Broadband coverage in Europe in 2011

Mapping progress towards the coverage objectives of the Digital Agenda

Digital Agenda for Europe

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Broadband coverage in Europe in 2011

Research Report

for the SMART 0027/2011 Project

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Executive Summary
Motivation

The purpose of the Broadband Coverage in Europe in 2011 (BCE 2011) project is to support the objectives of the European Union's Digital Agenda. Two of the Agenda's key objectives are to provide all European Union citizens with basic broadband coverage by 2013 and broadband speeds of at least 30 megabits per second by 2020. BCE 2011 is designed to measure progress towards that objective and identify where action will be needed to achieve it.

The project was commissioned by the Directorate General for Information Society and Media, DG INFSO (now DG Connect). Neelie Kroes, the Vice President of the European Commission responsible for the Digital Agenda for Europe, has pointed out that "accurate data is critical for delivering policy and regulation that enables broadband internet for all Europeans."

Methodology

With that need in view, DG INFSO requested a study to be based on a survey of broadband network operators and national regulatory agencies. The study was to cover all the 27 countries of the EU and also Norway and Iceland. The main objective was to research the coverage of each of the nine main broadband technologies – meaning what proportion of homes have access to services using each technology.

The study was also to estimate the coverage of "combinations" of technologies. Since the coverage areas of the different technologies will often overlap, this meant looking at the number of homes passed by each different technology capable of delivering a chosen level of performance and estimating the total number of homes which is served by at least one of the technologies. The two technology combinations chosen to report on were "Standard Broadband", combining DSL, FTTP, WiMAX and Standard Cable and "Next Generation Access (NGA) Broadband" combining VDSL, FTTP and Docsis 3 cable. Standard Broadband includes the main fixed-line technologies which are capable of providing basic broadband of at least 144kbps download speed for end-users. NGA Broadband includes the technologies which are needed to meet the Digital Agenda 30Mbps objective.

To achieve an accurate estimate of technologies and combinations, Point Topic successfully proposed a study which would map technology coverage at the level of sub-national regions. The regions used follow the EU-sponsored scheme for "Nomenclature of Units for Territorial Statistics" (NUTS), and specifically the NUTS 3 level which mostly corresponds to familiar administrative divisions such as counties, *departements*, or provinces. Working at the regional level allows a much more firmly based assessment of total coverage and the split between the more urban and the rural sectors in each country.

National Regulatory Authorities (NRAs) and operator respondents were asked to provide data at the country level and at the NUTS 3 level where possible. Thanks not least to the very valuable support of DG INFSO a high proportion of them did so.

Point Topic would like to take this opportunity to thank DG INFSO and all the respondents to the survey for their support. We would also like to thank all the consultants who produced earlier Digital Agenda reports on which this work has drawn heavily. Particular thanks are due to IDATE, who also helped, with the approval of the FTTH Council, by providing their current country-level data on FTTP coverage.

Results

The results show that the European Union already has standard broadband available for the great majority of EU homes, 95.7%, over 200 million altogether. It is also now half-way towards the goal of 30Mbps access for all by 2020. Over 50% of EU homes – 105 million - already had NGA broadband available to them. (The results quoted here are for the EU 27 countries. The results for the study countries as a whole are virtually the same as far as coverage percentages are concerned, as shown in the chart below.)

The gap is inevitably larger in rural areas, particularly where NGA is concerned. 78% of rural EU homes have access to standard broadband but only 12% - 5 million - have NGA available. Thus 35 million of the 40 million rural homes in Europe are waiting for NGA to arrive. Bringing it to them is likely to require considerable effort and investment.

As far as individual technologies are concerned, the research shows that DSL is by far the most important fixed line broadband technology in Europe today, with 92% coverage of households. Standard cable comes next with 42%. WiMAX has under 15% coverage.

Looking at NGA technologies, Docsis 3, which is also included in the standard cable figures, is most important with 37% coverage. VDSL, which is included in the DSL figures, is next at 21% and FTTP is available to just 12% of homes.

Total coverage in Europe by technology
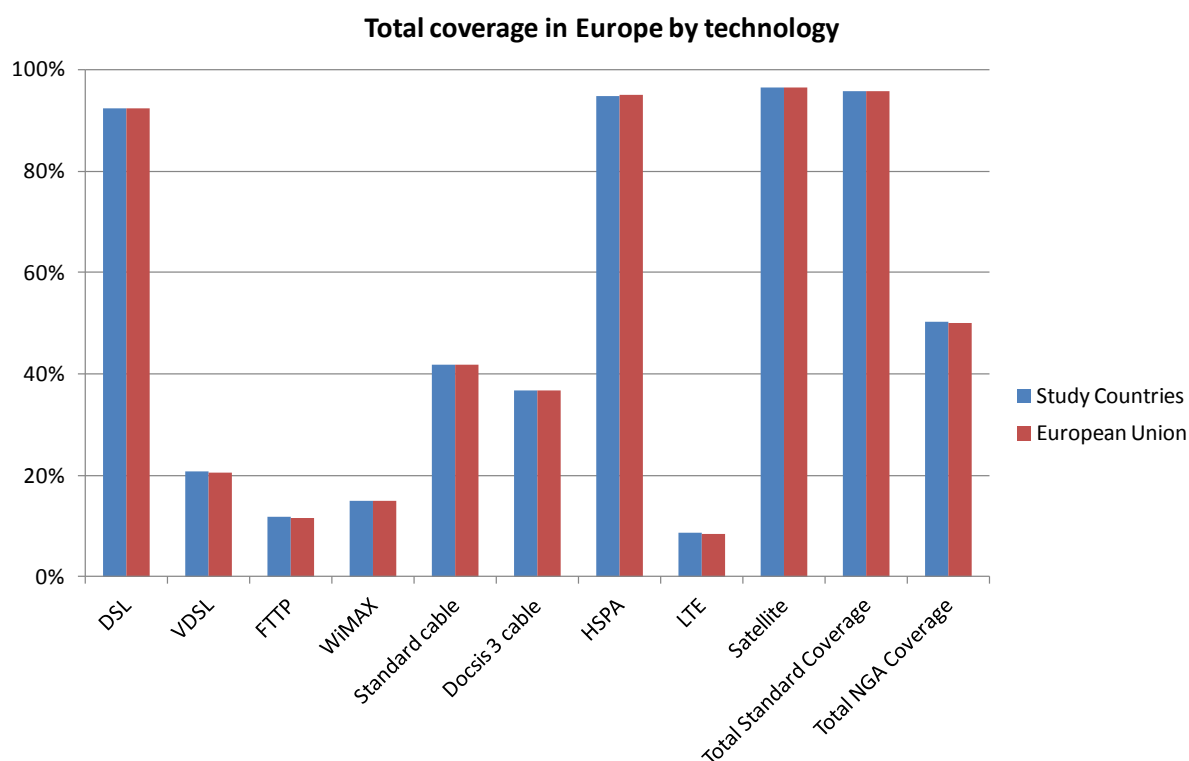
As for mobile broadband, HSPA has rapidly grown to 95% coverage, ahead of DSL and with almost as many homes passed as all the standard broadband technologies combined. At the other end of the scale, LTE is still very new with less than 9% coverage.

Looking at how these Europe-wide figures relate to coverage area by area, the map below shows a complex picture for NGA. This is the combination which shows the widest variations in coverage. Standard broadband is more uniform.

Some of the most densely populated countries - the Netherlands, Malta, Belgium - are already at or near 100% coverage. On the other hand, 208 of the 1324 NUTS 3 areas had 0% NGA availability at the end of 2011, many of them in Western Europe.

This is one area where the eastern side of the EU is taking a lead. Countries such as Lithuania, Bulgaria and Slovenia have seized the opportunity to overcome the deficiencies of their legacy networks by rolling out fibre.

NGA coverage in the study countries

Next Generation Access coverage

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

Source: BCE 2011
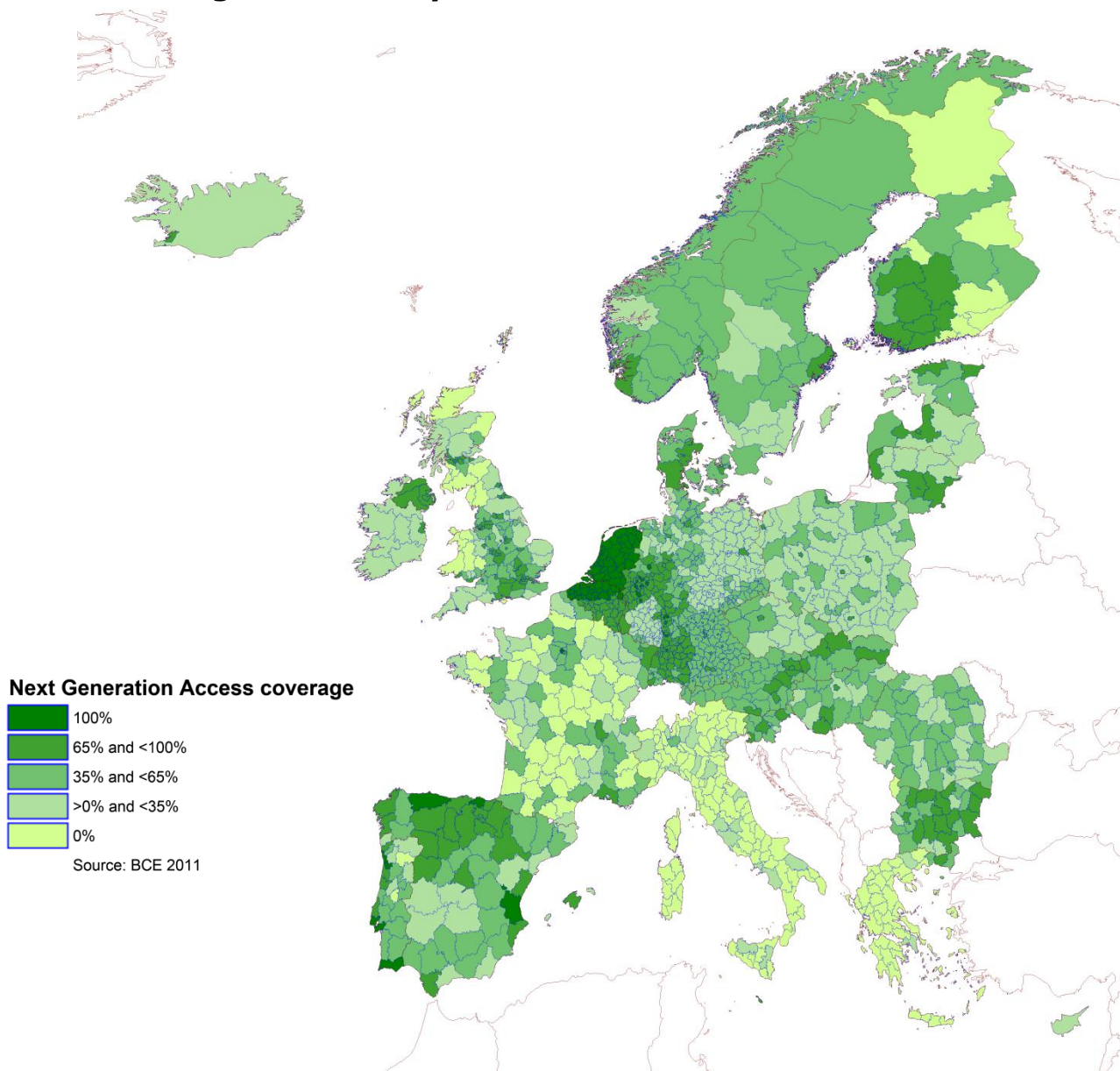
Conclusions

Point Topic believes this is the first time that such a broadband map has been achieved for Europe as a whole. As a result the project has been able to provide more accurate assessments of coverage at the country level than were possible before and a graphic picture of regional broadband coverage across the whole EU and also Norway and Iceland. We hope this can make a major contribution towards the successful development of policy in this area and the achievement of the Digital Agenda objectives.

1 Introduction

1.1 Project outline

Supporting the Digital Agenda

The purpose of the Broadband Coverage in Europe in 2011 (BCE 2011) project is to support the objectives of the European Union's Digital Agenda[1] . Two of its key objectives are to provide all European Union citizens with basic broadband coverage by 2013 and broadband speeds of at least 30 megabits per second by 2020. BCE 2011 is designed to measure progress towards that objective and identify where action will be needed to achieve it.

With this aim in view, DG INFSO, the Directorate General for Information Society and Media of the European Commission (know as DG Connect from 1 July 2012) invited consultants to tender for a project to survey the coverage of all the main broadband technologies in September 2011.

The nine technologies for which coverage data was required were DSL, VDSL, FTTP, WiMAX, Standard Cable, Docsis 3 Cable, HSPA, LTE and satellite. (See the Appendices to this report for definitions of these technologies and other concepts used by the project.) Data was wanted for end-2011 for all the 27 European Union countries plus Norway and Iceland (the 29 "study countries"). Rural and national coverage of each technology was to be reported for each study country.

In addition DG INFSO requested the same data for two "technology combinations", taking into account the overlaps of different technologies providing similar performance for end-users. The combinations which are provided by the project are "Standard Broadband", comprising the net coverage of all the fixed-line technologies capable of providing at least 2Mbps downstream (DSL, FTTP, WiMAX and Standard Cable)[2] and "Next Generation Access Broadband" which represents the fixed-line technologies capable of at least 30Mbps (VDSL, FTTP and Docsis 3 Cable).

Overlapping coverage

The combination measures are vital for the purposes of the project because they show how far the EU, and associated countries, has got towards the objectives of universal coverage of basic broadband by 2013 and 30Mbps broadband by 2020. But they depend on having some statistically sound way of measuring the overlap of different services.

Clearly it is not possible to simply add the coverage percentages of different technologies to reach a total coverage figure. Competing operators using different technologies will all tend to build their networks to serve the same or similar areas. In particular they generally choose to invest in the more densely populated towns and suburbs rather than rolling out in country areas. In the UK, for example, Point Topic calculates that the combined coverage of a cable network which passes 47% of the homes in the country, and a VDSL network which will pass 41% by the end of 2012 will be only 73% net coverage – thus 15% of gross coverage has been lost to overlaps.

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[1] http://ec.europa.eu/digital-agenda
[2] DSL coverage includes VDSL and Standard Cable includes Docsis 3 Cable

In turn, the only way to identify and measure overlapping and complementary coverage is to segment a country area by area and see which networks are present in each case. Point Topic was able to propose a solution of this kind because of its earlier experience, going back to 2005, of mapping broadband coverage in detail, first of all in the UK and more recently in all the EU 27 and a number of associated countries.

Mapping by sub-national regions

Point Topic's specific proposal was to collect coverage data for sub-national regions, and in particular the regions known as "NUTS 3" areas. NUTS stands for "National Units for Territorial Statistics" and it provides an internationally comparable set of regions across the EU and associated countries. Thus the NUTS scheme supports the most consistent available view of Europe-wide issues such as broadband coverage with a ready-made statistical framework. NUTS 3 level areas in particular are mainly of 150,000 to 800,000 population, with 1,324 of them in all comprising the 29 study countries.

In this way, Point Topic has taken the project a major step beyond DG INFSO's original specification. As a result it has been able to provide more accurate assessments of coverage at the country level and a graphic picture of regional broadband coverage across the whole EU and also Norway and Iceland. We believe this is the first time that such a broadband map has been achieved for Europe. We hope it can make a major contribution towards the successful development of policy in this area and the achievement of the Digital Agenda objectives.

Acknowledgements

Point Topic believes the project has been successful and if so our thanks are due to many groups and individuals who made that possible.

The support of DG INFSO in general and the project team in particular has been essential and much appreciated. They used and shared their Europe-wide contacts to ensure a good response to the survey of coverage, which was at the core of the project. Not least, Neelie Kroes, the Vice President of the European Commission responsible for the Digital Agenda, validated our work by pointing out that "accurate data is critical for delivering policy and regulation that enables broadband internet for all Europeans." She invited telecoms providers throughout Europe "to participate in this survey, so we have more accurate data to assist our joint efforts to offer broadband to citizens and businesses Europe-wide." This support was very valuable for achieving a good response to the Survey.

The respondents to the Survey also deserve our grateful thanks. They tackled a demanding and novel request for information with enthusiasm and care. We learnt a lot from our discussions with them and we hope the results do justice to their contribution. The figures in our deliverables are not always exactly the same as those our respondents provided, because of many issues, such as those arising out of different definitions and statistical bases for example. But we always aimed to give priority to what our respondents told us and to reflect it as closely as possible within the requirements of consistency and the overall framework.

The earlier work of other consultants for the Digital Agenda has also been an essential input to this project from the beginning. IDATE's report on Broadband Coverage in Europe as of December 2010 provided one of the starting points for our country estimates. IDATE also generously provided the project with access to key results from its research on FTTx coverage on behalf of the FTTH Council for Europe. IDATE's expertise is widely reflected in our results for FTTP.

1.2 Project methodology

Structure

The structure of the BCE 2011 project was simple. DG INFSO's specification for the project required that data collection should be based on a survey of broadband network operators and national regulatory authorities (NRAs) in the study countries. The Inception phase of the project developed the Survey Questionnaire and the supporting definitions and categories required for the project. The Survey was launched once all these had been approved.

Point Topic also chose to complement the Survey with a parallel research programme to help in checking the validity of the survey results and fill any gaps left by them. The final phase of the project involved integrating, checking and testing the results to produce the required unified picture of broadband coverage in Europe.

Project Survey

The Survey Questionnaire needed to gather data on one basic question – how many homes have access to broadband? - applied across three dimensions:

Technology – for each of the broadband technologies surveyed

Geography – for each country as a whole and for each region within each country

Rurality – for the rural areas of each country and each region compared with the corresponding country or region as a whole.

The key definitions for technologies and their coverage are provided in the Appendices to this report.

In addition, the Survey included supplementary questions to establish the context of the data supplied in circumstances where the respondents were working with a wide range of definitions, reference dates and confidentiality issues.

A questionnaire was developed and administered online using standard survey software. To provide more background and explanation of the Survey objectives, and an alternative route for providing data, Point Topic also prepared a series of spreadsheets featuring the main points of the Survey for each country. Some respondents chose to report their detailed data by returning the spreadsheet rather than completing the online questionnaire.

More detailed information about the Survey and the reasons for carrying it out can be found at the microsite set up for the project:
 <http://point-topic.com/Broadband_Coverage_in_Europe_in_2011>.

Confidentiality

Confidentiality was an important issue for many respondents to the Survey. In many cases, the data provided, particularly at NUTS 3 level, was regarded as commercially sensitive.

To meet respondents' need for confidentiality the publication of the project's results is limited to country-level figures for single technologies and technology combinations plus HSPA for NUTS 3 areas. The technology combinations (Standard Coverage and NGA Coverage) combine the coverage of multiple technologies so the coverage of any one

technology is usually obscured. In a similar way, HSPA Coverage, although referring to a single technology, combines the data for the multiple mobile operators which are offering service in all the study countries.

A further layer of data, coverage by NUTS 3 area for each technology surveyed, was provided to DG INFSO and is held by them as commercially confidential.

Point Topic also asked all survey respondents to state the level of confidentiality which they wanted to apply to the data they provided. These ranged from allowing the data to be freely available to not permitting any distribution and requiring it to be deleted by Point Topic as soon as the project was completed.

Point Topic was pleased to be able to meet respondents' confidentiality concerns and is grateful for the confidence placed in the company.

Parallel research

The Parallel Research programme was organised mainly on a country by country basis, but with overview tasks to bring together and support the country-level work where needed.

The programme relied on conventional techniques and published sources, including publications by NRAs and operators included in the Survey. The members of the research team for BCE 2011 also produce Point Topic's Operator Source and Global Broadband Statistics services and are familiar with the type of data used for this project and the sources from which it is derived.

Besides NRA and operator data the research drew on existing published research for the Digital Agenda programme and Point Topic's own research services and projects, for example for the European Space Agency.

IDATE also generously provided the project with access to key results from its research on FTTx coverage on behalf of the FTTH Council for Europe, specifically its February 2012 table of country level FTTx coverage and subscription numbers. Although they were sometimes superseded by later data, for example Survey responses from the NRAs, the IDATE figures were an essential input to the project's coverage estimates. Point Topic thanks IDATE and the FTTH Council for their contribution to the project.

The key deliverable from the Parallel Research was a Country Summary for each of the Study Countries including initial estimates for the coverage of each technology in each country as a whole. This was backed up by extensive data and mapping from the major operators in each country, plus NRA reports and details of broadband strategies and plans.

Data integration and modelling

The final major task of the study was to bring together the data from both the Operator Survey and the Parallel Research to produce the actual coverage estimate outputs from the project.

This work was done for each technology individually, in each country. In the best cases data from one of the respondents provided figures for total and rural coverage in each NUTS 3 area. At the other extreme the only data available was for total coverage by the technology in the country as a whole. (The Parallel Research programme was tasked to provide a best efforts estimate of total coverage as a minimum.) Even in these cases

the coverage totals were often supported by "presence" data, showing in which NUTS 3 areas the technology was available.

Where necessary the total and rural coverage for each NUTS 3 area was estimated from national coverage and presence data using simple models. The models relied on simple assumptions, for example, that investment in technologies like VDSL, cable and FTTP would strongly favour urban over rural areas.

Most cases were in between these two extremes. For example, data on NUTS 3 rural coverage was often missing even though total coverage data was provided. Here modelling assumptions were used to estimate rural coverage. Another difficulty was around the lack of good statistics about urban-rural splits and the varying definitions of rurality used by different respondents.

Taking account of all the above, the project succeeded in providing a complete set of estimates for total and rural coverage of all nine technologies considered and for all 1324 NUTS 3 areas in the 29 study countries

Estimating coverage for technology combinations

The individual technology estimates were in turn used to produce estimates of the total coverage provided in combination by technologies with similar performance characteristics. The particular examples chosen were fixed-line standard broadband coverage, combining DSL, FTTP, WiMAX and Standard Cable, and Next Generation Access Coverage, combining VDSL, FTTP and Docsis 3 Cable.

The project used a standardised approach to make these combination estimates. This was required to produce the technology combinations and also where we had data from multiple operators providing the same technology in the same area.

The default formula to estimate combination coverage was to take the average of:

The minimum possible coverage; equal to the coverage of the most widespread technology or operator in the area

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.

The default formula was applied in the great majority of cases but was varied in a few countries where some technologies were judged to be more complementary than overlapping in coverage. 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.

Note that the estimates for combination coverage at the national level were made by summing the estimates for the NUTS 3 areas in the country and not by applying this formula only at the country level. This provides a more accurate answer, at a higher confidence level, than simply taking the country-level average.

Finalisation

Once the NUTS 3 and country level datasets had been completed as outlined above they were provided to DG INFSO and checked and where necessary amended over several cycles. Point Topic also provided a series of "Country Assessments" showing the source and basis of the coverage estimates for each country. These assessments were reviewed and discussed in a project meeting between DG INFSO and the Point Topic team and used as the basis for further corrections. The final draft datasets were sent to

the NRAs of all the countries involved for their comments leading to the final changes before publication.

Finally, the finished datasets were used to generate graphic maps by using GIS software. The following maps were produced for each country and for the study countries as a whole.

Total standard broadband coverage by NUTS 3 area

Total NGA broadband coverage by NUTS 3 area.

1.3 Project deliverables

1.3.1 Summary of deliverablees

The deliverables provided by the BCE 2011 project were as follows.

Deliverables for publication

1. Research Report (this document)

2. Country-level dataset: coverage by technology

3. NUTS 3-level dataset: coverage by technology combination and HSPA

Additional deliverables for internal use by DG INFSO

4. Methodology Report

5. NUTS 3-level dataset: coverage by technology

1.3.2 Research Report

Introduction

This provides an overview of the objectives, methodology and deliverables of the Broadband Coverage in Europe in 2011 (BCE 2011) project.

The Project Outline explains DG INFSO's objectives in commissioning the project as a contribution towards achieving the targets of the Digital Agenda programme, and Point Topic's proposed approach. It summarises the project plan and the invaluable support provided by the National Regulatory authorities (NRAs) and broadband operators of all types in the study countries. It also explains the role of earlier Digital Agenda projects and how BCE 2011 relates to them.

The Methodology section explains the overall structure of the project and the key issues involved. It covers the Survey, which was the main basis of the project, Point Topic's approach to confidentiality, the Parallel Research programme, and the techniques used to integrate data from different sources and provide the complete set of research results required.

Finally this section provides a guide to the content and availability of the deliverables.

Europe Overview

This reviews the EU 27 and EU27+2 results as a whole. The first part is concerned with Europe-wide coverage as shown by the technology combinations and the Total and Rural coverage of individual technologies. It also shows how these results map onto the NUTS 3 geography of Europe for both Total Standard and Total NGA Coverage.

The second part compares the country-level figures for the standard, NGA and mobile technologies and for the Total and Rural estimates. It includes a series of bar charts showing the country coverage values for each technology and combination in rank order. The bar charts include values for both the EU 27 and EU27+2 groups of countries. The final section provides a set of data tables for all the coverage values and Europe-wide demographics.

Country Profiles

This section comprises results profiles for each of the 29 study countries. Each profile includes bar charts of the technology combination, total and rural coverage for each technology; maps showing Standard and NGA coverage for each NUTS 3 area; demographic and coverage data tables and brief discussion of the data results and mapping.

Country-level dataset

This dataset comprises basic demographics and coverage values for all the nine technologies and combinations, both Total and Rural for all 29 study countries plus the EU 27 and EU27+2 country groups.

NUTS 3-level dataset

This dataset is a listing of all 1,324 NUTS 3 areas in the study countries, in Excel alphabetical list order of their respective country codes and NUTS 3 codes. The data provided for each NUTS 3 area is the estimated Total and Rural coverage for the Standard and NGA combinations and for HSPA.

2 European overview

2.1 Europe-wide coverage

2.1.1 Coverage by technology combinations

**European coverage of technology combinations**
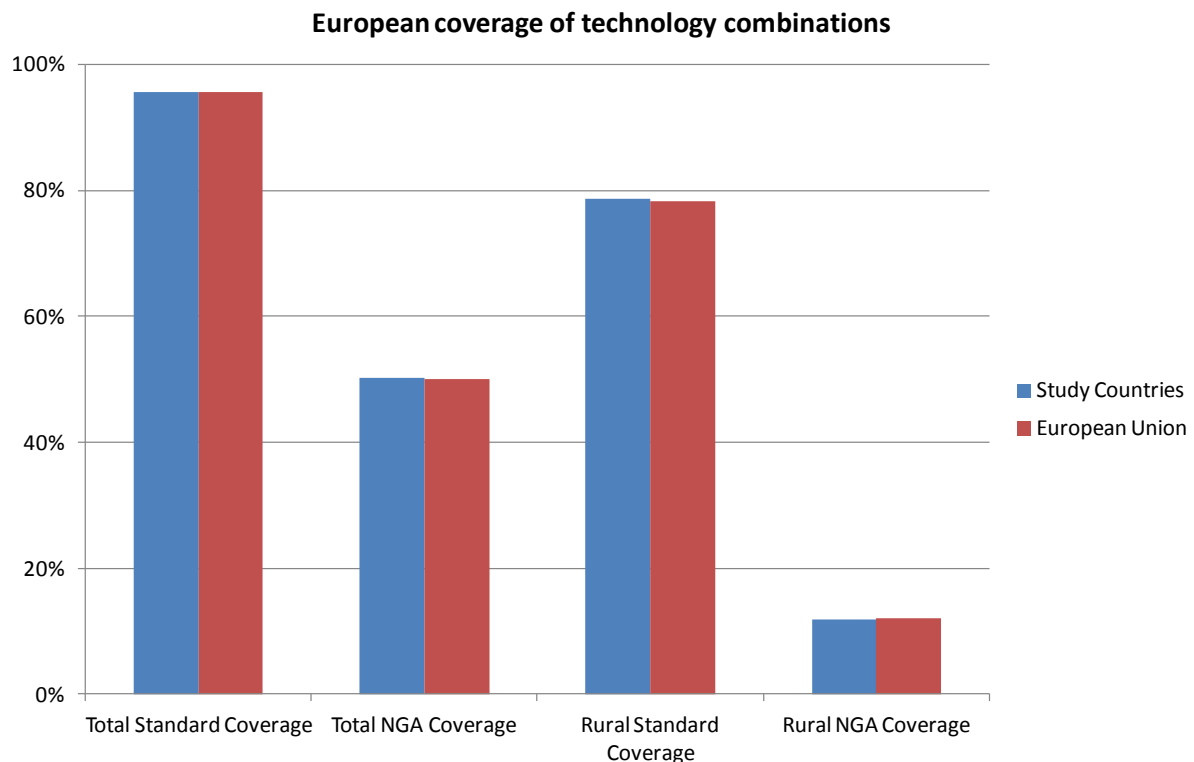
The central conclusions of the Broadband Coverage in Europe in 2011 (BCE 2011) project are illustrated above. For the first time the project was able to estimate the availability of broadband services across all the countries of the European Union (plus Norway and Iceland) taking account of all the main broadband technologies and of their distribution at sub-national level.

The results show that 95.7% of EU homes, over 200 million altogether, had access to at least a basic level of fixed broadband service by the end of 2011. (The figures for the study countries as a whole are virtually the same as the chart shows.) Over 50% of EU homes – 105 million - already had "Next Generation Access" services available to them, capable of delivering 30Mbps or more. This is an encouraging half-way milestone on the road to the Digital Agenda target of 30Mbps access for all by 2020.

The gap is inevitably larger in rural areas, particularly where NGA is concerned. 78.4% of rural EU homes have access to standard broadband but only 12.1% have NGA available. Thus 35 million of the 40 million rural homes in Europe are waiting for NGA to arrive and bringing it to them is likely to require considerable effort and investment.

2.1.2 Total coverage by technology

Total coverage in Europe by technology
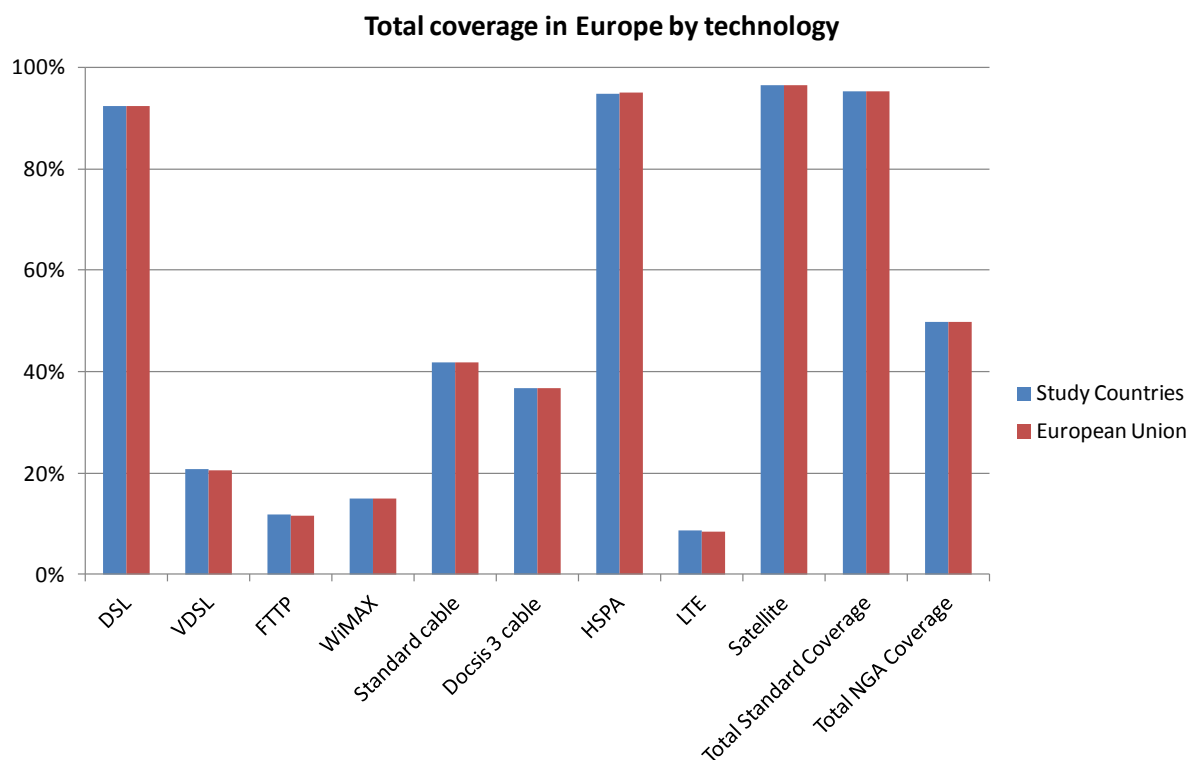
The chart above provides a profile of broadband coverage in Europe as of the end of 2011. Key conclusions are summarised below. (The source data for this chart and all others in this chapter is provided in section 3.4 below.)

1. DSL is by far the most important standard fixed broadband technology in Europe, with total coverage of over 92% of households

2. The cable networks account for the next largest contribution to standard broadband coverage with 42%

3. WiMAX is considerably less important with under 15% coverage across the study countries as a whole

4. When the coverage of all these networks is combined, also taking account of FTTP which is the only service available in some areas, the research shows that about 96% of the homes in Europe have access to at least a basic fixed-broadband service (called Total Standard Coverage, or TSC).

5. For fixed next-generation access (NGA) services the picture is considerably different. Here Docsis 3 over the cable networks is clearly the most important service at present with 37% coverage across Europe.

6. VDSL, the figures for which are also included in DSL, is the next biggest NGA service with 21% coverage. FTTP comes third on 12%.

7. Combining the net contribution of these services gives Total NGA Coverage of over 50% (50.2%). Although 37% of this is provided by Docsis 3 alone, the 33%

of total coverage of VDSL plus FTTP adds only 13% net coverage because of overlap between the technologies.

8. HSPA has almost 95% coverage in Europe on its own, ahead of DSL and only 0.8% short of TSC. But the performance over this service area is not very closely defined.

9. LTE on the other hand is the newest and currently the least widespread technology studied, with under 9% coverage. Most of this is due to a small number of countries but the number of countries and networks is increasing rapidly.

10. The new KA-band satellites are able to offer two-way broadband services of 2Mbps and above to virtually 100% of the premises within their footprints. After allowing for countries outside the footprints, or where satellite service providers are not active, this translates to 96% coverage of the study countries.

For completeness the chart shows total coverage for both the 29 study countries as a whole and the 27 countries of the European Union only. Clearly the two are virtually identical. Norway and Iceland, the non-EU countries included, account for only 1% of the population covered by the research. Although they are considerably more rural than the study countries as a whole – Norway is the most rural of them all – their rural areas are better served by broadband than average so the differences tend to cancel out.

Both averages are shown in the charts in this section and the country comparisons which follow but they are not usually distinguished in the text.

2.1.3 Rural coverage by technology

Besides researching the total coverage of broadband technologies the BCE 2011 project was also tasked to provide data on the coverage of the rural areas of Europe. Because of the financial barriers to supplying broadband in areas of low population density, the rural part of Europe is expected to present the most difficulty for achieving both the basic and 30Mbps Digital Agenda objectives.

The current situation reflects those difficulties. Standard broadband coverage in rural Europe is 78% against 96% for the study countries as a whole. The headline gap for NGA is much greater, with 12% coverage so far in rural areas against 50% as whole.

Note also that the definition of rurality is quite limited. Looking at the smallest administrative areas, only those with less than 100 inhabitants per square kilometre are classified as rural. Many whole provinces or even whole countries have population densities below this level but seen in finer detail they are a mix of urban and rural areas. (For convenience here we describe all areas which are not rural as urban, although many of them would not be described or recognised as towns or even suburbs in ordinary usage.)

Less than 19% of the population of Europe is estimated to live in rural areas on this definition, although full statistics are not available. But even areas with much higher densities than 100 persons per square kilometer will generally be uneconomic for the roll-out of new broadband networks on a purely commercial basis.

Rural coverage in Europe by technology
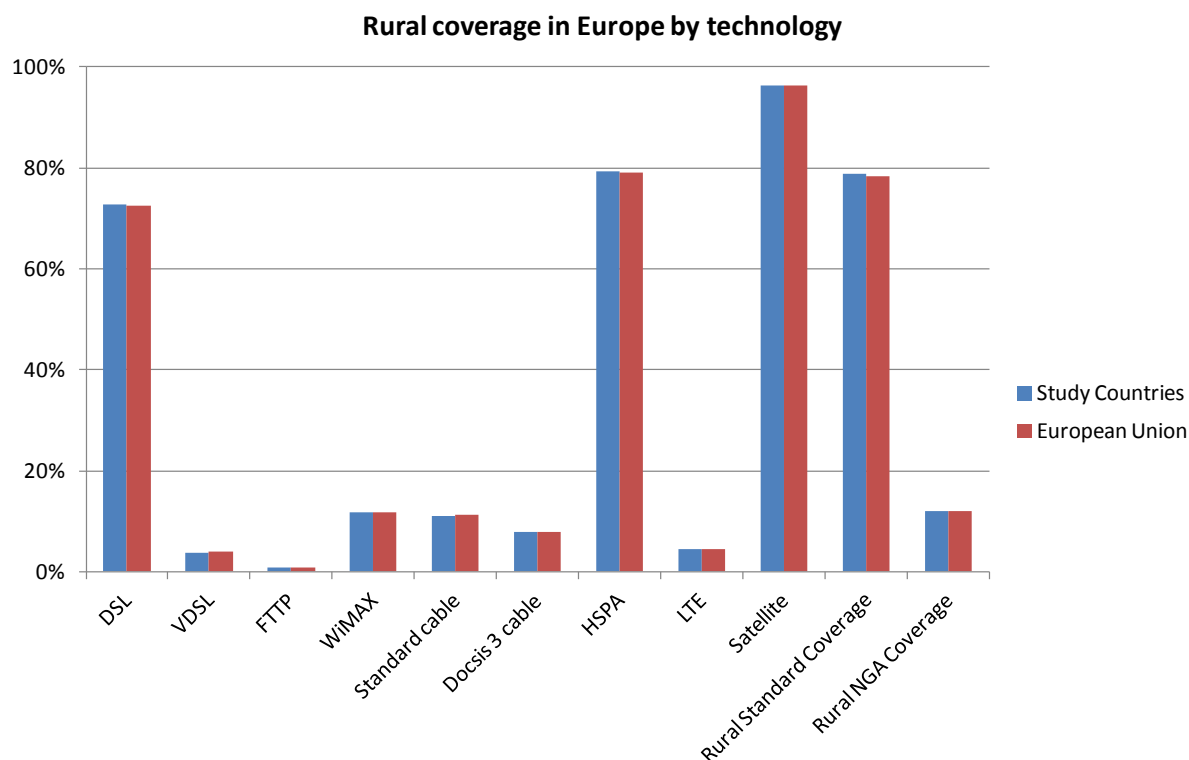
Looking at the rural profile, key conclusions are:

1. Even more than for the market as a whole, DSL is the main provider of fixed broadband access in rural areas. It provides 73% of rural coverage overall, which contributes 94% of rural standard coverage (RSC).

2. Despite the hopes expressed for it, WiMAX contributes less than 12% gross coverage to RSC so far. Even for WiMAX, urban areas offer more attractive markets.

3. Cable makes an slightly smaller gross contribution to coverage than WiMAX, at 11%. Given that cable networks need high population densities to achieve an economic return it is surprising that the figure is so high.

4. However, Docsis 3 cable is the biggest contributor to rural NGA coverage (RNC). With nearly 8% coverage it represents 66% of total RNC.

5. VDSL contributes another 4% to RNC and because of the existing twisted-copper-pair telephone networks in most areas it has the potential to do much more.

6. FTTP makes a negligible contribution to rural NGA at present, at less than 1% coverage, as would be expected from its economics. The total may be understated slightly because of the incidence of very small FTTP projects which fall below the size required for inclusion in the BCE 2011 research.

7. One positive factor for Rural NGA is that where networks do exist they are much more likely to be complementary than in the market as a whole. Rural VDSL, FTTP and Docsis 3 together have gross coverage of 12.5% and Point Topic estimates their net coverage at 11.9%, which is 95% efficient in terms of avoiding overlaps.

8. HSPA looks like the broadband saviour for some rural areas, with 79% coverage compared with 78% for the rural standard combination. On a simple model the combined rural coverage of HSPA and RSC should be about 90%.

9. LTE on the other hand has yet to make an appearance in rural areas, with Germany as the shining exception and Sweden some way behind, giving an overall average of 4%. This pattern suggests that LTE is unlikely to make much contribution to rural coverage unless it is mandated or subsidised in some way.

10. Satellite achieves the same percentage coverage in rural areas as for whole countries and its capabilities are better suited to rural demand.

2.1.4.Coverage by NUTS 3 areas

Map 2.01.01.Standard broadband coverage in the study countries

Standard broadband coverage

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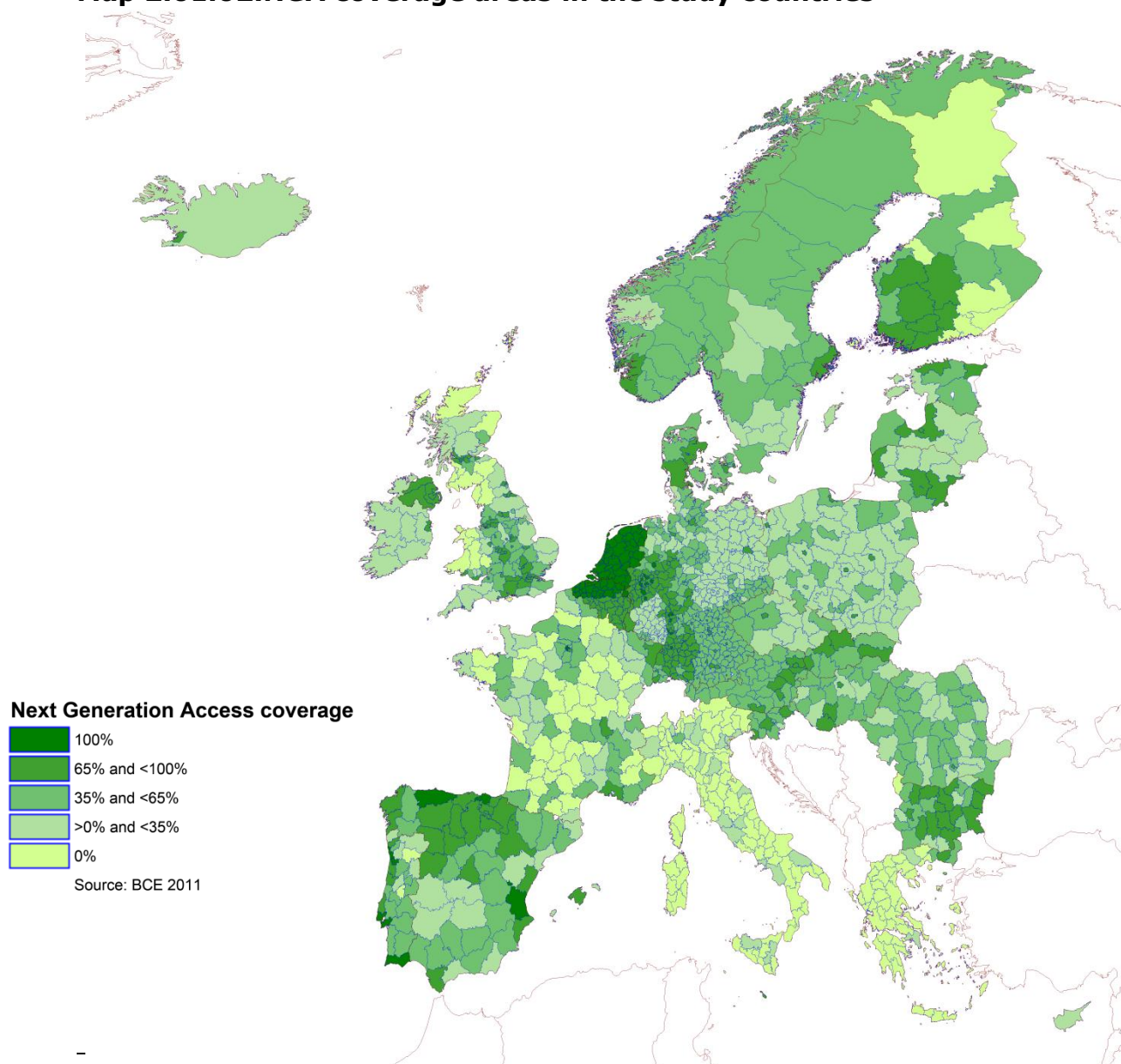- 0 and <75%

Source: BCE 2011
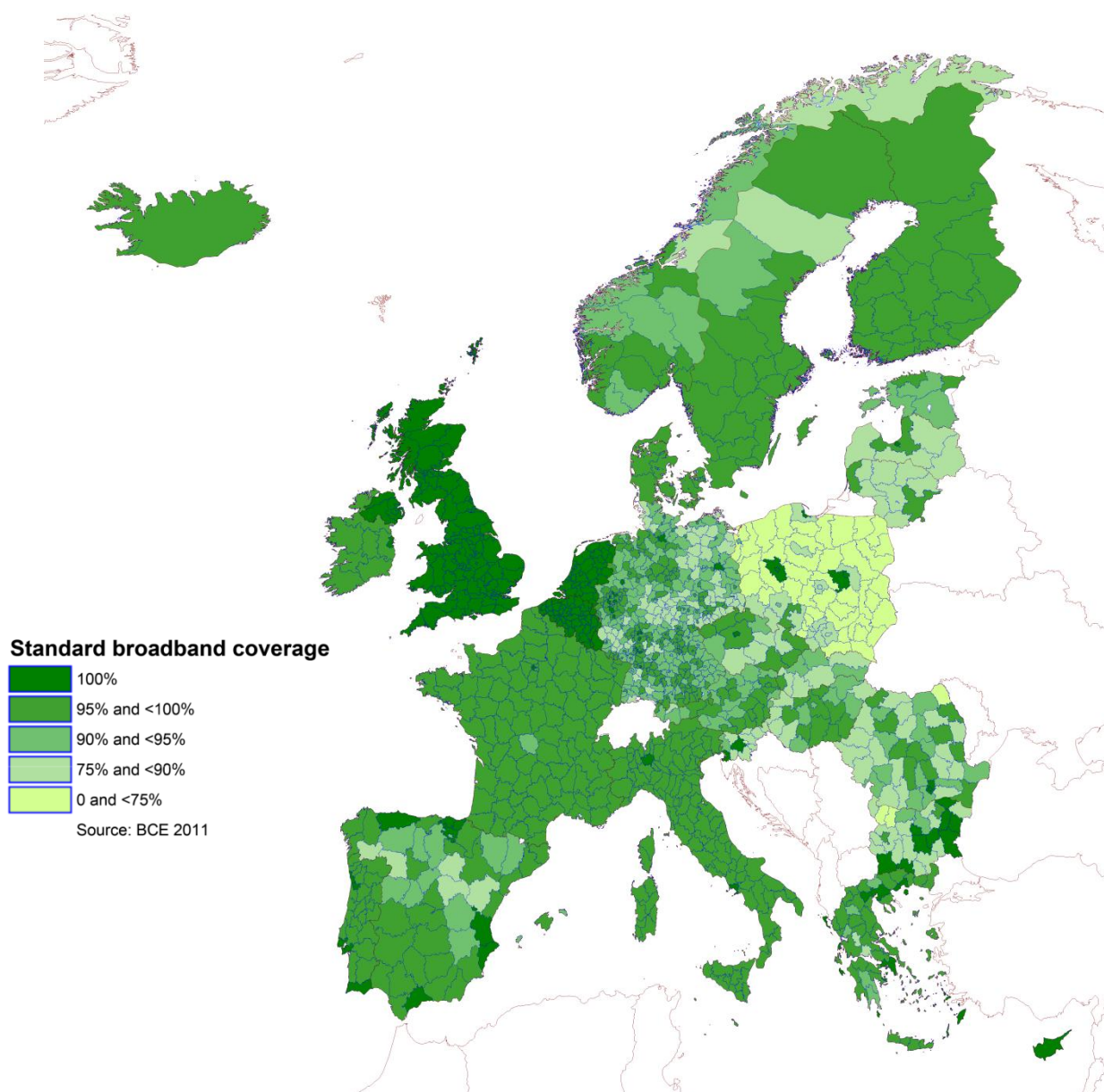
The maps in this section show how the two technology combinations, standard and NGA broadband coverage, are distributed across Europe.[3]

As far as standard coverage is concerned, the map shows a continent which has virtually complete coverage in its towns and cities, and their surroundings, but still has some way to go in the countryside.

The countries with the densest populations (Malta, the Netherlands, Belgium and the UK) already show 100% coverage. So do many urban areas right across the continent. Many whole countries have reached the 95% coverage level. At the other end of the scale, only a few areas have below 75% coverage but over 200 are below 90%. Many more would be found to have more limited coverage than is shown here if more stringent criteria for broadband performance were applied. Simply quoting over 95% standard coverage understates the scale of the task still to be accomplished to meet the first of the Digital Agenda objectives.

Map 2.01.02.NGA coverage areas in the study countries

Next Generation Access coverage
- 100%
- 65% and <100%
- 35% and <65%
- >0% and <35%
- 0%

Source: BCE 2011

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[3] The maps in this section do not show the NUTS 3 areas which are outside mainland Europe. The data for these areas is provided as a separate table at the end of this section.

Looking at NGA coverage the picture is almost reversed in some ways. Here countries in the eastern half of the EU are ahead of many of those on the western side. After the Netherlands, Malta and Belgium, at or near 100% coverage – largely due to the extent of their cable networks – many of the leaders – Lithuania, Bulgaria, Slovenia etc – are in the eastern half of the EU. They have seized the opportunity to overcome the deficiencies of their legacy networks by rolling out fibre to serve large apartment blocks where the economics can be very attractive.

Many areas with above average NGA coverage are in the eastern EU while many in the West have no coverage at all. 208 NUTS 3 areas had 0% NGA availability at the end of 2011; 60% of all NUTS 3 areas had below the average 50% coverage. Here again there is a long way to go.

Coverage data for NUTS 3 areas outside mainland Europe

Country	NUTS code	NUTS area name	Standard coverage	NGA coverage
France	FR910	Guadeloupe	97.2%	0.0%
France	FR920	Martinique	98.3%	0.0%
France	FR930	Guyane	96.3%	0.0%
France	FR940	Réunion	98.8%	0.0%
Portugal	PT200	Açores	99.3%	95.0%
Portugal	PT300	Madeira	99.5%	83.5%
Spain	ES630	Ceuta	92.2%	0.9%
Spain	ES640	Melilla	96.6%	0.0%
Spain	ES703	El Hierro	81.5%	24.2%
Spain	ES704	Fuerteventura	87.8%	14.4%
Spain	ES705	Gran Canaria	96.7%	14.8%
Spain	ES706	La Gomera	85.0%	35.3%
Spain	ES707	La Palma	90.5%	13.4%
Spain	ES708	Lanzarote	94.7%	12.2%
Spain	ES709	Tenerife	95.5%	9.7%

2.2 Country comparisons of total coverage

2.2.1 Standard technologies

Total Standard Coverage by country
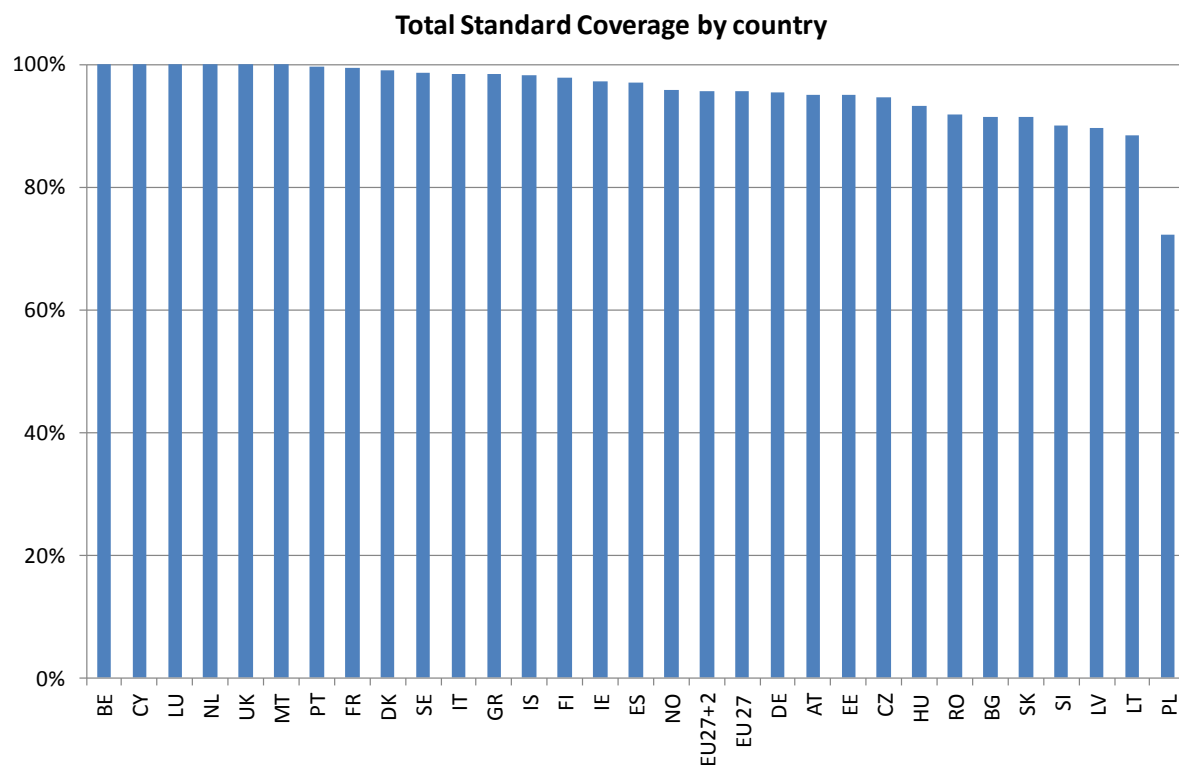
Total Standard Coverage combination

The "Standard Coverage" combination is meant to give an indication of the extent to which homes in each country or region can access fixed broadband service capable of providing at least 2Mbps downstream speed. The four technologies which are taken into account to calculate the combination are DSL (which includes VDSL), Standard Cable (which includes Docsis 3 cable), FTTP and WiMAX. This section looks at the contribution of DSL, Standard Cable and WiMAX in particular. FTTP is generally classified as an NGA technology, so it is considered more fully in the next section, but it can add significant extra standard coverage, particularly in countries where DSL coverage is limited.

As the chart shows, 17 of the 29 Study Countries have Total Standard Coverage over the European averages of 95.7%. All the former communist-bloc countries fall below the average as do Germany and Austria, narrowly. On the other hand, five countries show 100% TSC and 13 are above 98%.

DSL coverage

DSL, as indicated by the chart below, is by far the biggest contributor to the TSC combination. It accounts for at least 96% of TSC in all but six countries – which are all countries with below average TSC. The countries with less than the European average of 92.3% DSL coverage are the same as those with less than average TSC except for Austria, which is just above average coverage for DSL.

The distribution of DSL coverage reflects the pattern of past investment in the telephone network. Where a universal service obligation (USO) to provide telephone service has been implemented using fixed-line twisted copper-pair infrastructure then the availability of DSL has naturally followed. Where USO implementation was incomplete, or carried out by alternative means such as wireless telephony, then DSL coverage can be limited even now.

This history also explains the limitations of DSL coverage. The definition most widely used for DSL availability by telephone operators is that a premises has DSL coverage if it is in the service area of an exchange enabled for DSL. On this basis any country which has got 100% telephone USO implementation using copper infrastructure can have 100% DSL coverage as long as every exchange is enabled for DSL. But many homes will be too far from their serving exchange to get good broadband. A definition based on actual broadband performance produces significantly lower estimates for DSL coverage as discussed in more detail in the Country Profiles section.

Total DSL coverage by country
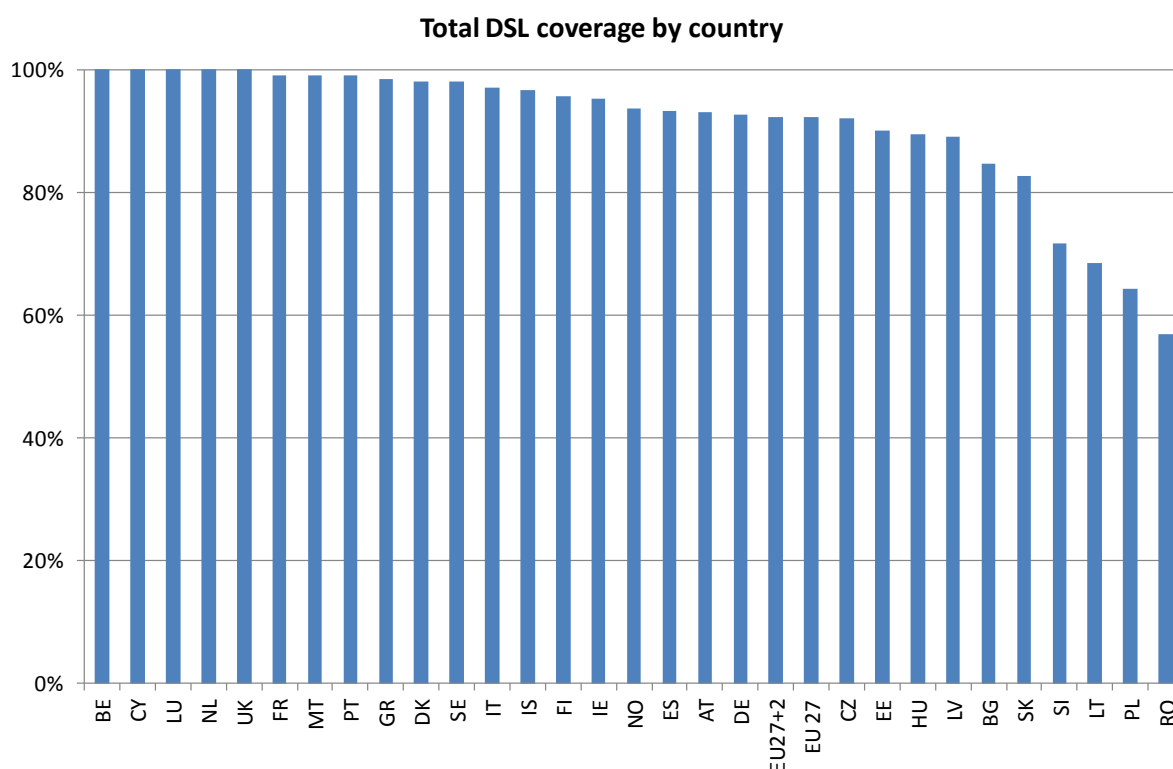
Standard Cable coverage

Cable networks are the next most widespread component of the TSC after DSL, but they add relatively little extra coverage. This is because they are overwhelmingly concentrated in relatively densely-populated urban and semi-urban areas and generally overlapped by DSL. The three most urbanised countries have cable coverage over 95%. Nowhere else has more than 78% and three countries have no cable networks providing broadband services at all. European coverage as a whole is only 42%.

On the other hand, Docsis 3 services over the cable networks make a very important contribution to the availability of NGA in the study countries, as discussed in the next section.
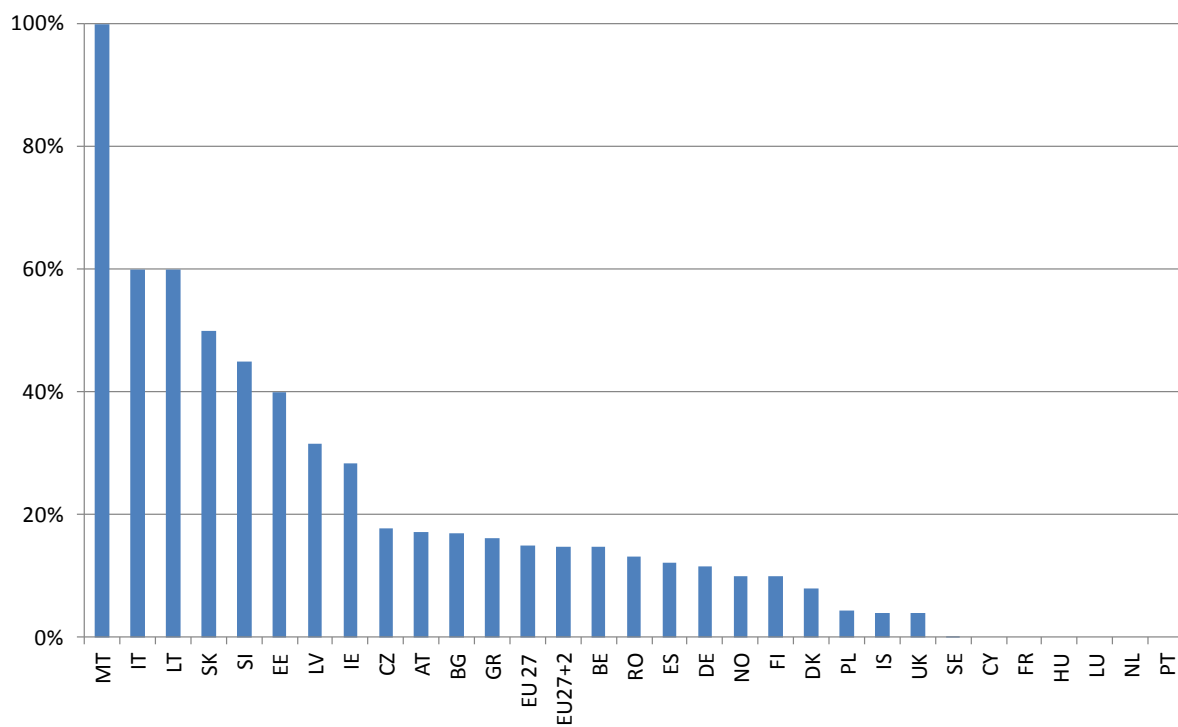
Total Standard Cable coverage by country
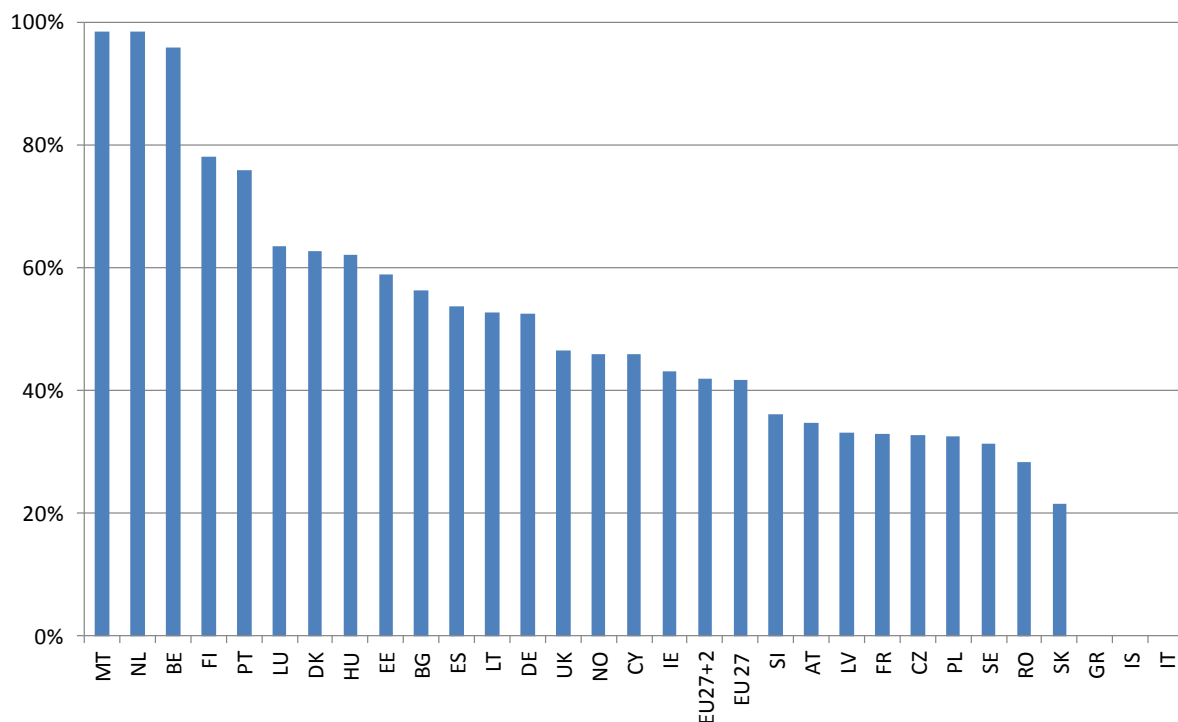
WiMAX coverage

The coverage of WiMAX is very hard to assess accurately. One fundamental reason is that WiMAX signals can often be received over a very large area, at least in principle, so

**Total WiMAX coverage by country**

operators may claim much greater coverage than they are realistically marketing to or supporting. The industry is also highly fragmented, with ease of entry and limited prospects favouring smaller operators. Also, many more plans and projects are announced than actually come to fruition and survive.

Having said that, WiMAX does play an important role in some countries, filling in gaps or providing a competitive alternative to the bigger networks. But despite being often quoted as a solution for rural not-spots the BCE 2011 survey showed that where WiMAX coverage is highest it includes a big urban element. It does add some coverage to the TSC where other networks are limited but it is not a major factor. Urban services are important in most of the countries with above average WiMAX coverage.

In six countries the project found no active WiMAX services for consumers at all. Reasons for this include; the country concerned has excellent broadband coverage anyway so there is no need for WiMAX; those services which are offered are aimed at businesses, not consumers; proposed networks have failed to get off the ground, presumably for economic reasons. In one further country, Sweden, WiMAX coverage was found to be very low, only 0.1%, also reflecting the high availability of other services.
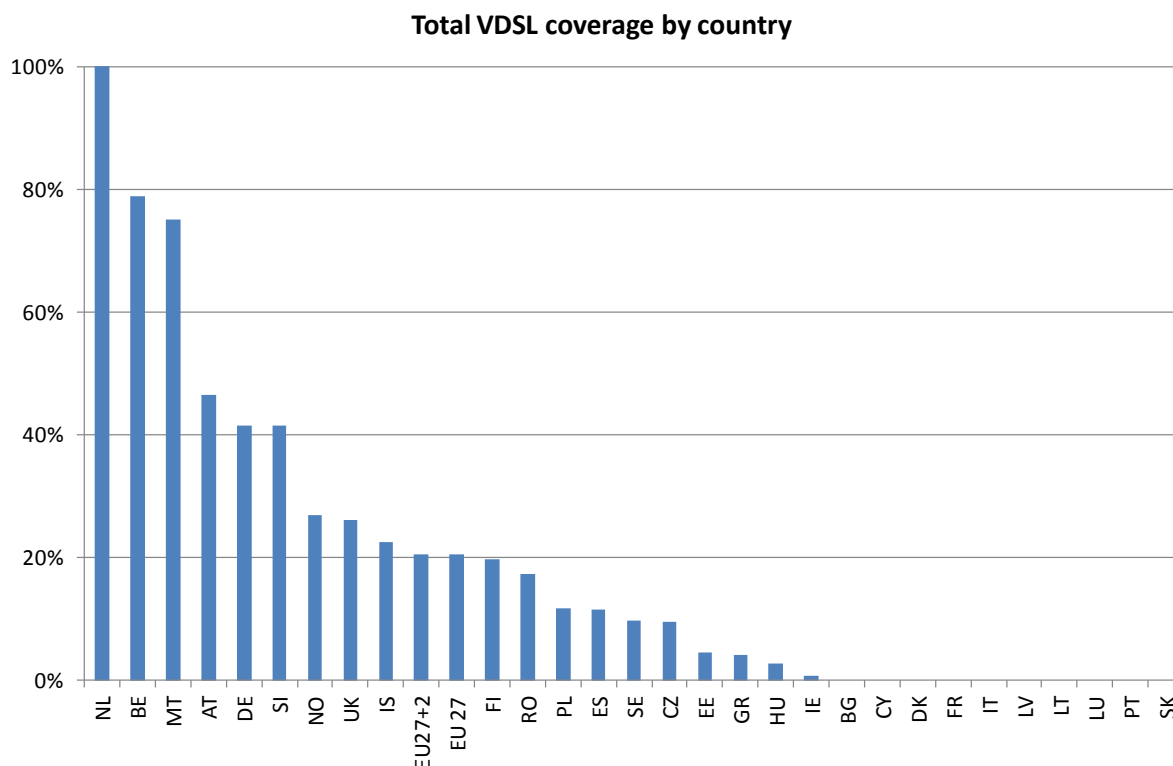
2.2.2 NGA technologies

Total NGA Coverage combination

Total NGA Coverage by country
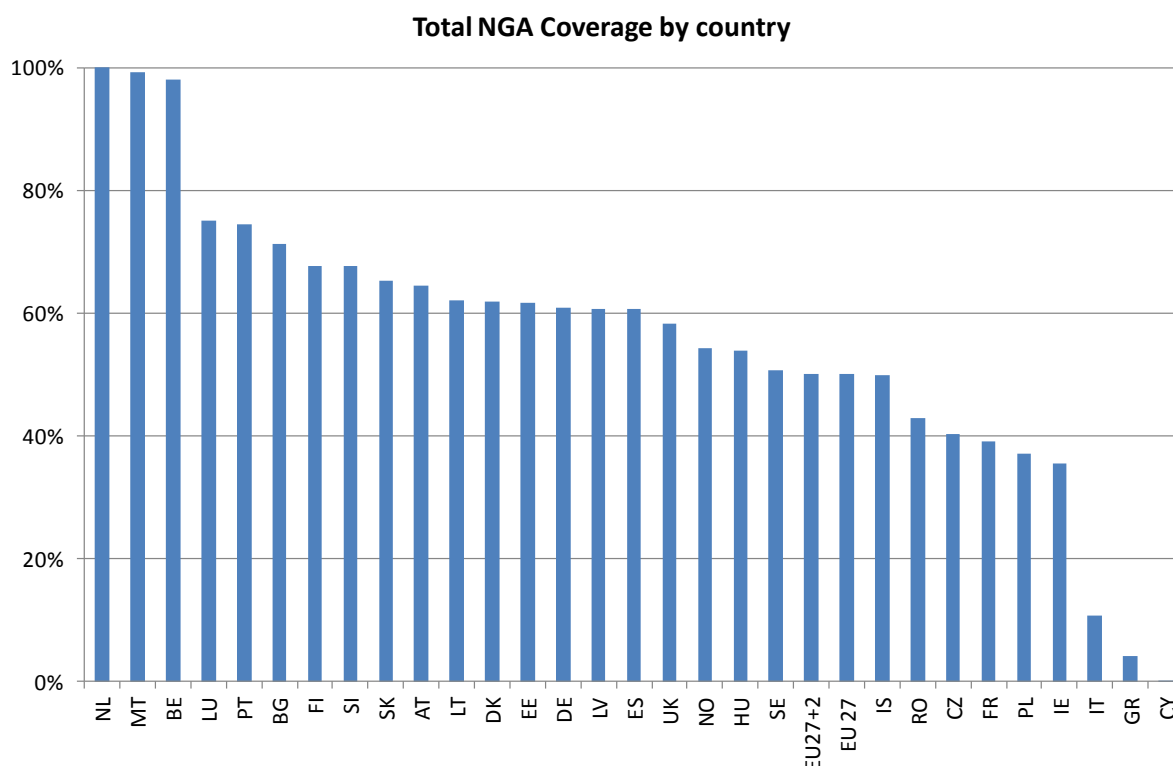
The NGA Coverage combination is intended to show how far advanced Europe is towards achieving the Digital Agenda objective of access to 30Mbps broadband for all by 2020. It combines the coverage of the three main fixed-line Next Generation Access technologies; VDSL, Docsis 3 Cable and FTTP. All three are capable of delivering the target of 30Mbps downstream, although VDSL will fall short of that capability where a premises is too far from the serving VDSL node.

As the chart shows, Europe as a whole is just half-way towards the 30Mbps goal today. The BCE 2011 project found 50.2% net coverage by fixed-line NGA services, after taking account of the overlaps between different services. Again, it is the most urbanised countries which have the highest NGA coverage but otherwise the pattern of high or low coverage is quite mixed. Countries with above average NGA coverage are found in all quarters of Europe, reflecting the effects of different development policies, infrastructure needs and technology choices.

VDSL coverage

Total VDSL coverage by country

VDSL is the most rapidly growing NGA technology in Europe, with coverage ahead of FTTP but still behind Docsis 3. Six countries now have over 40% coverage, well ahead of the European average of 20.6%. The most urban countries already have over 70%. In fact, the results of the Survey showed VDSL coverage of 100% for the Netherlands, although this is being investigated further as alternative sources suggest that VDSL coverage is not complete. Another 13 countries already have some VDSL coverage, ranging from 0.7% to 27%. Here coverage is growing rapidly in most cases, although some operators are doing only limited implementations, for example for users within VDSL range of the exchange only.

Ten more countries have no commercial consumer VDSL services working as yet. Several of these are well advanced with launch plans, while others are putting their emphasis on FTTP services and at least one is offering VDSL but only for business customers. Roughly speaking, VDSL is getting most attention where FTTP services are least developed.

FTTP coverage

FTTP coverage is greatest in Eastern Europe, where the immediate need is greatest – because of the limitations of other networks – and the residential building stock is most

favourable. A large proportion of housing in former communist-bloc countries consists of flats in system built blocks, typically 40 per block. It is often economically attractive to run optical fibre to a single block, or even a group of them, and then distribute broadband service over local networks provided by VDSL, Ethernet or even FTTH technology. (In-building VDSL distribution is not generally included in the definition of VDSL coverage for this project.)

Total FTTP coverage by country
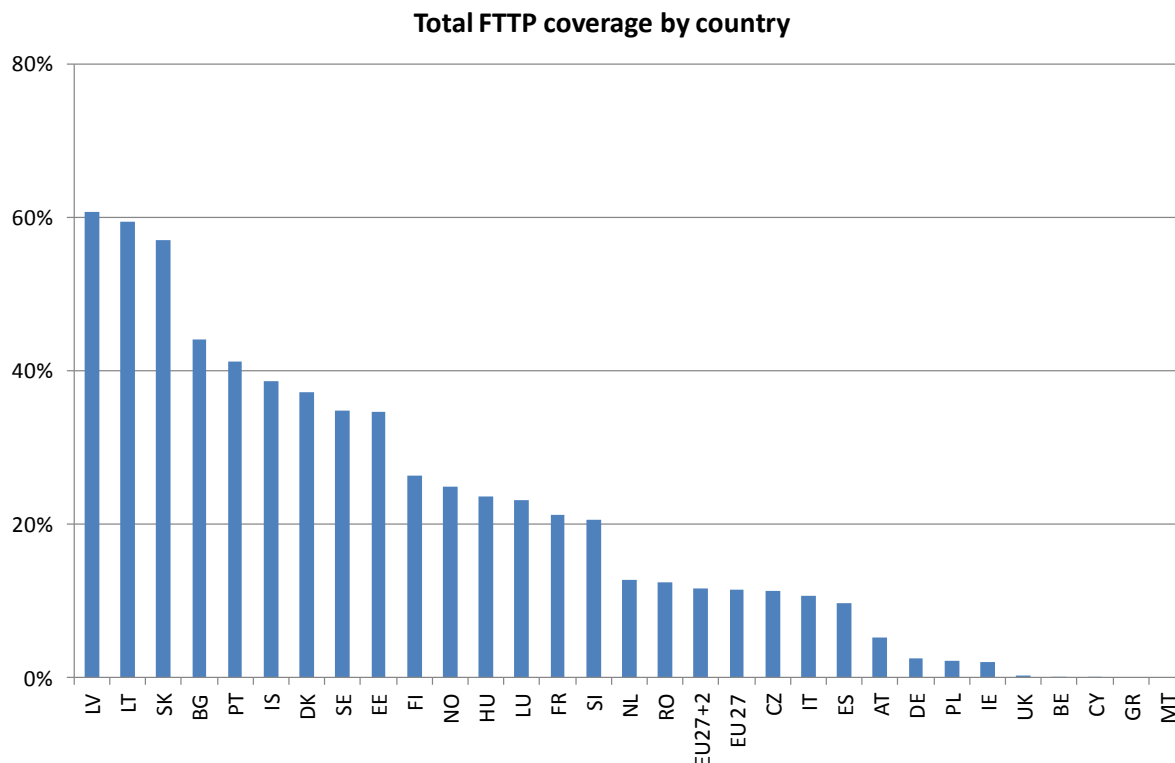
Thus the four countries with the highest FTTP coverage, ranging from 44% to 61%, are all in Eastern Europe. Most of the other Eastern European countries are above the European average of 11.6% as well. The five Nordic countries have also made a heavy commitment to fibre, all at more than twice the European average. Three other countries have also achieved well above average fibre coverage, with France and Luxembourg at 21.3% and 23.1% respectively and, standing out, Portugal at 41.2%, higher than all the Nordics.

Of the remaining 14 countries, 9 have fibre roll-out programmes of some significant scale with coverage between 2% and 13%, while the remainder have 0.2% or less. The low-coverage countries all report at least 98% TSC, and most have extensive NGA alternatives in the form of Docsis 3 and, increasingly, VDSL services.

