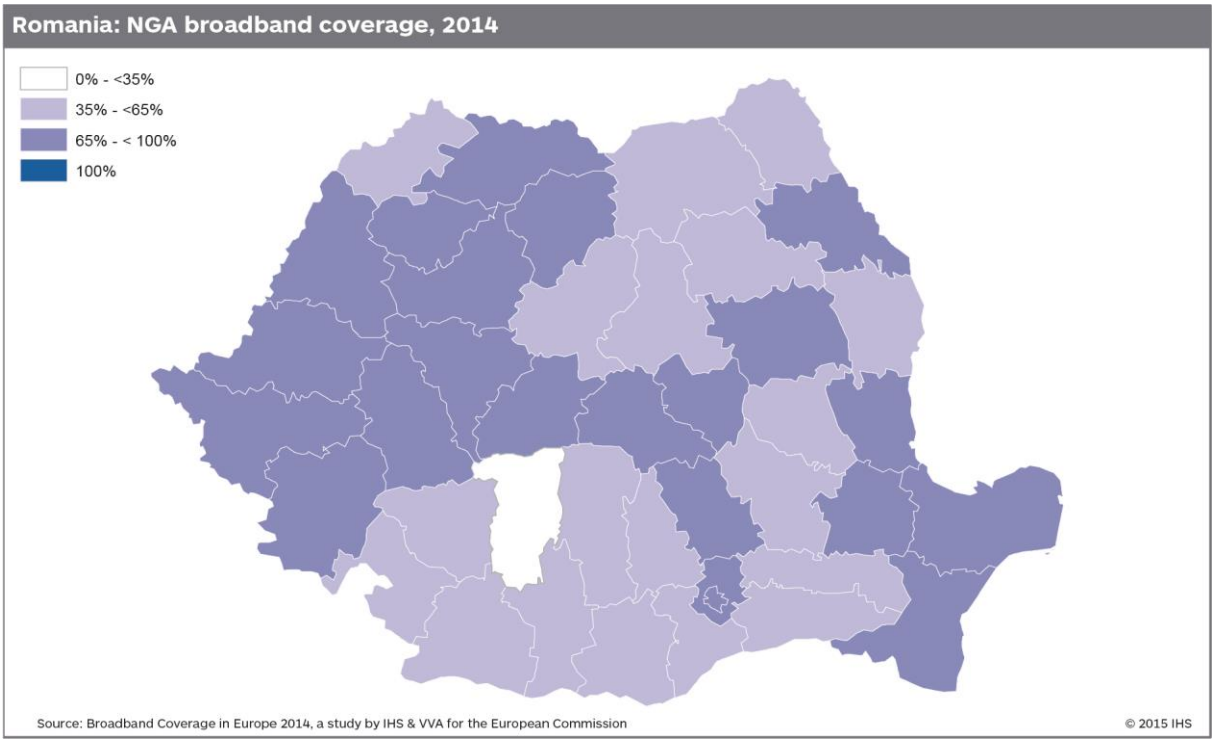
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.25.2 Regional coverage by broadband technology

Examining individual regions, there is substantial variation with regards to fixed broadband coverage across the regions, with coverage level ranging from under 80% to complete coverage in the capital Bucharest.



Regional NGA coverage ranges from under 35% (in Vâlcea region) to 97% in Bucharest. No other region achieved NGA coverage level exceeding 90% of households.



5.25.3 Regulatory and market overview

Romania's national broadband plan was originally adopted in 2009 under the title "Government Strategy for the development of electronic broadband communications in Romania for the period 2009 – 2015"[153]. In April 2015, new National Strategy on the Digital Agenda for Romania was approved by the government with a specific National Plan for Next Generation Network (NGN) Infrastructure Development included as part of the strategy[154].

It set out the following goals for the national expansion of broadband infrastructure:

- By the end of 2015, 100% of the population should have access to broadband services;
- By 2020, at least 80% of population should have access to 30 Mbps broadband services and 50% of population should have over 100 Mbps coverage.

In 2014, 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 is set to run throughout 2015[155].

The leading providers of fixed broadband services are the aforementioned DSL and FTTP incumbent operator Romtelecom and cable operators RCS&RDS and UPC Romania, with both companies recently investing in technology upgrades and network expansion. In November 2014, Telekom Romania began to offer 1Gbps FTTP connections in 13 major cities across Romania after investing EUR85.4 million into its fixed network infrastructure[156]. Upon upgrading 95% of its cable network to DOCSIS 3.0, UPC Romania launched 500 Mbps service in eight major cities (Bucharest, Cluj-Napoca, Timisoara, Constanta, Ploiesti, Iasi, Galati and Alba Iulia) in 2014[157].

Meanwhile, cableco RCS&RDS, which has also been offering 1Gbps speeds, has recently focused on a number of smaller acquisitions of local FTTP Providers – FastLink (with networks in Buzau and Bucharest) in 2013 and Cluj-based Fiber Optic Integrator[158] and City-Net's Diginet division in Botosani in 2014[159] .

LTE has been used to increase high-speed broadband coverage throughout the country, and three operators have launched services so far – Vodafone Romania and Orange Romania started offering commercial LTE services at the end of 2012, followed by Telekom Romania in 2013[160]. In 2014, both Vodafone[161] and Orange Romania announced network upgrades, with a launch of 300 Mbps capable connections[162].

[153] http://ec.europa.eu/digital-agenda/en/news/romania-broadband-strategy
[154] http://gov.ro/en/government/cabinet-meeting/national-strategy-on-the-digital-agenda-for-romania-2020
[155] http://www.telecompaper.com/news/romania-gives-green-light-to-ro-net-broadband-project--1060031
[156] https://www.telegeography.com/products/commsupdate/articles/2014/11/28/telekom-romania-launches-1gbps-ftth-in-13-cities/
[157] http://www.romania-insider.com/upc-launches-fiber-power-500-mbps-in-8-cities-in-romania/129865/
[158] https://www.telegeography.com/products/commsupdate/articles/2013/09/09/rcsrds-scoops-up-fastlink/
[159] http://telecomist.com/2014/07/rcsrds-boxing-clever-with-associate-upstart/
[160] GSA 4G Market and Technology Update. Available for download here: http://www.gsacom.com/gsm_3g/info_papers.php4
[161] https://www.telegeography.com/products/commsupdate/articles/2014/09/09/is-it-a-bird-a-plane-no-its-supernet-from-vodafone/
[162] https://www.orange.ro/acoperire/tehnologii-internet/

5.25.4 Data tables for Romania

Statistic	National
Population	20,095,996
Persons per household	2.7
Rural proportion	21.0%

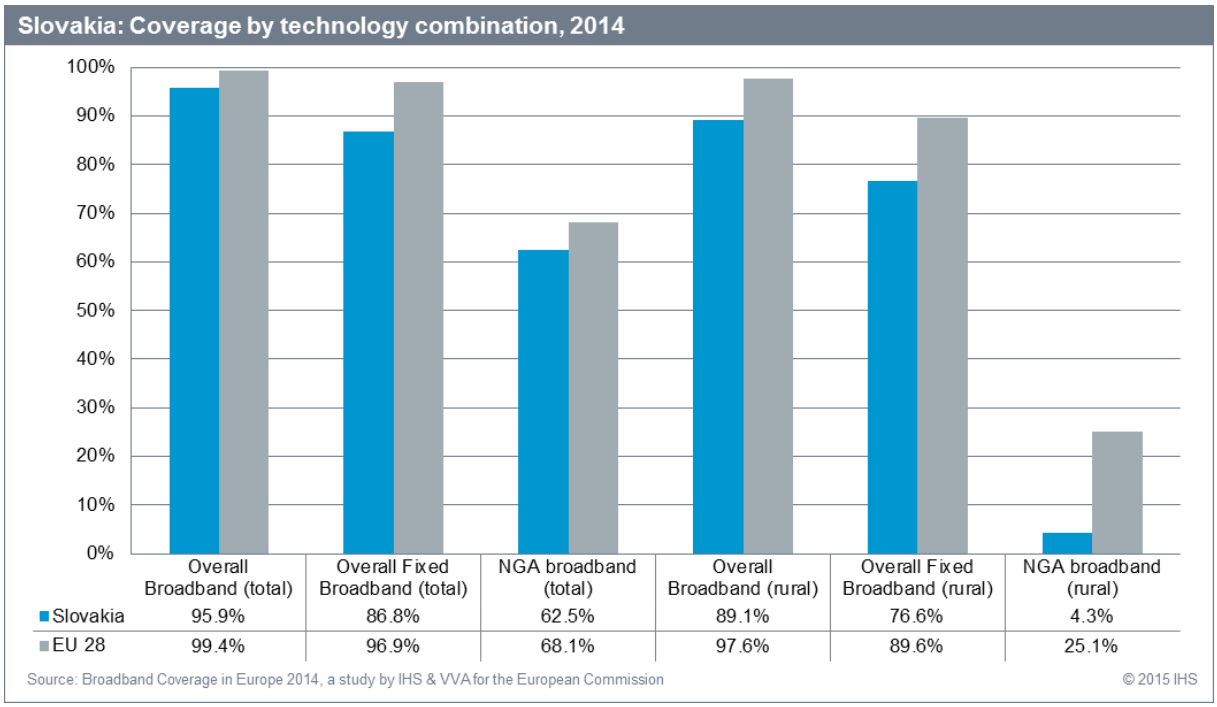
	Romania 2014		Romania 2013		Romania 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	71.4%	63.3%	75.8%	62.9%	*69.5%*	*48.7%*	93.5%	82.4%
VDSL	13.7%	1.8%	15.9%	1.5%	*12.0%*	*1.0%*	37.6%	15.1%
FTTP	58.0%	22.7%	54.7%	21.5%	*51.9%*	*21.1%*	18.7%	5.8%
WiMAX	67.4%	33.2%	60.7%	25.2%	*53.9%*	*24.2%*	19.6%	18.5%
Cable	32.7%	10.4%	28.8%	6.2%	*25.4%*	*3.7%*	43.5%	10.0%
DOCSIS 3.0	29.3%	7.4%	26.2%	4.4%	*24.7%*	*2.3%*	42.7%	9.2%
HSPA	99.7%	99.3%	99.7%	99.3%	*99.8%*	*99.6%*	97.3%	88.9%
LTE	55.8%	17.8%	25.0%	2.4%	*23.9%*	*1.9%*	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	*100.0%*	*100%*	99.3%	99.3%
Overall broadband	99.8%	99.6%	99.9%	99.7%	*99.9%*	*99.8%*	99.4%	97.6%
Overall fixed broadband	89.4%	80.2%	90.0%	78.2%	*86.0%*	*68.6%*	96.9%	89.6%
NGA broadband	69.2%	27.4%	65.9%	24.6%	*62.9%*	*22.8%*	68.1%	25.1%

Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures, originally presented by previous provider Point Topic, have been restated in the 2013 report due to new and more accurate data becoming available.

5.26 Slovakia

5.26.1 National coverage by broadband technology

In 2014, Slovakia continued to lag behind the EU average in all coverage combination categories at both national as well as rural levels. Progress has been made with regards to national NGA coverage, which increased by 8.7 percentage points and reached 62.5% of households, as well as rural fixed broadband coverage. Yet, a significant gap in rural NGA availability remained an issue in Slovakia with only 4.3% of rural households having access to high-speed broadband services, compared to 25.1% of rural households in the EU as a whole.



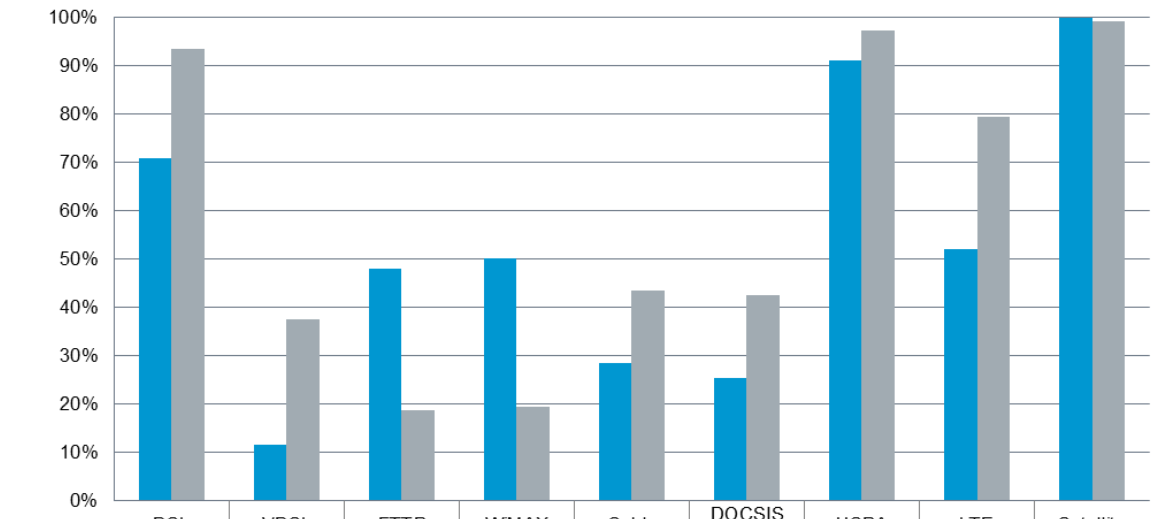
A closer look at the individual technology profiles provides an explanation for fixed broadband coverage in Slovakia falling behind the EU28 average. Both DSL and cable coverage recorded below-average levels with DSL networks passing 70.9% of homes, 20.3 percentage points less than the European average, and cable broadband services being available to 28.4% of households, compared to 43.5% of households across the EU.

On the other hand both WiMAX and FTTP showed relatively high coverage levels in 2014. A half (50.1%) of homes was passed by WiMAX networks. FTTP was the fastest growing fixed broadband technology in 2014, with coverage increasing by 9.1 percentage points. By the end of the year, FTTP networks reached 48% of Slovak households, considerably above the EU28 average of 18.7%.

Following the VDSL rollout by Slovak Telekom in 2013, VDSL coverage registered limited growth, increasing only by 1.4 percentage points to pass 11.7% of Slovak homes. This, along with relatively low availability of DOCSIS 3.0 (25.4%), in turn means that FTTP continued to be the primary NGA technology available in to Slovak households. This is a result of the strategy of both the incumbent Slovak Telekom and an alternative provider Orange Slovakia, which have focused extensively on FTTP deployments in recent years.

After large-scale commercial launch of LTE networks in Slovakia by Slovak Telekom and O2 Slovakia in 2013, further deployments continued, leading to a 28.2 percentage point increase in LTE coverage, which reached 52.2% of households at the end of 2014.

Slovakia: Coverage by technology, total, 2014



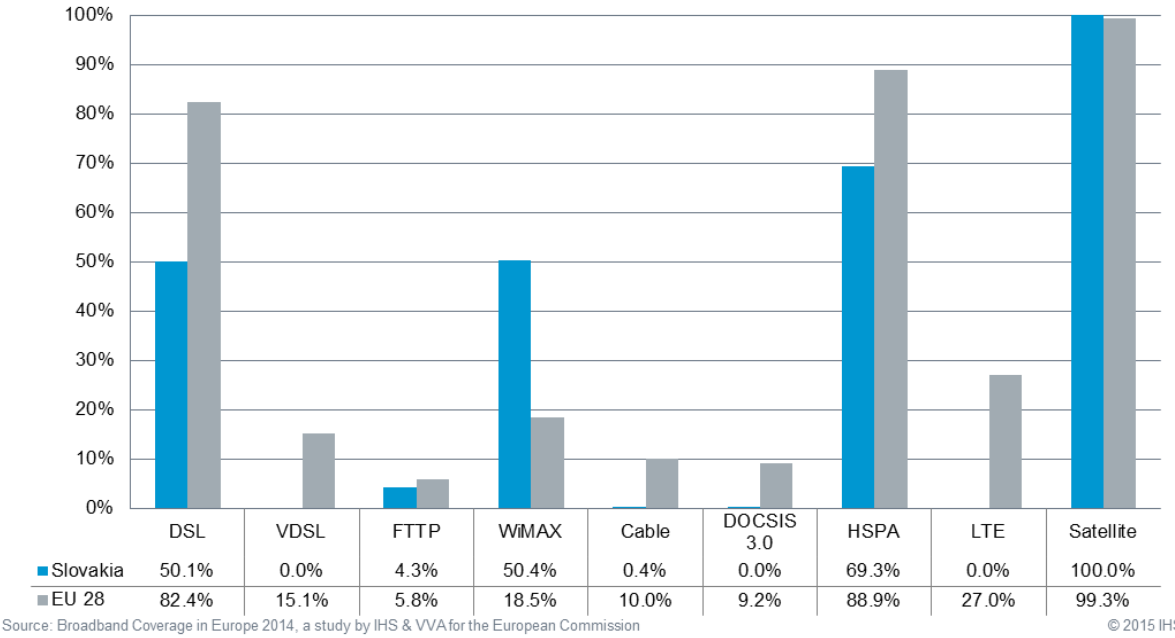
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Slovakia	70.9%	11.7%	48.0%	50.1%	28.4%	25.4%	91.1%	52.2%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Rural broadband coverage remains a challenge in Slovakia. DSL and WiMAX were the only two more widely available technologies in rural areas, covering 50.1% and 50.4% of rural households, respectively. However, due to considerable overlap of the two networks, there is still almost a quarter of rural households, which does not have access to any fixed broadband service.

FTTP was the only technology providing NGA access to rural households. Yet at the end of 2014, it passed only 4.3% of rural homes. Similarly, despite LTE deployments on national level, LTE networks remained absent from rural areas in 2014.

