VDSL in Europe's future

A successful strategy for superfast broadband

Prepared by: Tim Johnson

Date: 01 August 2013

Version: 1.1

Point Topic Ltd
73 Farringdon Road
London EC1M 3JQ, UK
Tel. +44 (0) 20 3301 3305
Email laura.kell@point-topic.com

Contents

1. Introduction

A combination of events is leading us into an exciting period for VDSL technology. The perception of what VDSL can do is changing rapidly, creating major opportunities for suppliers, operators and policy makers. Point Topic believes that VDSL could be the leading superfast broadband technology for Europe, helping to bring high-speed broadband to all Europeans over the next decade.

VDSL stands for 'Very-high-speed Digital Subscriber Line technology. Point Topic defines VDSL as the technology which provides superfast broadband speeds over the existing copper telephone network. It does this by extending fibre from the telephone exchange to street cabinets and then handing over to the traditional copper network for the last few 100 metres to subscriber homes and businesses. Thus it is also known as FTTC, for fibre to the cabinet, or more precisely as FTTC+VDSL

This report looks at the current coverage of superfast broadband and VDSL in the European Union, using Point Topic's broadband maps created for the European Commission. We use this research to demonstrate that in areas where superfast broadband is not yet available, VDSL could provide a low cost and quick route to high-speed broadband for the rest of Europe.

2. The opportunity for VDSL

The Digital Agenda targets for broadband coverage and performance are well known:

- All households should have access to broadband of at least basic quality by 2013;
- All households should have access to high-speed broadband of at least 30Mbps downstream speed by 2020;
- 50% of households should be subscribing to 100Mbps downstream broadband by 2020.

Point Topic sees the 30Mbps target as the key one. Achieving that will provide the means to ensure that the 100Mbps target for 2020 can also be achieved. For example, 100Mbps is likely to be the default entry-level speed on Docsis 3 networks by that time.

Achieving virtual 100% coverage of 30Mbps provides a big opportunity for the broadband industry, as well as a challenge. Point Topic estimates it will cost about €80 billion, using VDSL solutions – or alternatives at similar price levels – as far as possible.

Perceptions of VDSL are changing. There are now many established roll-outs of VDSL across Europe. Among the larger countries, Belgium, the Netherlands, Switzerland, Austria, the UK and Germany all had over 45% VDSL coverage by the end of 2012. The UK, Greece, the Czech Republic, Poland and the Netherlands all increased VDSL coverage by more than 10% in the year. All the smaller countries covered – Luxembourg, Malta, Cyprus and Iceland – already have high coverage,

There has been slower progress for VDSL's fixed-line rivals. Growth in FTTP (fibre-to-the-premises) has levelled off as the most attractive opportunities have been taken up. Similarly, the cable networks' upgrade to Docsis 3 has been very rapid in the period 2009 to 2012 but is now almost complete.

The anticipation of vectoring is also changing how people see VDSL. Vectoring will double the speed which can be delivered over VDSL at a given distance making the technology much more attractive as a route towards achieving Europe's broadband targets

Another factor is financial austerity. The amount available for investment in broadband infrastructure through the Connecting Europe Facility has been cut from the proposed €9 billion to €1 billion. Clearly the emphasis has got to be on cost-effective (rather than Rolls-Royce) solutions to Europe's broadband needs.

Together, these factors are starting to change the way that people see the role for VDSL in Europe's superfast future. To make the most of the opportunity VDSL will have to overcome a number of challenges:

- Competition from fibre and cable networks will be strong, particularly in the most attractive areas for investment, those with high population densities
- Vectoring, still only at the trial stage as of mid-2013, will have to demonstrate downstream speeds of at least 30Mbps for the great majority of users and hopefully 100Mbps for a large proportion
- Potential regulatory barriers, for example because of the practical impossibility of unbundling VDSL services where vectoring is present, must be overcome.

Not least, it would be helpful if the broadband-over-copper business could do a better job of promoting its value as generally the most viable solution for the mass delivery of superfast broadband in the current decade.