Docsis 3 coverage

Europe's cable networks have mostly proved able to upgrade quite quickly to Docsis 3 with download speeds of at least 30Mbps evolving towards 100Mbps and above. Across Europe as a whole over 87% of cable network coverage is now Docsis 3. Seven countries report 100% upgrade with the others ranging from 72% to 99%. The proportion will certainly increase over the next few years but some parts will not be suitable for upgrading. At least one cable operator has closed network segments which it is unable to upgrade.

Countries which are below the average of 87% upgraded are spread throughout Europe and throughout the range of cable network coverage, except for the highest coverage countries where the cable networks are all now 100% Docsis 3.
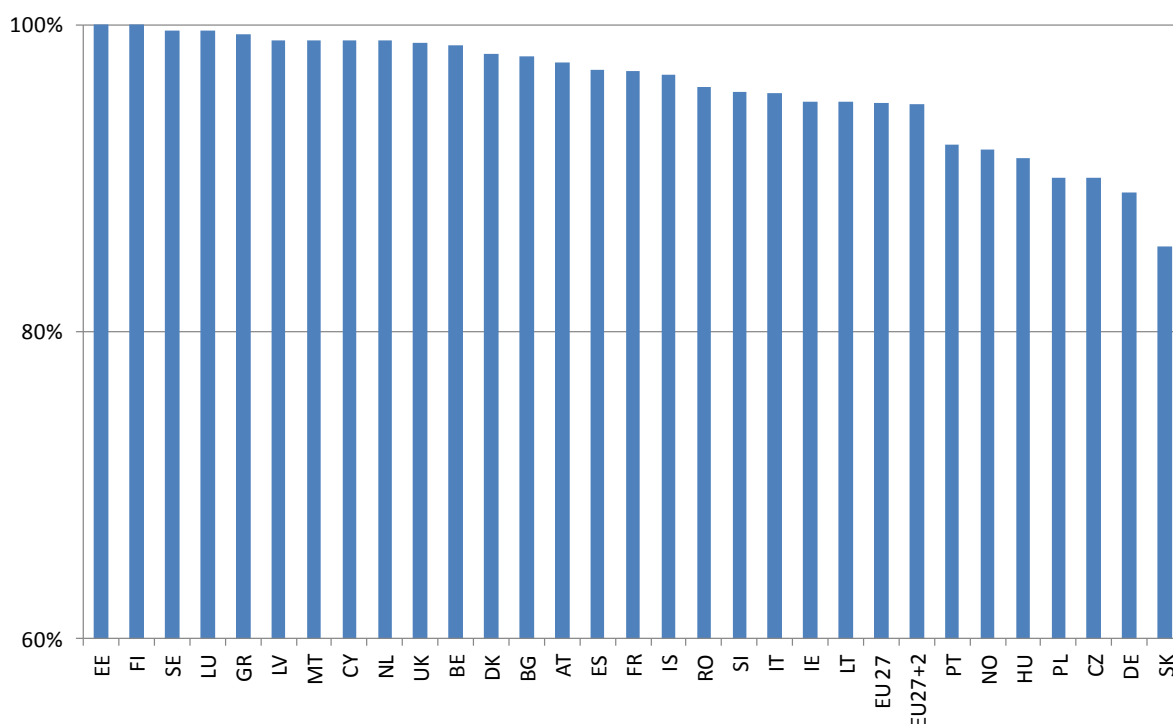
Total Docsis 3 coverage by country
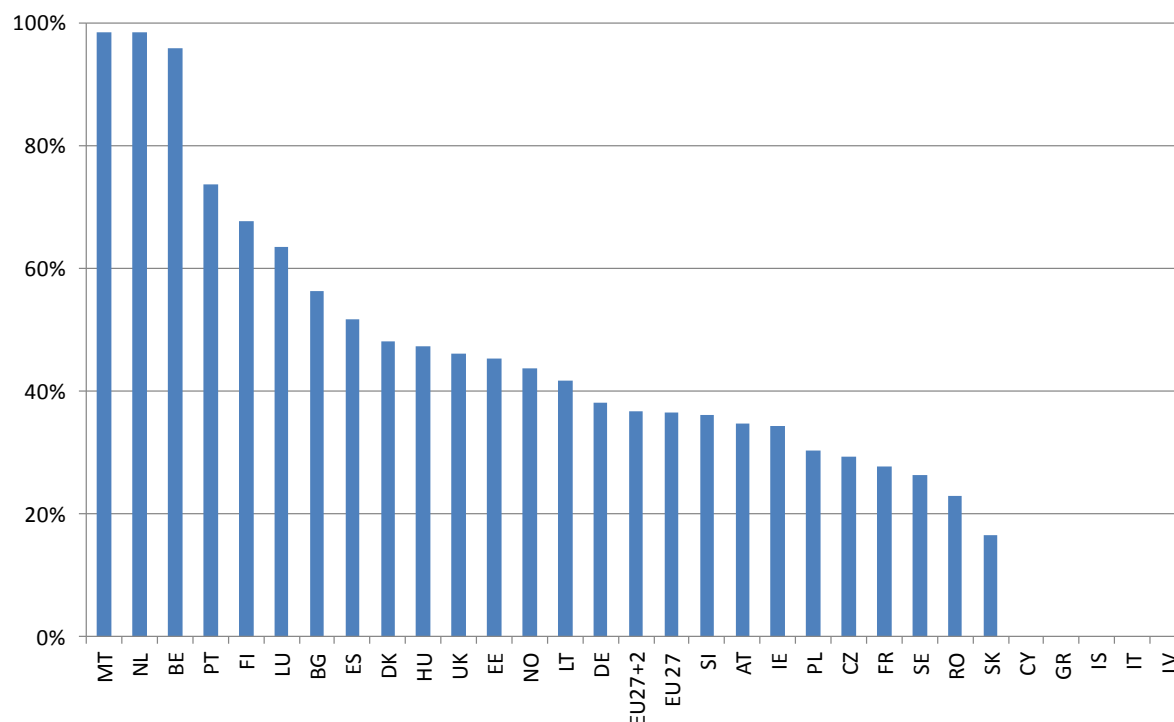
2.2.3 Mobile broadband technologies

**HSPA coverage**

Total HSPA coverage by country

HSPA has achieved a high degree of coverage across Europe in a short time. 22 countries are above the European average of 94.9% and no country has below 85%. However, this represents the mobile operators' own declared coverage areas in most cases, which use varying standards as far as actual performance is concerned. Where more rigorous standards are applied, such as providing at least 1Mbps download speed, coverage areas are seen to be lower. And any user knows that actual performance can be intermittent even well inside expected coverage areas.

One issue with HSPA performance is whether it should be measured indoors or outdoors. Point Topic set the default definition of coverage for the project as being for outdoors performance. This is to reflect the situation where HSPA is being offered as a direct substitute for fixed-line broadband to meet the Digital Agenda targets. In this case it is reasonable to assume that homes could cover the cost of an external aerial without making HSPA uncompetitive as a broadband solution.

LTE coverage

Scandinavia and other Baltic countries have led in the early rollout of LTE. Denmark and Sweden are well ahead with 54% and 48% coverage respectively. Austria was the only country without a Baltic coastline which had a commercial LTE service in operation by end-2011.

But averaged across Europe coverage was only 8.5% and 19 of the study countries were without a commercial LTE service at the end of 2011. Many have working trials and have already granted licences for LTE spectrum. Coverage is expected to increase rapidly in 2012-13.

Total LTE coverage by country
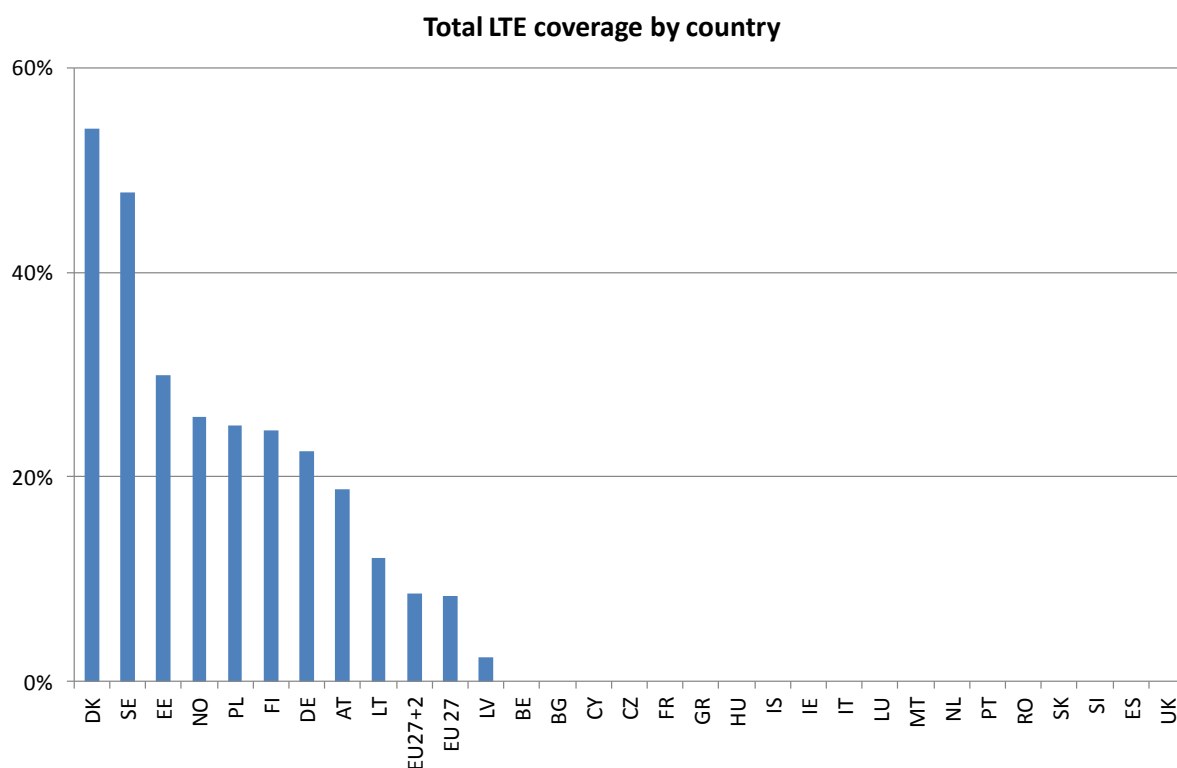
2.2.4 Satellite

All but five of the 29 countries surveyed enjoy Ka-band satellite coverage and distribution for consumer broadband services. The five exceptions are Estonia, Iceland, Latvia, Lithuania and Sweden.

Total and Rural Satellite coverage by country
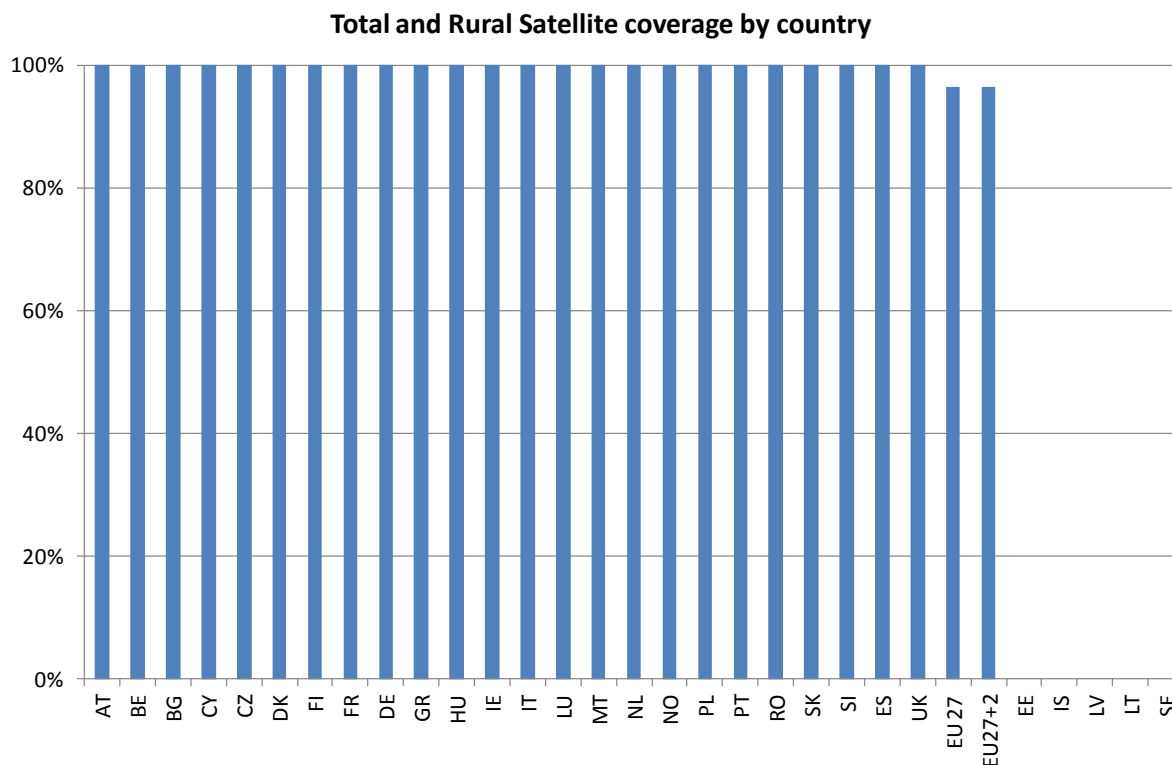
The project defined coverage as being 100%, in both urban and rural areas, in any country where service is available from at least one KA-band satellite service provider and as 0% otherwise. On this basis, 24 countries have 100% coverage and five 0%, as illustrated in the chart. This gives European average coverage of 96.6% for both urban and rural areas.

Although broadband satellites can "see" virtually every premises in the area covered by their beam footprints, their data throughput is limited. This means that they do not generally have enough capacity to provide service to all the unconnected premises.

Note that satellite coverage was not separately researched for the overseas administrative areas of the Study Countries which have them (France, Portugal and Spain). These areas were assumed to enjoy the same satellite coverage as the rest of the country concerned.

## 2.3 Country comparisons of rural coverage

2.3.1 Standard technologies

Rural Standard Coverage

Rural Standard Coverage is usually much lower than Total Standard Coverage. The European average TSC of 95.7% falls to 77.9% for the rural equivalent. Coverage also falls off much more sharply in the less well-served countries. Eight countries have rural coverage of less than 80%, ranging down to as low as 28%.

Seven of these countries are former members of the communist bloc. The one exception is Germany and even that is only a partial one because the provinces which used to form East Germany still show significantly lower Total and Rural coverage than the rest of the country. But the main reason why Germany shows much lower rural coverage than any of the other richer European economies is that the German data is based on the more rigorous standard of broadband performance rather than simple availability.

Another factor which tends to reduce all the rural coverage estimates is the assumption we make to estimate rural coverage where actual data is not available. In its simplest form the assumption is that the coverage of a technology within an area will only reach the rural parts if the urban (ie non-rural) parts are 100% covered. Where real data, reported by NRAs or operators, is available, it sometimes shows that rural areas do have some coverage, typically just a few percent, even where non-rural areas are not fully covered. Thus our estimates in the areas without actual data will sometimes understate rural coverage slightly.> This means that the implied coverage in non-rural areas is overstated by the equivalent amount so that the figure for total coverage is not affected.

Rural Standard Coverage by country
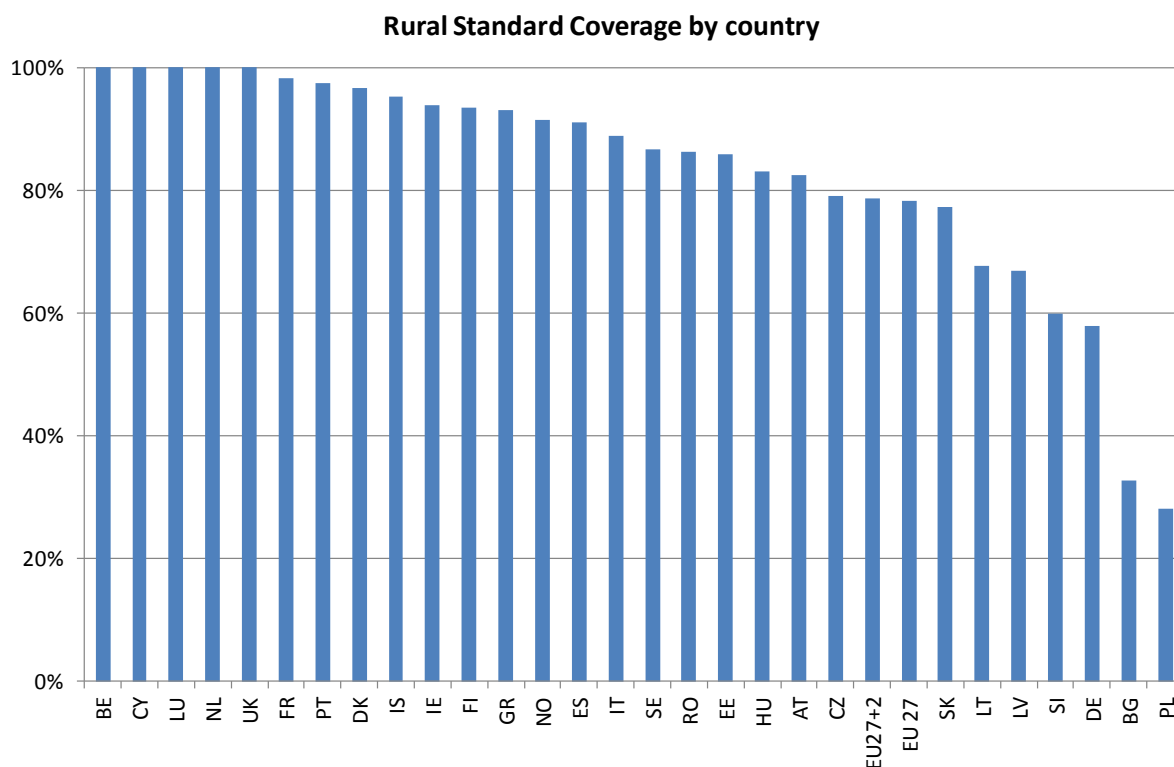
Rural DSL, Standard Cable and WiMAX coverage

DSL remains the biggest contributor to rural broadband coverage overall, just as it is for total coverage. But the total contribution is not so large – averaging 76% rather than 96% - and the range between countries is much greater. In Lithuania the contribution of DSL is as low as 11% of total RSC, and in both Lithuania and Slovenia WiMAX makes a bigger contribution.

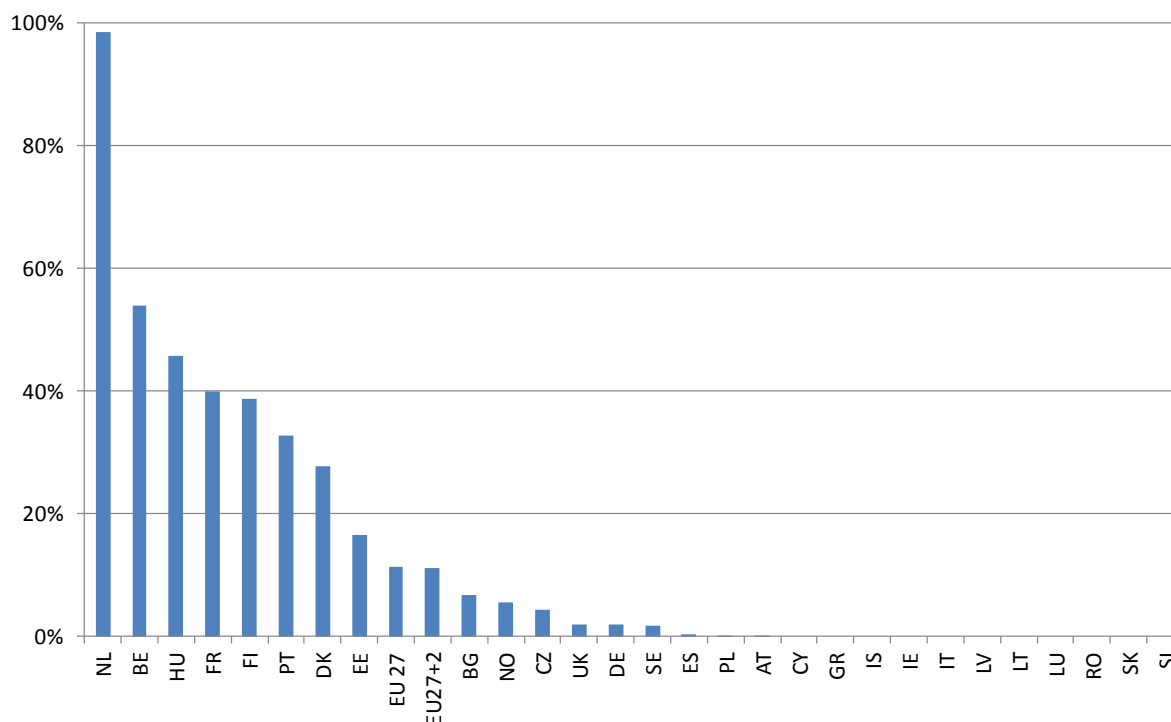**Rural DSL coverage by country**
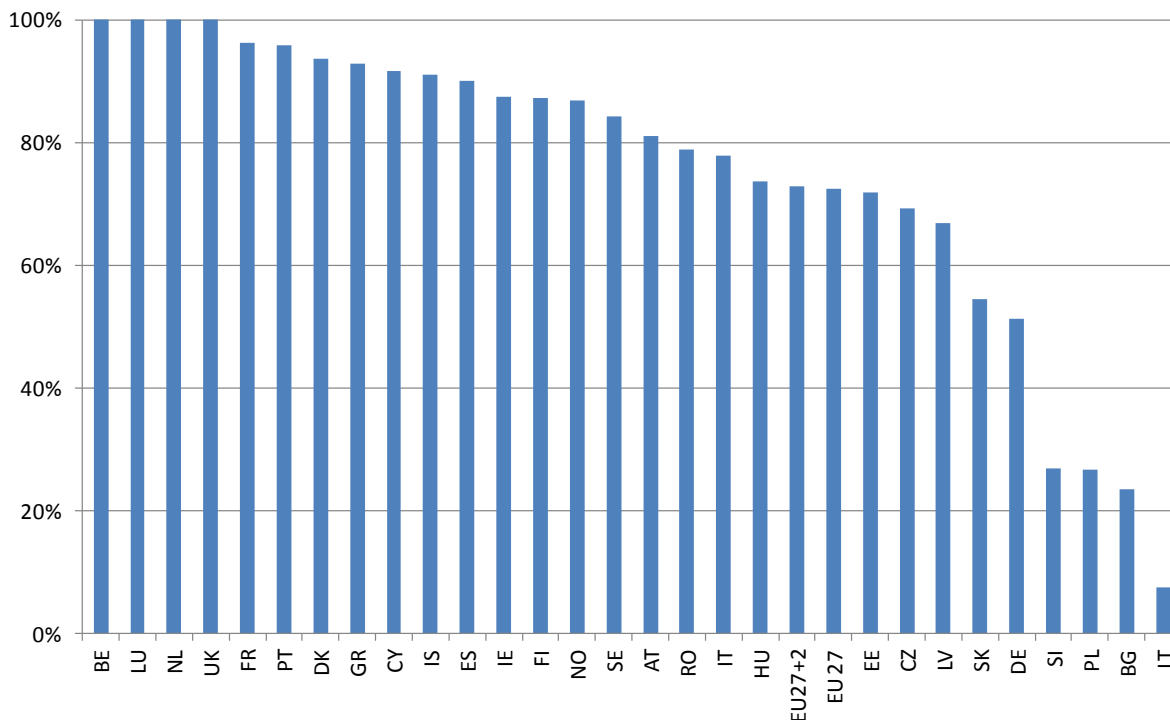
Rural WiMAX coverage by country
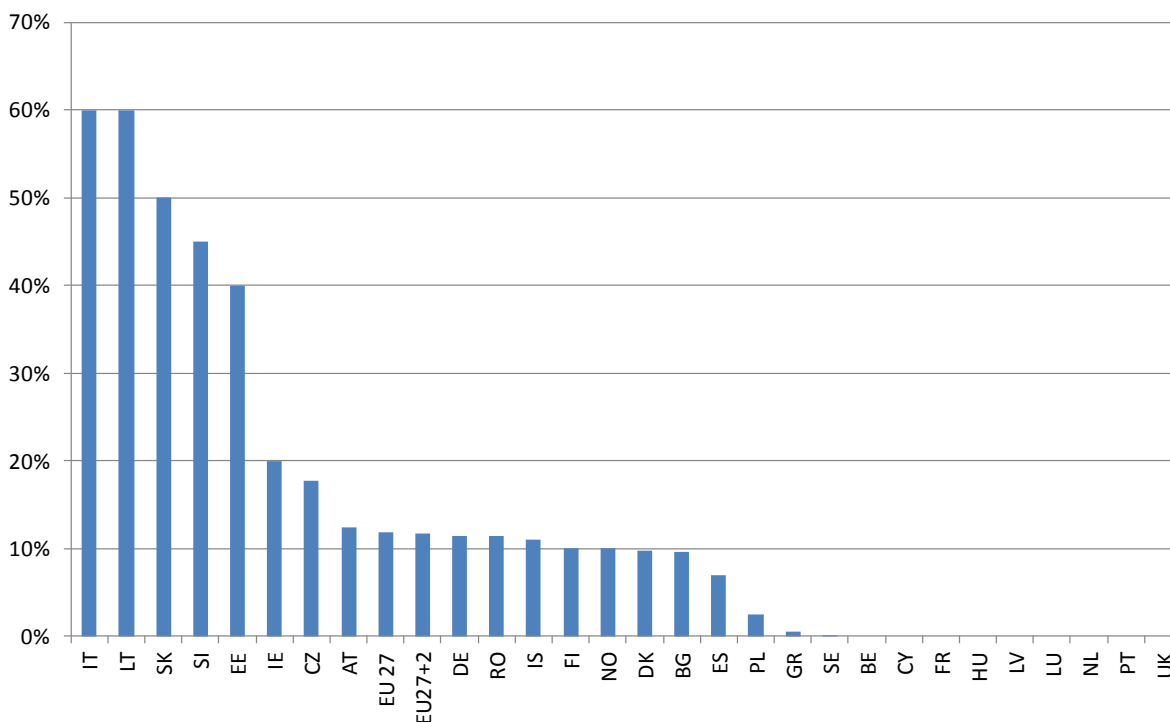
Rural WiMAX coverage follows a very similar pattern to Total WiMAX coverage, and the percentage difference is less than for other technologies. This is because WiMAX is assumed to cover urban and rural areas equally where it is available. Even so, overall average rural coverage is quite low at 11.8% and nine countries are shown as having no rural WiMAX.

On this measure, Belgium, Latvia and the UK join the six countries with no WiMAX at all because their WiMAX networks are all in large urban areas. Note that rural networks providing broadband using earlier fixed wireless technologies are available in many of these and the other study countries but they are not included in the survey because of their limited coverage and bandwidth capability.

The cable networks make about the same contribution to rural coverage as WiMAX with a European average of 11.3%. This is mainly in countries with extensive and old-established cable networks, many rolled out when the business case was not so rigorously calculated as it would be today. On the whole the countries with newer cable networks have at most only a few percent coverage of rural areas.

Rural Standard Cable coverage by country

Twelve of the study countries are shown as having no rural coverage by cable, while Spain and Portugal both have less than 1%. Of the 12, three have no broadband cable services in any case, but in the other cases the cable networks are entirely confined to the urban areas.

2.3.2 NGA technologies

Rural NGA coverage

As would be expected, the gap between Total and Rural NGA coverage is even greater than the gap for Standard coverage. While the study countries as a whole have 49.9% coverage of NGA their rural areas only manage 11.9%. This reflects the basic economics of broadband where more densely populated areas have a strong advantage

The Netherlands has 100% and Belgium 54% but only five other countries have more than 20% rural NGA coverage. Another six countries are above the European average, eight more below it and seven are showing no rural NGA coverage at all.

Each of these groups of countries is quite mixed in terms of national income and geography. Historical circumstances, national policy and the availability of different technologies have created a very varied picture as far as NGA coverage in more marginal areas is concerned.
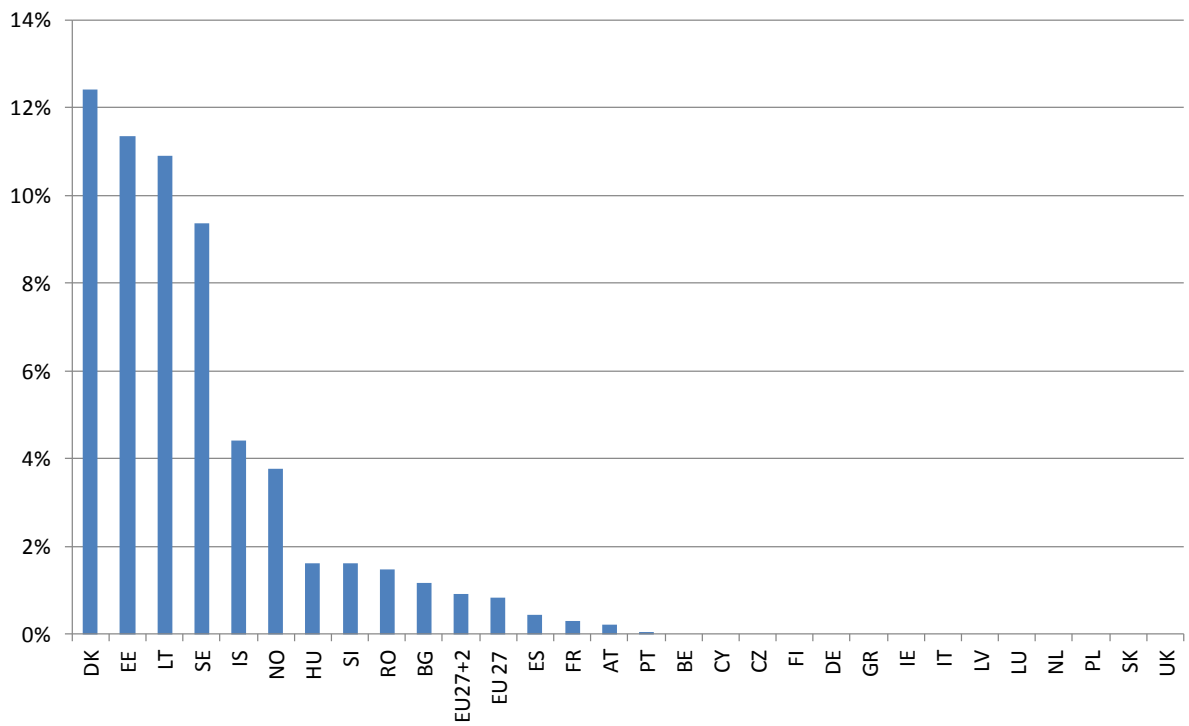
Rural NGA Coverage by country
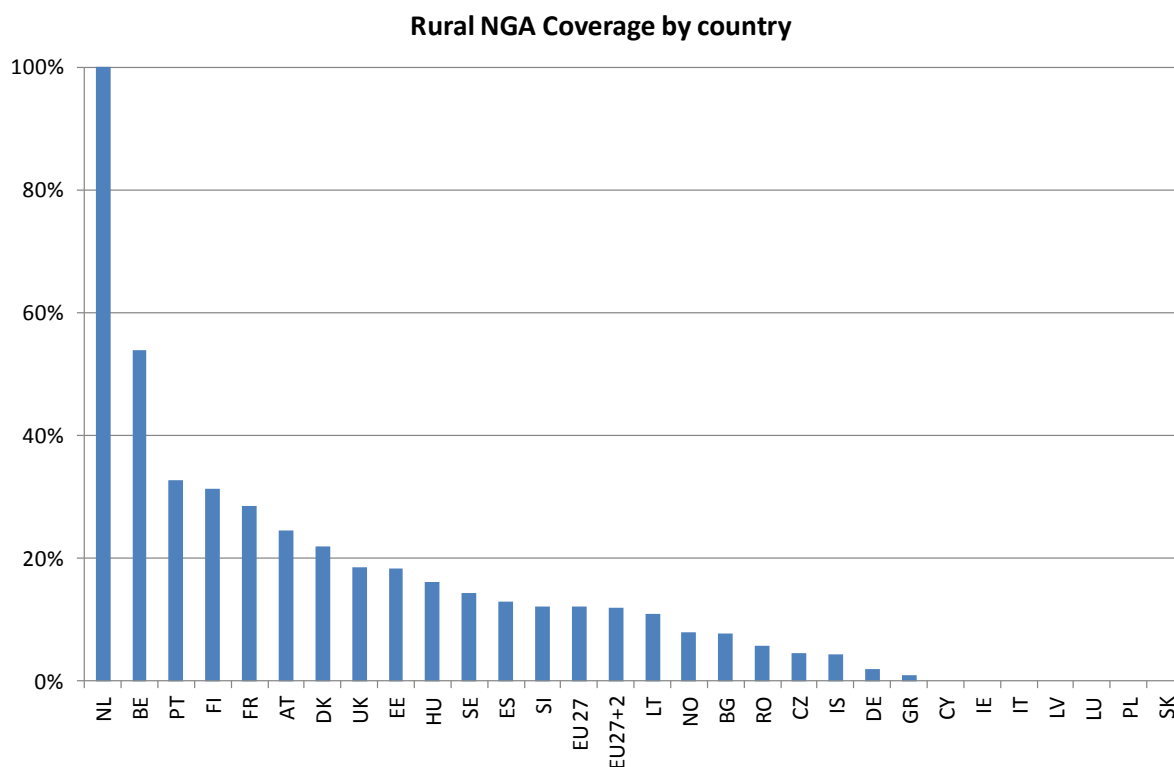
Rural VDSL, FTTP and Docsis 3 coverage

While DSL accounts for the bulk of rural coverage by standard broadband in most countries the picture for NGA is much more varied. Docsis 3 is the biggest contributor to rural NGA in 13 out of the 21 countries where rural NGA is present at any level, but still provides only 7.8% coverage of rural areas in the study countries as a whole. VDSL contributes the biggest share in 7 countries and covers 3.8%, while FTTP leads in 3 countries and covers only 0.9%.
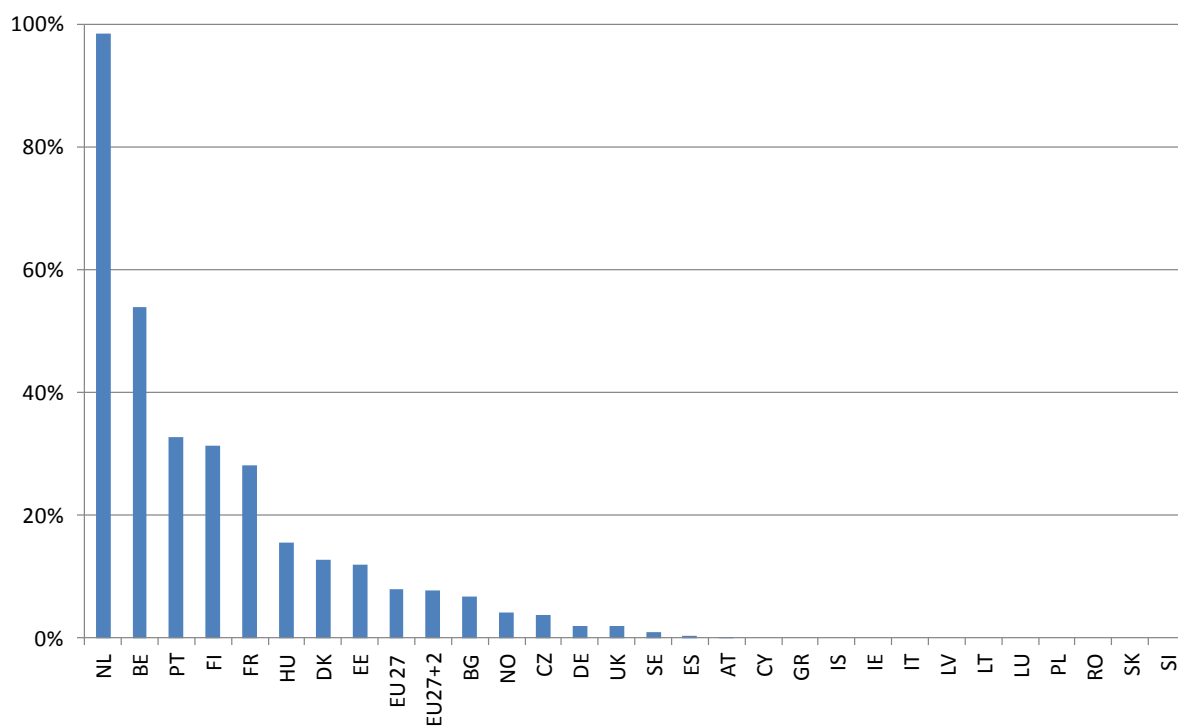
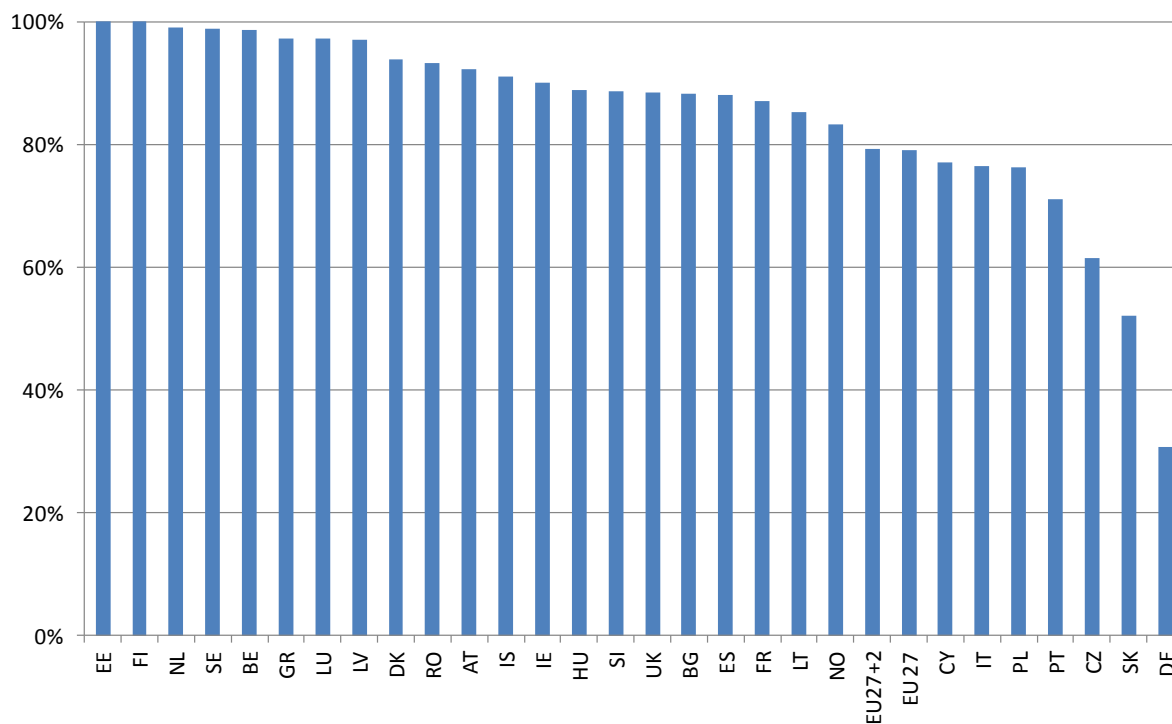**Rural VDSL coverage by country**
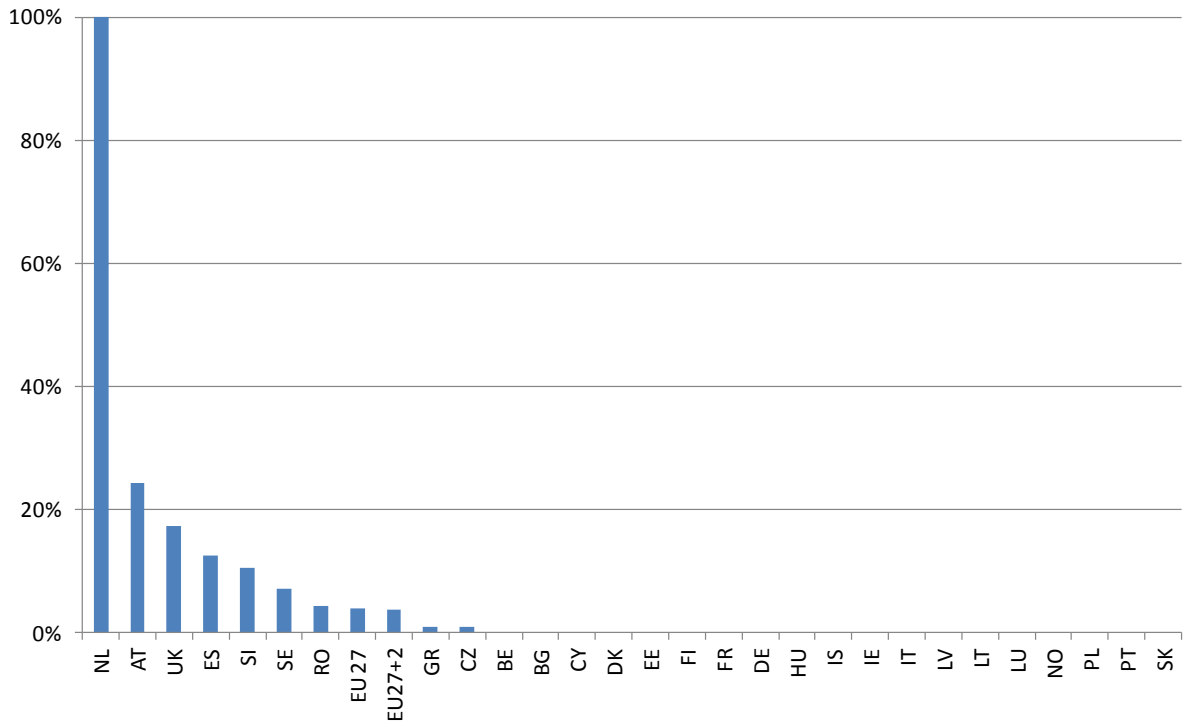
Rural FTTP coverage by country

Rural Docsis 3 coverage by country

2.3.3 Mobile broadband technologies

Rural HSPA coverage

Rural HSPA coverage by country

Leaving aside satellite services, HSPA provides the most extensive broadband coverage in rural areas, well ahead of DSL with 79% against 73%. HSPA is also ahead of the standard technology combination in rural areas, although only by 1%. 21 countries are ahead of the European average for HSPA coverage with more than 80%. Coverage is also continuing to grow rapidly where there is still headroom.
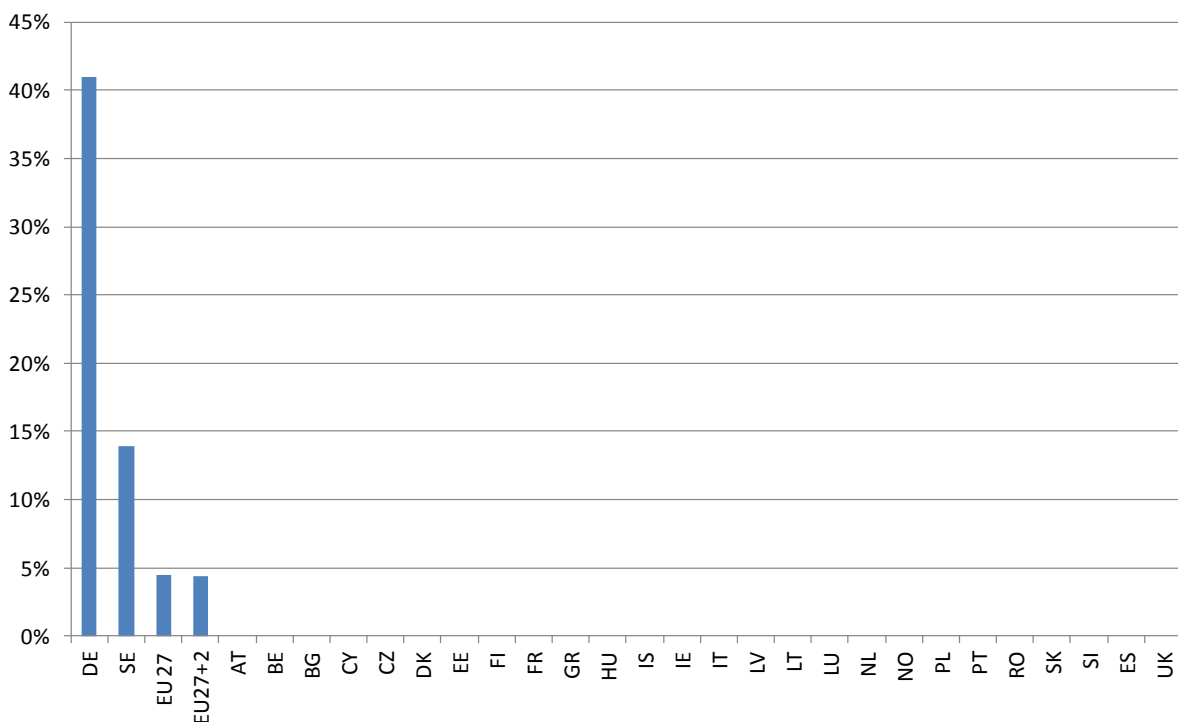
On the other hand there is little information on the actual broadband performance delivered by HSPA services in the more marginal areas. One clue is provided by the surprisingly low coverage quoted by Germany. In this case coverage is defined by the ability to receive a download speed of at least 1Mbps and is quoted at only 30.7%, well below that of any other country. No doubt the coverage quoted in other countries would be considerably lower if it was subjected to the same stringent test.

Rural LTE coverage

The wide coverage of HSPA contrasts totally with the current availability of LTE, the newest technology arrival. Only two countries were found to have any LTE presence in rural areas as of end-2011 – Germany and Sweden. Of these, Germany has leapt ahead by insisting on priority for rural areas in rolling out the LTE service.

The result has been coverage of over 40% claimed by LTE operators in Germany, mostly achieved in the second half of 2011. This estimate is based wholly on operator figures, not on any performance test, but is suggests a powerful way of filling the gap which the German authorities have identified in HSPA coverage and performance.

Rural LTE coverage by country

2.4 European data tables

Demographics

Country list	Country code	NUTS 3 areas	Persons per household	Land area (sq km)	Population	Population density	Total Households	Rural Households	Rural %
Study Countries	EU27+2	1,324	2.372	4,747,524	502,738,859	105.9	211,983,786	40,163,922	18.95%
European Union	EU 27	1,303	2.374	4,349,698	497,686,229	114.4	209,603,991	39,029,603	18.62%

Total coverage

Country list	DSL	VDSL	FTTP	WiMAX	Standard cable	Docsis 3 cable	HSPA	LTE	Satellite	Total Standard Coverage	Total NGA Coverage
Study Countries	92.31%	20.64%	11.69%	14.83%	41.83%	36.67%	94.86%	8.55%	96.55%	95.68%	50.17%
European Union	92.30%	20.57%	11.53%	14.89%	41.81%	36.62%	94.90%	8.37%	96.57%	95.67%	50.12%

Rural coverage

Country list	DSL	VDSL	FTTP	WiMAX	Standard cable	Docsis 3 cable	HSPA	LTE	Satellite	Rural Standard Coverage	Rural NGA Coverage
Study Countries	72.84%	3.80%	0.93%	11.75%	11.12%	7.82%	79.22%	4.37%	96.34%	78.73%	11.93%
European Union	72.44%	3.91%	0.85%	11.80%	11.28%	7.93%	79.09%	4.50%	96.35%	78.36%	12.05%

2.4 European data tables

Demographics

Country list	Country code	NUTS 3 areas	Persons per household	Land area (sq km)	Population	Population density	Total Households	Rural Households	Rural %
Study Countries	EU27+2	1,324	2.372	4,747,524	502,738,859	105.9	211,983,786	40,163,922	18.95%
European Union	EU 27	1,303	2.374	4,349,698	497,686,229	114.4	209,603,991	39,029,603	18.62%

Total coverage

Country list	DSL	VDSL	FTTP	WiMAX	Standard cable	Docsis 3 cable	HSPA	LTE	Satellite	Total Standard Coverage	Total NGA Coverage
Study Countries	92.31%	20.64%	11.69%	14.83%	41.83%	36.67%	94.86%	8.55%	96.55%	95.68%	50.17%
European Union	92.30%	20.57%	11.53%	14.89%	41.81%	36.62%	94.90%	8.37%	96.57%	95.67%	50.12%

Rural coverage

Country list	DSL	VDSL	FTTP	WiMAX	Standard cable	Docsis 3 cable	HSPA	LTE	Satellite	Rural Standard Coverage	Rural NGA Coverage
Study Countries	72.84%	3.80%	0.93%	11.75%	11.12%	7.82%	79.22%	4.37%	96.34%	78.73%	11.93%
European Union	72.44%	3.91%	0.85%	11.80%	11.28%	7.93%	79.09%	4.50%	96.35%	78.36%	12.05%

Total coverage by technology for each country

Countries	DSL	VDSL	FTTP	WiMAX	Stan-dard cable	Docsis 3 cable	HSPA	LTE	Satellite
Austria	93.0%	46.5%	5.3%	17.2%	34.8%	34.8%	97.5%	18.8%	100.0%
Belgium	100.0%	78.9%	0.2%	14.7%	95.9%	95.9%	98.7%	0.0%	100.0%
Bulgaria	84.8%	0.0%	44.2%	16.9%	56.2%	56.2%	98.0%	0.0%	100.0%
Cyprus	100.0%	0.0%	0.0%	0.0%	45.9%	0.0%	99.0%	0.0%	100.0%
Czech Republic	92.0%	9.6%	11.3%	17.7%	32.8%	29.3%	90.0%	0.0%	100.0%
Denmark	98.1%	0.0%	37.2%	8.0%	62.6%	48.1%	98.1%	54.1%	100.0%
Estonia	90.0%	4.5%	34.7%	40.0%	58.9%	45.4%	100.0%	30.0%	0.0%
Finland	95.7%	19.8%	26.4%	10.0%	78.0%	67.8%	100.0%	24.5%	100.0%
France	99.1%	0.0%	21.3%	0.0%	32.9%	27.7%	97.0%	0.0%	100.0%
Germany	92.8%	41.5%	2.6%	11.5%	52.5%	38.2%	89.1%	22.5%	100.0%
Greece	98.5%	4.2%	0.0%	16.1%	0.0%	0.0%	99.4%	0.0%	100.0%
Hungary	89.4%	2.8%	23.7%	0.0%	62.0%	47.3%	91.3%	0.0%	100.0%
Iceland	96.8%	22.6%	38.7%	4.0%	0.0%	0.0%	96.8%	0.0%	0.0%
Ireland	95.3%	0.7%	2.0%	28.3%	43.1%	34.2%	95.0%	0.0%	100.0%
Italy	97.0%	0.0%	10.7%	60.0%	0.0%	0.0%	95.5%	0.0%	100.0%
Latvia	89.0%	0.0%	60.8%	31.6%	33.1%	0.0%	99.0%	2.4%	0.0%
Lithuania	68.5%	0.0%	59.4%	60.0%	52.8%	41.7%	95.0%	12.1%	0.0%
Luxembourg	100.0%	0.0%	23.1%	0.0%	63.5%	63.5%	99.6%	0.0%	100.0%
Malta	99.0%	75.0%	0.0%	99.9%	98.5%	98.5%	99.0%	0.0%	100.0%
Netherlands	100.0%	100.0%	12.8%	0.0%	98.5%	98.5%	99.0%	0.0%	100.0%
Norway	93.7%	26.8%	24.9%	10.0%	45.9%	43.7%	91.9%	25.9%	100.0%
Poland	64.2%	11.7%	2.2%	4.4%	32.6%	30.3%	90.0%	25.0%	100.0%
Portugal	99.0%	0.0%	41.2%	0.0%	75.9%	73.7%	92.2%	0.0%	100.0%
Romania	57.0%	17.4%	12.5%	13.1%	28.4%	22.9%	95.9%	0.0%	100.0%
Slovakia	82.7%	0.0%	57.0%	50.0%	21.5%	16.6%	85.5%	0.0%	100.0%
Slovenia	71.8%	41.5%	20.5%	45.0%	36.0%	36.0%	95.6%	0.0%	100.0%
Spain	93.3%	11.6%	9.7%	12.2%	53.8%	51.7%	97.1%	0.0%	100.0%
Sweden	98.0%	9.8%	34.8%	0.0%	31.3%	26.3%	99.6%	47.8%	0.0%
United Kingdom	100.0%	26.1%	0.2%	4.0%	46.5%	46.1%	98.8%	0.0%	100.0%
Study Countries	92.3%	20.6%	11.7%	14.8%	41.8%	36.7%	94.9%	8.6%	96.5%
European Union	92.3%	20.6%	11.5%	14.9%	41.8%	36.6%	94.9%	8.4%	96.6%

Coverage by technology combination for each country

Countries	Total Standard	Total NGA	Total HSPA	Rural Standard	Rural NGA	Rural HSPA
Austria	95.0%	64.4%	97.5%	82.6%	24.5%	92.3%
Belgium	100.0%	98.0%	98.7%	100.0%	53.8%	98.7%
Bulgaria	91.5%	71.4%	98.0%	32.8%	7.8%	88.3%
Cyprus	100.0%	0.0%	99.0%	91.7%	0.0%	77.0%
Czech Republic	94.5%	40.3%	90.0%	79.0%	4.5%	61.6%
Denmark	99.0%	61.9%	98.1%	96.7%	21.9%	93.9%
Estonia	95.0%	61.8%	100.0%	85.9%	18.4%	100.0%
Finland	97.8%	67.8%	100.0%	93.5%	31.3%	100.0%
France	99.4%	39.1%	97.0%	98.2%	28.5%	87.0%
Germany	95.3%	60.8%	89.1%	58.0%	2.0%	30.7%
Greece	98.5%	4.2%	99.4%	93.2%	1.0%	97.3%
Hungary	93.2%	54.0%	91.3%	83.1%	16.2%	89.0%
Iceland	98.3%	50.0%	96.8%	95.4%	4.4%	91.2%
Ireland	97.2%	35.6%	95.0%	93.8%	0.0%	90.0%
Italy	98.5%	10.7%	95.5%	89.0%	0.0%	76.4%
Latvia	89.6%	60.8%	99.0%	67.0%	0.0%	97.0%
Lithuania	88.4%	62.2%	95.0%	67.6%	10.9%	85.3%
Luxembourg	100.0%	75.0%	99.6%	100.0%	0.0%	97.3%
Malta	99.9%	99.3%	99.0%	0.0%	0.0%	0.0%
Netherlands	100.0%	100.0%	99.0%	100.0%	100.0%	99.0%
Norway	95.9%	54.2%	91.9%	91.4%	8.0%	83.2%
Poland	72.2%	37.1%	90.0%	28.1%	0.0%	76.2%
Portugal	99.5%	74.5%	92.2%	97.4%	32.8%	71.1%
Romania	91.7%	42.9%	95.9%	86.3%	5.8%	93.2%
Slovakia	91.4%	65.3%	85.5%	77.3%	0.0%	52.1%
Slovenia	90.1%	67.7%	95.6%	59.9%	12.1%	88.7%
Spain	96.9%	60.7%	97.1%	91.1%	13.0%	88.0%
Sweden	98.6%	50.6%	99.6%	86.7%	14.3%	98.8%
United Kingdom	100.0%	58.3%	98.8%	100.0%	18.6%	88.5%
Study Countries	95.2%	49.9%	94.9%	78.1%	11.9%	79.2%
European Union	95.2%	49.8%	94.9%	77.7%	12.1%	79.1%

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Rural coverage by technology for each country

Countries	DSL	VDSL	FTTP	WiMAX	Standard cable	Docsis 3 cable	HSPA	LTE	Satellite
Austria	81.0%	24.4%	0.2%	12.5%	0.0%	0.0%	92.3%	0.0%	100.0%
Belgium	100.0%	0.0%	0.0%	0.0%	53.8%	53.8%	98.7%	0.0%	100.0%
Bulgaria	23.5%	0.0%	1.2%	9.6%	6.9%	6.9%	88.3%	0.0%	100.0%
Cyprus	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	77.0%	0.0%	100.0%
Czech Republic	69.3%	0.9%	0.0%	17.7%	4.3%	3.8%	61.6%	0.0%	100.0%
Denmark	93.6%	0.0%	12.4%	9.7%	27.8%	12.8%	93.9%	0.0%	100.0%
Estonia	71.8%	0.0%	11.4%	40.0%	16.5%	11.9%	100.0%	0.0%	0.0%
Finland	87.2%	0.0%	0.0%	10.0%	38.7%	31.3%	100.0%	0.0%	100.0%
France	96.3%	0.0%	0.3%	0.0%	39.9%	28.2%	87.0%	0.0%	100.0%
Germany	51.4%	0.0%	0.0%	11.5%	2.0%	2.0%	30.7%	41.0%	100.0%
Greece	93.0%	1.0%	0.0%	0.5%	0.0%	0.0%	97.3%	0.0%	100.0%
Hungary	73.7%	0.0%	1.6%	0.0%	45.7%	15.5%	89.0%	0.0%	100.0%
Iceland	91.2%	0.0%	4.4%	11.0%	0.0%	0.0%	91.2%	0.0%	0.0%
Ireland	87.6%	0.0%	0.0%	20.0%	0.0%	0.0%	90.0%	0.0%	100.0%
Italy	77.9%	0.0%	0.0%	60.0%	0.0%	0.0%	76.4%	0.0%	100.0%
Latvia	67.0%	0.0%	0.0%	0.0%	0.0%	0.0%	97.0%	0.0%	0.0%
Lithuania	7.5%	0.0%	10.9%	60.0%	0.0%	0.0%	85.3%	0.0%	0.0%
Luxembourg	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	97.3%	0.0%	100.0%
Netherlands	100.0%	100.0%	0.0%	0.0%	98.5%	98.5%	99.0%	0.0%	100.0%
Norway	86.9%	0.0%	3.8%	10.0%	5.6%	4.2%	83.2%	0.0%	100.0%
Poland	26.7%	0.0%	0.0%	2.5%	0.2%	0.0%	76.2%	0.0%	100.0%
Portugal	95.9%	0.0%	0.0%	0.0%	32.8%	32.8%	71.1%	0.0%	100.0%
Romania	78.8%	4.4%	1.5%	11.4%	0.0%	0.0%	93.2%	0.0%	100.0%
Slovakia	54.5%	0.0%	0.0%	50.0%	0.0%	0.0%	52.1%	0.0%	100.0%
Slovenia	27.0%	10.5%	1.6%	45.0%	0.0%	0.0%	88.7%	0.0%	100.0%
Spain	90.1%	12.6%	0.4%	7.0%	0.4%	0.4%	88.0%	0.0%	100.0%
Sweden	84.4%	7.2%	9.4%	0.1%	1.7%	1.0%	98.8%	13.9%	0.0%
United Kingdom	100.0%	17.4%	0.0%	0.0%	2.0%	2.0%	88.5%	0.0%	100.0%
Study Countries	72.8%	3.8%	0.9%	11.7%	11.1%	7.8%	79.2%	4.4%	96.3%
European Union	72.4%	3.9%	0.8%	11.8%	11.3%	7.9%	79.1%	4.5%	96.3%

3 Coverage by country

3.01 Austria

3.01.1 National coverage by broadband technology

Austria: coverage by technology combinations
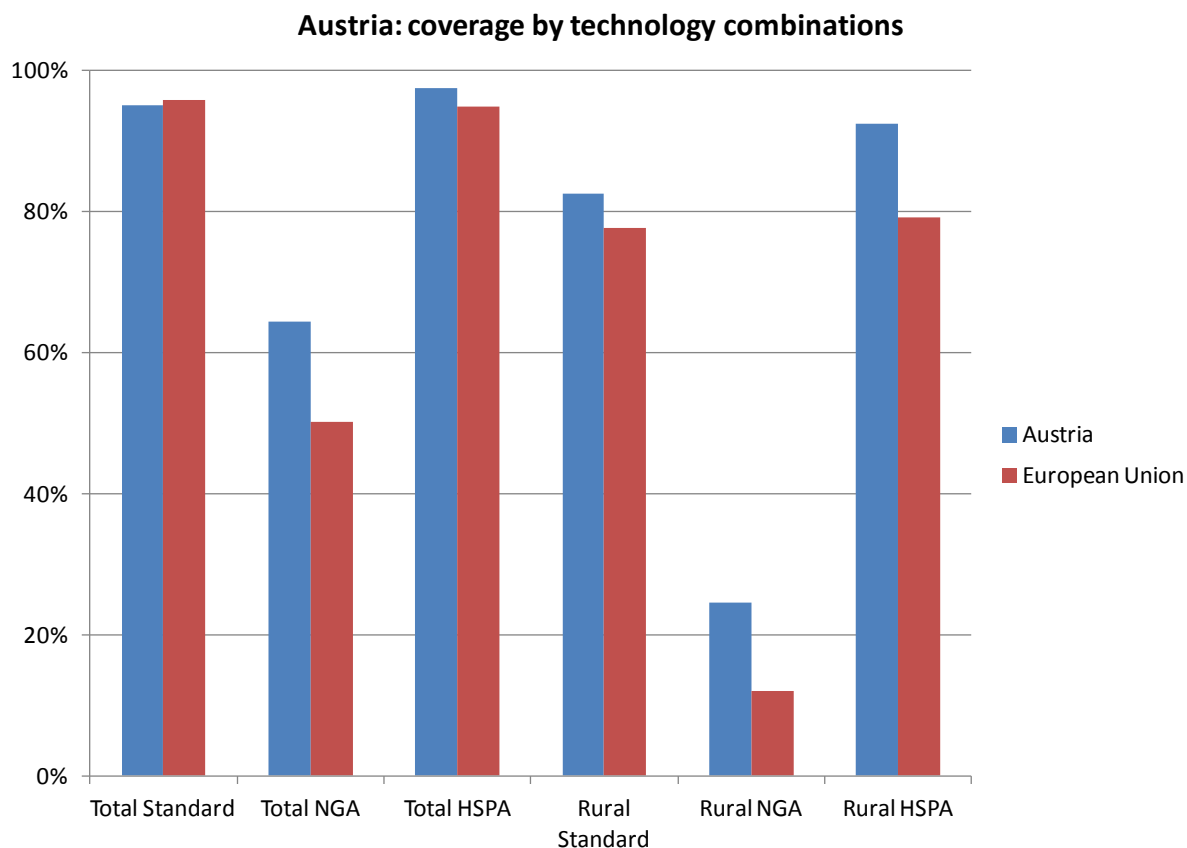
Austria has close to average standard broadband coverage but considerably better than average NGA coverage, both for the country as a whole and for rural areas. HSPA coverage is better than average overall and significantly above average in rural areas.

As the technology profile shows, Austria gains its NGA advantage by having more than double average VDSL coverage and reasonable Docsis 3 coverage as well. This offsets the relatively low development of FTTP. Besides good HSPA coverage, Austria is one of the 10 study countries which had already launched commercial LTE services by the end of 2011.

The rural profile reinforces this picture. Austria is distinctly better than average at bringing DSL services to rural areas and well ahead in delivering VDSL. WiMAX also makes a significant contribution in the countryside. On the other hand, FTTP and cable services are absent, or available only to a very small extent.

Rural HSPA services help to fill the gap and Austria is also one of the countries with full distribution for KA-band satellite broadband.

Broadband Coverage in Europe 2011

Austria: total coverage by technology
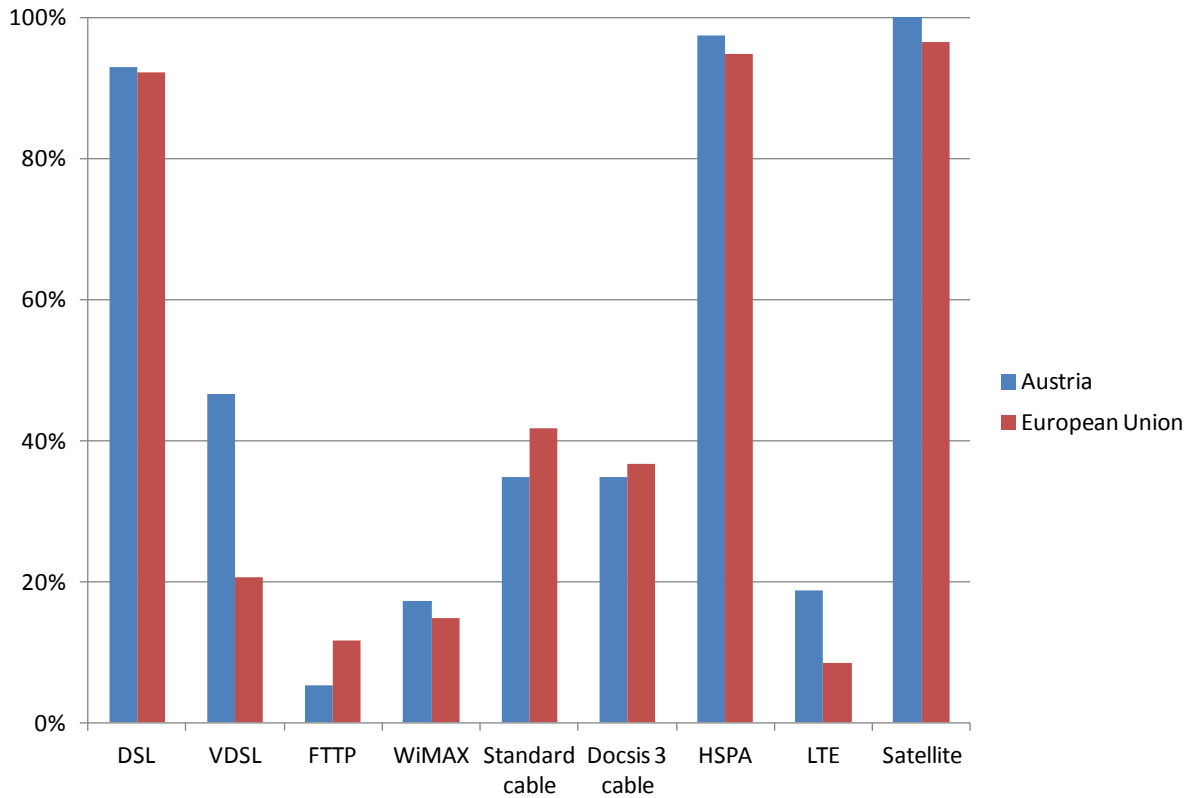
Austria: rural coverage by technology
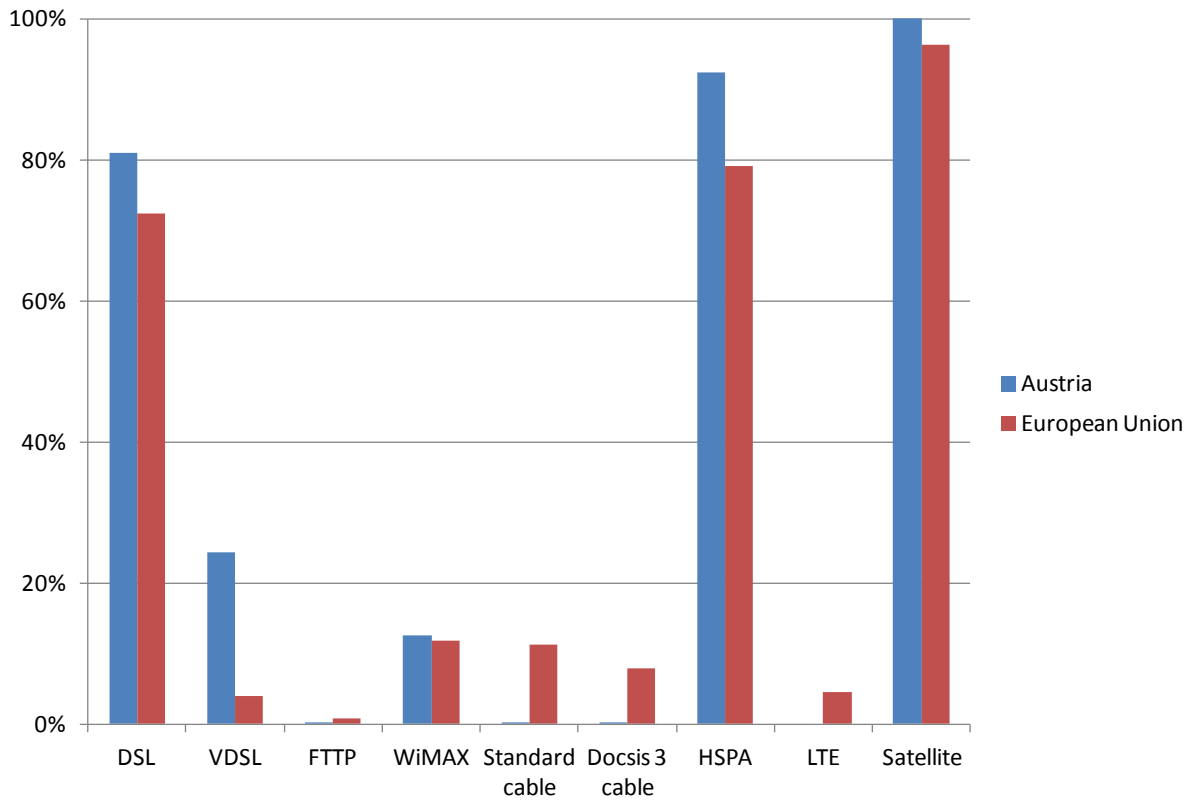
3.01.2 Regional coverage by technology combinations

Map 3.01.01.Austria Standard broadband coverage

Standard broadband coverage

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

Source: BCE 2011
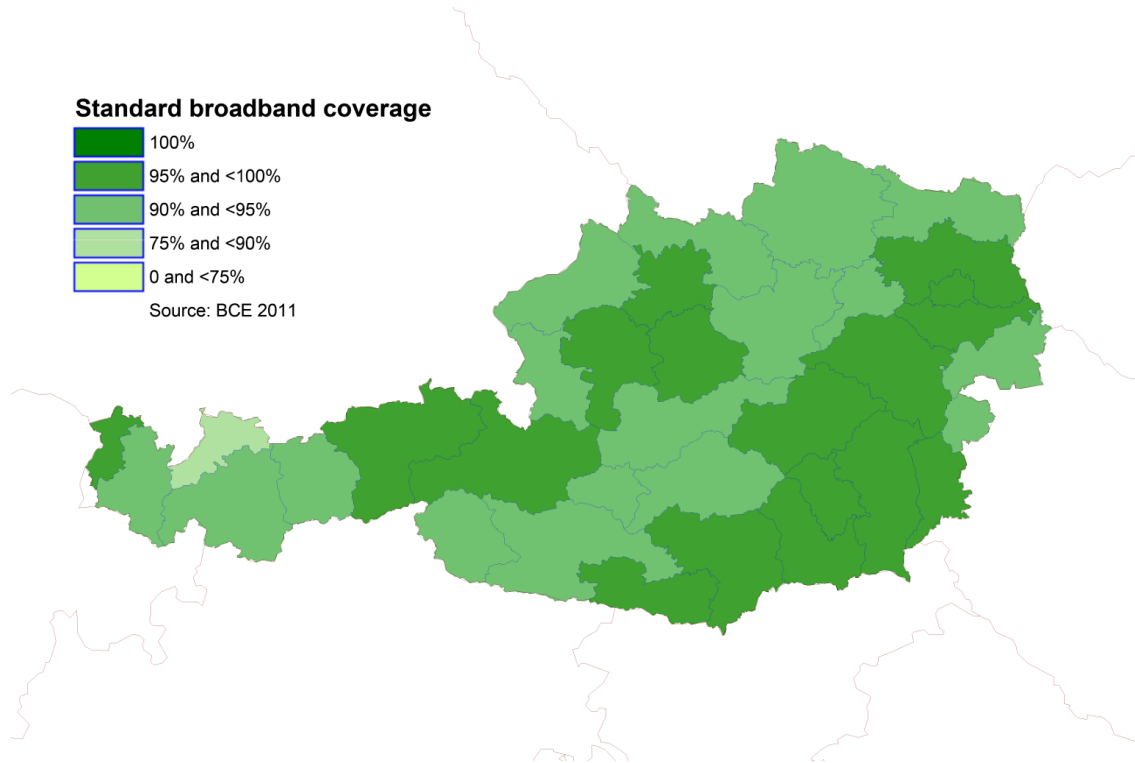
Map 3.01.02.Austria Next Generation Access coverage

Next Generation Access coverage

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

Source: BCE 2011
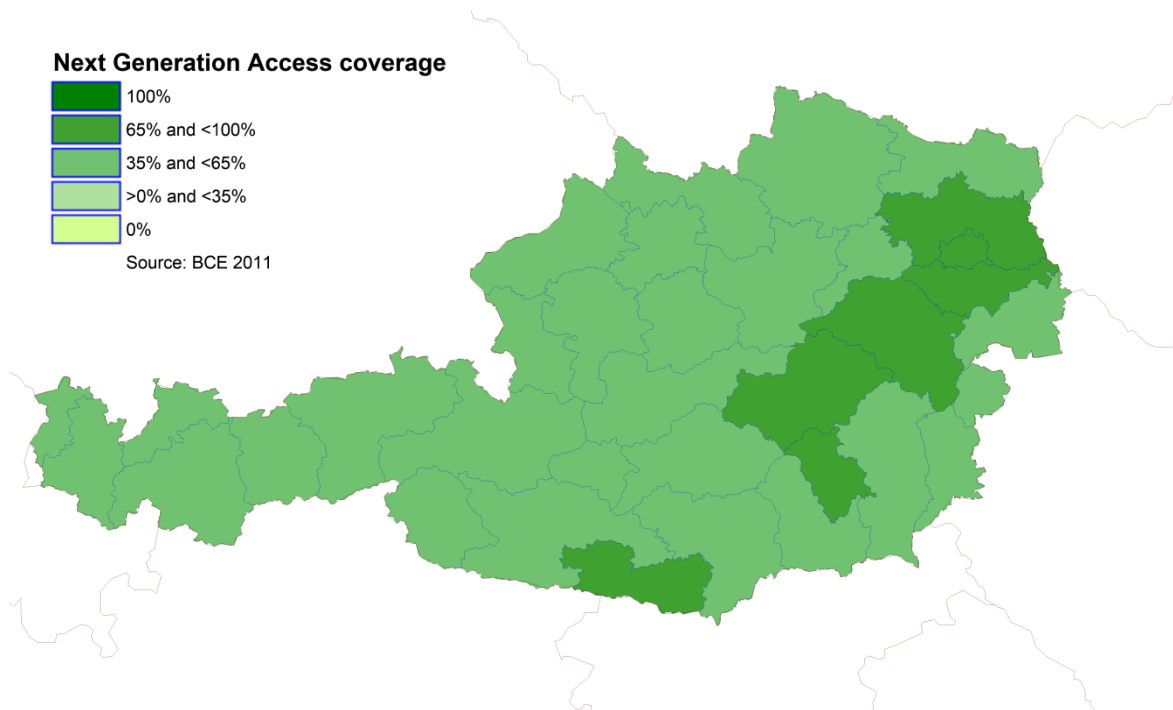
Austria has about average standard broadband coverage. The major cities and more urbanised areas in the east and centre of the country all have at least 95%. Most of the more rural areas have at least 92%. The exceptions are the two most mountainous provinces in the west of the country, Tiroler Oberland and Ausserfern which have just above and just below 90% coverage respectively.

Austria's NGA coverage is well above average thanks to its extensive cable network and widespread VDSL rollout. So far it is the east of the country which has benefited most. A belt of seven provinces, stretching south-west from Vienna and its surroundings down to Graz and Klagenfurt-Villach all have at least 65% NGA availability. But the rest of the country has average to good coverage too, with no province having less than 42%.