Slovakia: Coverage by technology, rural areas, 2014

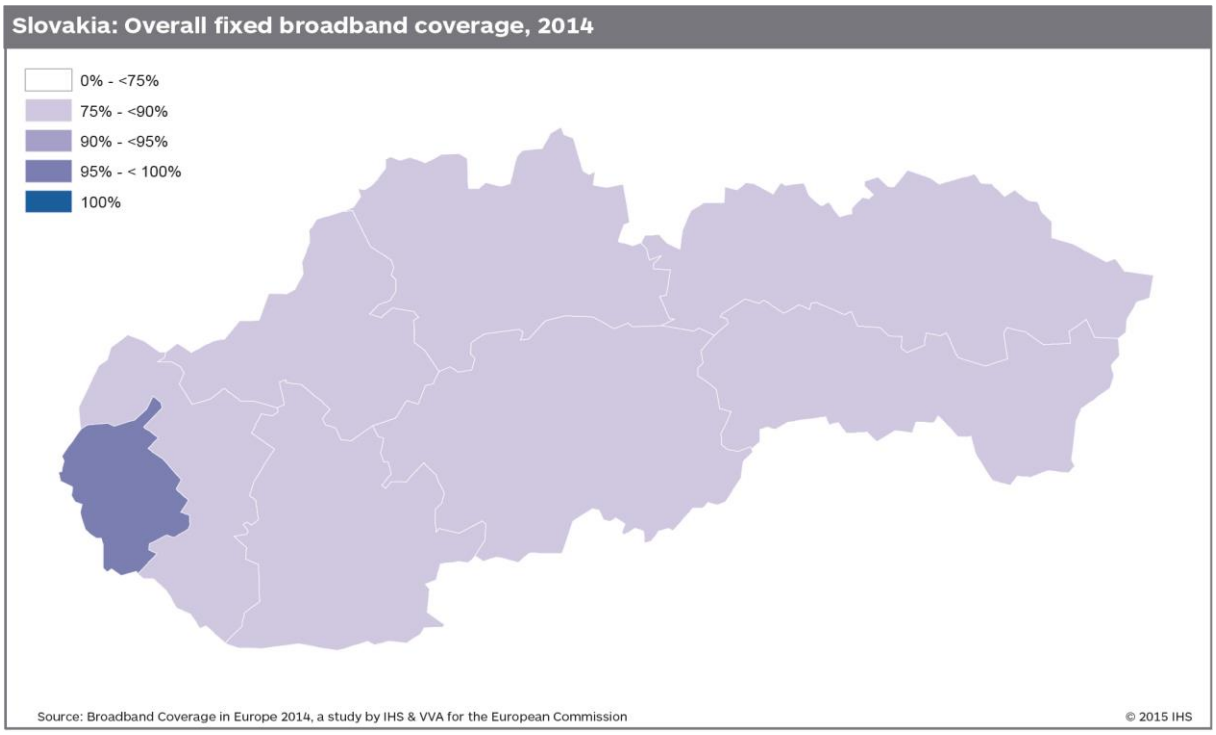


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Slovakia	50.1%	0.0%	4.3%	50.4%	0.4%	0.0%	69.3%	0.0%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

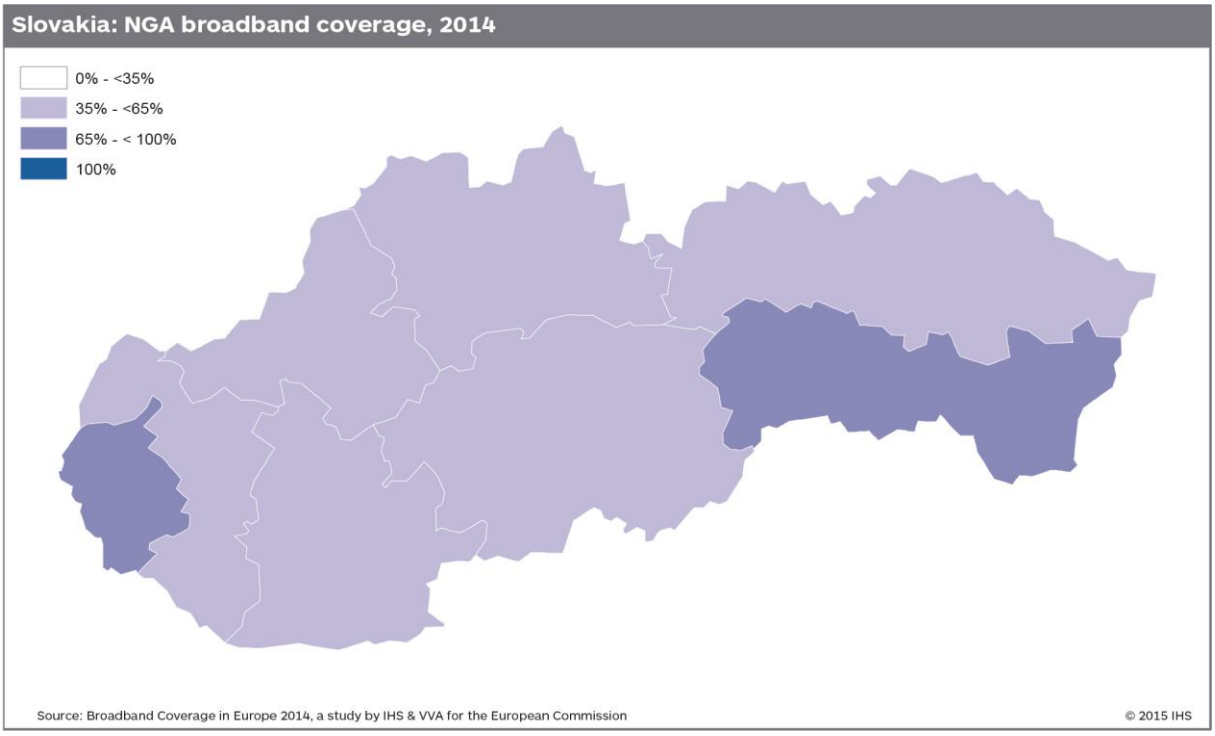
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

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.



With regards to NGA networks, coverage levels were in the 45% to 65% range across all regions except for Bratislava (95% availability) and the Kosický region (82%).



5.26.3 Regulatory and market overview

Slovakia's national broadband strategy objectives were set in the "Strategic Document for Digital Growth and Next Generation Access Infrastructure (2014 – 2020)" issued in 2011. The main goal of the strategy is to meet a Digital Agenda target of 100% coverage of 30 Mbps high-speed broadband and the preparation for meeting the target concerning coverage of high-speed broadband above 100 Mbps.

The incumbent, Slovak Telekom, made a decision to focus on FTTP network deployment already in 2007 with an initial goal of countrywide coverage. By 2013, Slovak Telekom's fibre network was available to 362 thousand households. Moreover, 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[163]. In June 2014 the operator announced that it will offer download speeds of 300 Mbps following upgrade of parts of its data networks[164].

Orange Slovakia has also been investing in rolling out its FTTP network across Slovakia since 2007 and was present in 18 cities covering 332 thousand homes at the end of 2014[165]. Cable network operators responded to the FTTP deployment by upgrading their networks to DOCSIS 3.0. UPC, the leading cable provider has been upgrading its network since 2011 and in 2014, 94% of its network, which spreads across 43 cities, was DOCSIS 3.0 capable. UPC also increased the maximum connection speed on its network to 300 Mbps compared to the previous250 Mbps downstream connection speeds[166].

Slovak operators have been rather slow compared to the other study countries in rolling out LTE networks on a large scale. In November 2013, Slovak Telekom launched LTE broadband services in five Slovak cities, with a wider scale deployment following in 2014 and 2015[167]. At the end of 2014 the company's LTE network was estimated to cover 52% of the population. O2 Slovakia, despite a small scale launch as early as in 2012, only launched a wider commercial network in December 2014. Earlier in the year, Orange Slovakia launched its own LTE network in July 2014 in Bratislava, Banska Bystrica and Kosice. A further launch in 2015 is expected from Swan[168].

[163] http://www.telekom.sk/swift_data/source/ST_SK/Slovak%20Telekom%20Annual%20Report%202013.pdf. p.32

[164] https://www.telekom.sk/documents/10179/44166/2014-EN-annual-report.pdf/96095a80-775a-453e-88a2-abfc89317d03, p.20

[165] http://www.orange.sk/onas/press-centrum/vyrocne-spravy/vyrocna-sprava-2014#kapitola4

[166] http://www.libertyglobal.com/oo-slovakia.html

[167] https://www.telekom.sk/english/press-centre/press-releases/telekom-reached-more-than-100-cities-with-4g-network-won-an-award-for-the-best-mobile-network

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

5.26.4 Data tables for Slovakia

Statistic	National
Population	5,419,523
Persons per household	2.8
Rural proportion	29.0%

	Slovakia 2014		Slovakia 2013		Slovakia 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	70.9%	50.1%	*70.5%*	*38.4%*	45.6%	61.7%	93.5%	82.4%
VDSL	11.7%	0.0%	*10.3%*	*0.0%*	0.3%	0.0%	37.6%	15.1%
FTTP	48.0%	4.3%	*38.9%*	*3.6%*	39.4%	0.9%	18.7%	5.8%
WiMAX	50.1%	50.4%	*49.9%*	*50.4%*	50.0%	48.7%	19.6%	18.5%
Cable	28.4%	0.4%	*27.7%*	*0.4%*	28.3%	2.3%	43.5%	10.0%
DOCSIS 3.0	25.4%	0.0%	*24.8%*	*0.0%*	24.0%	0.0%	42.7%	9.2%
HSPA	91.1%	69.3%	*86.1%*	*68.9%*	85.5%	64.7%	97.3%	88.9%
LTE	52.2%	0.0%	*24.0%*	*0.0%*	0.2%	0.0%	79.4%	27.0%
Satellite	100.0%	100.0%	*100.0%*	*100.0%*	100.0%	100.0%	99.3%	99.3%
Overall broadband	95.9%	89.1%	*93.3%*	*84.5%*	92.8%	82.3%	99.4%	97.6%
Overall fixed broadband	86.8%	76.6%	*86.5%*	*71.8%*	75.2%	80.9%	96.9%	89.6%
NGA broadband	62.5%	4.3%	*53.8%*	*3.6%*	51.1%	1.0%	68.1%	25.1%

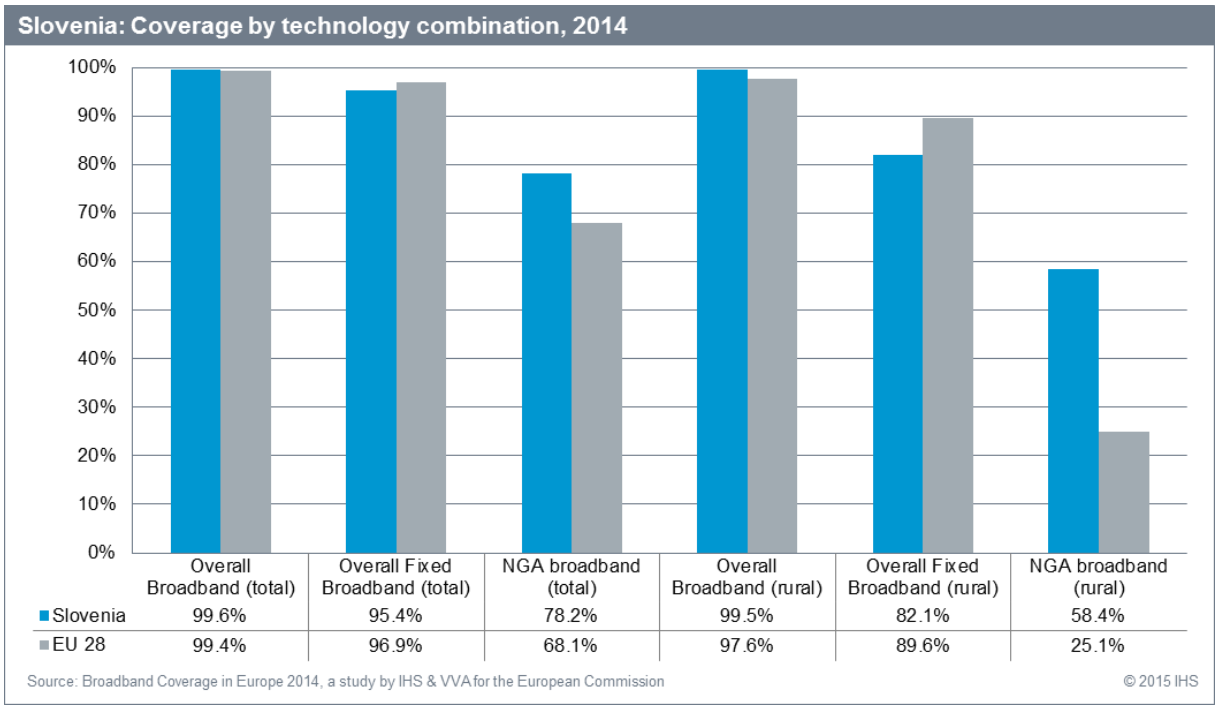
Note: In 2014, the Slovak NRA adopted a new methodology for capturing DSL coverage of the incumbent network operator as a service coverage (all households within the reach of a DSL network), rather than the previously reported technical coverage (including only households realistically able to receive DSL services of advertised quality taking into account crosstalk on copper lines). The NRA also conducted an extensive review of coverage by other technologies to provide more comprehensive data than previously available. As a result, it was necessary to restate 2013 coverage figures (highlighted in italics) to reflect the real developments in the Slovak broadband market. However, in light of the newly available figures, cautious approach when comparing with the 2012 should be applied.

5.27 Slovenia

5.27.1 National coverage by broadband technology

In 2014, 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.

Compared to the previous year, particular progress was made in rural areas, where fixed broadband coverage increased by 4.4 percentage points and at the end of 2014 more than 8 in 10 (82.1%) rural households had access to fixed broadband. Availability of NGA services in rural areas grew by 11.6 percentage points, resulting in 58.4% of rural homes passed by at least one NGA network in 2014, more than double the EU28 average of 25.1%.

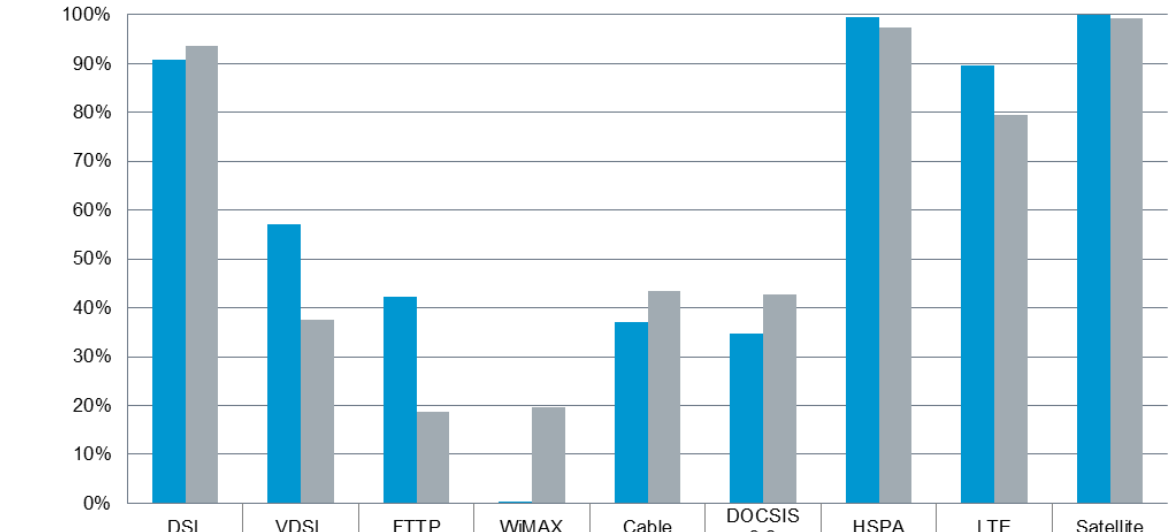


Among the individual technologies, DSL was the key fixed broadband technology covering over 90% of households in 2014. Cable networks passed 37.2% of Slovenian homes and were largely upgraded to DOCSIS 3.0, with high speed cable broadband services being available to 34.8% of households.

With regards to NGA technologies, Slovenia outperforms the EU average in terms of both VDSL (reaching 57.2% of households) and FTTP (passing 42.2% of homes). FTTP was also the fixed technology, which saw the most substantial coverage increase, with a 5.6 percentage point coverage growth reported in 2014.

Like many other countries, Slovenia has seen extensive LTE network deployment over the last couple of years, with Si.Mobil launching its LTE network already in 2012, followed by the incumbent Telekom Slovenije in March 2013. LTE expansion has continued since 2013 with LTE coverage increasing by 26.3 percentage points and reaching 89.7% of households by the end of 2014, exceeding the EU28 average of 79.4%.

Slovenia: Coverage by technology, total, 2014



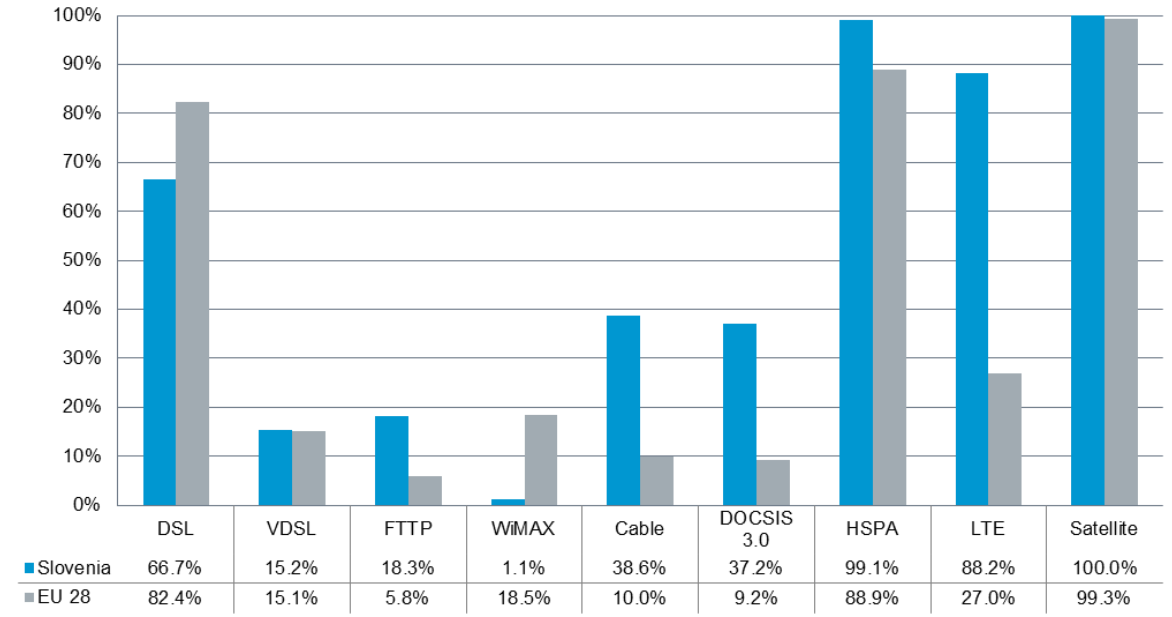
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Slovenia	90.8%	57.2%	42.2%	0.3%	37.2%	34.8%	99.4%	89.7%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Characteristic for Slovenia is rather high presence of cable networks in rural areas, which continued to grow by almost ten percentage points throughout 2014, with 38.6% of rural homes being passed by cable networks at the end of the year, considerably above the EU28 average of 10%. Moreover, due to cable network updates, DOCSIS 3.0 cable broadband services were available to 37.2% of rural homes, making it the most widespread NGA technology across rural Slovenia. Notably though, rural FTTP coverage was also considerably high reaching 18.3% of rural households compared to 5.8% of average rural homes across the EU.