3. Superfast broadband coverage in Europe today

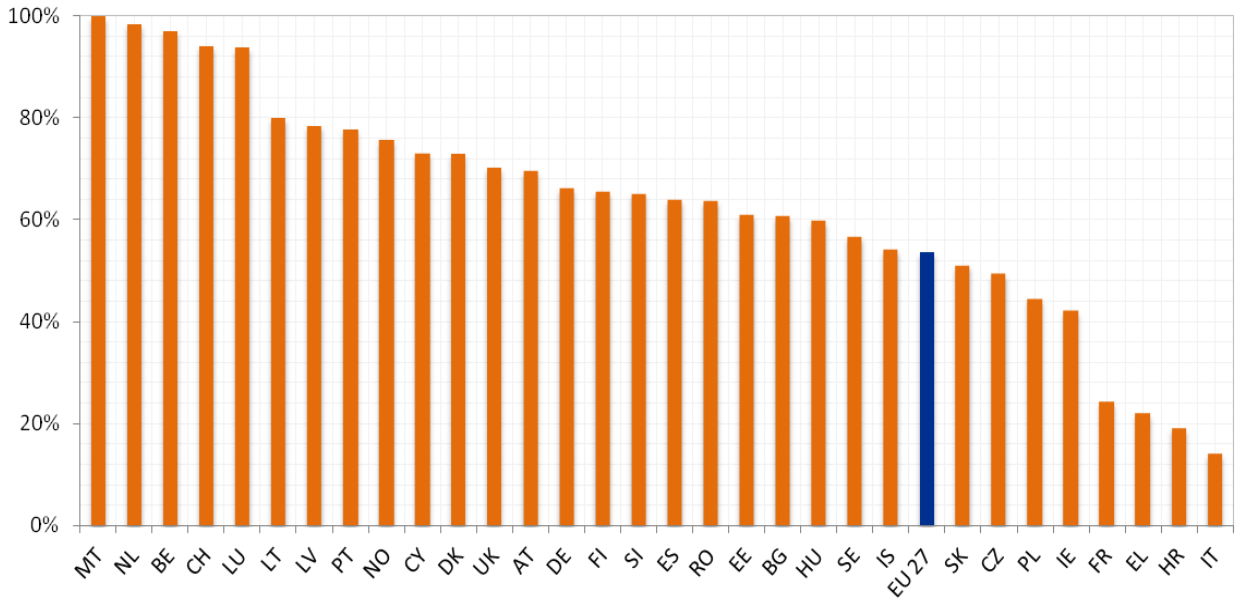
3.1 The BCE 2012 study

The results presented here draw from Point Topic's study, *Broadband Coverage in Europe in 2012*, completed for the European Commission in July 2013. The purpose of the study was to measure progress towards the coverage objectives of the European Union's Digital Agenda.

The study mapped the coverage of DSL, VDSL, FTTP, standard cable, Docsis 3 cable, WiMAX, HSPA, LTE and satellite across the whole of Europe.

At the end of 2012 the European Union was more than half-way towards its target of 30Mbps access for all by 2020. 113 million EU households, 54% of the total, were already covered by NGA services.

Figure 1 NGA coverage by country[i], end-2012



Source: Broadband Coverage in Europe in 2012, a study by point-topic.com for the European Commission

To produce an accurate assessment of the overall coverage of standard and high-speed broadband coverage, Point Topic measured the coverage of each technology in every NUTS 3 area in the European Union. NUTS 3 areas roughly correspond to provinces.

3.2 Coverage by country

The map shows the overall coverage of NGA broadband across Europe by allocating each province to one of five bands – 0% coverage, between 0% and 35%, and so on. It shows the wide variation of coverage across the EU27 and also includes Croatia[ii], Norway, Iceland and Switzerland.

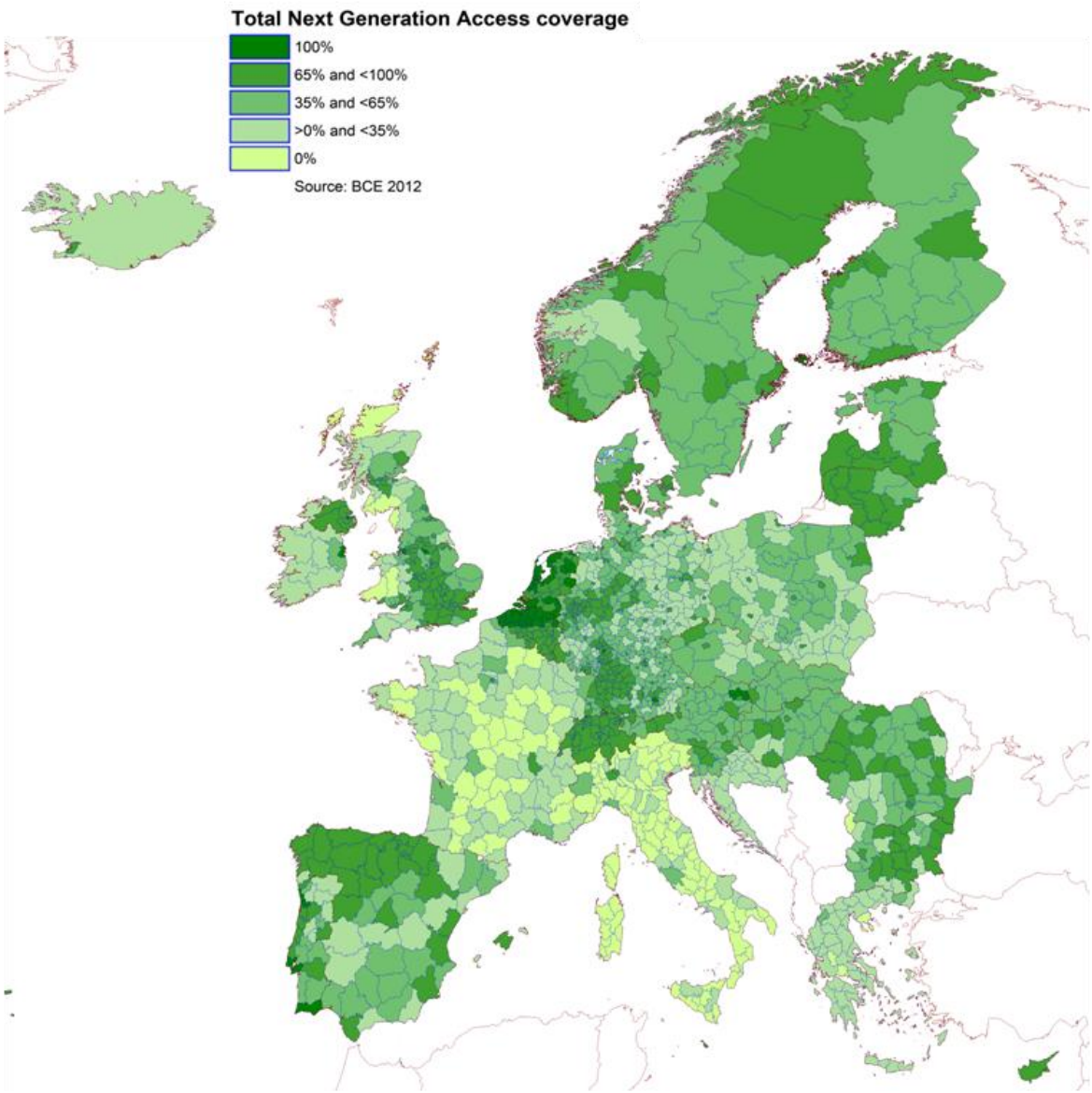
The highest coverage is in the Benelux countries plus Malta and Switzerland. These are all highly urbanised and relatively rich countries. Over 90% of homes in these countries can already get access to 30Mbps broadband service if they choose.

