



DSL White Paper

A new Nexans DSL Application Centre to help Telecom operators deploy Triple Play

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Synopsis

This Special Report highlights the new DSL Application Centre located in Santander, Spain, which tests DSL cables under actual operating conditions, thus allowing telecom customers to find the optimized cable type and configuration when deploying Triple Play.

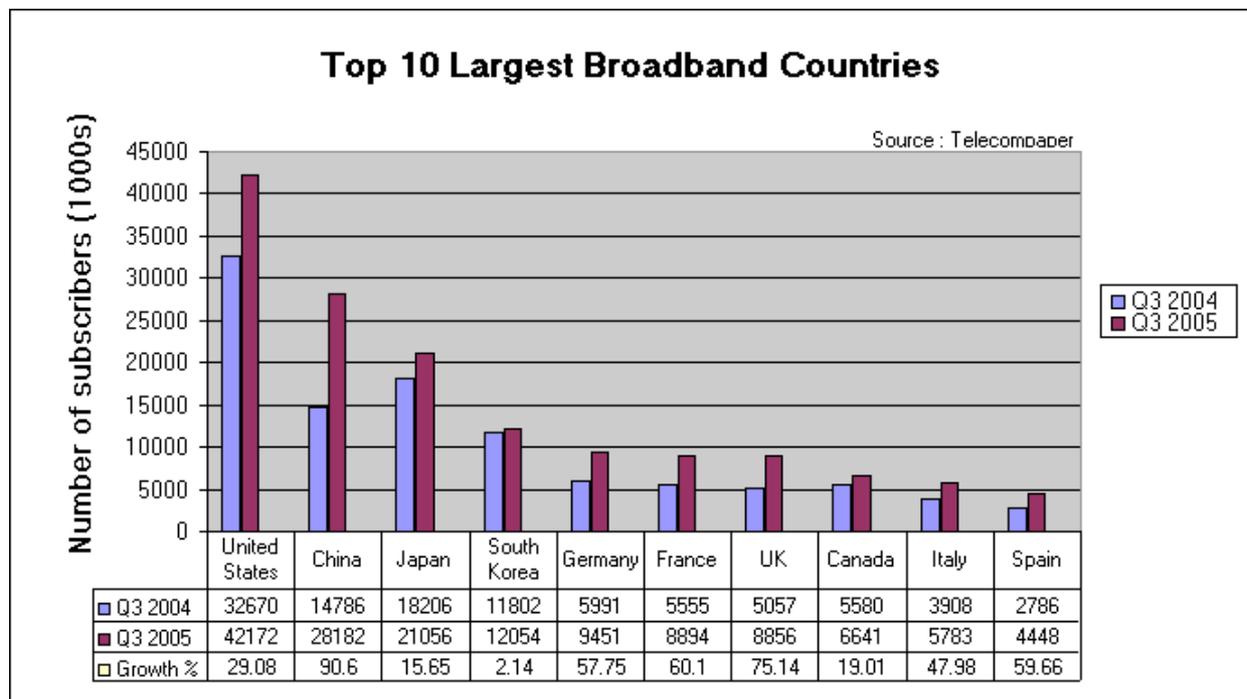
The Report first explains that the major problem facing today's operators is the "eligibility" of subscribers to receive Triple Play services, primarily multi-channel television. Then it updates figures concerning the proliferation of broadband and expanding DSL infrastructures worldwide. It explores operator's strategic DSL development and explains Nexans double response: first, its product, enhanced DSL copper cable; and secondly, a new service, the DSL Application Centre. It briefly outlines benefits for the operator, and finally explains how fiber solutions can be used to further extend DSL for operators wishing to deliver full Triple Play services to a maximum number of subscribers.

1. The major problem for Operators: subscriber “eligibility”

The major problem for operators today is “eligibility,” i.e. the capacity for subscribers to get maximum services in terms of voice, data and image no matter where they live. Each subscriber line must support the maximum number of services, especially multi-channel television (which is a big consumer of bandwidth). Because of intense competition among operators, there is no longer a choice open to them. They **must** deliver Triple Play. The largely copper infrastructure that once supported only analogical telephone must now support high data speeds capable of handling online television, and eventually HDTV. Nexans’ new DSL Application Centre works in partnership with Telecom Operators and Telecom OEMs to allow them to draw up an initial diagnostics of existing infrastructure; and then to show in a second diagnosis how enhanced copper cables could allow them to offer more services. It is the qualitative and quantitative difference between these two diagnoses that creates added-value to their infrastructure, allowing DSL to deliver advanced Triple Play to a large number of subscribers, thus generating additional revenue.