Expansion of LTE networks resulted in a 31.9 percentage point increase in LTE coverage, which reached 88.2% of rural households, just 1.5 percentage points below national coverage and considerably above the EU average of 27.0%.

Slovenia: Coverage by technology, rural areas, 2014

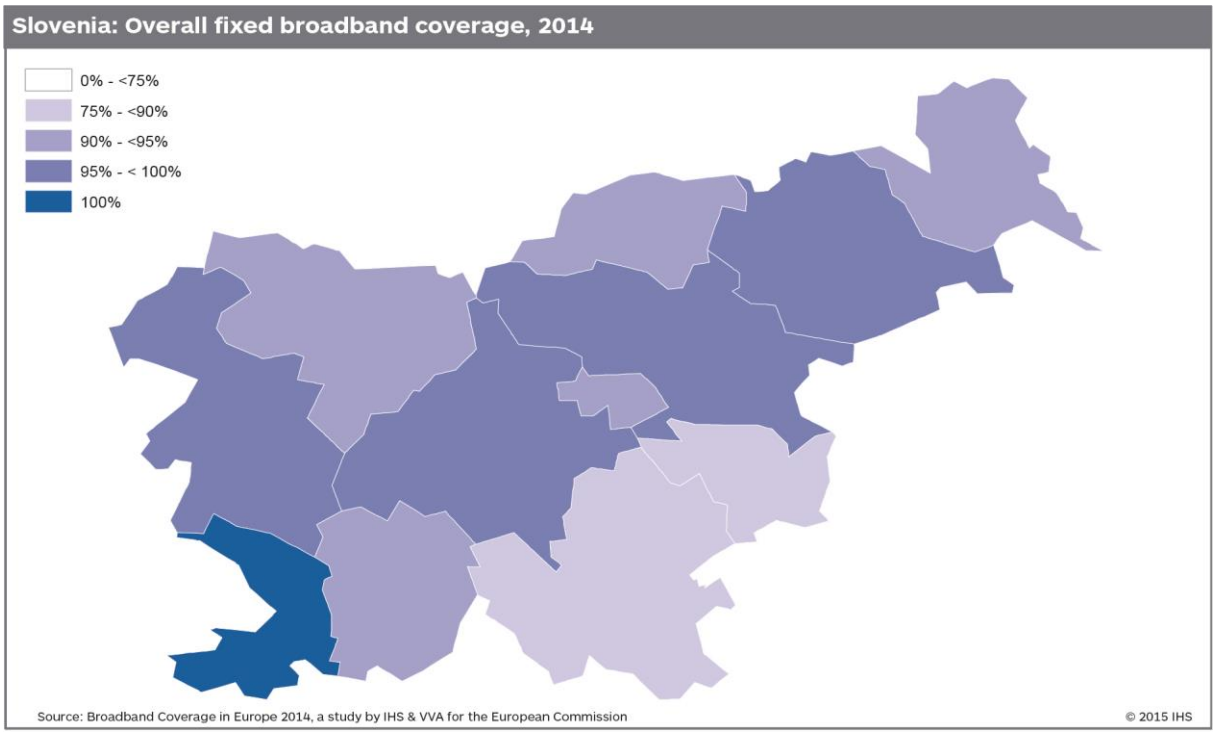


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Slovenia	66.7%	15.2%	18.3%	1.1%	38.6%	37.2%	99.1%	88.2%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

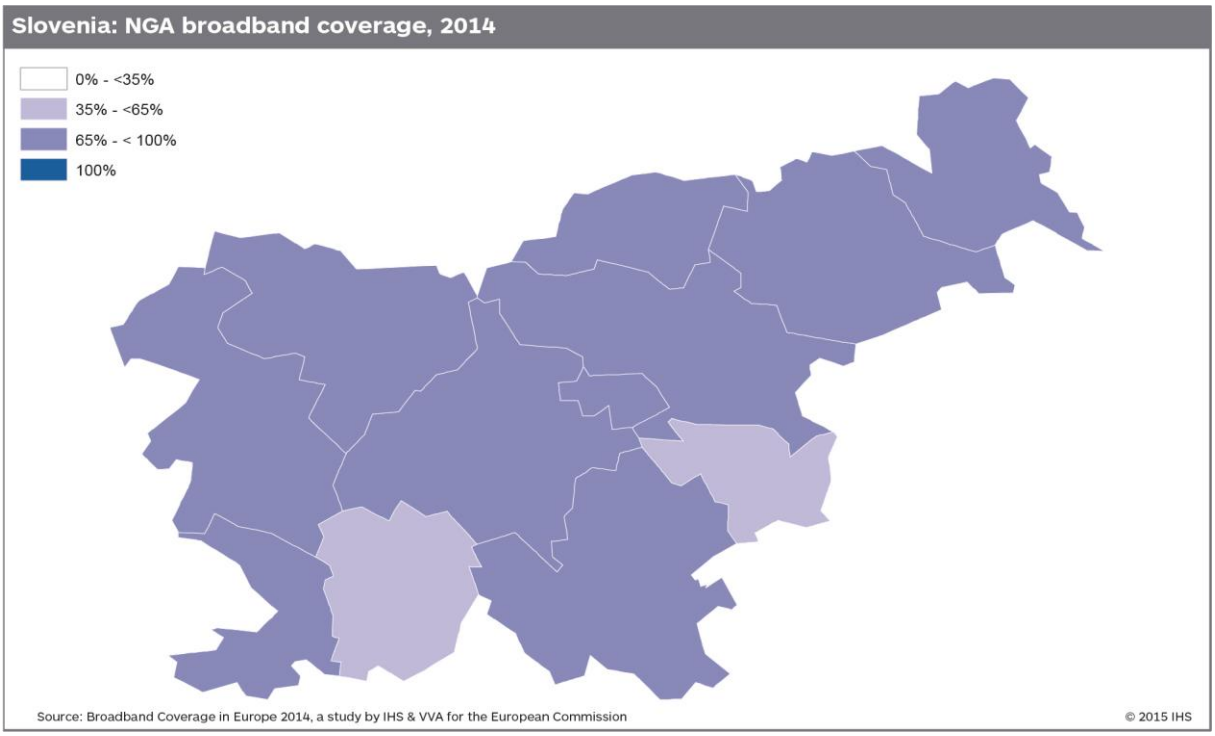
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.27.2 Regional coverage by broadband technology

Fixed broadband coverage across ten of the twelve Slovenian regions exceeded 90%, with the exceptions being Spodnjeposavska region and Jugovzhodna Slovenija region, which both registered coverage lower than 90% (87.5% and 89.0%, respectively). The coastal Obalno-kraška region recorded complete fixed broadband coverage.



There was more regional variation in terms of NGA coverage. Although it did not exceed 90% in any of the regions, it ranged from 49% (Spodnjeposavska region) to nearly 87% (Obalno-kraška region).



5.27.3 Regulatory and market overview

The “Broadband Network Development Strategy in the Republic of Slovenia” was published in 2008 and is scheduled to run until 2020[169]. The main objectives of this strategy include:

- broadband coverage of 90% of the population with access to triple-play services and at least 20Mbit/s connection speed by 2015;
- broadband coverage of 90% of the population with fibre to the home (FTTH) or comparable broadband connections of greater capacity by 2020.

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[170]. In Setember 2014, the company started to provide 1Gbps connections in ten selected cities including the capital Ljubljana, Nova Gorica, Kranj, Grosuplje and others[171].

Telekom Slovenije faces competition primarily from fibre provider T-2 and cable operator Telemach. Telemach started with DOCSIS 3.0 upgrades on its network in 2009, while T-2 has been deploying its FTTP network since 2006. T-2 has been offering connections of up to 1Gbps symmetrical speeds on its FTTP network since 2013[172].

In the mobile broadband market, Si.mobil launched an LTE network in 2012 and aimed to achieve 75% coverage by the end of 2014 and 95% coverage by mid-2017. The incumbent operator, Telekom Slovenije launched its LTE network in March 2013[173] and announced 80% coverage in March 2015. Tušmobil became the third provider launching its LTE service in May 2015[174].

[169] http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?doc_id=4863; New strategy, Digital Slovenia 2020, is currently being prepared by the Slovenian government and finalised a public consultation stage in March 2015: http://www.mizs.gov.si/si/delovna_podrocja/direktorat_za_informacijsko_druzbo/digitalna_slovenija_2020/

[170] http://www.telekom.si/en/company/history

[171] http://www.telekom.si/en/company/press-releases/Telekom_Slovenijes_TopTrio_1G_Plan_Offering_The_Fastest_Internet_To_Residential_Users

[172] http://www.csimagazine.com/csi/1Gbps-comes-to-Slovenia.php

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

[174] https://www.telegeography.com/products/commsupdate/articles/2015/05/21/tusmobil-begins-lte-rollout/

5.27.4 Data tables for Slovenia

Statistic	National
Population	2,058,821
Persons per household	2.5
Rural proportion	24.8%

	Slovenia 2014		Slovenia 2013		Slovenia 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	*90.8%*	*66.7%*	*90.6%*	*63.8%*	68.6%	55.6%	93.5%	82.4%
VDSL	*57.2%*	*15.2%*	*56.4%*	*12.6%*	42.9%	10.1%	37.6%	15.1%
FTTP	42.2%	18.3%	36.6%	17.0%	31.3%	14.0%	18.7%	5.8%
WiMAX*	0.3%	1.1%	0.3%	1.1%	0.0%	0.0%	19.6%	18.5%
Cable	37.2%	38.6%	35.2%	28.7%	30.3%	23.7%	43.5%	10.0%
DOCSIS 3.0	34.8%	37.2%	32.9%	27.1%	29.1%	23.7%	42.7%	9.2%
HSPA	99.4%	99.1%	99.1%	98.9%	96.2%	85.2%	97.3%	88.9%
LTE	89.7%	88.2%	63.4%	56.3%	12.8%	0.0%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	*99.6%*	*99.5%*	99.5%	99.5%	98.1%	92.6%	99.4%	97.6%
Overall fixed broadband	*95.4%*	*82.1%*	95.2%	77.7%	84.3%	64.4%	96.9%	89.6%
NGA broadband	78.2%	58.4%	76.1%	46.8%	71.4%	35.8%	68.1%	25.1%

Notes: In 2014, a number of operators made corrections of reported data for DSL coverage leading to an increase in DSL and VDSL coverage. As a result, the 2013 figures for DSL, VDSL and overall broadband and fixed broadband categories (highlighted in italics) were subsequently restated to reflect the new information. In light of the newly available figures, direct comparisons with the 2012 DSL and VDSL coverage figures should not be made.

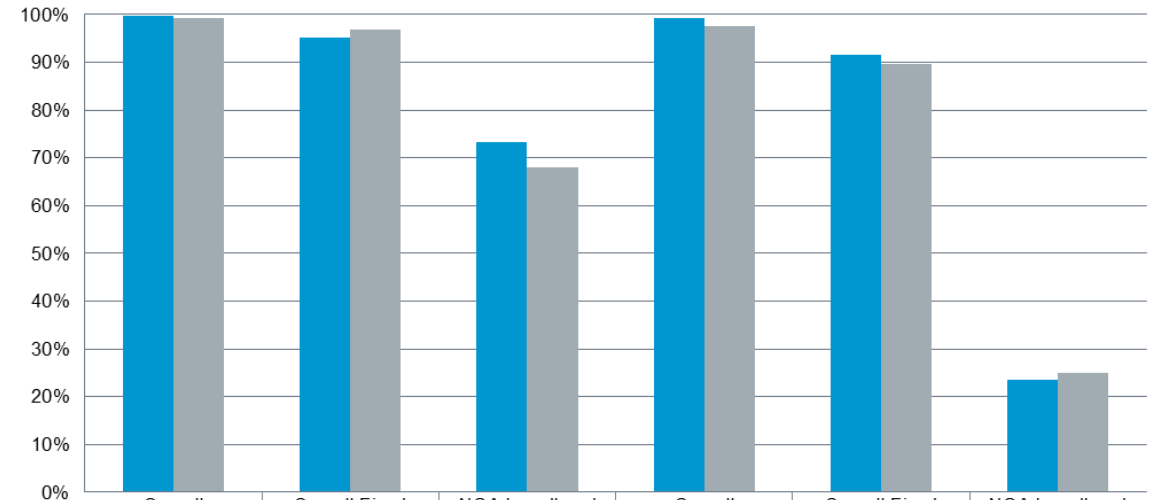
*There is no national WiMAX provider present in Slovenia and WIMAX technology is only used in small, mostly rural areas as part of an Open Access Network initiative aimed at increasing coverage of white spot areas.

5.28 Spain

5.28.1 National coverage by broadband technology

While Spain outperformed the EU average with regards to overall broadband coverage, both on national and rural level, its national fixed broadband coverage and rural NGA coverage lagged slightly behind the European average. In 2014, most substantial increases were reported for national NGA coverage, which grew by 8.4 percentage points to 73.2% of households, over five percentage points above the EU average.

Spain: Coverage by technology combination, 2014



	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%	73.2%	99.2%	91.6%	23.6%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

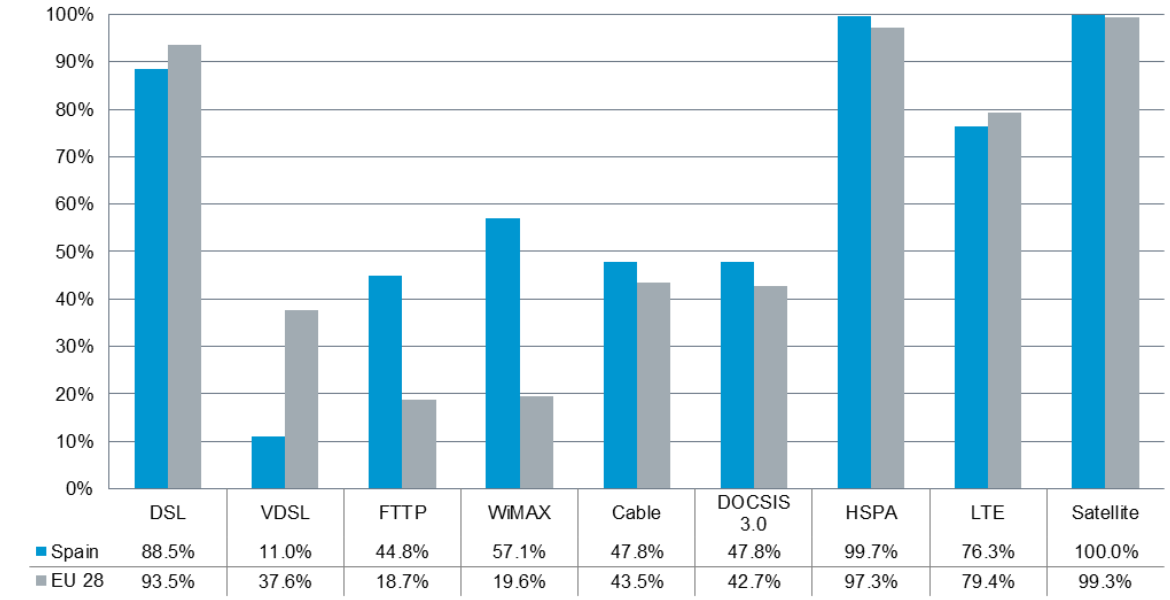
When looking at individual technologies, most substantial fixed broadband gains were made with regards to FTTP, with coverage increasing by 22.1 percentage points to 44.8% by the end of 2014, the biggest increase in FTTP coverage among the study countries. Given the completed DOCISIS 3.0 upgrade, DOCSIS 3.0 networks, covering 47.8% of Spanish households, remained the primary NGA technology in terms of coverage, although FTTP has closed the gap significantly.

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, the operators 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 aren't 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 at the end of 2014, a figure unchanged in the last three years.

In terms of mobile technologies, LTE coverage recorded a significant 29.2 percentage point increase year-on-year. LTE services were first deployed in 2013 and this deployment continued throughout 2014 with 76.3% of households being able to connect to the high-speed mobile broadband technology.

Spain: Coverage by technology, total, 2014



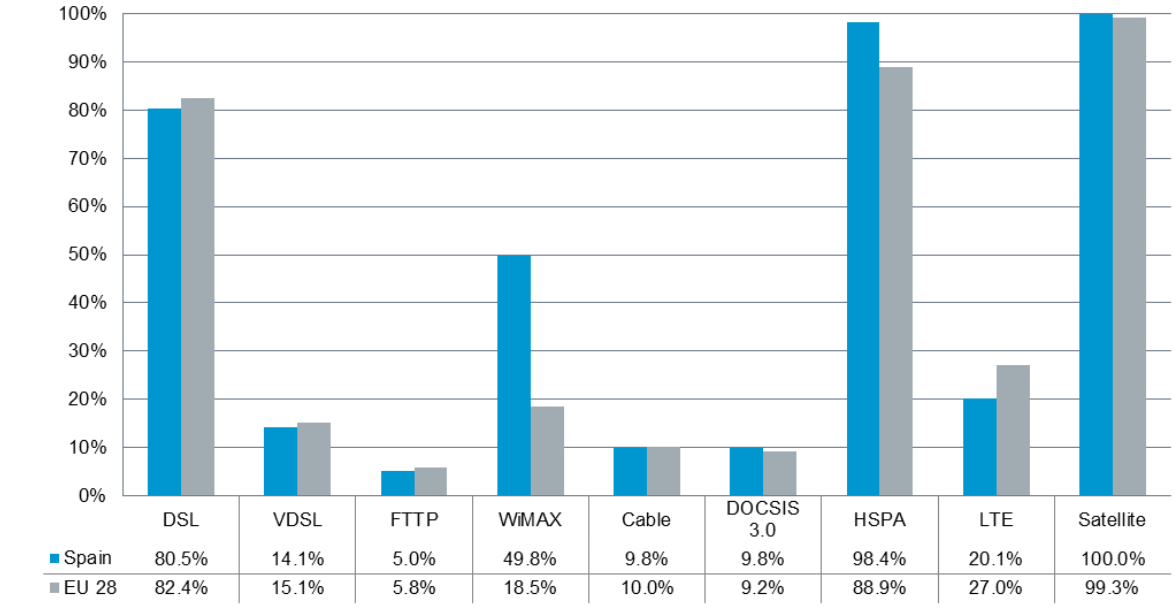
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Spain	88.5%	11.0%	44.8%	57.1%	47.8%	47.8%	99.7%	76.3%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

In rural areas, DSL continued to be the key fixed broadband technology, covering 8 in 10 (80.5%) of rural households, along with WiMAX, available to 49.8% of rural homes. Contrary to the development on national level, VDSL was the most wide-spread NGA technology, although at 14.1%, its reach remained rather limited. Both DOCSIS 3.0 and FTTP networks passed less than 10% of rural households at the end of 2014.