3.01.3 Data tables for Austria

Demographics

Statistic	National
Population	8,318,592
Persons per household	2.3
Rural proportion	28.6%

Coverage by technology

Technology	Total	Rural
DSL	93.0%	81.0%
VDSL	46.5%	24.4%
FTTP	5.3%	0.2%
WiMAX	17.2%	12.5%
Standard cable	34.8%	0.0%
Docsis 3 cable	34.8%	0.0%
HSPA	97.5%	92.3%
LTE	18.8%	0.0%
Satellite	100.0%	100.0%
Standard Combination	95.0%	82.6%
NGA Combination	64.4%	24.5%

3.02 Belgium

3.02.1 National coverage by broadband technology

Belgium: coverage by technology combinations
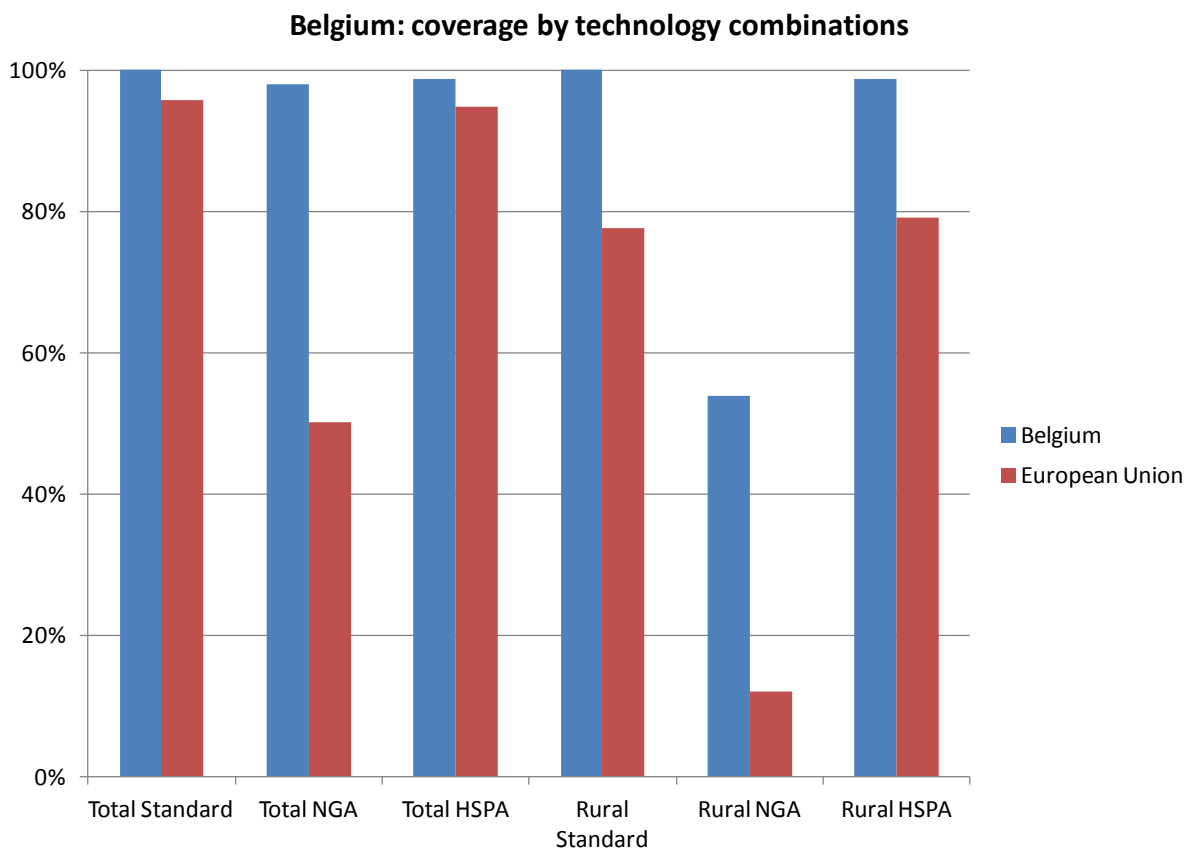
As a relatively small, densely populated and prosperous country, Belgium enjoys one of the highest levels of standard and NGA broadband coverage in Europe. All Belgium coverage combinations are ahead of the European average, well ahead in the case of the NGA and rural. Total and Rural standard coverage is 100%, total NGA coverage is 98% and rural NGA coverage is 53.8%, the second highest in Europe. HSPA coverage is also well above average.

As the technology profile shows these figures are achieved by having 100% DSL coverage plus one of the most widespread cable networks in Europe which is now fully upgraded to Docsis 3. VDSL coverage of 78.9% is the second highest in Europe. On the other hand, FTTP coverage is negligible so far at only 0.2% and LTE had yet to be launched as of end-2011.

Belgium's rural population is only 4% of the total and with 100% of exchanges enabled for DSL it has complete broadband coverage by that definition. Rural NGA is largely provided by Docsis 3 service for the moment.

Broadband Coverage in Europe 2011

Belgium: total coverage by technology
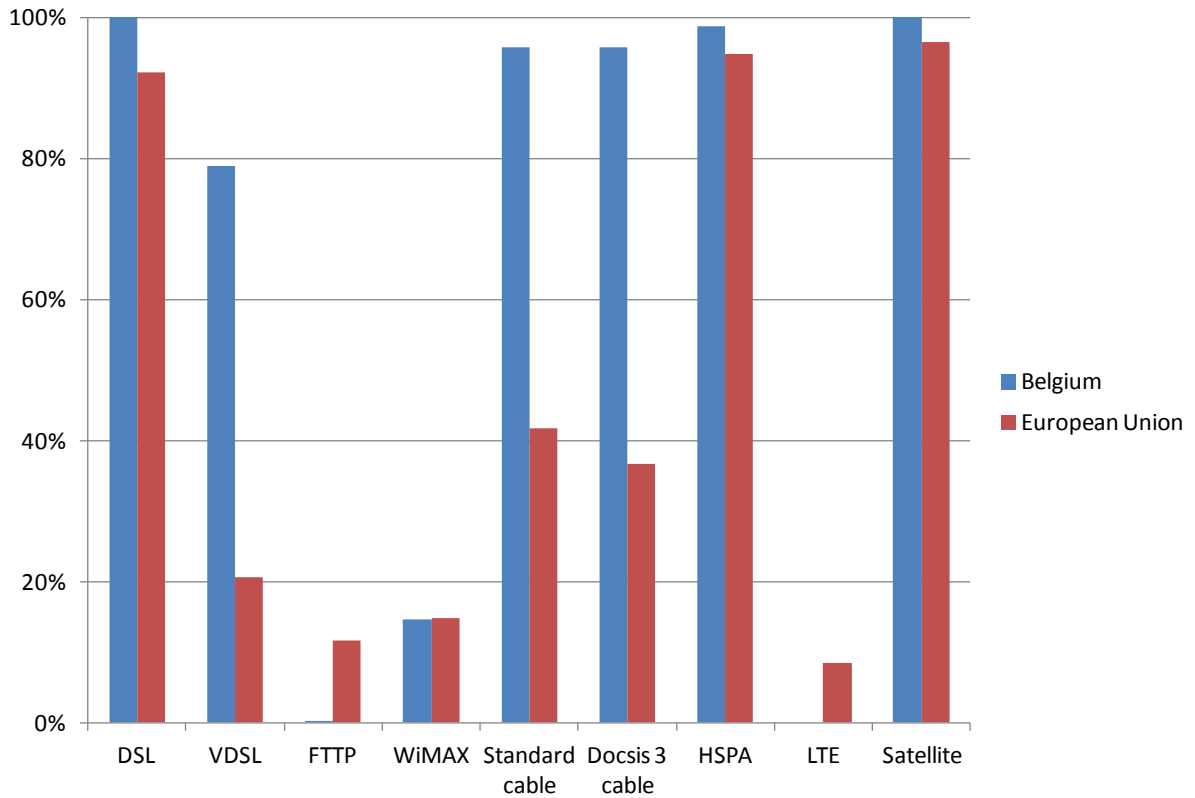
Belgium: rural coverage by technology
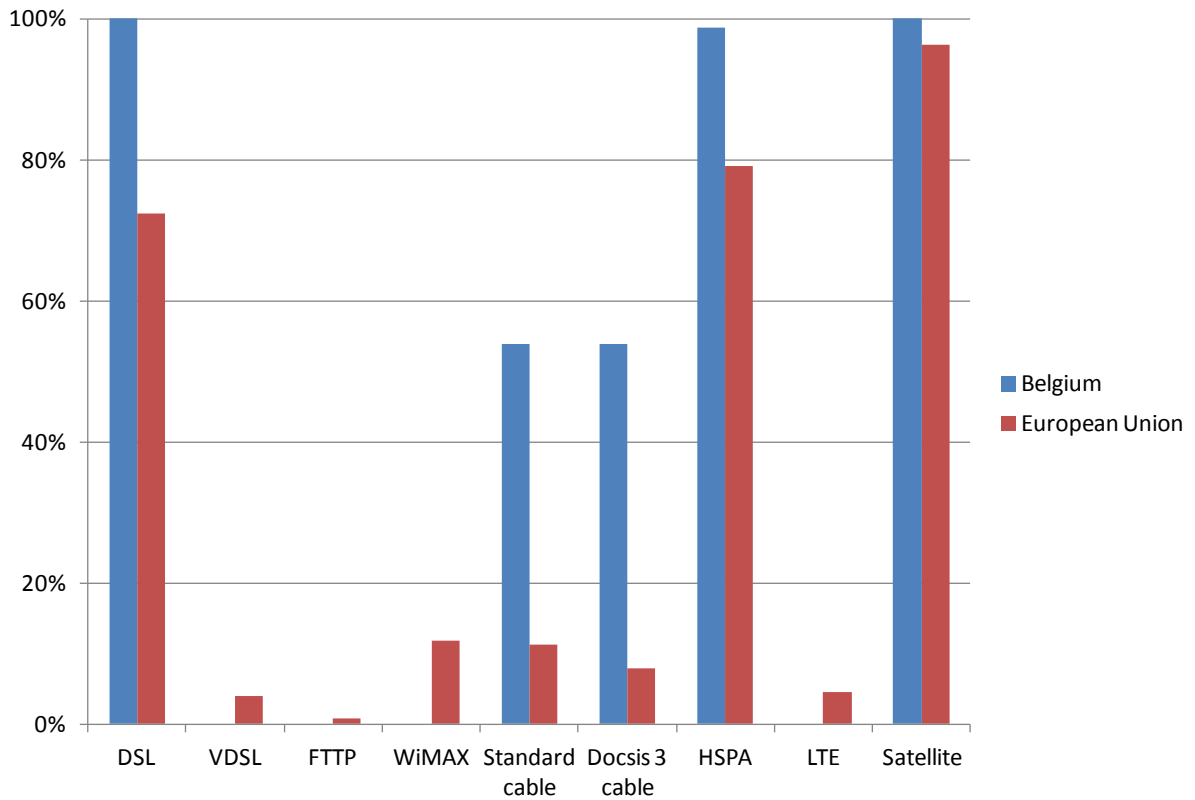
3.02.2 Regional coverage by technology combinations

Map 3.02.01.Belgium Standard broadband coverage

Standard broadband coverage

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

Source: BCE 2011
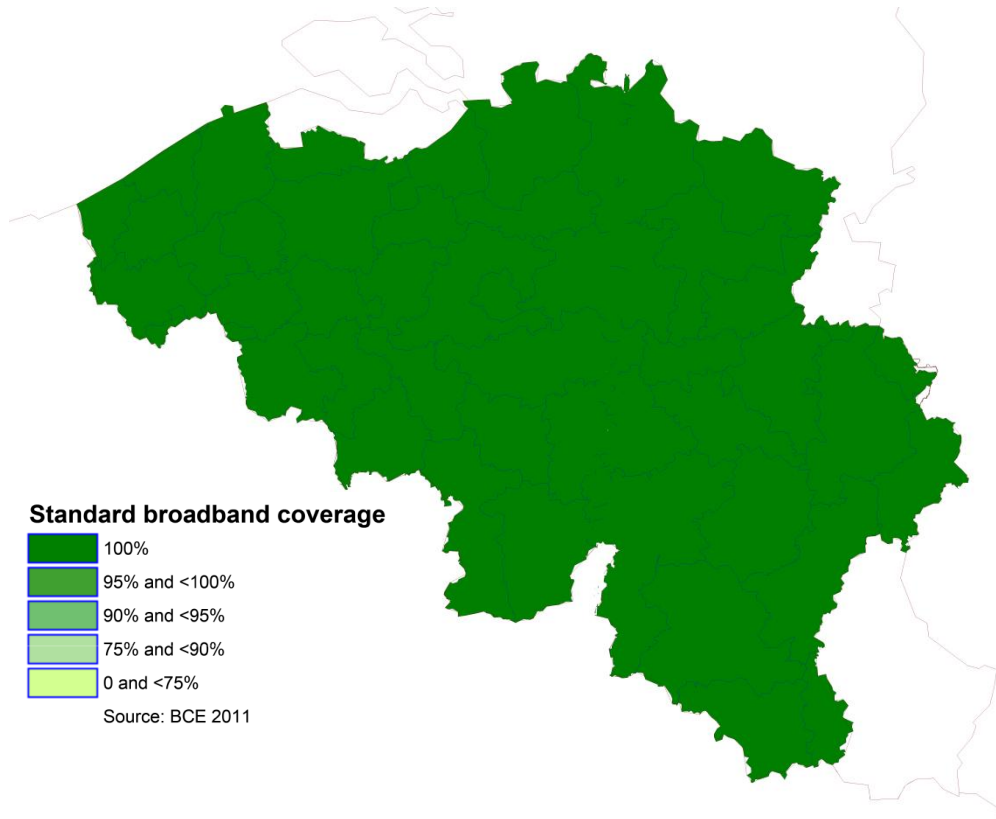
Map 3.02.02.Belgium Next Generation Access coverage

Next Generation Access coverage

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

Source: BCE 2011

Belgium has uniform 100% standard broadband coverage. NGA coverage is not quite so clear-cut. While the cable networks in the northern half of the country report complete coverage, those in the south do not cover the rural sector. Even so, overall coverage is almost 95% in these provinces.

3.02.3 Data tables for Belgium

Demographics

Statistic	National
Population	10,666,866
Persons per household	2.4
Rural proportion	4.0%

Coverage by technology

Technology	Total	Rural
DSL	100.0%	100.0%
VDSL	78.9%	0.0%
FTTP	0.2%	0.0%
WiMAX	14.7%	0.0%
Standard cable	95.9%	53.8%
Docsis 3 cable	95.9%	53.8%
HSPA	98.7%	98.7%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	100.0%	100.0%
NGA Combination	98.0%	53.8%

3.03 Bulgaria

3.03.1 National coverage by broadband technology

Bulgaria: coverage by technology combinations
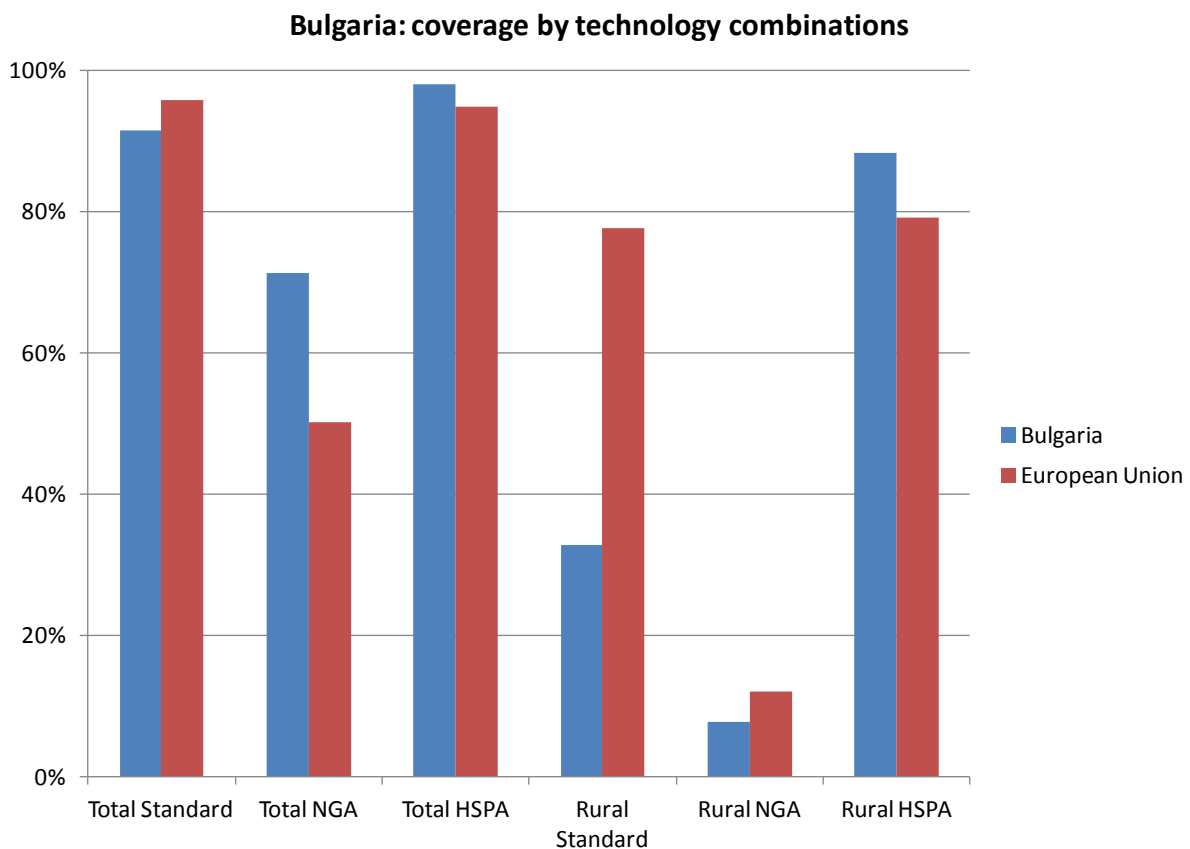
Bulgaria is making up for the limitations of its legacy networks by jumping ahead to next-generation broadband solutions. As a result although it has below average standard coverage, it is sixth Europe-wide for NGA coverage with 71.4%. It is also well above average in HSPA coverage, both Total and Rural.

The technology profile shows that the NGA advantage is achieved with the fourth highest rollout of FTTP in Europe, 44.2%, and an upgraded cable network covering 56.2% of the country. WiMAX plays an average role and VDSL and LTE have yet to appear.

Bulgaria has the smallest percentage of rural homes of any of the Balkan countries in the study, at 17.2%, and they are not as yet well served by fixed broadband services. Rural coverage of all these technologies is below average, except for FTTP, which although providing only 1.2% rural coverage is ahead of the very modest Europe-wide figure of 0.9%. HSPA does fill some of the gap, on 88% against a European rural average of 79%.

Broadband Coverage in Europe 2011

## Bulgaria: total coverage by technology
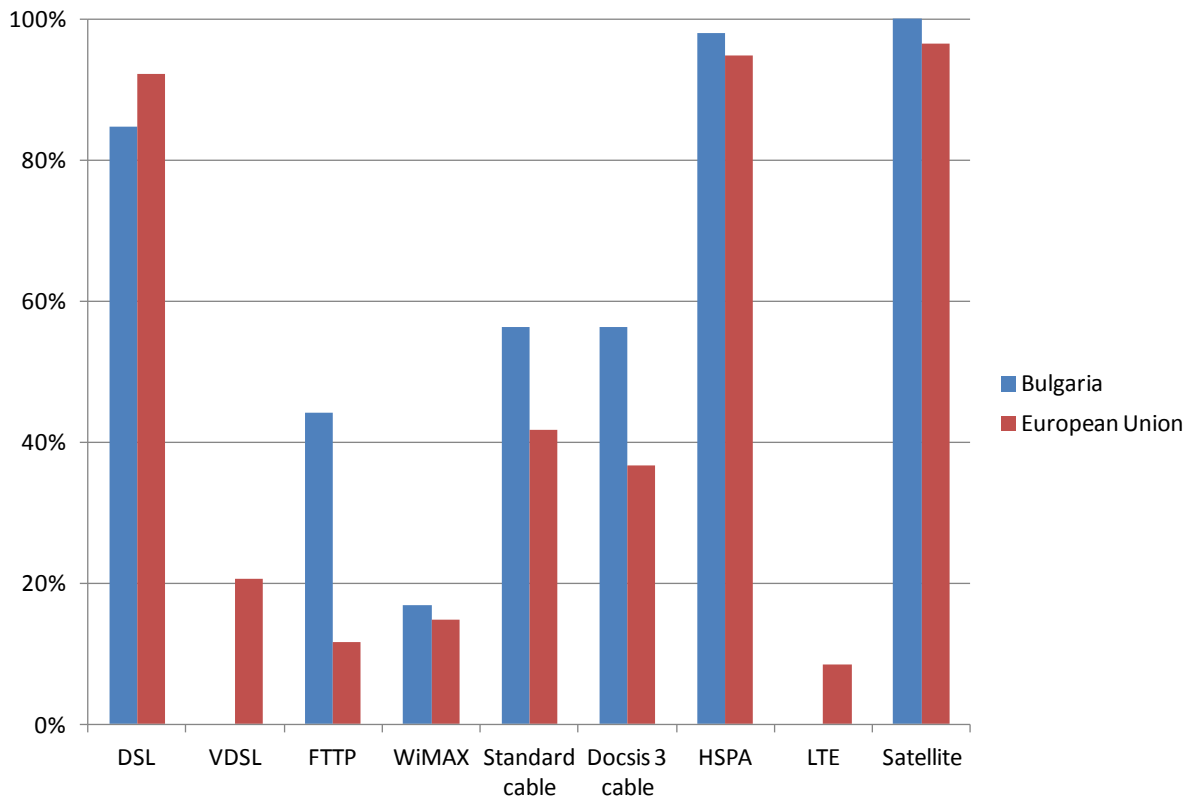
Bulgaria: rural coverage by technology
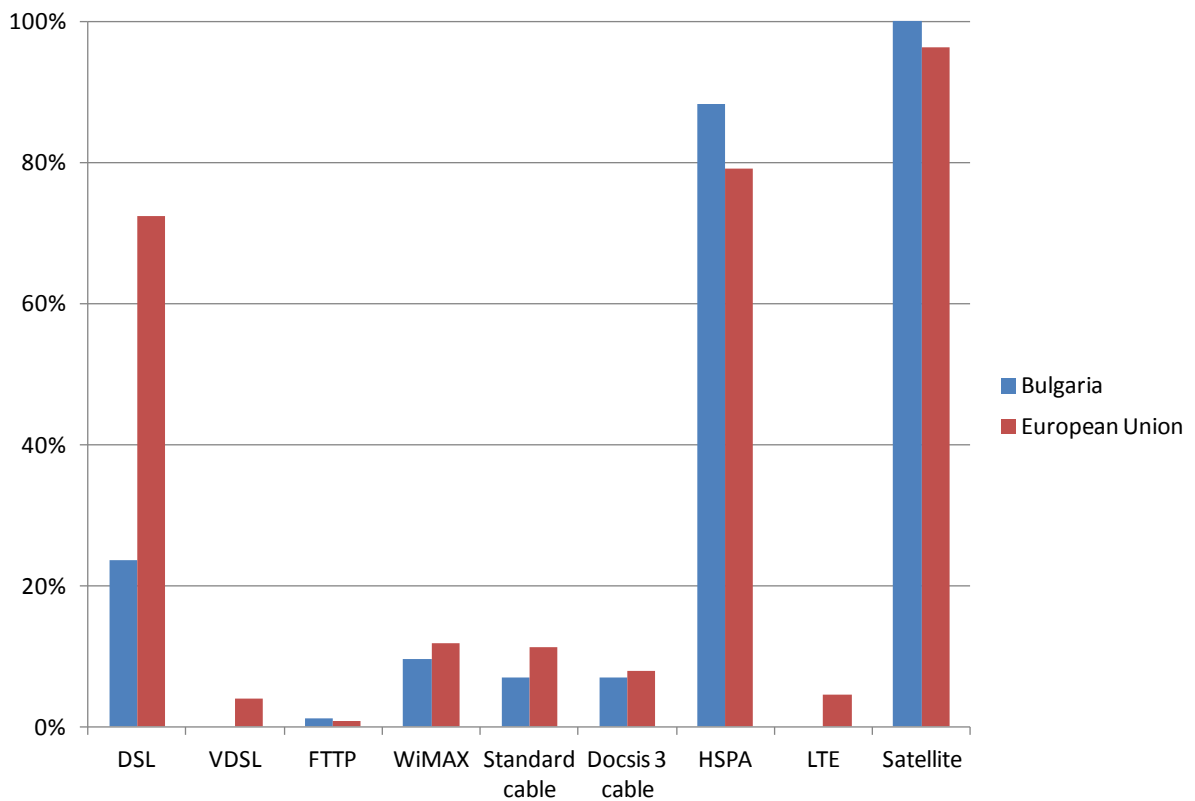
3.03.2 Regional coverage by technology combinations

### Map 3.03.01.Bulgaria Standard broadband coverage

Standard broadband coverage

- 100%
- 95% and <100%
- 90% and <95%
- 75% and <90%
- 0 and <75%
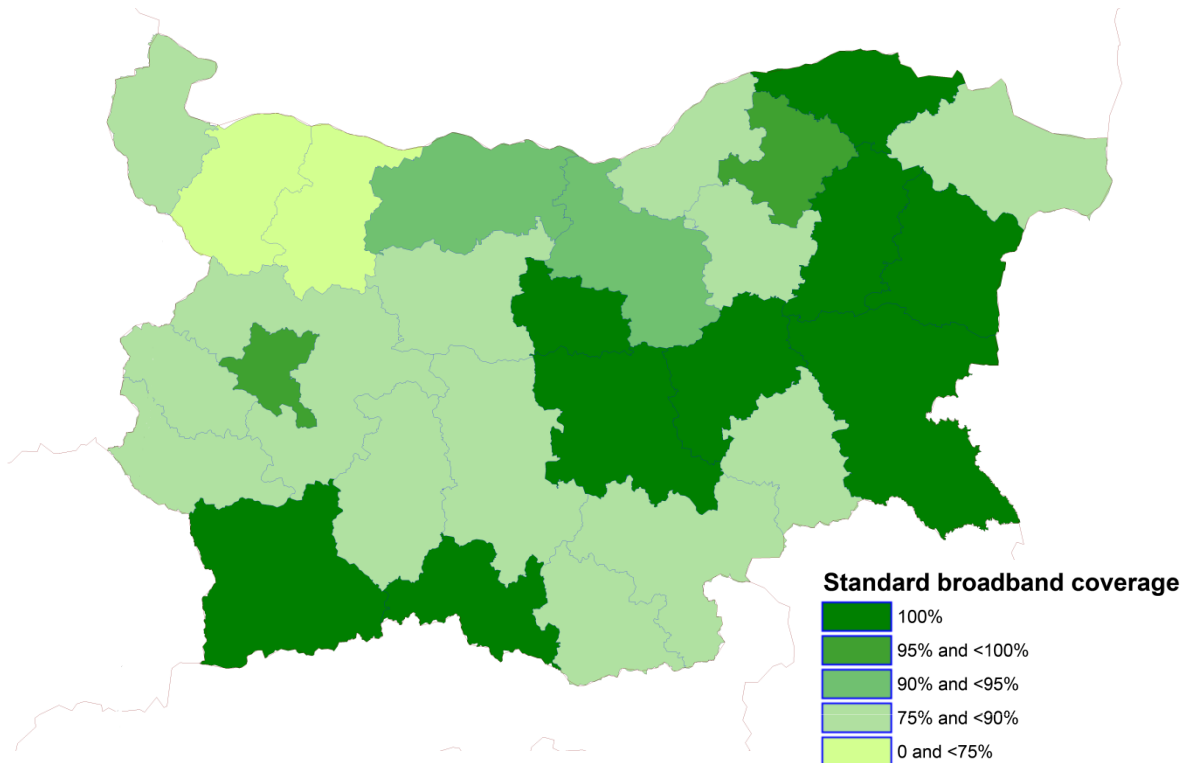
Source: BCE 2011

Map 3.03.02.Bulgaria Next Generation Access cov

Next Generation Access coverage

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

Source: BCE 2011
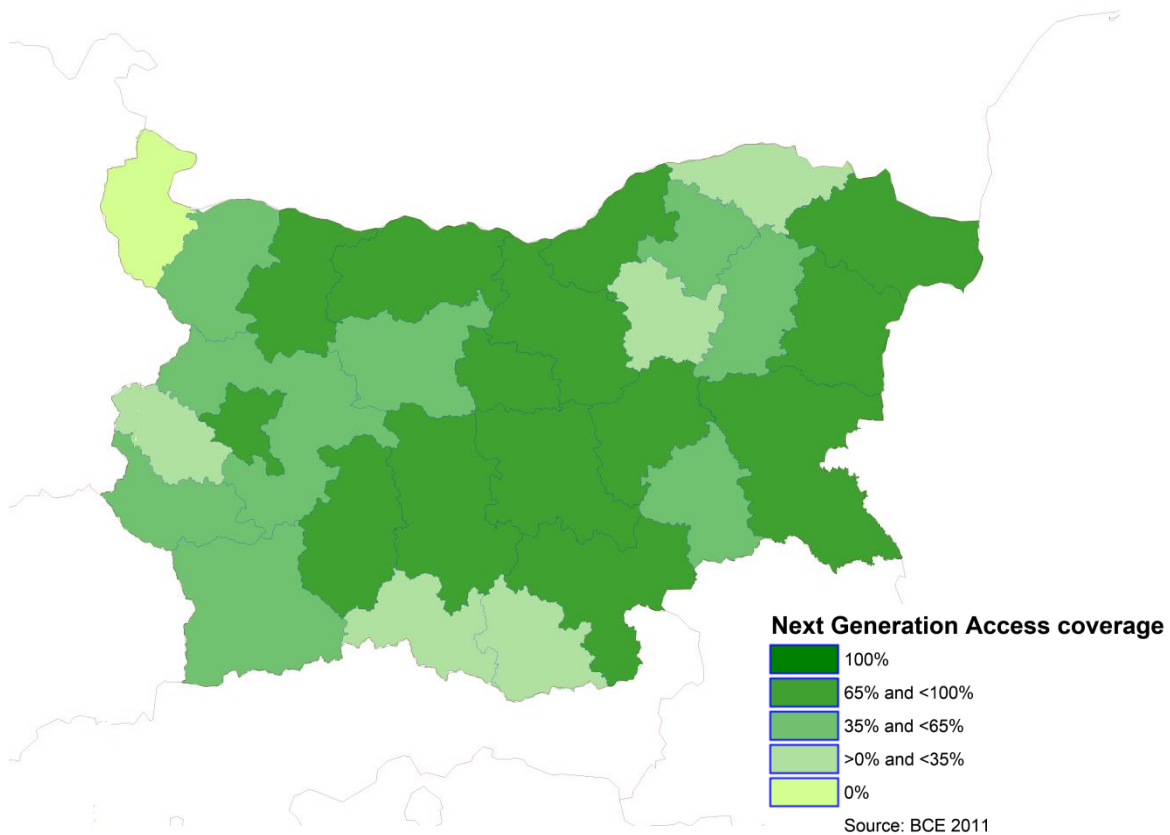
Bulgaria has variable broadband coverage with a different pattern from that familiar in Western Europe. The areas which lead in TSC tend to be behind in NGA coverage, and

vice versa. Sofia, the capital, for example, is behind the leading areas for standard coverage, at 95%, but is first in the country for NGA with 90%.

Tourist areas such as the coastal provinces are among those with 100% standard broadband coverage. Most provinces have between 80% and 94%. Those in north-west Bulgaria are the lowest, ranging from around 80% down to below 65%.

With NGA the pattern is reversed. Most of the country has over 65% coverage but the more rural areas range below that with mountainous areas in the south of the country for example below 20%. The only province found with 0% NGA coverage was Vidin in the far north-west.

3.03.3 Data tables for Bulgaria

Demographics

Statistic	National
Population	7,640,238
Persons per household	2.4
Rural proportion	12.7%

Coverage by technology

Technology	Total	Rural
DSL	84.8%	23.5%
VDSL	0.0%	0.0%
FTTP	44.2%	1.2%
WiMAX	16.9%	9.6%
Standard cable	56.2%	6.9%
Docsis 3 cable	56.2%	6.9%
HSPA	98.0%	88.3%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	91.5%	32.8%
NGA Combination	71.4%	7.8%

3.04 Cyprus

3.04.1 National coverage by broadband technology

Cyprus: coverage by technology combinations
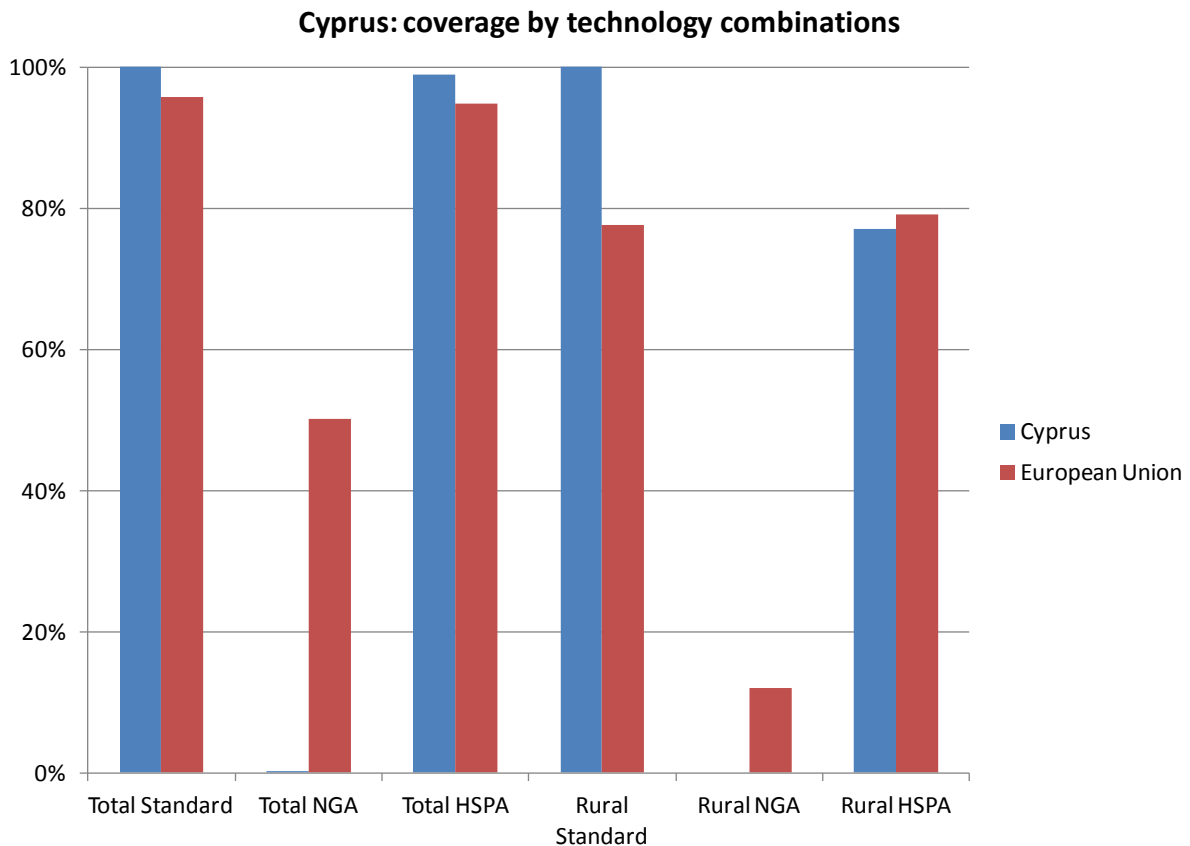
As a small country with a low proportion of rural homes Cyprus enjoys almost complete coverage by standard fixed broadband and HSPA. Rural coverage of 92% is not among the highest but this translates into less than 1,000 homes without access to broadband.

NGA, by contrast, was absent in 2011 but this promises to change rapidly in 2012 as both VDSL and cabled upgrades to Docsis 3 are rolled out.

The technology profile illustrates the strength of coverage by the basic DSL, cable and HSPA technologies in Cyprus. DSL, HSPA and satellite are the only options available in rural areas at present.

Cyprus: total coverage by technology
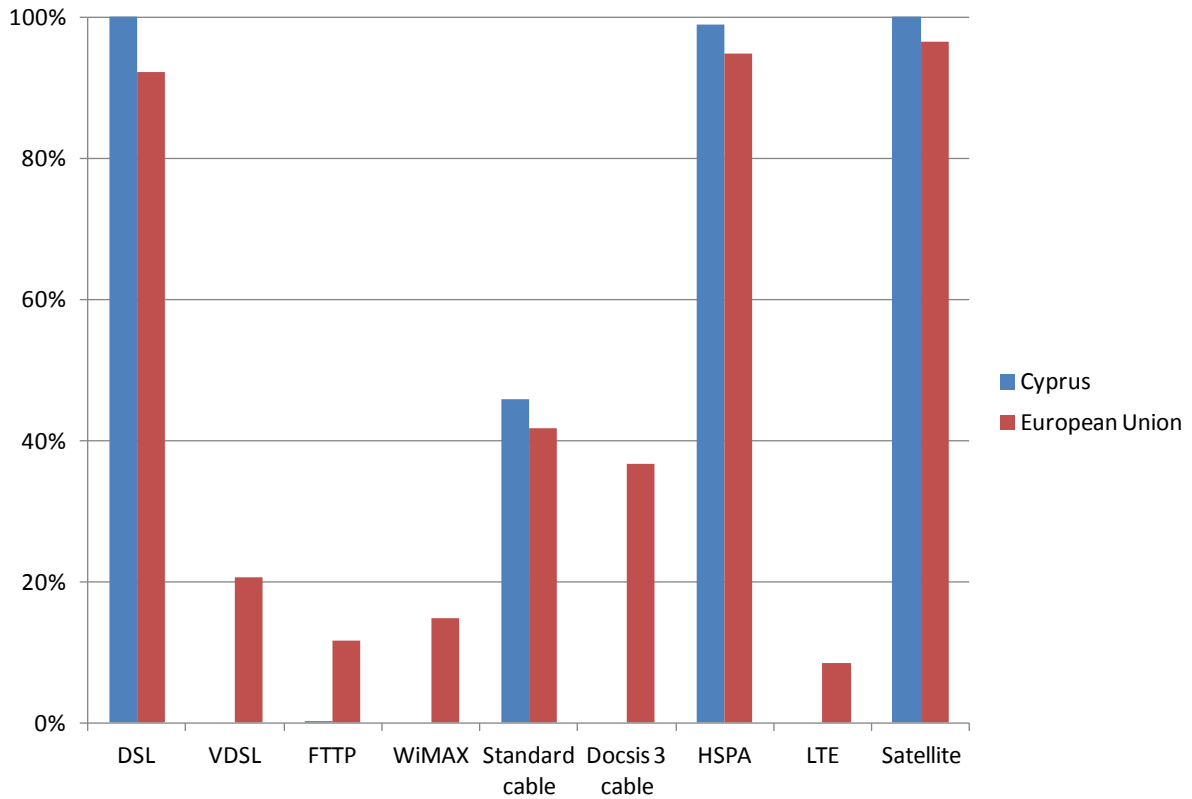
## Cyprus: rural coverage by technology
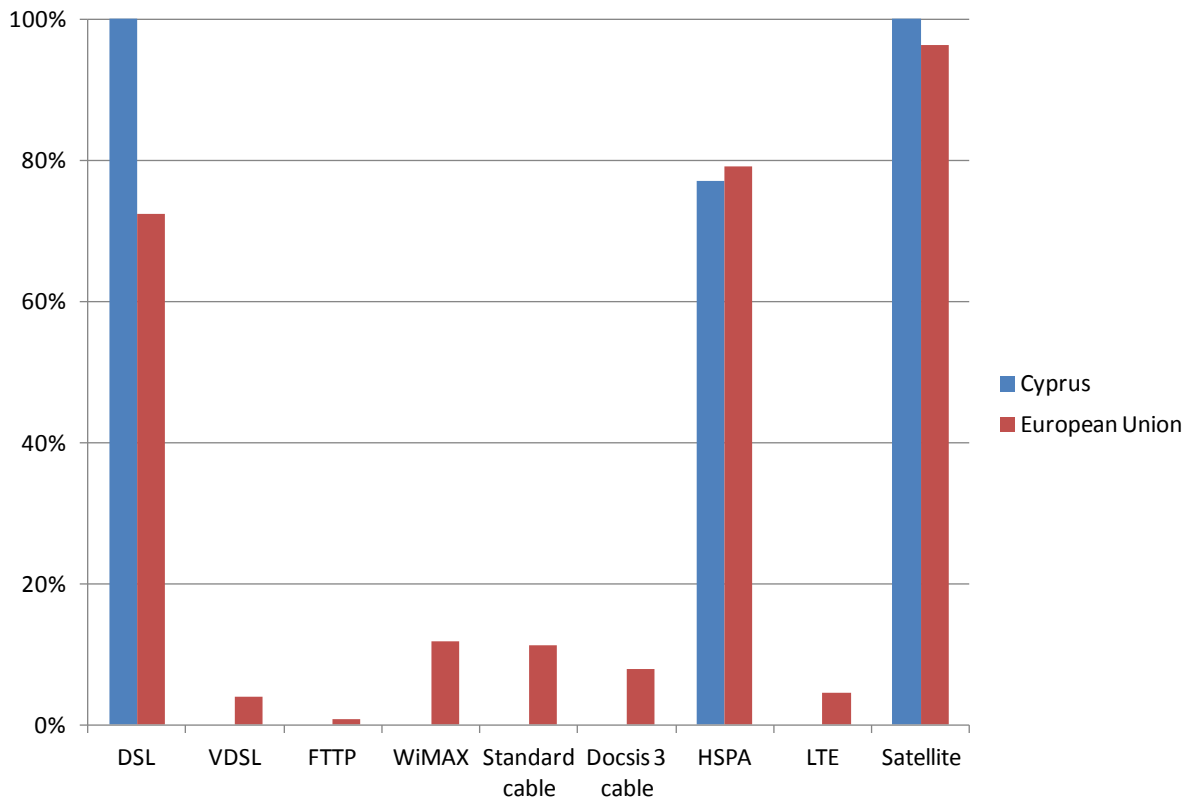
3.04.2 Regional coverage by technology combinations

Map 3.04.01.Cyprus Standard broadband coverage

Standard broadband coverage

■	100%
■	95% and <100%
■	90% and <95%
■	75% and <90%
■	0 and <75%
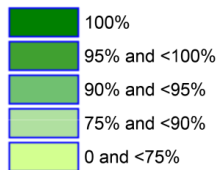
Source: BCE 2011

Map 3.04.02.Cyprus Next Generation Access coverage

Next Generation Access coverage

■	100%
■	65% and <100%
■	35% and <65%
■	>0% and <35%
■	0%
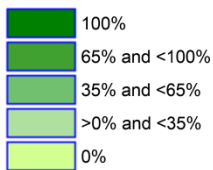
Source: BCE 2011

Cyprus consists of one single NUTS 3 area. It reports 100% standard broadband coverage, thanks to a complete DSL network, but with no NGA coverage as of end-2011.

3.04.3 Data tables for Cyprus

Demographics

Statistic	National
Population	789,269
Persons per household	2.8
Rural proportion	4.3%

Coverage by technology

Technology	Total	Rural
DSL	100.0%	100.0%
VDSL	0.0%	0.0%
FTTP	0.0%	0.0%
WiMAX	0.0%	0.0%
Standard cable	45.9%	0.0%
Docsis 3 cable	0.0%	0.0%
HSPA	99.0%	77.0%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	100.0%	100.0%
NGA Combination	0.0%	0.0%

3.05 Czech Republic

3.05.1 National coverage by broadband technology

Czech Republic: coverage by technology combinations
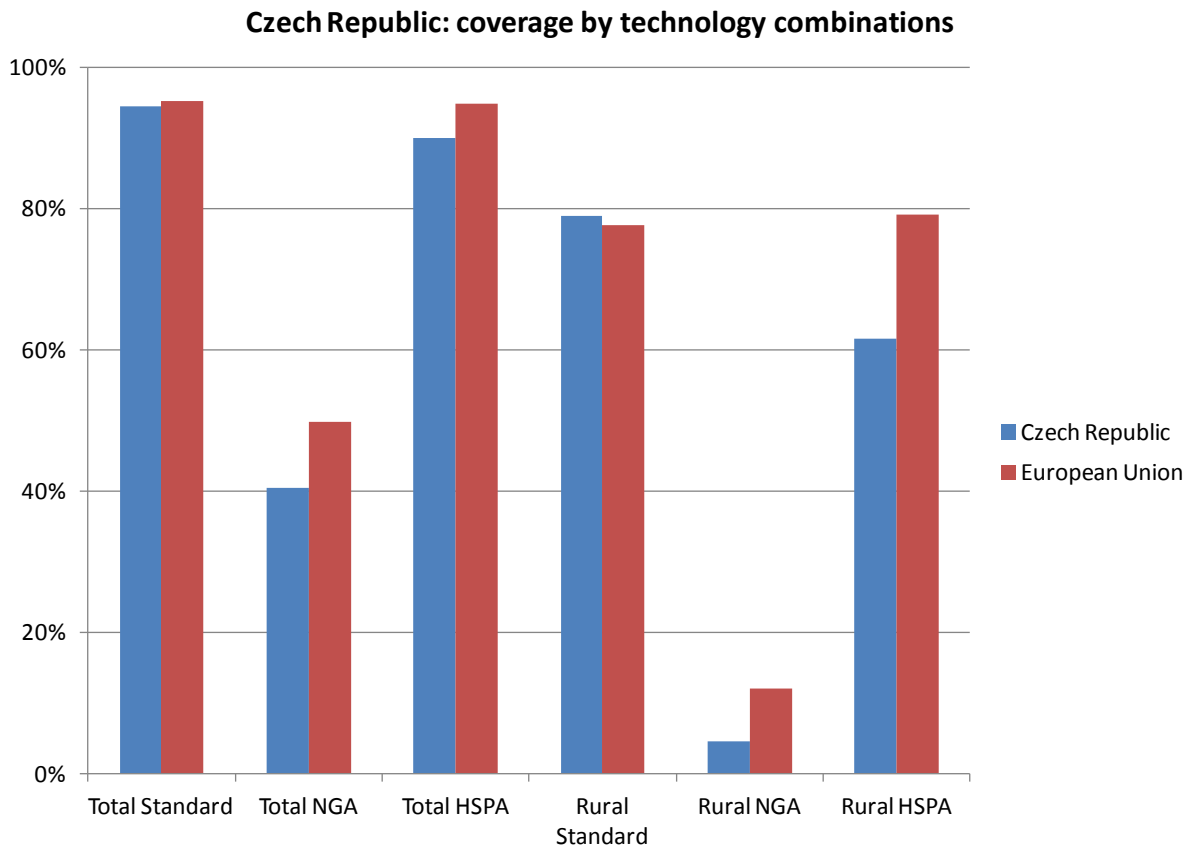
The Czech Republic is close to the European average as far as standard broadband and overall HSPA coverage is concerned. But it is somewhat behind in NGA coverage and has one of the lowest figures for Rural HSPA at 62%.

The technology profile provides the background. The Czech Republic is at the European average for FTTP, but behind on cable network coverage and even more on VDSL. The rural profile shows how this translates into below-average fixed-network coverage for everything except WiMAX which does make an important contribution to filling the standard coverage gap in rural areas.

Czech Republic: total coverage by technology
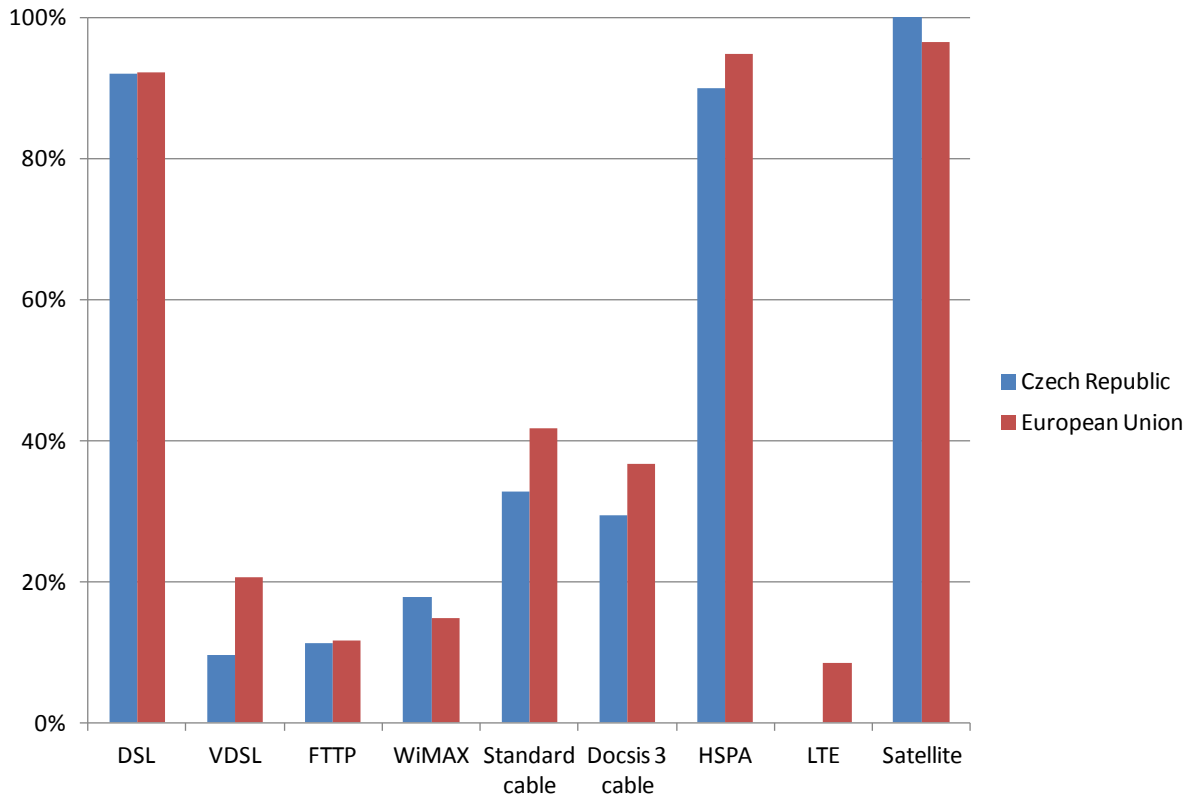
Czech Republic: rural coverage by technology
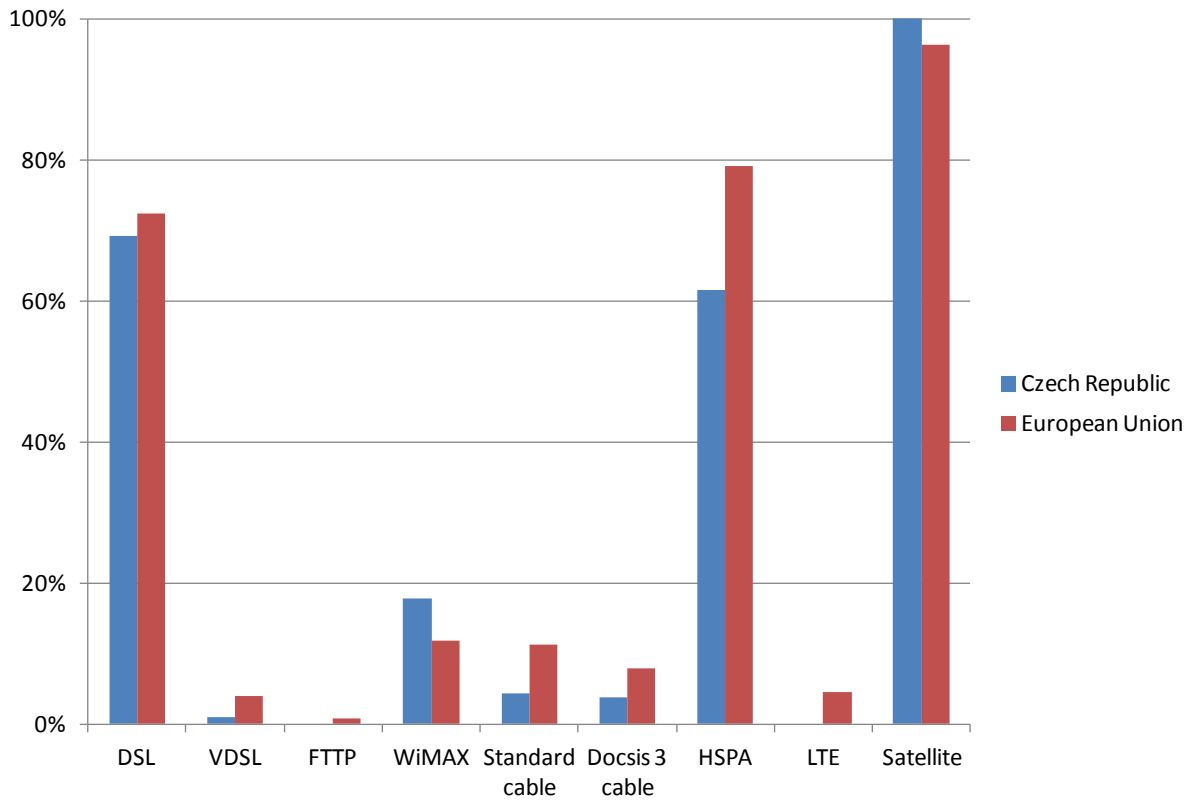
3.05.2 Regional coverage by technology combinations

Map 3.05.01.Czech Republic Standard broadband coverage

Standard broadband coverage

100%
95% and <100%
90% and <95%
75% and <90%
0 and <75%

Source: BCE 2011
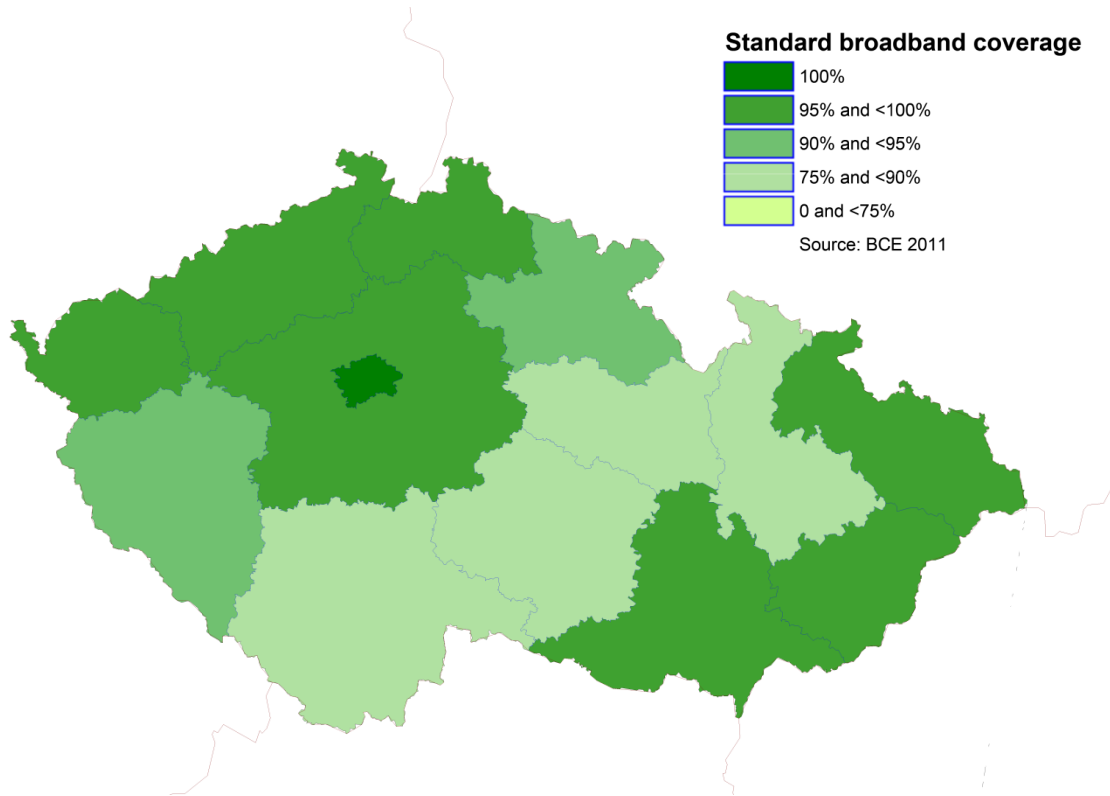
Map 3.05.02.Czech Republic Next Generation Access coverage

Next Generation Access coverage

100%
65% and <100%
35% and <65%
>0% and <35%
0%

Source: BCE 2011
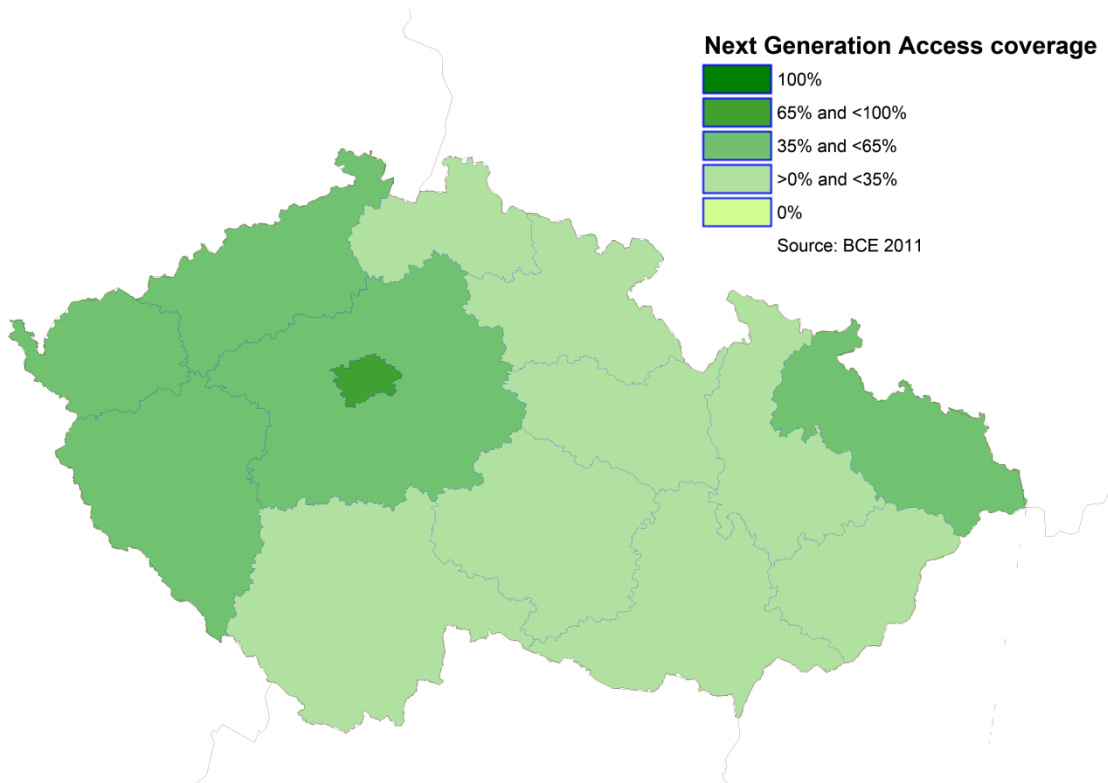
Standard broadband coverage in the Czech Republic ranges down from 100% in the capital Prague to about 86% in the most rural regions. The regions around Prague and in

the north-west all have over 95% coverage as do those in the south and east around Brno and Ostrava.

NGA coverage is also highest in Prague, at 83%. The regions around Prague and in the west of the Republic , and around Ostrava in the east, all have over 35% coverage. The remainder range down as low as 12%.

3.05.3 Data tables for Czech Republic

Demographics

Statistic	National
Population	10,381,130
Persons per household	2.4
Rural proportion	26.0%

Coverage by technology

Technology	Total	Rural
DSL	92.0%	69.3%
VDSL	9.6%	0.9%
FTTP	11.3%	0.0%
WiMAX	17.7%	17.7%
Standard cable	32.8%	4.3%
Docsis 3 cable	29.3%	3.8%
HSPA	90.0%	61.6%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	94.5%	79.0%
NGA Combination	40.3%	4.5%

3.06 Denmark

3.06.1 National coverage by broadband technology

Denmark: coverage by technology combinations
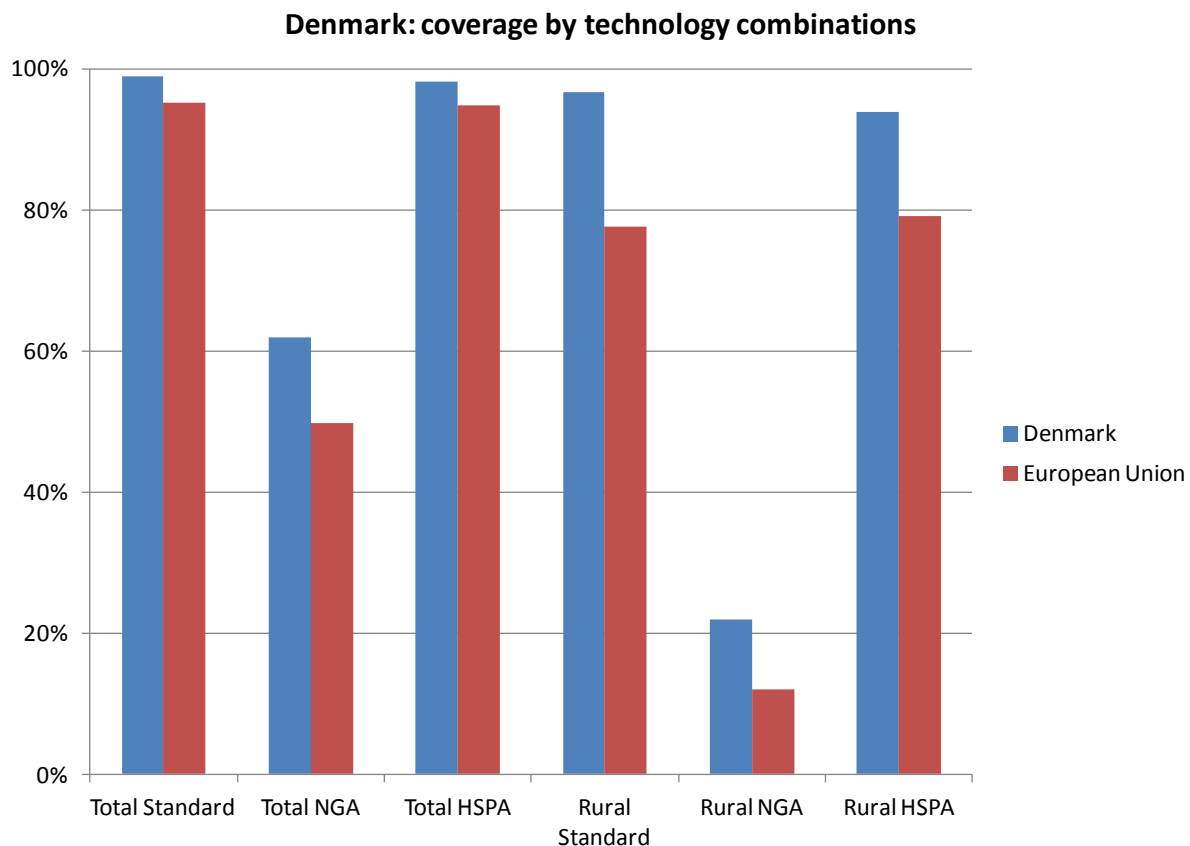
Denmark holds its position as one of the leading broadband countries in Europe with a wide range of services offering good coverage rather than having a leading position in particular services. Its technology combination coverage is ahead of the European average by every measure, particularly in respect of Total NGA and Rural Standard broadband.

The technology profile shows that Denmark is well ahead of the average for most broadband technologies, but not usually in the leading position. For example, DSL coverage is shown here as 98% rather than the 100% claimed by several countries. This reflects the NRA's data which shows DSL coverage falling short of 100% despite the fact that Denmark has universal telephone service and all its exchanges are enabled for DSL. Evidently there is an assumption that end-users need to be able to receive at least minimum broadband speeds to be counted as being in the DSL coverage area but the speed required is not explicitly defined..

The exception for leadership is LTE, where Denmark is first on the list with 54% coverage already achieved. The exceptions for being behind the average are VDSL and WiMAX. VDSL is available in Denmark but aimed only at business users so that it is not included in these consumer-focused results. WiMAX is present but, as in other countries with a full range of broadband choices, makes a smaller contribution than average.

The rural profile tells the same story only more so. Denmark is ahead of the average for every technology excepting only VDSL, WiMAX and, oddly enough, LTE. In particular it is first in Europe for rural FTTP, already providing 12% coverage against the continental average of only 0.9%.

Broadband Coverage in Europe 2011

Denmark: total coverage by technology
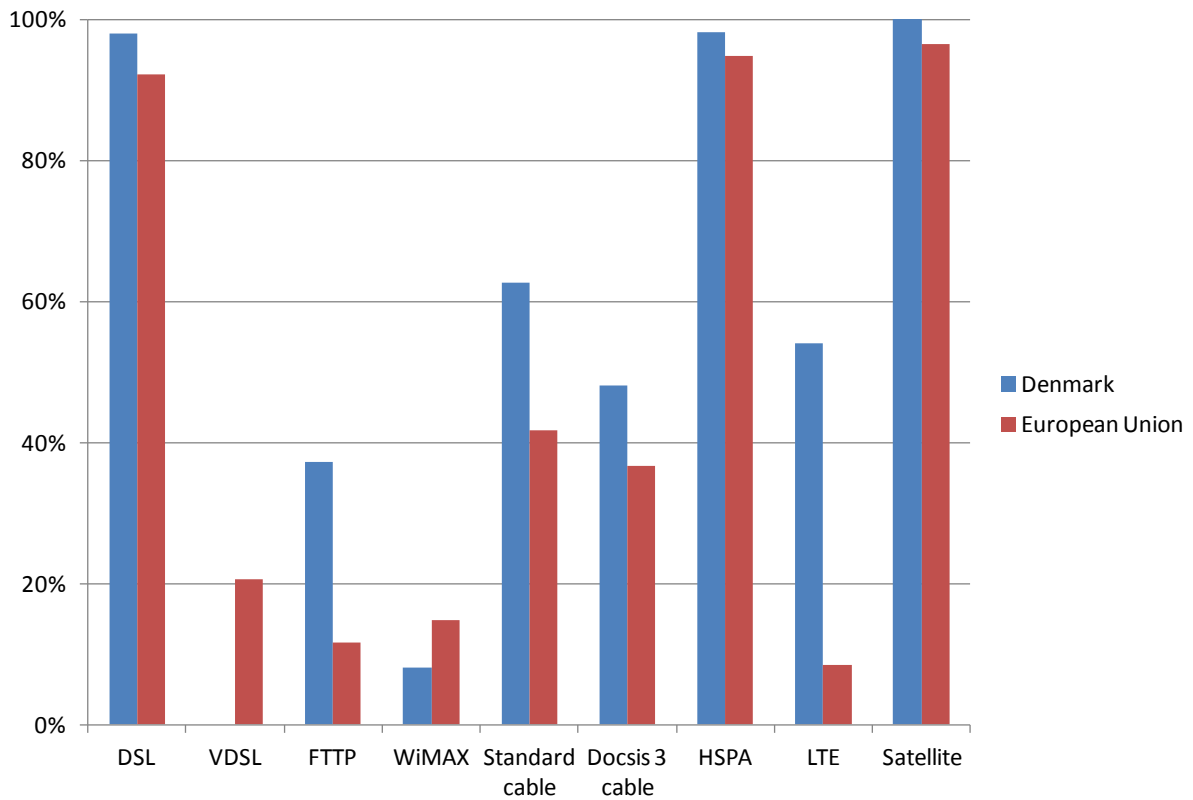
Denmark: rural coverage by technology
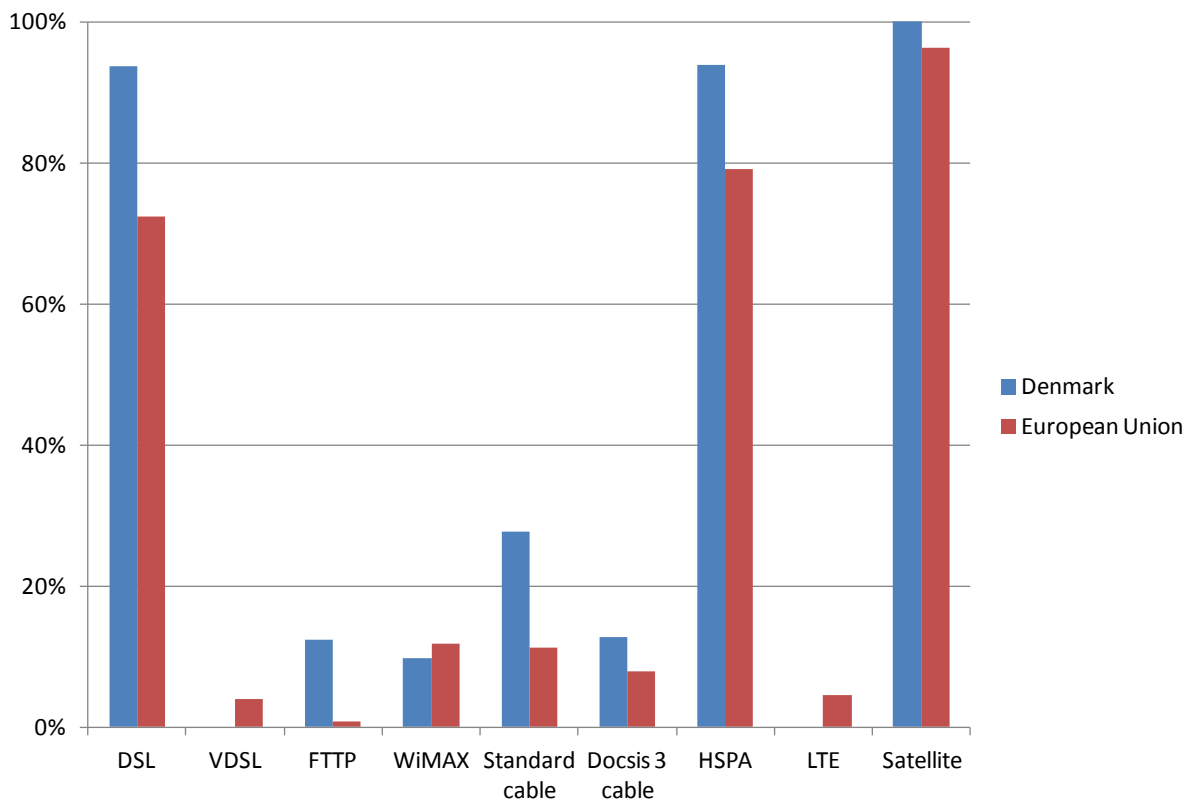
3.06.2 Regional coverage by technology combinations

Map 3.06.01.Denmark Standard broadband coverage

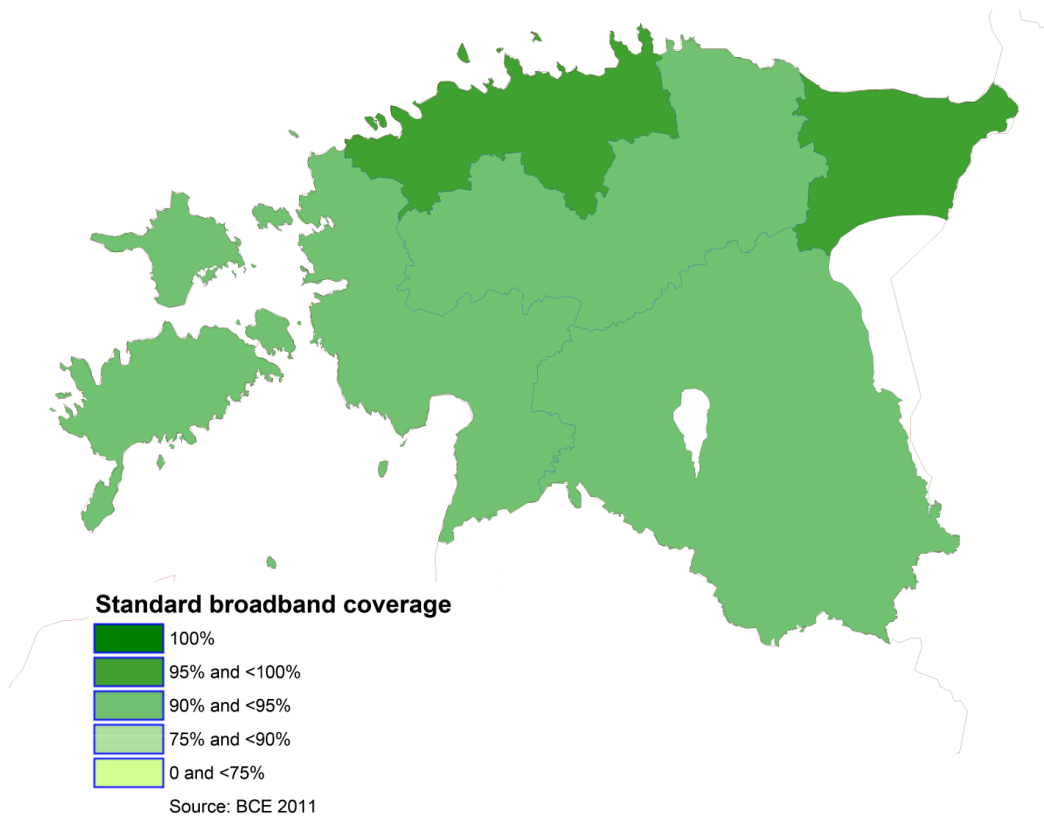**Standard broadband coverage**

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

Source: BCE 2011
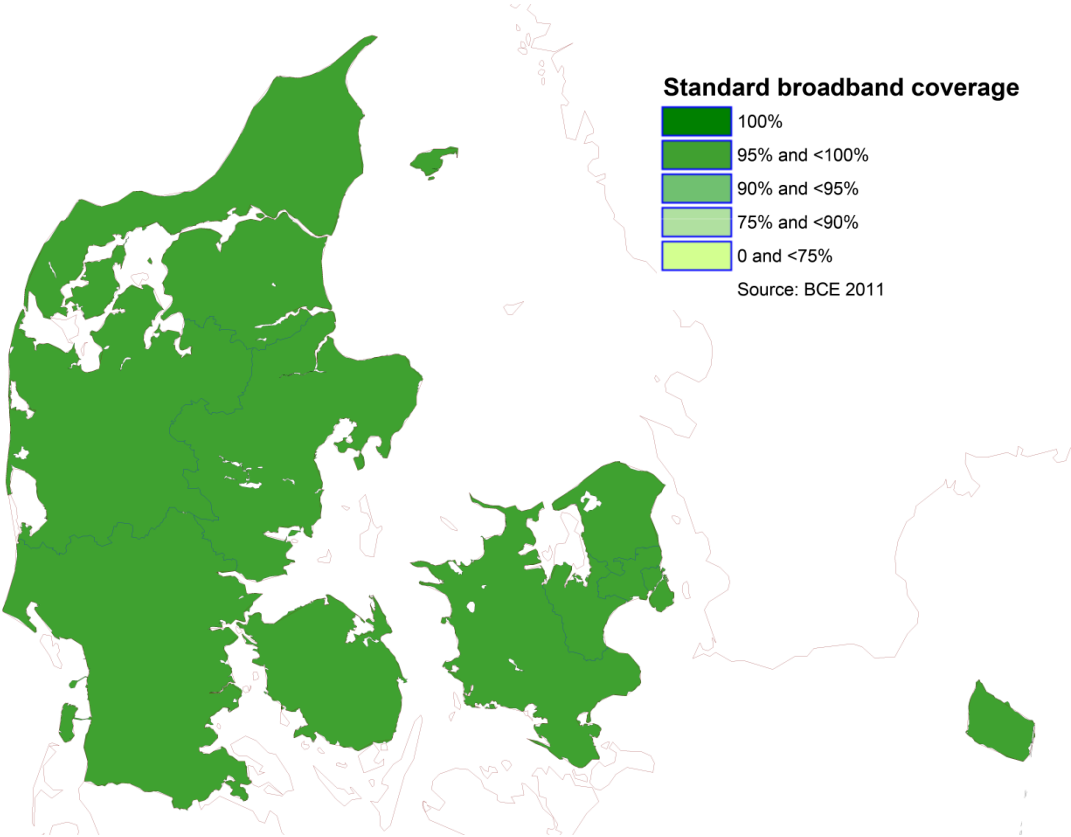
Map 3.06.02.Denmark Next Generation Access coverage

Broadband Coverage in Europe 2011

Next Generation Access coverage

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

Source: BCE 2011
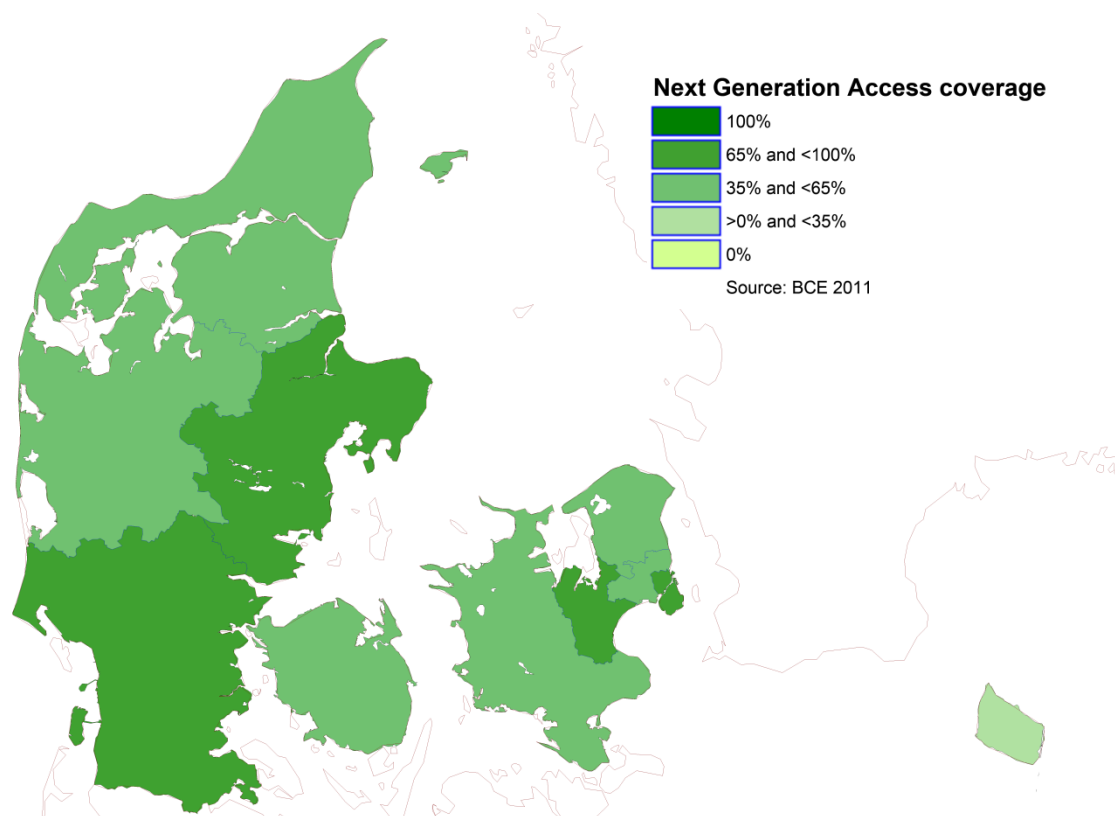
Denmark has uniformly high standard broadband coverage with all the mainland regions between 98% and 99.9%, and only the eastern island of Bornholm below 97%.