At the other end of the scale, four countries have NGA coverage under 25%. Remarkably, they include two of the biggest countries in Europe, France and Italy, plus Greece and Croatia in the Balkans. These countries all have relatively good telephone networks and absent or limited cable network coverage. As a result they have relied mainly on DSL for broadband services until now and have not developed superfast alternatives to the same extent as other countries.

In between these two extremes lie the other 22 countries covered by the map, all with between 40% and 80% coverage. One striking feature is that a number of relatively poor eastern EU countries are high on the list. Most notable are Lithuania and Latvia but the map shows that several others (Slovenia, Romania, Bulgaria and Hungary) have high NGA coverage in the big cities even if the overall percentage is in the average range. Here the combination of deficient telephone networks and the opportunity to wire up apartment blocks at low cost has driven wide coverage of FTTP.

Other countries, in Scandinavia and Northern Europe, are high on the list because they have been rich enough to finance extensive FTTP networks even though they already had good cable and VDSL coverage on the whole. But Portugal and Spain have been able to use the economic development case to develop extensive FTTP services as well.

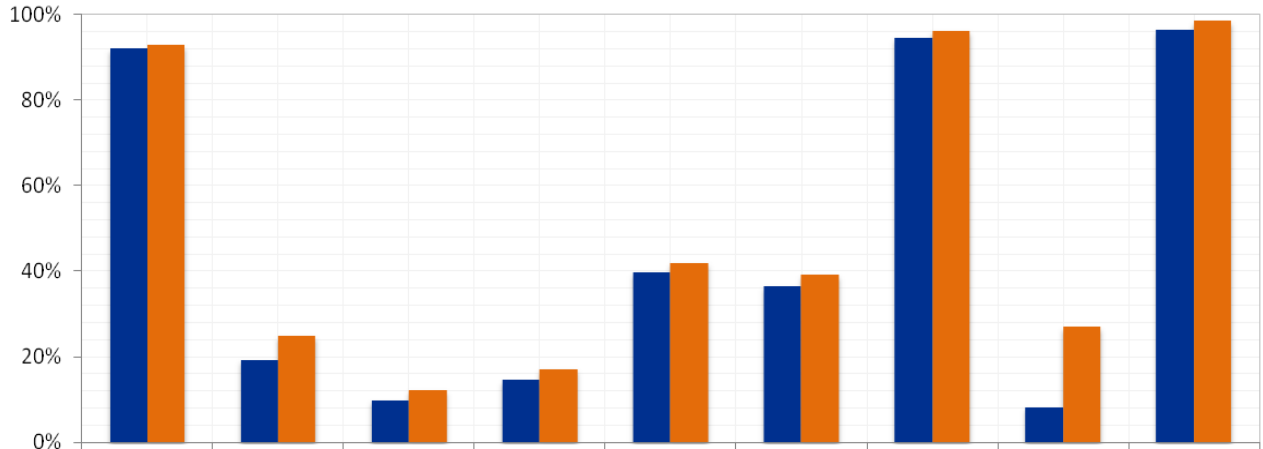
Figure 2 NGA Coverage by province, end 2012



3.3 Coverage by technology

Three technologies provide fixed-line NGA services in Europe. But their prospects differ substantially. Docsis 3 has grown very rapidly with the upgrading of cable networks – but that process is almost completed. FTTP grew rapidly in some countries where it can offer low costs – but its best markets are close to saturation. VDSL came late to the market but is now the fastest growing superfast technology.

Figure 3 EU 27 total coverage by technology, end 2011 and 2012



	DSL	VDSL	FTTP	WiMAX	Standard cable	Docsis 3 cable	HSPA	LTE	Satellite
2011	92.2%	19.3%	9.9%	14.6%	39.9%	36.6%	94.7%	8.3%	96.6%
2012	92.9%	24.9%	12.3%	17.2%	42.0%	39.3%	96.3%	27.0%	98.6%

Source: Broadband Coverage in Europe in 2012, a study by point-topic.com for the European Commission

Many people are surprised by the picture presented by the bar chart because it contradicts the common public perception of the relative availability of superfast. This is because the emphasis in the media is generally on the coverage of FTTP services. Regular research, mainly sponsored by the FTTH Council, shows that, the UK, for example, continues to be very low on this measure.