Rural LTE coverage recorded increased quite significantly from 2.2% of rural households passed in 2013 to 20.1% rural coverage in 2014, yet it remained below the EU28 average of 27.0%.

Spain: Coverage by technology, rural areas, 2014

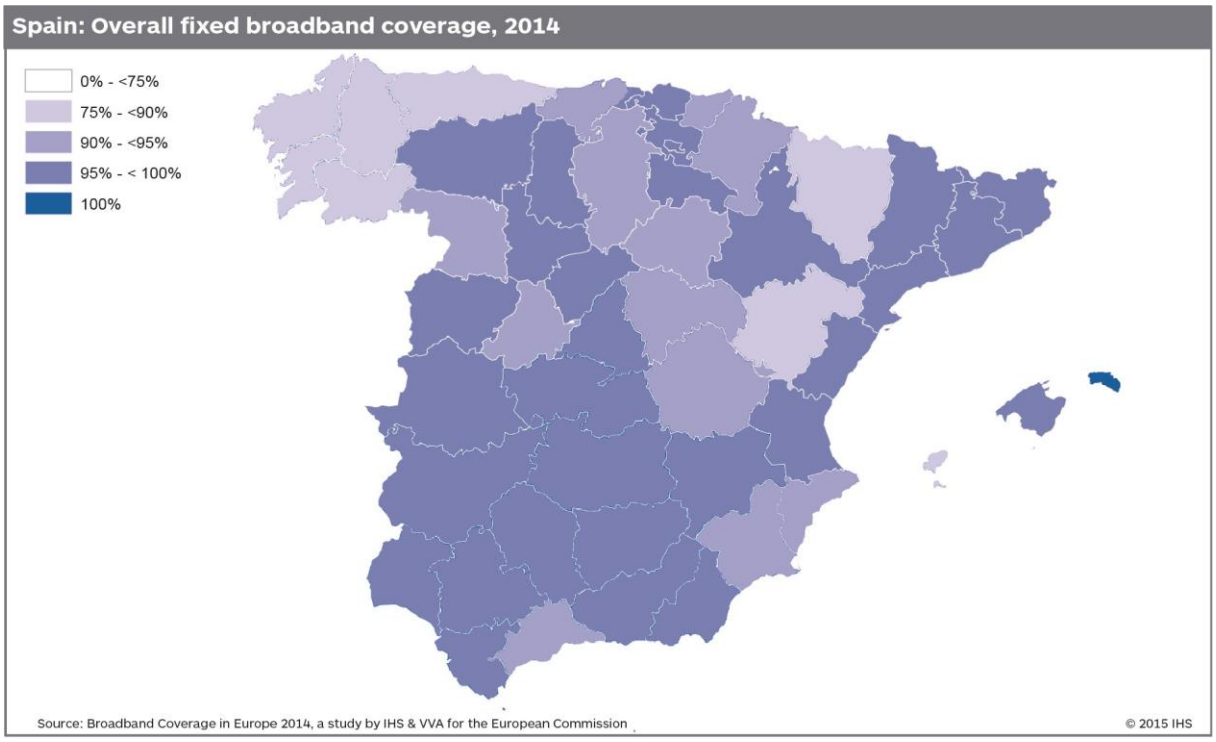


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Spain	80.5%	14.1%	5.0%	49.8%	9.8%	9.8%	98.4%	20.1%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

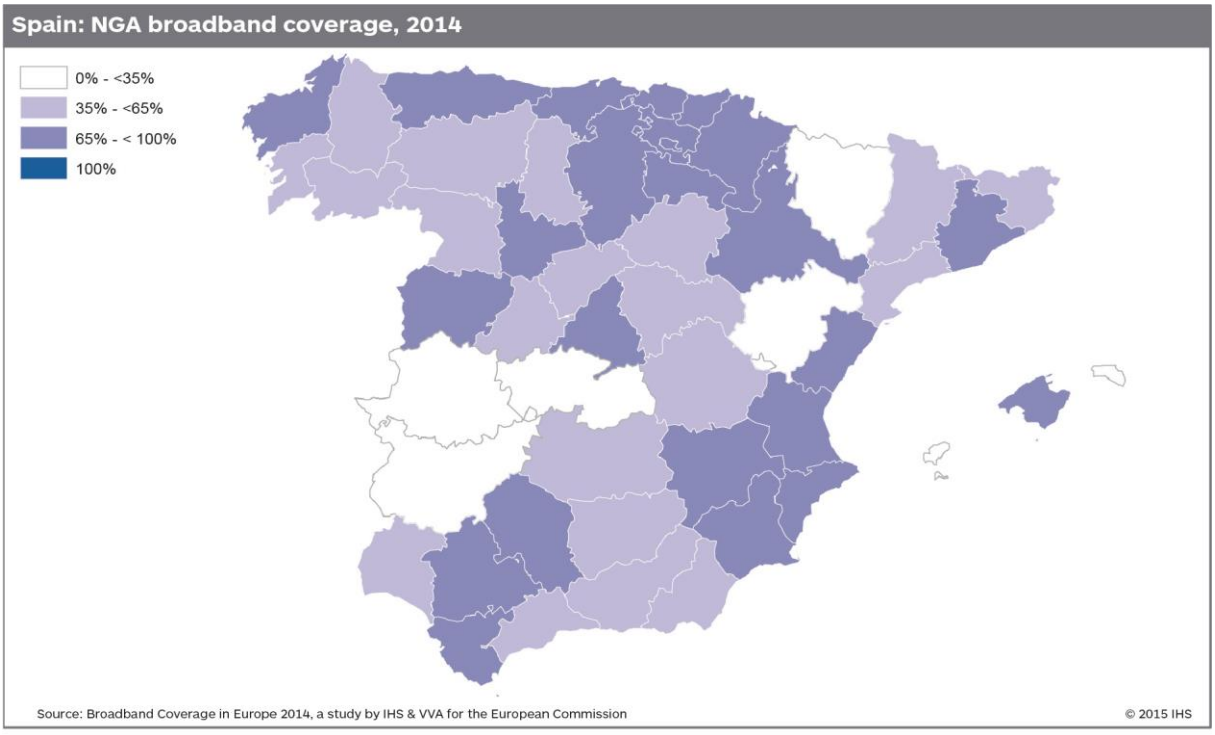
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.28.2 Regional coverage by broadband technology

Looking at fixed broadband coverage in the individual regions, it is possible to see that only the island of Menorca had complete coverage (due to 100% WiMAX coverage across the island).



In terms of NGA coverage, the northern regions tend to lead along with the coastal regions. On the other hand, the overseas provinces and the Mediterranean Islands recorded lower availability of NGA services.



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)	93.5%	93.5%
ES640	Melilla (ES)	93.4%	93.4%
ES703	El Hierro	48.7%	5.4%
ES704	Fuerteventura	91.3%	13.0%
ES705	Gran Canaria	88.6%	72.9%
ES706	La Gomera	53.9%	15.8%
ES707	La Palma	74.3%	7.3%
ES708	Lanzarote	91.6%	43.7%
ES709	Tenerife	91.7%	56.9%

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 wide broadband access in line with the goals of the Digital Agenda for Europe [175] . The national strategy comprises 9 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.

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 management procedures to streamline the administrative processes and reduce costs. The plan is also aimed at assisting the operators with obtaining funds from the European Regional Development Fund (ERDF), and to a lesser extent from the European Agricultural Fund for Rural Development (EAFRD), for the rollout of NGA networks in underserved areas.

Largest Spanish operators include the incumbent, Telefonica, which faces competition from a range of smaller telcos and cable providers. Given the investment involved in nationwide network expansion and deployment, Spanish operators have been turning to agreements in order to reduce costs of NGA expansion.

In March 2013, Vodafone signed an agreement with Orange Spain to form a joint venture for the construction of a national FTTH network. According to the terms of the agreement, both parties will also deploy individual fibre networks in complementary areas and will facilitate mutual infrastructure access[176]. The same year a network sharing agreement was signed between the Vodafone/Orange joint venture and Telefonica Espana [177] , allowing Vodafone/Orange access to fibre infrastructure within multiple dwelling buildings, such as tower blocks (vertical fibre infrastructure). Telefonica will have access to Vodafone/Orange's network where it has no coverage.

Following its EUR 7.2 billion acquisition of cable operator ONO[178], Vodafone curtailed its agreement with Orange in terms of coverage targets[179]. In an announcement made in June 2014, Vodafone stated that it would work with Orange on a network that will service 2 million

[175] http://www.agendadigital.gob.es/digital-agenda/Documents/digital-agenda-for-spain.pdf
[176] https://technology.ihs.com/484420/vodafone-launching-joint-fibre-service-in-spanish-market
[177] http://www.reuters.com/article/2013/07/02/us-spain-fibre-optic-idUSBRE9610ZW20130702
[178] http://www.bbc.co.uk/news/business-26608062
[179] http://www.vodafone.com/content/index/media/vodafone-group-releases/2014/vodafone-spain-orange-spain-fibre-sharing-agreement.html

homes and will offer Orange wholesale access to the ONO cable network for a further 1 million properties.

Jazztel announced the expansion of its fibre optic network in July 2014 and announced its connection target of 3 million homes by the end of 2014[180]. Telefonica plans to connect 10 million homes by end 2014 and Vodafone already connections 7 million homes following the acquisition of ONO. However, recent reports of a potential requirement for Telefonica to lease access to its fibre network have resulted in Telefonica slowing its fibre expansion and revising downwards its coverage targets[181].

Vodafone first launched an LTE network in Spain in 2013, with further network expansion taking place throughout 2014. Vodafone was followed by Orange, Yoigo, and Telefonica (under its brand name Movistar) in 2013. In addition, regional licenses have been distributed to regional operators, with COTA launching an LTE network in the Murcia region in 2013[182].

[180] http://uk.reuters.com/article/2014/07/24/jazztel-network-idUKL6N0PZ2W820140724

[181] https://www.telegeography.com/products/commsupdate/articles/2015/01/15/movistar-espana-slowing-fibre-network-rollout-as-a-result-of-regulators-wholesale-proposals/

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

5.28.4 Data tables for Spain

Statistic	National
Population	47,129,783
Persons per household	2.6
Rural proportion	18.5%

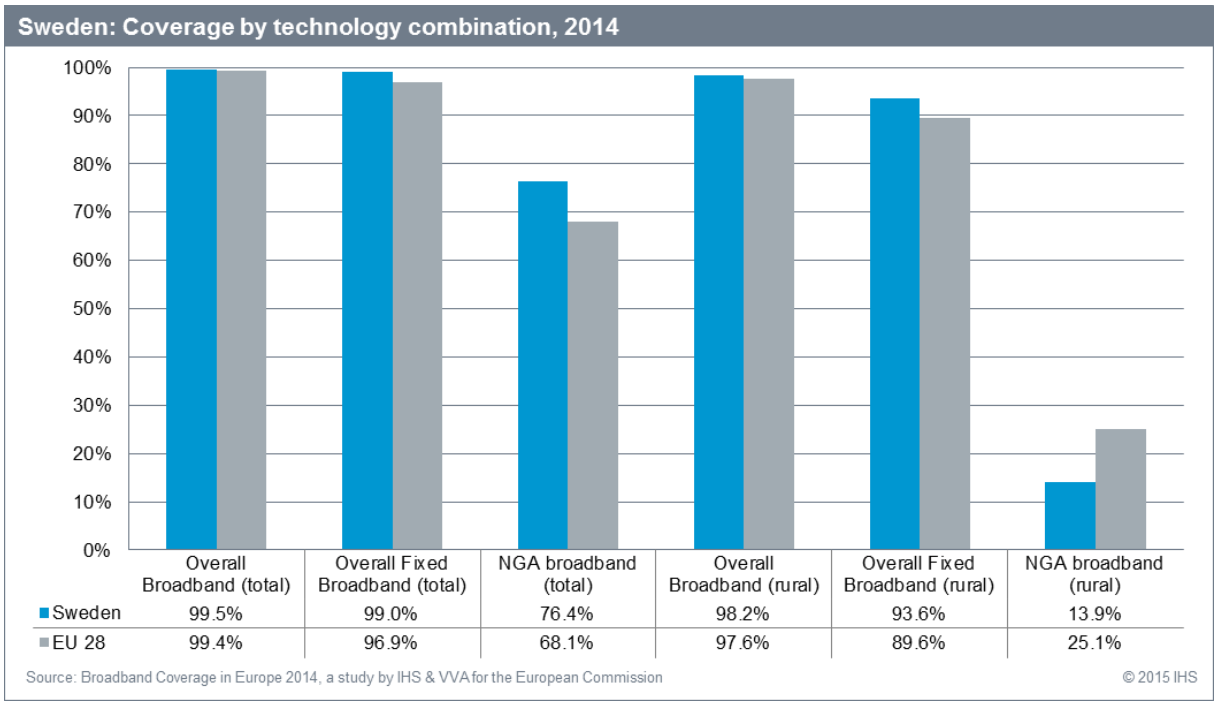
	Spain 2014		Spain 2013		Spain 2013		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	88.5%	80.5%	91.0%	86.2%	94.8%	79.6%	93.5%	82.4%
VDSL	11.0%	14.1%	11.0%	16.0%	10.9%	0.0%	37.6%	15.1%
FTTP	44.8%	5.0%	22.7%	2.5%	17.9%	0.0%	18.7%	5.8%
WiMAX	57.1%	49.8%	55.2%	51.7%	51.3%	53.0%	19.6%	18.5%
Cable	47.8%	9.8%	48.5%	8.8%	51.3%	*8.3%*	43.5%	10.0%
DOCSIS 3.0	47.8%	9.8%	48.5%	8.8%	50.3%	*8.3%*	42.7%	9.2%
HSPA	99.7%	98.4%	99.1%	95.1%	98.6%	92.3%	97.3%	88.9%
LTE	76.3%	20.1%	47.1%	2.2%	0.0%	0.0%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	99.8%	99.2%	99.6%	97.8%	99.4%	96.6%	99.4%	97.6%
Overall fixed broadband	95.1%	91.6%	96.5%	94.3%	97.6%	90.3%	96.9%	89.6%
NGA broadband	73.2%	23.6%	64.9%	23.1%	63.9%	13.0%	68.1%	25.1%

Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic. Rural VDSL coverage should not be directly compared to the 2012 rural VDSL coverage figure as some discrepancy in methodology might have occurred as Point Topic did not include rural VDSL coverage figures reported by the regulator in its 2012 estimates. According to the NRA, rural VDSL coverage in 2012 was similar to coverage in 2013.

5.29 Sweden

5.29.1 National coverage by broadband technology

In 2014, Sweden continued to outperform most of the EU with regards to overall broadband converge, fixed broadband coverage, and national NGA coverage. Rural NGA coverage however remained relatively low. Despite a 5.1 percentage point increase, NGA networks covered only 13.9% of rural households at the end of 2014, compared to the EU28 average of 25.1%.

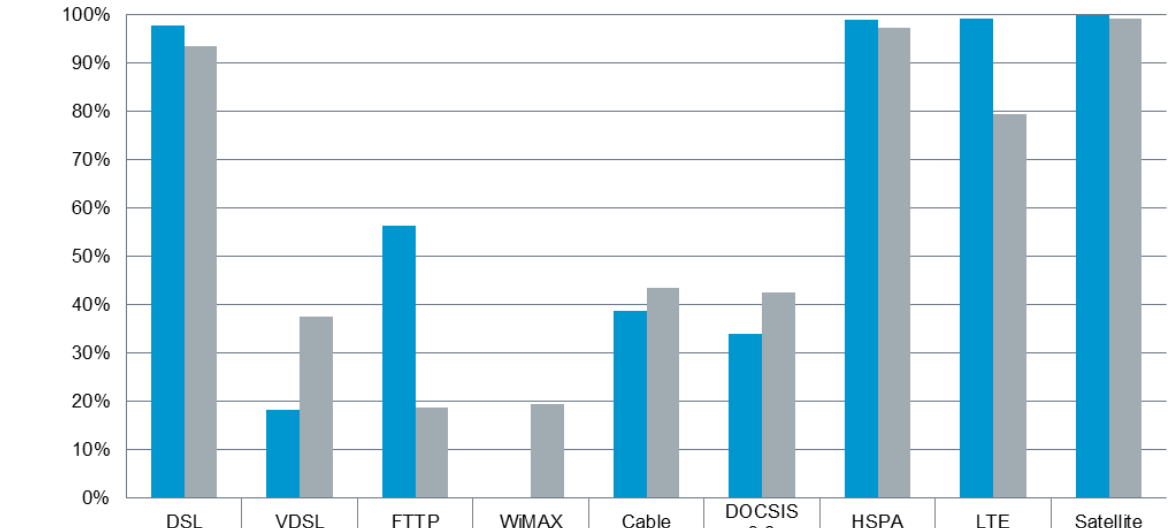


DSL remained the dominant fixed broadband technology in Sweden, available to nearly 98% of households, but FTTP coverage continued to grow in 2014 increasing by 4.6 percentage points and reaching 56.4% of households by the end of the year. The high level of FTTP availability is a result of the technology being traditionally preferred by the Swedish operators for the next-generation networks deployments.

Neither VDSL nor DOCSIS 3.0 registered any change in coverage compared to 2013. DOCSIS 3.0 networks passed a third (34.0%) of Swedish homes, while VDSL was available to only 18% of households, and was thus the least spread NGA technology.

In 2014, Sweden lost its leading position in LTE coverage to the Netherlands, yet with 99.2% of households passed by LTE networks, it remained well-above most study countries.