NGA coverage is also fairly evenly distributed in Denmark. The capital city, Copenhagen has 78% coverage and three other large regions, including the Aarhus area, over 65%. All but one of the remaining regions have between 44% and 63% NGA coverage. The exception is Bornholm with less than 6%.

3.06.3 Data tables for Denmark

Demographics

Statistic	National
Population	5,475,791
Persons per household	2.1
Rural proportion	30.3%

Coverage by technology

Technology	Total	Rural
DSL	98.1%	93.6%
VDSL	0.0%	0.0%
FTTP	37.2%	12.4%
WiMAX	8.0%	9.7%
Standard cable	62.6%	27.8%
Docsis 3 cable	48.1%	12.8%
HSPA	98.1%	93.9%
LTE	54.1%	0.0%
Satellite	100.0%	100.0%
Standard Combination	99.0%	96.7%
NGA Combination	61.9%	21.9%

3.07 Estonia

3.07.1 National coverage by broadband technology

Estonia: coverage by technology combinations
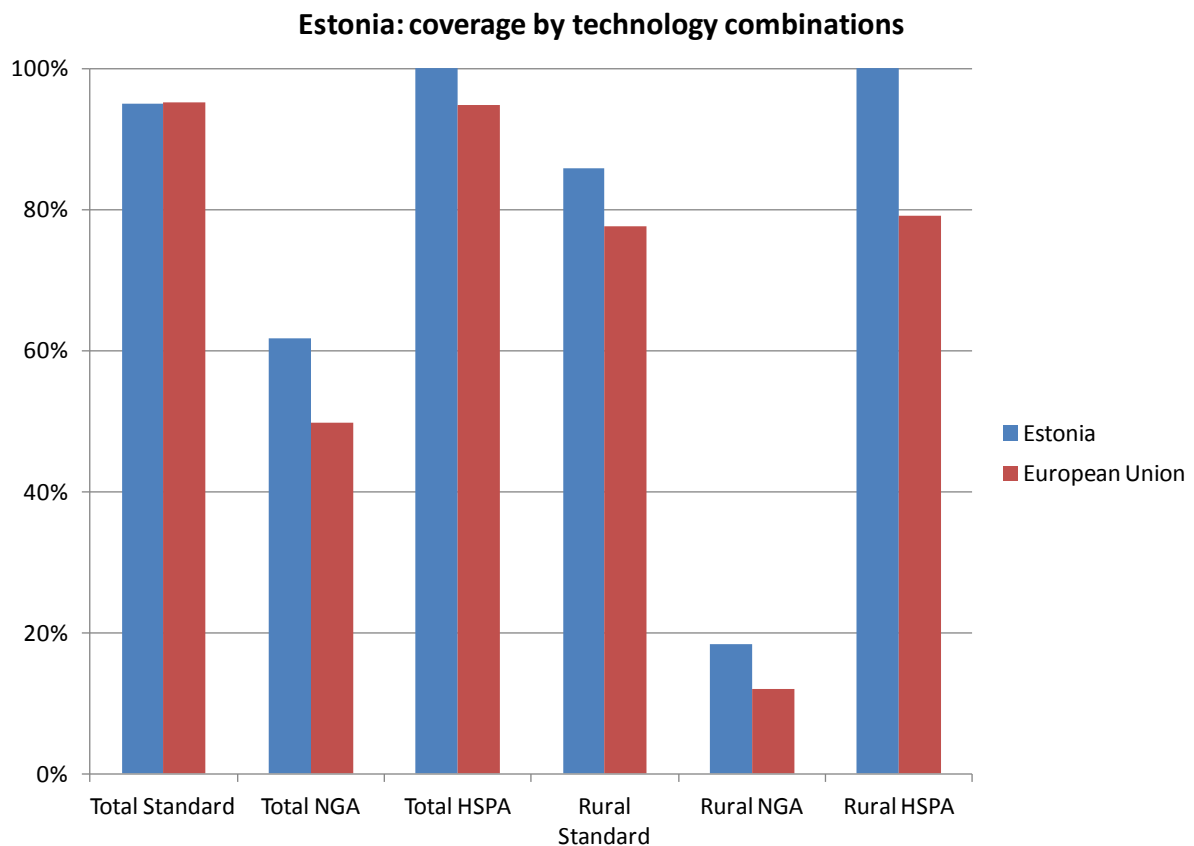
Estonia is almost exactly on the average for Total Standard Coverage and ahead of the average for all the other combinations. Not least it has 100% HSPA coverage, helped by its relatively small size and mountain-free geography. Estonia also has the third-highest LTE availability in Europe, up with its Nordic neighbours which it increasingly resembles.

Estonia's good performance is based on a broadband infrastructure which is skewed away from DSL to some extent. VDSL is present but with low coverage so far (only 4.5%), but there are high coverage values for FTTP (35%) and Standard Cable (59%). Estonia has a high value for NGA coverage (62%) mainly because of FTTP and Docsis 3.

Above-average Rural Standard Coverage in Estonia owes a lot to WiMAX which at 40% has the sixth highest coverage in Europe. Estonia also does relatively well with Rural NGA, thanks to the second-highest rural FTTP coverage in Europe and a good contribution from Docsis 3.

Broadband Coverage in Europe 2011

Estonia: total coverage by technology
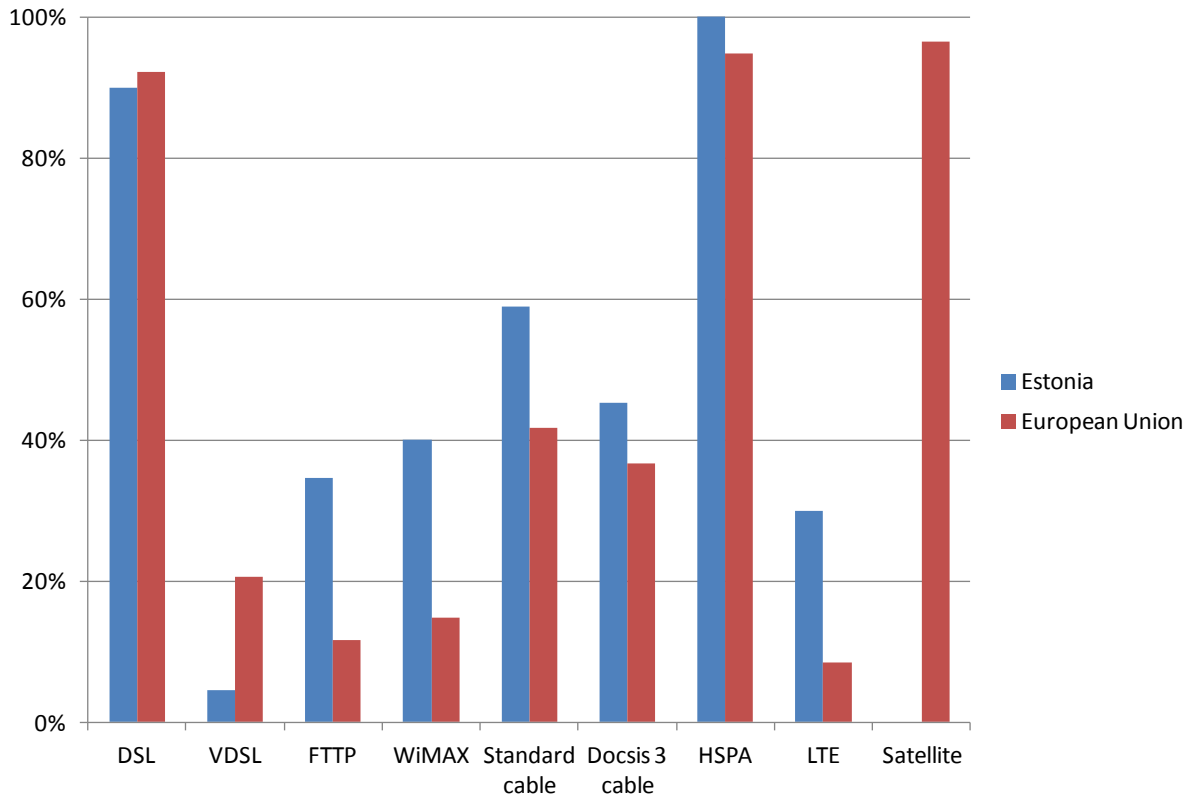
Estonia: rural coverage by technology
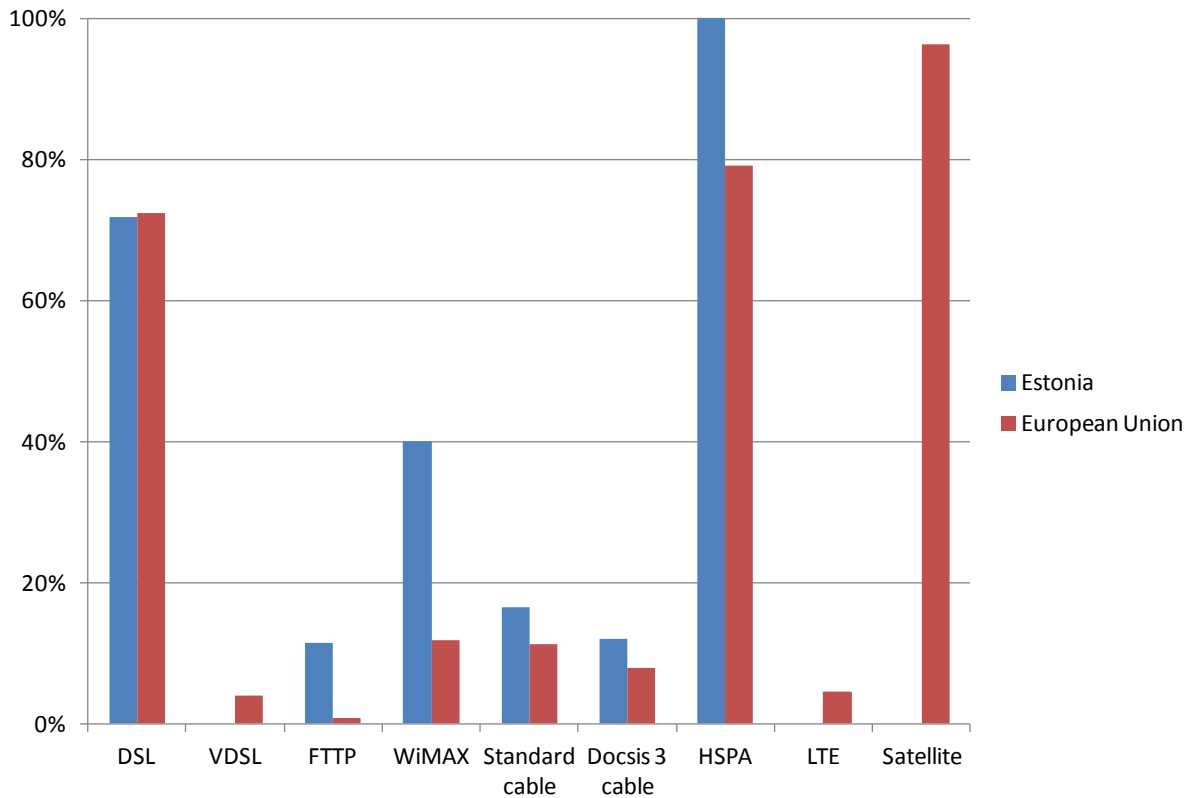
3.07.2 Regional coverage by technology combinations

Map 3.07.01.Estonia Standard broadband coverage

Standard broadband coverage

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

Source: BCE 2011

Map 3.07.02.Estonia Next Generation Access coverage

Next Generation Access coverage

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

Source: BCE 2011
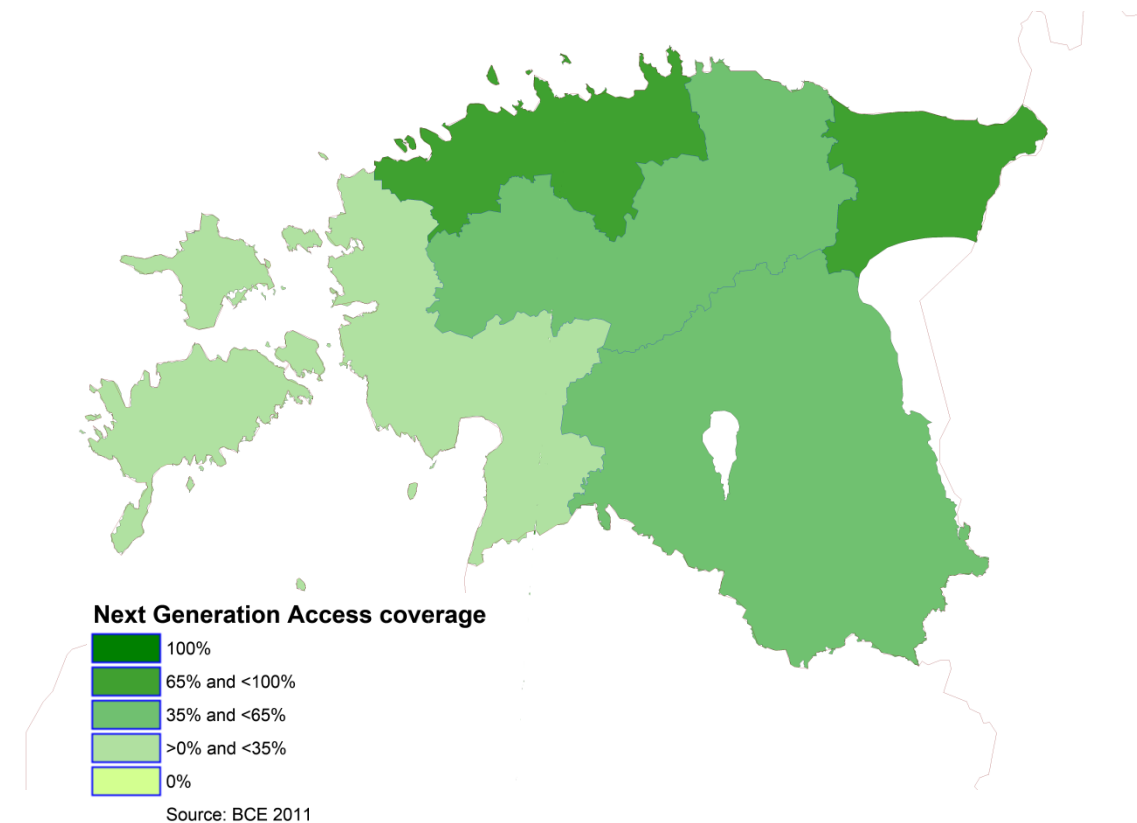
Broadband Coverage in Europe 2011

Standard broadband coverage is highest in the north of Estonia, with the Tallinn region and the north-east of the country both about 97%. The other three provinces have 92% to 93%.

The coverage of Next Generation Access is more varied. The capital region is clearly highest, with almost 90% NGA coverage, and the north-east reaches almost 70%. The two central and southern regions are some way behind with 41% and 37%, and the more rural Baltic coast and islands have 33%.

3.07.3 Data tables for Estonia

Demographics

Statistic	National
Population	1,340,935
Persons per household	2.3
Rural proportion	30.6%

Coverage by technology

Technology	Total	Rural
DSL	90.0%	71.8%
VDSL	4.5%	0.0%
FTTP	34.7%	11.4%
WiMAX	40.0%	40.0%
Standard cable	58.9%	16.5%
Docsis 3 cable	45.4%	11.9%
HSPA	100.0%	100.0%
LTE	30.0%	0.0%
Satellite	0.0%	0.0%
Standard Combination	95.0%	85.9%
NGA Combination	61.8%	18.4%

3.08 Finland

3.08.1 National coverage by broadband technology

Finland: coverage by technology combinations
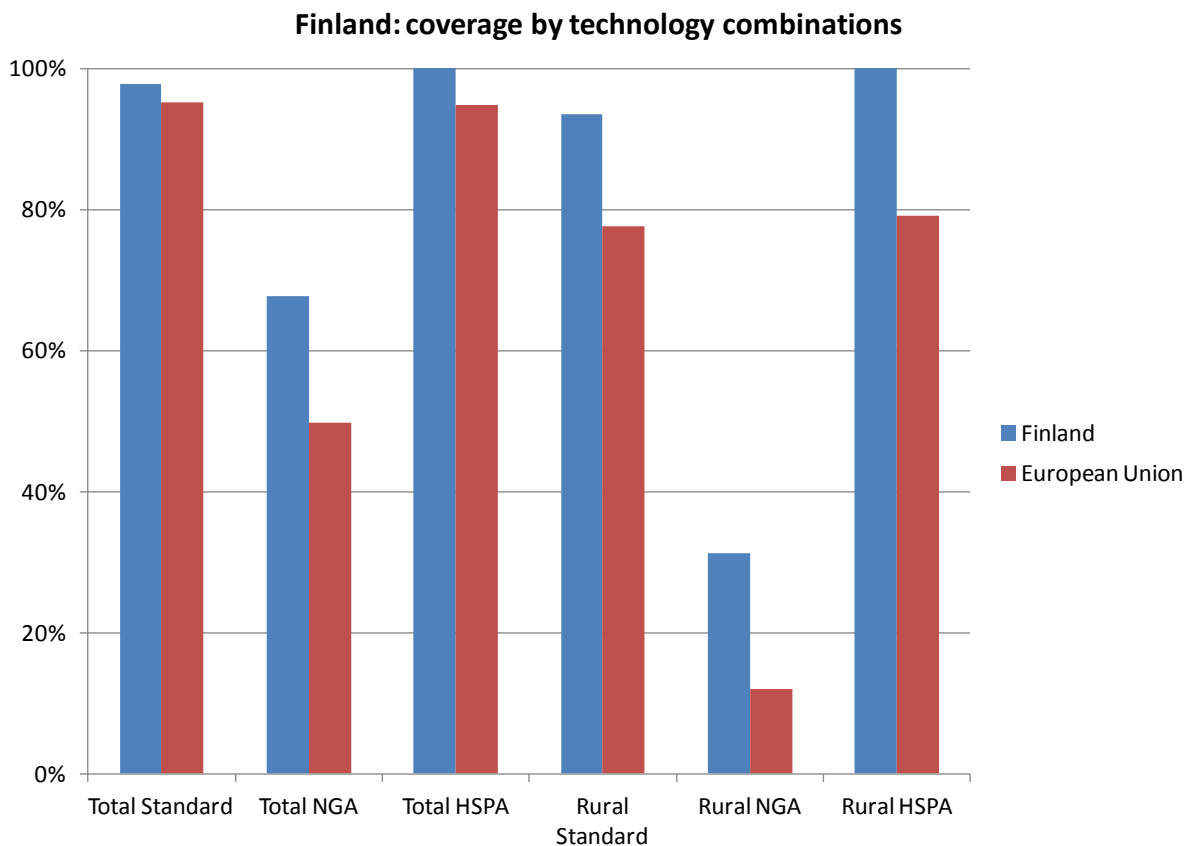
Finland is well ahead of the averages on all the technology combinations, particularly those relating to rurality and NGA. It has the fourth highest rural NGA coverage for example, at 31%. Not least it has 100% HSPA coverage reflecting its industrial strengths and priorities. This is particularly impressive considering Finland is level with Norway with the lowest population density of all the study countries of mainland Europe (16 persons per sq km), and with one-third of the population living in rural areas.

Finland achieves this with good coverage by the full range of NGA technologies. It has an extensive cable network (Docsis 3 coverage is fifth highest in Europe at 68%) and fairly high FTTP coverage (21%) but also a relatively high VDSL rollout at 20%. Its blanket coverage of HSPA is now being matched by the rapid spread of LTE services, sixth highest in the study countries, at 25% by the end of 2011.

Of the NGA options, only Docsis 3 spreads significantly into the rural sector, providing 31% coverage. The study found little or no rural presence of VDSL, FTTP or LTE. WiMAX has a significant role in filling the gaps left by DSL for standard coverage.

Broadband Coverage in Europe 2011

Finland: total coverage by technology
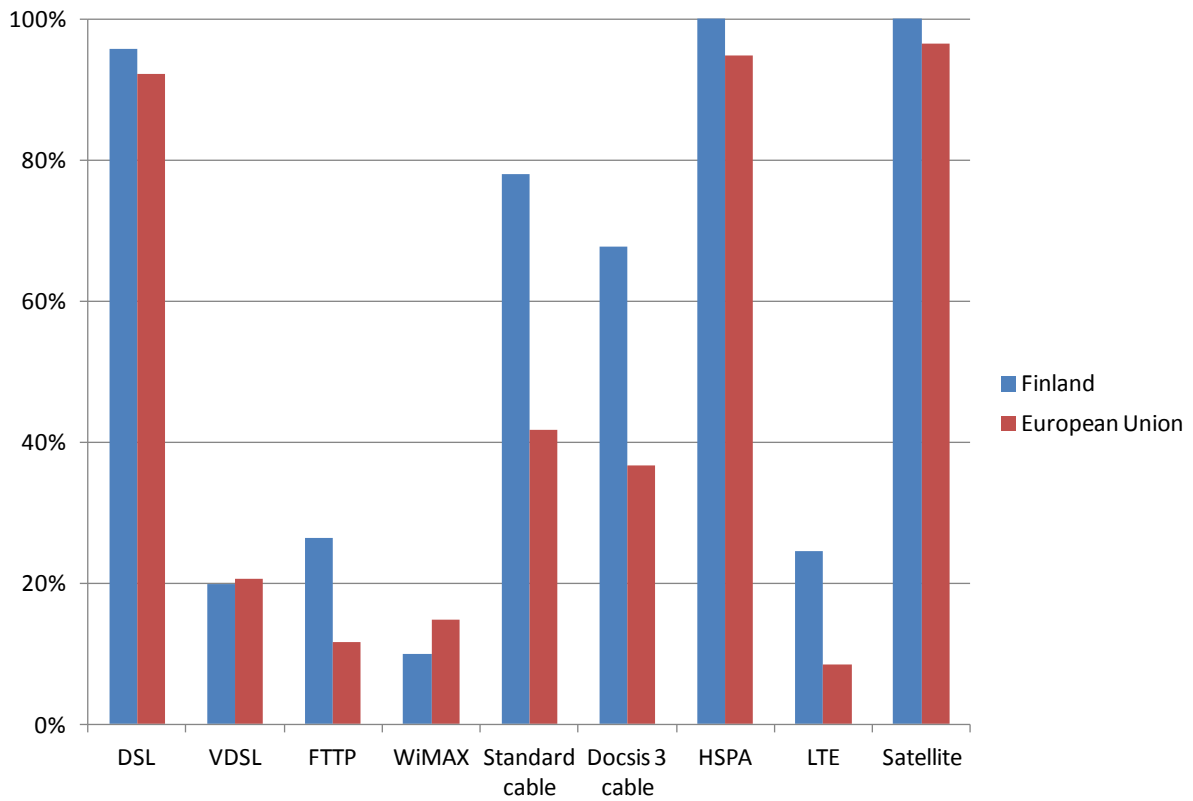
Finland: rural coverage by technology
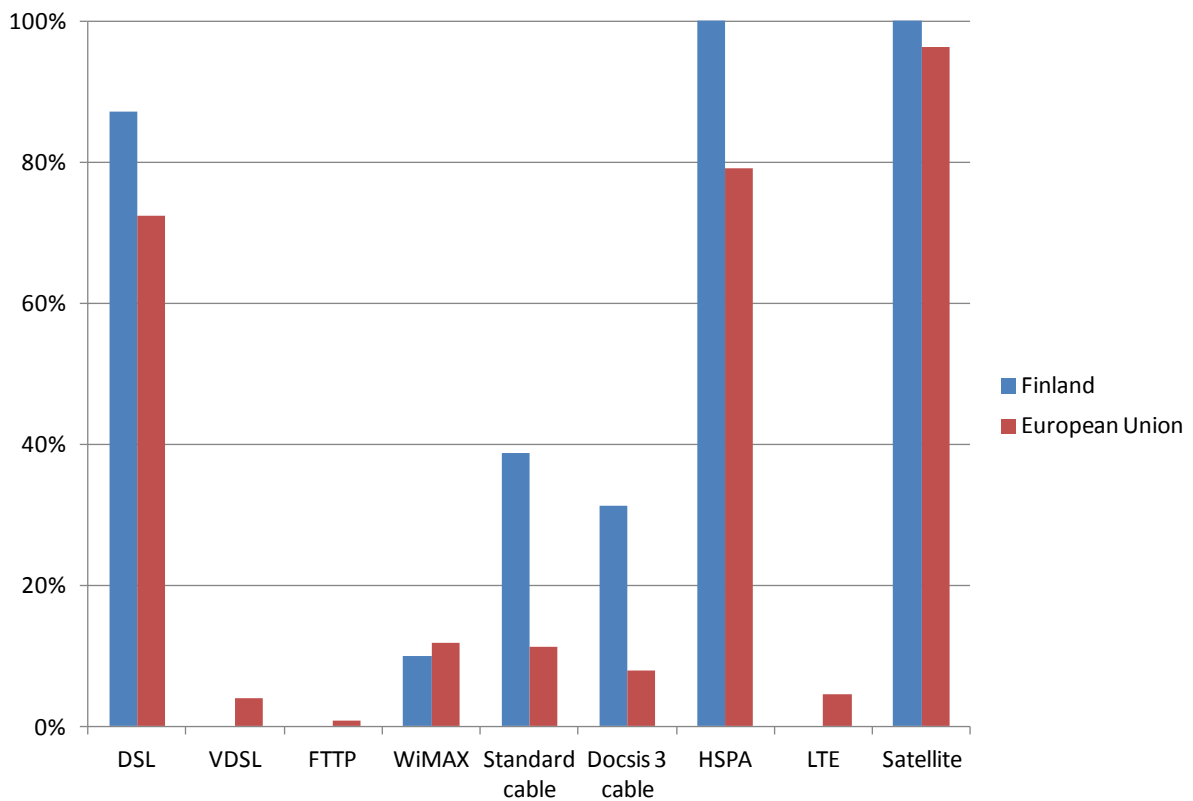
3.08.2 Regional coverage by technology combinations

Map 3.08.01.Finland Standard broadband coverage

Standard broadband coverage
- 100%
- 95% and <100%
- 90% and <95%
- 75% and <90%
- 0 and <75%

Source: BCE 2011
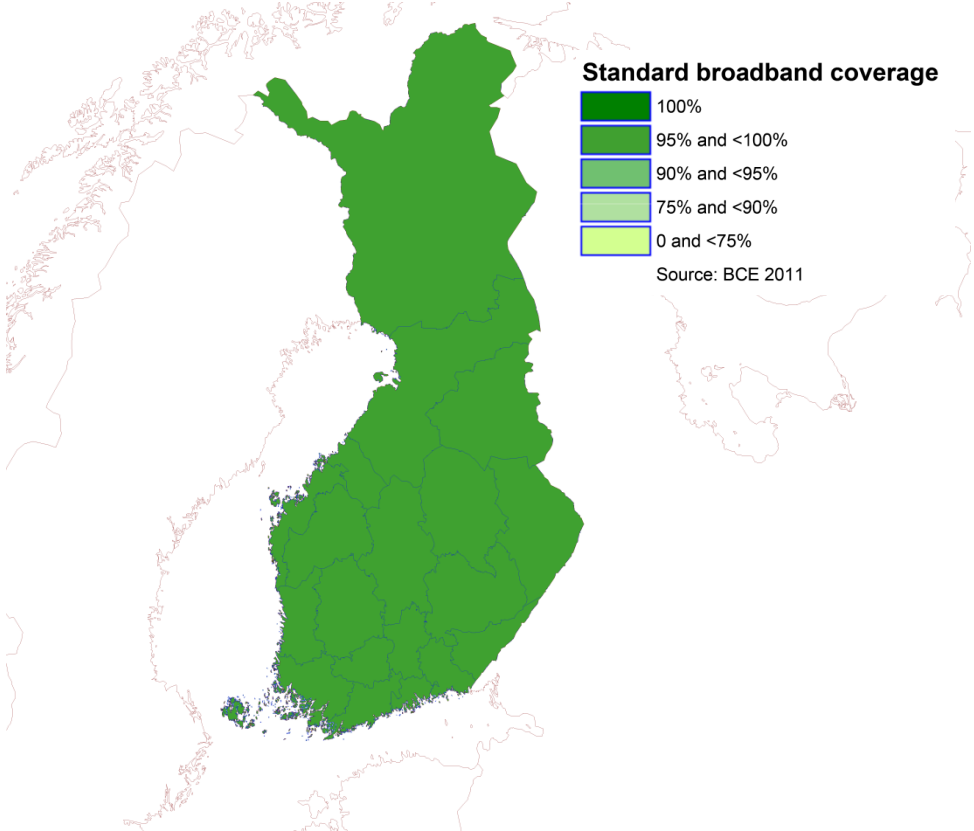
Map 3.08.02.Finland Next Generation Access coverage

Next Generation Access coverage
- 100%
- 65% and <100%
- 35% and <65%
- >0% and <35%
- 0%

Source: BCE 2011

Finland has uniformly high standard broadband coverage. The south-western province of Uusimaa which includes the capital Helsinki and Finland's second largest city, Espoo, has 99.7% coverage, but all provinces have at least 95%, even the most rural.

With NGA there are much bigger contrasts. Uusimaa has 97% coverage. All the other south-western provinces are over 65% or just short of it, and so are a number of the more central and eastern ones. But the project research showed no evidence of NGA services in eight provinces, including the far north of Finland and the Aaland islands.

3.08.3 Data tables for Finland

Demographics

Statistic	National
Population	5,300,484
Persons per household	2.1
Rural proportion	33.3%

Coverage by technology

Technology	Total	Rural
DSL	95.7%	87.2%
VDSL	19.8%	0.0%
FTTP	26.4%	0.0%
WiMAX	10.0%	10.0%
Standard cable	78.0%	38.7%
Docsis 3 cable	67.8%	31.3%
HSPA	100.0%	100.0%
LTE	24.5%	0.0%
Satellite	100.0%	100.0%
Standard Combination	97.8%	93.5%
NGA Combination	67.8%	31.3%

3.09 France

3.09.1 National coverage by broadband technology

France: coverage by technology combinations
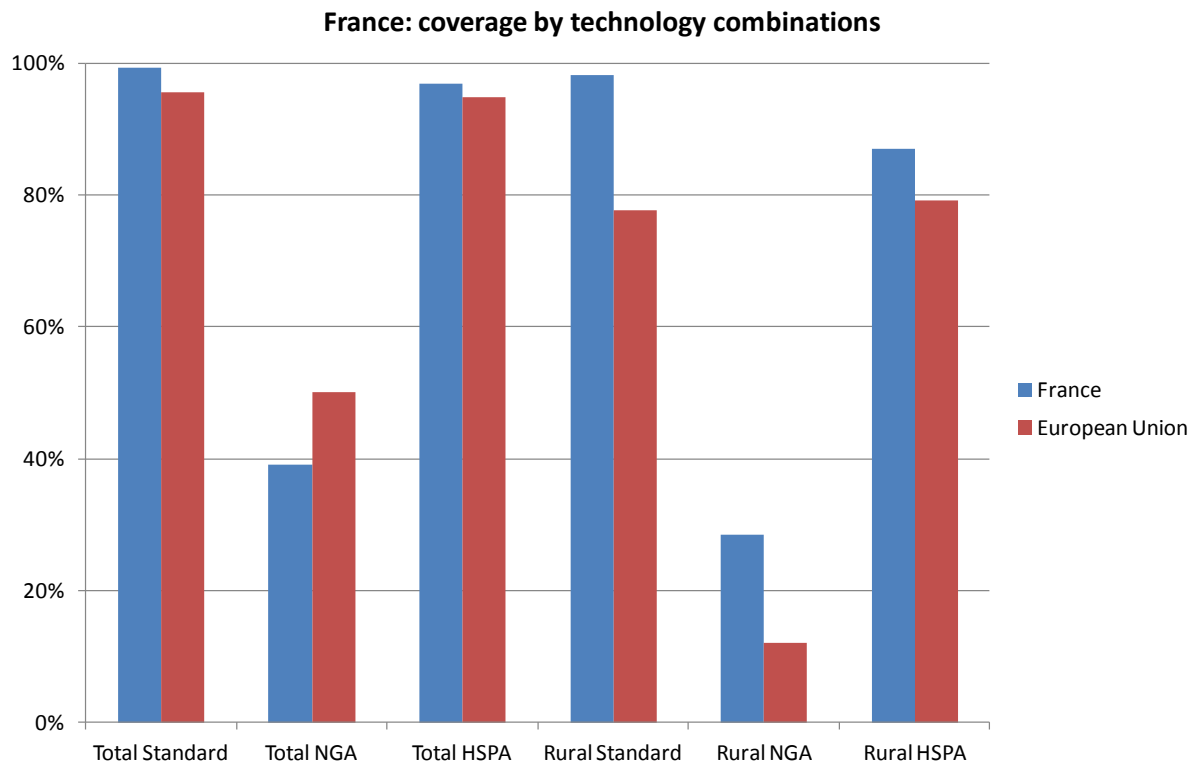
France is ahead of the European averages on most combination measures, particularly for rural broadband, where it is fifth among the study countries for both standard and NGA coverage (98% and 29% respectively). But it is some way behind the average and 24th in Europe for Total NGA coverage.

This pattern is the result of the country's distinctive technology profile. With FTTP coverage at 21%, France has made a much bigger commitment to fibre than any other large European country. But it is not making any use of VDSL and has lower than average coverage of both Standard and Docsis 3 cable. The net result at present is relatively low NGA availability.

On the other hand, France's rural areas are much better served by cable networks than most other countries. France has the fourth highest rural coverage of Standard Cable (40%) and the fifth highest for Docsis 3 (28%) which is enough to give it a high position for rural NGA.

WiMAX networks are available in France but they are aimed at business users and so are not included in this study. Nor was LTE available in France as of end-2011.

Broadband Coverage in Europe 2011

France: total coverage by technology
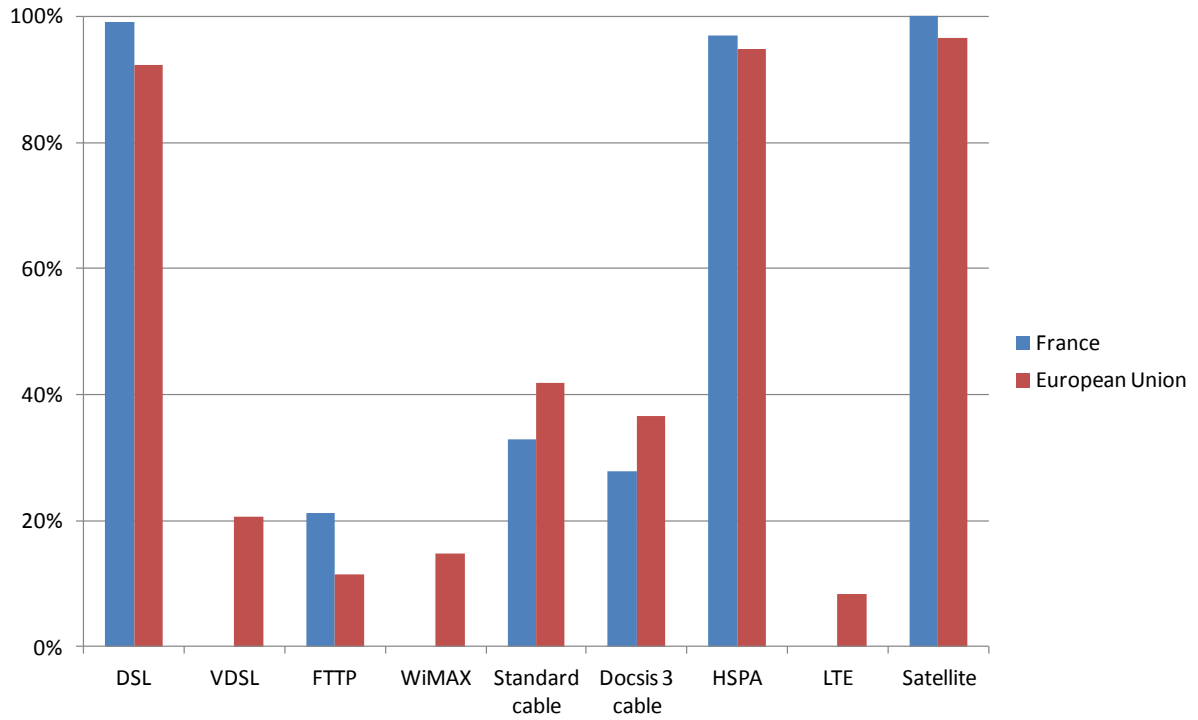
France: rural coverage by technology
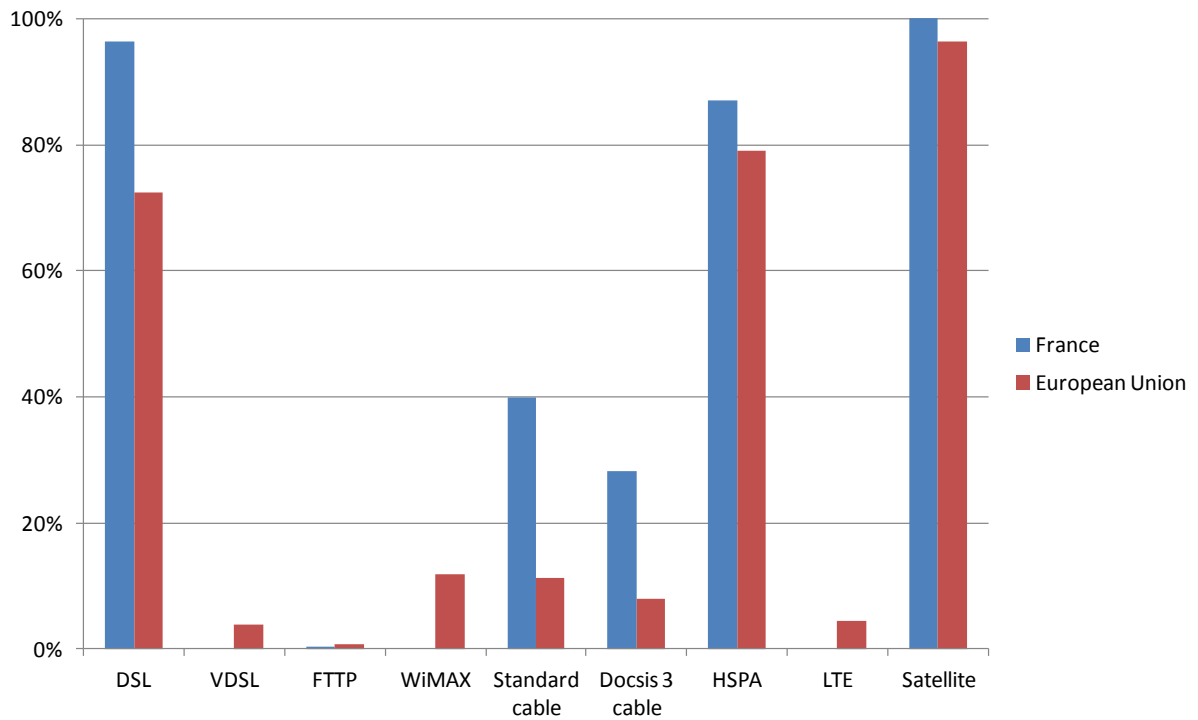
3.09.2 Regional coverage by technology combinations[4]

Map 3.09.01.France Standard broadband coverage

Standard broadband coverage

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

Source: BCE 2011
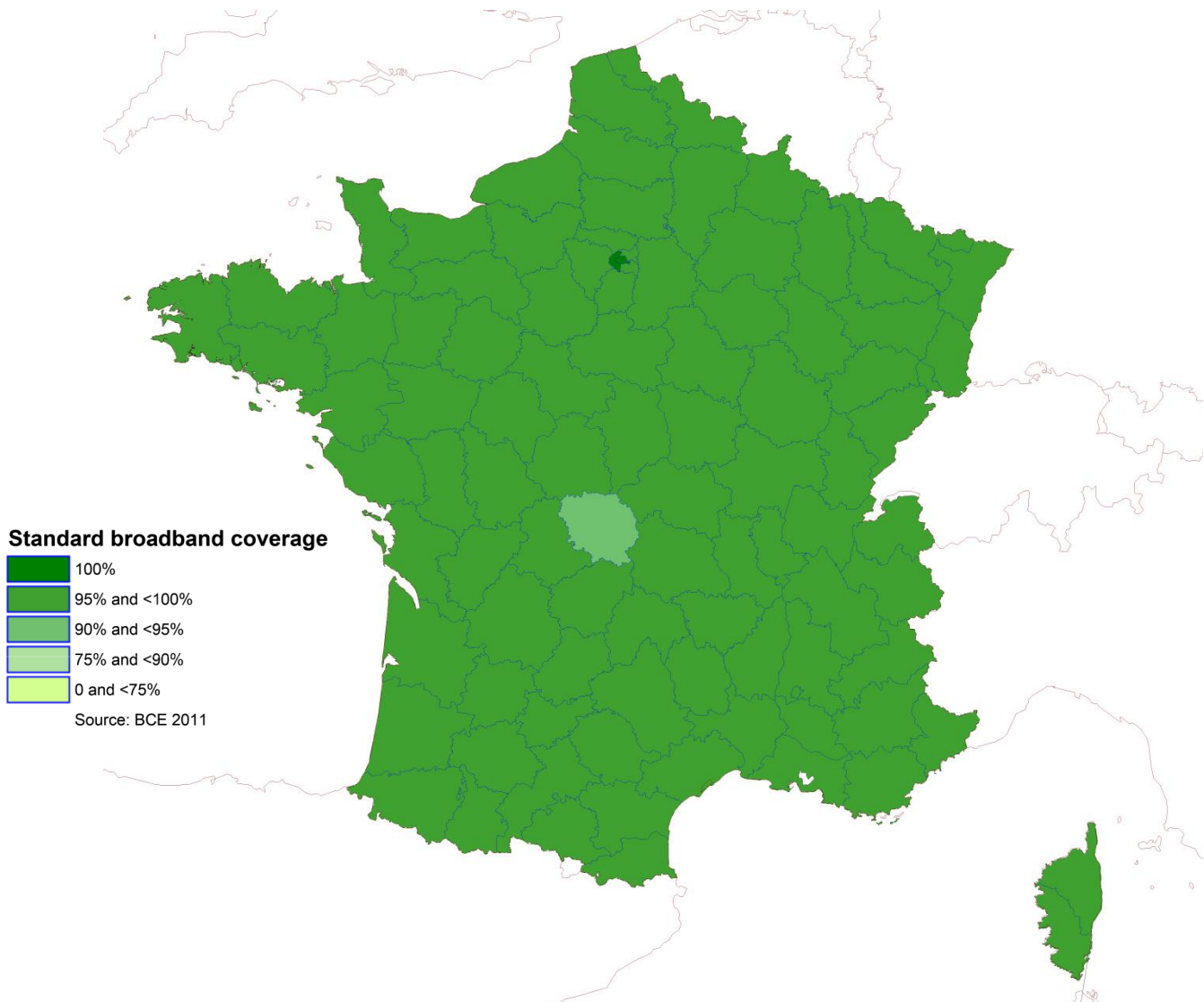
France's 100 NUTS 3 areas correspond to the country's normal administrative division into "departements". Standard broadband coverage across them is high but not completely uniform. Paris and its suburbs reach 100%. The rest of mainland France all has 95% coverage or better, as do the overseas departements. The one exception is Creuse, a rugged and rural departement in the heart of the country, which is just short of 95%.

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[4] The maps in this section do not show the NUTS 3 areas which are outside mainland Europe. The data for these areas is provided as a separate table at the end of this section.

Map 3.09.02.France Next Generation Access coverage

Next Generation Access coverage

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

Source: BCE 2011
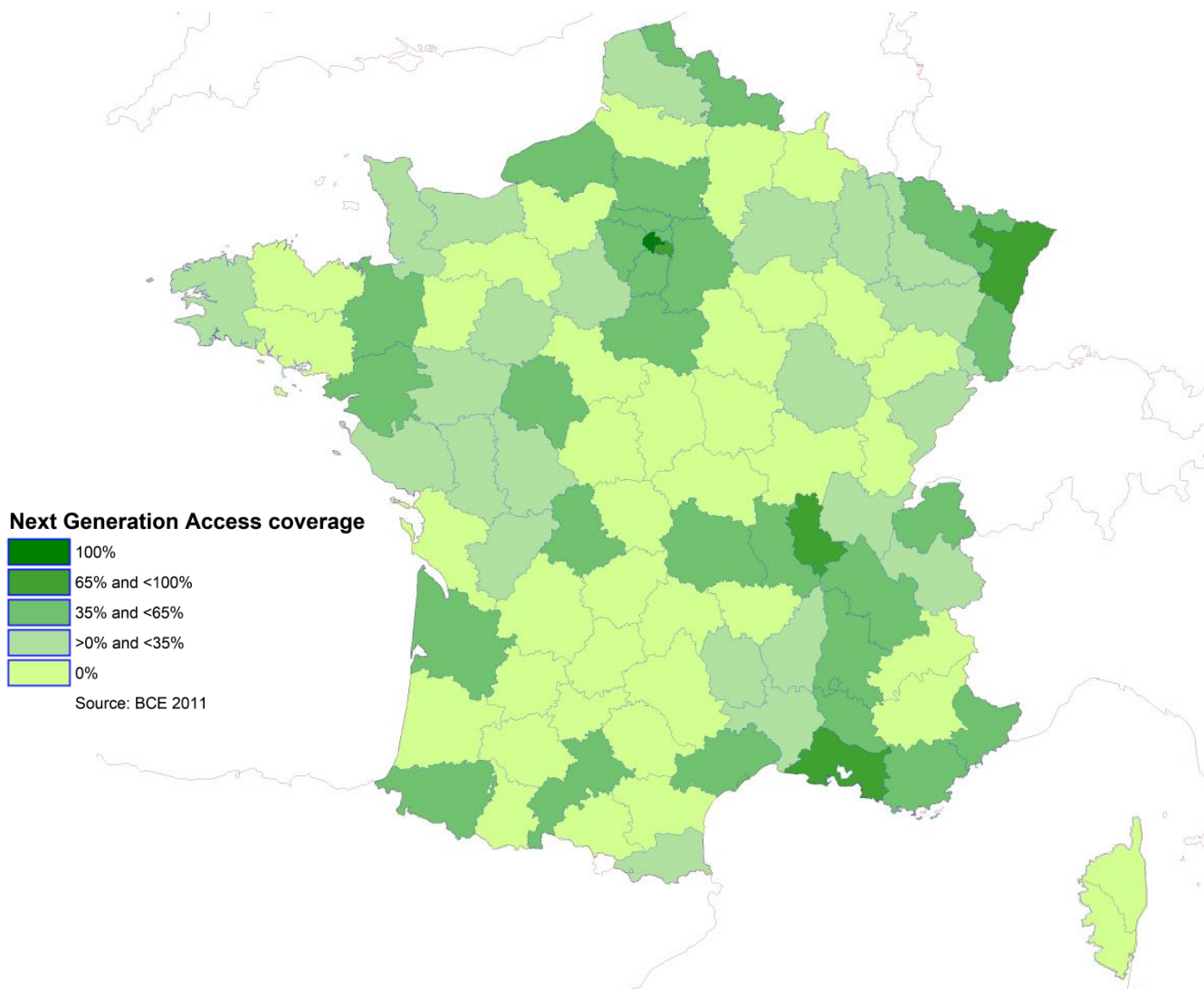
NGA in France forms a complicated patchwork. Paris and its closest suburbs enjoy 100% coverage. Other Paris suburbs and some city regions – Lyons, Strasbourg, Marseilles – have between 89% and 69%. Then many relatively urban regions, spread right across France, from the Riviera to the North and from the Jura to Brittany are in the 35% to 65% range. Another 21 departments, mostly those with large towns, have at least 10% NGA coverage, three more have just one or two percent and 43, including all the overseas ones, have none.

Coverage data for French NUTS 3 areas outside mainland Europe

Country	NUTS code	NUTS area name	Standard coverage	NGA coverage
France	FR910	**Guadeloupe**	97.2%	0.0%
France	FR920	Martinique	98.3%	0.0%
France	FR930	Guyane	96.3%	0.0%
France	FR940	Réunion	98.8%	0.0%

3.09.3 Data tables for France

Demographics

Statistic	National
Population	64,007,290
Persons per household	2.3
Rural proportion	23.2%

Coverage by technology

Technology	Total	Rural
DSL	99.1%	96.3%
VDSL	0.0%	0.0%
FTTP	21.3%	0.3%
WiMAX	0.0%	0.0%
Standard cable	32.9%	39.9%
Docsis 3 cable	27.7%	28.2%
HSPA	97.0%	87.0%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	99.3%	98.2%
NGA Combination	39.1%	28.5%

3.10 Germany

3.10.1 National coverage by broadband technology

Germany: coverage by technology combinations
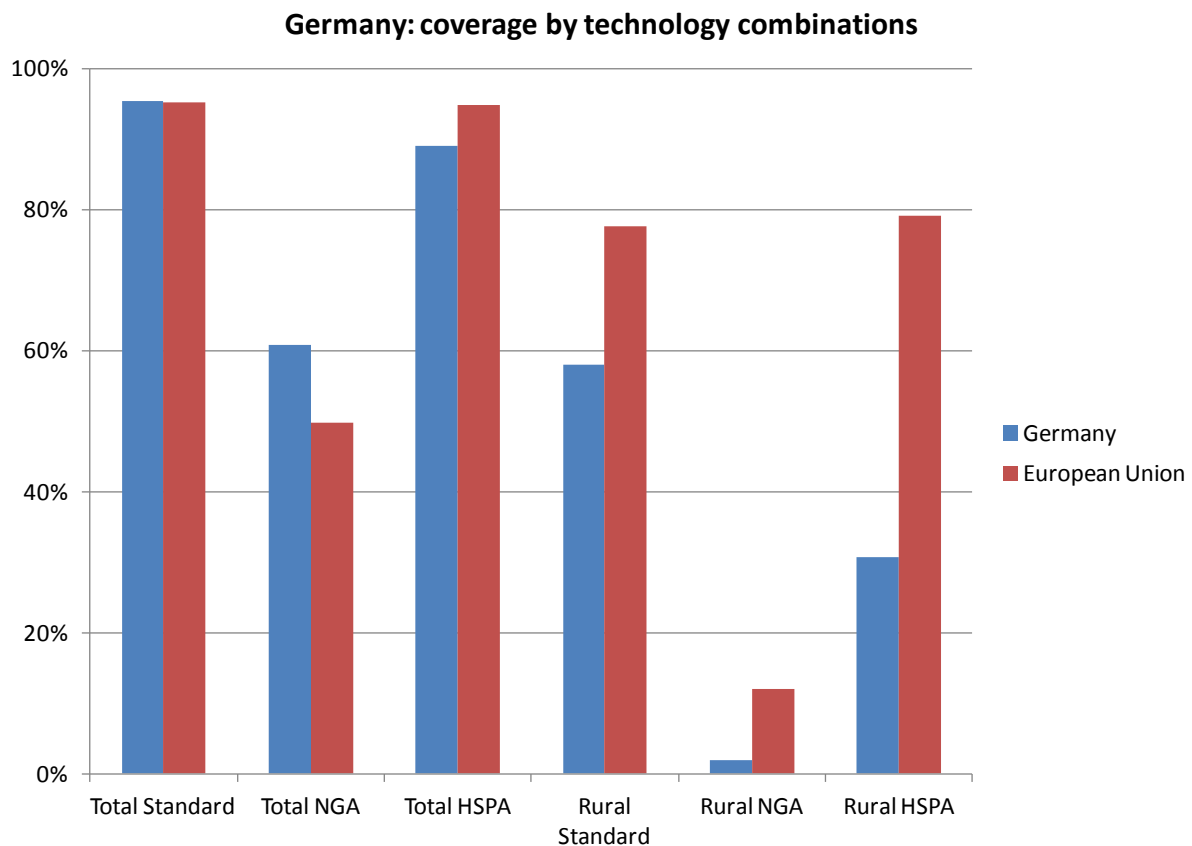
Germany has a very well-developed broadband infrastructure but its coverage shows up as unexpectedly low compared with European averages. The main reason is that Germany's official definitions for broadband coverage are much more rigorous than those applied so far in most other countries. Germany publishes detailed statistics for broadband coverage based on the availability of services providing a minimum of 1Mbps download speed.

The BCE 2011 project has based its estimates on these statistics and as a result Germany shows up as falling well below all but one of the European combination averages. The exception is Total NGA coverage. Here the 1Mbps limit is irrelevant and Germany is well above average, at 61%. In fact it has the highest NGA coverage of any large European country.

The technology profile shows where these combination estimates come from.   At 93% Germany's DSL coverage is barely ahead of the European average but the figure would be close to 100% if based on a looser definition. The gap illustrates the shortfall Europe-wide between DSL coverage as often understood and a situation where everyone can enjoy, say, the 2Mbps they would need for reliable video streaming.. Even more striking, HSPA coverage comes out at only 89%, the second lowest in Europe, again because of the 1Mbps test.

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On the other hand, Germany has one of the highest rollouts of VDSL to date, at 42% coverage. Other contributors to the NGA total are an extensive cable network with 38% coverage of Docsis 3 and modest FTTP coverage at 2.6%.

Germany: total coverage by technology

Germany: rural coverage by technology
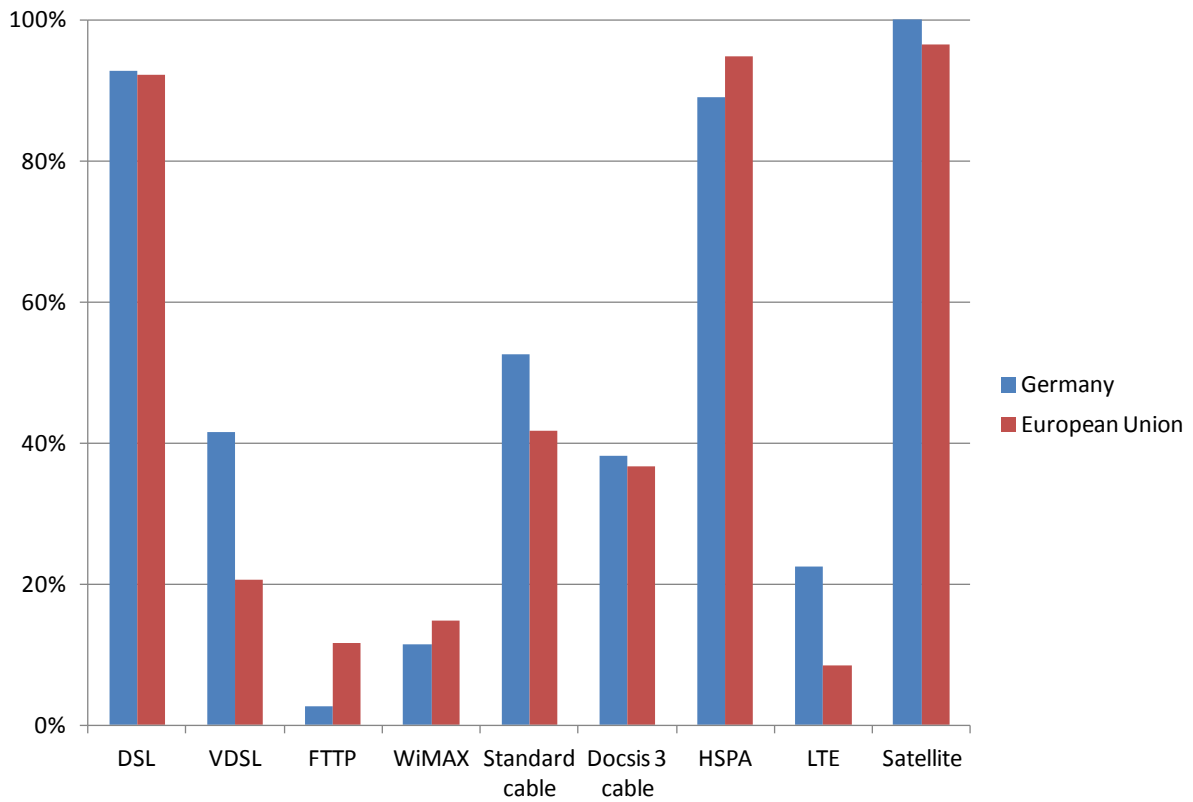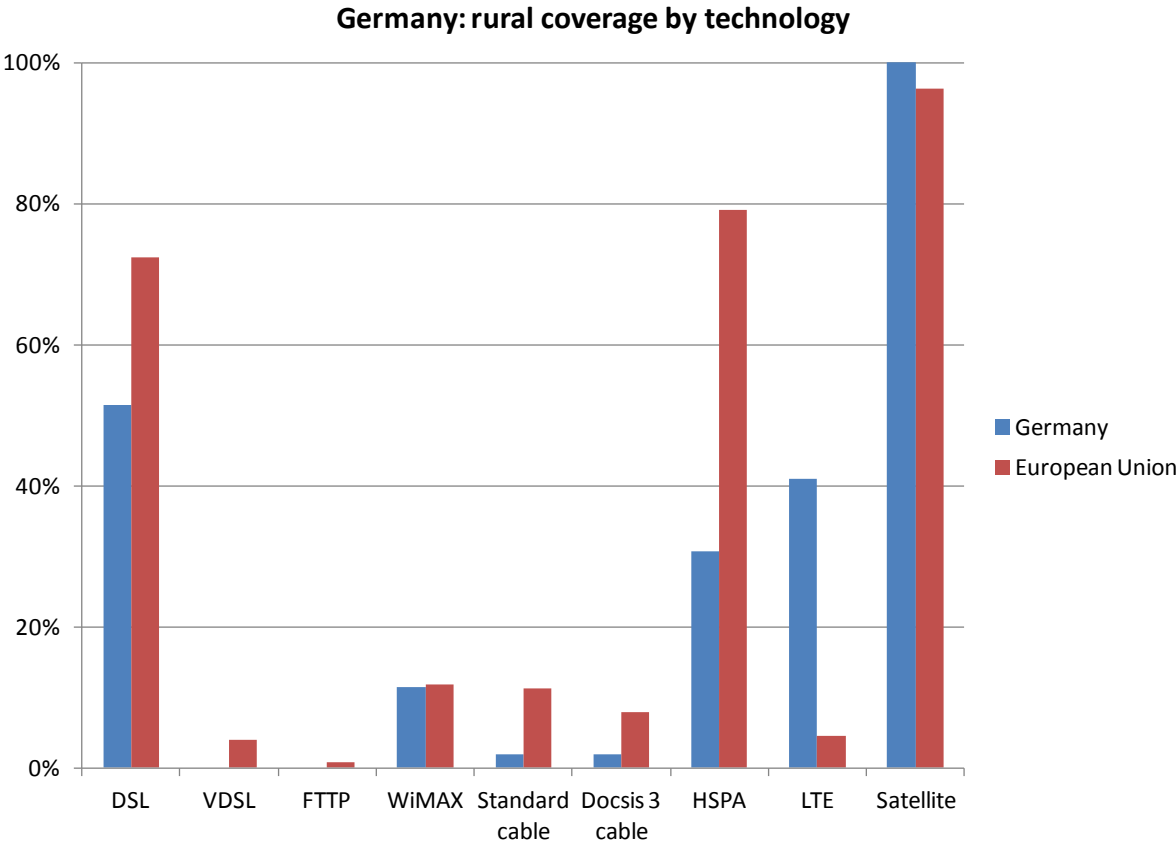
As far as rural coverage is concerned, the 1Mbps requirement reduces coverage estimates substantially. DSL coverage at 51% is fifth-lowest in Europe. HSPA coverage at 31% is the very lowest, and by a big margin. WiMAX, which has about average presence overall in Germany, does make a useful contribution to standard coverage.

The picture is similar for rural NGA. VDSL and FTTP are virtually absent and Docsis 3 makes only a small contribution.

The striking action which Germany has taken to redress the rural gap is the rollout of LTE. Licensees are mandated to give priority to rural areas in building their LTE networks and this is starting to take effect. By the end of 2011, LTE operators were claiming 41% rural coverage, by far the highest in Europe. But note that this is operator-defined coverage – reference to performance tests is likely to reduce the figure.

3.10.2 Regional coverage by technology combinations

Map 3.10.01.Germany Standard broadband coverage

Standard broadband coverage

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

Source: BCE 2011
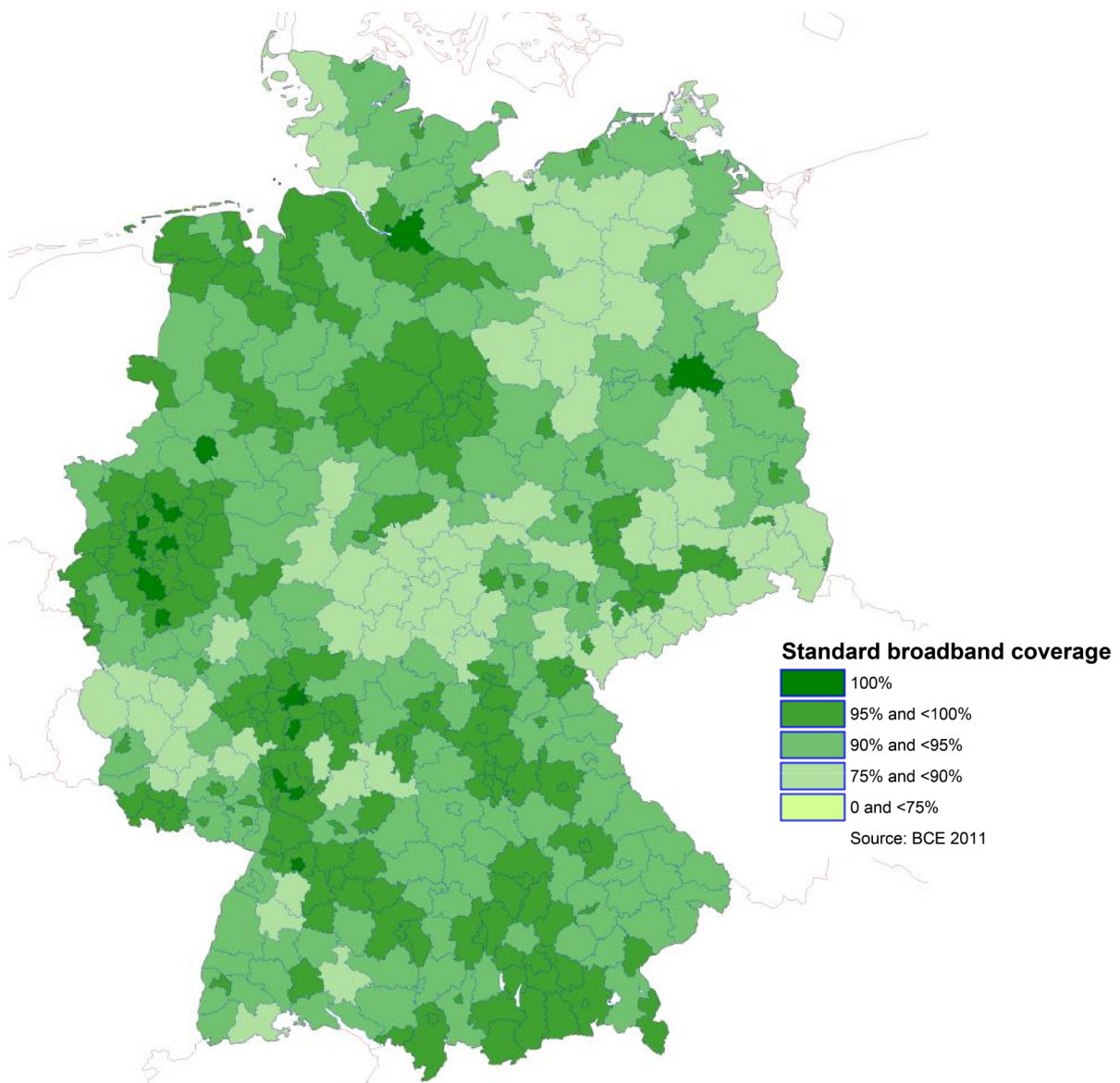
Map 3.10.02.Germany Next Generation Access coverage
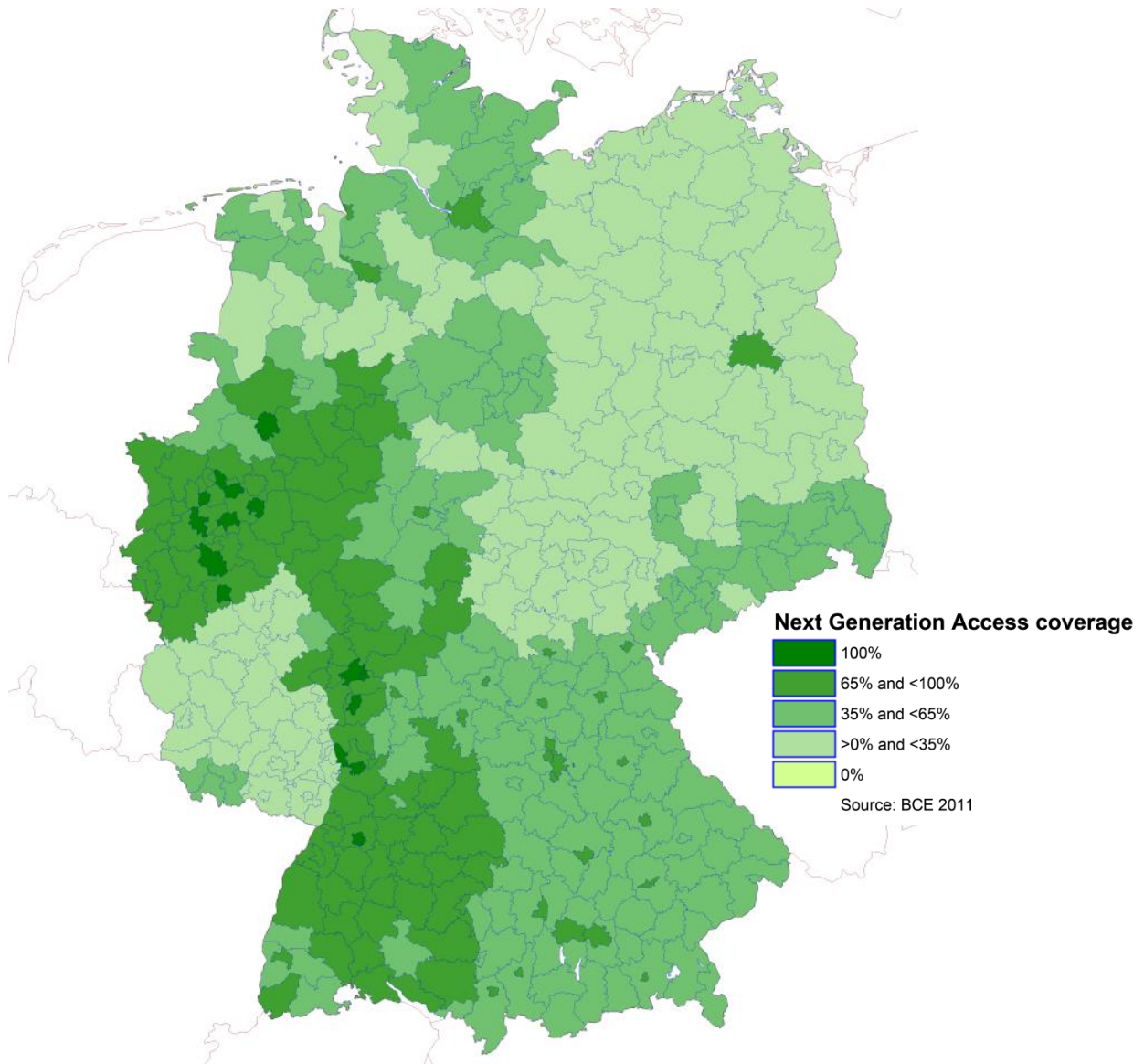
As mentioned above, standard broadband coverage in Germany is reported on a more conservative basis than for most countries. This provides a more revealing picture as the map above shows. Coverage for Germany's 429 different NUTS 3 areas (corresponding to Germany's Landkreise and Stadtkreise, equivalent to rural and urban counties) ranges from 100% down to 81%.

Seventeen of the counties have 100% standard coverage, including most of the great cities from Berlin and Hamburg on down. Another 196 areas have at least 95% coverage, 58 of them with at least 99%. Then 143 have at least 90% coverage, leaving 73 with under 90% but at least 80%.

As the map shows, many of the counties with the lowest coverage are in the former East Germany, but others are in the more rural areas of West German provinces such as Rheinland-Pfalz and Hessen.

The pattern with NGA coverage is more consolidated, largely the reflecting the coverage of Germany's cable networks and where they have been upgraded to Docsis 3. Some

compact cities with full cable networks already have 100% NGA coverage on this basis. A broad swathe of areas in the western half of the country, all the way down the Rhine valley , have at least 65% NGA as do the big cities and independent towns in the rest of the country. That leaves 132 counties with less than 35%, as yet, of which 16 have less than 10% NGA. Again, most of these are in the eastern laender but they do include most of Rheinland-Pfalz and a swathe across Lower Saxony.

3.10.3 Data tables for Germany

Demographics

Statistic	National
Population	82,217,837
Persons per household	2.061
Rural proportion	10.6%

Coverage by technology

Technology	Total	Rural
DSL	92.8%	51.4%
VDSL	41.5%	0.0%
FTTP	2.6%	0.0%
WiMAX	11.5%	11.5%
Standard cable	52.5%	2.0%
Docsis 3 cable	38.2%	2.0%
HSPA	89.1%	30.7%
LTE	22.5%	41.0%
Satellite	100.0%	100.0%
Standard Combination	95.3%	58.0%
NGA Combination	60.8%	2.0%

3.11 Greece

3.11.1 National coverage by broadband technology

Greece: coverage by technology combinations
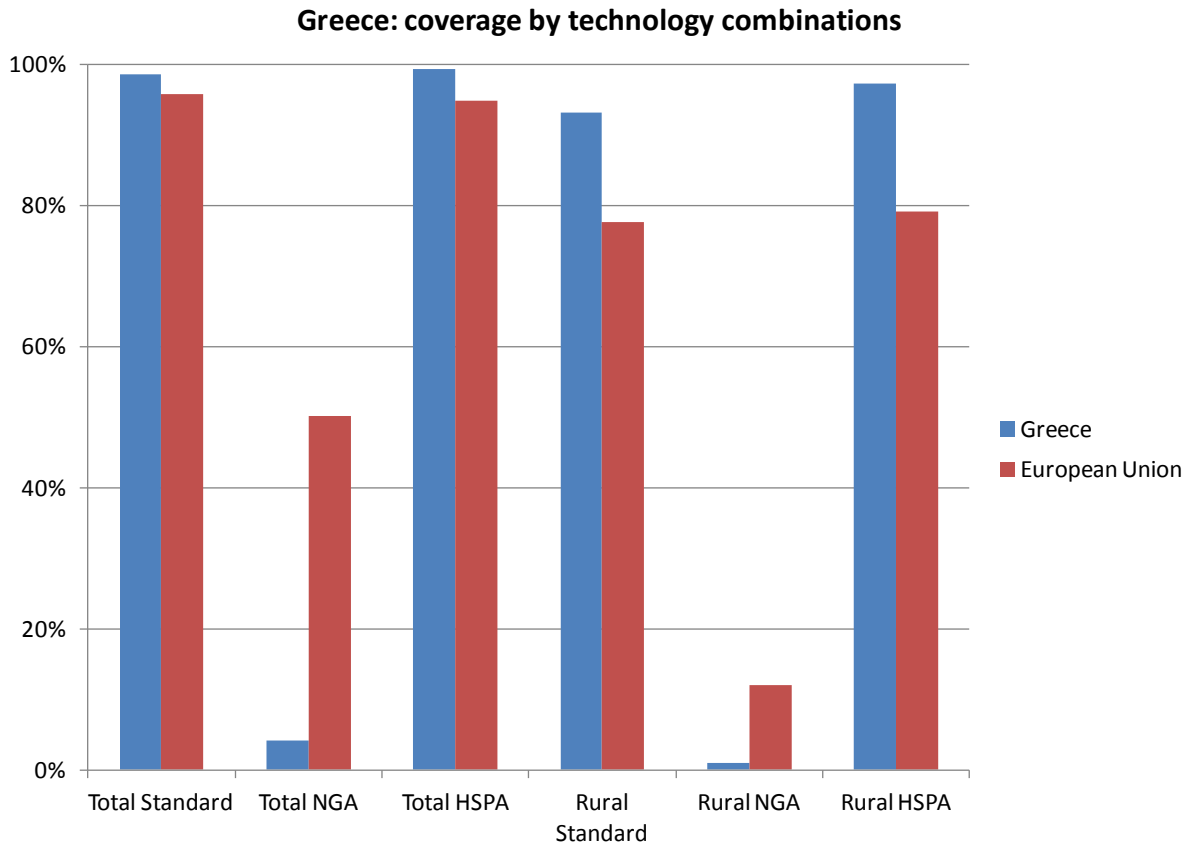
Greece is ahead of European averages for standard broadband coverage, including Total, Rural and HSPA, but at an early stage of development as far as NGA is concerned. Standard rural coverage is good considering the country's low income per head and fragmented terrain.

The TSC for Greece is based mainly on DSL coverage, defined by whether premises are within the service area of an exchange enabled for DSL. The incumbent operator is now rolling out VDSL but there is no other source of NGA speeds so far – Greece does not have a cable network providing broadband services. LTE is yet to start.

DSL provides well above average (93%) coverage of rural areas but VDSL has only a small rural presence so far. Although there are WiMAX networks in Greece they make very little contribution to rural coverage because they are mainly deployed as alternative networks in Greece's two big cities – Athens and Salonika.