But as the chart shows FTTP is both the smallest and the slowest growing of the three superfast technologies. When the coverage of all three is taken into account, the UK and Germany in particular are seen to be well ahead in superfast coverage compared with countries such as Sweden and France which are generally regarded as leaders in telecoms technology.

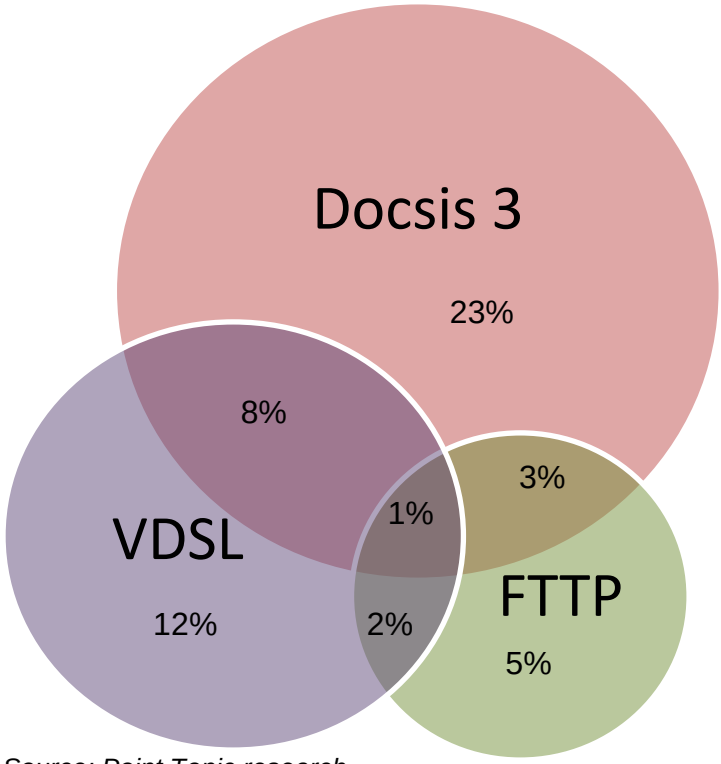
3.4 Overlap of technologies

While over half of all European households can access a superfast broadband service, Point Topic estimates that 23% can only access Docsis 3 and only 1% have a choice of all three technologies. The Venn diagram on the next page shows roughly how the three NGA technologies overlap.

At the end of 2012, Docsis 3 was by far the biggest superfast technology in Europe, passing 39% of all homes. VDSL was next with 25% of homes covered and FTTP had only 12%. If the technologies all complemented each other then 70% of European homes would be able to get fixed-line superfast broadband if they wanted it. But in fact, as the Venn diagram suggests, they overlapped extensively.

The overlap percentages shown above, totalling 14%, are based on simple top-down estimates using conditional probability for Europe as a whole. In fact the actual overlap is higher. Point Topic's "NGA Competition Map" will provide a detailed picture of the extent of overlap taking a bottom-up approach starting at provincial level.