Sweden: Coverage by technology, total, 2014



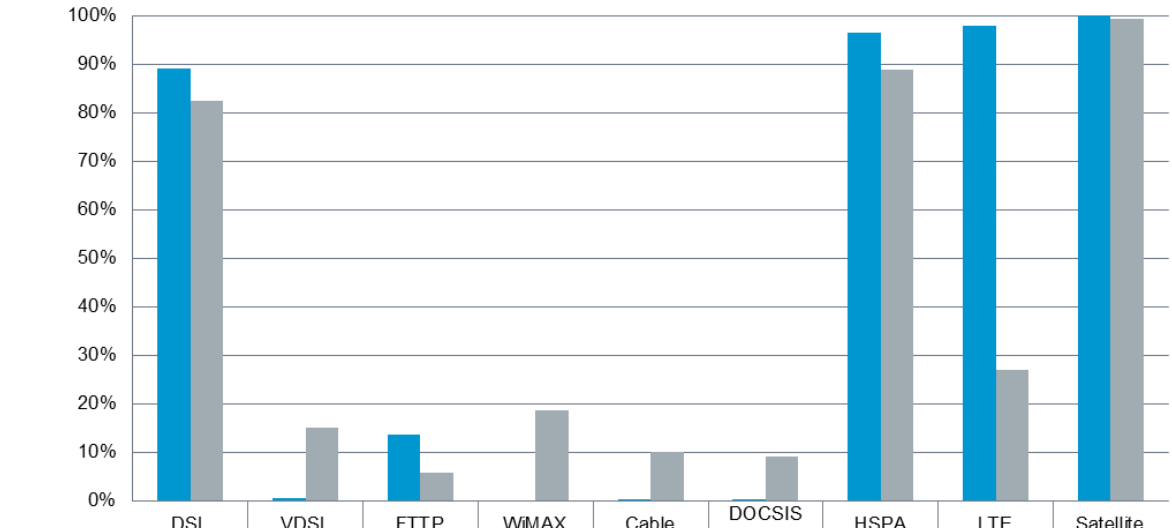
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Sweden	97.9%	18.3%	56.4%	0.0%	38.8%	34.0%	99.1%	99.2%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

However, considerable gaps in NGA broadband coverage could be observed in rural areas. While DSL coverage is high, with DSL networks passing 89.0% of rural homes, NGA access is dependent almost exclusively on FTTP. While rural FTTP coverage reached 13.7% of households and hence above the EU average, alone it could not ensure substantial rural NGA coverage.

This was partially offset by wireless technologies. Especially, with rural LTE coverage reaching 98.0% of rural households by the end of 2014.

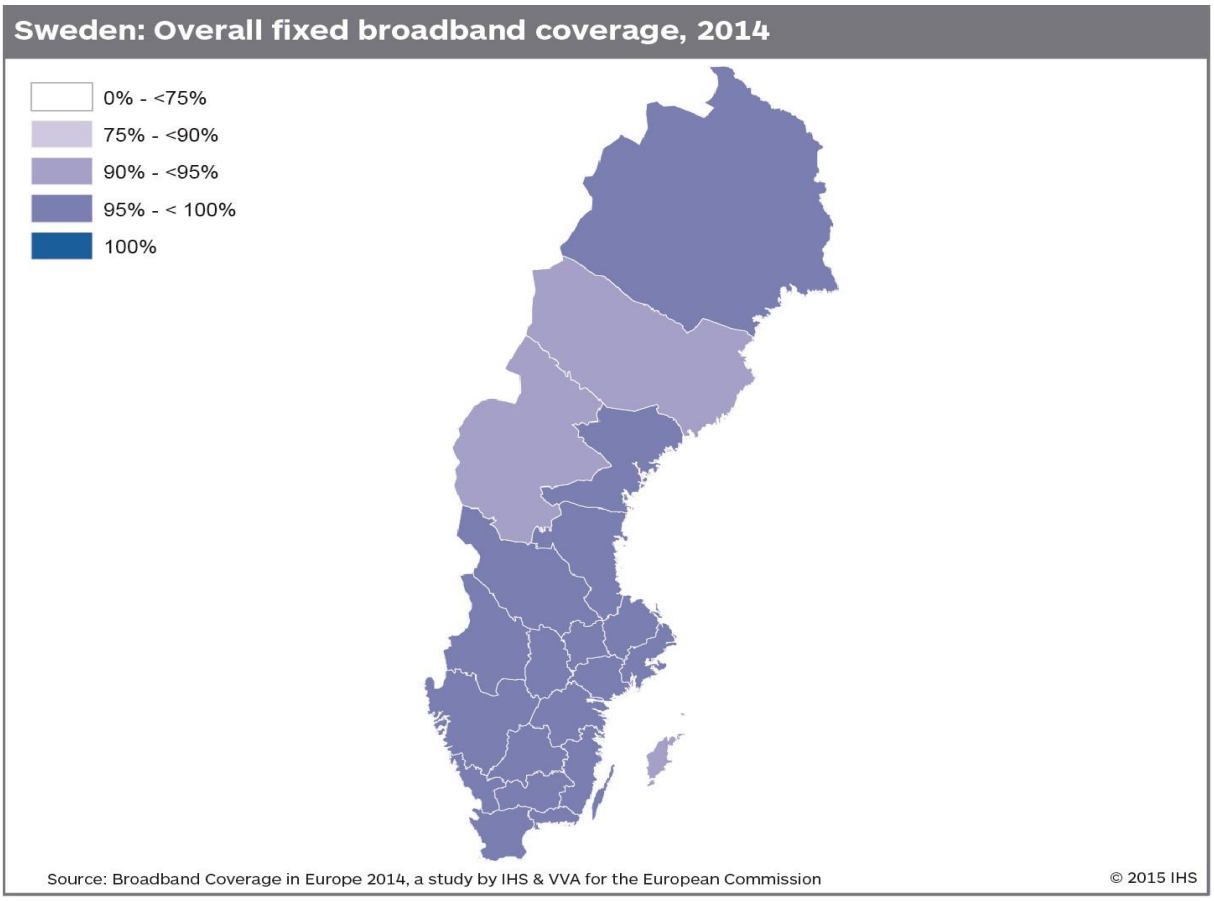
Sweden: Coverage by technology, rural areas, 2014

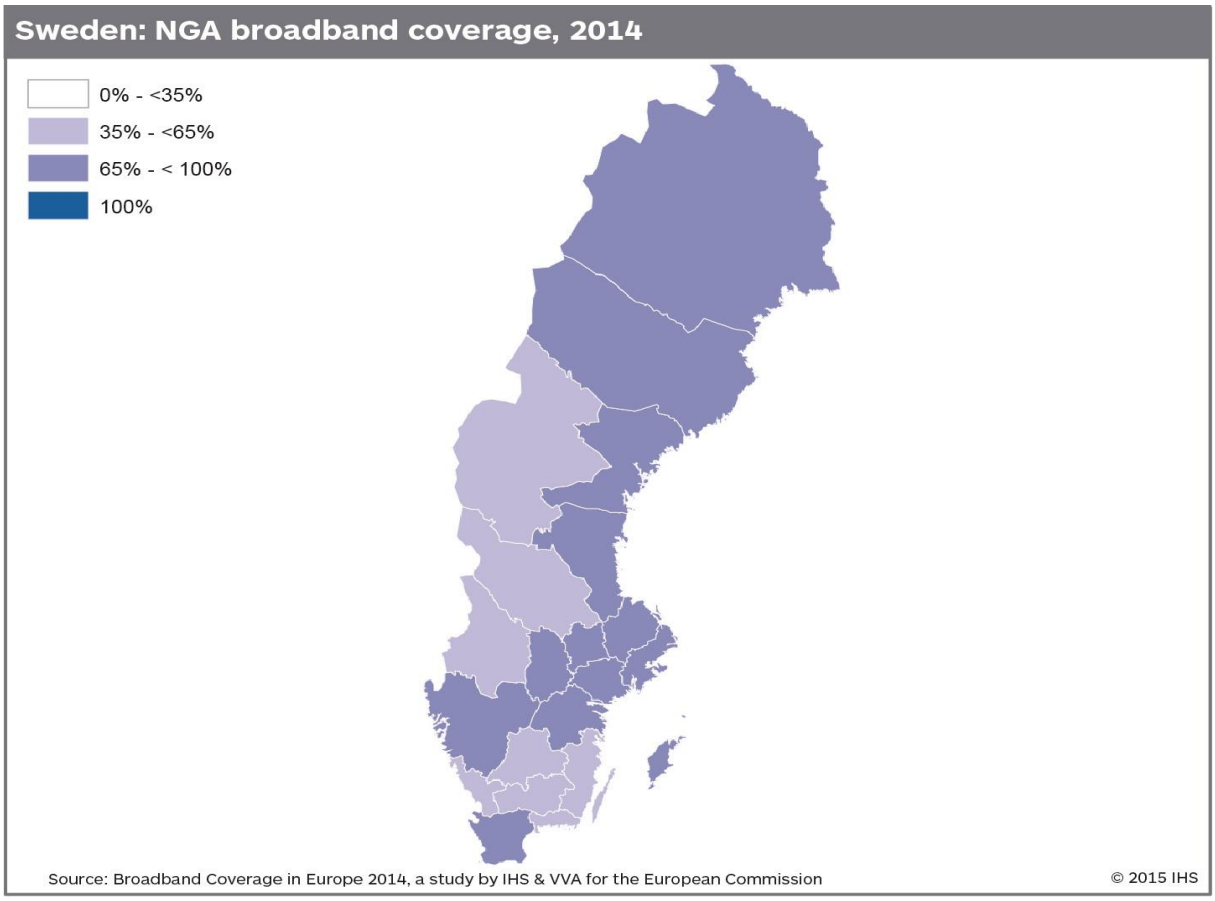


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Sweden	89.0%	0.5%	13.7%	0.0%	0.1%	0.0%	96.5%	98.0%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.29.2 Regional coverage by broadband technology





Fixed broadband coverage levels are consistently high across most regions, exceeding 97% in 18 out of 21 regions. While no region reported complete coverage, 12 of the regions had fixed broadband coverage levels exceeding 99%.

NGA coverage across regions was more varied, with some regions reporting coverage levels under 60% (for instance 52.6% in Dalarnas region), while two regions, Stockholm and Västerbottens reported NGA coverage close to 90%.

5.29.3 Regulatory and market overview

The 'Broadband Strategy for Sweden' was published in 2009 and puts forth the Swedish policy on broadband expansion until 2020. According to the key targets of the strategy, 40% of all households and businesses should have access to services with a minimum speed of 100 Mbps by 2015 and 90% of all households and businesses should have access to services with a minimum speed of 100 Mbps by 2020[183].

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[184]. This is on top of a previous EUR 530 million investment announced in 2011[185].

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. The service was initially available to over 1 million households[186]. By 2014, this number was estimated to be 1.4 million, with a new flagship 1 Gbps service launched in March 2014.

In the wireless market, LTE is very well established, with TeliaSonera launching LTE services in December 2009[187], followed by Tele2 and Telenor in 2010. More than 2 years later in May 2012, TeliaSonera reported that it had 140,000 LTE subscribers, which was in line with the expansion of its network[188]. In 2012, Three was the last operator to launch its LTE network in Sweden[189].

[183] http://www.government.se/content/1/c6/13/49/80/112394be.pdf

[184] http://www.telia.se/media/2014/10/05/telia-satsar-nio-miljarder-p-fiber/066cb492-9c96-4d31-8eb5-144da57ee8af

[185] http://www.telegeography.com/products/commsupdate/articles/2011/06/15/telia-to-cover-2-3m-fibre-homes-including-1m-swedish/

[186] http://www.multichannel.com/news/distribution/com-hem-revs-500-meg-broadband-tier/261362

[187] http://www.totaltele.com/view.aspx?ID=451548

[188] http://www.telegeography.com/products/commsupdate/articles/2012/05/30/telia-reaches-140000-lte-subscribers-in-sweden-working-on-a-skype-beater/

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

5.29.4 Data tables for Sweden

Statistic	National
Population	9,644,864
Persons per household	2.3
Rural proportion	11.94%

	Sweden 2014		Sweden 2013		Sweden 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	97.9%	89.0%	98.0%	88.2%	98.0%	88.4%	93.5%	82.4%
VDSL	18.3%	0.5%	17.8%	0.2%	16.6%	0.2%	37.6%	15.1%
FTTP	56.4%	13.7%	51.8%	8.8%	46.2%	6.2%	18.7%	5.8%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.6%	18.5%
Cable	38.8%	0.1%	39.3%	0.1%	40.6%	0.1%	43.5%	10.0%
DOCSIS 3.0	34.0%	0.0%	34.3%	0.0%	34.7%	0.1%	42.7%	9.2%
HSPA	99.1%	96.5%	99.7%	97.9%	99.7%	98.2%	97.3%	88.9%
LTE	99.2%	98.0%	99.2%	96.5%	93.3%	70.6%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	99.5%	98.2%	99.8%	98.7%	99.8%	99.1%	99.4%	97.6%
Overall fixed broadband	99.0%	93.6%	99.0%	91.8%	98.5%	91.4%	96.9%	89.6%
NGA broadband	76.4%	13.9%	71.2%	8.9%	56.6%	6.3%	68.1%	25.1%

Note: While the Swedish NRA provided the research team with aggregated technology coverage data for individual NUTS 3 regions, data reported in the BCE 2014 study might differ slightly from the data published by the regulator. This is due to a different base of population coverage being reported by the regulator and household coverage reported in the BCE study.

Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

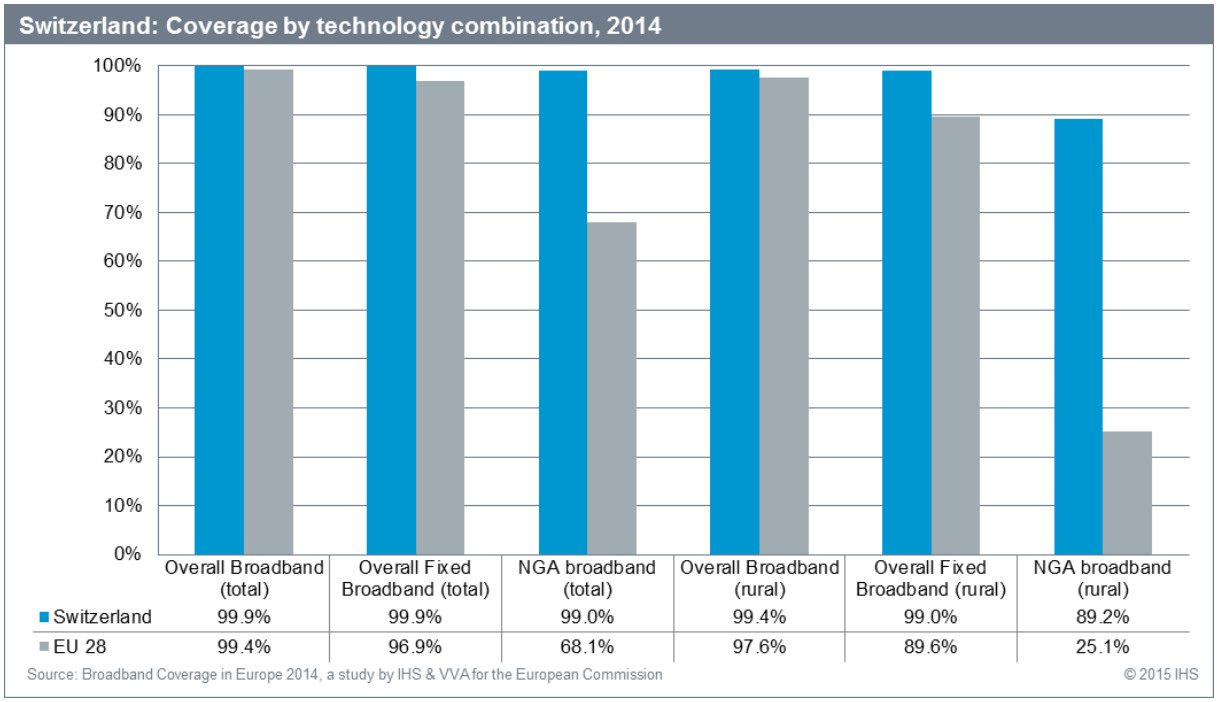
5.30 Switzerland

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.

In 2014 Switzerland remained one of the top performers with regards to broadband coverage, reporting above-average coverage levels for all technology combinations. Progress has been made with regards to rural NGA coverage, which grew by 14.4 percentage points to 90.9% of households by the end of the year, the fourth highest coverage level among the study countries.

No significant gains were made for other technology combinations, but this can be attributed to the fact that Switzerland recorded very high broadband coverage already in previous years. At the end of 2014, nearly complete coverage was 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%).

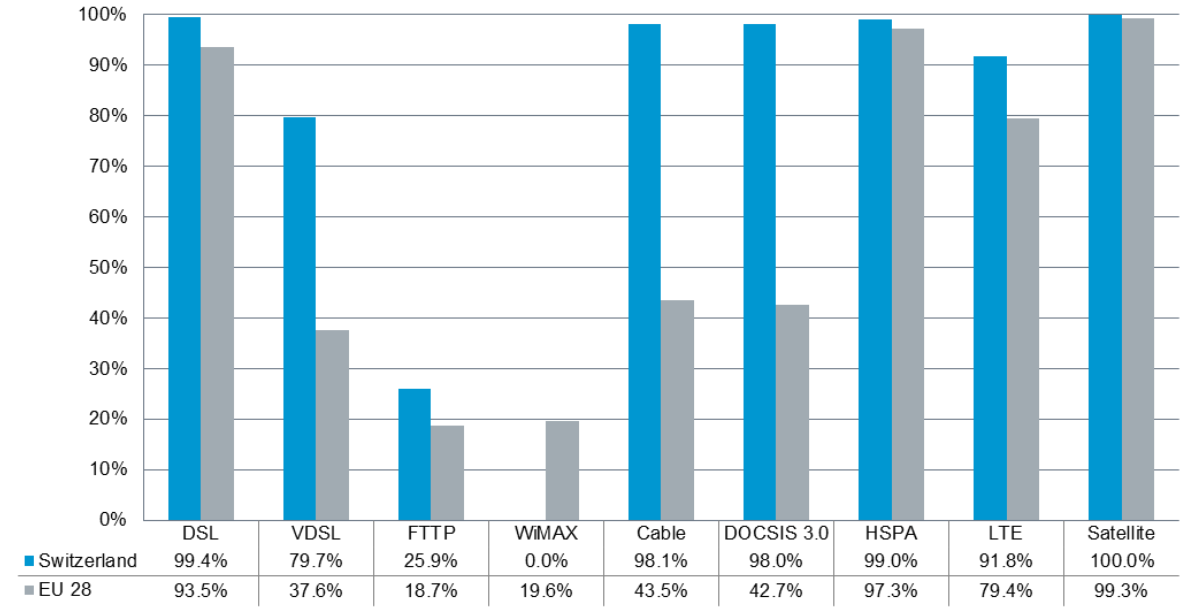


As in 2013, Switzerland was ahead of the EU average in each category with the exception of WiMAX, which is absent in the Swiss market. Of particular importance is very high cable coverage (98.1%), which has been almost completely upgraded to DOCSIS 3.0 (98.0% of households are covered by DOCSIS 3.0 technology) meaning that cable networks also serve as the key NGA technology.

VDSL and FTTP are however growing technologies, with VDSL coverage increasing by 7.5 percentage points to 79.7% and FTTP coverage growing by 4.8 percentage points, passing 25.9% of homes by the end of 2014. These increases can be attributed to a large-scale deployment of both VDSL and FTTP networks by the incumbent operator, Swisscom.