Broadband Coverage in Europe 2011

Greece: total coverage by technology
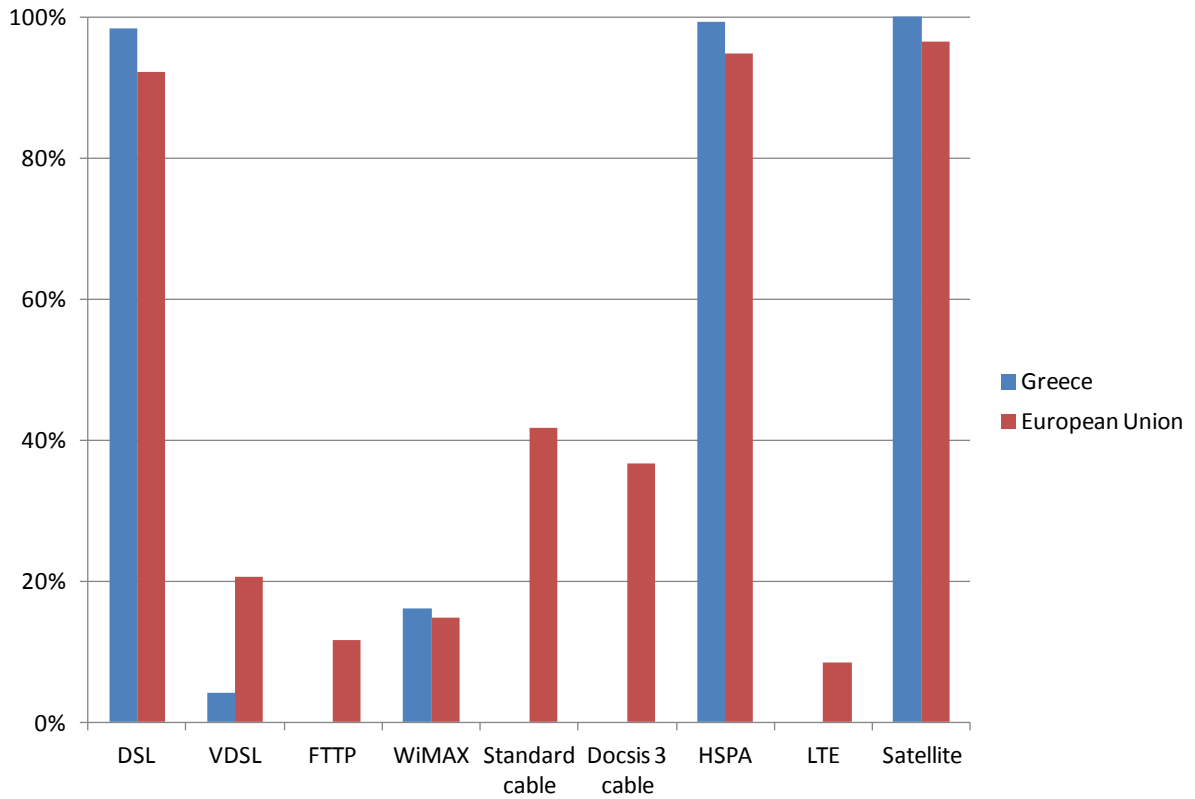
Greece: rural coverage by technology
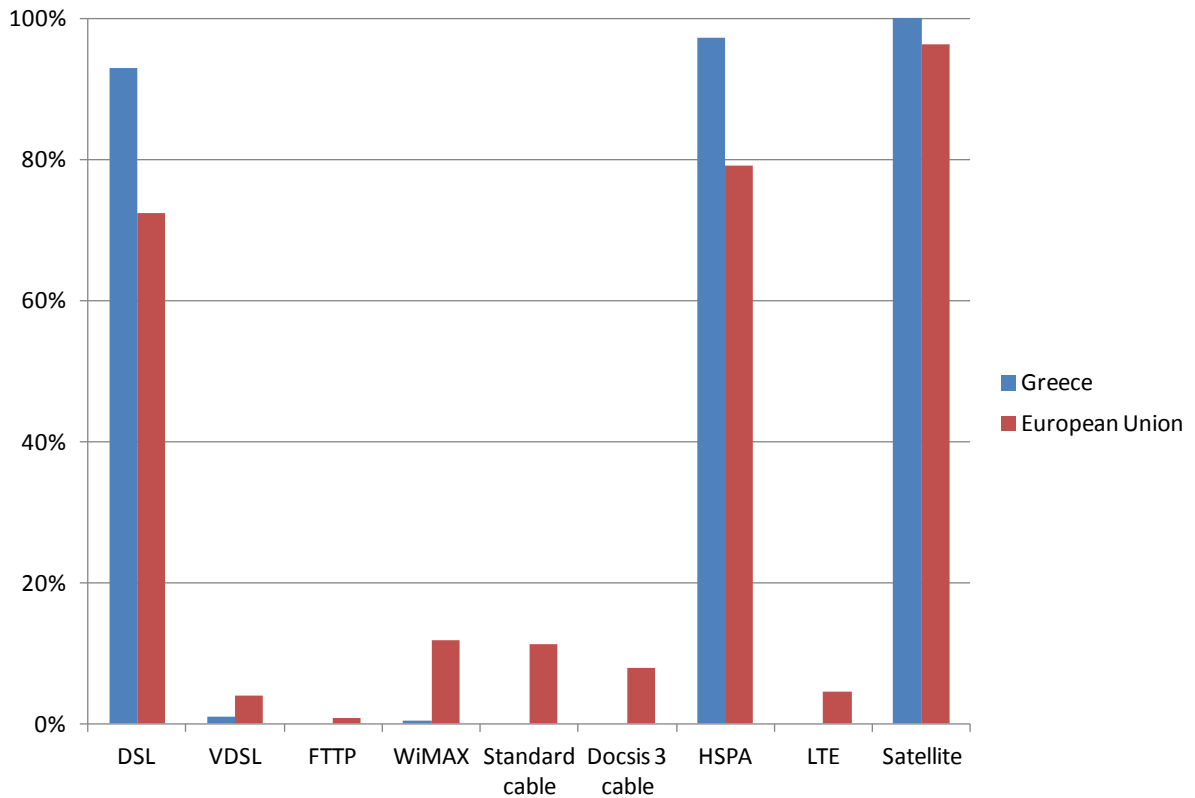
3.11.2 Regional coverage by technology combinations

Map 3.11.01.Greece Standard broadband coverage

Standard broadband coverage

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

Source: BCE 2011
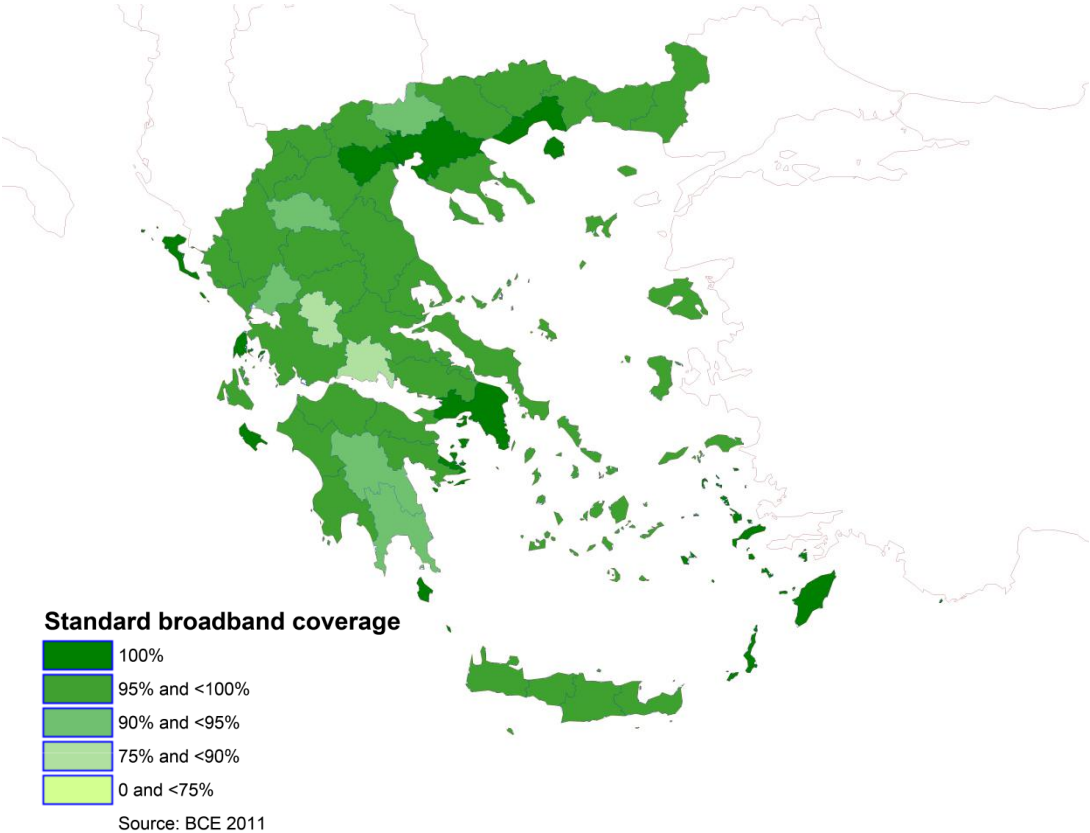
Map 3.11.02.Greece Next Generation Access coverage

Next Generation Access coverage

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

Source: BCE 2011

Greece has good standard broadband coverage, with the provinces around Athens and Thessalonika reporting 100%, and many of the islands at the same level. Most of the rest of the country has at least 92%. Only two provinces in central Greece, Fokita and Evrytania report less than this, with 83% and 80% respectively.

NGA coverage is much less developed at only 4.2% overall. VDSL is the only provider of NGA services and unusually it is being rolled out first in more remote areas. Four provinces in the north-east of Greece each have between 22% and 73% VDSL coverage. Otherwise, the Athens area had 6% and nowhere else had any at all as of end-2011.

3.11.3 Data tables for Greece

Demographics

Statistic	National
Population	11,213,785
Persons per household	2.5
Rural proportion	22.0%

Coverage by technology

Technology	Total	Rural
DSL	98.5%	93.0%
VDSL	4.2%	1.0%
FTTP	0.0%	0.0%
WiMAX	16.1%	0.5%
Standard cable	0.0%	0.0%
Docsis 3 cable	0.0%	0.0%
HSPA	99.4%	97.3%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	98.5%	93.2%
NGA Combination	4.2%	1.0%

3.12 Hungary

3.12.1 National coverage by broadband technology

Hungary: coverage by technology combinations
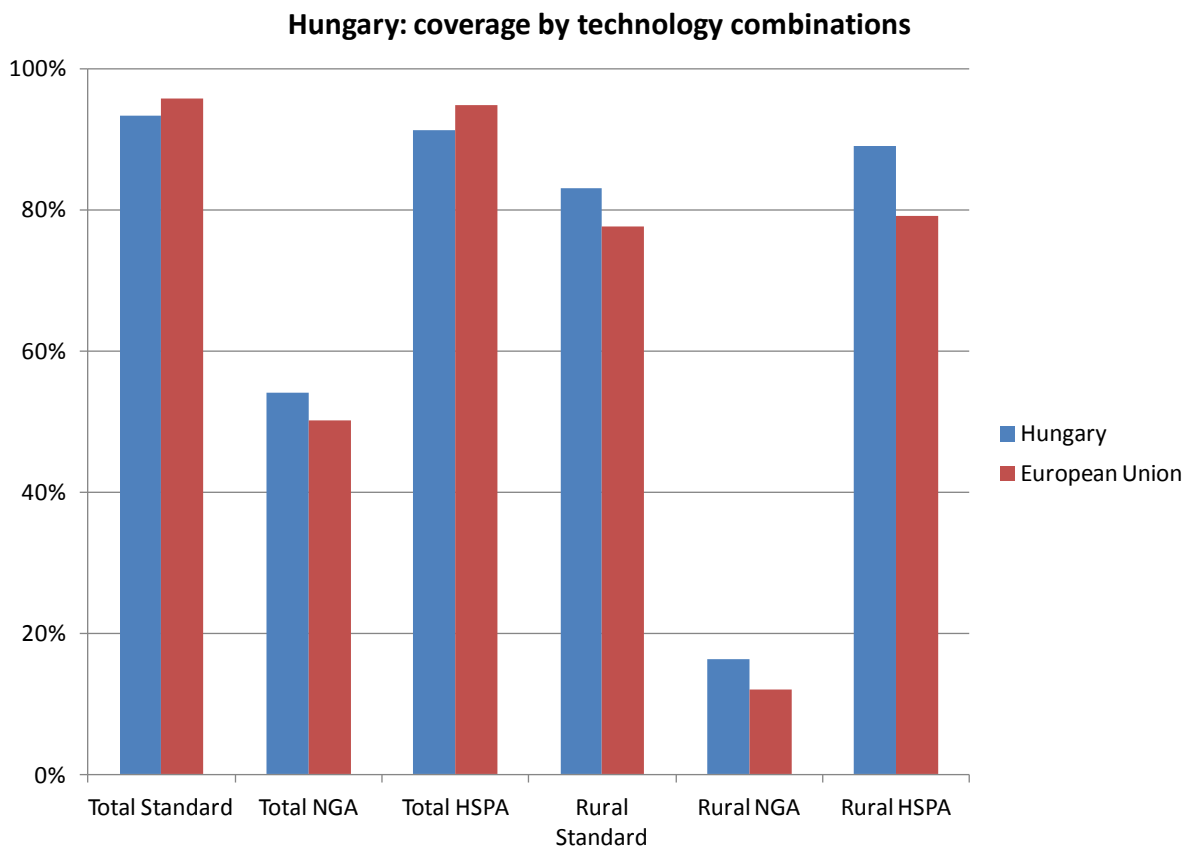
Hungary is ahead of all the European averages for Rural coverage and for Total NGA. But it is behind on Total Standard Coverage (92% against 95%) and Total HSPA (91% against 95%).

Hungary's broadband advantages include an extensive cable network, with 62% total coverage and 47% for Docsis 3, against European averages of 42% and 37% respectively. It also has double the average FTTP coverage (24% against 12%) and is starting to roll out VDSL. These combine to give Total NGA Coverage of 54%. DSL on the other hand is 3% below average reflecting the same history of network development as the other Eastern European study countries.

DSL and cable combine to provide above average coverage in rural areas, and the presence of Docsis 3 and some FTTP gives above average rural NGA. A planned WiMAX network does not appear to be operational yet but LTE was due to be available from early in 2012.

Broadband Coverage in Europe 2011

Hungary: total coverage by technology
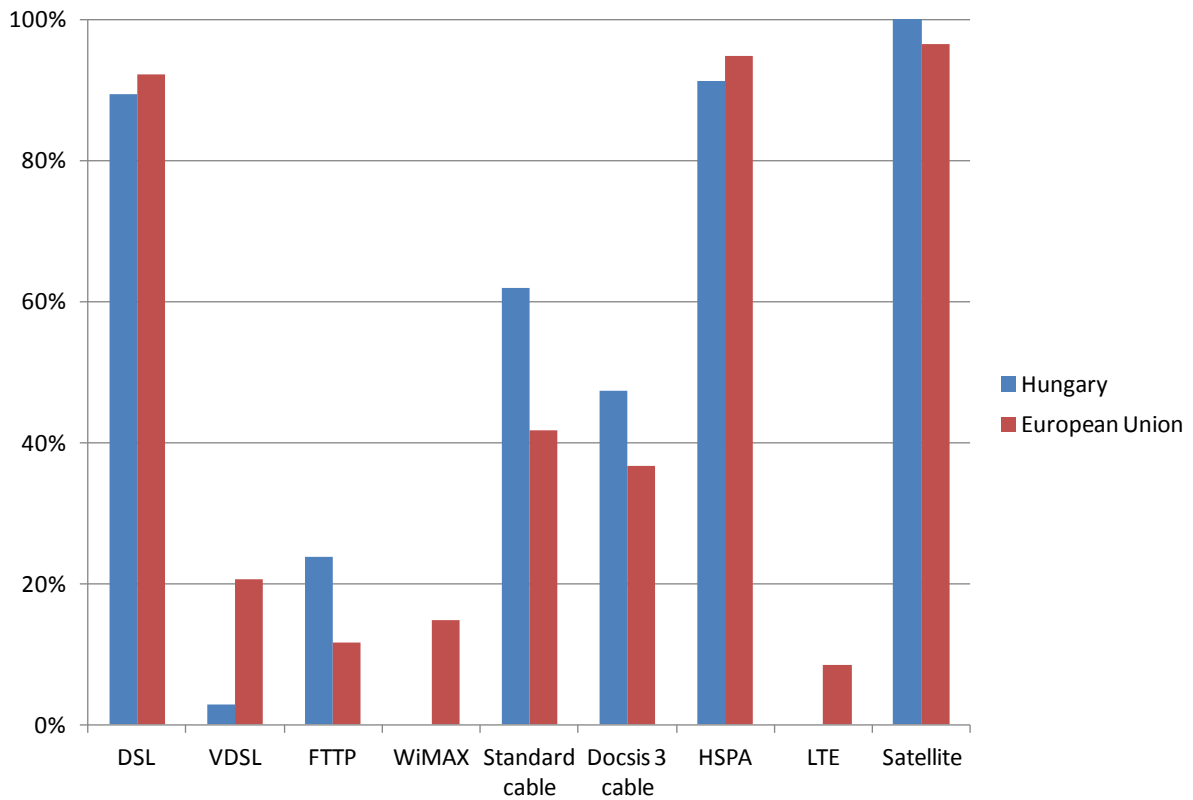
Hungary: rural coverage by technology
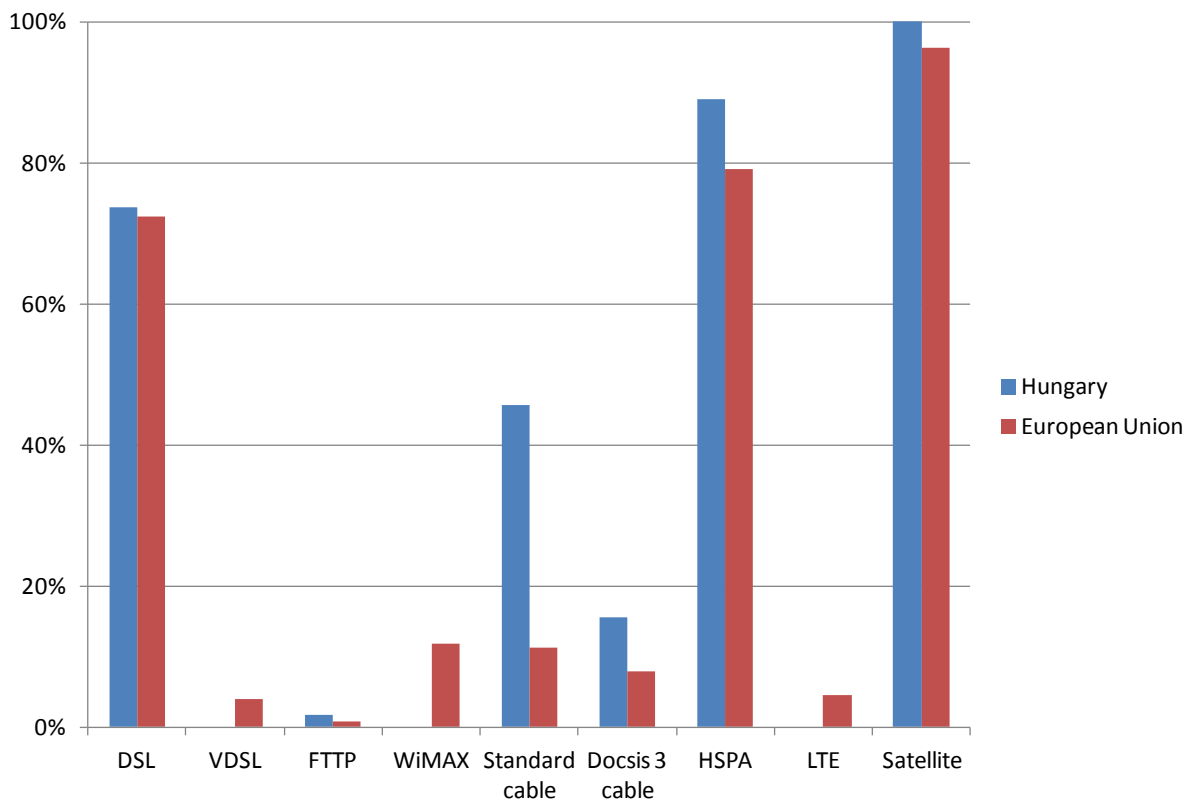
3.12.2 Regional coverage by technology combinations

Map 3.12.01.Hungary Standard broadband coverage

Standard broadband coverage

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

Source: BCE 2011
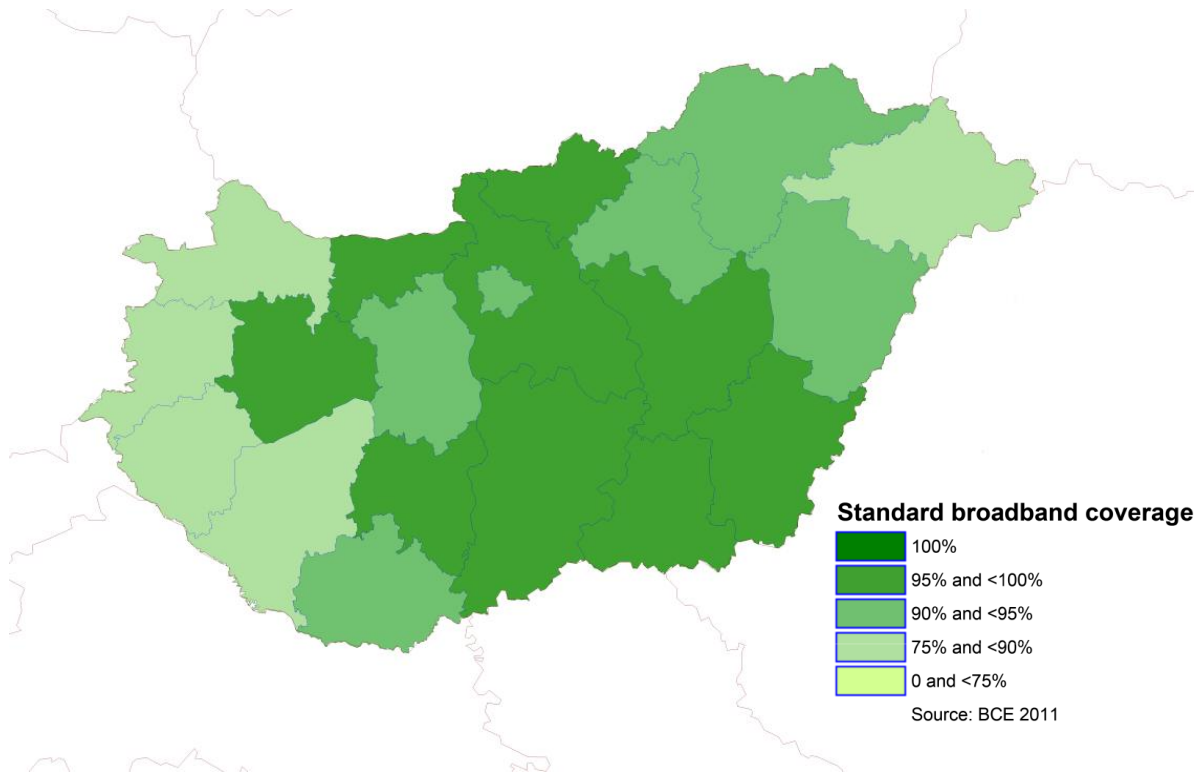
Map 3.12.02.Hungary Next Generation Access coverage

Next Generation Access coverage

- 100%
- 65% and <100%
- 35% and <65%
- >0% and <35%
- 0%
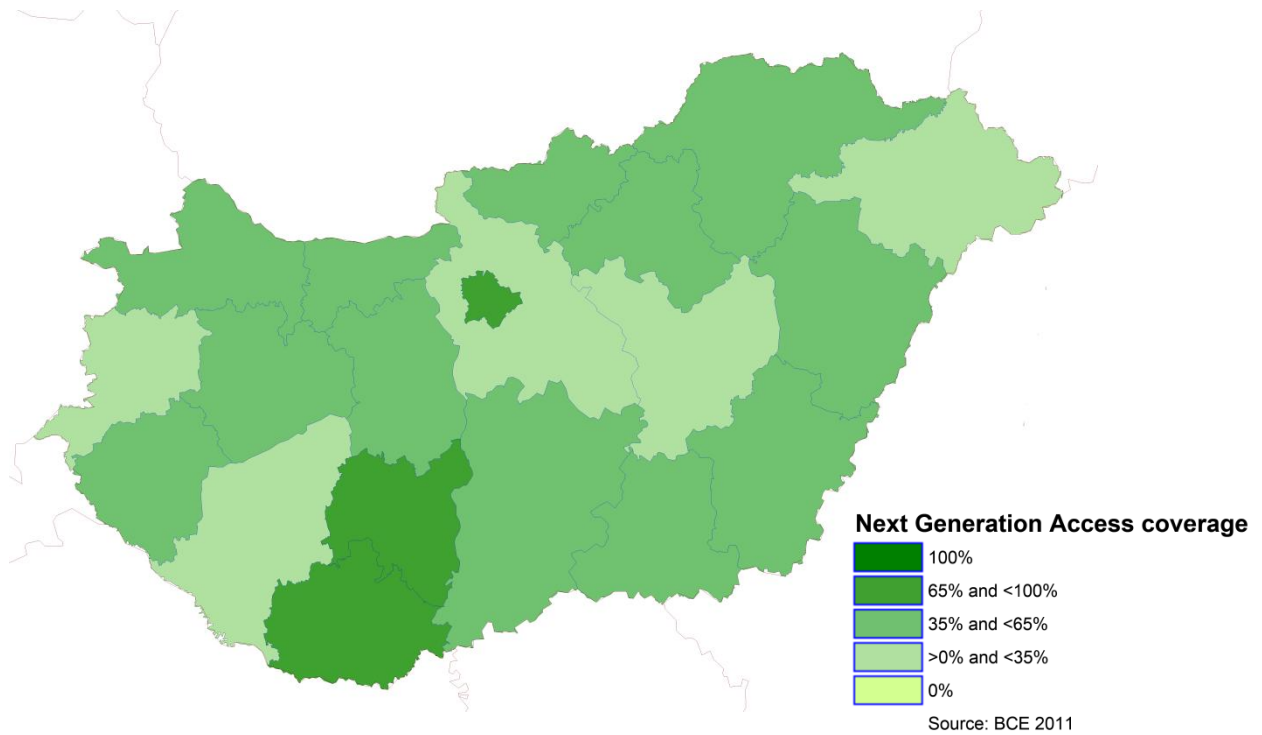
Source: BCE 2011

Most of Hungary has at least 90% standard broadband coverage. The exceptions are the provinces on the country's eastern and western borders which have from 87% down to 80%.

The pattern is reversed with NGA to some extent. Budapest, the capital, Pecs, one of Hungary's biggest cities, and the region of Tolna, north of Pecs, have high coverage, with 90%, 78% and 97% respectively. The rest of the country ranges down from 61% to 24%.

3.12.3 Data tables for Hungary

Demographics

Statistic	National
Population	10,045,401
Persons per household	2.6
Rural proportion	32.3%

Coverage by technology

Technology	Total	Rural
DSL	89.4%	73.7%
VDSL	2.8%	0.0%
FTTP	23.7%	1.6%
WiMAX	0.0%	0.0%
Standard cable	62.0%	45.7%
Docsis 3 cable	47.3%	15.5%
HSPA	91.3%	89.0%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	93.2%	83.1%
NGA Combination	54.0%	16.2%

3.13 Iceland

3.13.1 National coverage by broadband technology

Iceland: coverage by technology combinations
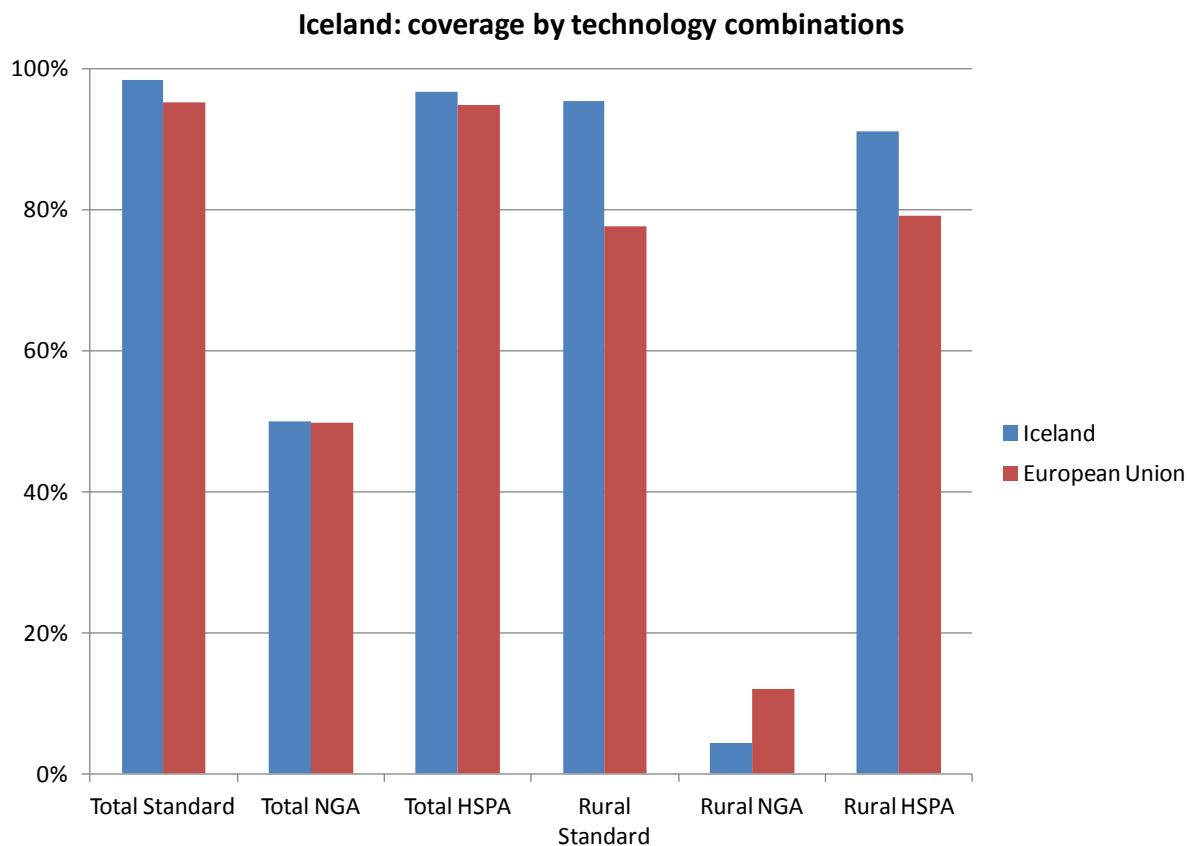
Iceland is ahead of the European averages for Standard broadband and HSPA, both Total and Rural, and up with the average for Total NGA. But it is some way behind the 12% average for Rural NGA with only 4.4%. Few rural areas can be as hard to reach as those of Iceland, which has a far lower population density than any of the other study countries at 3.1 persons persquare kilometer. Moreover, 63% of the population lives in Reykjavik and other towns, so the remainder is very thinly spread.

Nevertheless, the country has good DSL and HSPA coverage, both at 97%. WiMAX makes an average contribution, mainly in rural districts.   Iceland is also in the upper part of the list as far as FTTP (39%) and VDSL (23%) are concerned. These have to provide all the NGA coverage because there is no cable network. LTE is not yet present either. Iceland is also one of the countries where KA-band coverage is not available although data connections can be provided via earlier-generation satellites.

All this presents a considerable challenge for rural NGA coverage which is only 4.4%, met entirely by FTTP at present.

Broadband Coverage in Europe 2011

Iceland: total coverage by technology
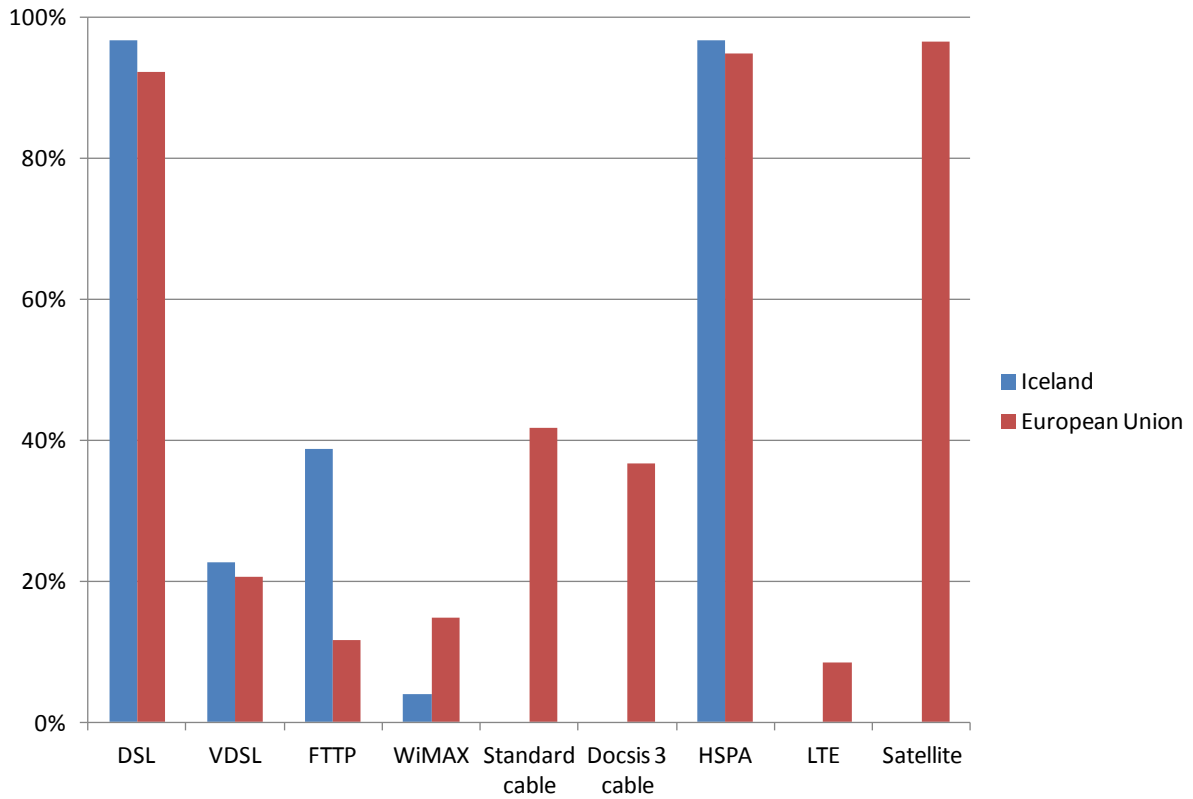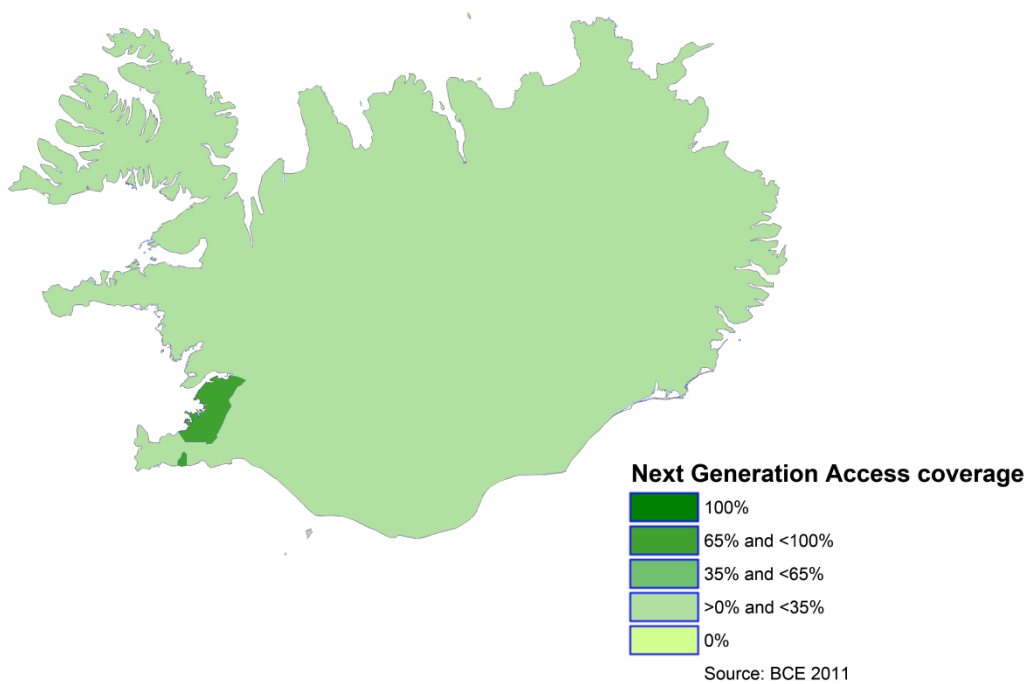

Iceland: rural coverage by technology
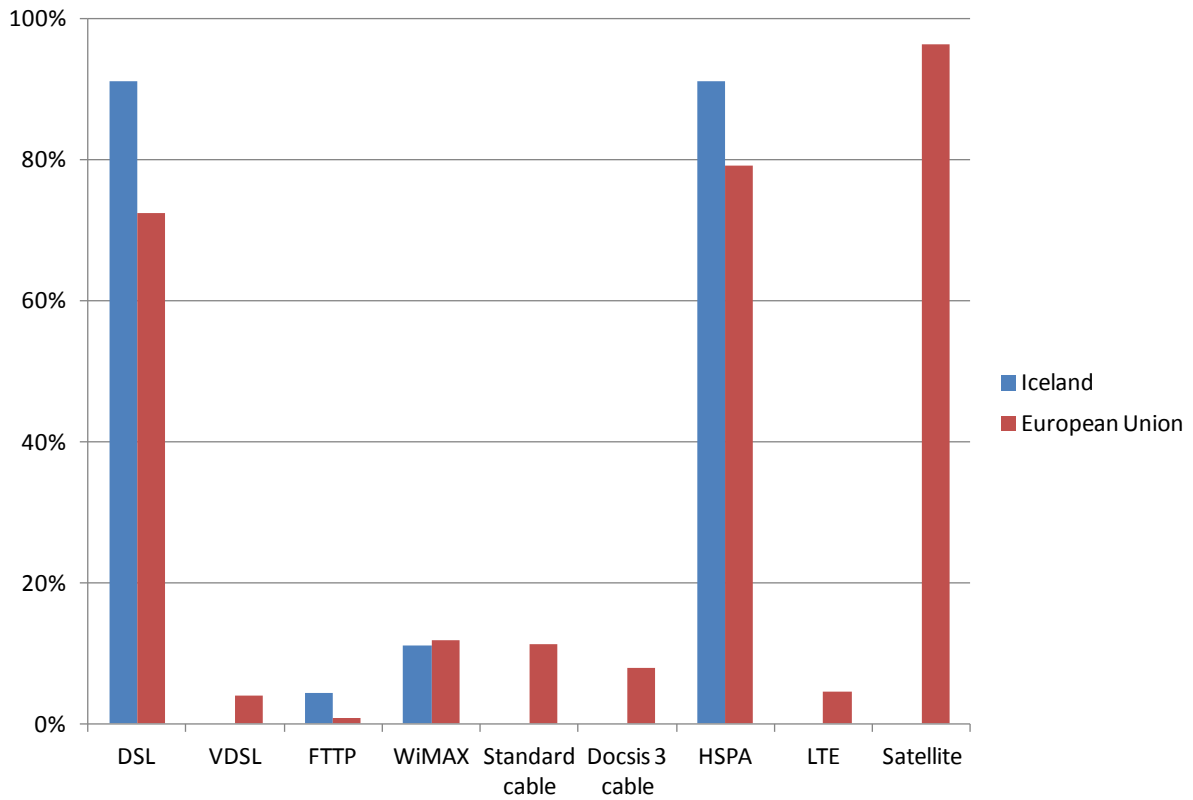
3.13.2 Regional coverage by technology combinations

Map 3.13.01.Iceland Standard broadband coverage

Standard broadband coverage
- 100%
- 95% and <100%
- 90% and <95%
- 75% and <90%
- 0 and <75%

Source: BCE 2011
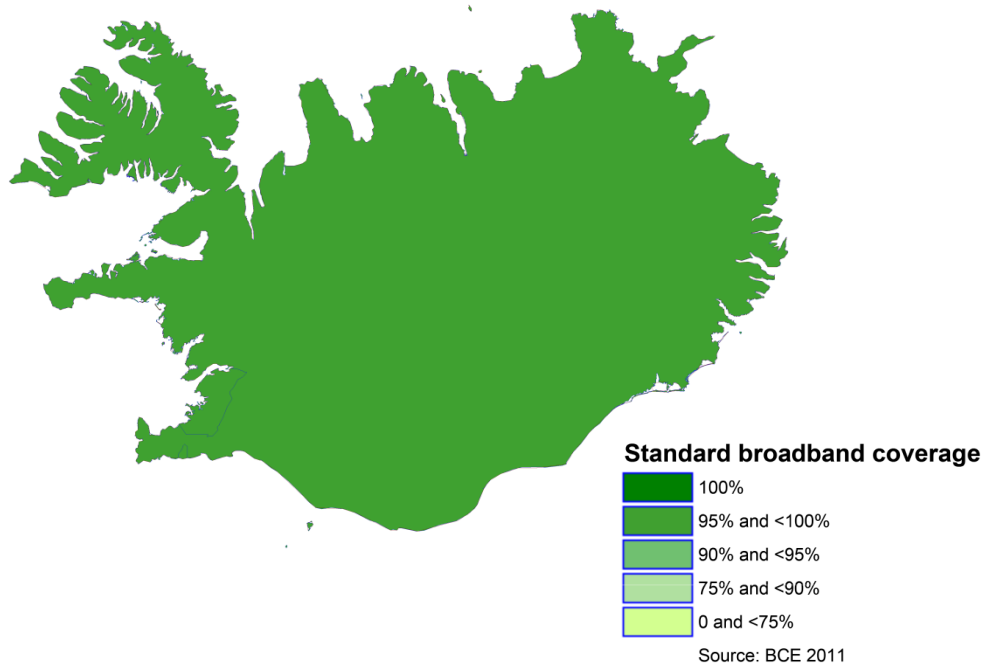
Map 3.13.02.Iceland Next Generation Access coverage

Next Generation Access coverage
- 100%
- 65% and <100%
- 35% and <65%
- >0% and <35%
- 0%

Source: BCE 2011

Iceland has two NUTS 3 areas, one comprising the capital city, Reykyavik, and the other the rest of the country. The capital has 99.7% standard broadband coverage and the rest of the country is not far behind on 96%.

The picture is quite different with NGA. Here the capital also has a high figure, 77% but the rest of the country, by far the most thinly populated area covered by the study, is only on 4%.

3.13.3 Data tables for Iceland

Demographics

Statistic	National
Population	315,459
Persons per household	2.544
Rural proportion	36.6%

Coverage by technology

Technology	Total	Rural
DSL	96.8%	91.2%
VDSL	22.6%	0.0%
FTTP	38.7%	4.4%
WiMAX	4.0%	11.0%
Standard cable	0.0%	0.0%
Docsis 3 cable	0.0%	0.0%
HSPA	96.8%	91.2%
LTE	0.0%	0.0%
Satellite	0.0%	0.0%
Standard Combination	98.3%	95.4%
NGA Combination	50.0%	4.4%

3.14 Ireland

3.14.1 National coverage by broadband technology

Ireland: coverage by technology combinations
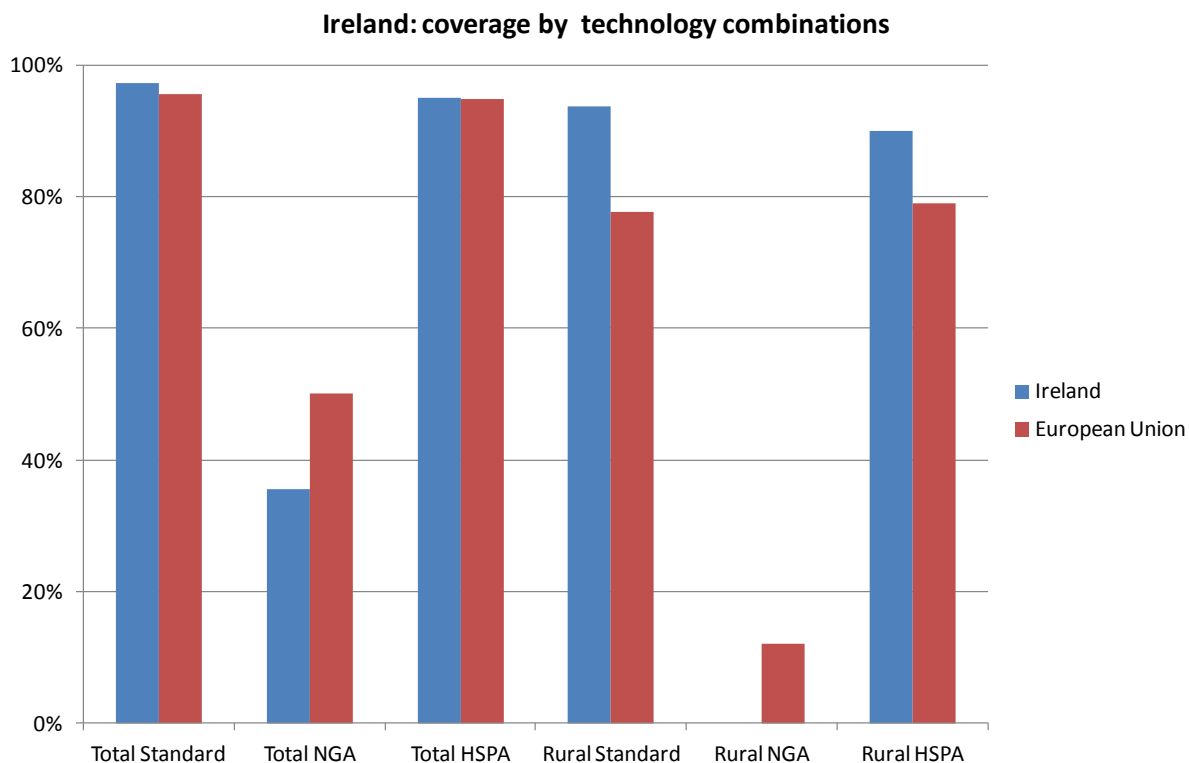
Ireland has average overall coverage, and better than average rural coverage, of standard and HSPA broadband. But NGA services are some way behind the European average and coverage is focused on the Dublin area.

Total coverage of standard fixed and HSPA broadband technologies in Ireland is slightly ahead of the European Union averages at 97.1% and 95.0% respectively. The Rural coverage measures are well ahead of the average at 93.8% and 90.0%.

On the other hand, the coverage of fixed NGA technologies is rather behind the average at 35.6% in the country as a whole and 0.0% in rural areas.

The reasons for this difference can be seen in the profile of coverage by each technology below. The standard broadband technologies – DSL, WiMAX and Standard Cable – are all ahead of the European averages for coverage. The widespread availability of WiMAX is an important feature for rural coverage. The NGA technologies – VDSL, FTTP and Docsis 3 cable - are all behind. Docsis 3 is close to the European average but VDSL and FTTP are still in the early stages of development in Ireland.

Similarly, HSPA coverage is level with the EU mean but commercial LTE services had not started in Ireland as of end-2011.

The contrast is even more striking in the profile of rural coverage by technology. DSL, WiMAX and HSPA are all ahead of the EU average and Ireland is one of the countries with 100% satellite availability. But the project did not find evidence of any significant rural coverage by the fixed or mobile NGA technologies, or standard cable.
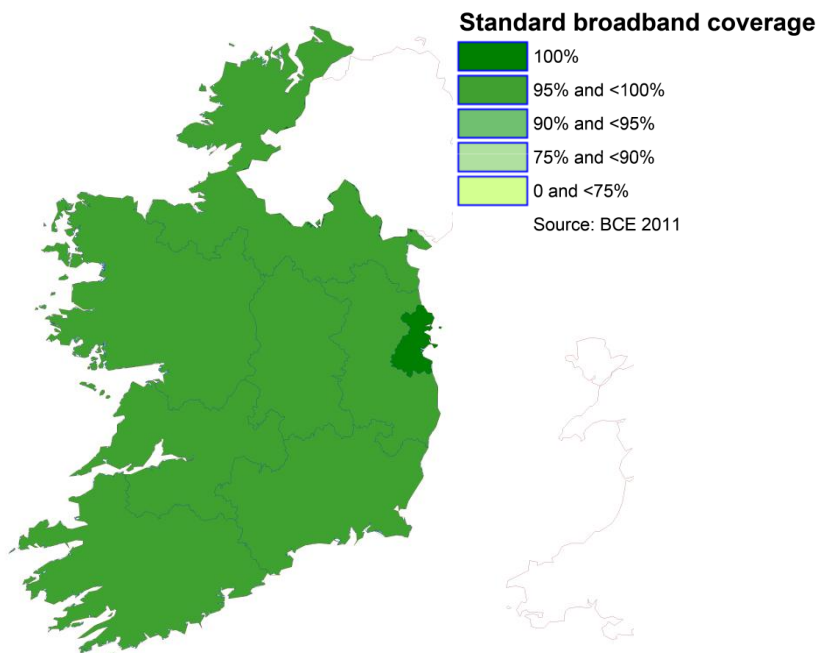
Ireland: total coverage by technology
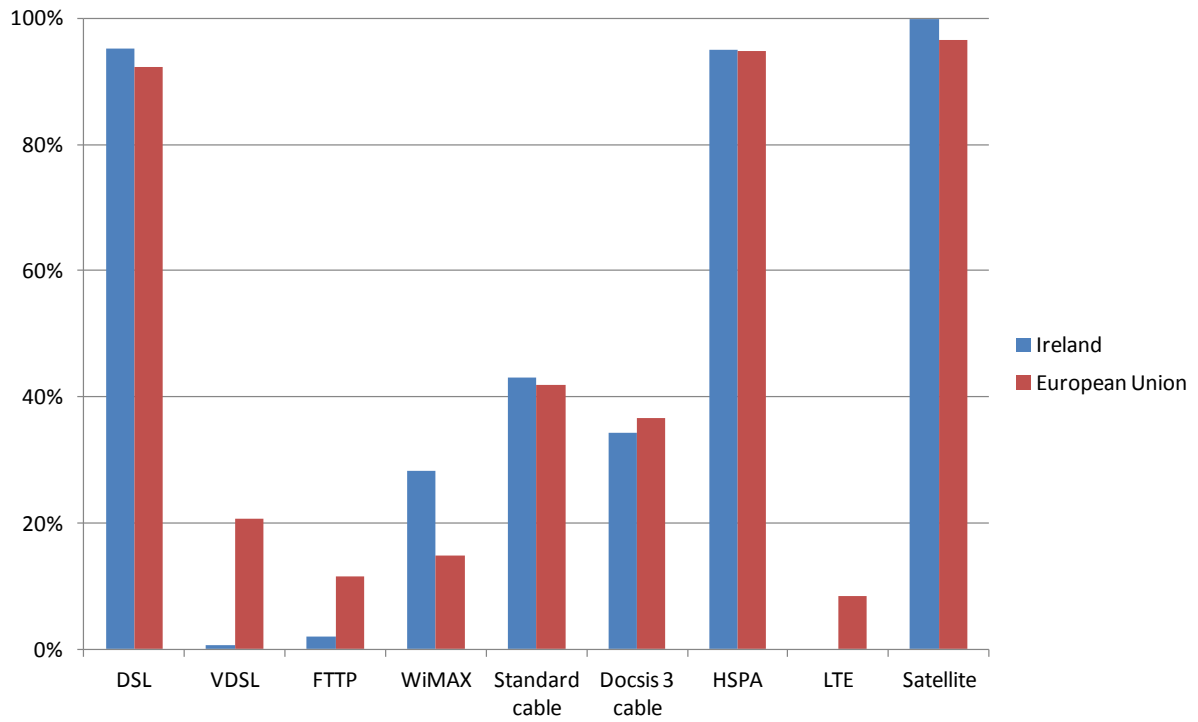
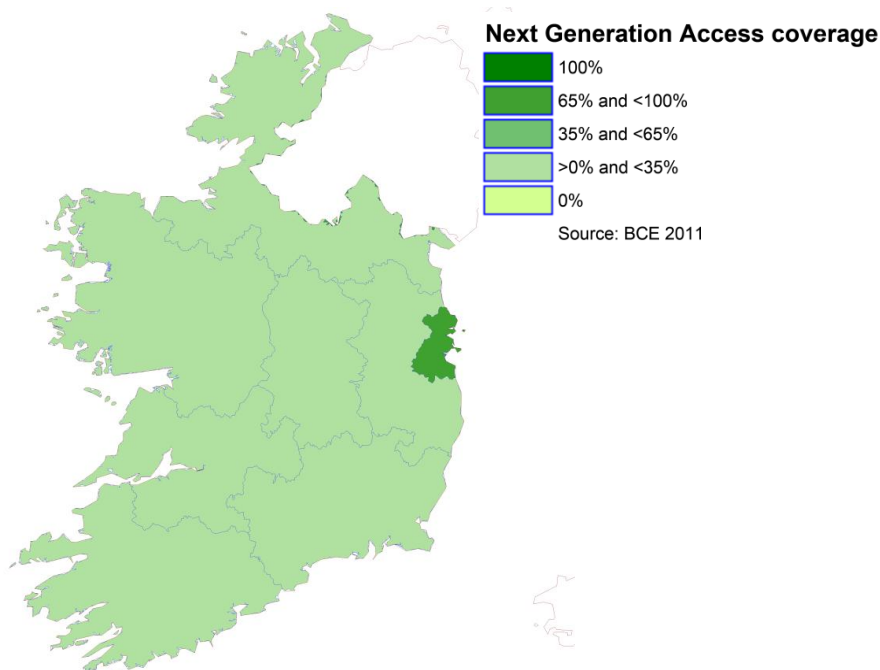## Ireland: rural coverage by technology
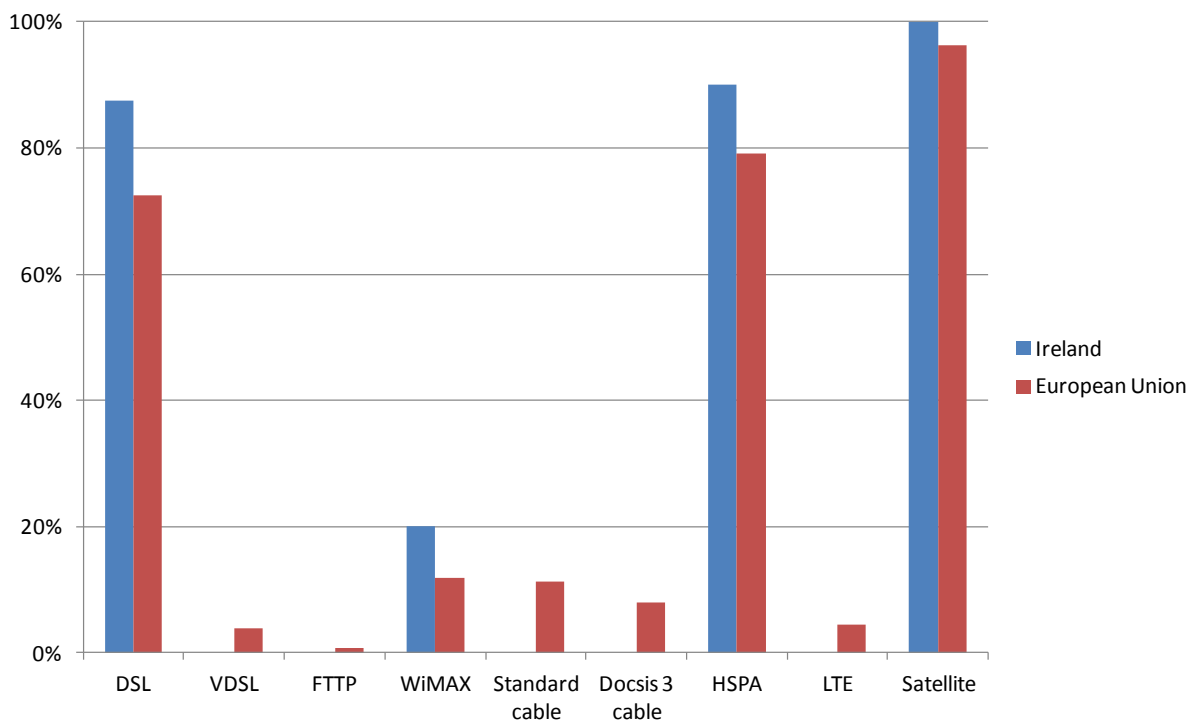
3.14.2 Regional coverage by technology combinations

All regions of Ireland have total standard coverage of 95% or more although only Dublin has 100%. The differences with NGA coverage are much greater, with Dublin over 88% but no other region reaching 26%. The NUTS 3 regions in the south and east of the country all have NGA coverage between 14% and 26% but the Border and West regions have only 4.2% and 0.2% respectively. This pattern reflects the coverage of the cable network because Docsis 3 is the only NGA technology with significant reach in Ireland at present.

Map 3.14.01.Ireland Standard broadband coverage

Map 3.14.02.Ireland Next Generation Access coverage

3.14.3 Data tables for Ireland

Demographics

Statistic	National
Population	4,401,335
Persons per household	2.7
Rural proportion	38.0%

Coverage by technology

Technology	Total	Rural
DSL	95.3%	87.6%
VDSL	0.7%	0.0%
FTTP	2.0%	0.0%
WiMAX	28.3%	20.0%
Standard cable	43.1%	0.0%
Docsis 3 cable	34.2%	0.0%
HSPA	95.0%	90.0%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	97.1%	93.8%
NGA Combination	35.6%	0.0%

3.15 Italy

3.15.1 National coverage by broadband technology

Italy: coverage by technology combinations
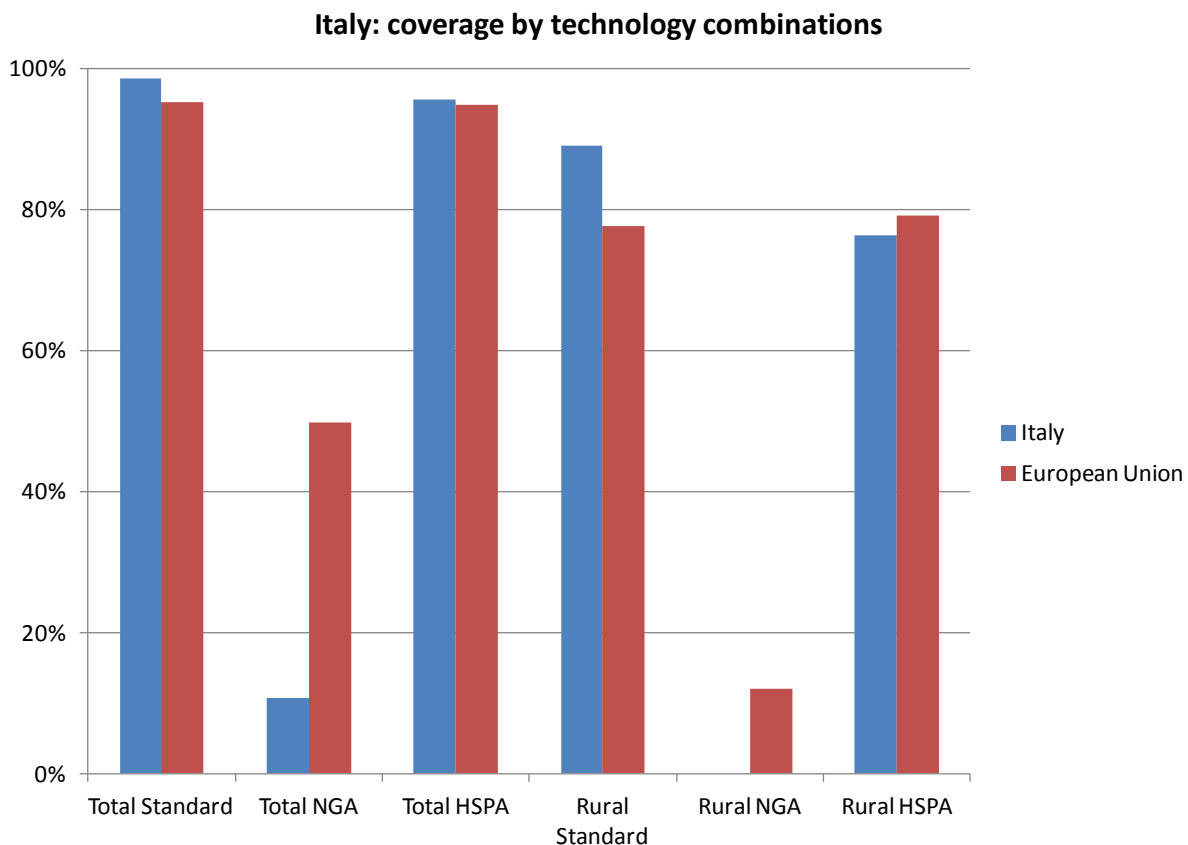
Italy's broadband infrastructure is ahead of the European averages for Total Standard Coverage and HSPA. It is also well ahead of average in Rural Standard Coverage, on 89% against 78%. But it lags slightly in Rural HSPA and it is 27th of the study countries for Total NGA Coverage, on 10.7%.

The reasons for this pattern are clear from the technology profile. Italy has above average DSL coverage (97%) and one of the highest figures for WiMAX availability in the study countries (60%). These two together provide basic broadband coverage across the country as a whole.

But the country has no cable network and hence no Docsis 3. The NGA gap was filled to some extent by the development of one of Europe's first major FTTP services. Since then the pace of growth has slowed so that FTTP coverage is now below the European average level, but it should pick up again with the entry of other operators into the market. However there is no sign of VDSL rollout as yet, leaving FTTP as the only fixed NGA option. LTE is also not yet available in Italy.
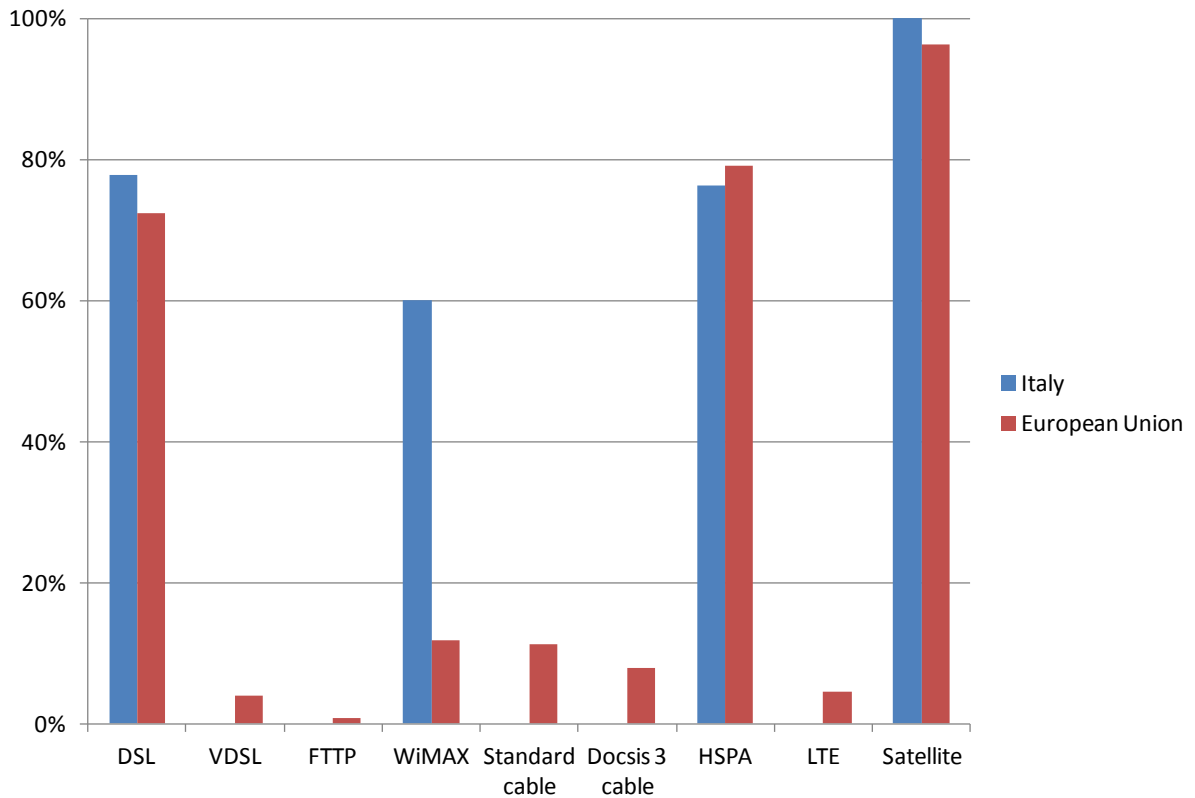
The effects are clear in the rural sector where Italy is one of seven study countries which have no identified rural NGA coverage at all. But the extensive WiMAX networks mean that rural current-generation demand is reasonably well met.

Italy: total coverage by technology
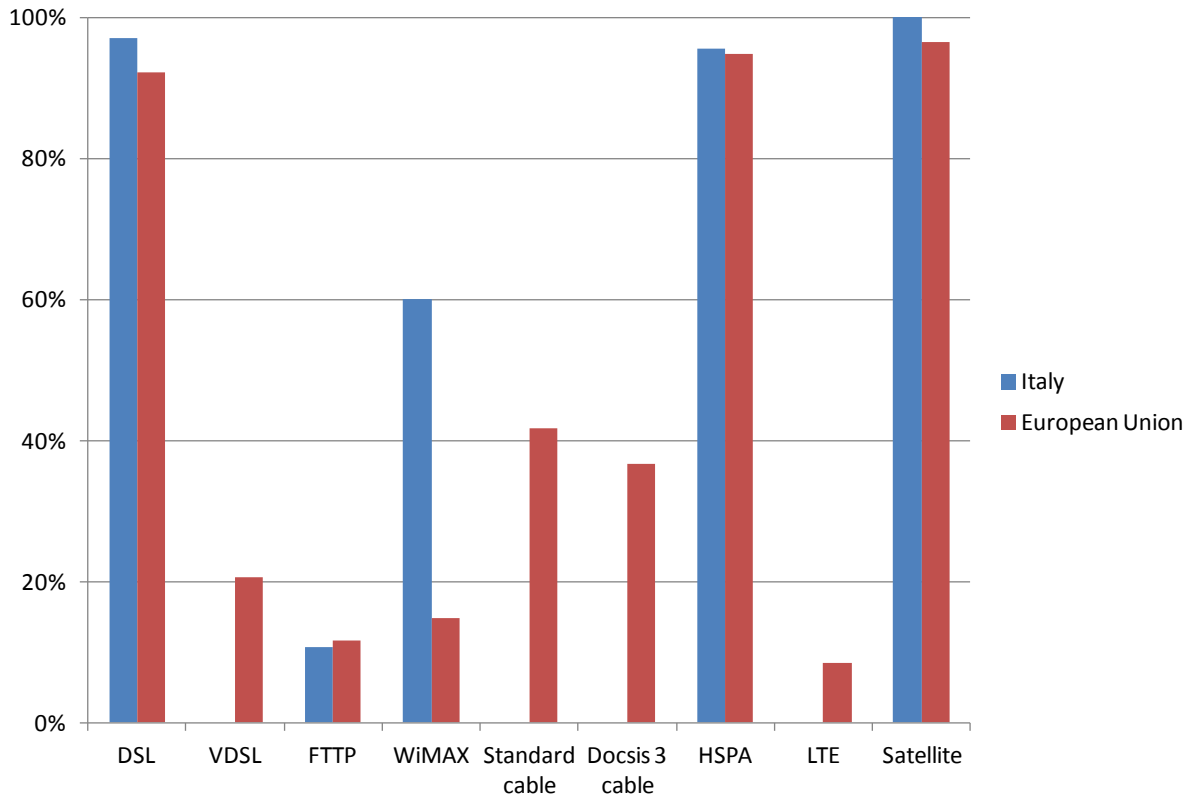
Italy: rural coverage by technology

3.15.2 Regional coverage by technology combinations

Map 3.15.01.Italy Standard broadband coverage

Standard broadband coverage

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

Source: BCE 2011

Italy has high and, as far as current data goes, fairly uniform standard broadband coverage. The two most densely populated regions, Milan and Naples have 100% coverage. All the rest have at least 96%.

Italy's NGA coverage mainly reflects the rollout of its pioneering FTTP network. Milan, where it started, has 55% coverage. Fourteen more regions, home to Italy's other big cities, have between 35% and 10%. Another four have about 1% and the remaining 88 have nothing so far.

Map 3.15.02.Italy Next Generation Access coverage

Next Generation Access coverage

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

Source: BCE 2011
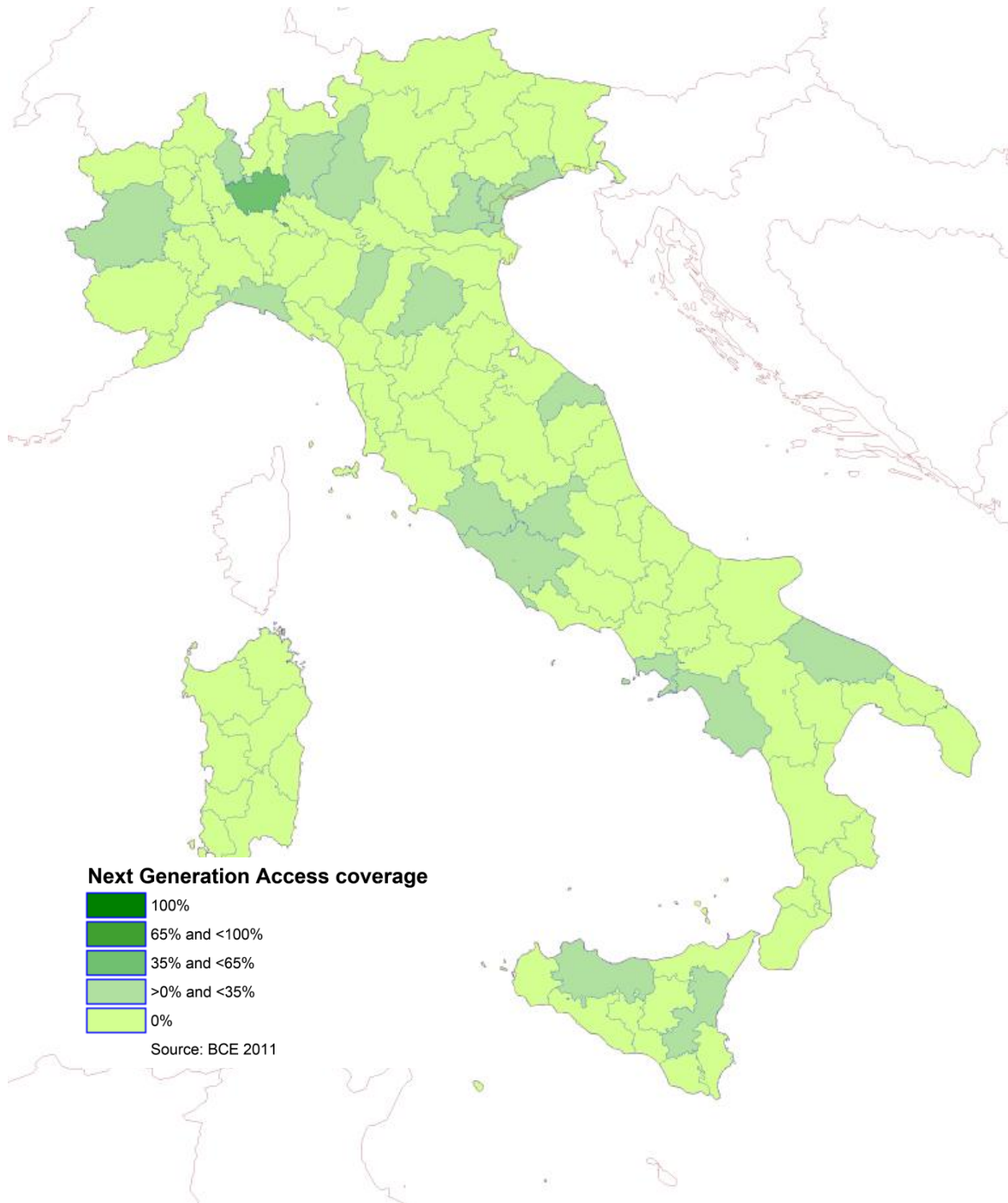
3.15.3 Data tables for Italy

Demographics

Statistic	National
Population	59,619,290
Persons per household	2.4
Rural proportion	13.6%

Coverage by technology

Technology	Total	Rural
DSL	97.0%	77.9%
VDSL	0.0%	0.0%
FTTP	10.7%	0.0%
WiMAX	60.0%	60.0%
Standard cable	0.0%	0.0%
Docsis 3 cable	0.0%	0.0%
HSPA	95.5%	76.4%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	98.5%	89.0%
NGA Combination	10.7%	0.0%

3.16 Latvia

3.16.1 National coverage by broadband technology

Latvia: coverage by technology combinations
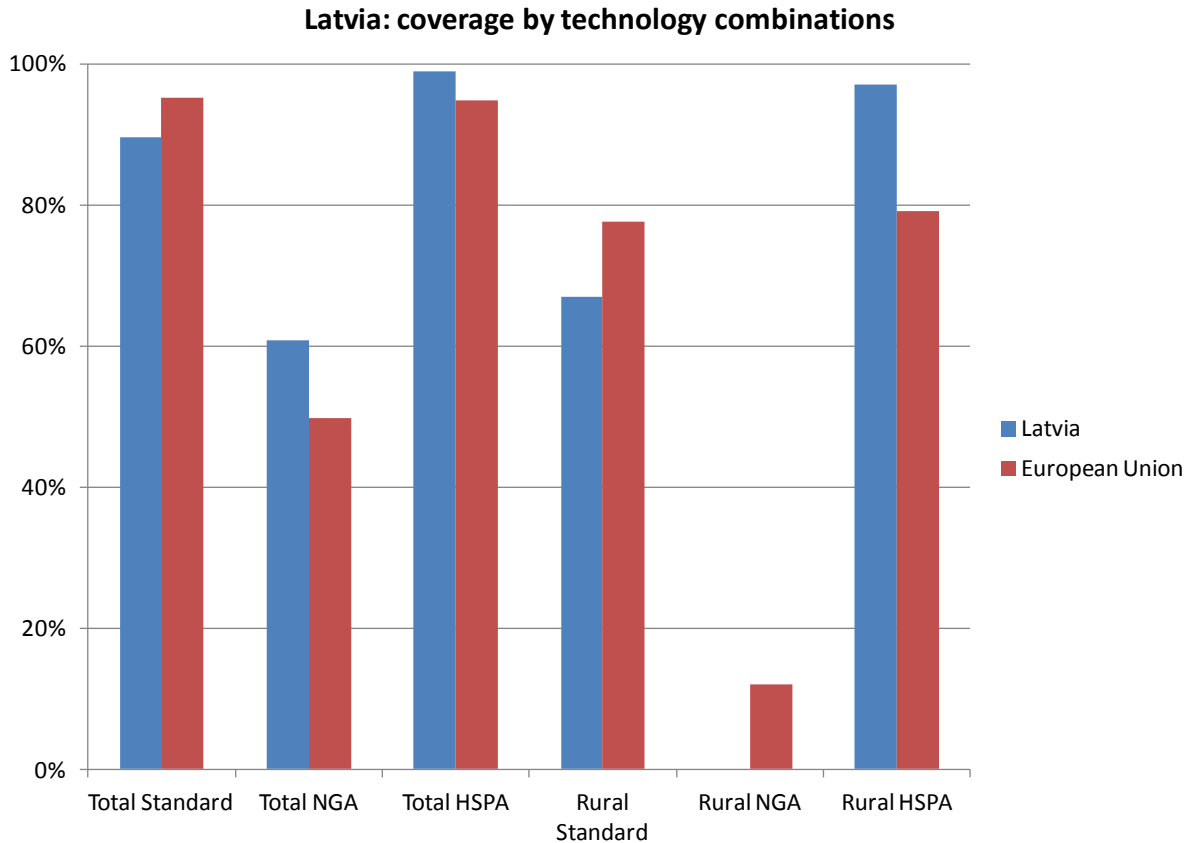
Latvia's broadband infrastructure presents a mixed picture. Total NGA coverage is well ahead of average at 61%. Total and Rural HSPA is also high, at 99% and 97%. But Total and Rural Standard coverage is below average (90% and 67%) and the project found no evidence of Rural NGA.

As the technology profile shows this unusual distribution results from having the highest FTTP coverage of all the study countries, at 61%. The strength in FTTP makes up to some extent for the low coverage of DSL and provides all Latvia's NGA coverage. Although there are quite extensive cable networks in Latvia they are not offering Docsis 3 services as yet and there is no VDSL activity. WiMAX also fills in some of the gaps in DSL coverage but it is largely confined to urban areas. LTE service has started as well but it is also providing only urban coverage so far.

Latvia is also one of the countries which does not have distribution available for KA-band satellite broadband. This leaves its rural areas, home to 32% of the population, served only by DSL and HSPA. But the high coverage of the latter should mean that less than 3% of homes are entirely without broadband access.