Figure 4 Coverage and overlap of fixed-line NGA technologies in Europe, end 2012



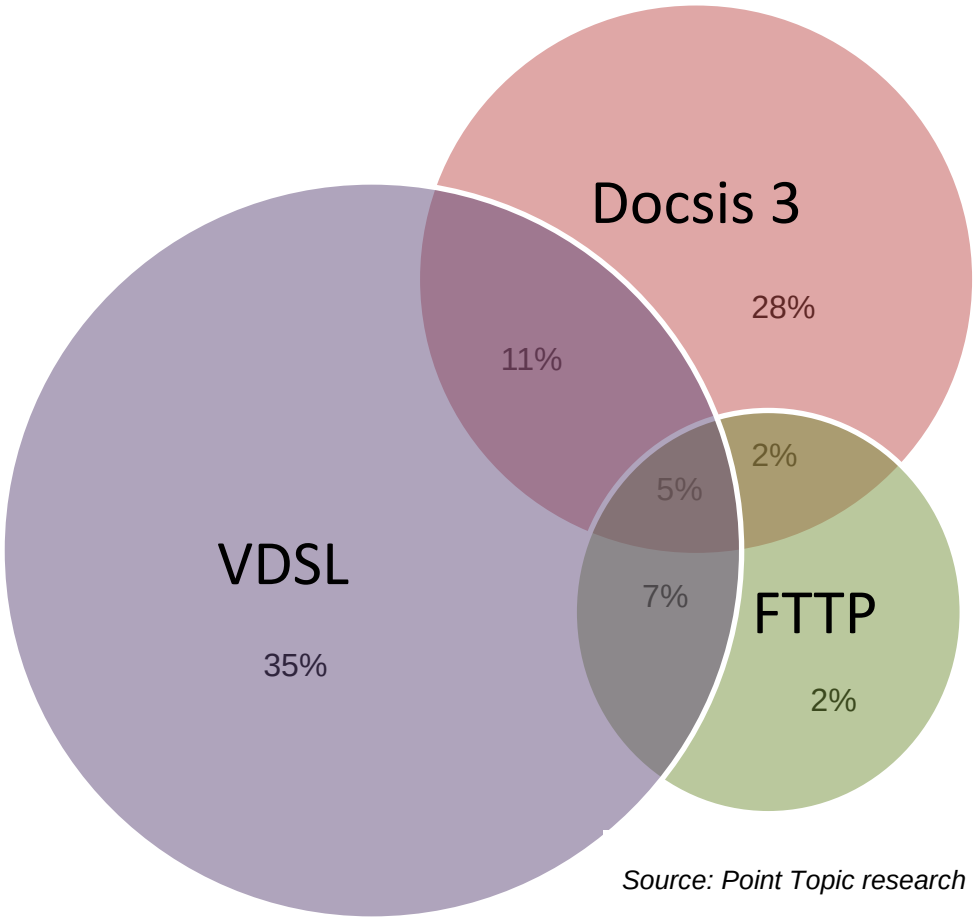
Source: Point Topic research

Estimates of technology overlap need to take account of the fact that superfast technologies generally favour urban areas and leave rural areas without coverage. The "NGA Competition Map" is based on Point Topic's European Kilometre Grid which provides an objective framework for segmenting each province into urban, semi-rural and rural areas. This provides a firm basis for estimating overlap and also showing where superfast coverage is completely lacking.

3.5 Forecasts of coverage

Point Topic has also made an initial top-down forecast of superfast coverage and overlap in Europe by 2020 – by when the Digital Agenda aim is to have 100% superfast coverage. Taking account of the relative growth rates and economics of the alternative technologies this leads to a forecast of 73% coverage by VDSL, 45% by Docsis 3 and 16% by FTTP.

Figure 5 Projected coverage and overlap of NGA technologies in Europe, end-2020



Source: Point Topic research

The reasons for the expected success of VDSL are based on economics and technology. VDSL uses an already-existing network; FTTP and Docsis 3 will require the construction of new networks to continue their expansion. At the same time improvements in VDSL performance with the introduction of vectoring and the G.fast standard will keep VDSL competitive in the speed range which most home users will want in the years up to 2020.

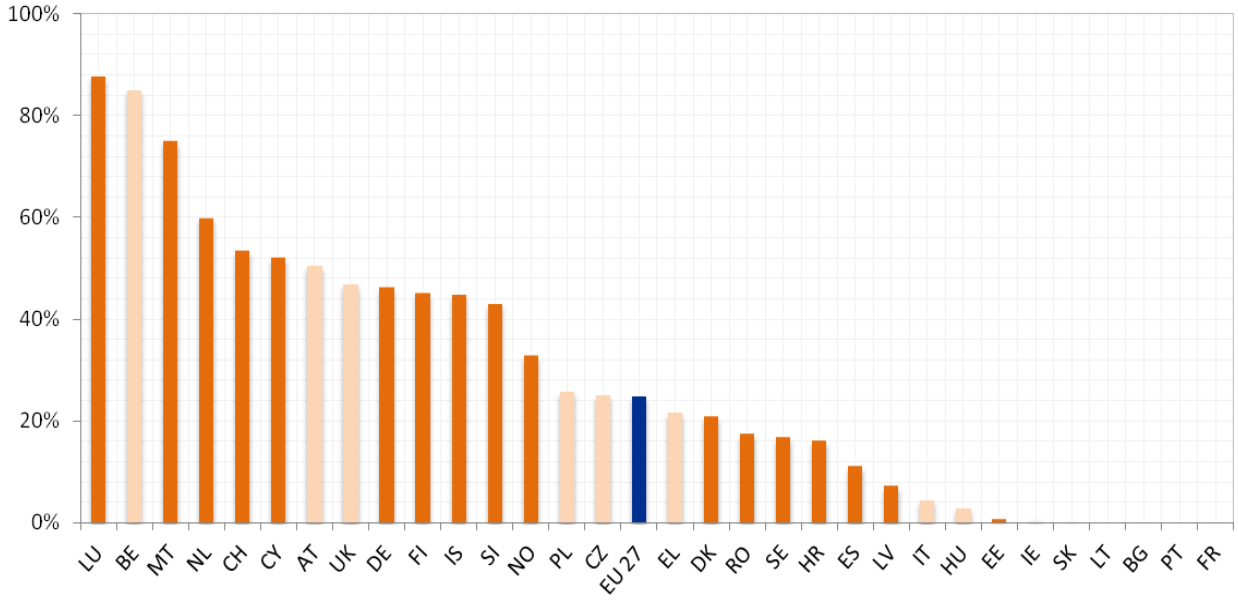
However, this forecast is limited to 90% superfast coverage, leaving the last 10%, generally the most rural and remote areas, without coverage. In fact, Point Topic is confident that a high proportion of the remaining 10% will also achieve fixed-line superfast coverage by 2020. But we think that coverage will be gained very much on a case-by-case basis, with ad hoc solutions for relatively small areas which take advantage of particular local opportunities. These solutions will tend to favour FTTP much more for the last 10% than for the coverage of Europe as a whole. Thus we expect the total percentage of FTTP coverage will be significantly higher than shown here. If superfast coverage of Europe is near to 100%, then FTTP should reach at least 20% of homes.

4. Focus on VDSL coverage

At the end of 2012, 25% of households in the European Union were able to access VDSL services. VDSL was the fastest-growing NGA technology in Europe in 2012, with coverage ahead of FTTP but still behind Docsis 3.

Twelve countries had over 40% coverage, well ahead of the European Union average of 25%. No VDSL coverage was reported for Bulgaria, Lithuania, Portugal or France. A further six countries had limited implementations covering less than 10% of households.

Figure 6 Total VDSL coverage by country[iii], end 2012



Source: Broadband Coverage in Europe in 2012, a study by point-topic.com for the European Commission

The 31 countries covered by Point Topic's research can be grouped into categories which reflect their very different superfast situations and directions.