LTE coverage increased by 24 percentage points throughout 2014 and by the end of the year covered 91.8% of households compared to EU average of 79.4%.

Switzerland: Coverage by technology, total, 2014



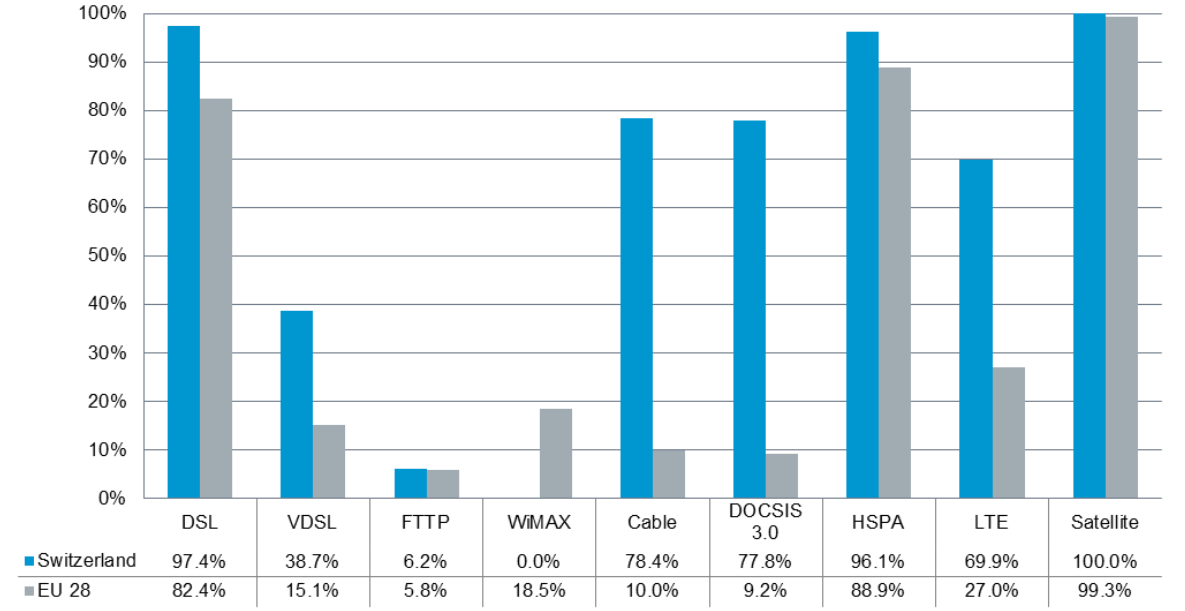
	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Switzerland	99.4%	79.7%	25.9%	0.0%	98.1%	98.0%	99.0%	91.8%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Switzerland is 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. DOCSIS 3.0 also accounts largely for high rural NGA coverage, with VDSL as available to 38.7% of households and rural FTTP coverage being marginal at 0.4%. While rural VDSL coverage increased by 9.6 percentage points in 2014, the gain in DOSCIS 3.0 coverage was nearly twice as high, at 17.4 percentage points.

Significant gains were also made with regards to rural LTE, with coverage increasing by 54.4 percentage points and reaching 69.9%, more than double the EU average.

Switzerland: Coverage by technology, rural areas, 2014

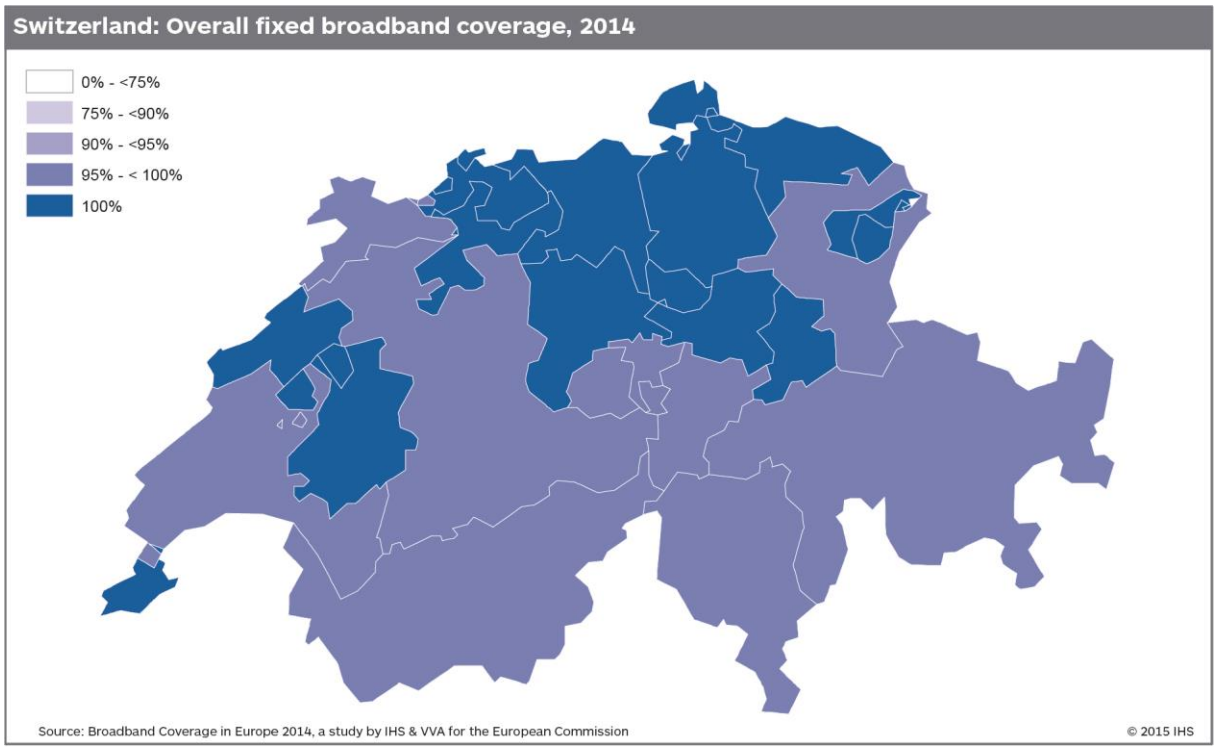


	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
Switzerland	97.4%	38.7%	6.2%	0.0%	78.4%	77.8%	96.1%	69.9%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

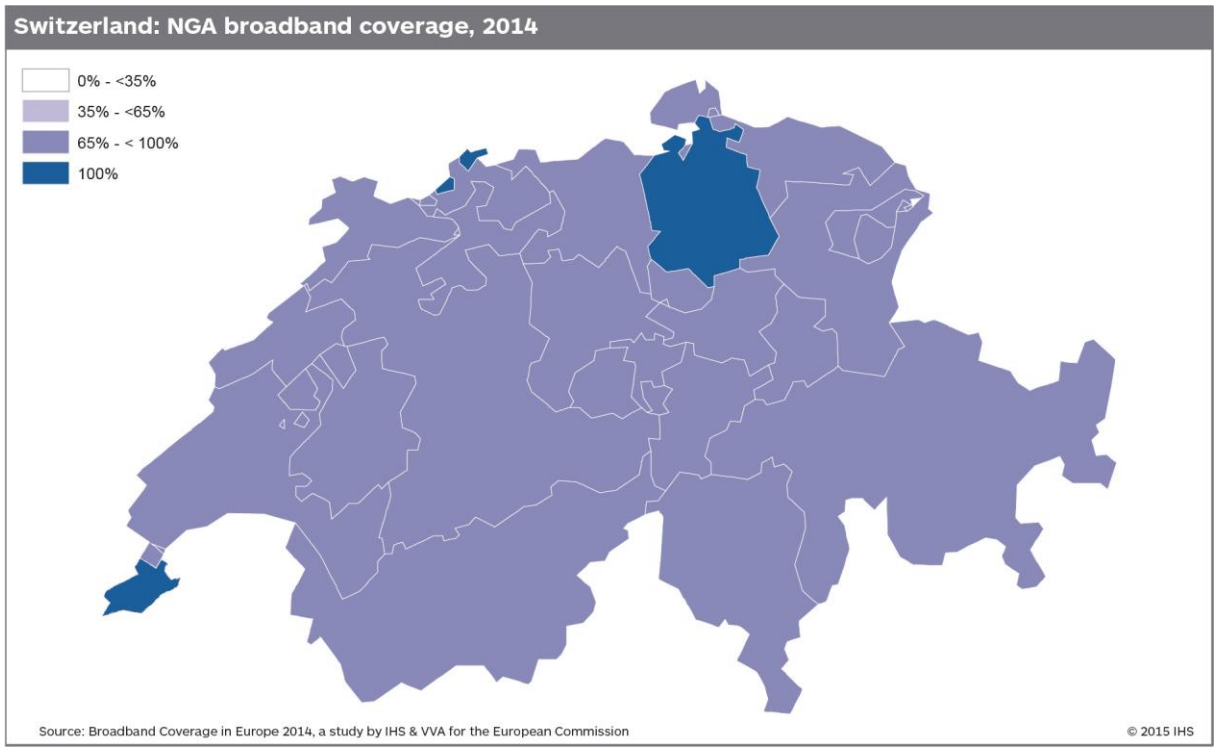
Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

5.30.2 Regional coverage by broadband technology

Sixteen out of the 26 Swiss regions registered virtually complete fixed broadband coverage, with coverage in all the remaining regions exceeding 95%. Lowest coverage was recorded in Graubünden, at 95.5%.



Complete NGA coverage was recorded in Geneva, Basel and Zürich, with over 90% of homes covered in the majority of the remaining regions. There were only three regions where, at the end of 2014, NGA coverage was lower than 90% - Valais, Jura and Graubünden.



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.

Swiss cable operators, led by Liberty-Global backed Cablecom, have been investing heavily in network upgrades since 2006 and by 2013 nearly all cable networks were upgraded to the DOCSIS 3.0 standard and offering up to 250 Mbps downstream broadband connections[190]. By July 2014, Cablecom reported that 250 Mbps broadband covered 2 million households, with 1 Gbps network roll-out on the way[191].

Swisscom has adopted a varied approach to its network upgrade, starting with VDSL trials in 2006 and announcing a FTTP network deployment plan in 2008[192]. By the end of 2014, Swisscom's FTTP network passed approx. 920 thousand homes across Switzerland capable of up to 1Gbps downstream speeds.[193] The company aims to roll out ultra-fast broadband technologies to over 2.3 million homes and businesses by the end of 2015 and to more than 4.6 million by 2020.

Swisscom also rolled out the first LTE network at the end of 2012 followed by Orange and Sunrise in 2013[194]. In 2014, both Orange and Swisscom launched LTE-Advanced networks in 2014. Sunrise aims to cover 97% of the population by 2015, with a potential launch of an LTE-Advanced network also planned[195].

[190] http://www.upc-cablecom.ch/en/internet/products/

[191] https://www.telegeography.com/products/commsupdate/articles/2014/07/25/cablecom-rollout-brings-250mbps-broadband-to-2m-homes/

[192] http://www.swisscom.ch/en/about/medien/press-releases/2008/12/20081209_01_Mit_fibre_suisse_in_die_Glasfaserzukunft.html

[193] http://www.swisscom.ch/content/dam/swisscom/de/about/investoren/documents/2014/2013-annual-results.pdf.res/2014-annual-results.pdf, p. 10

[194] http://www.zdnet.com/sunrise-joins-switzerlands-4g-crowd-with-lte-launch-in-26-towns-7000017004/

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

5.30.4 Data tables for the Switzerland

Statistic	National
Population	8,039,060
Persons per household	2.3
Rural proportion	12.8%

	Switzerland 2014		Switzerland 2013		Switzerland 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	99.4%	97.4%	99.4%	97.3%	99.4%	97.0%	93.5%	82.4%
VDSL	79.7%	38.7%	72.3%	29.1%	53.4%	12.7%	37.6%	15.1%
FTTP	25.9%	6.2%	21.1%	3.7%	16.7%	2.9%	18.7%	5.8%
WiMAX	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.6%	18.5%
Cable	98.1%	78.4%	97.2%	66.3%	95.0%	65.7%	43.5%	10.0%
DOCSIS 3.0	98.0%	77.8%	97.1%	60.4%	93.1%	58.8%	42.7%	9.2%
HSPA	99.0%	96.1%	98.8%	94.2%	97.4%	88.9%	97.3%	88.9%
LTE	91.8%	69.9%	67.7%	15.5%	20.2%	0.5%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	99.9%	99.3%	99.9%	99.3%	99.9%	99.0%	99.4%	97.6%
Overall fixed broadband	99.9%	99.0%	99.8%	98.9%	99.8%	98.8%	96.9%	89.6%
NGA broadband	99.0%	89.2%	98.7%	76.4%	94.4%	64.8%	68.1%	25.1%

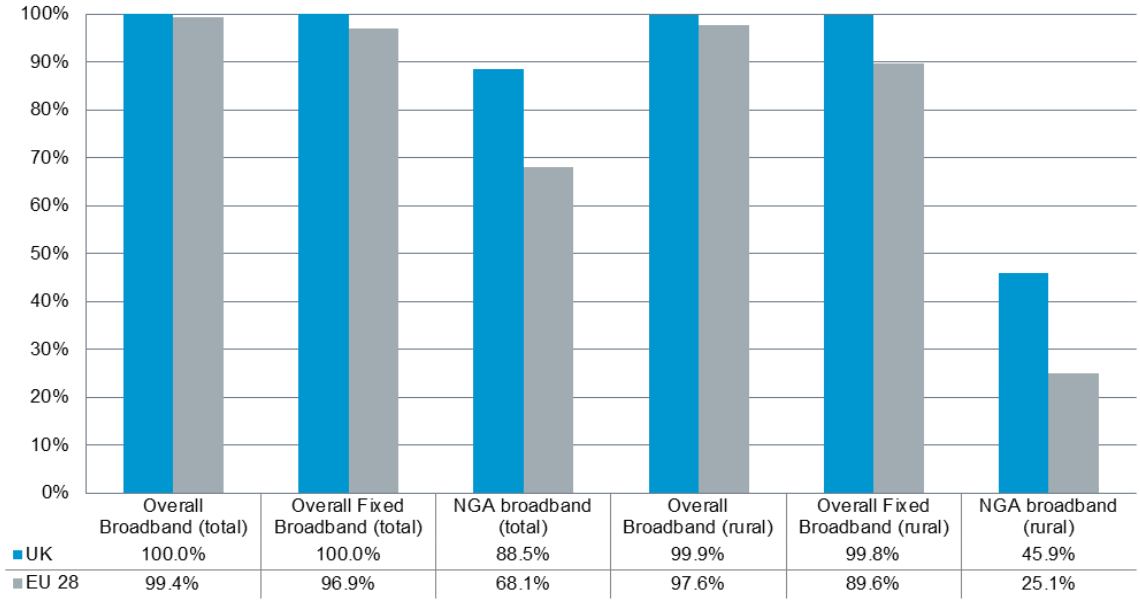
Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

5.31 United Kingdom

5.31.1 National coverage by broadband technology

The United Kingdom is one of the top performers with regards to overall broadband coverage and fixed broadband coverage, reporting complete coverage on national level and nearly complete coverage in rural areas.

UK: Coverage by technology combination, 2014

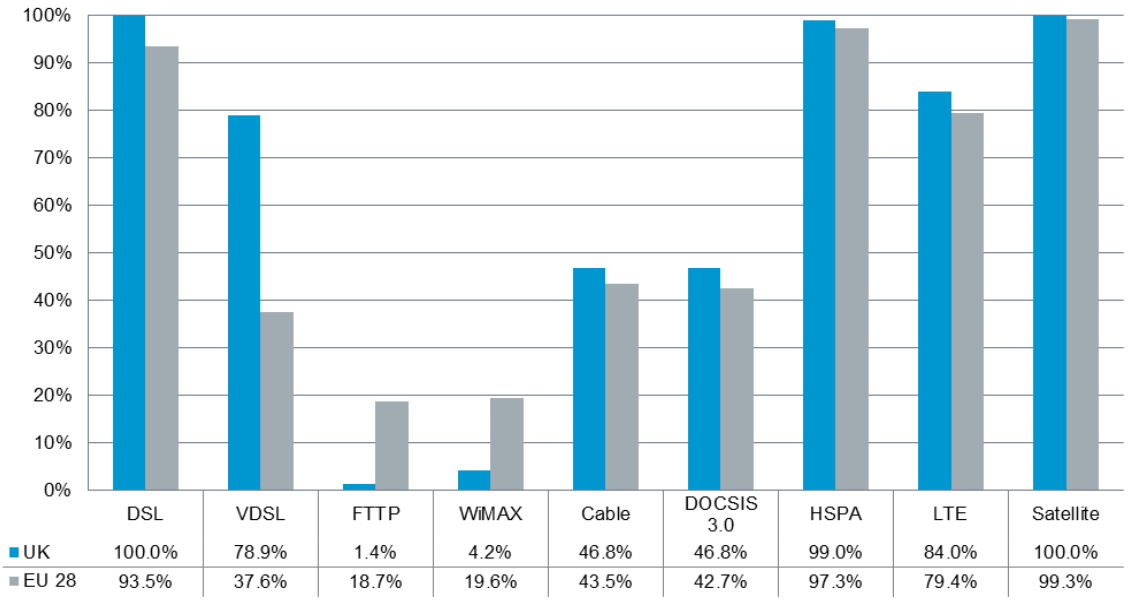


	Overall Broadband (total)	Overall Fixed Broadband (total)	NGA broadband (total)	Overall Broadband (rural)	Overall Fixed Broadband (rural)	NGA broadband (rural)
UK	100.0%	100.0%	88.5%	99.9%	99.8%	45.9%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission © 2015 IHS

In 2014, the UK saw further improvements in NGA coverage, both nationally and in rural areas. National NGA coverage increased by 6.8 percentage points to 88.5% or households, over twenty percentage points above the EU28 average. Rural NGA coverage recorded even more significant growth, with an increase of almost twenty percentage points to 45.9% of rural homes covered, compared to the EU average of 25.1%.