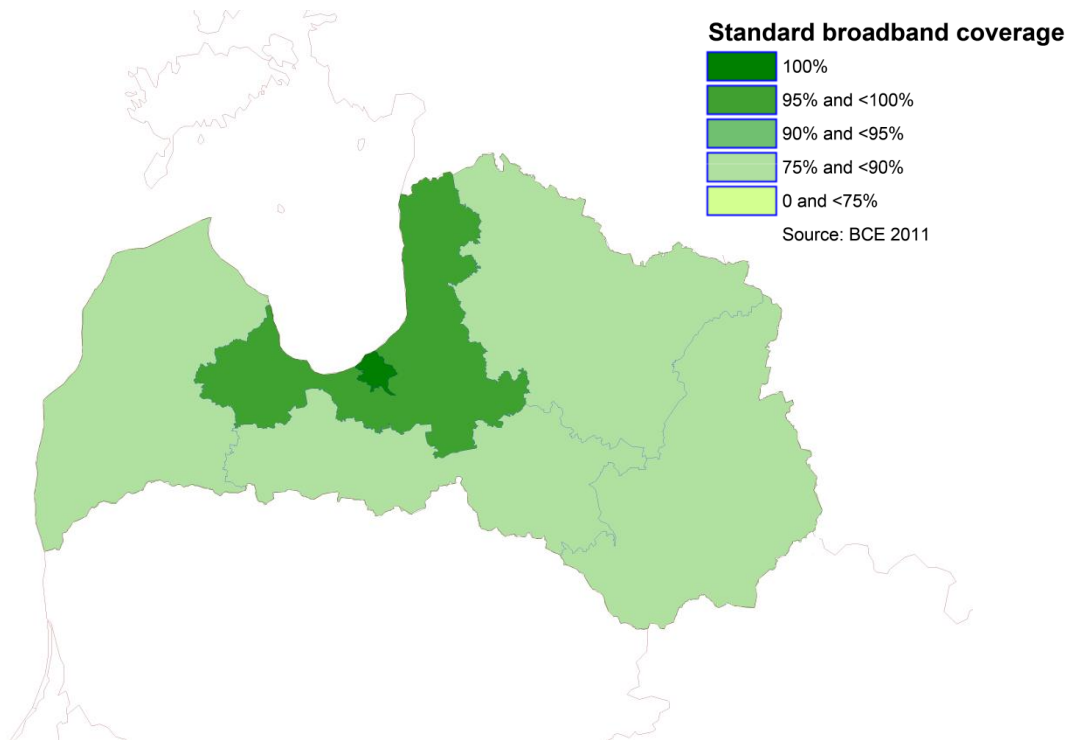# Broadband Coverage in Europe 2011

Latvia: total coverage by technology
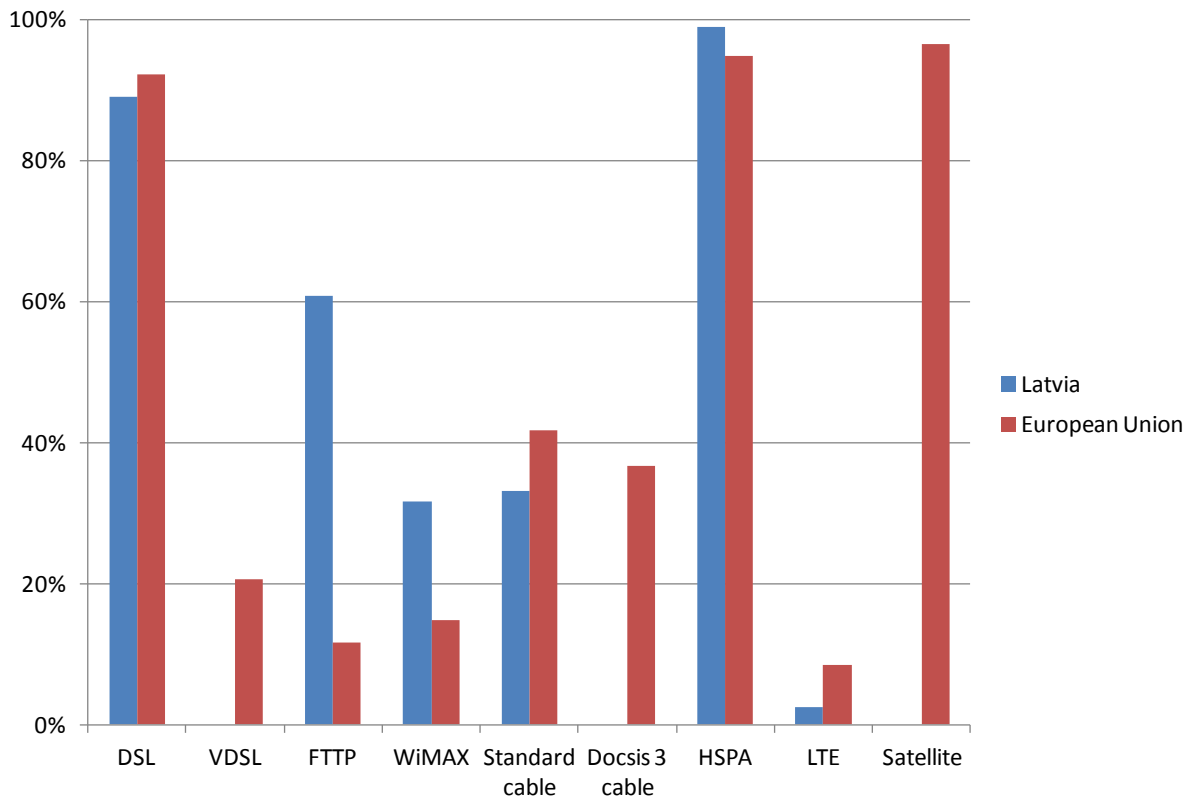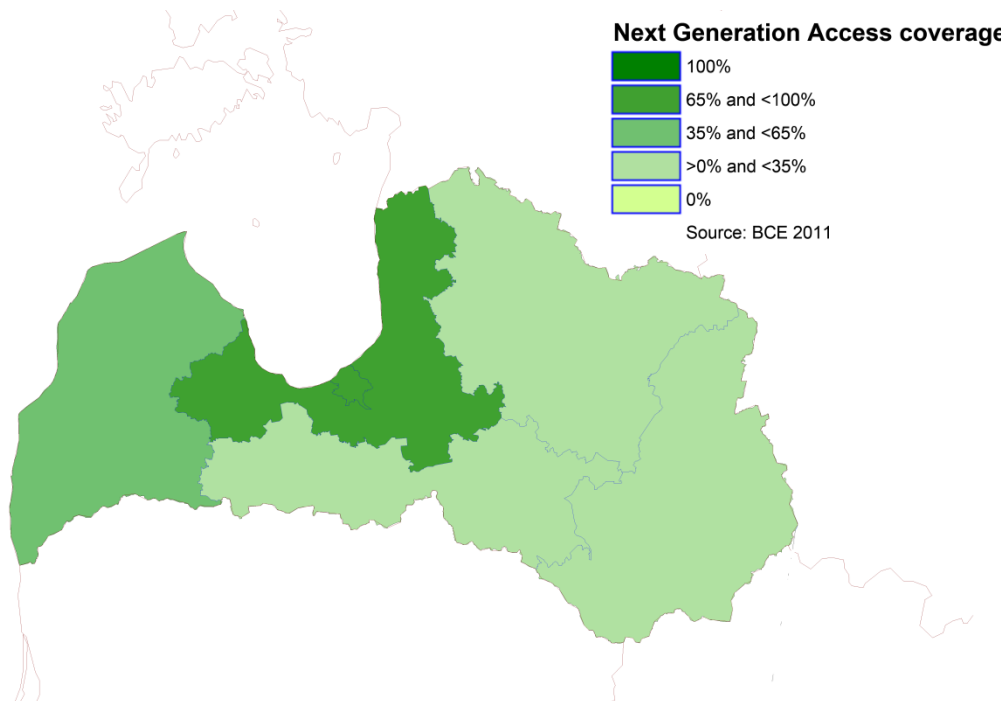

Latvia: rural coverage by technology
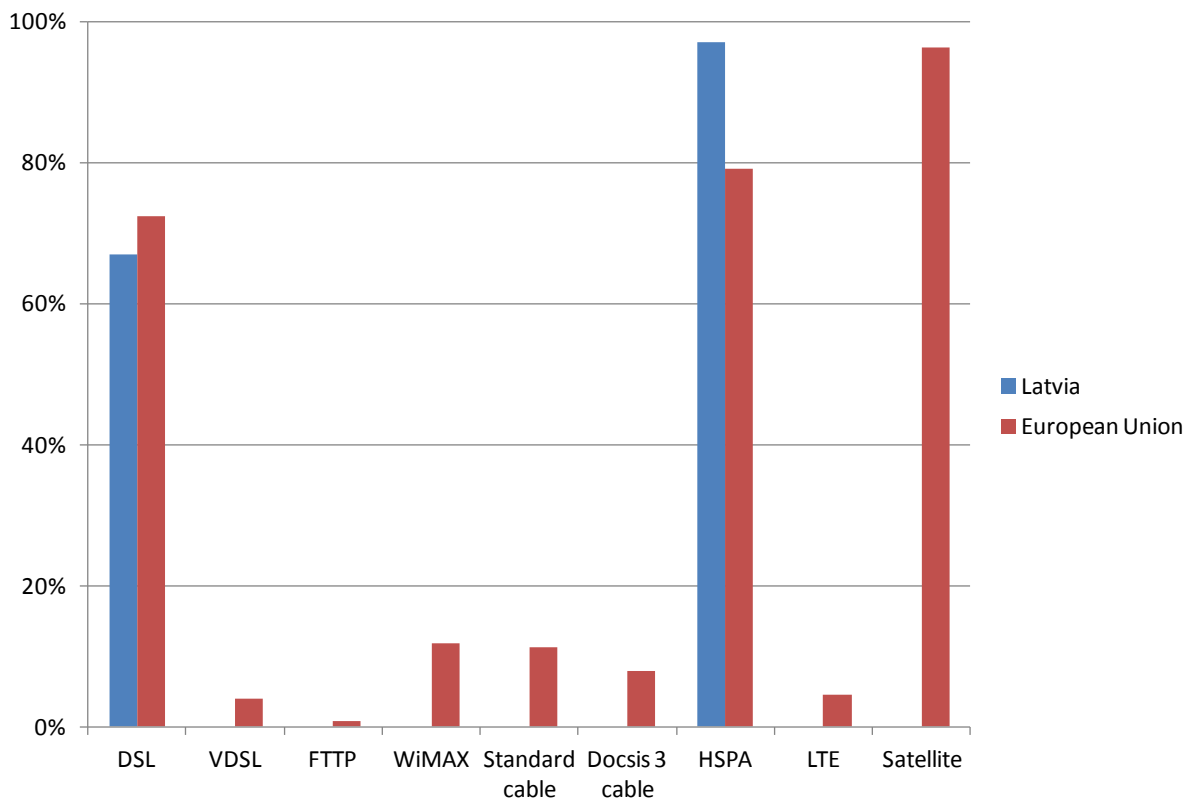
3.16.2 Regional coverage by technology combinations

Map 3.16.01.Latvia Standard broadband coverage

Standard broadband coverage

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

Source: BCE 2011

Map 3.16.02.Latvia Next Generation Access coverage

Next Generation Access coverage

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

Source: BCE 2011

Latvia has 100% standard broadband coverage in the capital, Riga, and 95% in the surrounding region (Pieriga). The western region (Kurzeme) follows on 89% while the other three regions each have about 79% standard coverage.

NGA coverage, which is entirely dependent on FTTP networks at present, shows a similar pattern. TheRiga region leads on 89%, followed by Pieriga on 76%, Kurzeme on 58% and the others on 32%.

3.16.3 Data tables for Latvia

Demographics

Statistic	National
Population	2,270,894
Persons per household	2.7
Rural proportion	31.5%

Coverage by technology

Technology	Total	Rural
DSL	89.0%	67.0%
VDSL	0.0%	0.0%
FTTP	60.8%	0.0%
WiMAX	31.6%	0.0%
Standard cable	33.1%	0.0%
Docsis 3 cable	0.0%	0.0%
HSPA	99.0%	97.0%
LTE	2.4%	0.0%
Satellite	0.0%	0.0%
Standard Combination	89.6%	67.0%
NGA Combination	60.8%	0.0%

3.17 Lithuania

3.17.1 National coverage by broadband technology

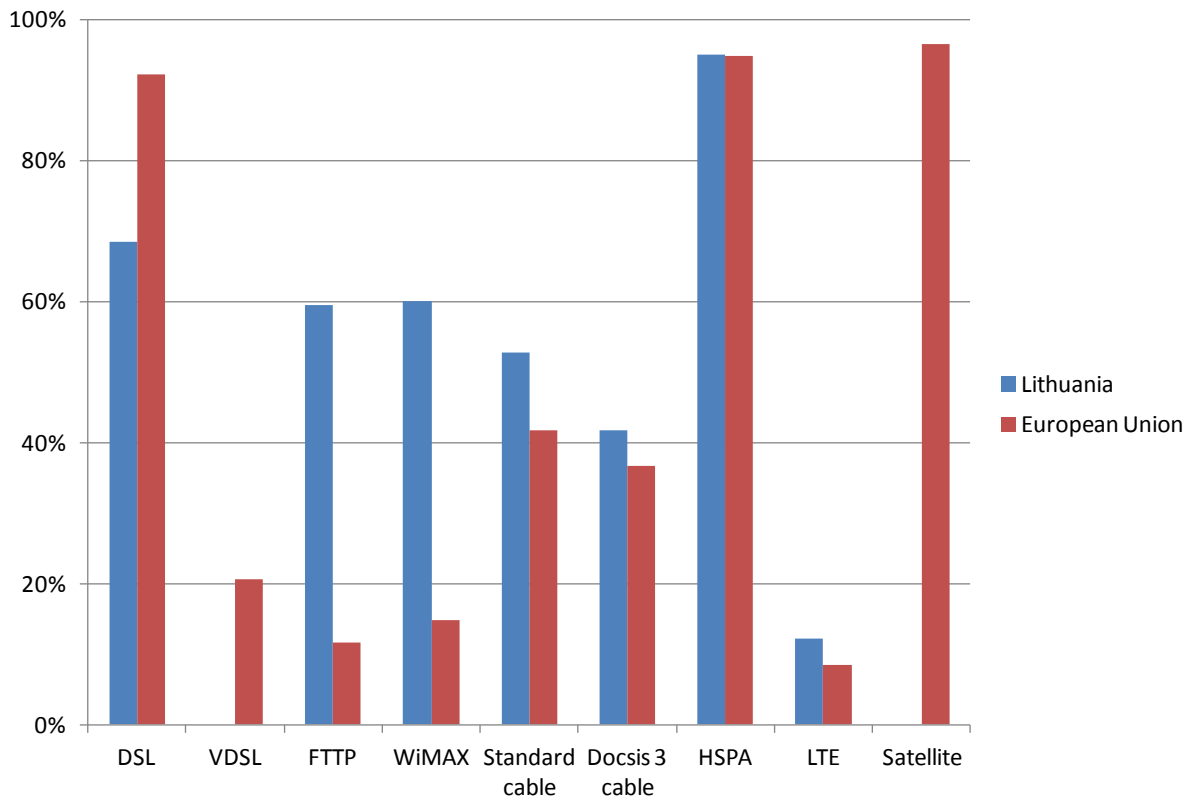**Lithuania: coverage by technology combinations**
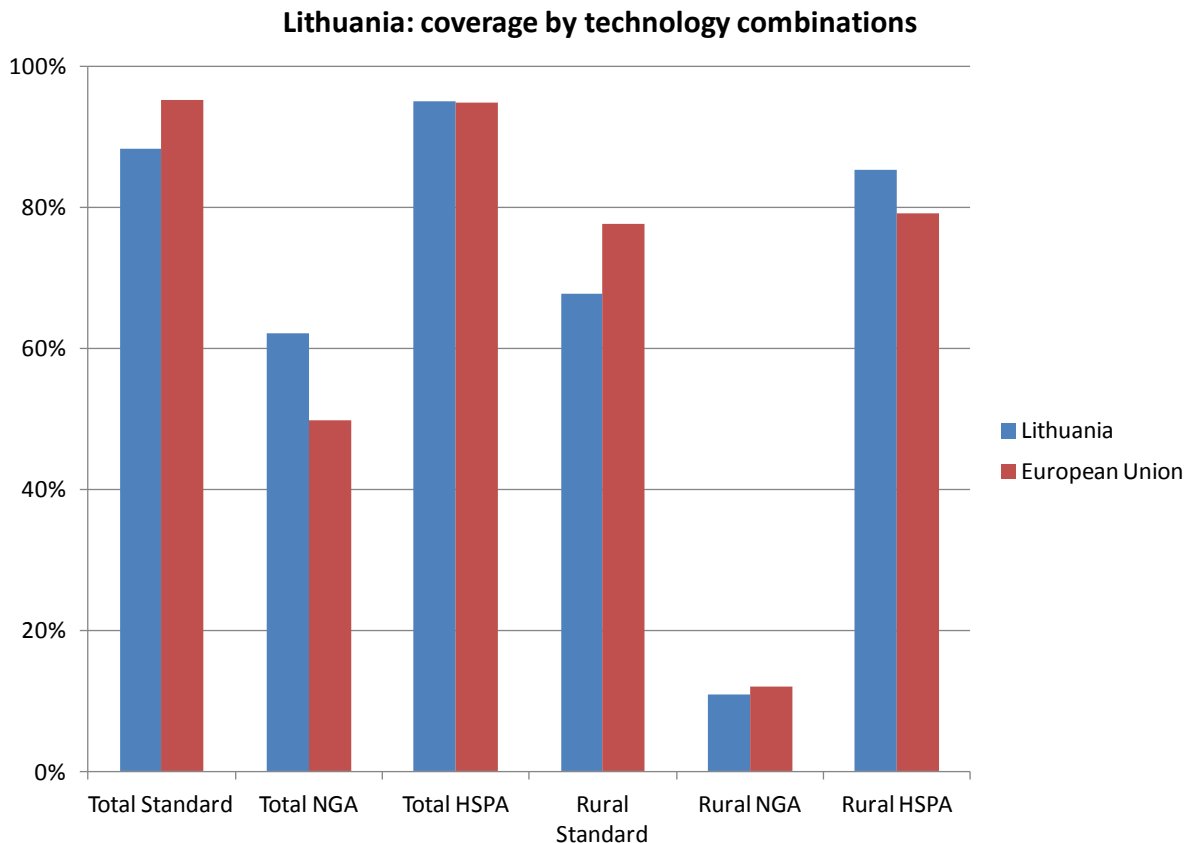
Lithuania is behind the European averages in standard broadband coverage. TSC is the fourth lowest among the study countries at 88%, and Rural Standard Coverage is sixth lowest at 68%. But this is offset by high Total NGA Coverage of 62% against the European average of 50%, while Rural NGA is close to average. HSPA coverage is also equal to the average across the country as a whole and ahead in rural areas.

The profile of individual technologies shows that DSL coverage is actually the lowest of all the study countries at 65%, but FTTP is second highest at 59%. Lithuania also has above average cable network coverage with a high proportion upgraded to Docsis 3, extensive WiMAX coverage and, not least, the early roll-out of an LTE network which had already passed 12% coverage by end-2011. VDSL is absent, but Lithuanian households in urban areas can mostly look to FTTP or Docsis 3 for broadband.

Lithuania is also one of the top three countries for rural FTTP, with 11% coverage, although that is the only NGA solution available in the countryside. An extensive WiMAX network fills many of the gaps left by very limited DSL availability and above-average HSPA also contributes. But Lithuania is one of the countries without KA-band satellite distribution and up to 5% of rural homes could be without broadband access.

Broadband Coverage in Europe 2011
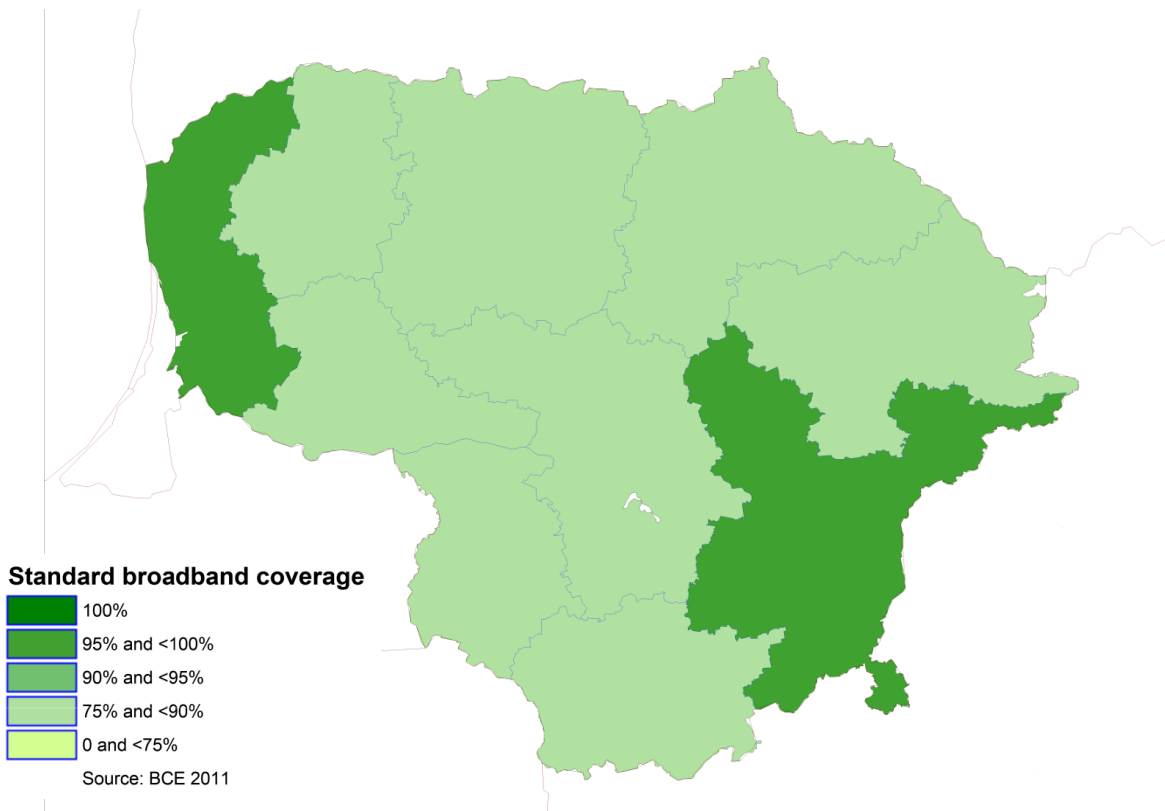
Lithuania: total coverage by technology
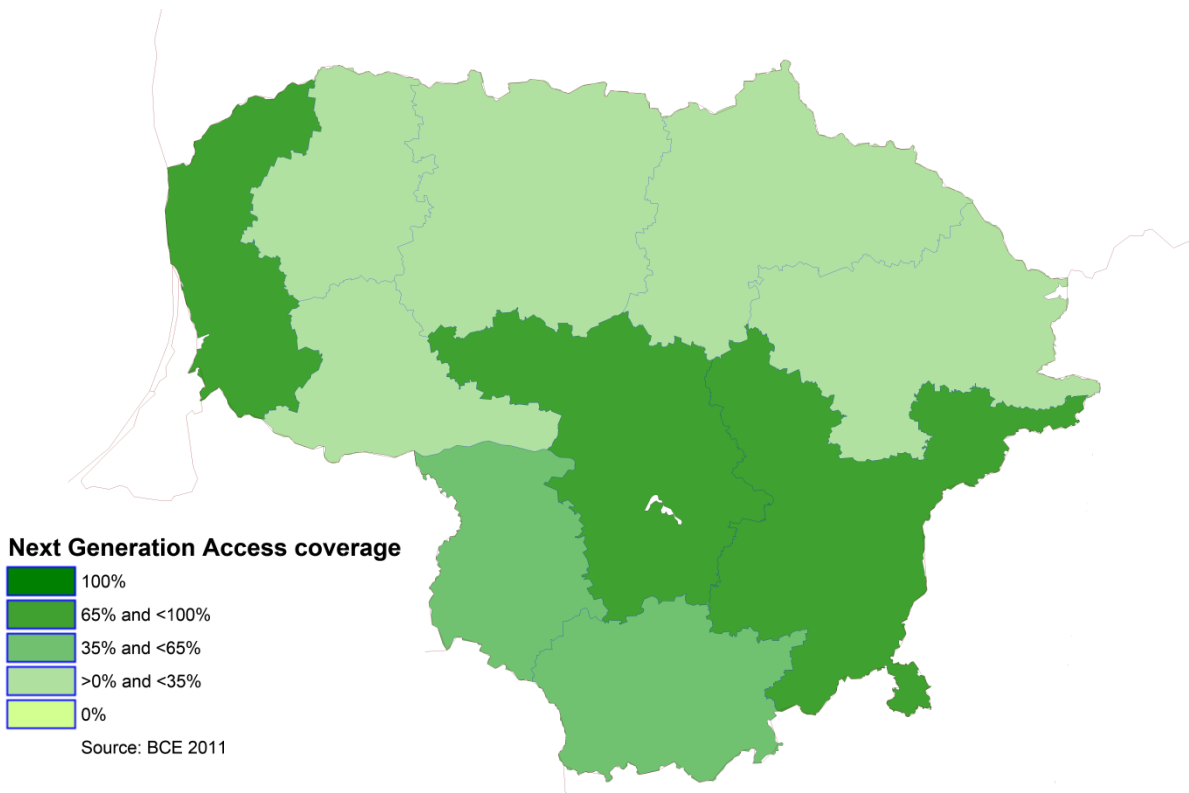

Lithuania: rural coverage by technology
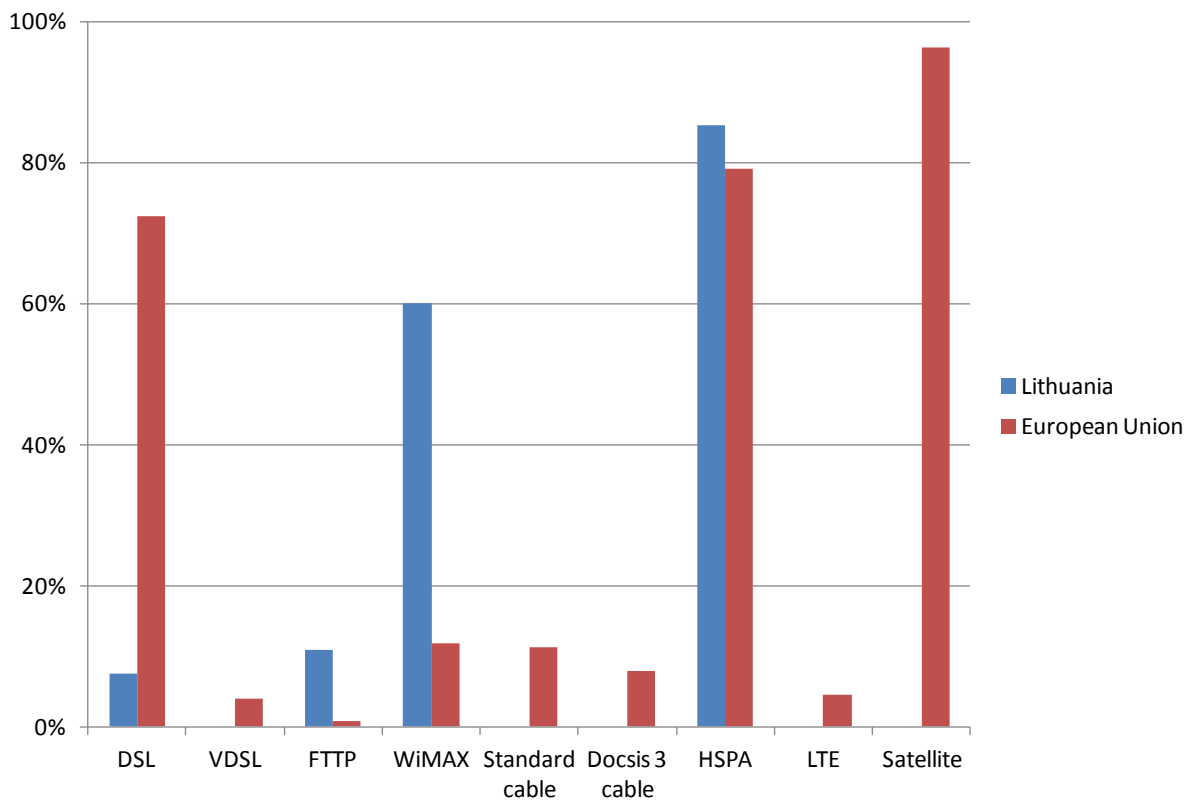
3.17.2 Regional coverage by technology combinations

Map 3.17.01.Lithuania Standard broadband coverage

Standard broadband coverage

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

Source: BCE 2011

Map 3.17.02.Lithuania Next Generation Access coverage

Next Generation Access coverage

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

Source: BCE 2011

Lithuania has high standard broadband coverage in two of its most urbanised regions, the capital Vilnius and Klaipeda, both with over 99%.   Kaunas the second city is a little way behind on 89%. The other regions are between 77% and 80%.

Lithuania's high FTTP rollout and good Docsis 3 coverage is reflected in its NGA distribution. NGA coverage in Vilnius and Klaipeda is almost equal to their standard coverage at over 99%. Kaunas is some way behind on 77% and four other provinces are between 27% and 40%. The three most rural provinces are still below 10%.

3.17.3 Data tables for Lithuania

Demographics

Statistic	National
Population	3,366,357
Persons per household	2.4
Rural proportion	34.0%

Coverage by technology

Technology	Total	Rural
DSL	68.5%	7.5%
VDSL	0.0%	0.0%
FTTP	59.4%	10.9%
WiMAX	60.0%	60.0%
Standard cable	52.8%	0.0%
Docsis 3 cable	41.7%	0.0%
HSPA	95.0%	85.3%
LTE	12.1%	0.0%
Satellite	0.0%	0.0%
Standard Combination	88.4%	67.6%
NGA Combination	62.2%	10.9%

3.18 Luxembourg

3.18.1 National coverage by broadband technology

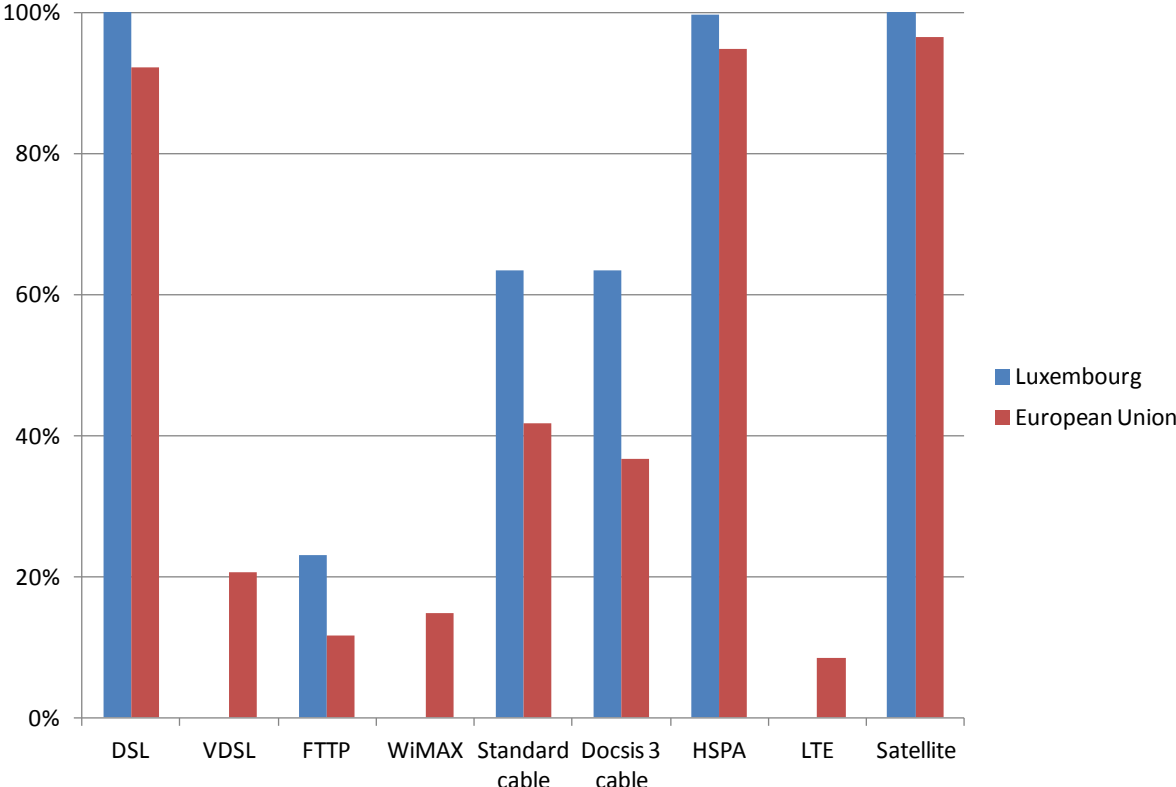**Luxembourg: coverage by technology combinations**
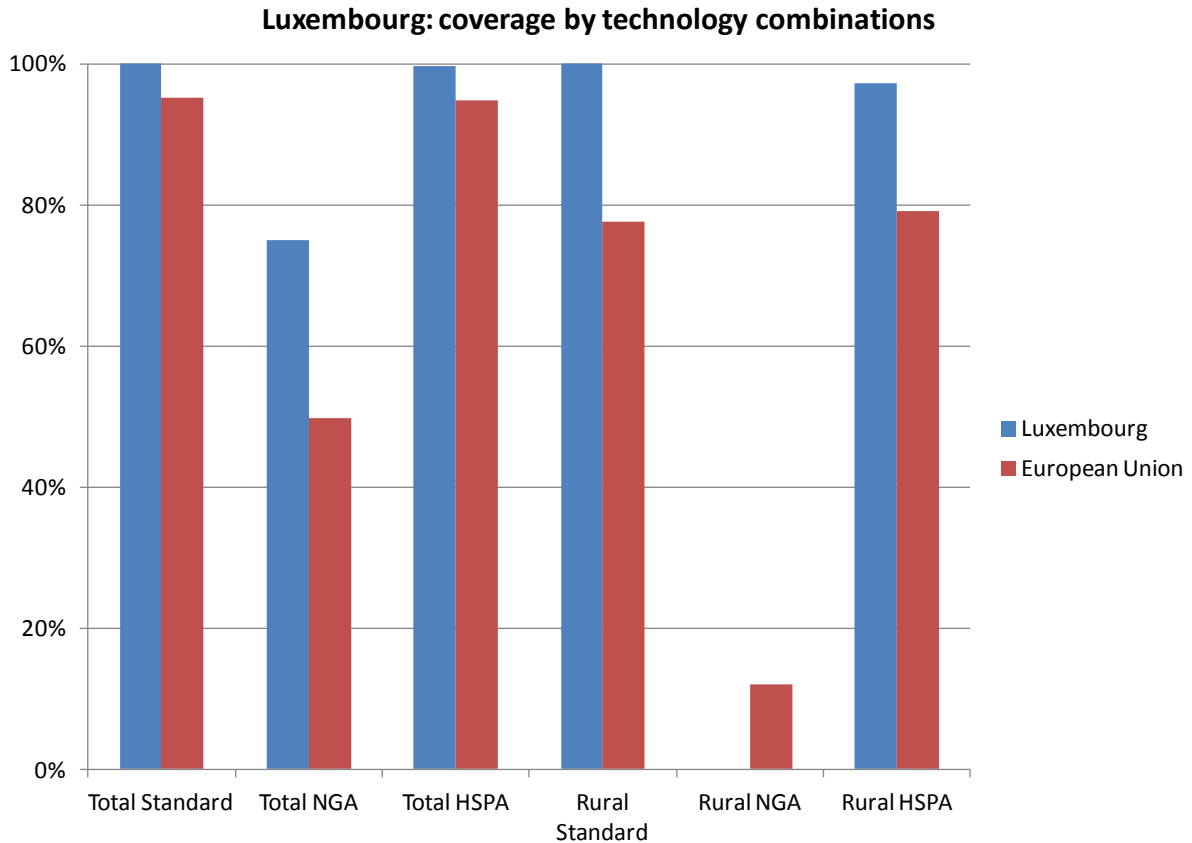
Luxembourg enjoys 100% coverage of standard broadband and 99.6% coverage of HSPA so its basic broadband needs are well supplied, NGA coverage is also well above average, fourth among the study countries at 75%. However, the 15% of the population which lives in Luxembourg's often rugged and forested rural areas have little or no access to NGA.

Luxembourg's strength in NGA is based on having the sixth most extensive cable network in Europe, with 64% coverage, fully upgraded to Docsis 3, plus above average FTTP coverage of 23%. However there is no VDSL coverage, no WiMAX networks were identified and LTE has yet to start.
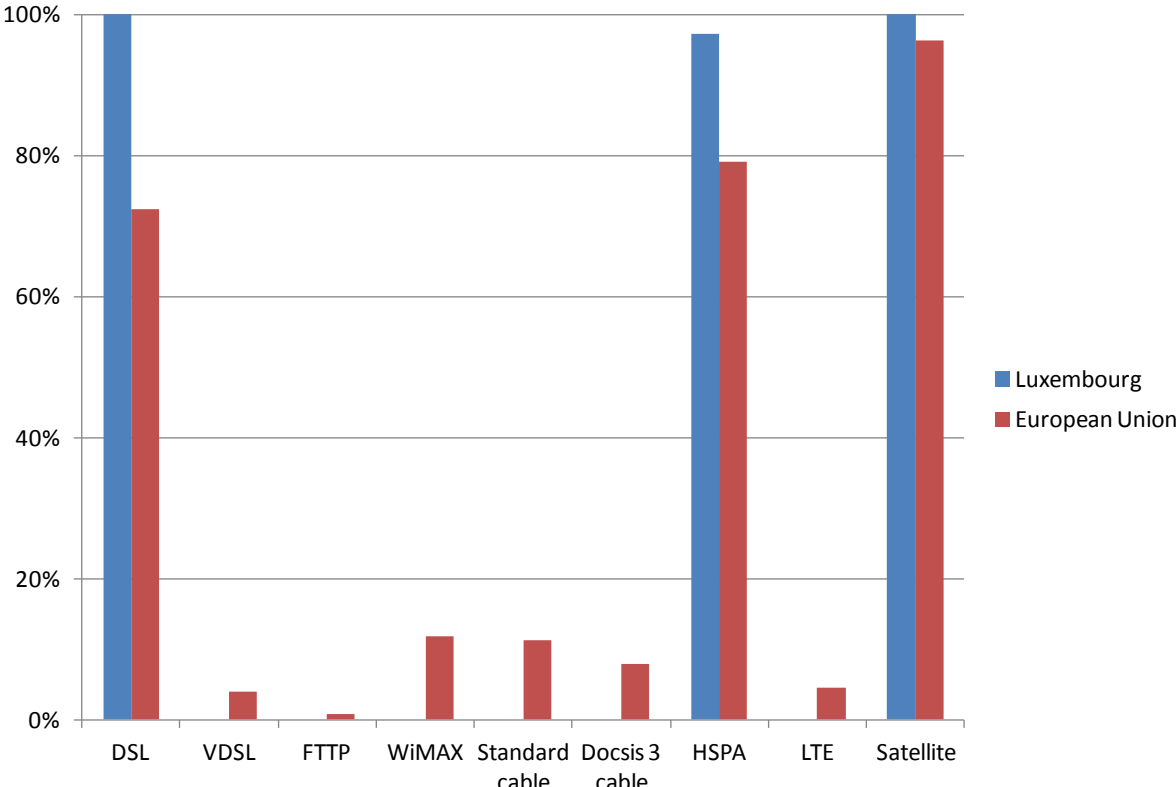
As the rural profile shows, the NGA services cover the towns quite well but leave nothing over for the countryside. The high DSL and HSPA coverage should at least mean that almost all rural homes can get a basic broadband service.

Broadband Coverage in Europe 2011
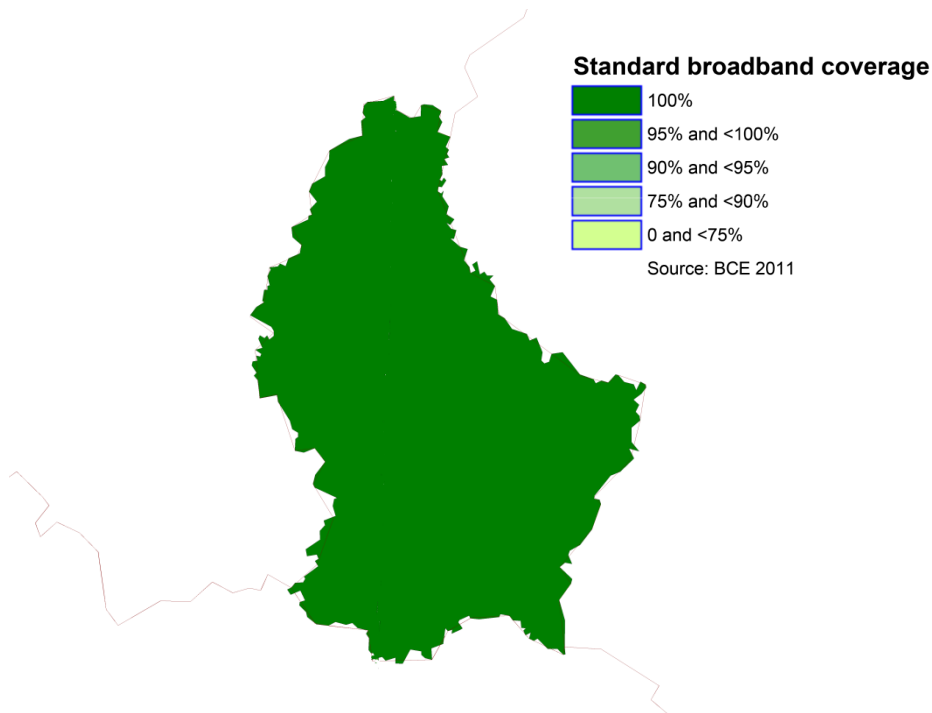
Luxembourg: total coverage by technology
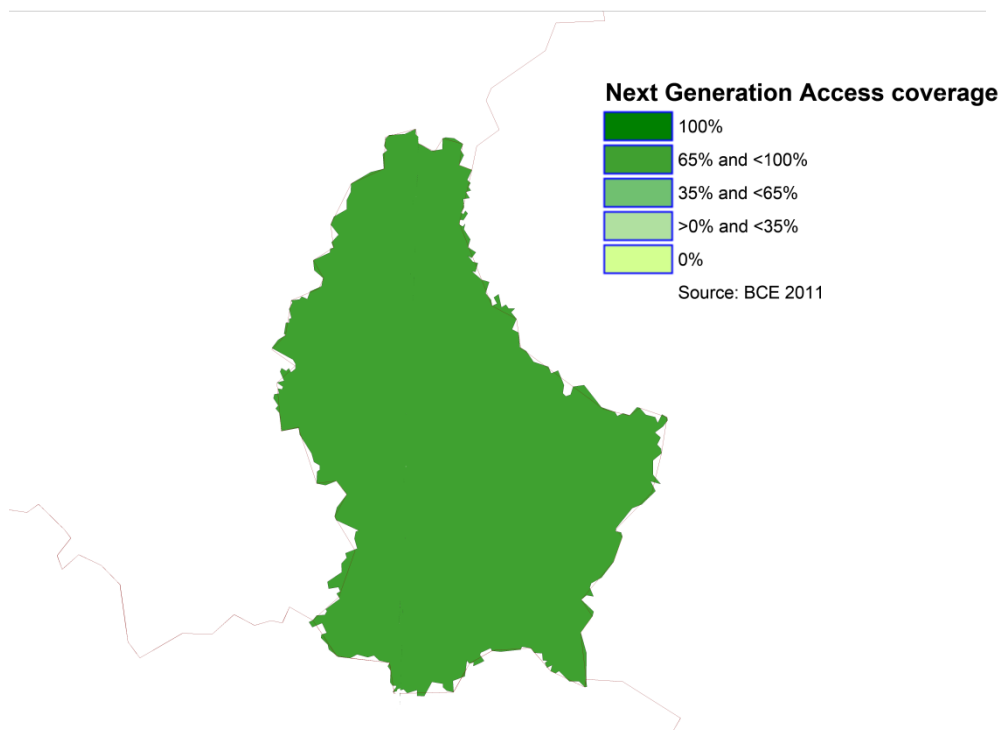

Luxembourg: rural coverage by technology

3.18.2 Regional coverage by technology combinations

Map 3.18.01.Luxembourg Standard broadband coverage

Standard broadband coverage
- 100%
- 95% and <100%
- 90% and <95%
- 75% and <90%
- 0 and <75%

Source: BCE 2011

Map 3.18.02.Luxembourg Next Generation Access coverage

Next Generation Access coverage
- 100%
- 65% and <100%
- 35% and <65%
- >0% and <35%
- 0%

Source: BCE 2011

Luxembourg consists of just a single NUTS 3 area and its DSL network gives it 100% standard broadband coverage. NGA coverage is only 75% because the country's FTTP and Docsis 3 networks do not reach into rural areas.

3.18.3 Data tables for Luxembourg

Demographics

Statistic	National
Population	483,799
Persons per household	2.4
Rural proportion	14.8%

Coverage by technology

Technology	Total	Rural
DSL	100.0%	100.0%
VDSL	0.0%	0.0%
FTTP	23.1%	0.0%
WiMAX	0.0%	0.0%
Standard cable	63.5%	0.0%
Docsis 3 cable	63.5%	0.0%
HSPA	99.6%	97.3%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	100.0%	100.0%
NGA Combination	75.0%	0.0%

3.19 Malta

3.19.1 National coverage by broadband technology

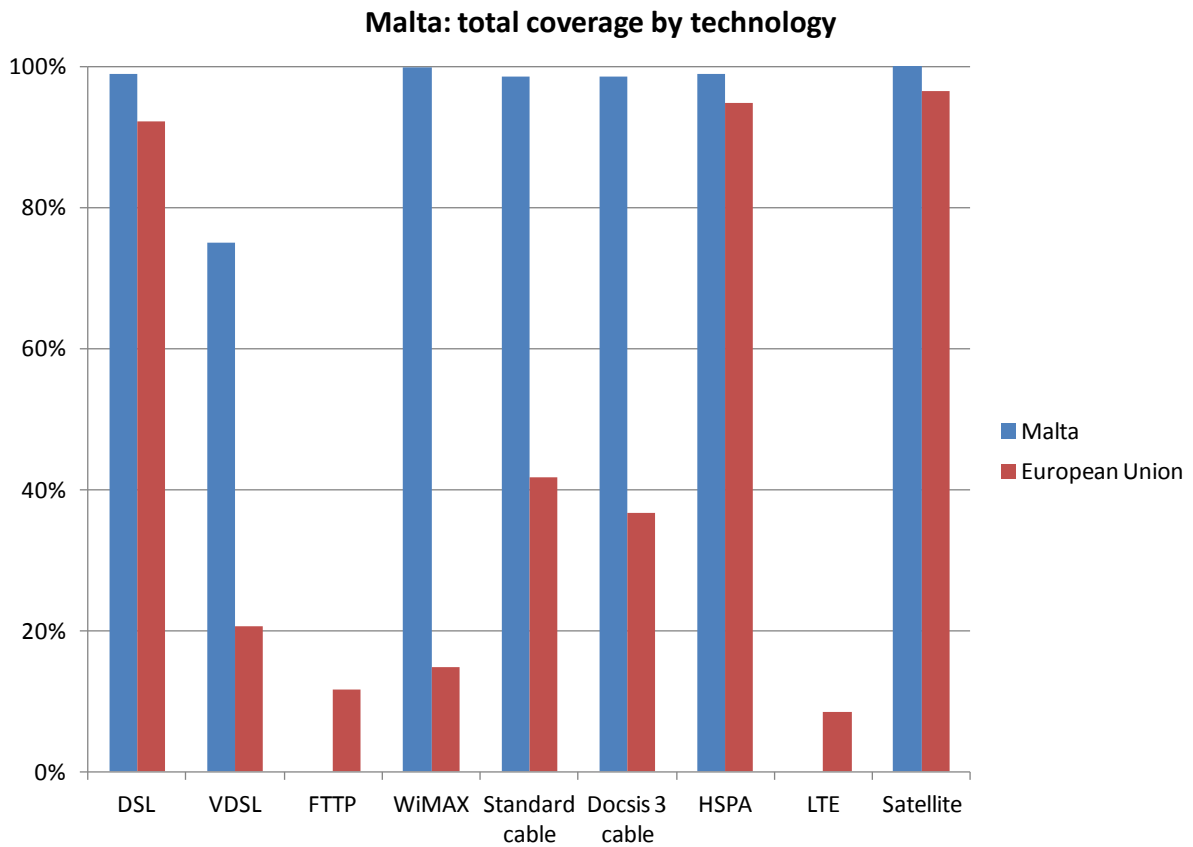**Malta: coverage by technology combinations**
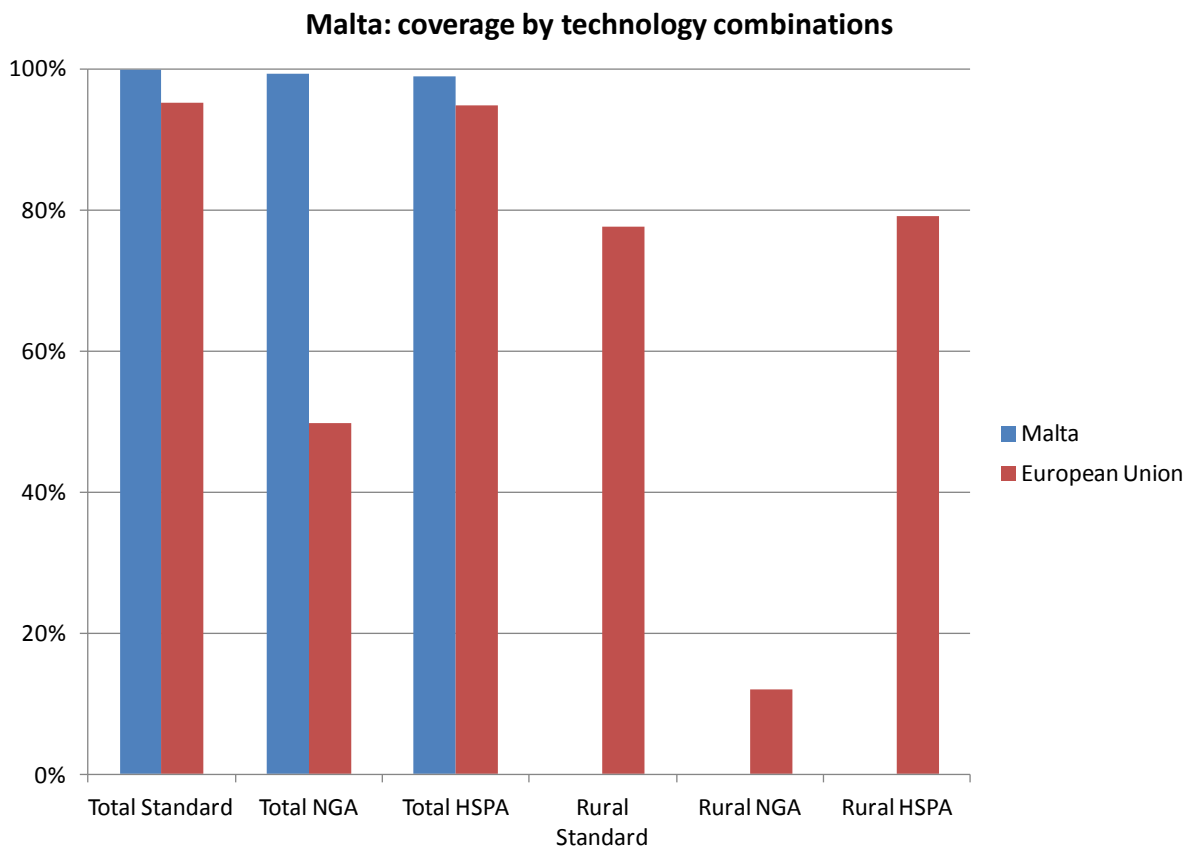
Malta is by far the smallest in land area and most densely populated of the study countries. It has no rural areas by the definitions used for the project. Coverage of standard broadband, NGA and HSPA is all 100% or virtually so.

As for the individual technologies, DSL, WiMAX and Standard Cable all cover the whole or almost the whole of the two main islands which make up the country. The cable network is fully upgraded to Docsis 3 so NGA has almost 100% coverage.

VDSL is also being rapidly rolled out across the whole telephone network but the NRA points out that it is not able to identify whether actual connections are VDSL or ADSL2+. Against this background, FTTP has not yet found a niche and LTE is still in the future.
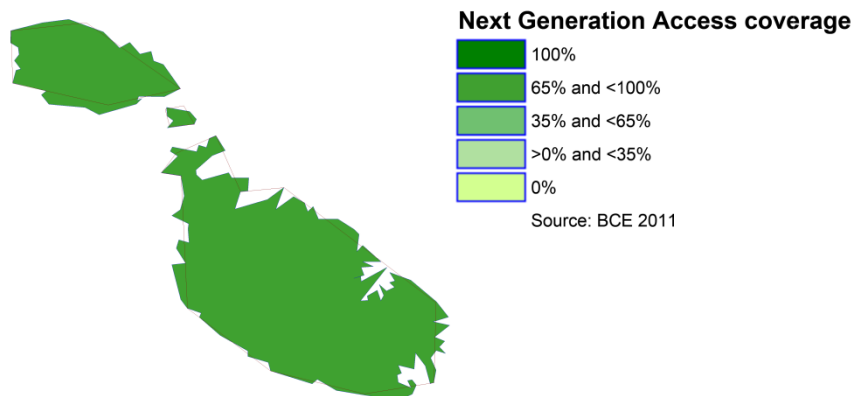
Malta: total coverage by technology

3.19.2 Regional coverage by technology combinations

Map 3.19.01.Malta Standard broadband coverage

Standard broadband coverage
- 100%
- 95% and <100%
- 90% and <95%
- 75% and <90%
- 0 and <75%

Source: BCE 2011
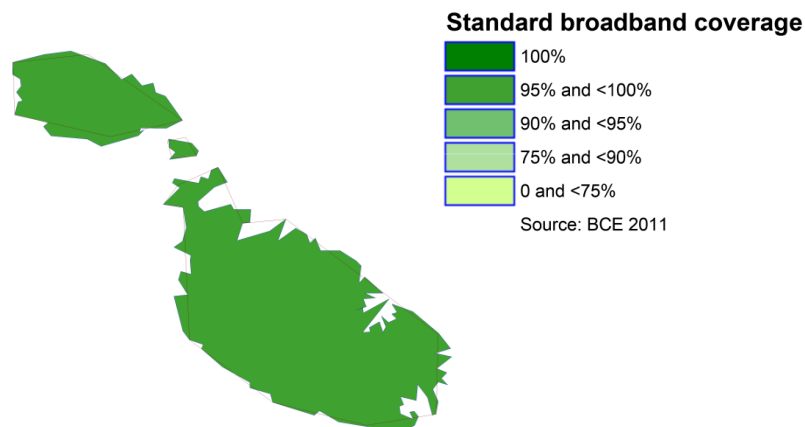
Map 3.19.02.Malta Next Generation Access coverage

Next Generation Access coverage

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

Source: BCE 2011

Malta comprises two NUTS 3 areas, being the main island of Malta and the smaller islands of Gozo and Comino respectively. The combination of DSL, cable and WiMAX ensure 100% standard broadband coverage while Docsis 3 is the leading NGA medium, giving 99% coverage.

3.19.3 Data tables for Malta

Demographics

Statistic	National
Population	410,290
Persons per household	2.856
Rural proportion	0.0%

Coverage by technology

Technology	Total	Rural
DSL	99.0%	
VDSL*	75.0%	
FTTP	0.0%	
WiMAX	99.9%	
Standard cable	98.5%	
Docsis 3 cable	98.5%	
HSPA	99.0%	
LTE	0.0%	
Satellite	100.0%	
Standard Combination	99.9%	
NGA Combination	99.3%	

*Possibly including ADSL2+

3.20 Netherlands

3.20.1 National coverage by broadband technology

Netherlands: coverage by technology combinations
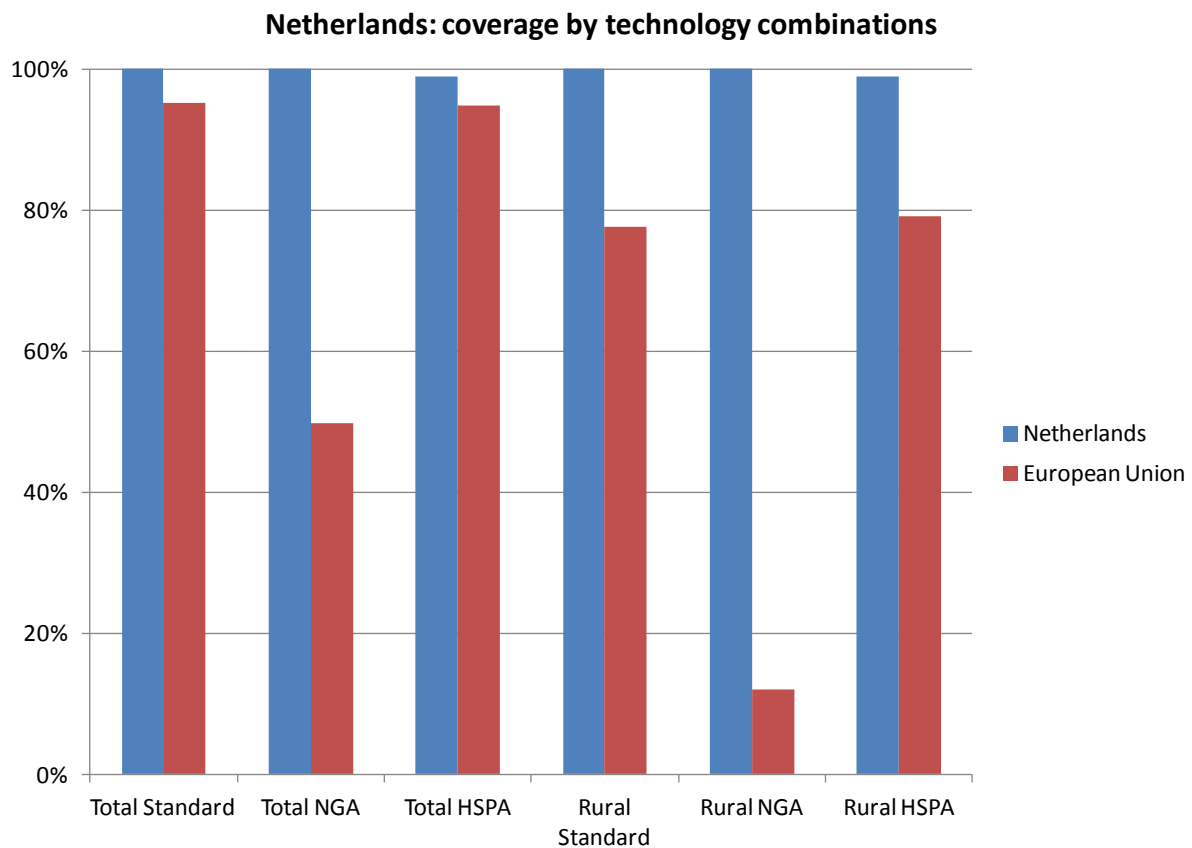
The Netherlands has the most fully developed broadband infrastructure in Europe. Total and Rural coverage of standard and NGA broadband is 100%. HSPA coverage is 99%.

The technology profile shows that the DSL and cable networks have virtually 100% coverage. The cable network is now fully upgraded to Docsis 3 but the 100% VDSL coverage found by the Survey is being investigated further as alternative sources suggest that VDSL coverage is not complete.[5] FTTP has achieved more modest coverage, only just ahead of the European average at 13%, but the Netherlands is recognised as the home of some world-leading fibre-city projects. Not surprisingly, WiMAX has not found a role in this environment, while LTE is not yet launched.

One factor behind this success is that the Netherlands is second only to Malta as the most densely populated of the study countries, with 446 persons per square kilometre. Only 2% of them live in rural areas, so extending high coverage to the countryside is relatively easy.
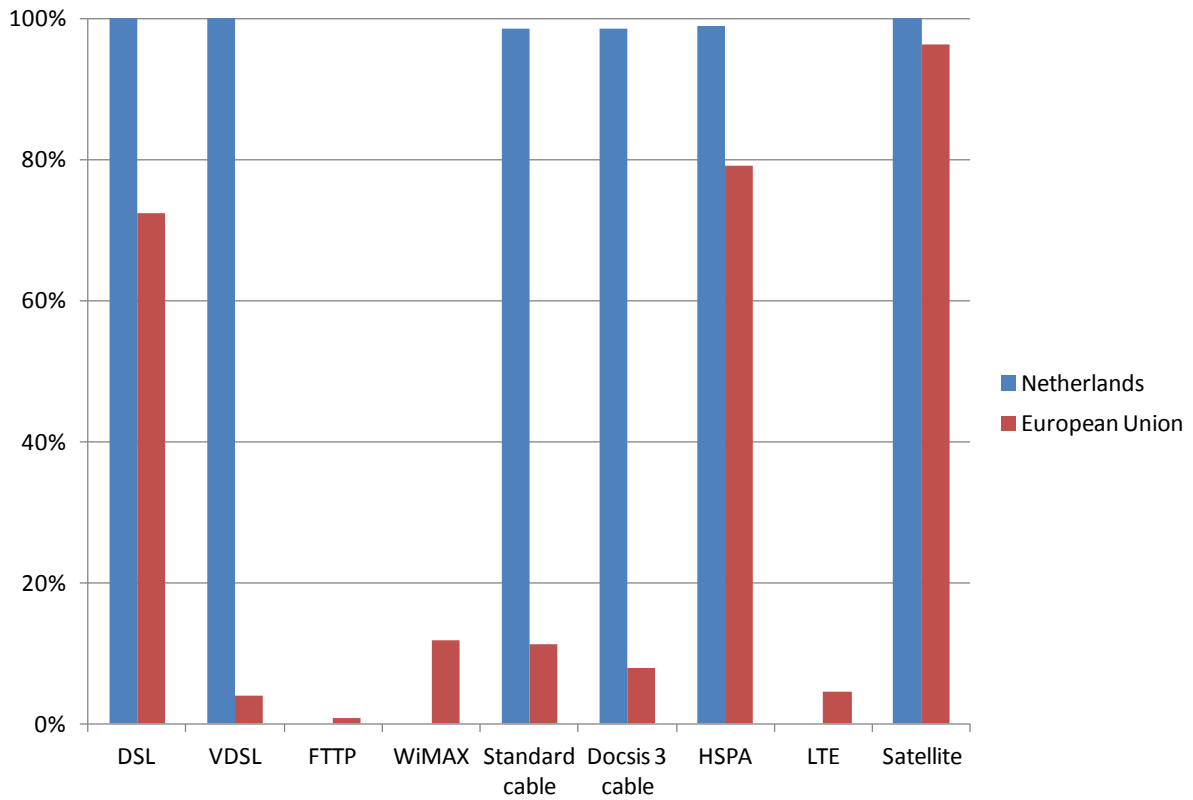
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[5] Studies by Dialogic, a Netherlands consultancy, have found white areas as far as VDSL is concerned in some provinces and a report for the European Commission (not yet published) quotes 53% VDSL coverage.

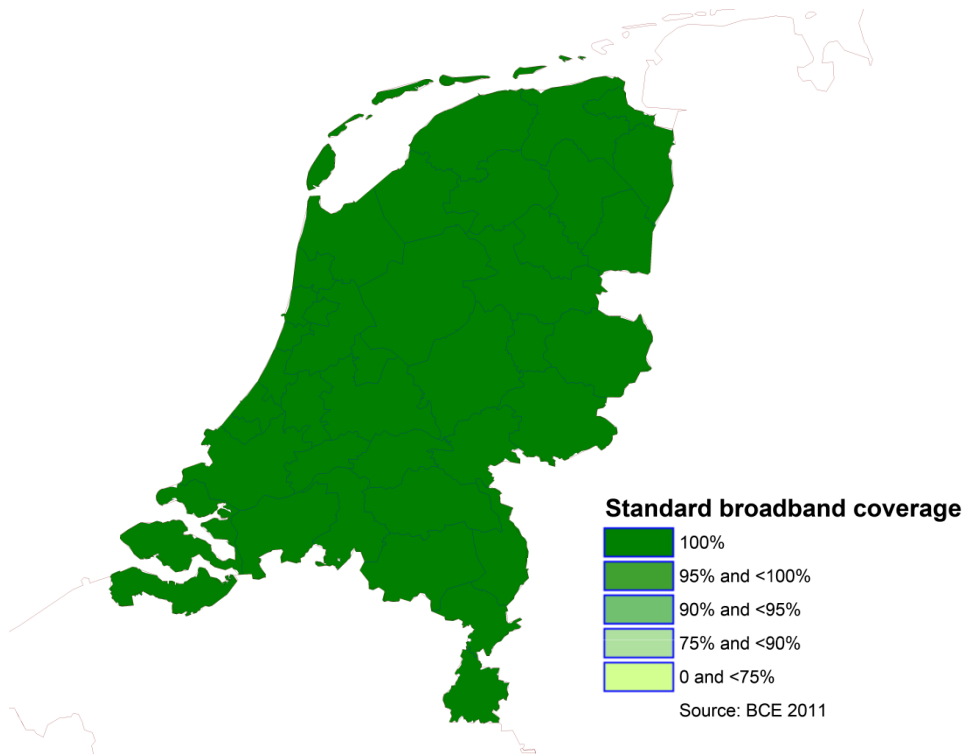## Netherlands: total coverage by technology
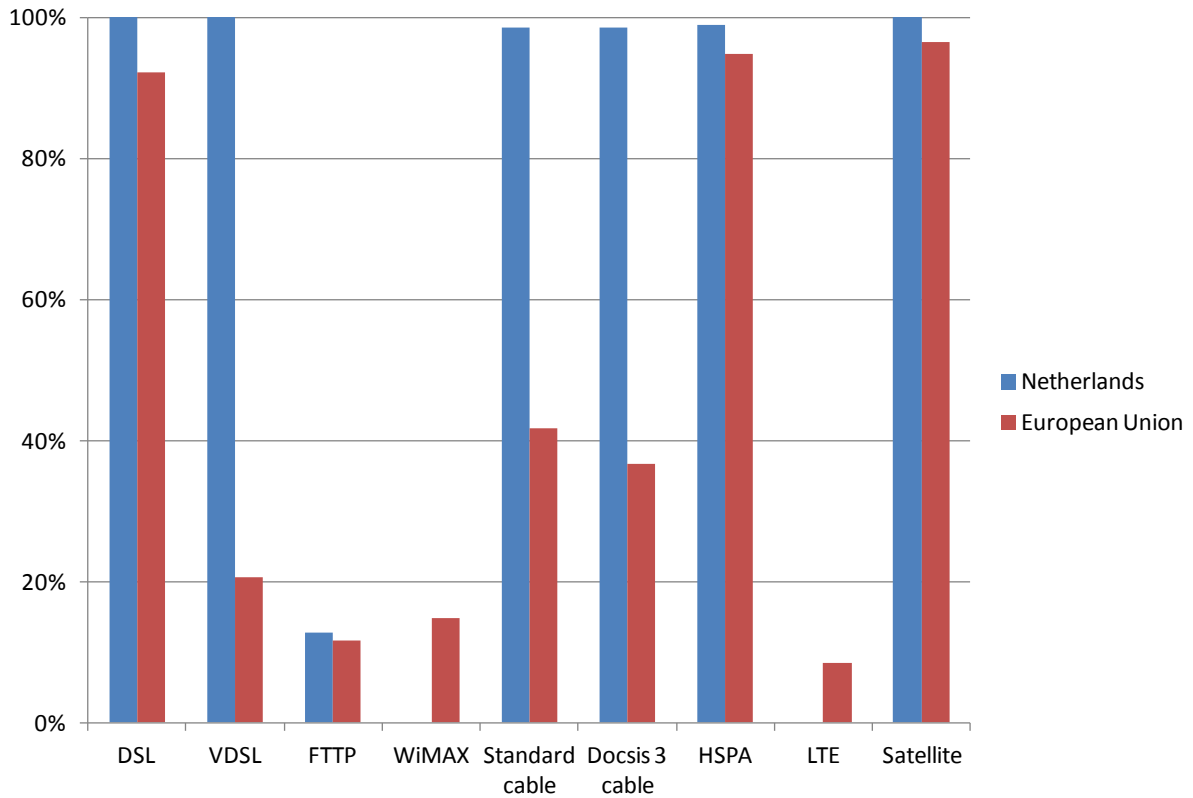
Netherlands: rural coverage by technology

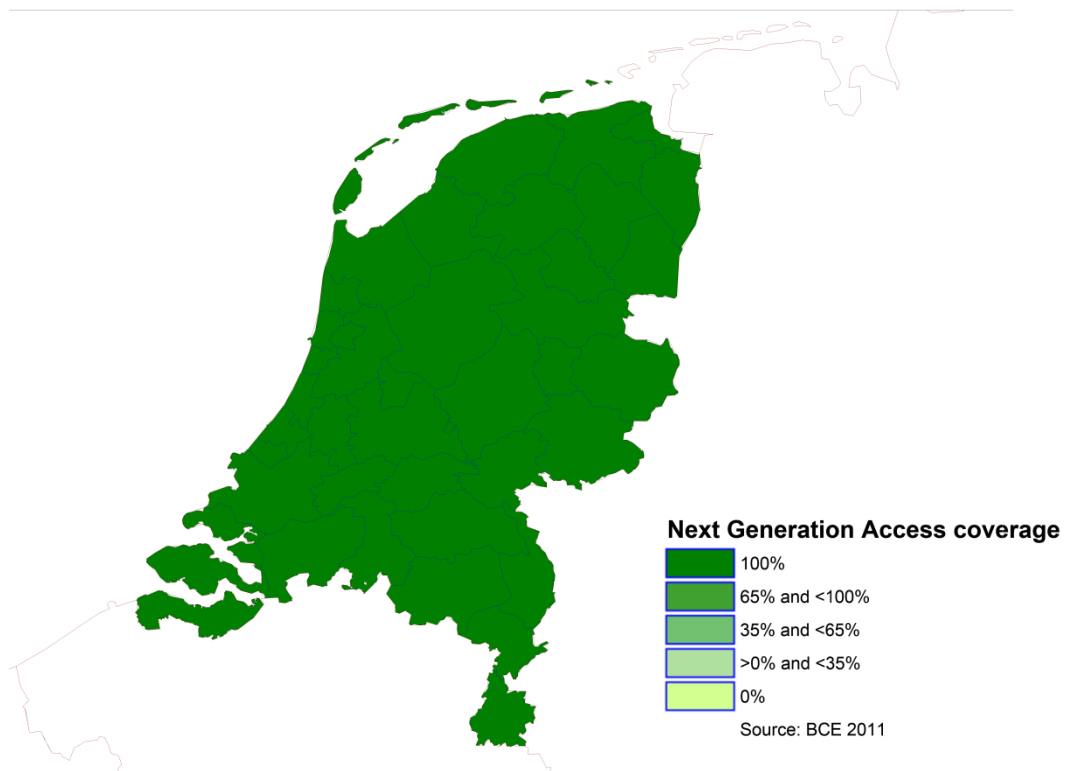## 3.20.2 Regional coverage by technology combinations

Map 3.20.01.Netherlands Standard broadband coverage

Standard broadband coverage
- 100%
- 95% and <100%
- 90% and <95%
- 75% and <90%
- 0 and <75%

Source: BCE 2011

Map 3.20.02.Netherlands Next Generation Access coverage

Next Generation Access coverage
- 100%
- 65% and <100%
- 35% and <65%
- >0% and <35%
- 0%

Source: BCE 2011

The Netherlands enjoys 100% standard and NGA broadband coverage throughout the whole country.

3.20.3 Data tables for Netherlands

Demographics

Statistic	National
Population	16,405,399
Persons per household	2.2
Rural proportion	2.0%

Coverage by technology

Technology	Total	Rural
DSL	100.0%	100.0%
VDSL	100.0%	100.0%
FTTP	12.8%	0.0%
WiMAX	0.0%	0.0%
Standard cable	98.5%	98.5%
Docsis 3 cable	98.5%	98.5%
HSPA	99.0%	99.0%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	100.0%	100.0%
NGA Combination	100.0%	100.0%

3.21 Norway

3.21.1 National coverage by broadband technology

Norway: coverage by technology combinations
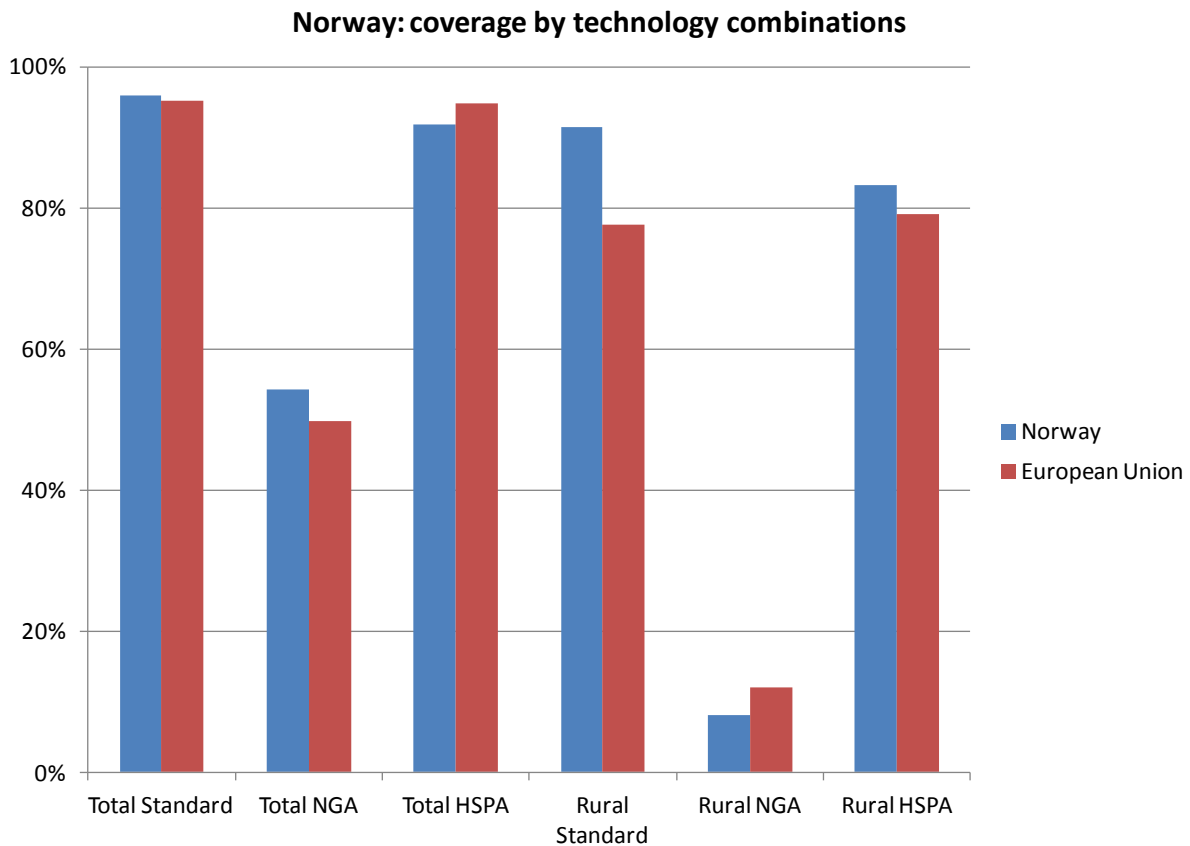
Norway has the most challenging geography of all the study countries as far as delivering broadband services is concerned. Besides a difficult terrain, it has the highest rural population, 48%, and one of the lowest population densities, at 16 persons per square kilometre.

On the other hand, Norway is now a rich country and it has used its wealth and commitment to modernisation to create a broadband infrastructure which compares well with the rest of Europe. It is ahead of the European averages on all the combination measures except for Total HSPA coverage (92% against the 95% average) and Rural NGA (8% against 12%) both of which reflect the geographical difficulties.

The technology profile shows that Norway is ahead of the averages on them all except for WiMAX and HSPA. DSL and cable network coverage are both above average. WiMAX networks cover a relatively small percentage (10%) for such a rural country but are focused on particularly difficult areas. All three NGA technologies show well above average coverage. LTE was already on 26% coverage by end-2011.

The difficulty comes in extending this level of coverage to rural areas. Rural DSL at 87% is well above the average of 73% and HSPA is above average as well. Even so, maybe 2% of Norwegian homes do not have broadband service from any of the terrestrial technologies, although KA-band satellite is available.