Superfast rich

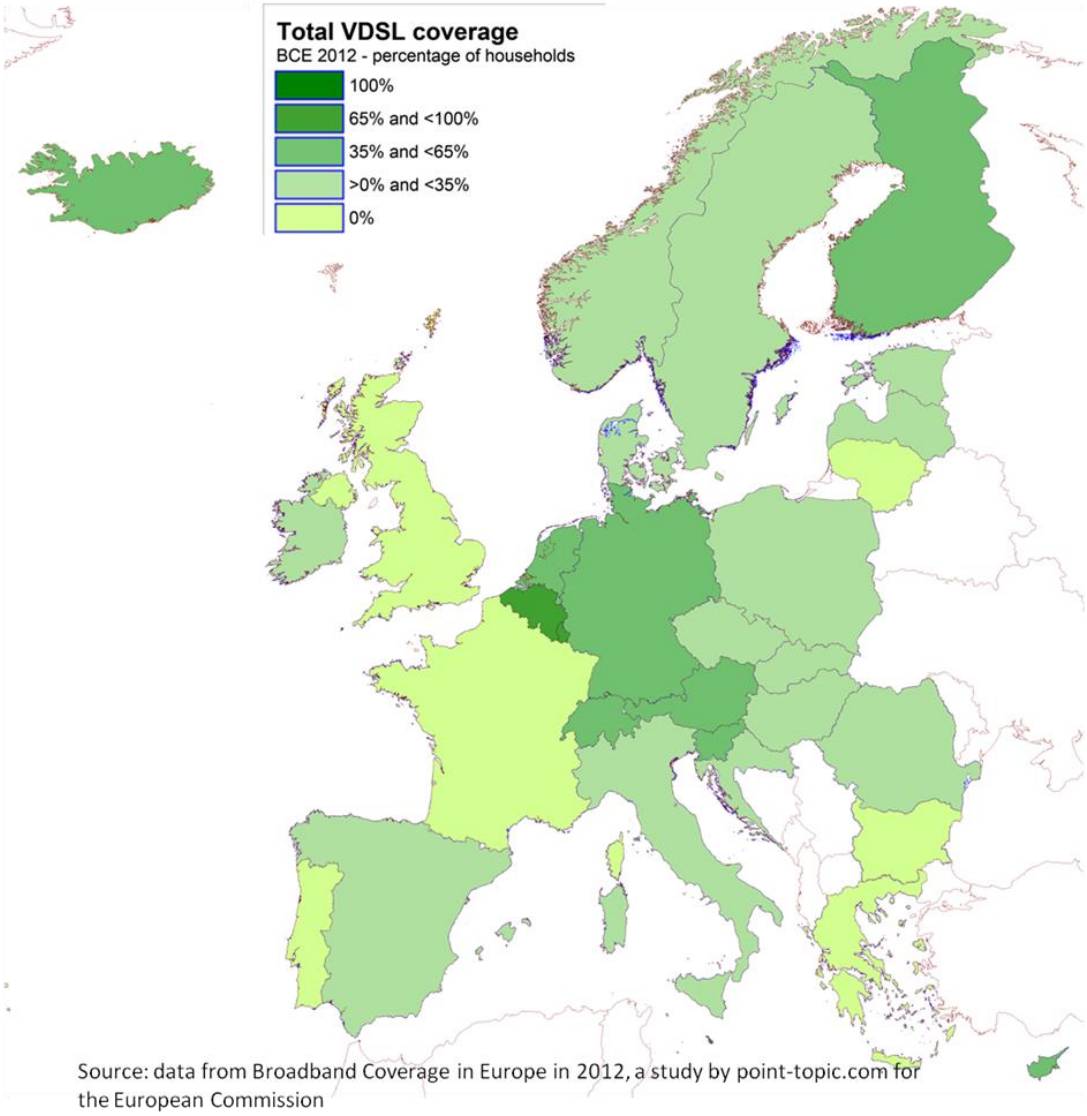
The "Superfast Rich" countries include Luxembourg, Belgium, the Netherlands, Malta, Finland and Slovenia within the EU, plus Switzerland and Iceland. They all have high coverage of VDSL and at least one other superfast technology, Docsis 3 cable in most cases. Only Luxembourg has high coverage of all three. Finland, Iceland and Slovenia are the only other ones with high coverage of FTTP.

Most of these countries are also rich in general economic terms and the exceptions have other good reasons for high superfast coverage. Malta is both the smallest and the most urban country in the EU, which makes superfast rollout attractive. Slovenia has been developing superfast capability with special reference to IPTV coverage since the mid-2000s and has also been more successful than most countries in organising complementary rather than overlapping coverage of superfast networks.

VDSL Led

The next group could be called "VDSL Led" countries. These are using VDSL as their main route to increasing superfast coverage. Germany, the UK, Austria and Cyprus already have high VDSL coverage and it is either their biggest superfast network or close to becoming so. Four others in this group are Poland, the Czech Republic, Greece and Croatia. They have only medium VDSL coverage so far and it is generally second to cable in superfast coverage (except in Greece which has no cable) but again, VDSL is set to become the most widespread superfast choice within a year or two.