UK: Coverage by technology, total, 2014



	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
UK	100.0%	78.9%	1.4%	4.2%	46.8%	46.8%	99.0%	84.0%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission © 2015 IHS

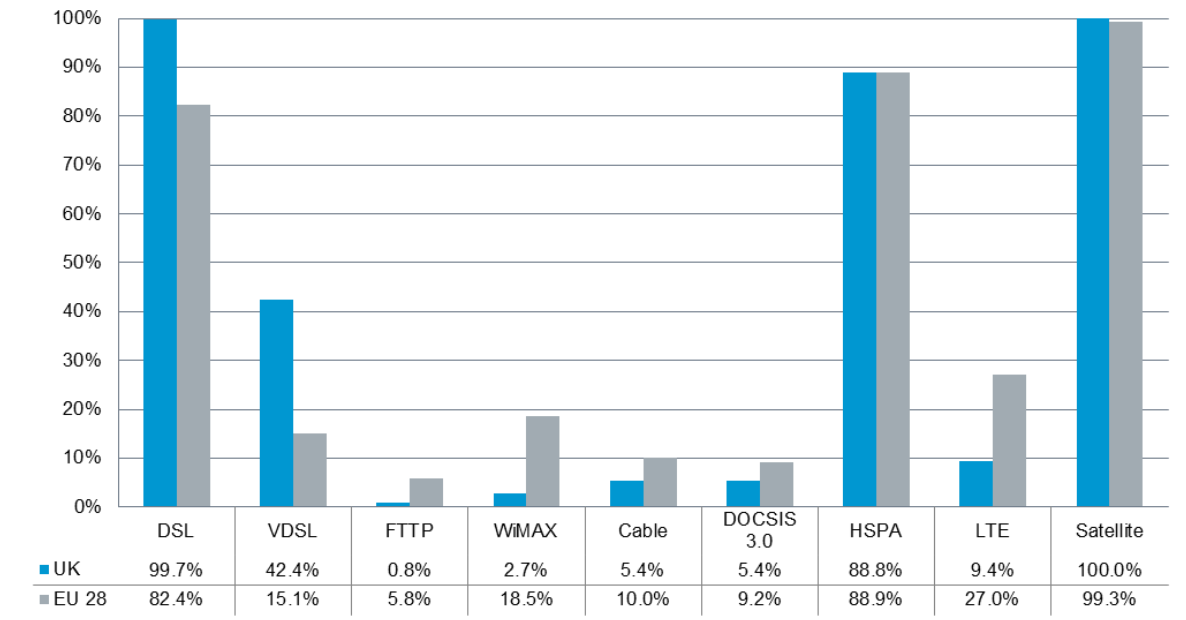
Examining individual technologies, UK broadband coverage is driven by DSL networks, with VDSL being the key NGA technology. On national level, VDSL is the only fixed broadband technology recording substantial coverage increase, with coverage levels growing by eleven percentage points to 78.9%, making the UK one of the European leaders in terms of VDSL coverage.

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[196].Other telcos including BSkyB and TalkTalk have also announced plans to develop next-generation infrastructure across a range of primarily urban areas[197].

While Virgin Media has announced plans to expand its cable network in additional areas[198], this has not yet been reflected in 2014, when DOCSIS 3.0 networks passed 46.8% of households, lagging behind VDSL coverage by over 30 percentage points.

LTE deployment continued in 2014, with coverage increasing by 21 percentage points to 84%, above the EU average of 79.4%. This reflects continued LTE rollout since the operator Everything Everywhere had first deployed LTE services in 2012, which was followed in 2013 by Three, O2 and Vodafone.

UK: Coverage by technology, rural areas, 2014



	DSL	VDSL	FTTP	WiMAX	Cable	DOCSIS 3.0	HSPA	LTE	Satellite
UK	99.7%	42.4%	0.8%	2.7%	5.4%	5.4%	88.8%	9.4%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	99.3%

Source: Broadband Coverage in Europe 2014, a study by IHS & VVA for the European Commission

Rural areas are almost completely dependent on DSL coverage for broadband access, with WiMAX and Cable networks passing only 2.7% and 5.4% of households respectively. At the same time, almost complete rural DSL coverage (99.7%) secures high-level of access to basic fixed broadband technology.

VDSL is the fastest growing broadband technology in rural areas, with coverage increasing by 16.8 percentage points to 42.4%, and remains the primary NGA access technology

196 http://www.telegraph.co.uk/finance/newsbysector/mediatechnologyandtelecoms/telecoms/11772541/BT-forced-to-pay-back-129m-in-broadband-subsidies-to-local-councils.html

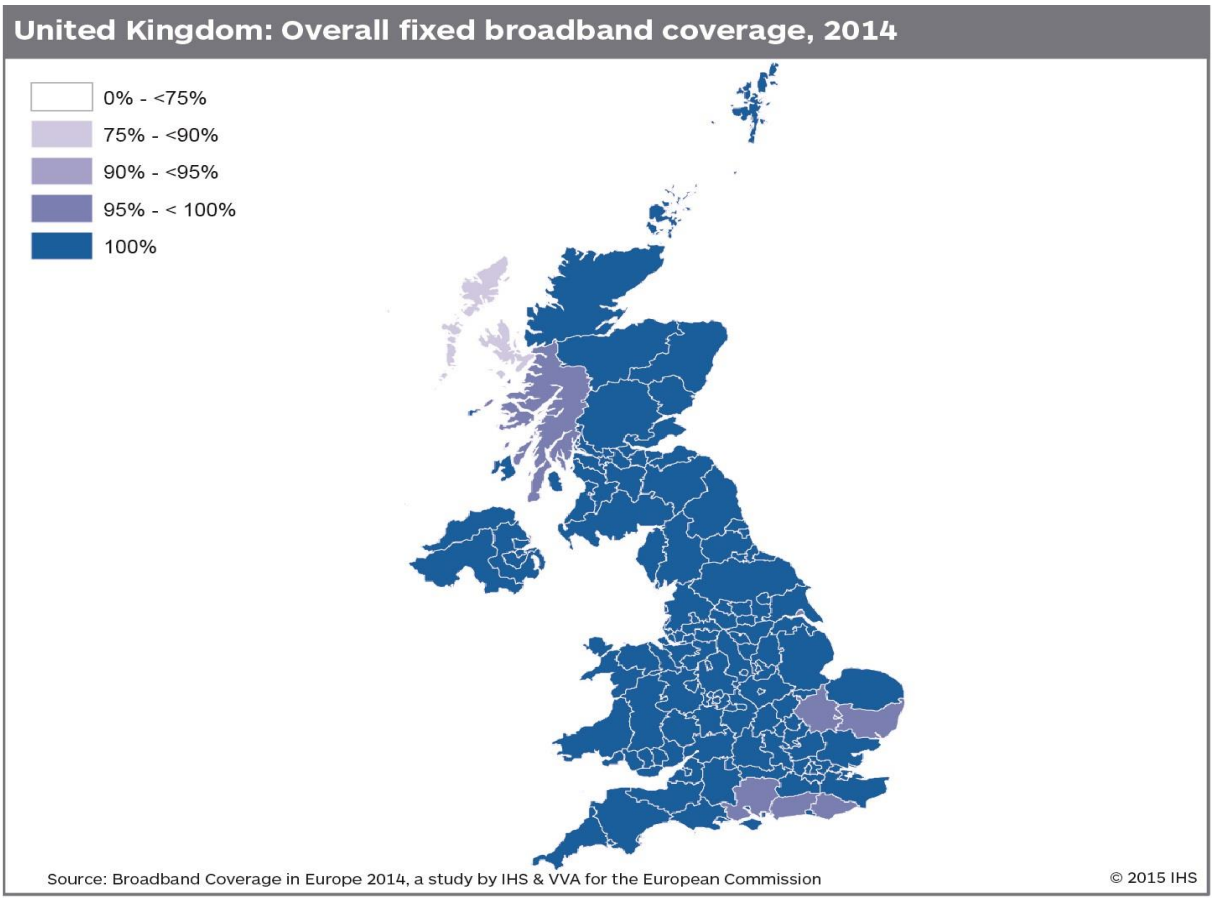
197 http://www.theguardian.com/technology/2014/apr/15/sky-talktalk-cityfibre-ultra-fast-network-york

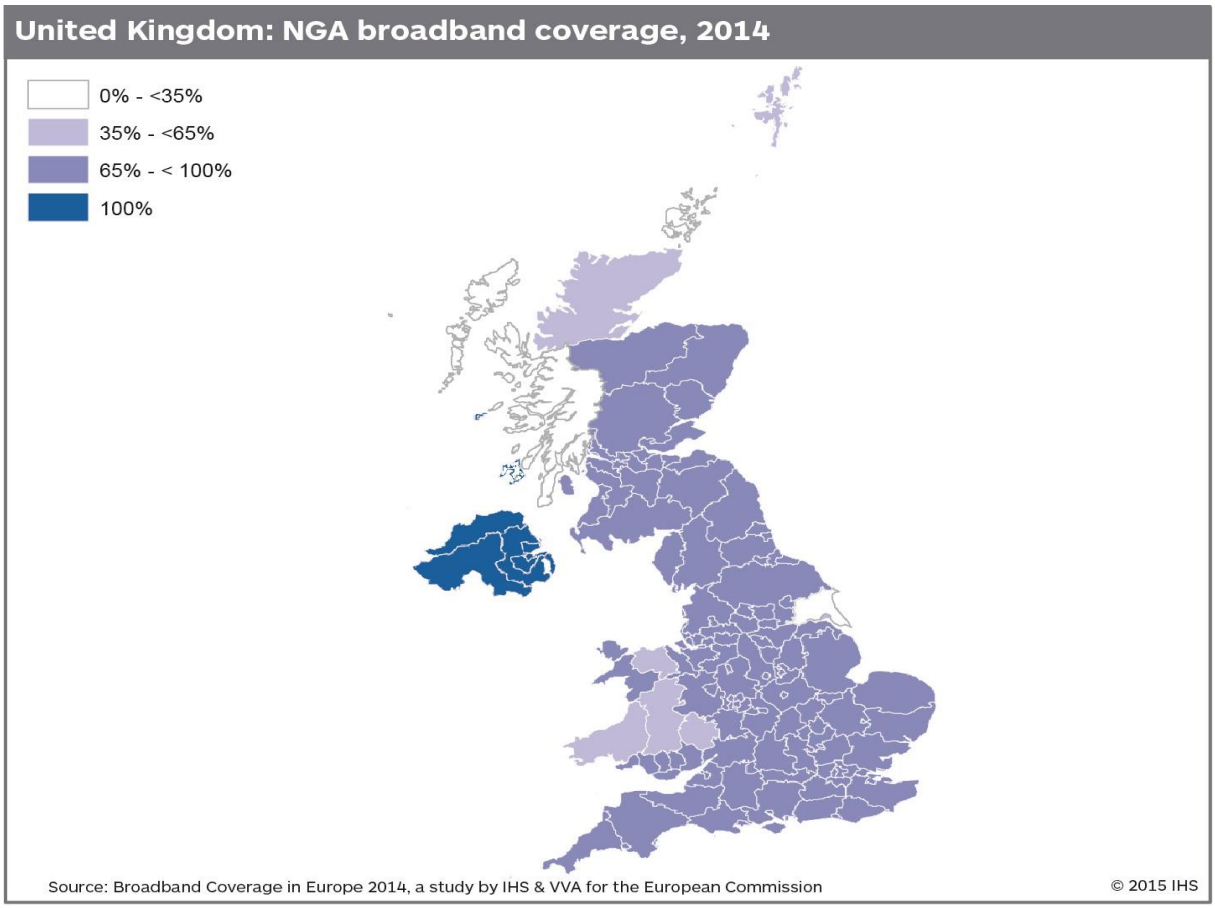
198 http://about.virginmedia.com/press-release/9444/virgin-media-takes-superfast-broadband-to-east-london

available to rural households. As on national level, this reflects BT's focus on investments in VDSL rollout.

LTE availability in rural areas is still problematic, with only 9.4% of rural households covered by LTE compared to the EU average of 27%. While this represents considerable progress compared to 2014, when no LTE coverage was reported, the UK still lags behind many other EU countries in terms of rural LTE availability.

5.31.2 Regional coverage by broadband technology





Complete fixed broadband coverage was reported in almost all of the regions in the UK, with only five out of 139 regions having lower coverage. Most of these were the 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 is 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 was to be achieved by 2015 and 95% of households were set to have access to at least 24Mbps broadband by 2017[199].

In order to reach rural and most difficult-to-reach areas of the UK a specialist unit belonging to the UK's Department for Media, Culture & Sport (DCMS), 'Broadband Delivery UK', was put in place, able to grant funding totalling at £530 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[200].

On top of the £530m funding dedicated to improve rural coverage, the UK Government so far committed to invest (via the National Infrastructure Plan) £790 million funding for superfast broadband, plus £300m split between the creation of super-connected cities and improvement of mobile voice quality and coverage. A £10m competitive fund was also put in place, aiming at encouraging firms to develop solutions to deliver superfast broadband in the most remote areas.

The UK's National Audit Office indicated that due to delays in the process for rolling out rural broadband initiatives, the original target set for completing the rural broadband programme (May 2015) should be revised, and a new target of December 2016 was set for completion. A further update by the UK National Audit Office published in January 2015 indicated that this target is likely to be achieved ahead of schedule[201].

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, with the intention of building out their own access infrastructure in a number of locations across the UK[202]. In February 2015, Virgin Media announced plans to invest £3 billion in extending its high-speed broadband network, increasing its reach by almost a third[203].

[199] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/78096/10-1320-britains-superfast-broadband-future.pdf
[200] http://www.computerweekly.com/news/4500249351/Gigaclear-wins-third-BDUK-superfast-broadband-contract
[201] http://www.nao.org.uk/wp-content/uploads/2015/01/The-Superfast-Rural-Broadband-Programme-update.pdf
[202] http://corporate.sky.com/media/press_releases/2014/sky_talktalk_partner_with_cityfibre
[203] https://technology.ihs.com/524497/virgin-media-invests-3-billion-to-boost-broadband-coverage-by-a-third

5.31.4 Data tables for the United Kingdom

Statistic	National
Population	63,905,297
Persons per household	2.3
Rural proportion	8.6%

	UK 2014		UK 2013		UK 2012		EU28 2014	
Technology	Total	Rural	Total	Rural	Total	Rural	Total	Rural
DSL	100.0%	99.7%	100.0%	98.6%	99.6%	99.6%	93.5%	82.4%
VDSL	78.9%	42.4%	67.9%	25.6%	46.9%	14.3%	37.6%	15.1%
FTTP	1.4%	0.8%	0.9%	0.5%	0.7%	0.1%	18.7%	5.8%
WiMAX	4.2%	2.7%	4.2%	2.7%	4.1%	2.7%	19.6%	18.5%
Cable	46.8%	5.4%	47.1%	5.4%	48.0%	5.0%	43.5%	10.0%
DOCSIS 3.0	46.8%	5.4%	47.1%	5.4%	48.0%	5.0%	42.7%	9.2%
HSPA	99.0%	88.8%	98.5%	85.1%	98.4%	84.8%	97.3%	88.9%
LTE	84.0%	9.4%	63.0%	0.0%	17.3%	0.0%	79.4%	27.0%
Satellite	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.3%	99.3%
Overall broadband	100.0%	99.9%	100.0%	99.3%	100.0%	99.9%	99.4%	97.6%
Overall fixed broadband	100.0%	99.8%	100.0%	99.3%	99.8%	99.8%	96.9%	89.6%
NGA broadband	88.5%	45.9%	81.8%	26.0%	70.3%	18.2%	68.1%	25.1%

Note: The 2013 figures are drawn from the previous year's study conducted by IHS and VVA. The 2012 figures reflect data reported by Point Topic.

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

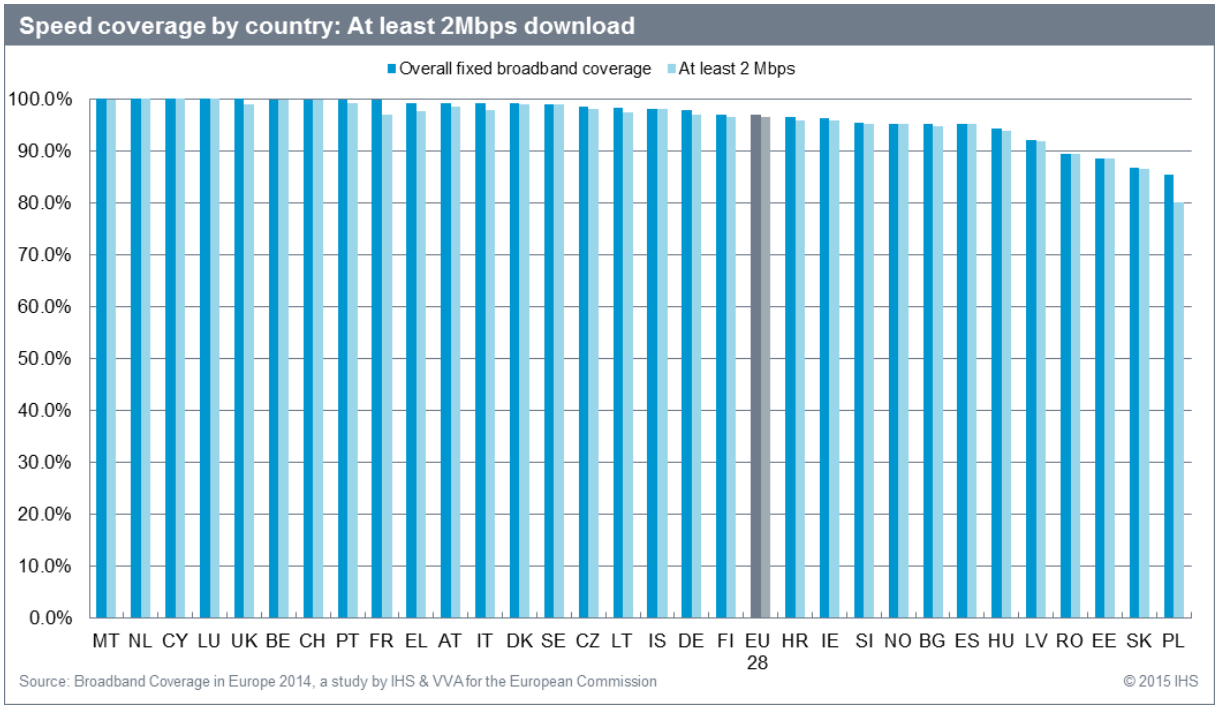
utilizing these technologies can achieve 100 Mbps actual download speeds (for example, in the case of FTTB – fibre-to-the-building – connections included in the FTTP category in-building wiring can pose significant constraints on achievable end-user broadband speeds), respondents were asked to exclude 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, 96.9% of households had access to fixed broadband and 96.4% of homes were reached by networks providing them with actual download speeds of at least 2 Mbps.