Broadband Coverage in Europe 2011
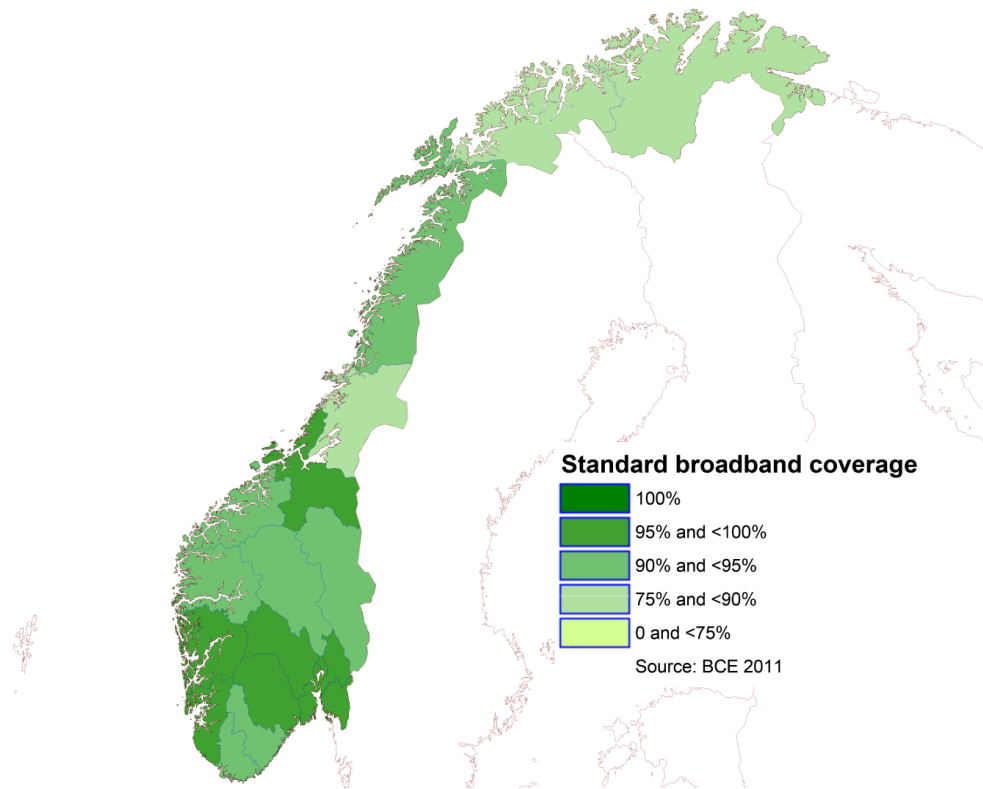
Norway: total coverage by technology
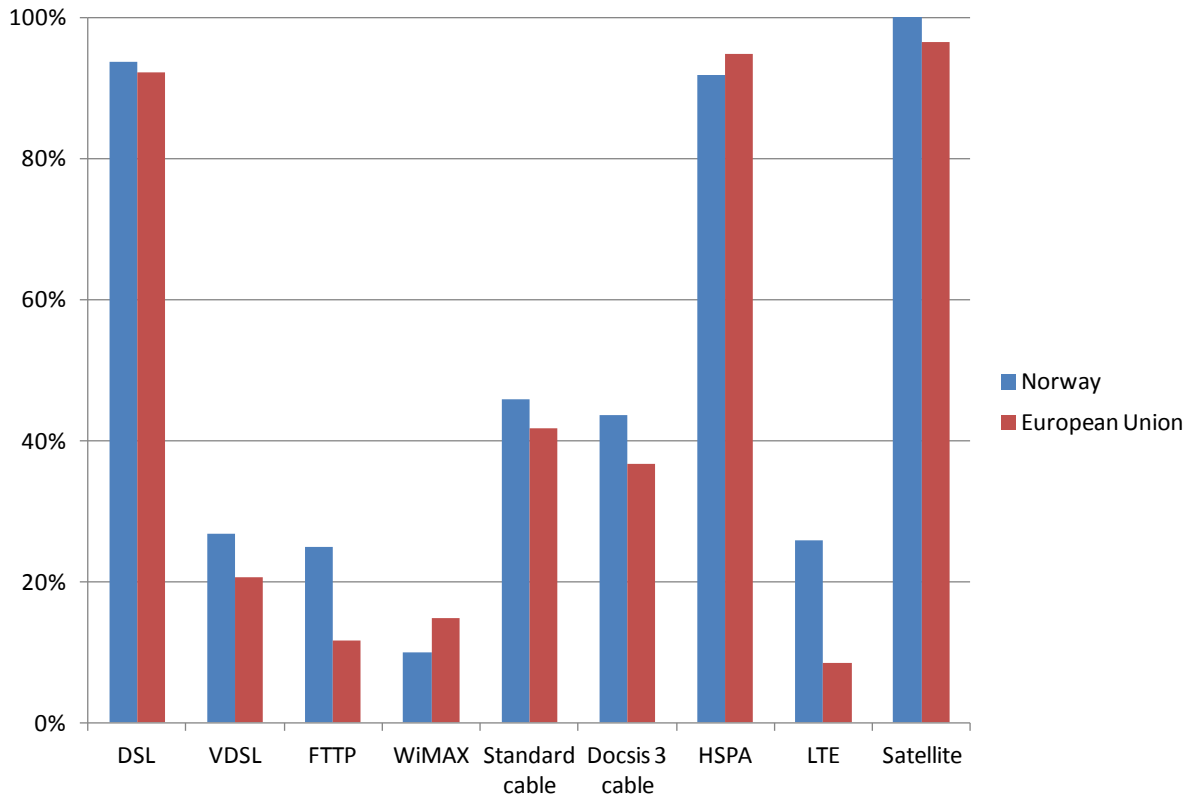
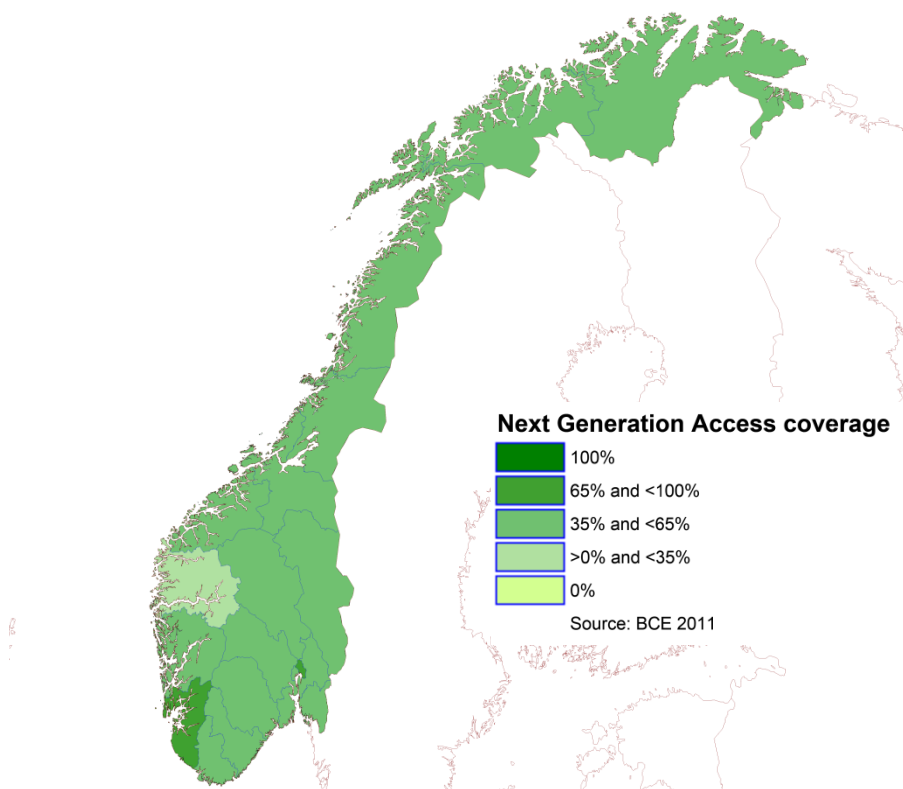## Norway: rural coverage by technology
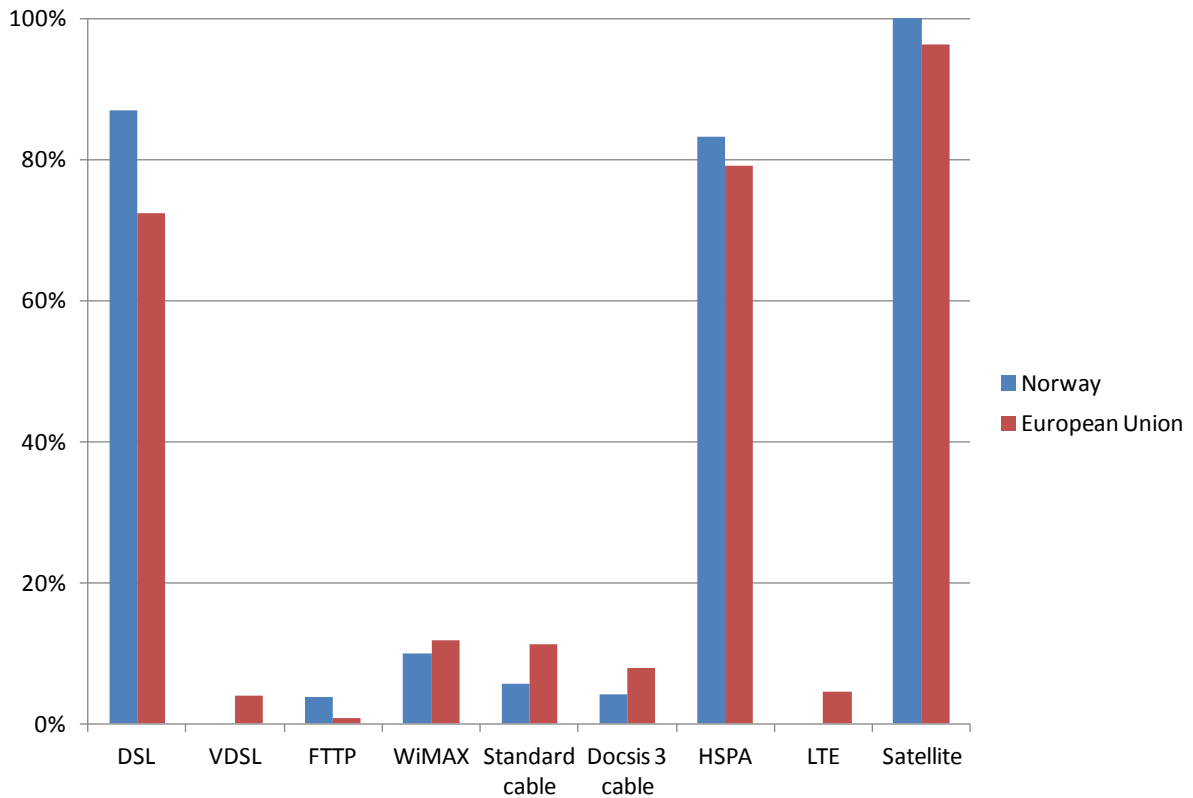
3.21.2 Regional coverage by technology combinations

Map 3.21.01.Norway Standard broadband coverage

Standard broadband coverage

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

Source: BCE 2011

Map 3.21.02.Norway Next Generation Access coverage

Next Generation Access coverage

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

Source: BCE 2011

Broadband Coverage in Europe 2011

Norway has good standard broadband coverage in the more urban provinces – even though some of these are quite rural by general European standards. Oslo has over 99% while its neighbourhood and the areas around the biggest cities (Bergen, Stavanger, Skien, Trondheim) are all over 96%. At the other end of the country, even the most northerly province has 86% coverage.

NGA coverage peaks at 92% in Oslo and the next highest, the Stavanger area, is some way behind at 67%. Otherwise coverage is quite evenly spread across the country, with at least 43% NGA availability in almost every province. Only two provinces have less than 40% NGA and they are both in central Norway rather than the far north as might be expected.

## 3.21.3 Data tables for Norway

Demographics

Statistic	National
Population	4,737,171
Persons per household	2.1
Rural proportion	48.3%

Coverage by technology

Technology	Total	Rural
DSL	93.7%	86.9%
VDSL	26.8%	0.0%
FTTP	24.9%	3.8%
WiMAX	10.0%	10.0%
Standard cable	45.9%	5.6%
Docsis 3 cable	43.7%	4.2%
HSPA	91.9%	83.2%
LTE	25.9%	0.0%
Satellite	100.0%	100.0%
Standard Combination	95.9%	91.4%
NGA Combination	54.2%	8.0%

3.22 Poland

3.22.1 National coverage by broadband technology

Poland: coverage by technology combinations
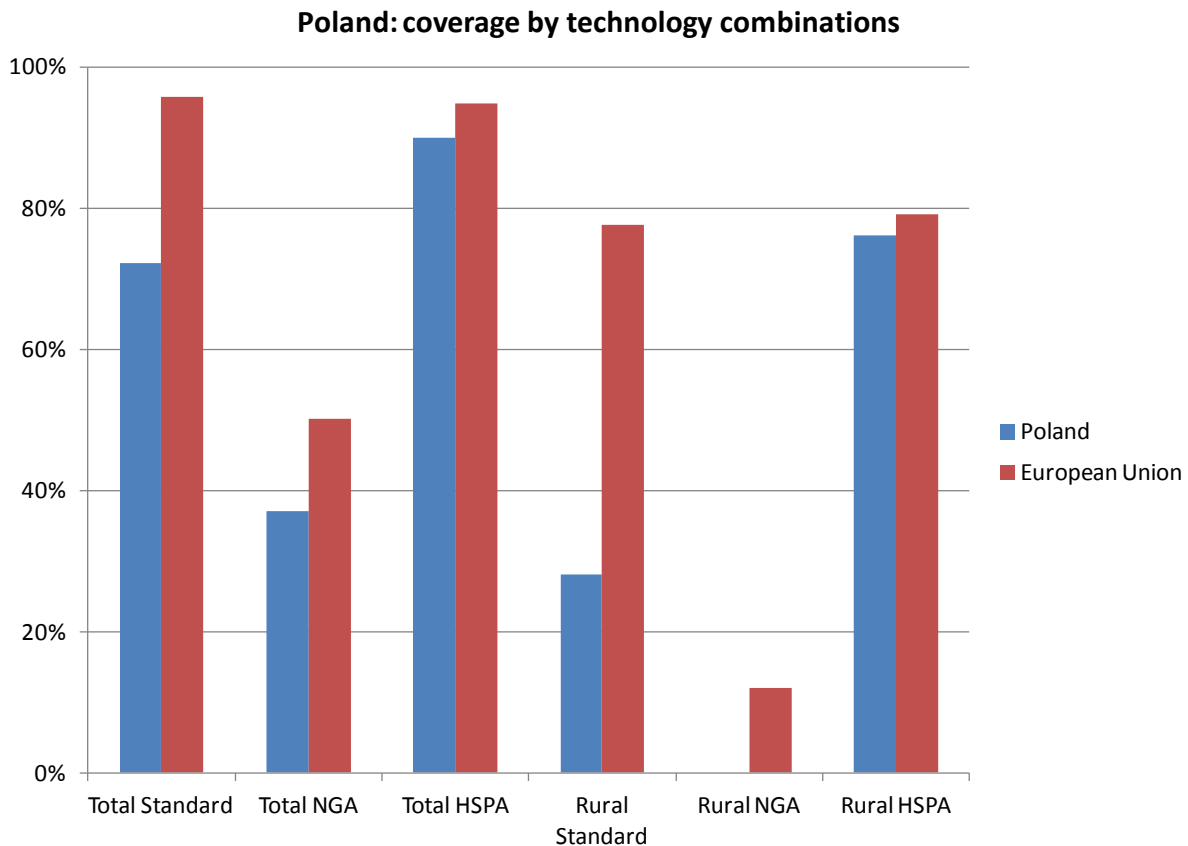
Poland is one of the most rural countries in the study, with 39% of the population living in communities with less than 100 persons per square kilometre. This together with its size, variety and economic history means that the country faces a major challenge in creating its broadband infrastructure.

At present Poland is behind the European averages on all the technology combination measures. The study found the lowest values for Total and Rural Standard Coverage of all the study countries, at 72% and 28% respectively. On the other hand, Total NGA Coverage compares well with some of the biggest European countries, as does mobile broadband taking HSPA and LTE together.

Poland is bringing all the NGA technologies into play to leapfrog the shortfall in standard coverage. The cable networks cover one-third of the country and are over 90% upgraded to Docsis 3. VDSL rollout is starting to become significant although FTTP is still at an early stage. Poland is also one of the Eastern European leaders in creating an LTE network, here estimated to cover 25% of the population.

Little of this investment has spread over into rural areas as yet. DSL coverage is very low and although there is some WiMAX its availability is limited. A high proportion of rural homes in Poland do not have a terrestrial broadband service available, although there is KA-band coverage by satellite.
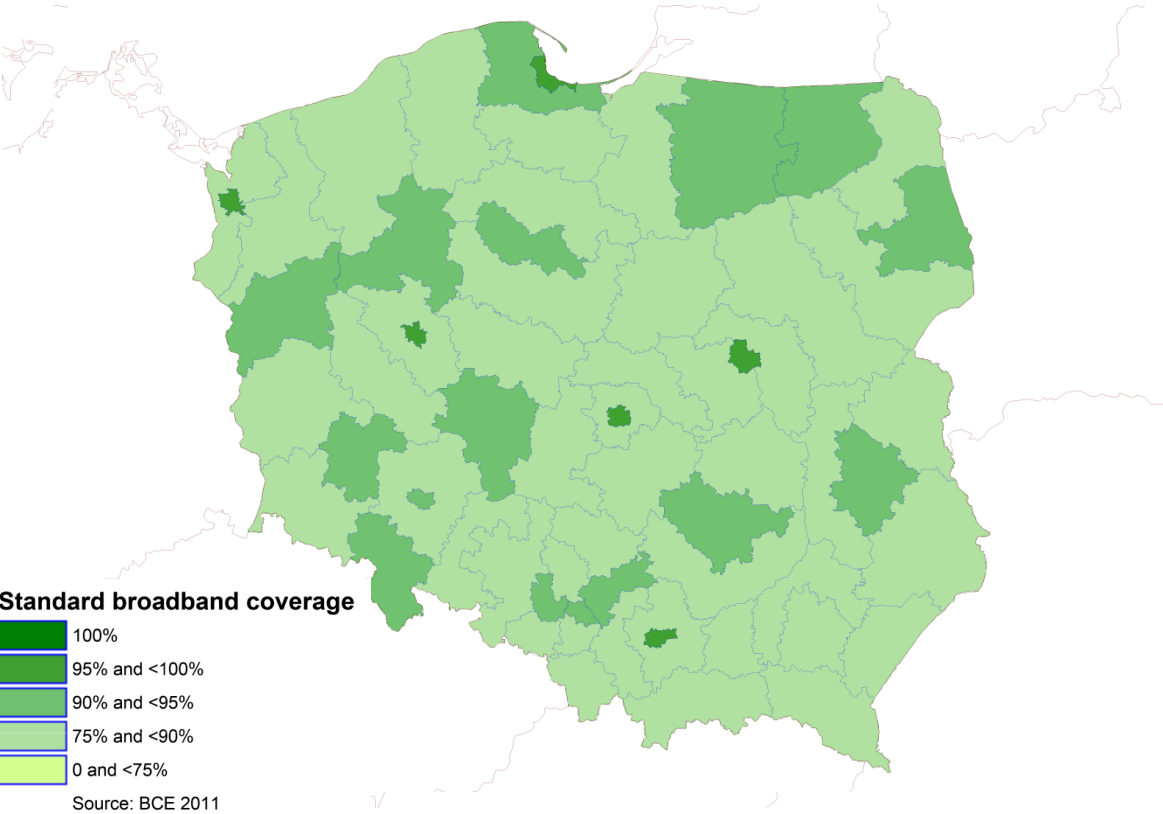
Poland: total coverage by technology
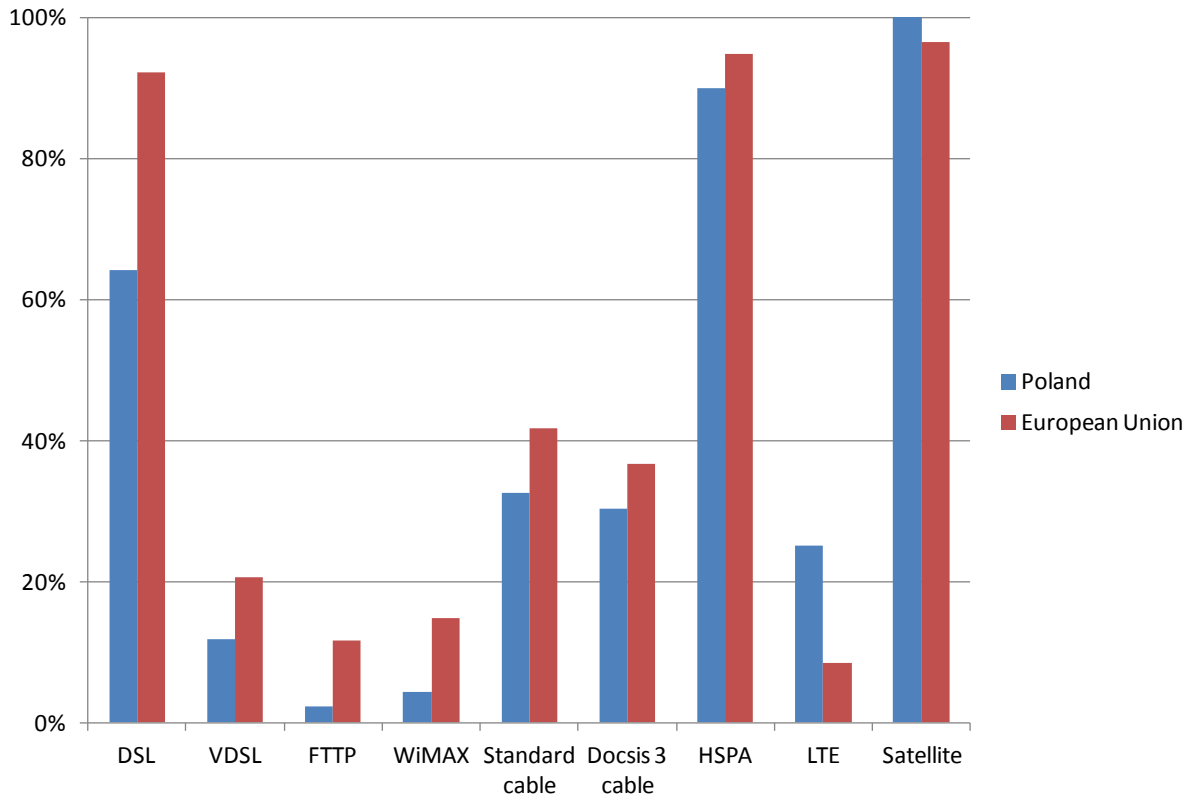
Poland: rural coverage by technology
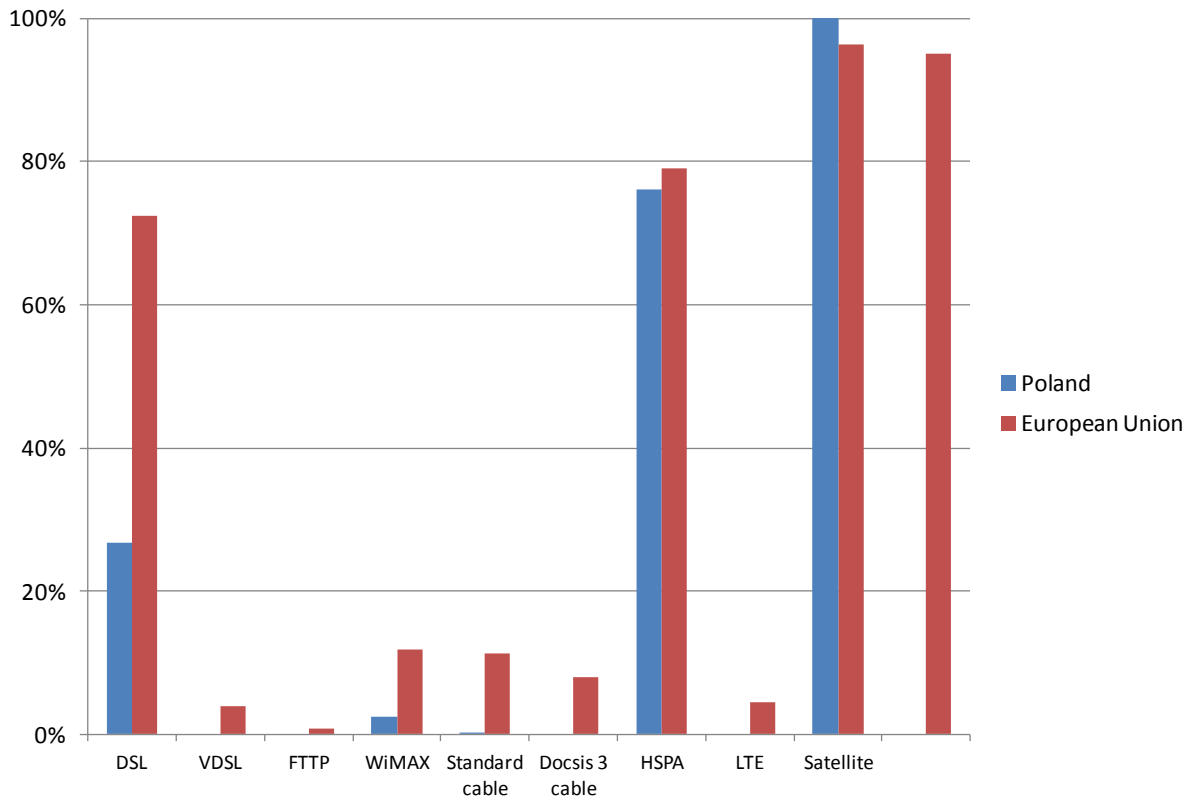
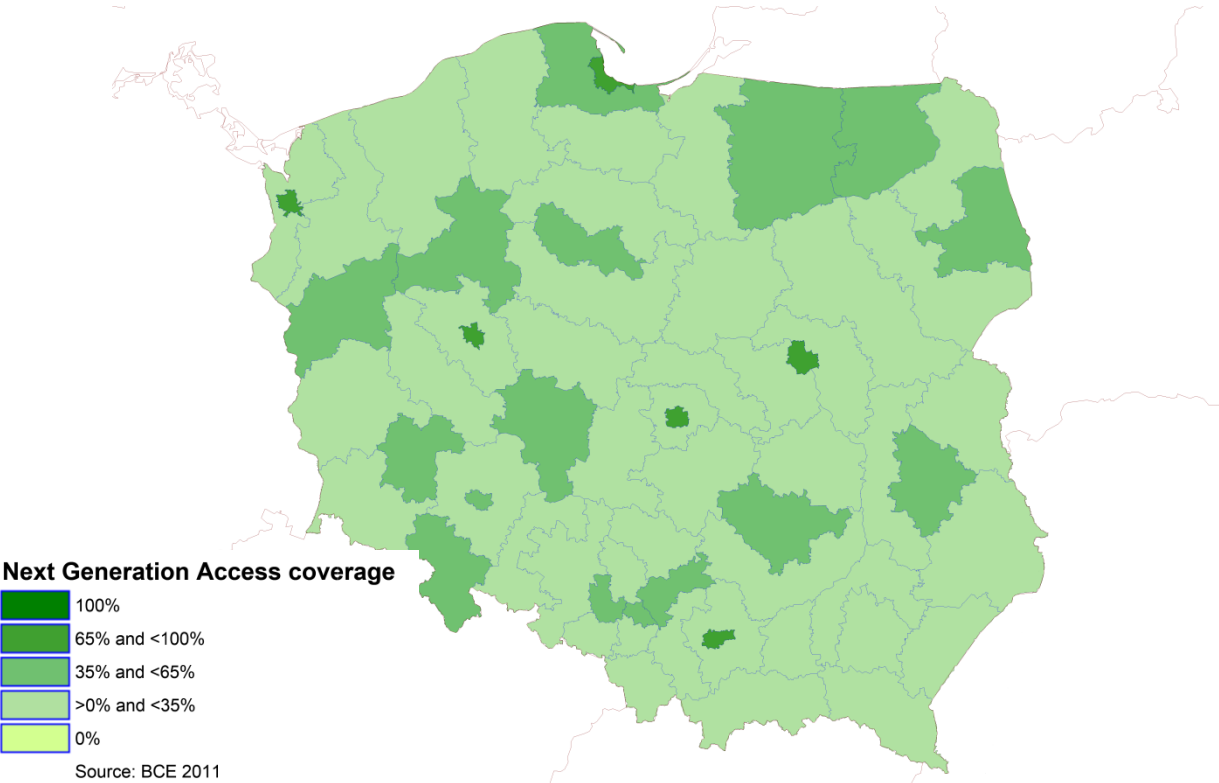## 3.22.2 Regional coverage by technology combinations

Map 3.22.01.Poland Standard broadband coverage

Standard broadband coverage

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

Source: BCE 2011

Map 3.22.02.Poland Next Generation Access coverage

Next Generation Access coverage

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

Source: BCE 2011

Standard broadband coverage in Poland varies hugely. The capital and some of the big cities and their regions (Warsaw, Poznan, Gdansk) enjoy 100%. Other cities and their surrounding regions, particularly in the south and west, range down to 77%. But large areas of rural Poland, 42 of the country's 66 NUTS 3 areas, have less than 75% coverage, ranging down to less than 45% in the south-east and the north-east.

To some extent NGA coverage offsets this pattern. It is also highest in the big cities, specifically Warsaw and Gdansk with 97% coverage, and Poznan, Szczezin, Lodz and Krakow all with over 75%. But 16 more rural NUTS 3 areas, including some in the north and east, have NGA coverage between 35% and 60%. All the remaining 44 provinces have some NGA availability, ranging down to as low as 9%.

3.22.3 Data tables for Poland

Demographics

Statistic	National
Population	38,115,641
Persons per household	2.8
Rural proportion	38.7%

Coverage by technology

Technology	Total	Rural
DSL	64.2%	26.7%
VDSL	11.7%	0.0%
FTTP	2.2%	0.0%
WiMAX	4.4%	2.5%
Standard cable	32.6%	0.2%
Docsis 3 cable	30.3%	0.0%
HSPA	90.0%	76.2%
LTE	25.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	72.2%	28.1%
NGA Combination	37.1%	0.0%

3.23 Portugal

3.23.1 National coverage by broadband technology

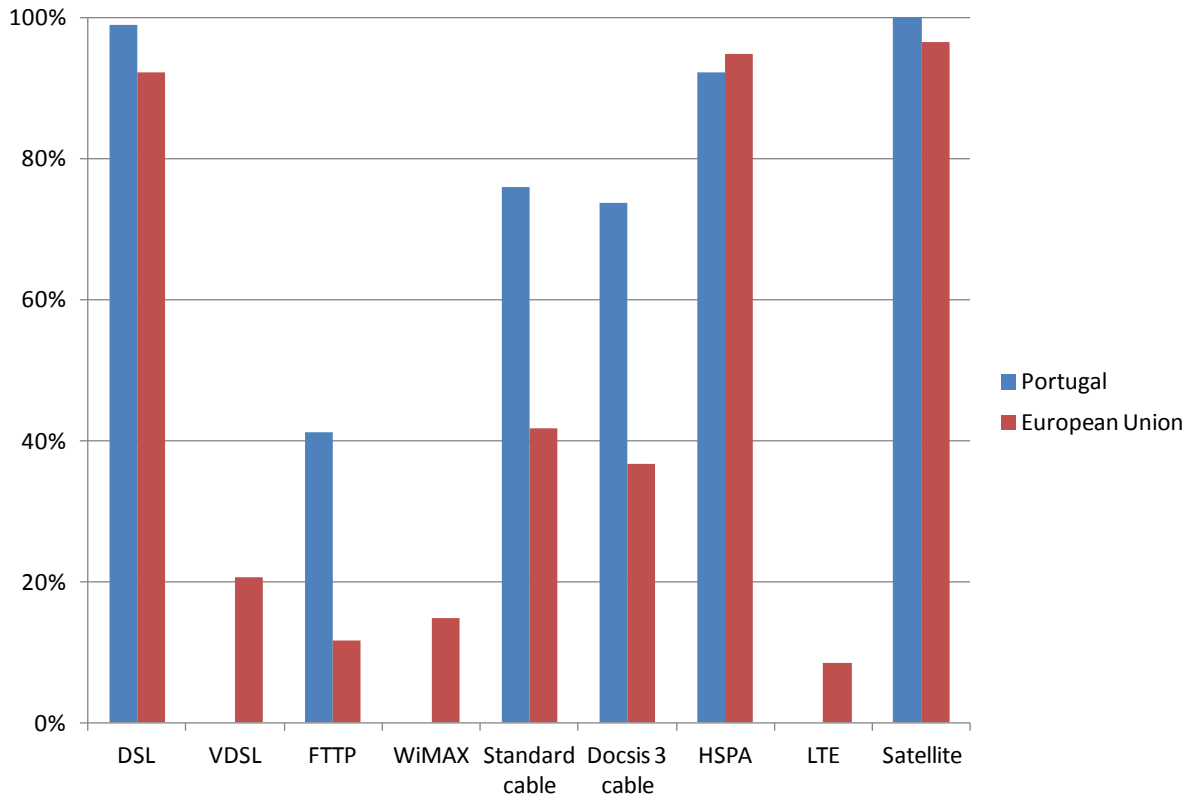**Portugal: coverage by technology combinations**
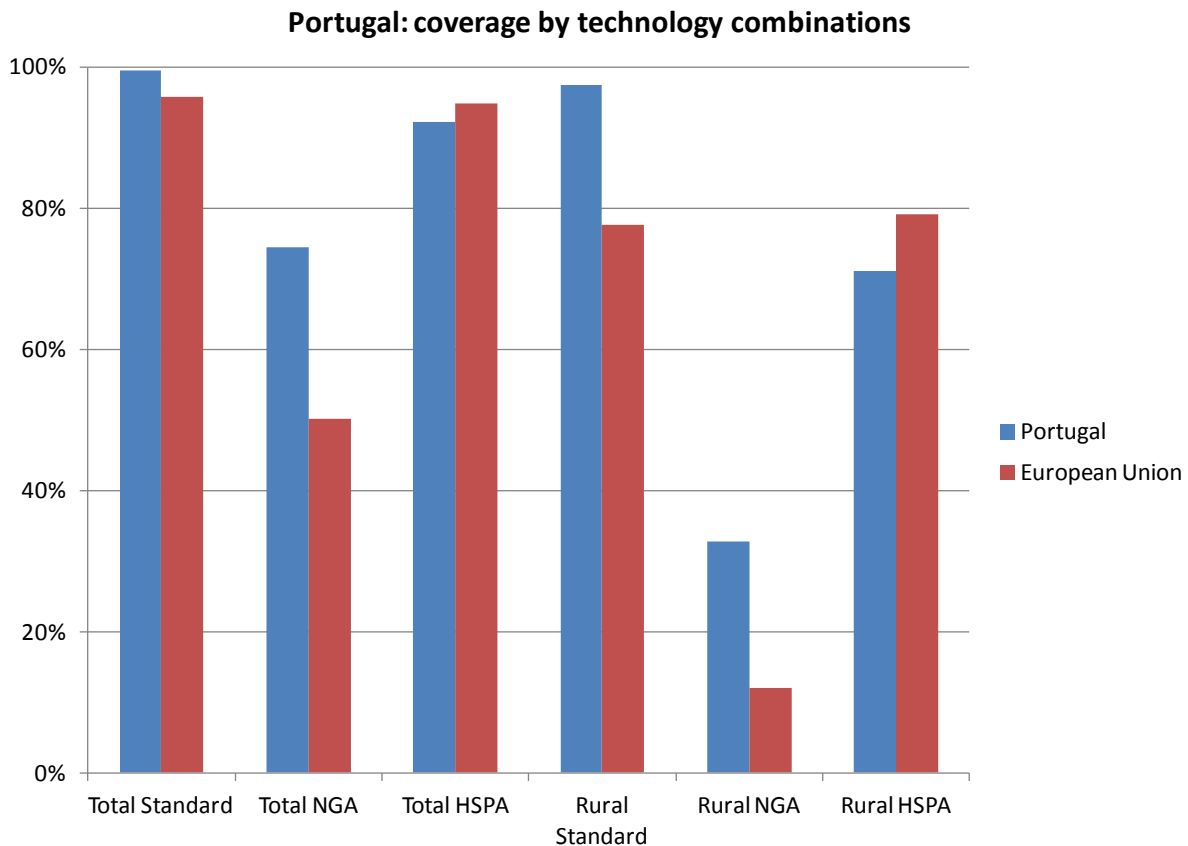
Portugal has made major investments in broadband coverage, particularly for next generation access. As a result, despite being a relatively poor country, it is well ahead of the European averages for the coverage of fixed line standard and NGA services. For example it has the fifth highest Total NGA Coverage of any of the study countries, 74.5%, and the third highest rural figure at 33%.

Total DSL coverage is quoted at 99%, using the definition of coverage as "being within the service area of a DSL-enabled exchange". But the Portuguese exchange network is quite thinly spread in rural areas so a performance-based definition would probably reduce the coverage figure significantly. On the other hand, Portugal has an extensive cable network with the fourth-highest Docsis 3 coverage in the study countries, at 74%. This is now backed up with the fifth biggest FTTP network with 41% coverage. But VDSL is not being pursued in view of the priority being given to FTTP and a plan to launch a WiMAX network does not appear to have come to fruition.
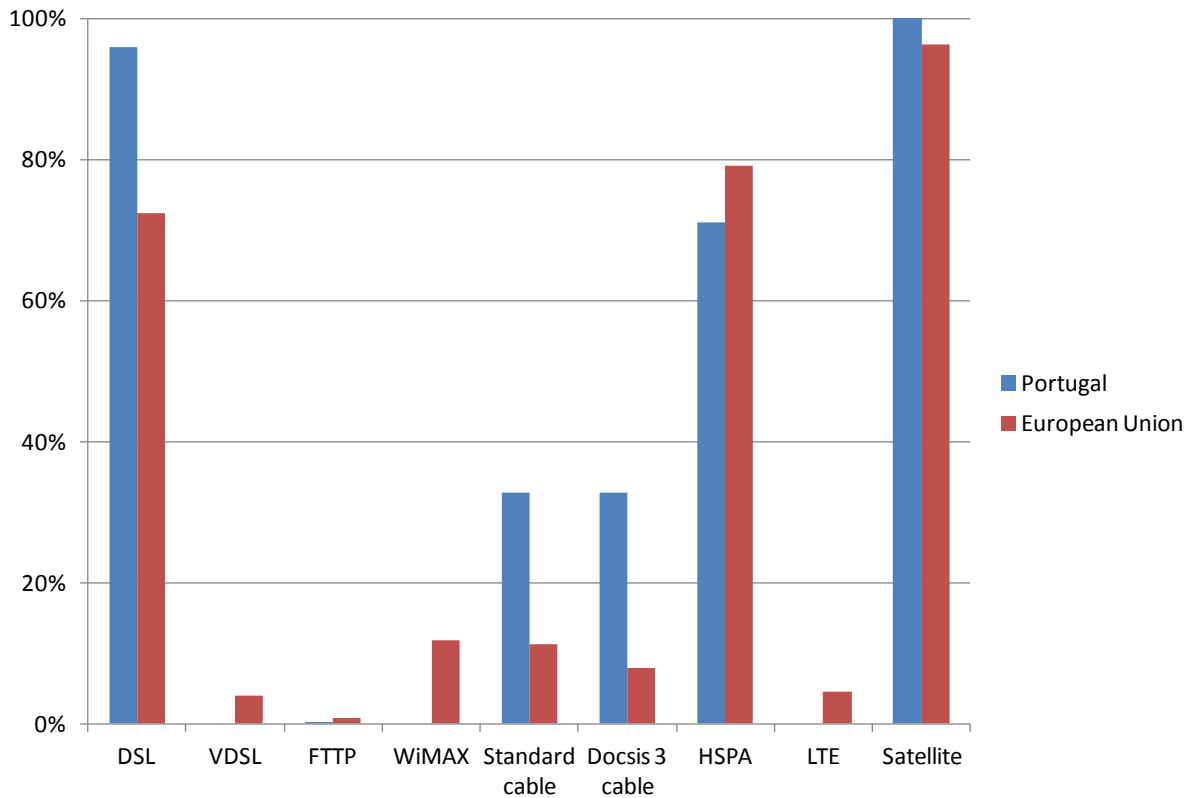
Besides basic DSL and HSPA, rural areas benefit from the wide coverage of Docsis 3 cable, which accounts for all the rural NGA coverage so far.

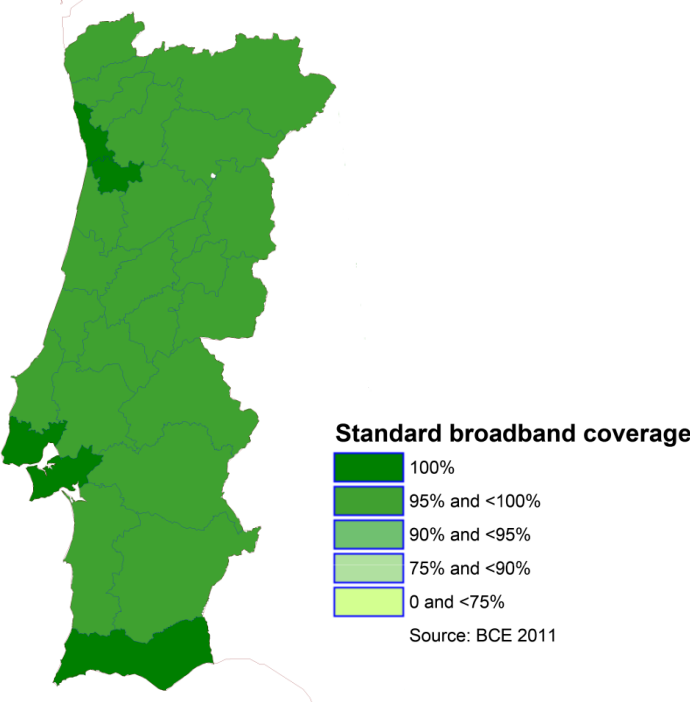## Portugal: total coverage by technology

Portugal: rural coverage by technology

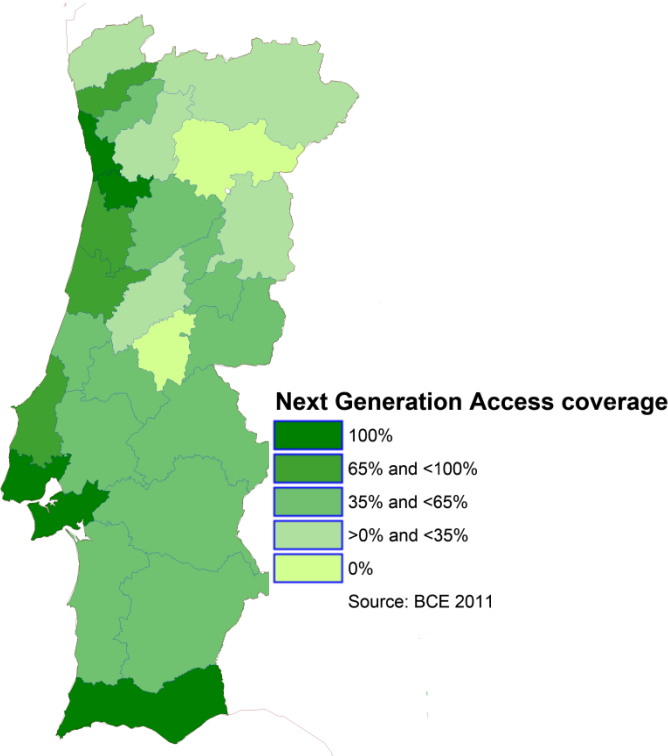## 3.23.2 Regional coverage by technology combinations[6]

Map 3.23.01.Portugal Standard broadband coverage

Standard broadband coverage
- 100%
- 95% and <100%
- 90% and <95%
- 75% and <90%
- 0 and <75%

Source: BCE 2011

Map 3.23.02.Portugal Next Generation Access coverage

Next Generation Access coverage
- 100%
- 65% and <100%
- 35% and <65%
- >0% and <35%
- 0%

Source: BCE 2011

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[6] The maps in this section do not show the NUTS 3 areas which are outside mainland Europe. The data for these areas is provided as a separate table at the end of this section.

Broadband Coverage in Europe 2011

Portugal has 99% standard broadband coverage across all its NUTS 3 areas, with Lisbon and Oporto and their surrounding areas, and the southern province of the Algarve all enjoying 100%.

The coverage of NGA is more varied. The same five provinces have 100% NGA as well as 100% standard coverage. Three coastal provinces, and also the overseas regions of Madeira and the Azores have 95% down to 81% NGA coverage. Thirteen others have 71% down to 36%. Three more in the north and east have between 27% and 20%. Of the four with less than 10%, including two with 0%, three are on Portugal's northern and -eastern borders, while one is in the centre of the country.

Coverage of Portuguese NUTS 3 areas outside mainland Europe

Country	NUTS code	NUTS area name	Standard coverage	NGA coverage
Portugal	PT200	Açores	99.3%	95.0%
Portugal	PT300	Madeira	99.5%	83.5%

3.23.3 Data tables for Portugal

Demographics

Statistic	National
Population	10,617,575
Persons per household	2.7
Rural proportion	18.3%

Coverage by technology

Technology	Total	Rural
DSL	99.0%	95.9%
VDSL	0.0%	0.0%
FTTP	41.2%	0.0%
WiMAX	0.0%	0.0%
Standard cable	75.9%	32.8%
Docsis 3 cable	73.7%	32.8%
HSPA	92.2%	71.1%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	99.5%	97.4%
NGA Combination	74.5%	32.8%

3.24 Romania

3.24.1 National coverage by broadband technology

Romania: coverage by technology combinations
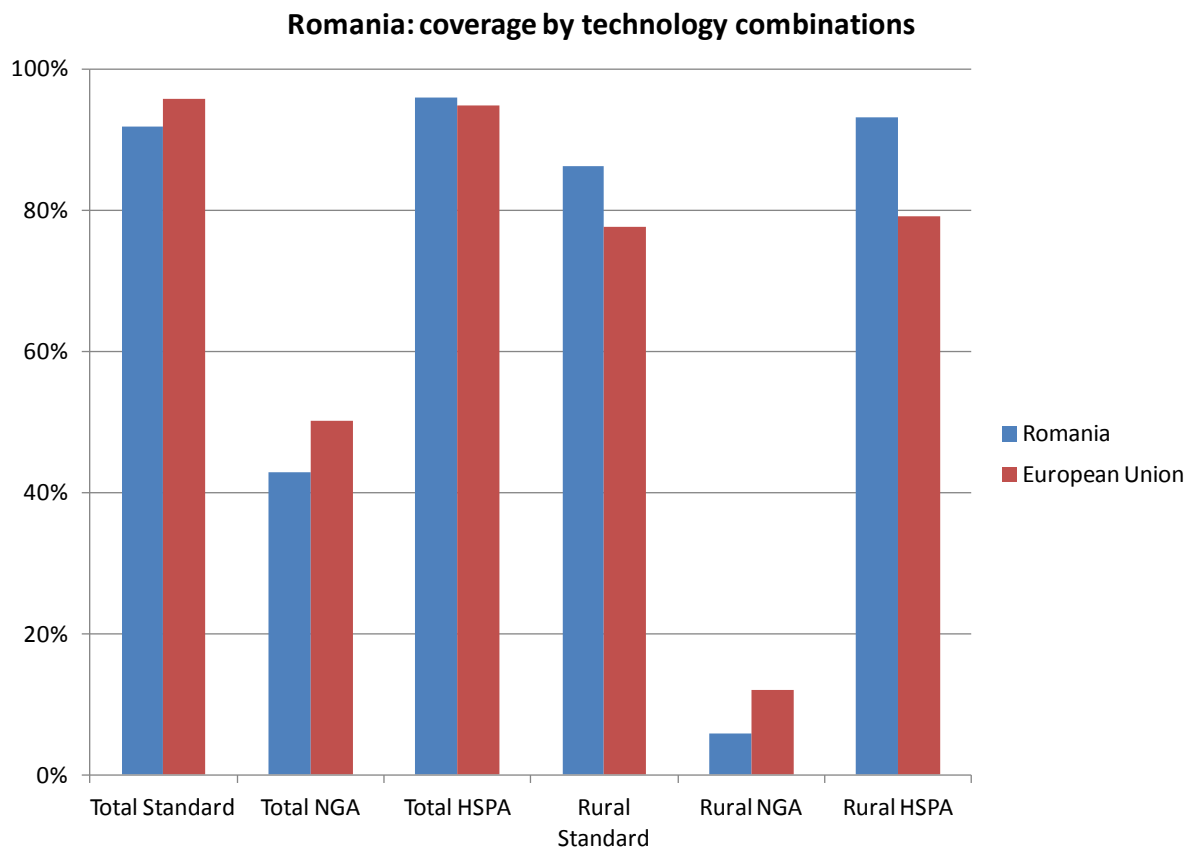
As one of the most rural countries in Europe (45%), with low population density, a difficult economic history and some rugged terrain, Romania faces major challenges in building a broadband infrastructure. Despite this, Romania's broadband profile compares well with other countries in Eastern Europe and is ahead of European averages on Standard and HSPA measures of rural coverage (86% and 93% respectively).

This has been achieved with a significantly different technology profile from the standard in most European countries. Rather than direct DSL, the dominant mode of fixed broadband provision is by distribution from nodes located in apartment blocks. Backhaul from the node is usually by fibre but sometimes by copper. Distribution within the block is most often by LAN, but also by VDSL or coaxial cable.

Reflecting this, the broadband data available for Romania is segmented in a different way from other countries. To accommodate it within the framework of the project we used two different technology categories which provide services equivalent in performance to DSL and VDSL. These are identified for convenience as DSL* and VDSL* but they are different technologically from DSL and VDSL.

DSL* is defined as including a variety of solutions, typically involving shared backhaul from LAN or coaxial cable distribution within apartment blocks, which provide download speeds of under 30Mbps. VDSL* represents solutions offering 30Mbps and above, either by VDSL direct to the end-user or FTTB backhaul from in-building VDSL distribution
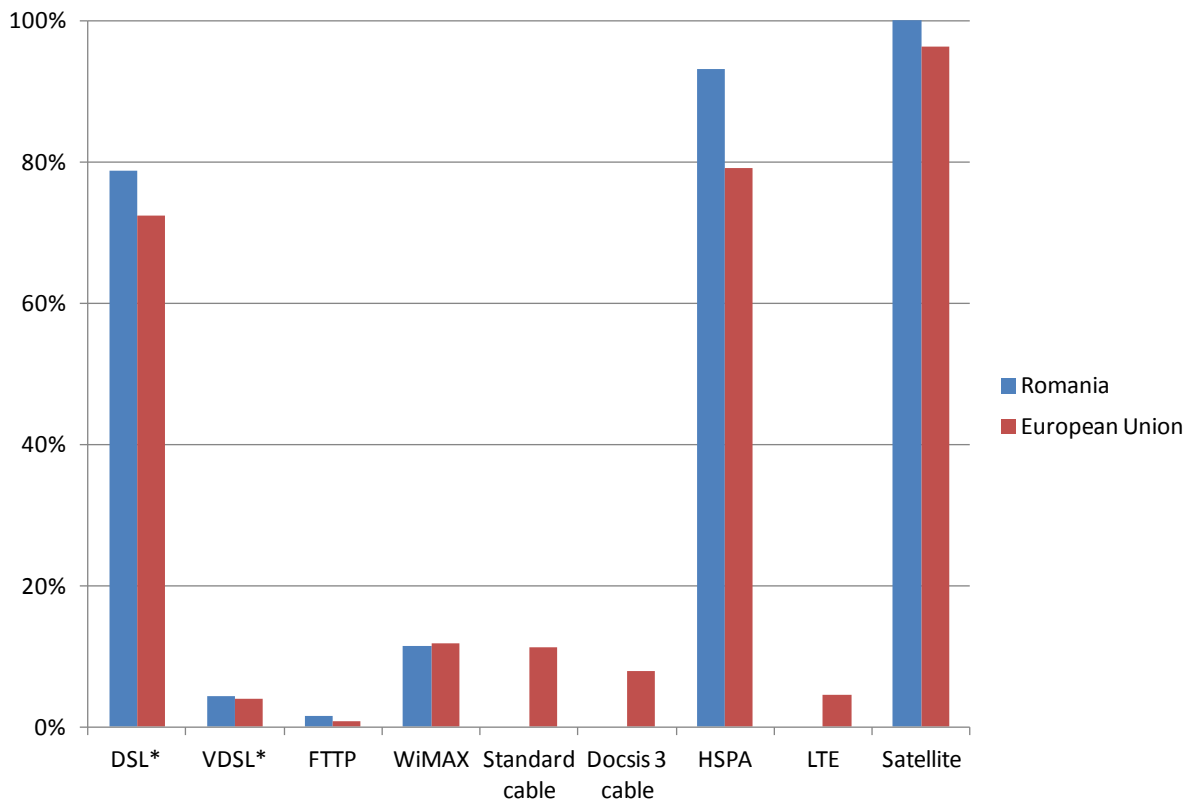
networks. And whereas the numbers for DSL include VDSL, where it is available, DSL* does not include VDSL*, and the two networks are assumed to be complementary rather than overlapping.

Romania: total coverage by technology
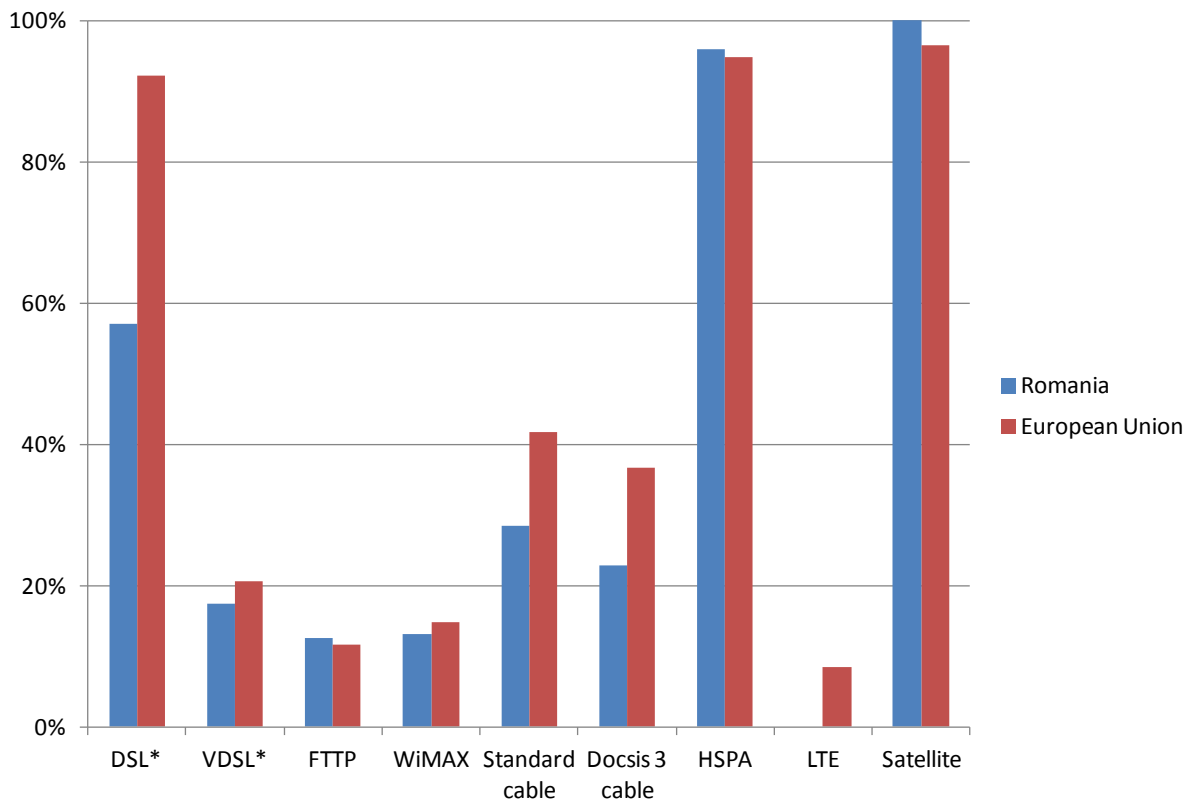
**Romania: rural coverage by technology**

See text for definitions of DSL and VDSL*

The technology and rural profiles above use these definitions. They show that Romania has a good spread of technologies within this framework with significant contributions from all the NGA technologies. As in some other Eastern European countries, DSL*, VDSL* and FTTP tend to be complementary rather than overlapping so that Total Standard Coverage and NGA Coverage are both higher than might be expected on initial inspection. HSPA coverage is good but LTE has not yet arrived.

At the rural level the pattern is rather different. While 75% of urban Romanians live in apartment blocks, 95% of villagers live in single family houses. In this case DSL* (which includes other solutions providing download speeds of less than 25Mbps) is the predominant broadband medium and delivers higher than average Rural Standard Coverage. In fact, the solutions grouped together as DSL* show higher coverage in rural areas than in total. This is because DSL* is often the only option in rural areas, while VDSL* and FTTP are uncompetitive where there are no apartment blocks. The cable networks also have little or no coverage in rural areas.

## 3.24.2 Regional coverage by technology combinations

Map 3.24.01.Romania Standard broadband coverage
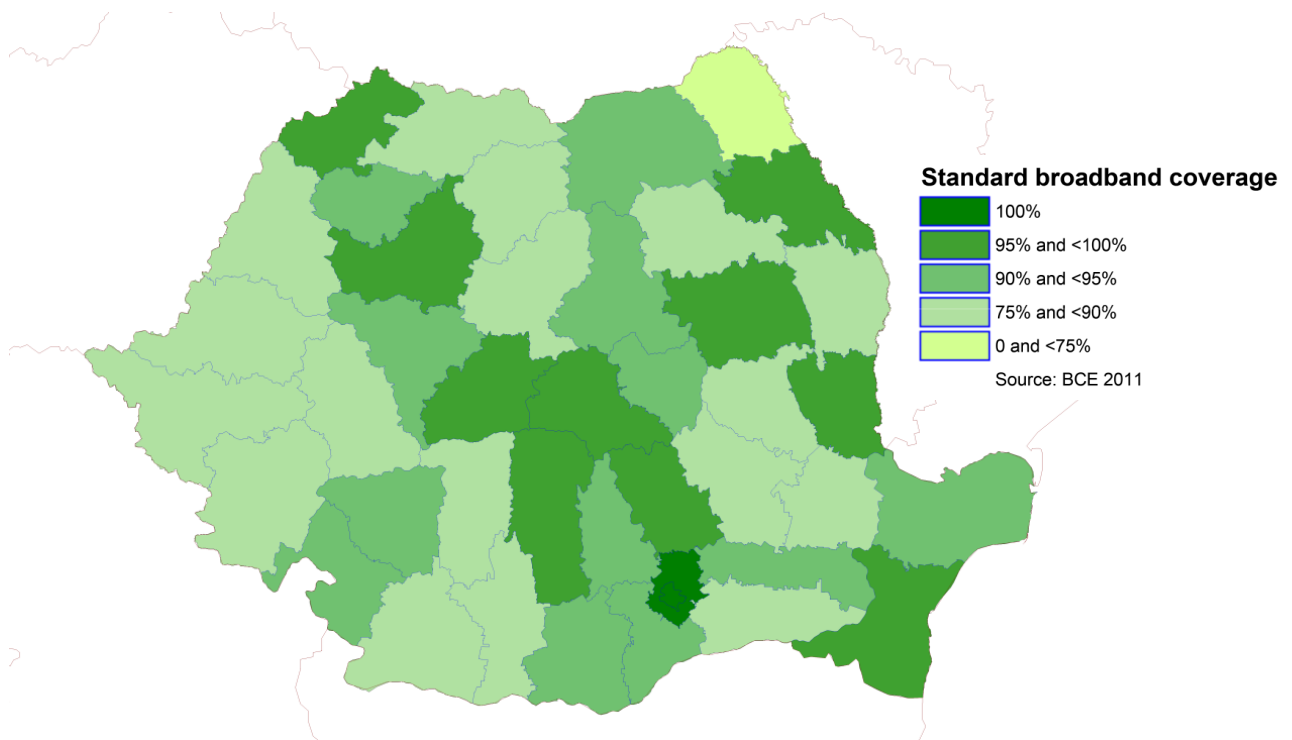
Only Bucharest and its region enjoys 100% standard broadband coverage in Romania, otherwise coverage ranges down from 99% to 84% for most areas. Two provinces, the most western and the most north-eastern have less than this, with 75% and 74% respectively.

As far as NGA is concerned, Bucharest is more clearly ahead of the rest of the country with 82% coverage while no other area has better than 60%. The more urban provinces mostly have between 60% and 35% while most of the rest of the country has between 30% and 20%. The exception is the far north-eastern province, Botosani, with only 9%.

Map 3.24.02.Romania Next Generation Access coverage
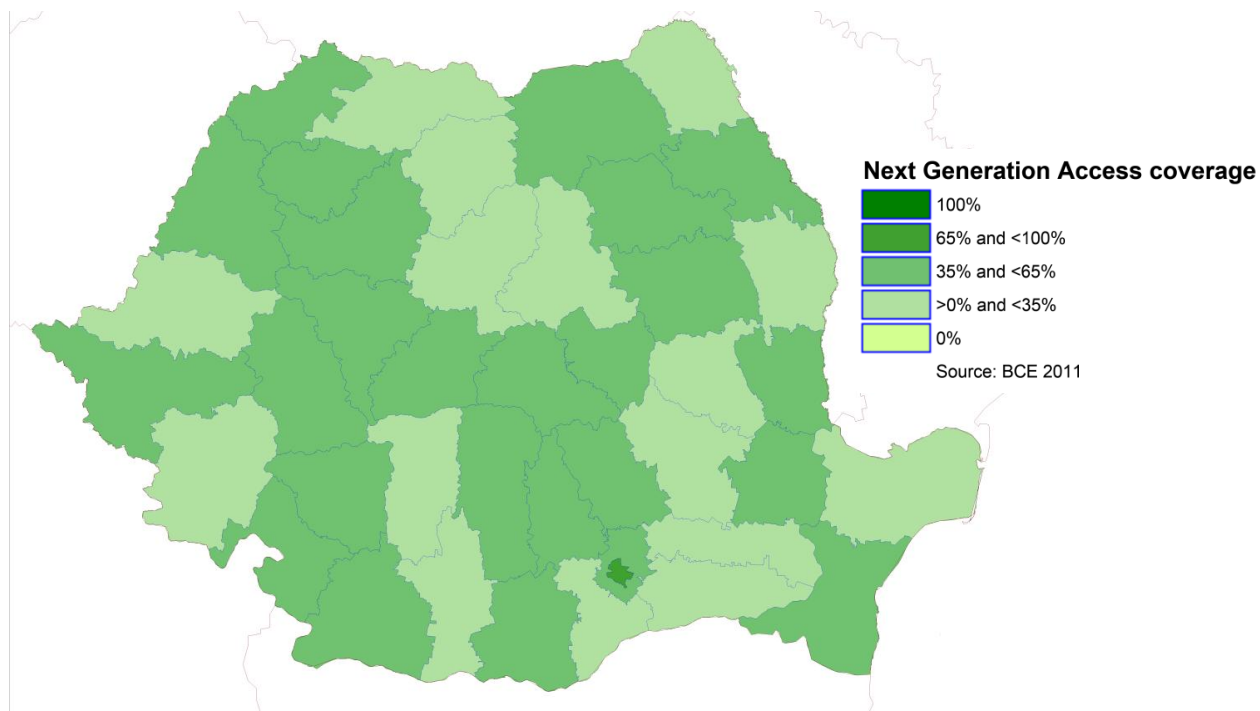
3.24.3 Data tables for Romania

Demographics

Statistic	National
Population	21,528,627
Persons per household	2.9
Rural proportion	44.8%

Coverage by technology

Technology	Total	Rural
DSL*	57.0%	78.8%
VDSL*	17.4%	4.4%
FTTP	12.5%	1.5%
WiMAX	13.1%	11.4%
Standard cable	28.4%	0.0%
Docsis 3 cable	22.9%	0.0%
HSPA	95.9%	93.2%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	91.7%	86.3%
NGA Combination	42.9%	5.8%

For definitions of DSL and VDSL* see Section 3.24.1 and the Appendixes

3.25 Slovakia

3.25.1 National coverage by broadband technology
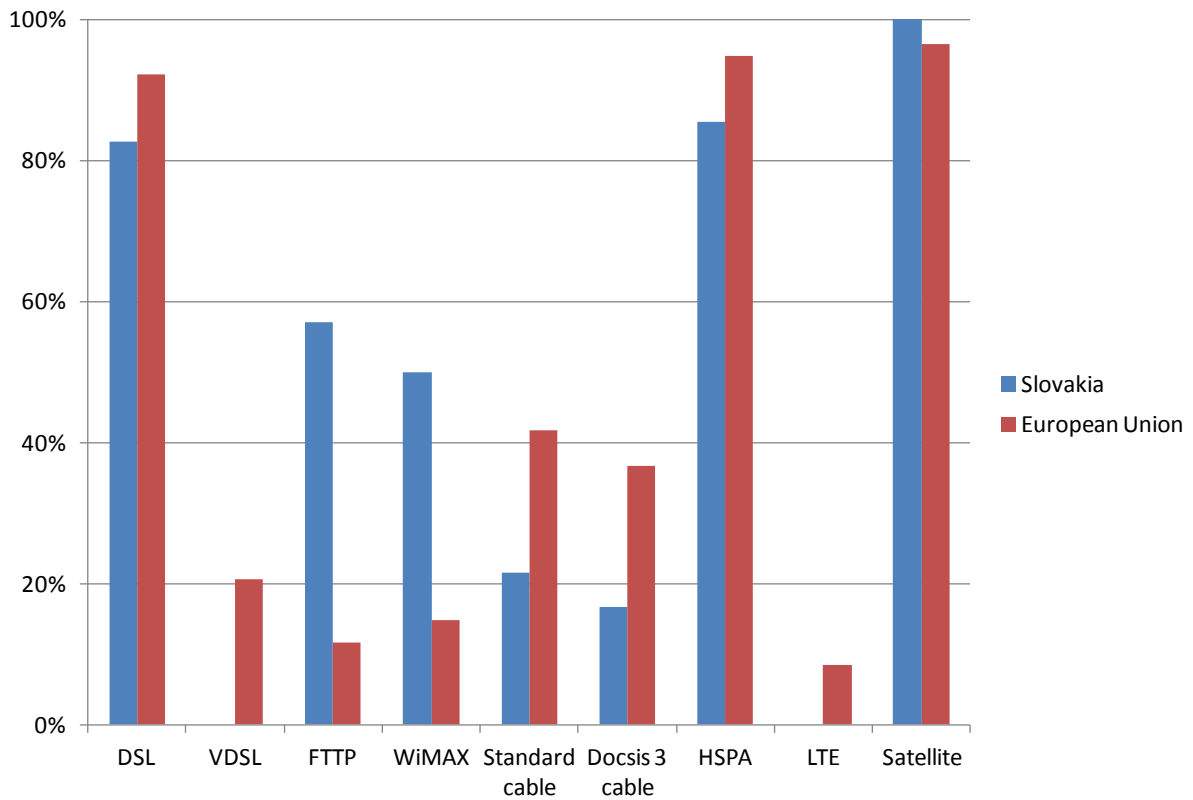
Slovakia: coverage by technology combinations
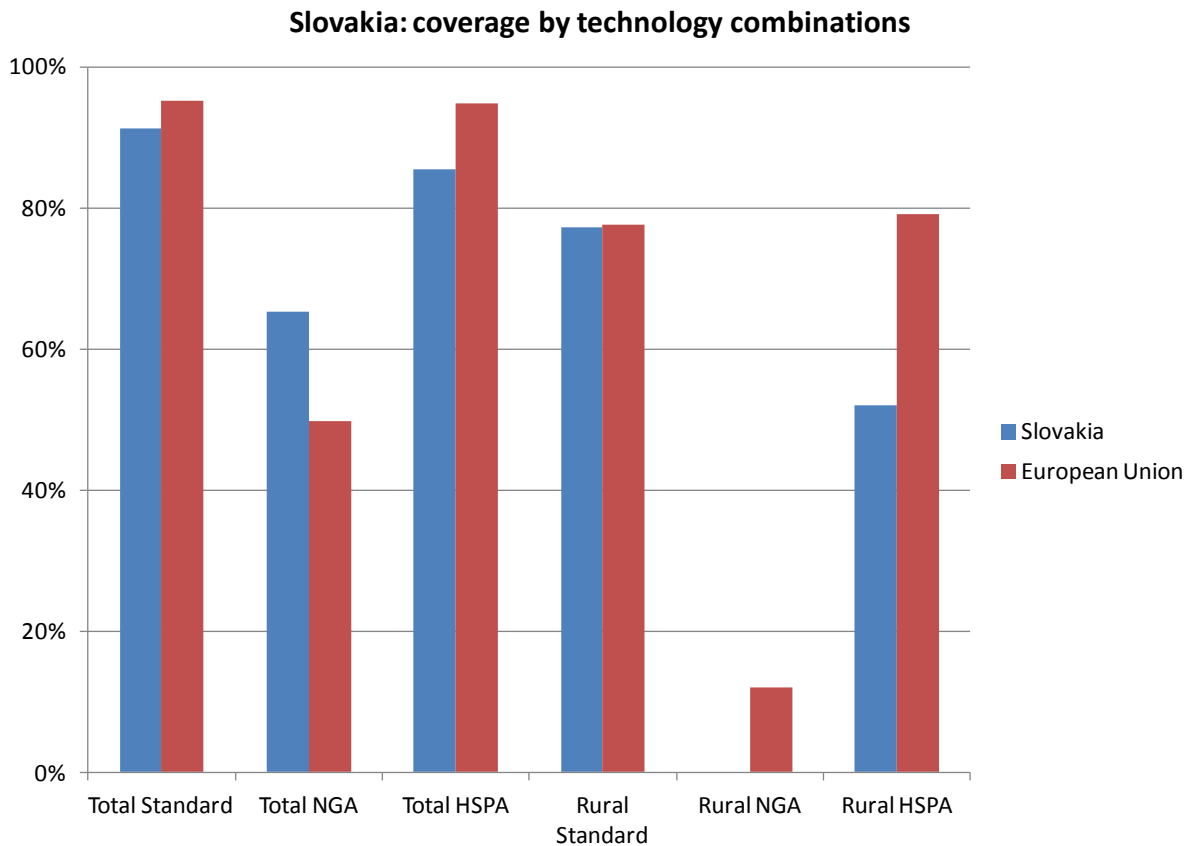
Slovakia reflects the same pattern as many of the more eastern countries included in the study Total standard coverage is below average at 91% but NGA coverage is in the top 10 at 65%. Rural standard coverage is up with the European average but NGA has yet to reach rural areas.

As the technology profile shows, the NGA coverage is largely provided by FTTP solutions, typically involving fibre backhaul from distribution nodes in large system-built apartment blocks. This provides 57% population coverage, the third highest in the study countries. Cable Docsis 3 also makes an NGA contribution but VDSL is not yet present.

In rural areas the pattern is very different. There are none of the apartment blocks which support the economics of FTTP, the cable networks do not extend to rural areas either and VDSL, which could offer an attractive option in some cases, is not yet developed. As a result, Slovakia is one of the seven study countries which have little or no NGA in rural areas.

Broadband Coverage in Europe 2011

Slovakia: total coverage by technology

Slovakia: rural coverage by technology
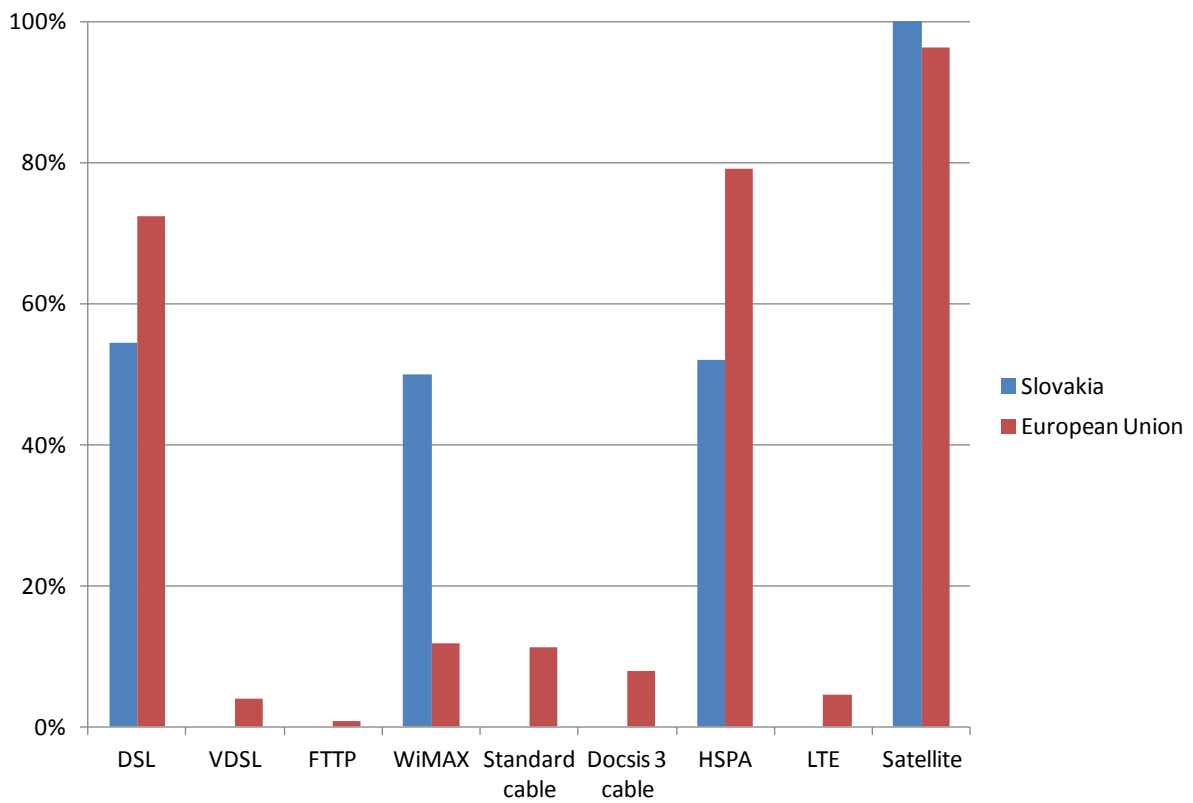
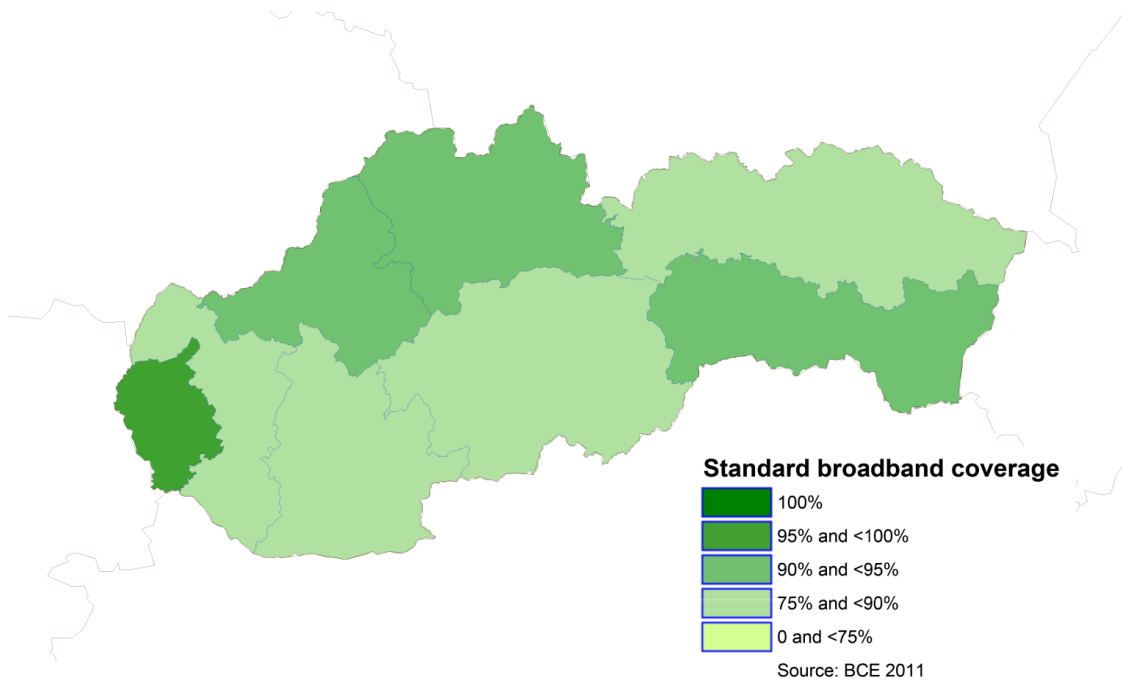## 3.25.2 Regional coverage by technology combinations

Map 3.25.01.Slovakia Standard broadband coverage

Standard broadband coverage
- 100%
- 95% and <100%
- 90% and <95%
- 75% and <90%
- 0 and <75%

Source: BCE 2011

Map 3.25.02.Slovakia Next Generation Access coverage

Next Generation Access coverage
- 100%
- 65% and <100%
- 35% and <65%
- >0% and <35%
- 0%

Source: BCE 2011
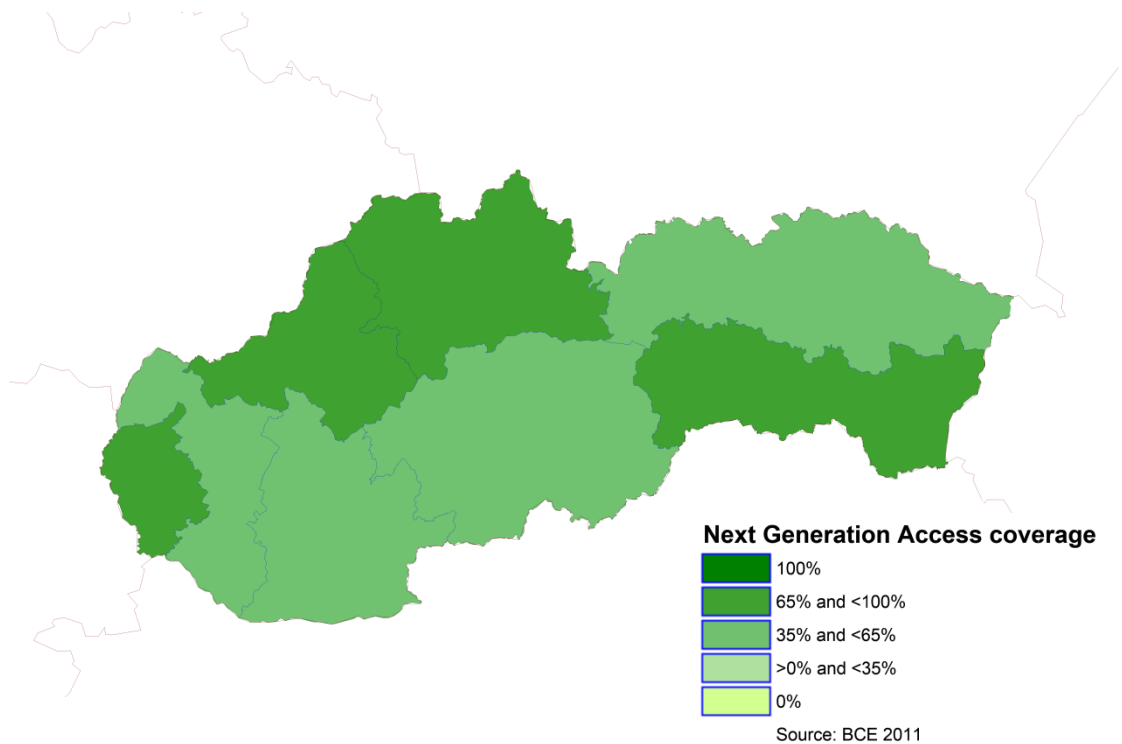
Standard broadband coverage in Slovakia is highest in the Bratislava province, at 96%, with the other more industrialised provinces in the north-west and the south-east of the country following on 93% and the remainder on 89%.