Figure 7 VDSL coverage bands map by country, 2012



VDSL Contributing

"VDSL Contributing" is a group of countries where VDSL is playing a significant role but is secondary to other technologies and the emphasis is already on FTTP or likely to become so. Three of them have the advantage of Scandinavian income levels and technology – Sweden, Denmark and Norway – while the fourth, Romania, combines high-density housing, a deficient telephone network and

fiercely competitive infrastructure investment to make FTTP the most attractive choice in most situations.

FTTP Led

On the other hand, the wholly "FTTP Led" countries have low or even zero VDSL and, in many cases, limited telephone networks. They are either in the Eastern EU (Estonia, Latvia, Lithuania, Hungary, Slovakia, Bulgaria) or Iberia (Portugal and Spain). For the Eastern EU countries, their legacy networks and housing stock – with a high proportion of the population living in apartment blocks – have meant that fibre-to-the-building is an economically attractive solution for rolling out broadband. Portugal and Spain have faced similar issues and have been able to use development funds to improve broadband coverage.

Spain could be seen as on the edge of this group. It has the highest existing VDSL coverage of all the countries in the group and relatively low total FTTP + Docsis 3 coverage. VDSL is likely to play a bigger role in Spain than in other FTTP Led countries.

VDSL Expected

The "VDSL Expected" group includes just three countries where VDSL coverage is currently low or zero but, in Point Topic's view, is likely to play a rapidly growing role in the near future. And since the group includes Italy and France, together with Ireland, what happens in it will have a major effect on the overall average for Europe. These countries have been slow to adopt VDSL, preferring to emphasise FTTP solutions, for a mix of historical, ideological, technical and financial reasons. Now the focus is shifting and rapid growth of VDSL is expected in 2014-16.

A key development was the decision by the Committee of Experts in April 2013 in favour of allowing VDSL2 on France Telecom's network. The government is still committed to fibering 60% of France by 2020 but it seems likely that simple economics will shift the balance in favour of VDSL, ie FTTC, rather than FTTH or even FTTB.

5. The challenges for VDSL

The growing role of VDSL in delivering superfast services is clear, but is the technology strong enough to meet the needs of Europe between now and 2020? How does its performance match up to the Digital Agenda speed targets? Will it be acceptable from a regulatory point of view? Can it provide the basis of the robust, predictable, uniform networks which service providers need? Will it be able to prevail in the political and marketing battles it faces?

Download speeds

How fully can VDSL meet the objectives for 30Mbps and 100Mbps coverage set by the EU's Digital Agenda?

While VDSL today offers a big increase in download speeds for most users it still falls short of the 30Mbps level for a high proportion of them. But with the arrival of vectoring technology VDSL speeds should be approximately doubled.

Vectoring is now being trialled in many countries, in Europe and worldwide. Point Topic expects the trials to lead to fully commercial services starting in 2014, with vectoring becoming general between 2014 and 2017. On this basis VDSL should be offering 30Mbps and above for almost all homes passed by 2020.

On the other hand, even with vectoring VDSL seems unlikely to offer a reliable 100Mbps service to more than a small minority of users. Although vendors like to talk up the capability of their products, real user download speeds of 100Mbps seem to be at the limit of their range.

A further development in the pipeline for copper-based broadband is the G.fast standard, which will bring fibre to "the curb", typically a local distribution point, and hence is sometimes called FTTdp. G.fast will still use the copper telephone line for the last tens of metres to the end user, which means that it will be able to deliver symmetrical services of hundreds of megabits each way. But the extra cost will be significant and it is not yet clear how much contribution G.fast will be making by 2020.

Regulatory issues

Regulatory issues provide one possible impediment to the rapid rollout of VDSL, particularly with vectoring. The way vectoring works is by cancelling-out the crosstalk interference between different VDSL services in the same telephone cable bundle. This means there has to be a single control over all the services provided in the bundle, which rules out different operators operating their own lines independently, at least on any simple model.

Regulators are addressing the need to ensure maximum competition in this situation by developing new rules. BNetzA, the German regulator, faces what is probably the most complex and developed market, with VDSL unbundlers already present in many street cabinets, and alternative network operators (ANOs) taking the lead in rolling our VDSL in some areas where Deutsche Telekom does not yet offer it. BNetzA's proposed regulation addresses the issues involved so as to maximise competition while enabling the performance improvement of vectored VDSL and preserving the value of existing investments as far as possible.

Most other countries will be able to manage with a simpler solution, for example where VDSL unbundling has not yet developed.

A more long term, and possibly more difficult, issue is the need for transparency about what VDSL can be expected to deliver. As with other DSL technologies, what VDSL provides is essentially a best-efforts service. Since performance depends heavily on a variety of unpredictable local factors (such as the technical quality of the individual line or interference sources) it is hard to predict what speed a particular user can expect to get until the service is actually set up.

This makes it all the more necessary for broadband stakeholders to have the best information which is available. Policy-makers need to know whether VDSL will in fact be able to provide a satisfactory service in a given area. Investors and ANOs need to identify where a competing network could be viable. End-users simply want to know if they will be able to get the broadband services they need. Overcoming the tradition of secrecy about network configurations and details to get access to the information which the public needs could prove quite difficult.

Adequate solutions to these issues are available. Regulators and communities may need to be quite tough to ensure they are provided.

Network issues

The "best efforts" nature of VDSL is a problem for the network operators as well as other stakeholders. It restricts their ability to run comprehensive marketing campaigns and make firm promises of high performance. The issues include "gaps in coverage", "gaps in quality" and "distance from the cabinet".