2. Update: continuing proliferation of broadband worldwide

Broadband is continuing to proliferate worldwide, with broadband connections now outnumbering dial-up connections in many countries. In fact, in the US, broadband penetration among active Internet users recently reached 63.76%, and is still rising. Broadband continues to be driven by PC applications, video-phones, networked gaming consoles, home security devices, and especially video and multi-channel television (with high-definition television services on the near horizon). The US leads all countries with 42,200,000 total broadband subscribers with approximately 30% yearly growth, followed by China with 28,182,000 subscribers and Japan with 21,056,000 subscribers. However, at its current growth rate of over 90% a year, China should overtake the US in total broadband subscribers by the end of 2006. According to the worldwide Broadband Survey, the top ten are currently as follows:



Both the US and China have a long way to go in terms of penetration (i.e. connections per 100 households). Here, the ten world leaders are: Hong Kong: 73%; South Korea: 67%; Israel: 55%; Taiwan: 55%; Netherlands: 54%; Singapore: 51%; Denmark: 51%; Finland: 49%; Canada: 46%; Japan: 44%. The United States has 33% penetration per 100 households, putting it in 19th place, between the UK (33.5%) and Slovenia (32%).¹

**176 million
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Roughly speaking, there are currently 176 million broadband subscribers worldwide, with 115 million of these subscribers (approximately 65%) having chosen DSL.²

3. Expanding DSL infrastructures

Various forms of DSL already reached 115 million subscribers worldwide by end June 2005, with half a million people choosing it every week. European Union countries constitute the largest regional DSL population, with Germany standing first, followed by France, Italy, the UK, Spain, the Netherlands, Belgium, Sweden, Switzerland and Denmark. Western Europe and Asia Pacific lead growth rates (approx. 25%), followed by North America; however developing areas in Southeast Asia are also showing exceptionally high rates of growth (15%).

The UK is the fastest growing established DSL market, growing by over 20% to reach almost five million subscribers, but other fast-growing countries are generally those at an earlier stage of market development. Turkey has added almost 180,000 subscribers to DSL services in 2005 – representing a growth of 39%. Significant growth in DSL subscribers is also evident in Thailand (27%), Poland (25%), Mexico (19%) and Portugal (18%).³

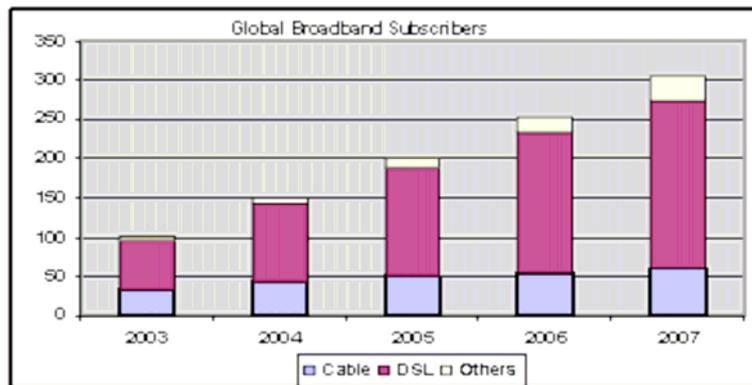


Figure 2: Broadband Connection Study

¹ All charts and figures are available at www.websiteoptimization.com/bw/0601/

² According to the DSL forum (30 June 2005)

³ See the ISP Review at www.ispreview.co.uk

4. Operator's strategic DSL development

Basic analogue telephone service on conventional copper infrastructure has been operational for many years, and was adequate to providing dial-up "narrowband" access to the Internet at approximately 56 kbit/s. However dial-up narrowband access no longer corresponds to subscribers' expectations. Subscribers now want speedier access able to cover more services. To meet these customers' expectations, operators are widely deploying successive generations of DSLAMs (Digital Subscriber Line Access Multiplexers) able to support more and more bandwidth.

To connect DSLAM equipment on the existing PSTN network, most operators first used cable specifications previously employed for their Switching equipment connection, i.e. low frequency cable specifications. However, the emergence of aDSL2+ and the increase of "allocated bandwidth per subscriber" have forced operators and equipment vendors to seriously consider higher cable specifications. This is a first step in improving overall DSL line performance.