The pattern is essentially the same for Slovakia's above average NGA coverage although the percentage differences are greater. Bratislava leads on 85%, the other more industrial areas are on 73% and the remainder on 55%.

3.25.3 Data tables for Slovakia

Demographics

Statistic	National
Population	5,400,998
Persons per household	2.8
Rural proportion	30.2%

Coverage by technology

Technology	Total	Rural
DSL	82.7%	54.5%
VDSL	0.0%	0.0%
FTTP	57.0%	0.0%
WiMAX	50.0%	50.0%
Standard cable	21.5%	0.0%
Docsis 3 cable	16.6%	0.0%
HSPA	85.5%	52.1%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	91.4%	77.3%
NGA Combination	65.3%	0.0%

3.26 Slovenia

3.26.1 National coverage by broadband technology

Slovenia: coverage by technology combinations
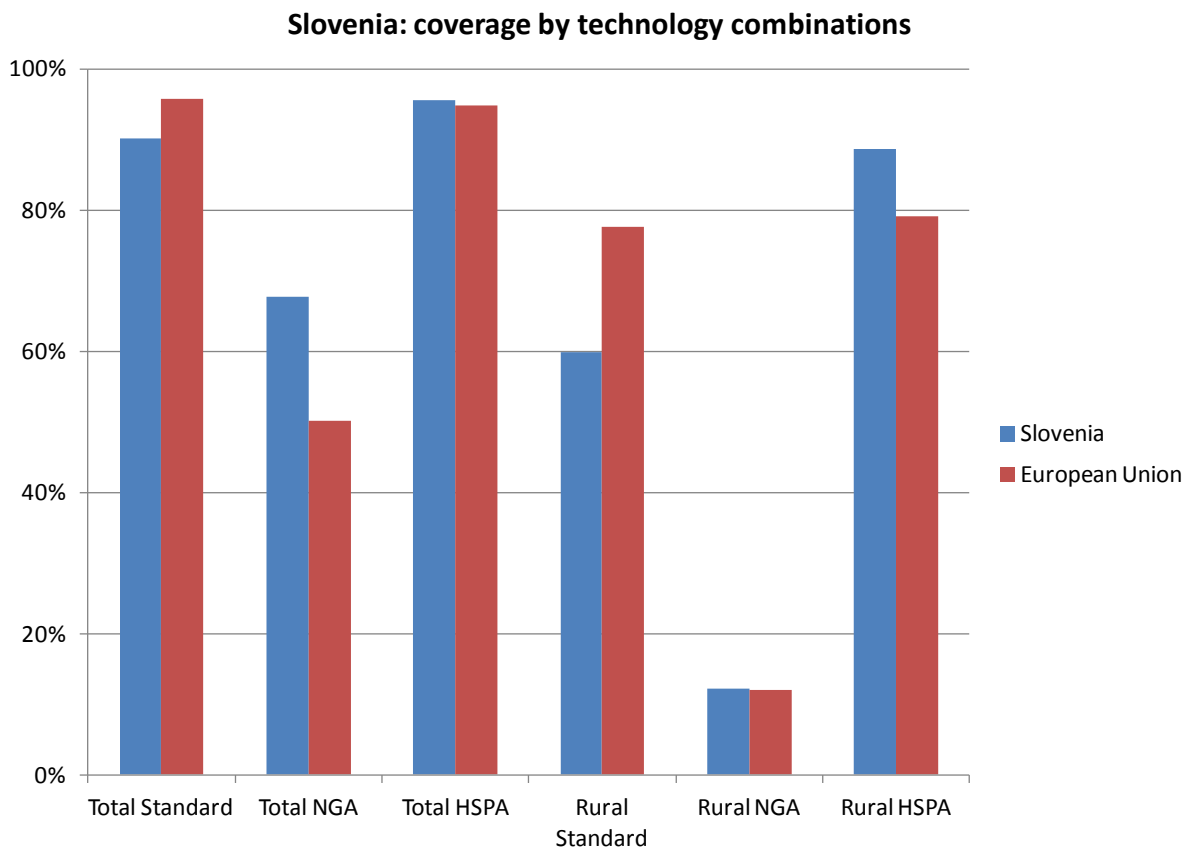
Slovenia has a similar broadband profile to several other Balkan and Eastern European nations. Standard coverage is below the European averages at 90% Total and 60% Rural. But Total NGA coverage is good, 68% against the European average of 50%. Slovenia also has rather better rural NGA coverage than many of its peers, matching the European average at 12%.

Slovenia is also making use of a wider range of technologies than some other countries in its area. VDSL, FTTP and Docsis 3 all make a substantial contribution to NGA coverage. FTTP and the cable networks also add significantly to standard coverage. The telephone incumbents are often the providers of FTTP as well as DSL/VDSL so the networks are more likely to be complementary rather than overlapping. WiMAX has wider than average coverage and is deliberately deployed to fill in DSL coverage gaps. All these factors help to maximise the effectiveness of Slovenia's broadband infrastructure.
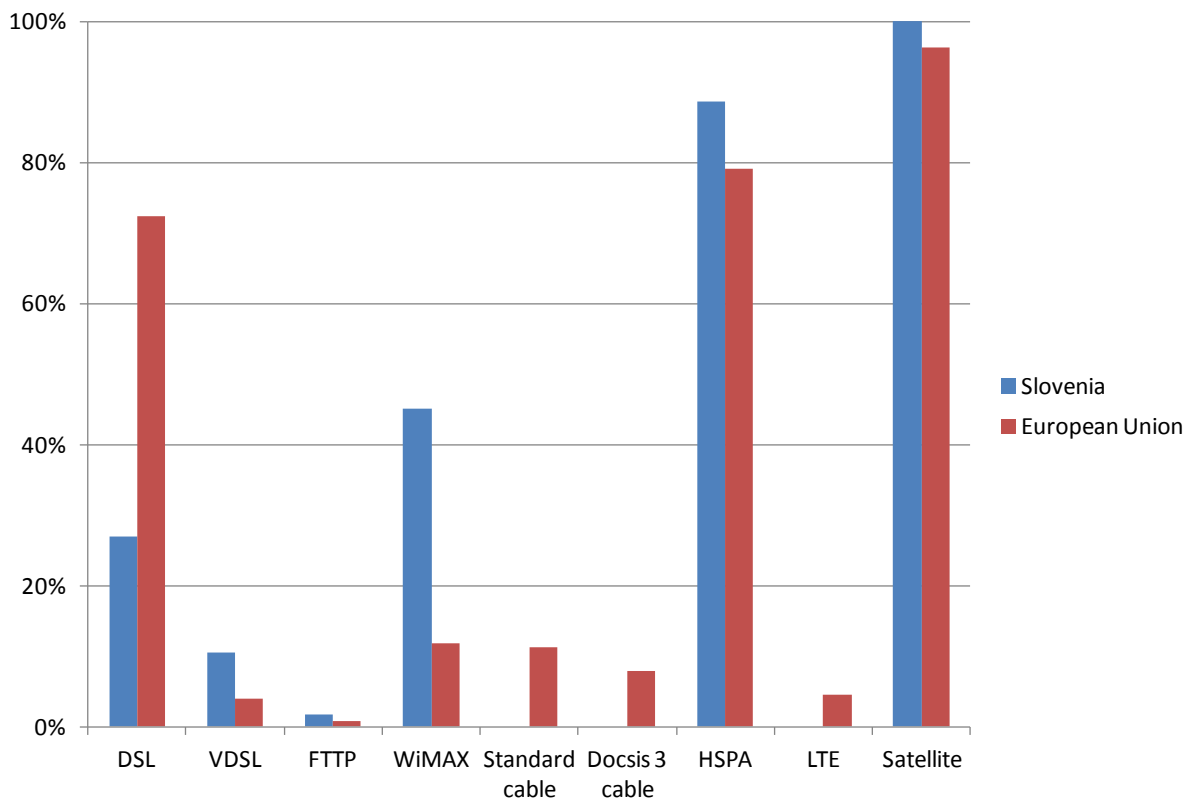
These factors are also seen at work in rural areas. WiMAX makes a bigger contribution to coverage than DSL and both VDSL and FTTP provide more than average rural access – 11% against 4% and 1.6% against 0.9% respectively.

Broadband Coverage in Europe 2011

Slovenia: total coverage by technology
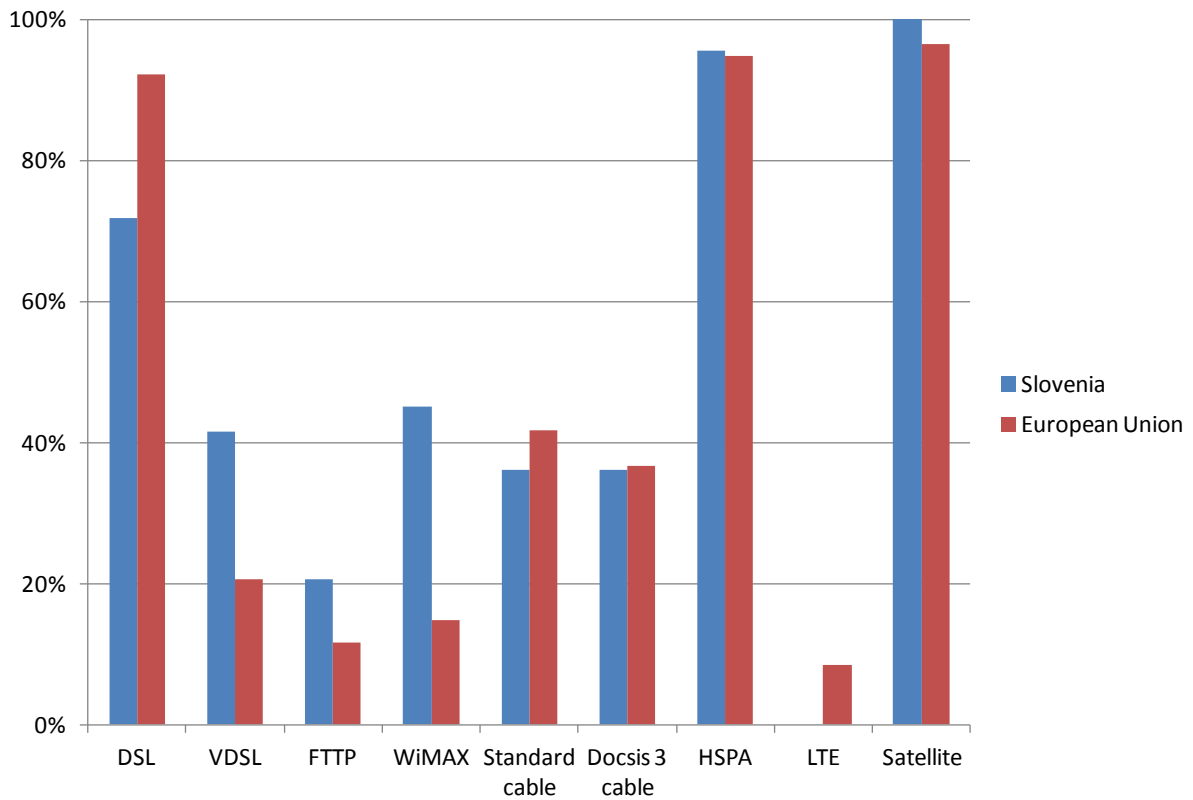
Slovenia: rural coverage by technology

3.26.2 Regional coverage by technology combinations

Map 3.26.01.Slovenia Standard broadband coverage

Standard broadband coverage

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

Source: BCE 2011
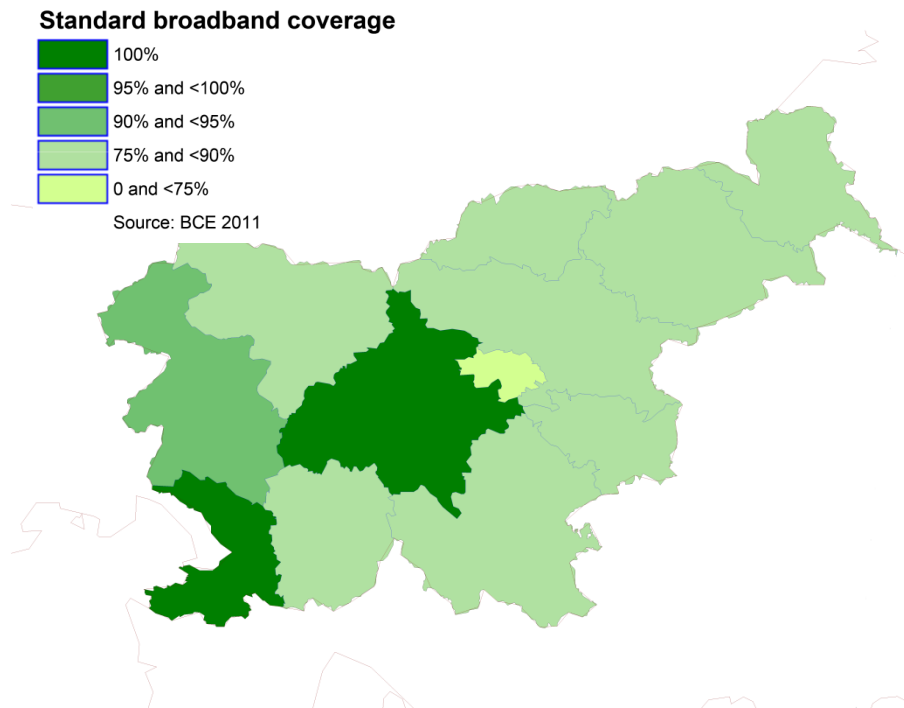
Map 3.26.02.Slovenia Next Generation Access coverage

Next Generation Access coverage

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

Source: BCE 2011
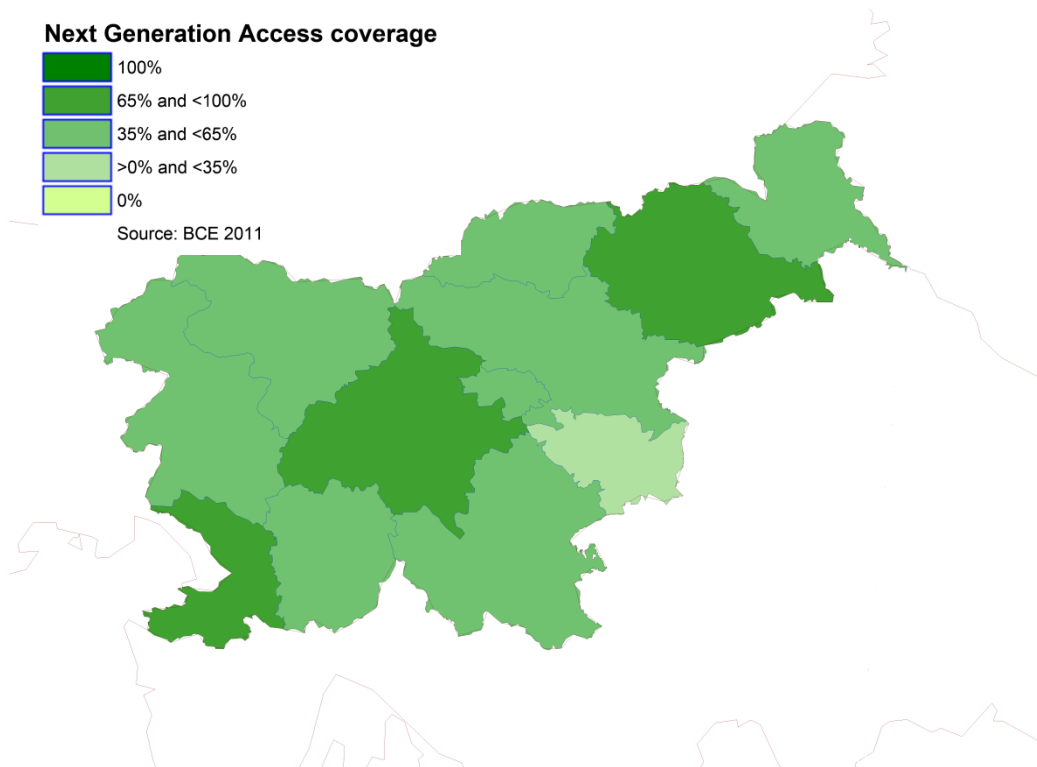
Slovenia's Standard broadband coverage peaks at 100% around the capital, Ljubljana and in the coastal region. Elsewhere it falls off, ranging from 92% in the west down to only 72% in the small, mountainous region of Zasavska.

The pattern with NGA coverage is similar, Ljubljana and the coast do best with 96% and 81% respectively. The region including Maribor, Slovenia's second city, has 74% while the other regions have between 60% and 30%

3.26.3 Data tables for Slovenia

Demographics

Statistic	National
Population	2,010,269
Persons per household	2.5
Rural proportion	24.7%

Coverage by technology

Technology	Total	Rural
DSL	71.8%	27.0%
VDSL	41.5%	10.5%
FTTP	20.5%	1.6%
WiMAX	45.0%	45.0%
Standard cable	36.0%	0.0%
Docsis 3 cable	36.0%	0.0%
HSPA	95.6%	88.7%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	90.1%	59.9%
NGA Combination	67.7%	12.1%

3.27 Spain

3.27.1 National coverage by broadband technology

Spain: coverage by technology combinations
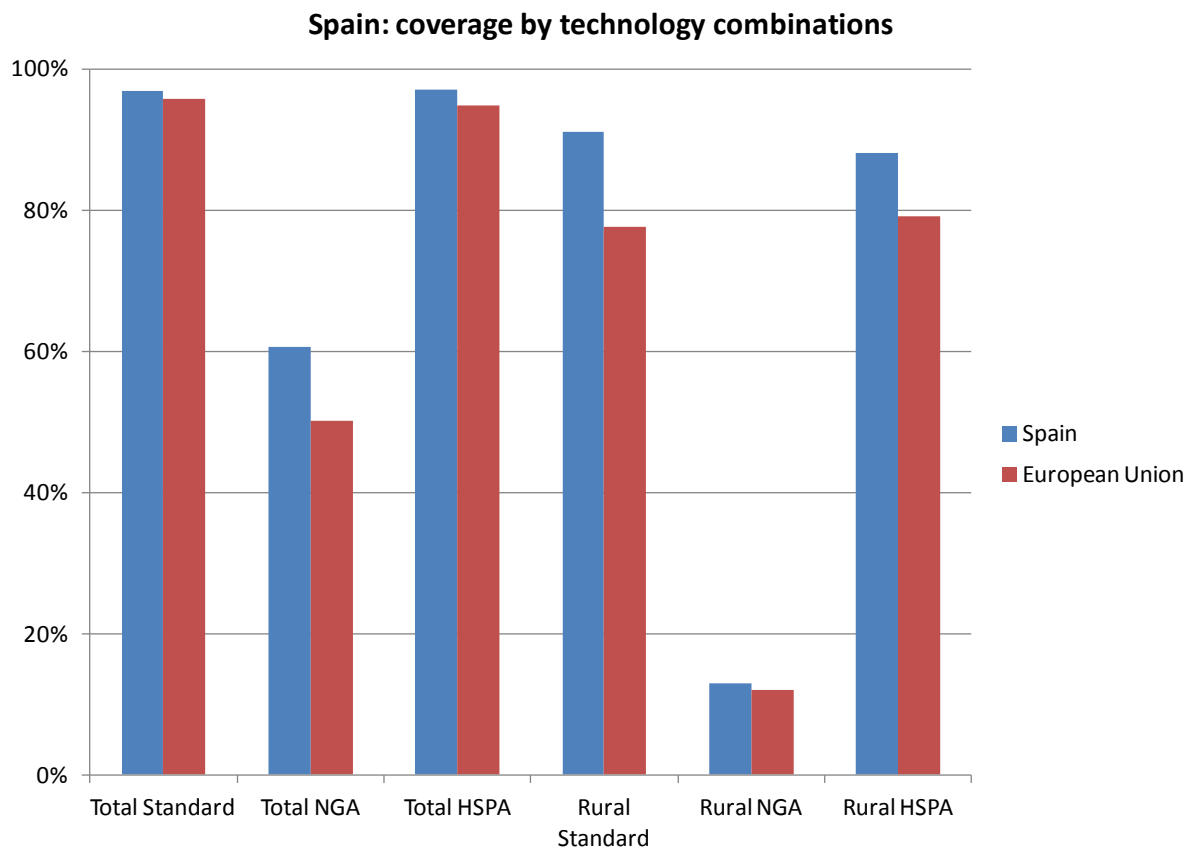
Spain has made a major commitment to developing its broadband infrastructure and it is ahead of European averages on all technology combinations. In particular it has a higher Total NGA coverage than any of the other larger European countries except Germany, and despite its thinly populated countryside it is well ahead of the average for Rural Standard Coverage.

The backbone of Spain's NGA coverage is provided by an extensive cable network, covering 54% of the population and mostly upgraded to Docsis 3. VDSL and FTTP make a contribution as well, although slightly below average.
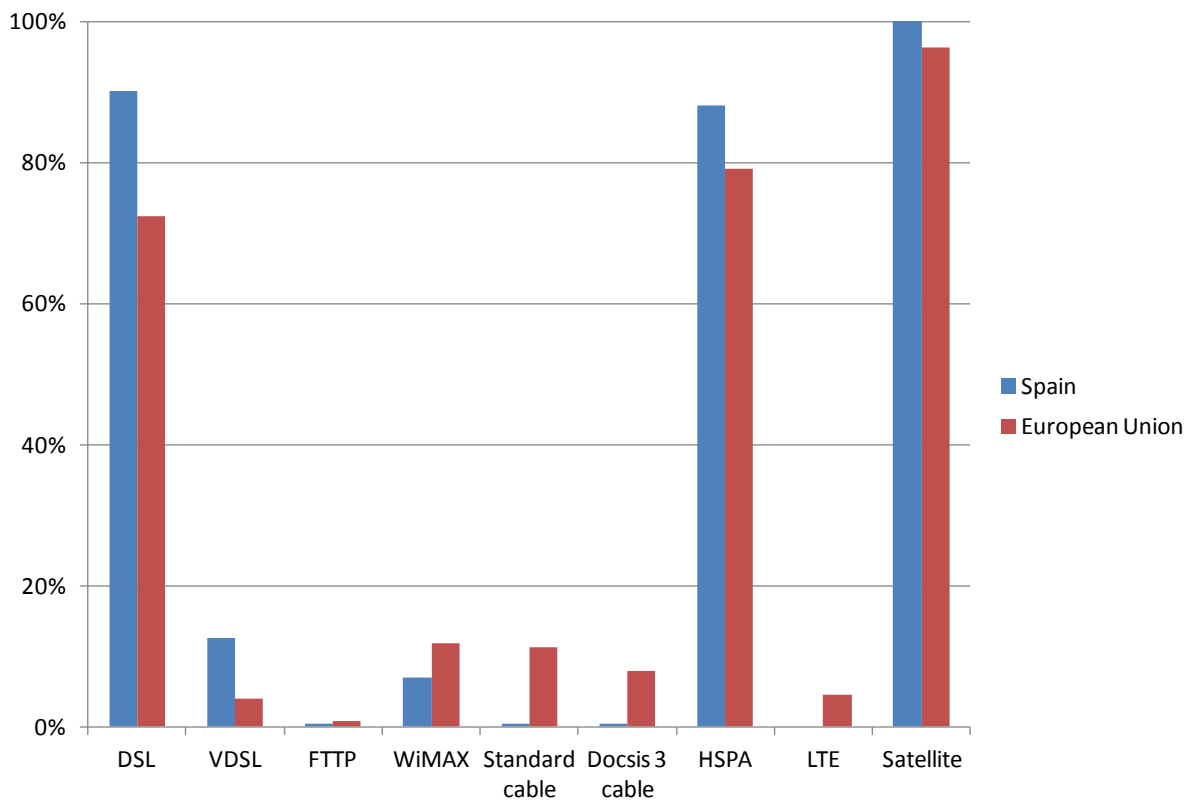
The benefits of using the full range of technologies are seen in rural areas, where VDSL accounts for almost all the NGA coverage. DSL accounts for most of the RSC. Although WiMAX is available its coverage seems to be patchy.

Spain: total coverage by technology
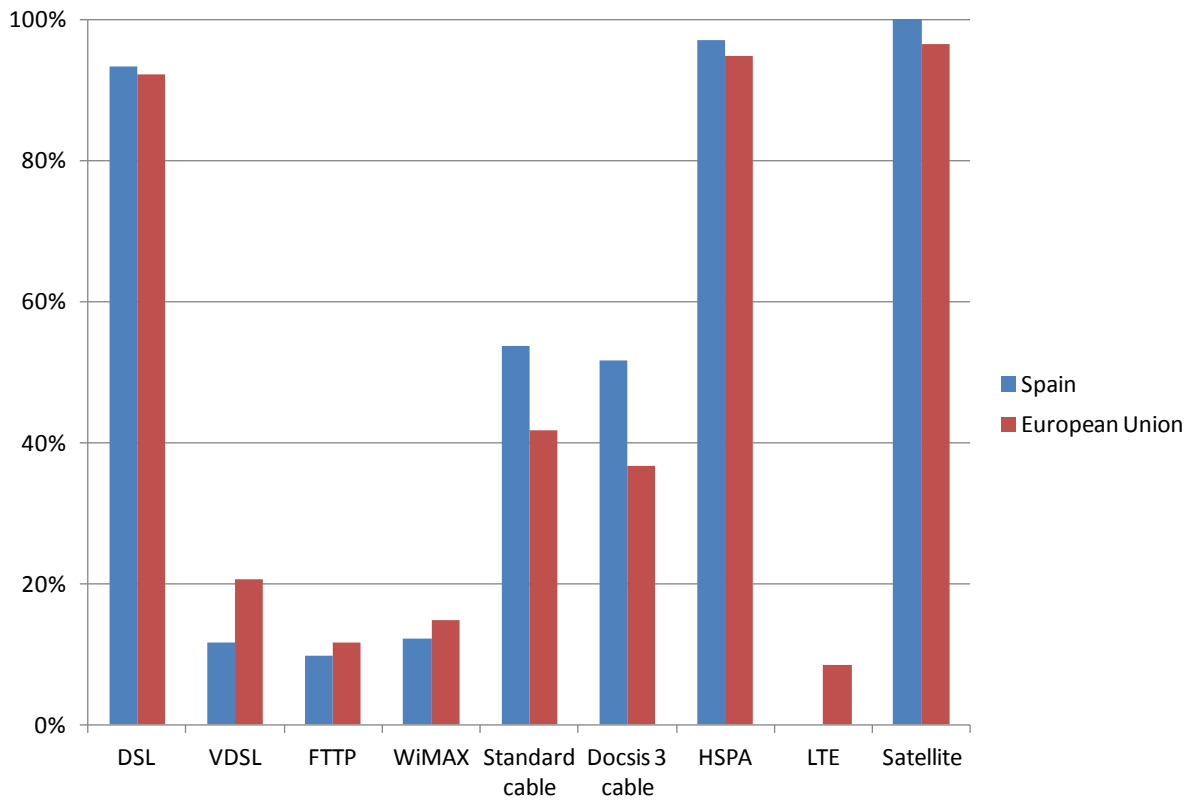
Spain: rural coverage by technology

3.27.2 Regional coverage by technology combinations[7]

Map 3.27.01.Spain Standard broadband coverage

Standard broadband coverage
- 100%
- 95% and <100%
- 90% and <95%
- 75% and <90%
- 0 and <75%

Source: BCE 2011
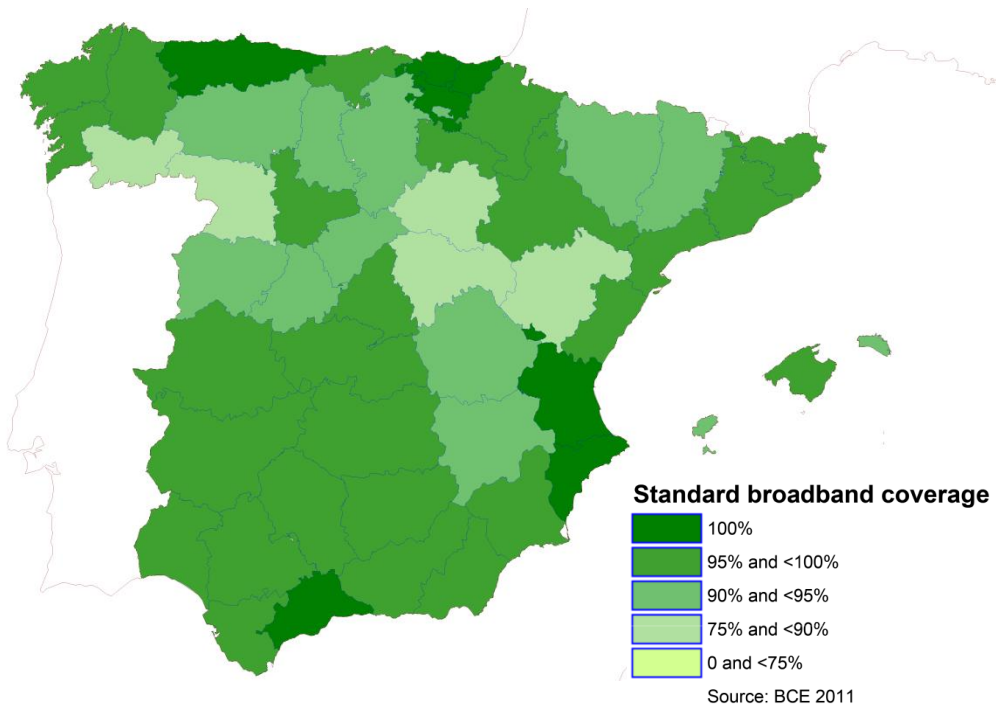
Map 3.27.02.Spain Next Generation Access coverage
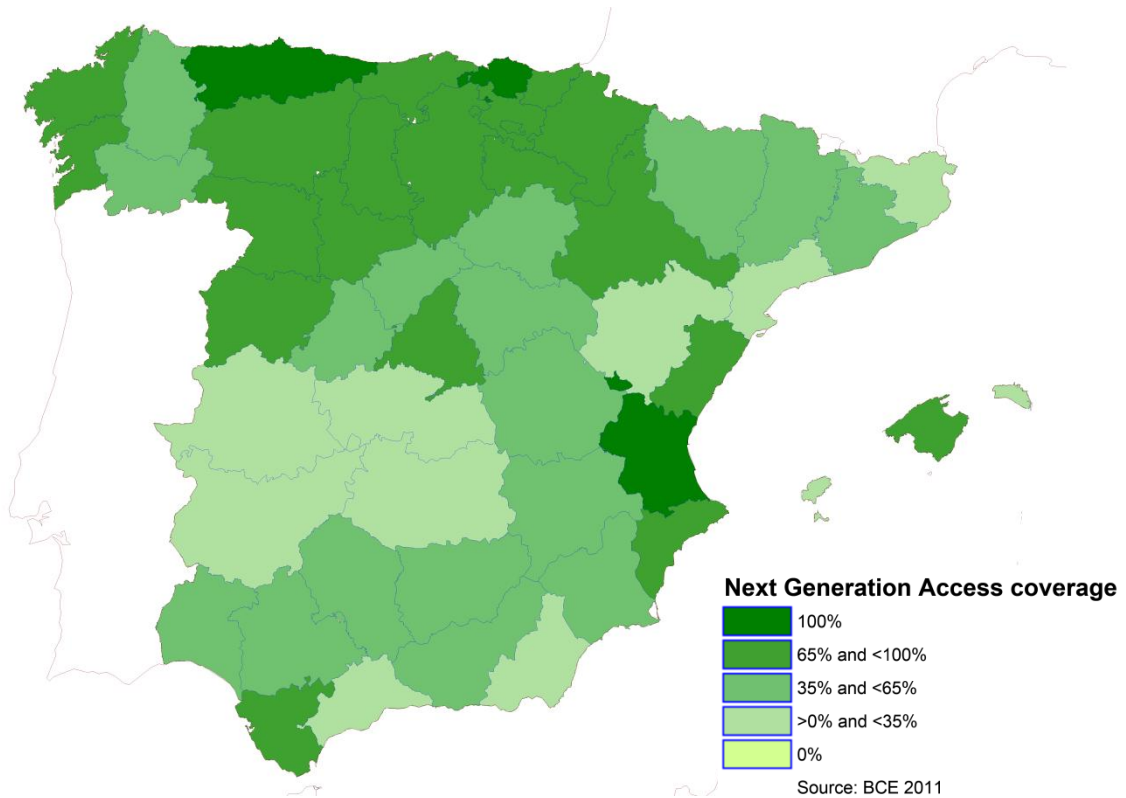
Next Generation Access coverage
- 100%
- 65% and <100%
- 35% and <65%
- >0% and <35%
- 0%

Source: BCE 2011

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[7] The maps in this section do not show the NUTS 3 areas which are outside mainland Europe. The data for these areas is provided as a separate table at the end of this section.

The pattern of broadband coverage in Spain shows a picture of decentralised regional development. Seven NUTS 3 areas in Spain show 100% standard broadband coverage but they include neither of the two major cities, Madrid and Barcelona. Like most of the other major city regions in Spain they are both in the 98% to 95% range. Most other regions have at least 90%. Only eight of Spain's 59 NUTS 3 areas have less than 90% coverage, including much of the central uplands in the north of the country and some of the more remote Canary Islands.

The same areas tend to lead with NGA coverage. Three provinces show 100% NGA – all among the seven leaders in standard broadband - and those with at least 65% are well spread throughout the country. Most of the other mainland provinces have at least 32% NGA coverage or more. Of the 15 provinces with less than 28% coverage, many are either overseas provinces or Mediterranean islands.

Coverage in Spanish NUTS 3 areas outside mainland Europe

Country	NUTS code	NUTS area name	Standard coverage	NGA coverage
Spain	ES630	Ceuta	92.2%	0.9%
Spain	ES640	Melilla	96.6%	0.0%
Spain	ES703	El Hierro	81.5%	24.2%
Spain	ES704	Fuerteventura	87.8%	14.4%
Spain	ES705	Gran Canaria	96.7%	14.8%
Spain	ES706	La Gomera	85.0%	35.3%
Spain	ES707	La Palma	90.5%	13.4%
Spain	ES708	Lanzarote	94.7%	12.2%
Spain	ES709	Tenerife	95.5%	9.7%

3.27.3 Data tables for Spain

Demographics

Statistic	National
Population	45,283,259
Persons per household	2.7
Rural proportion	20.0%

Coverage by technology

Technology	Total	Rural
DSL	93.3%	90.1%
VDSL	11.6%	12.6%
FTTP	9.7%	0.4%
WiMAX	12.2%	7.0%
Standard cable	53.8%	0.4%
Docsis 3 cable	51.7%	0.4%
HSPA	97.1%	88.0%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	96.9%	91.1%
NGA Combination	60.7%	13.0%

3.28 Sweden

3.28.1 National coverage by broadband technology

Sweden: coverage by technology combinations
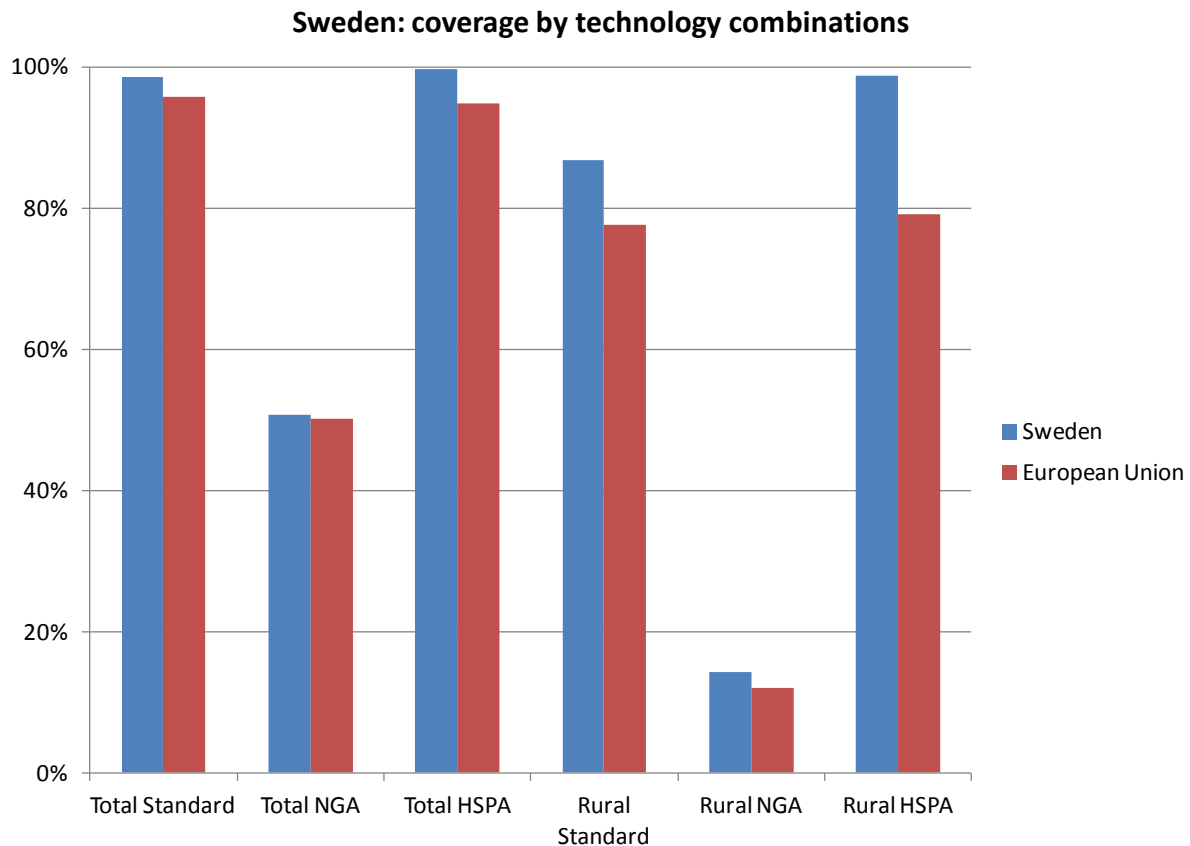
Sweden is ahead of the European average on all the technology combination measures, but perhaps not by so much as might be expected given its reputation for leading edge innovation, particularly in telecommunications. Its greatest strength is in mobile broadband. Sweden is third among the study countries for total HSPA coverage (99.6%) and fourth for rural HSPA coverage (98.8%). But it is not in the first ten for any of the combination measures and it is only just above average for Total NGA coverage.

This is despite having made an early start on building FTTP networks. FTTP is now the biggest contributor to NGA in Sweden, covering almost 35% of the population. The cable networks offer Docsis 3 to a more modest 26%. VDSL is more limited still, covering only 10%. Currently at least, the incumbent is offering VDSL only where it can be provisioned direct from the exchange. The mix is evidently not strong enough to give Sweden the leadership position which would be expected.

On the other hand, Sweden has made a major feature of LTE, which already covers 48% of the population, making it second among the study countries in deploying the technology. LTE coverage in rural areas is also second highest among the study countries at 14%.

In fact LTE is already the most widespread technology in rural Sweden after the basic mainstays, DSL and HSPA. (Sweden is one of the countries where KA-band satellite is not available.) VDSL, FTTP and a little Docsis 3 make up the NGA coverage. Standard coverage is good, well above the averages, especially considering how thinly Sweden's rural population is spread. But WiMAX is not available.

Sweden: total coverage by technology
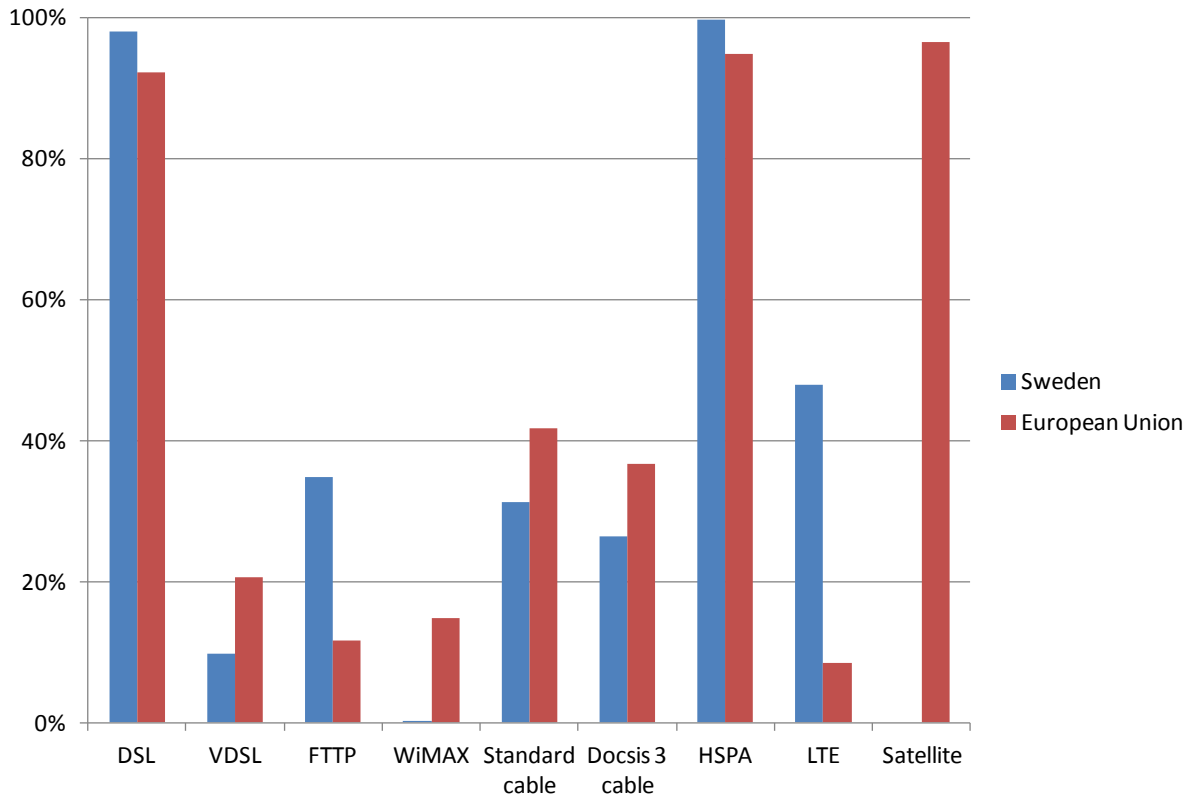
Sweden: rural coverage by technology
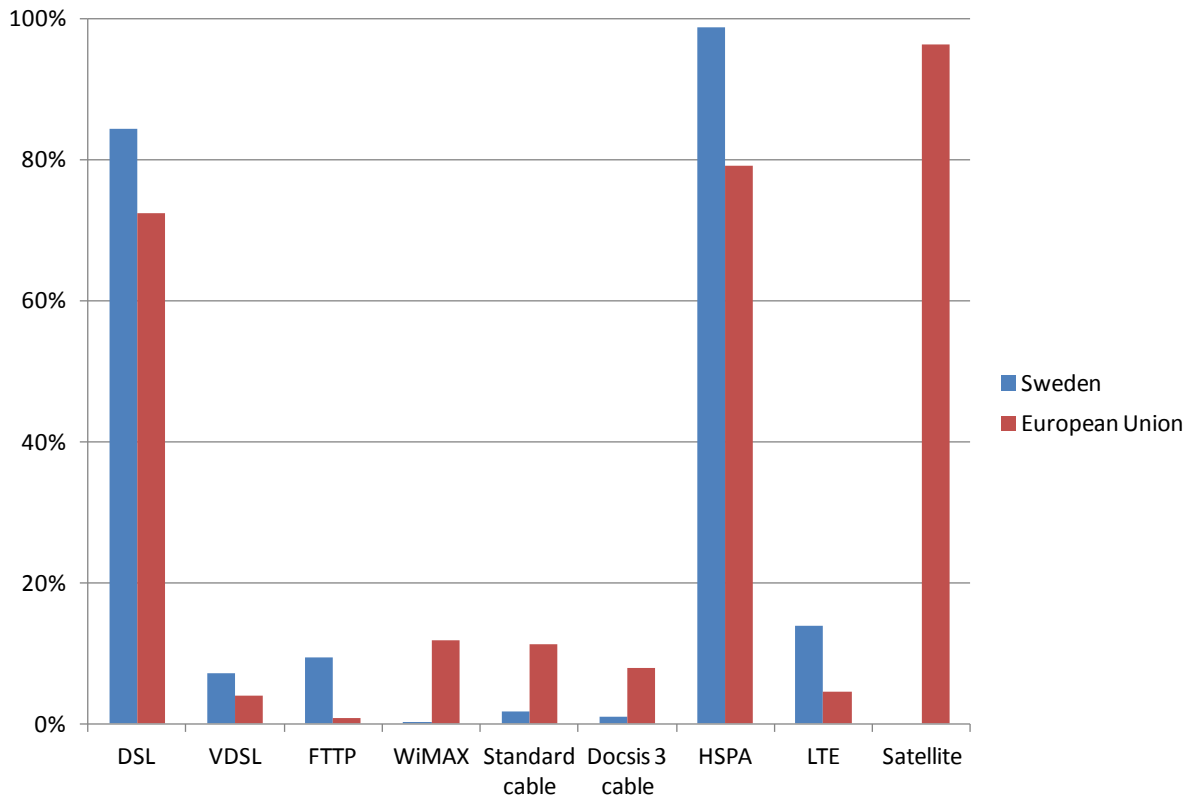
3.28.2 Regional coverage by technology combinations

Map 3.28.01.Sweden Standard broadband coverage

Standard broadband coverage

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

Source: BCE 2011
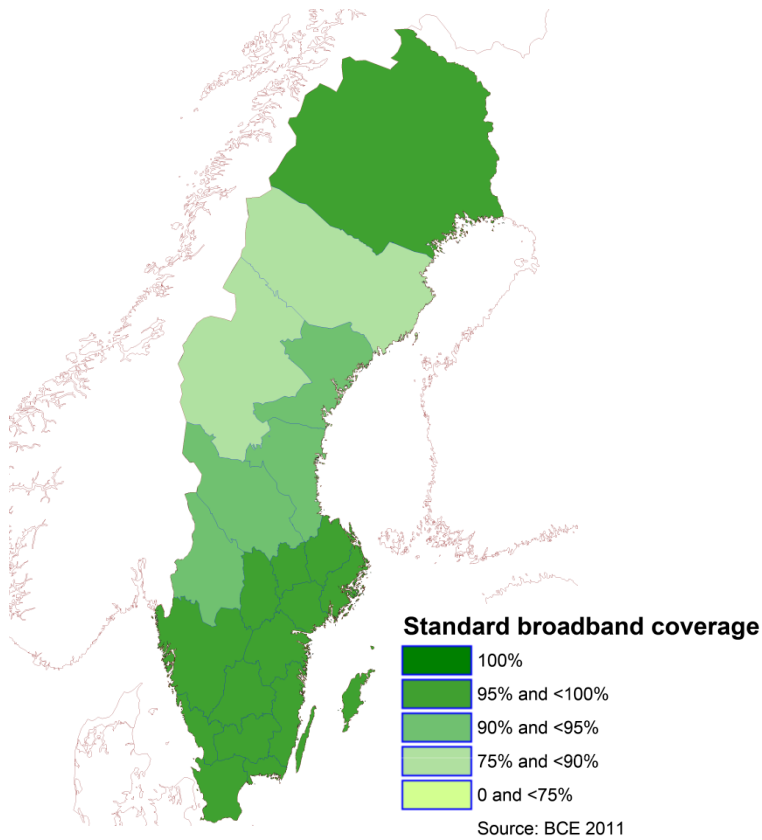
Map 3.28.02.Sweden Next Generation Access coverage

Next Generation Access coverage

- 100%
- 65% and <100%
- 35% and <65%
- >0% and <35%
- 0%
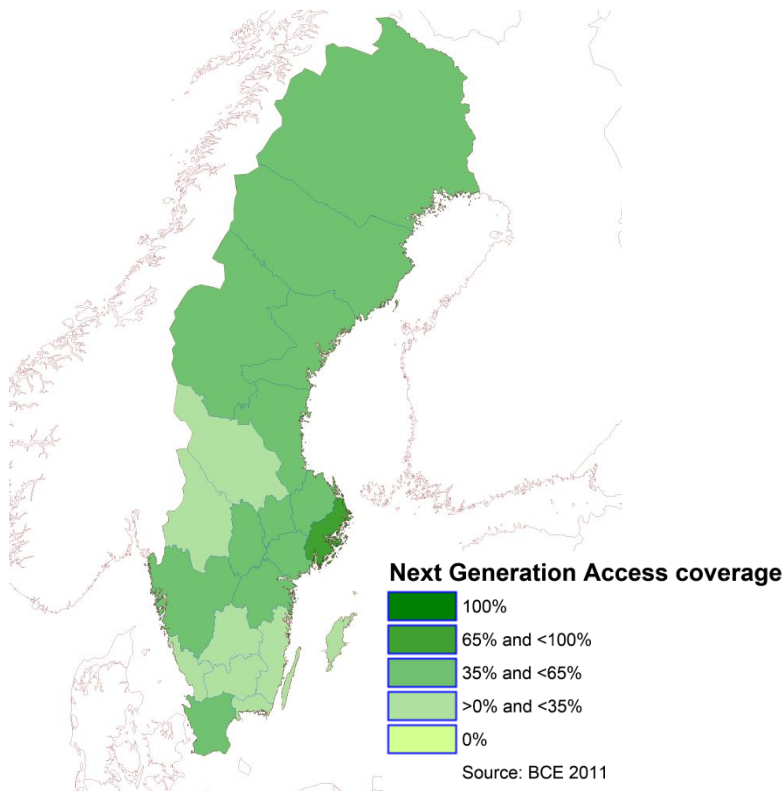
Source: BCE 2011

Sweden does not claim 100% standard broadband coverage anywhere, but Stockholm and the whole south of the country, plus the Baltic islands, all have at least 95% and mostly 98% or more. Perhaps unexpectedly, the most northern part of the country also has 98% coverage despite its low population density. The reason is, of course, that most of the people who do live there, live in the towns and compact settlements. Even in its emptiest part, coverage in Sweden goes no lower than 89%.

The picture with NGA is more differentiated. Here Stockholm has a strong advantage with 80% coverage. The next highest is at 57%, but the group between 57% and 35% does include all the more northern provinces as well as the more urbanised central belt. Areas in the south and the Baltic islands make up most of the eight areas with under 35% coverage. The lowest is Kalmar province on the south-eastern corner of Sweden with 21%.

3.28.3 Data tables for Sweden

Demographics

Statistic	National
Population	9,182,927
Persons per household	2.1
Rural proportion	10.4%

Coverage by technology

Technology	Total	Rural
DSL	98.0%	84.4%
VDSL	9.8%	7.2%
FTTP	34.8%	9.4%
WiMAX	0.0%	0.1%
Standard cable	31.3%	1.7%
Docsis 3 cable	26.3%	1.0%
HSPA	99.6%	98.8%
LTE	47.8%	13.9%
Satellite	0.0%	0.0%
Standard Combination	98.6%	86.7%
NGA Combination	50.6%	14.3%

3.29 United Kingdom

3.29.1 National coverage by broadband technology

UK: coverage by technology combinations
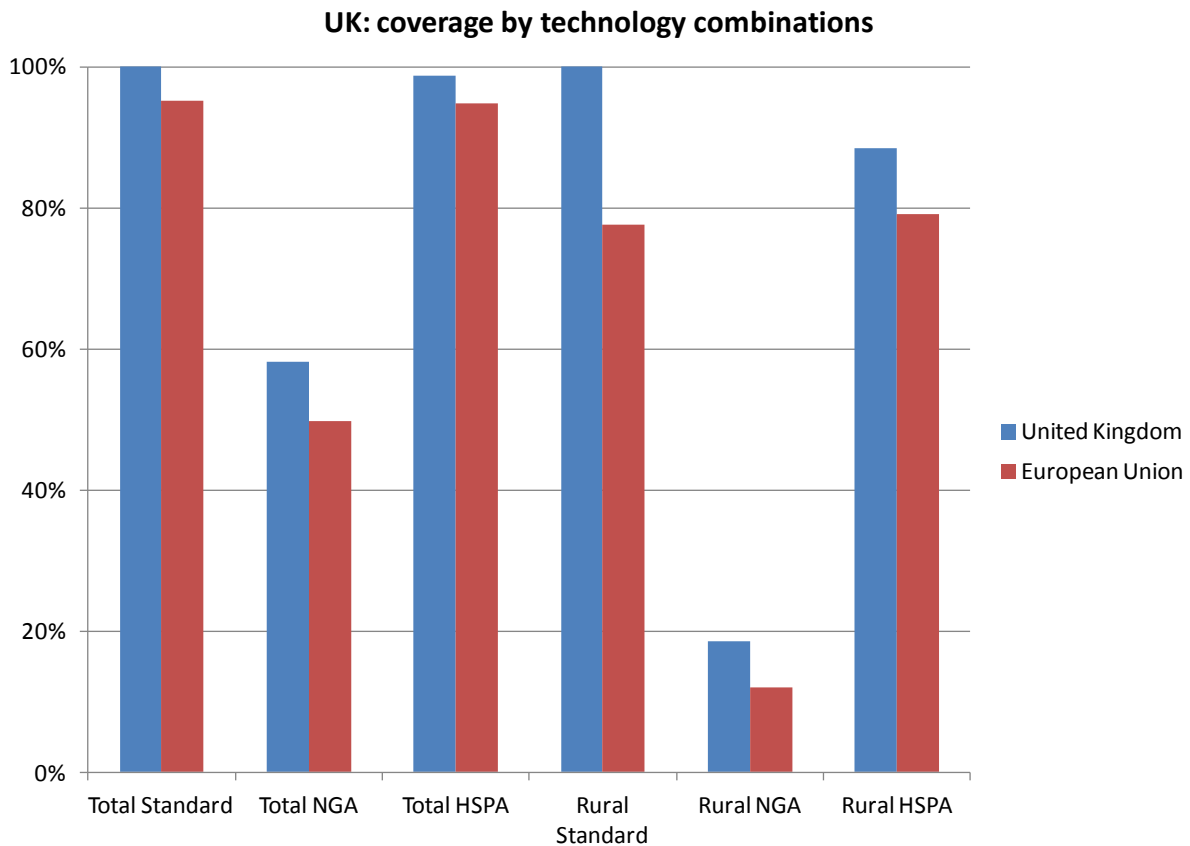
The United Kingdom is above average on all the technology combination measures, reporting 100% Standard Coverage in particular. Contrary to the widespread impression it is ahead of the European average for Total NGA Coverage (58% against 50%) and even in the top ten countries for Rural NGA.

The 100% TSC and RSC is based on complete DSL coverage, defined as "being within the service area of a DSL-enabled exchange". A more rigorous definition based on performance would reduce this figure. An extensive cable network passing 47% of homes also contributes to standard coverage. WiMAX makes a small additional contribution in remote areas but in fact most of its coverage is urban. LTE is not yet available, with the grant of licences now delayed until 2013.

Being almost completely upgraded to Docsis 3 the cable network also provides the basis of the UK's NGA coverage. This is now supplemented by a rapidly growing VDSL network, reaching 26% of homes as of end-2011. FTTP is also present but negligible as yet.
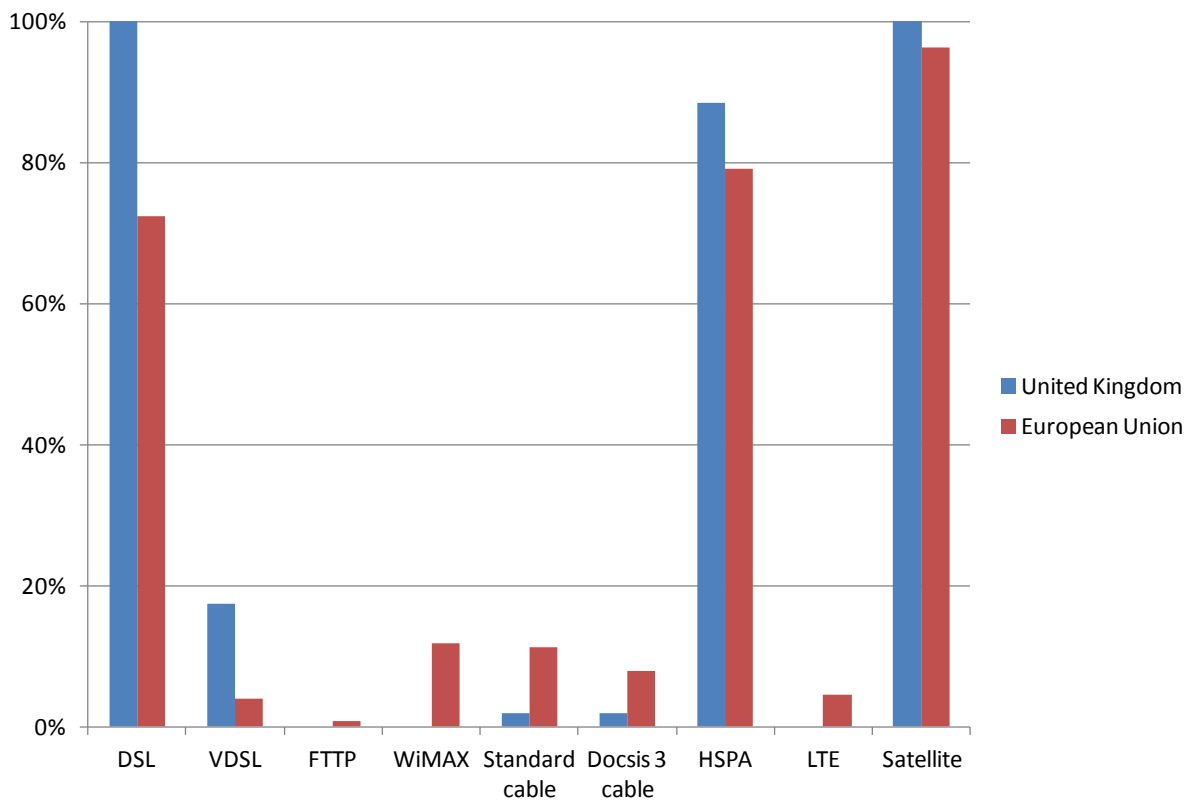
The rural picture shows the value of VDSL as a way of providing NGA to rural areas. The UK already had 17% rural coverage at the end of 2011, the third highest in Europe. The only other rural NGA comes from Docsis 3 covering 2%.

Broadband Coverage in Europe 2011

UK: total coverage by technology
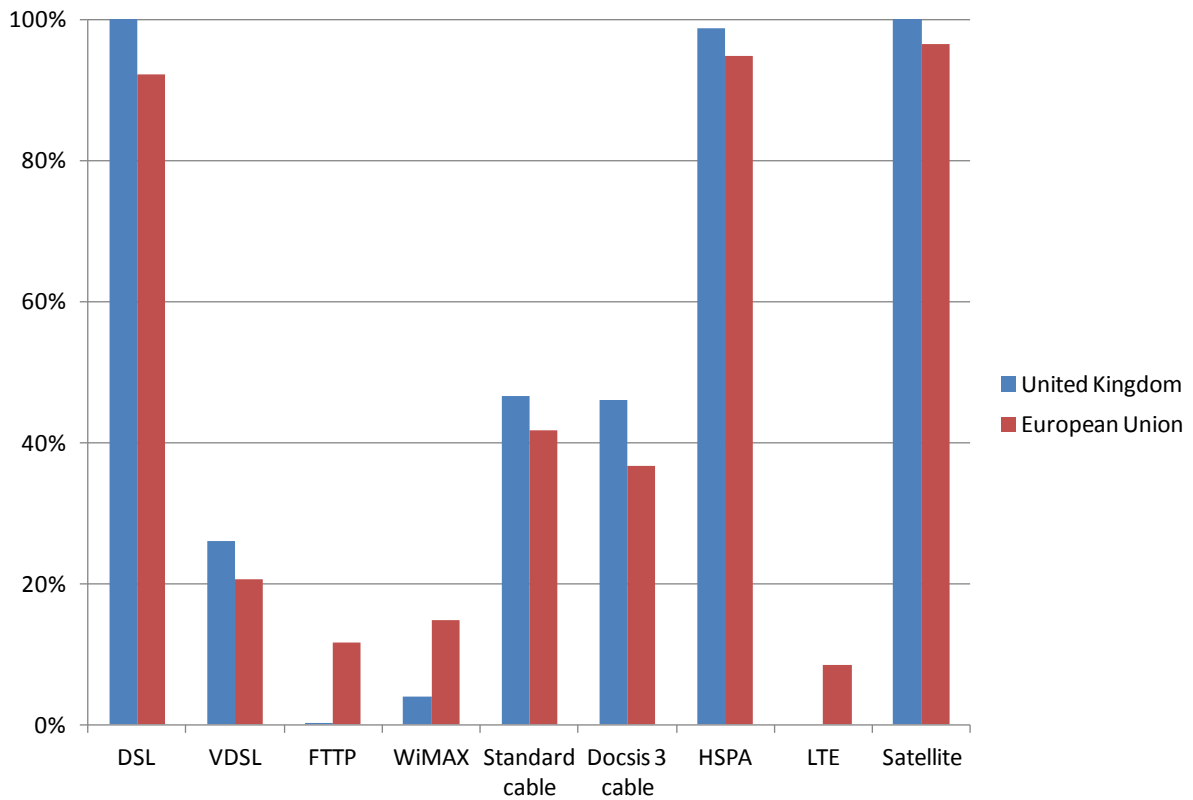
UK: rural coverage by technology

3.29.2 Regional coverage by technology combinations

Map 3.29.01.UK Standard broadband coverage

Standard broadband coverage

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

Source: BCE 2011
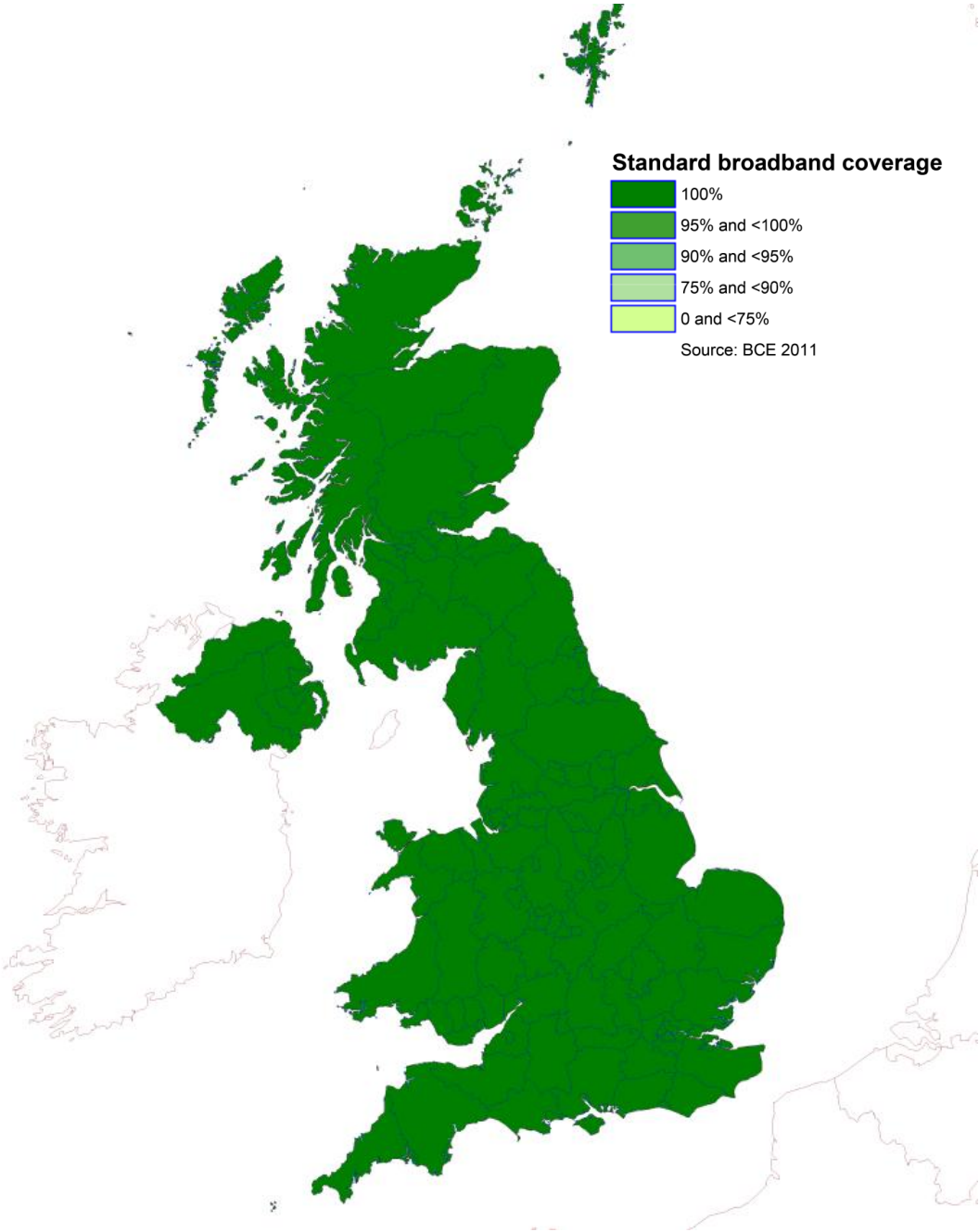
The United Kingdom has uniform 100% standard broadband coverage on the basis that all its telephone exchanges are enabled for DSL or an equivalent fixed-wireless service.

The picture with NGA is much more complicated. Since NGA services in the UK are still led by Docsis 3, the highest levels of coverage are in provincial cities where there is an extensive cable network, rather than in the capital. Portsmouth, Nottingham, and Brighton and Hove, for example, all have over 96% NGA coverage. Another 56 areas have more than 65%.

Broadband Coverage in Europe 2011

VDSL is also starting to roll out and reach beyond the cable areas. Thus some 33 areas, generally less urbanised, have at least 35% NGA coverage. Another 23 more rural areas, mostly in England and Scotland, have something although it may be only a few percent. Finally 18 areas, mostly in Scotland and Wales, have no NGA as yet.

Northern Ireland is a special case. Although it is mostly rural, a state-funded scheme has rolled out VDSL services to cover almost the whole province.

Map 3.29.02.UK Next Generation Access coverage

Next Generation Access coverage

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

Source: BCE 2011
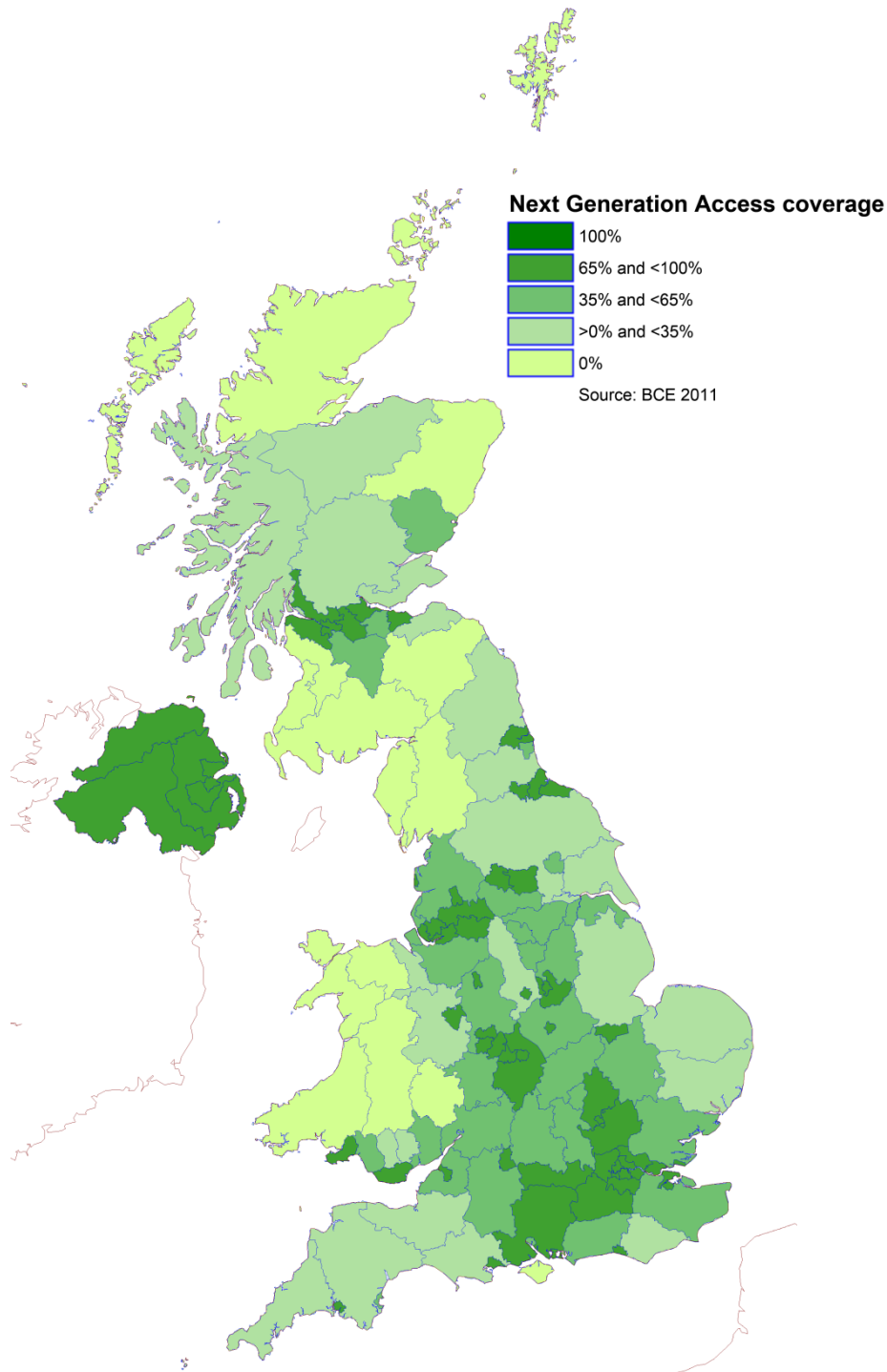
3.29.3 Data tables for United Kingdom

Demographics

Statistic	National
Population	61,191,951
Persons per household	2.3
Rural proportion	10.3%

Coverage by technology

Technology	Total	Rural
DSL	100.0%	100.0%
VDSL	26.1%	17.4%
FTTP	0.2%	0.0%
WiMAX	4.0%	0.0%
Standard cable	46.5%	2.0%
Docsis 3 cable	46.1%	2.0%
HSPA	98.8%	88.5%
LTE	0.0%	0.0%
Satellite	100.0%	100.0%
Standard Combination	100.0%	100.0%
NGA Combination	58.3%	18.6%

Appendices

A1 Categories for definition

One major task in carrying out the BCE 2011 project was to explain, and as far as possible implement, a complex set of definitions for the multiple different categories required for data collection. The main categories are listed in Table 1 and the issues surrounding them are discussed below. Fuller definitions are provided where needed in the Appendices.

Table 1 Categories and outline definitions for the BCE 2011 project

Category	Definitions
Study Countries	The 27 members of the EU plus Iceland and Norway
Sub-national regions	The 1,324 NUTS 3 areas of the 29 study countries as defined by Eurostat under its "National Units for Territorial Statistics" scheme.
Urban vs. Rural	The project defined rural areas as those with a population of less than 100 persons per square kilometer when segmented at the NUTS 5 level (also known as LAU 2, for Local Administrative Unit 2). NUTS 5 or LAU 2 areas are typically the smallest administrative units in regular use in a country.
Technologies	The nine broadband technologies specified for study; DSL, VDSL, FTTP, WiMAX, Standard Cable, Docsis 3 Cable, HSPA, LTE, Satellite. See the Appendices for the definitions used for the project.
Coverage	The coverage of a particular technology is the percentage of homes within an area (a complete country or sub-national region) which have access to that technology. Having access means being able to subscribe to the service without requiring significant additional investment to connect the home to the technology network. The exact definition varies between the technologies. See the Appendices for the definitions used for the project.
Reference date	The objective of the project was to map the coverage of the different technologies as at end-2011. Most data provided was for end-2011 or was scaled to end-2011 for the final coverage figures but the applicable date was noted in each case.

A2 Technology definitions

The table shows the definitions used for the different broadband technologies when collecting data for the project. The first eight definitions were included in the Survey questionnaire. The satellite broadband definition was not included in the questionnaire but it was used for the research on satellite availability across Europe.

Different definitions were used for two technologies in Romania, identified as DSL* and VDSL* as explained further below.

Note that the definitions are not intended to be rigorous from an engineering point of view but rather to be easy to use and to relate to the practical definitions used by operators and NRAs.

Technology	Project definition
DSL	Broadband provided over conventional telephone lines with a maximum download speed of under 25Mbps
VDSL (also called FTTC+VDSL etc.)	A "Very-high-speed" version of DSL capable of delivering 25Mbps or more over conventional telephone lines. 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. 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	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	A wireless service using one of the IEEE standards 802.16d, for fixed users and 802.16e for mobile
Cable Modem (Standard Cable)	Broadband delivered over a fixed TV network using coaxial cable according to the earlier cable broadband standards such as DOCSIS 1 or 2, usually providing download speeds up to about 20Mbps.
DOCSIS 3	Broadband delivered over a fixed 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
Satellite	Broadband provided by KA-band satellites supporting at least 2Mbps downstream bandwidth per user and a direct return channel

The same technology definitions were used for all countries and respondents with the exception of Romania. To accommodate different reporting structures for broadband data in Romania we used two modified definitions for DSL and VDSL, identified as DSL* and VDSL*.

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DSL* includes a variety of solutions, typically involving shared backhaul from LAN or coaxial cable distribution within apartment blocks, which provide download speeds of under 30Mbps. VDSL* represents solutions offering 30Mbps and above, either by VDSL direct to the end-user or FTTB backhaul from in-building VDSL distribution networks. And whereas the numbers for DSL include VDSL, where it is available, DSL* does not include VDSL*, and the two networks are assumed to be complementary rather than overlapping.

A3 Coverage definitions

The table shows the definitions used to determine whether households are within the coverage area for each of the different broadband technologies when collecting data for the project. The first eight definitions were included in the Survey questionnaire. The satellite broadband definition was not included in the questionnaire but it was used for the research on satellite availability across Europe.

Note that the definitions are not intended to be rigorous from an engineering point of view but rather to be easy to use and to relate to the practical definitions used by operators and NRAs.

Technology	Qualification for coverage
DSL	In a telephone exchange area fully enabled for DSL
VDSL	Close enough to a VDSL-enabled cabinet or exchange to get a broadband signal of at least 25Mbps downstream, typically equivalent to a radial distance of about 500 metres
FTTP	Can be connected now to a fibre service without requiring the construction of new fibre infrastructure
WiMAX	Can receive at least 2Mbps downstream from an existing service without requiring the construction of new WiMAX infrastructure
Cable Modem (Standard Cable)	Can be connected now to a broadband service without requiring the construction of new cable TV network infrastructure
DOCSIS 3	Can be connected now to a DOCSIS 3 service without requiring the construction of new cable TV network infrastructure
HSPA	In the stated coverage area for at least one HSPA-upgraded 3G mobile network.
LTE	In the stated coverage area for at least one LTE mobile network
Satellite	In a country where service is available from at least one KA-band satellite service provider

Defining coverage caused more difficulty than defining technology. Considering DSL, for example, in many countries any household in the service area of a DSL-enabled exchange is defined as having DSL coverage. It is not hard to report 100% DSL coverage on this basis. On the other hand, as any country-dweller knows, distance from the exchange is also crucial in determining the speed available on a DSL connection. German statistics recognise this by defining DSL coverage as having a minimum 1Mbps download speed available. The result is that Germany reports relatively low DSL coverage but the figure is more meaningful from the end-user's point of view.