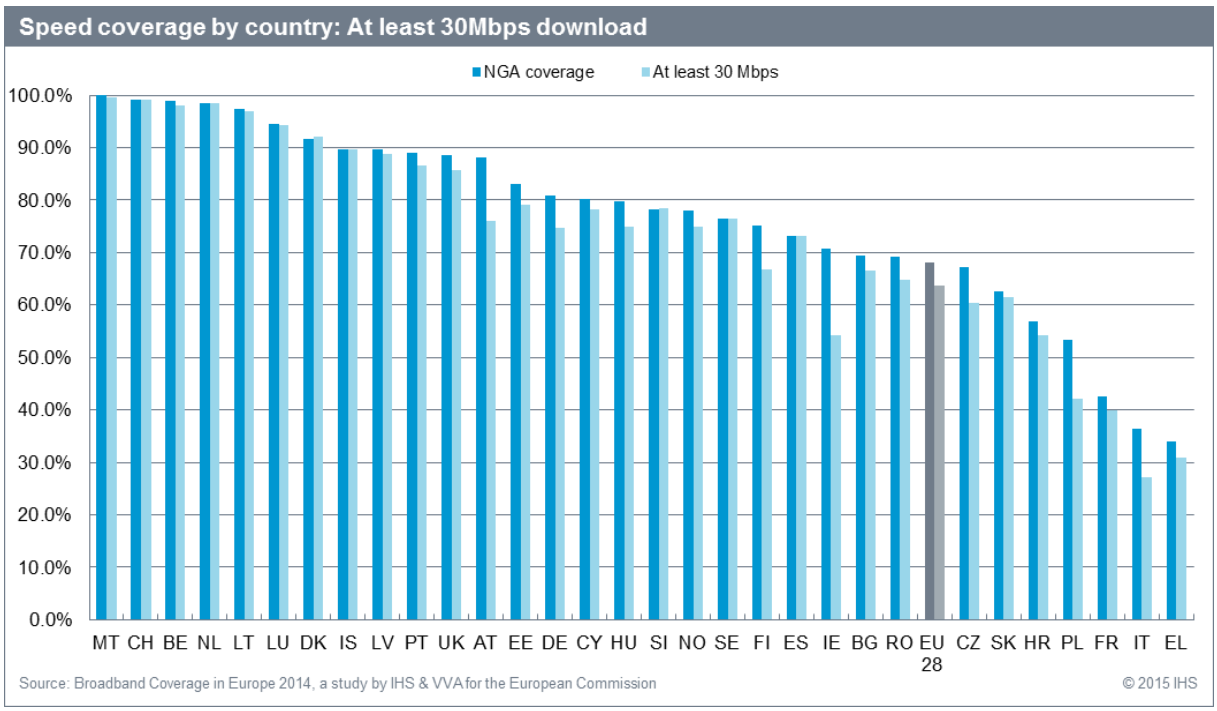


Among the study countries, bigger gaps between fixed broadband coverage and availability of at least 2 Mbps broadband connections could be seen for countries with higher proportion of DSL or WiMAX networks in the make-up of fixed broadband coverage, as traditionally DSL

(and WiMAX) networks tend to be less reliant 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 around 80% of households in Poland had access to actual 2 Mbps download speed connections, while 85.4% 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 4.4% percentage difference between NGA coverage (68.1%) and availability of at least 30 Mbps broadband services, which were accessible to 63.7% of average EU households.

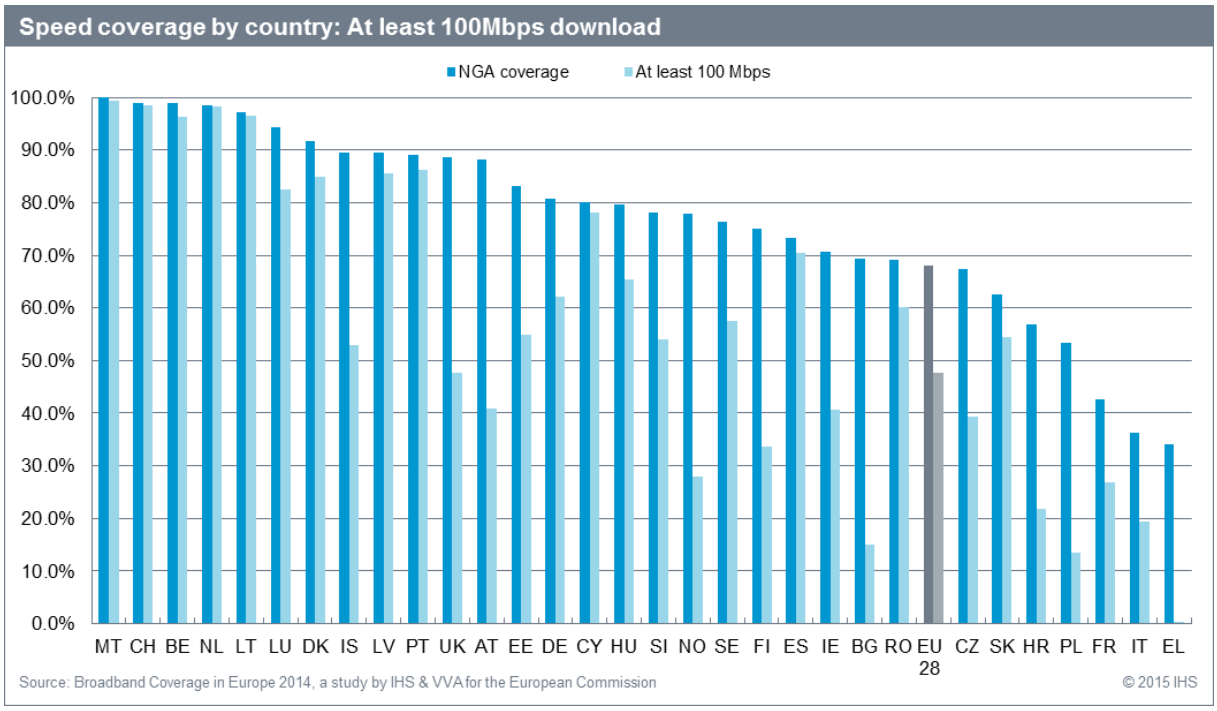


Among the individual countries, the biggest inconsistencies appear to be in countries, which have seen large increases in VDSL coverage in recent years, resulting in high levels of VDSL coverage compared to other NGA technologies. As the quality of VDSL connection speeds relies on a number of factors, 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, Ireland and Poland, for which differences of more than 10 percentage points between NGA coverage and at least 30 Mbps actual download speed availability were recorded in 2014.

Interestingly, while Greece ranked the last among the study countries in terms of NGA coverage with 34.0% of homes passed, when looking at availability of at least 30 Mbps broadband services, Greek households seem to be better off than their Italian counterparts. As 31.0% of Greek households have access to at least 30 Mbps broadband connections, in Italy, on 27% of households have the option, despite NGA networks passing 36.3% of homes across the country.

Looking at the availability of at least 100 Mbps download speeds, it is possible to see that EU as whole is nearing the Digital Agenda goal of 50% of households having access to 100 Mbps broadband services by 2020 with 47.6% of European households being able to receive such speed in 2014. 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.

Broadband coverage by speed data table

	Broadband coverage (>2Mbps)	Broadband coverage (>30Mbps)	Broadband coverage (>100Mbps)
AT	98.4%	75.9%	40.8%
BE	99.8%	98.0%	96.2%
BG	94.8%	66.5%	15.1%
HR	95.8%	54.3%	21.8%
CY	100.0%	78.1%	78.1%
CZ	98.0%	60.4%	39.4%
DK	99.0%	92.0%	85.0%
EE	88.4%	79.2%	54.9%
FI	96.5%	66.8%	33.7%
FR	97.0%	40.0%	26.9%
DE	99.8%	74.6%	62.1%
EL	97.6%	30.8%	0.4%
HU	93.9%	74.8%	65.4%
IS	98.0%	89.6%	52.9%
IE	95.9%	54.3%	40.6%
IT	97.8%	27.2%	19.5%
LT	97.4%	96.9%	96.6%
LV	91.9%	88.8%	85.5%
LU	100.0%	94.4%	82.5%
MT	99.8%	99.5%	99.4%
NL	100.0%	98.4%	98.2%
NO	95.2%	75.0%	28.0%
PL	80.2%	42.2%	13.5%
PT	99.1%	86.6%	86.1%
RO	89.3%	64.8%	60.2%
SK	86.5%	61.5%	54.5%
SI	95.3%	78.5%	54.0%
ES	95.1%	73.2%	70.5%
SE	99.0%	76.4%	57.5%
CH	99.9%	99.0%	98.5%
UK	98.9%	85.7%	47.7%
EU 28	96.4%	63.7%	47.6%

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	DOCSIS 3 broadband is delivered over a fixed cable TV network using coaxial cable according to the DOCSIS 3 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.

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	A household has DOCSIS 3 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.

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%	88.2%	94.6%	94.5%	20.2%
BE	99.9%	99.9%	98.8%	99.5%	99.4%	84.0%
BG	99.9%	95.1%	69.4%	99.3%	59.4%	1.4%
HR	99.0%	96.6%	57.0%	95.4%	80.9%	10.2%
CY	100.0%	100.0%	80.1%	100.0%	100.0%	51.0%
CZ	99.2%	98.5%	67.3%	93.8%	91.3%	6.5%
DK	99.5%	99.1%	91.7%	99.5%	97.5%	53.7%
EE	99.8%	88.4%	83.1%	99.1%	84.1%	57.1%
FI	99.8%	97.0%	75.1%	98.6%	69.2%	7.5%
FR	100.0%	99.7%	42.6%	99.7%	98.5%	20.0%
DE	99.8%	97.9%	80.8%	96.9%	92.4%	33.1%
EL	99.9%	99.3%	34.0%	99.3%	96.4%	0.5%
HU	99.1%	94.4%	79.7%	97.1%	81.4%	19.4%
IS	98.7%	98.0%	89.6%	97.6%	93.5%	70.2%
IE	97.6%	96.3%	70.7%	95.0%	92.2%	8.0%
IT	99.4%	99.1%	36.3%	94.9%	90.5%	0.0%
LT	99.4%	98.3%	97.3%	98.1%	91.9%	58.9%
LV	99.6%	91.9%	89.6%	98.7%	51.2%	43.7%
LU	100.0%	100.0%	94.4%	100.0%	100.0%	94.0%
MT	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
NL	100.0%	100.0%	98.4%	100.0%	100.0%	97.7%
NO	99.3%	95.2%	78.0%	97.5%	81.7%	31.2%
PL	99.8%	85.4%	53.4%	99.3%	79.9%	31.1%
PT	99.8%	99.8%	89.1%	98.6%	98.2%	44.0%
RO	99.8%	89.4%	69.2%	99.6%	80.2%	27.4%
SK	95.9%	86.8%	62.5%	89.1%	76.6%	4.3%
SI	99.6%	95.4%	78.2%	99.5%	82.1%	58.4%
ES	99.8%	95.1%	73.2%	99.2%	91.6%	23.6%
SE	99.5%	99.0%	76.4%	98.2%	93.6%	13.9%
CH	99.9%	99.9%	99.0%	99.3%	99.0%	89.2%
UK	100.0%	100.0%	88.5%	99.9%	99.8%	45.9%
EU 28	99.4%	96.9%	68.1%	97.6%	89.6%	25.1%

6.3.2 Total coverage by technology for each country

	DSL***	VDSL	FTTP	WiMAX	Cable***	DOCSIS 3.0	HSPA	LTE	Satellite
AT	98.4%	81.6%	7.1%	16.5%	39.1%	39.1%	98.0%	60.1%	100.0%
BE	99.9%	90.0%	0.4%	15.1%	96.2%	96.2%	97.8%	67.8%	100.0%
BG	85.1%	0.0%	28.3%	64.6%	64.5%	61.4%	99.6%	36.1%	100.0%
HR	94.6%	43.8%	8.8%	2.0%	31.0%	21.8%	97.7%	58.1%	100.0%
CY	100.0%	60.2%	48.8%	0.0%	56.3%	56.3%	99.0%	0.0%	100.0%
CZ	97.0%	45.7%	13.9%	70.6%	33.4%	31.9%	97.0%	91.9%	100.0%
DK	98.2%	65.8%	51.6%	0.0%	63.1%	63.1%	99.0%	99.0%	100.0%
EE	33.8%	8.6%	68.7%	40.9%	68.9%	62.1%	99.0%	79.2%	75.4%
FI	94.0%	48.4%	37.7%	2.3%	44.3%	44.3%	99.5%	92.1%	100.0%
FR	99.5%	15.5%	13.6%	0.0%	29.2%	29.2%	99.7%	75.4%	100.0%
DE	95.8%	43.0%	4.4%	10.1%	62.4%	61.6%	92.5%	92.1%	100.0%
EL	99.3%	33.8%	0.4%	0.1%	0.0%	0.0%	99.3%	70.2%	100.0%
HU	88.7%	49.9%	20.8%	0.0%	64.3%	60.4%	98.2%	73.0%	100.0%
IS	96.1%	84.3%	52.9%	4.0%	0.0%	0.0%	97.5%	72.3%	0.0%
IE	92.5%	60.8%	1.7%	26.6%	42.4%	40.7%	94.6%	87.0%	100.0%
IT	98.2%	24.3%	19.5%	47.2%	0.0%	0.0%	97.7%	77.0%	100.0%
LT	69.2%	0.0%	94.9%	90.3%	53.4%	42.9%	98.6%	79.9%	50.0%
LV	48.6%	12.7%	83.9%	44.6%	34.3%	28.6%	99.2%	65.0%	20.3%
LU	100.0%	88.8%	42.8%	0.0%	70.5%	65.0%	99.6%	96.0%	100.0%
MT	100.0%	75.0%	8.4%	100.0%	100.0%	100.0%	99.0%	67.0%	100.0%
NL	100.0%	68.9%	28.2%	0.0%	96.8%	96.8%	99.6%	99.6%	100.0%
NO	90.4%	36.5%	40.0%	0.0%	49.5%	49.5%	98.6%	83.0%	100.0%
PL	75.6%	28.5%	7.3%	2.5%	40.5%	39.5%	99.5%	66.7%	100.0%
PT	99.1%	0.0%	65.8%	0.0%	80.1%	80.0%	96.7%	94.2%	100.0%
RO	71.4%	13.7%	58.0%	67.4%	32.7%	29.3%	99.7%	55.8%	100.0%
SK	70.9%	11.7%	48.0%	50.1%	28.4%	25.4%	91.1%	52.2%	100.0%
SI	90.8%	57.2%	42.2%	0.3%	37.2%	34.8%	99.4%	89.7%	100.0%
ES	88.5%	11.0%	44.8%	57.1%	47.8%	47.8%	99.7%	76.3%	100.0%
SE	97.9%	18.3%	56.4%	0.0%	38.8%	34.0%	99.1%	99.2%	100.0%
CH	99.4%	79.7%	25.9%	0.0%	98.1%	98.0%	99.0%	91.8%	100.0%
UK	100.0%	78.9%	1.4%	4.2%	46.8%	46.8%	99.0%	84.0%	100.0%
EU 28	93.5%	37.6%	18.7%	19.6%	43.5%	42.7%	97.3%	79.4%	99.3%

6.3.3 Rural coverage by technology for each country

	DSL***	VDSL	FTTP	WiMAX	Cable***	DOCSIS 3.0	HSPA	LTE	Satellite
AT	88.9%	2.4%	2.1%	18.0%	17.2%	17.2%	85.0%	4.6%	100.0%
BE	98.8%	69.2%	0.0%	3.3%	60.1%	60.1%	77.4%	28.2%	100.0%
BG	53.6%	0.0%	0.2%	12.3%	1.4%	1.4%	97.9%	0.0%	100.0%
HR	76.1%	0.5%	0.0%	3.2%	10.2%	9.7%	89.9%	7.5%	100.0%
CY	99.9%	51.0%	0.0%	0.0%	0.0%	0.0%	99.0%	0.0%	100.0%
CZ	81.5%	2.5%	4.9%	70.3%	1.8%	0.5%	79.0%	43.2%	100.0%
DK	95.0%	20.6%	42.0%	0.0%	6.5%	6.5%	99.0%	99.0%	100.0%
EE	36.7%	2.7%	47.4%	40.0%	41.0%	26.0%	98.0%	74.7%	75.4%
FI	66.4%	0.0%	7.5%	1.1%	0.0%	0.0%	97.2%	56.3%	100.0%
FR	97.6%	17.7%	1.7%	0.0%	1.3%	1.3%	98.4%	2.8%	100.0%
DE	84.7%	26.0%	0.8%	13.3%	14.0%	13.4%	62.5%	78.8%	100.0%
EL	96.3%	0.5%	0.0%	0.4%	0.0%	0.0%	96.6%	23.1%	100.0%
HU	73.4%	0.0%	4.0%	0.0%	19.2%	17.4%	94.2%	14.9%	100.0%
IS	89.0%	69.1%	2.3%	7.0%	0.0%	0.0%	93.2%	46.9%	0.0%
IE	86.6%	7.3%	0.0%	20.4%	1.8%	1.7%	85.3%	64.6%	100.0%
IT	85.7%	0.0%	0.0%	47.2%	0.0%	0.0%	81.5%	16.1%	100.0%
LT	15.1%	0.0%	58.9%	83.8%	0.0%	0.0%	95.6%	36.0%	50.0%
LV	8.2%	0.0%	43.7%	18.7%	0.0%	0.0%	97.3%	4.2%	20.3%
LU	99.9%	88.1%	35.7%	0.0%	52.8%	0.0%	99.6%	89.5%	100.0%
MT	100.0%	0.0%	0.0%	100.0%	100.0%	100.0%	95.7%	0.0%	100.0%
NL	99.9%	51.1%	20.5%	0.0%	93.2%	93.2%	95.5%	95.5%	100.0%
NO	70.2%	13.4%	22.3%	0.0%	2.9%	2.9%	95.0%	31.7%	100.0%
PL	75.3%	25.1%	4.3%	1.4%	14.7%	10.8%	97.8%	3.4%	100.0%
PT	97.1%	0.0%	15.8%	0.0%	35.0%	34.8%	72.7%	57.6%	100.0%
RO	63.3%	1.8%	22.7%	33.2%	10.4%	7.4%	99.3%	17.8%	100.0%
SK	50.1%	0.0%	4.3%	50.4%	0.4%	0.0%	69.3%	0.0%	100.0%
SI	66.7%	15.2%	18.3%	1.1%	38.6%	37.2%	99.1%	88.2%	100.0%
ES	80.5%	14.1%	5.0%	49.8%	9.8%	9.8%	98.4%	20.1%	100.0%
SE	89.0%	0.5%	13.7%	0.0%	0.1%	0.0%	96.5%	98.0%	100.0%
CH	97.4%	38.7%	6.2%	0.0%	78.4%	77.8%	96.1%	69.9%	100.0%
UK	99.7%	42.4%	0.8%	2.7%	5.4%	5.4%	88.8%	9.4%	100.0%
EU 28	82.4%	15.1%	5.8%	18.5%	10.0%	9.2%	88.9%	27.0%	98.7%

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