"Gaps in coverage" refers to the situation where the basic telephone network is not available. This applies to quite a high percentage of homes in many eastern and southern EU countries although it can prove difficult to identify exactly where.

"Gaps in quality" occur where the network does exist but it is technically not good enough to carry acceptable VDSL services. This may be because of earlier economy measures, such as using aluminium instead of copper, or because it is old and much modified.

"Distance from the cabinet" reflects the fact that DSL performance falls off sharply with distance. Street cabinets in urban areas usually have all their users within a few hundred metres, which is fine. But there are always exceptions and, in rural areas particularly, individual properties, even whole villages, may be at the end of cables which are kilometres long.

The best way to address all these issues will be to build new networks, or network segments, to fill the gaps and bring distant users within VDSL range of a fibre point-of-presence. Such networks will require extending fibre, whether all the way to the home or reverting to copper for the last few metres.

6. Conclusions

VDSL should be the leading superfast broadband technology for Europe over the next decade.

Using VDSL as the major vehicle for delivering the Digital Agenda objectives and, more fundamentally, for meeting Europe's economic and social needs for broadband, will have its problems. But Point Topic believes that it can work, and we expect that it will.

In most areas where superfast is not yet available VDSL will provide the lowest cost and fastest route to the European Union's objective for 30Mbps broadband for all by 2020.

Countries which have been slow to recognise the role of VDSL need to catch up quickly. Industry and operators need to make the case that VDSL is the best technology for now, not second-best. Europe needs infrastructure investments which will repay their cost. VDSL meets that criterion because it can deliver a good revenue return for the investors and economic growth for Europe.

7. About Point Topic

Point Topic was founded in 1998 to focus on providing factual data on internet access and broadband in a particular. Detailed mapping of the take-up and coverage of broadband services has been a special focus for Point Topic since 2006. Find out more about our work on our website – www.point-topic.com.

UK Broadband Geography

Point Topic has been mapping the availability and take-up of broadband in every postcode (1.7m geolocations) in the UK since 2005.

We have an unmatched research programme that allows us to model the geography of the UK broadband internet market in fine detail. The full database can be purchased for the whole country, or the specific areas that you are interested in.

European Space Agency

Using Point Topic's maps of current and future broadband availability in Europe, the European Space Agency (ESA) was able to identify areas where satellite could provide a competitive option for broadband services. The dataset included every NUTS 3 area in the EU27, plus six other European countries. NUTS 3 areas typically correspond to provinces in Europe.

The project was also able to establish the potential role for satellite broadband in the context of the EU's Digital Agenda targets.

Broadband Coverage in Europe in 2011 and 2012

The European Commission asked Point Topic to discover how far its member states had progressed towards providing basic broadband to all by 2013 and superfast broadband to all by 2020. To find out, Point Topic mapped the coverage of nine broadband technologies in every NUTS 3 area in the EU27, as well as Norway, Croatia, Iceland and Switzerland.

Point Topic believes that this project continues to provide the best view of broadband coverage in Europe. Our positioning in the broadband market place, combined with our experience mapping broadband on other highly relevant projects helped us to deliver more accurate assessments of coverage at the country level and a graphic picture of coverage across Europe.

Mapping for every European country now offered

Point Topic now offers broadband availability datasets at a post-sector level for most of Europe. The data is essential for any organisation which is targeting a broadband opportunity and needs good data to take it forward.

The service provides in-depth broadband market information at a high geographical resolution. It enables the fact-based preparation of everything from policy decisions and business cases to network plans and marketing campaigns.The service covers all countries in the European Union and others on request.

By providing essential data at a low cost it opens up these broadband markets to increased competition. Europe Detail makes it much easier for new or established broadband players to research alternative opportunities and choose the best ones for them.

8. Further reading

The paper is based mainly on results from the research projects which Point Topic carried out for DG Connect of the European Commission. Published references include:

- Digital Agenda for Europe Scoreboard
- Digital Agenda for Europe Scoreboard Report
- Broadband Coverage in Europe in 2011

  Last year's report produced by Point Topic for the European Commission. Point Topic's BCE 2012 report is due to be published in Autumn 2013.

- Europe's Broadband Investment Needs

  A report by Point Topic looking at the investment needed to complete superfast broadband coverage of Europe.

[i] Country codes for Figures 1 and 6 are as follows: AT, Austria; BE, Belgium; BG, Bulgaria; CH, Switzerland; CY, Cyprus; CZ, Czech Republic; DE, Germany; DK, Denmark; EE, Estonia; EL, Greece; ES, Spain; EU, European Union FI, Finland; FR, France; HL, Croatia; HU, Hungary; IE, Ireland; IS, Iceland; IT, Italy; LT, Lithuania; LU, Luxembourg; LV, Latvia; MT, Malta; NL, Netherlands; NO, Norway; PL, Poland; PT, Portugal; RO, Romania; SE, Sweden; SI, Slovenia; SK, Slovakia; UK, United Kingdom.

[ii] Croatia became the 28th member of the EU on 1 July 2013.

[iii] The difference in the shading of the bars for different countries in Figure 6 reflects differences in the definitions of the figures provided. The more solid bars show where the definition refers to VDSL services able to provide downstream services of at least 25Mbps. The lighter bars apply to countries where the figures provided cover all VDSL services, not just ones over 25Mbps, or where no explicit definition was provided.