In a second phase, operators looked at their outside plant to see how this could be improved, as well, so as to deliver advanced DSL. An obvious step was to start with their yearly repair and maintenance operations, and instead of simply replacing "low specification level cable" (defined for analogue services) by the same cable, most operators have shifted to, or are now shifting to, higher specification level. At this stage, what they are looking for is not a high-definition cable but a cable that will contribute in a measurable way and in combination with DSLAM equipment cable to enhanced DSL line performance thus increasing subscriber eligibility

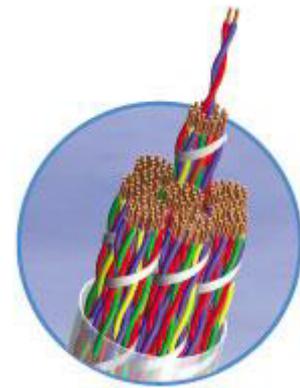
5. The Nexans PRODUCT: Enhanced xDSL Copper Cable

Bearing in mind the axiom "the longer the line, the lower the data rate," it does not matter what the Central Office Digital Subscriber Line Access Multiplexer (DSLAM) is capable of delivering in terms of bit rates if the outside plant is unable to deliver downstream to the customer. On this depends consistent QoS, high bit rates, the number of services available to subscribers (fewer services equal less revenue for the Service Provider), and optimized geographical coverage.⁴

⁴ Note that doubling the radius of outside plant quadruples the area of coverage ($\pi \times r^2 = \mathbf{A}$); thus, multiplying the potential customer base by a factor of four (subject to population distribution, of course).

Nexans has developed a Copper Enhanced xDSL cable solution to allow operators and equipment vendors to get the best from their copper cable infrastructure by allowing them:

- Either, to extend distances from Central Offices to distant subscribers. This means that subscribers who were too far away to receive basic DSL or advanced Triple Play services can now do so
- Or, for a given subscriber at a given distance from the Central Office, to increase the data rate, meaning that this subscriber is now eligible for faster Internet or more services



During a preliminary test program, Nexans heavily invested in the duplication of a one to five km outside plant installation to demonstrate: first, the correlation between the copper cable used and the xDSL service performance levels; and secondly, the superior performance (in terms of outreach and data rates) of enhanced cables over current analogue voice cables.

After one year of Research, Nexans identified an optimized design for Enhanced xDSL cable. The superior performance of such an Enhanced xDSL cable allows operators and their DSLAM equipment suppliers to significantly increase data rates and geographical reach. This translates into more services available for more potential customers and better Quality of Service for all customers

When we compared regular POTS cables and Enhanced xDSL cables (both indoor and outdoor), it was demonstrated that:

- Up to 50% more services could be delivered to customers located within a 2.5 kilometer radius, and better Quality of Service to the subscriber
- The reach could be extended by some 40%, meaning the availability of broadband for significantly more subscribers

Moreover, enhanced xDSL cables indoors combined with standard 1km POTS cables outdoors (compared with POTS both indoors and outdoors) greatly reduced the discrepancy between subscribers. Now, all of them become potentially eligible for Triple Play services.

The Nexans Copper Enhanced xDSL cables also offer other advantages to both operators and equipment suppliers:

- High availability and steady source of supply
- Excellent EMC performance within a “noisy” environment
- Easy installation because of standard size and special sheaths
- Fire-reaction and fire-resistance for indoor safety
- Future headroom for tomorrow’s needs (quadruple play, wireless convergence)

6. The new Nexans SERVICE: the DSL Application Centre

To further support its customers in deploying the right kind of cable in the optimum configuration, Nexans developed a unique DSL Application Centre for his customers. This is a value-added service which focuses on performance and bandwidth, rather than on standard cable characteristics.

Nexans went directly to Telecom Operators to find out what they needed to increase the quality of their Internet offer, win new customers, and lower capital investment and operating costs.

Because Telecom Operators do not sell cables, lines or connections to their subscribers, but rather bandwidth and services, they above all wanted to pre-test xDSL performance so as to have the assurance that a level of service could be achieved in terms of distance from central office, reliability, and high data speeds.

Until now, there was no way to pretest cable performance in actual operating conditions.

It took Nexans one year to conduct all of the tests to develop the enhanced DSL copper cable mentioned above. Now, Nexans takes the process one step further. Nexans has also built up a so called "Nexans upgrading program" to enable Telecom Operators and Telecom OEM's to evaluate and compare actual infrastructure against projected, improved infrastructure (both indoor and outdoor) to show what performance levels could be achieved by rationally upgrading the system.

This is achieved in three phases:

Phase 1: Nexans carry out a diagnostic (I) on the operator's current network.

Phase 2: Nexans take a closer look in terms of basic elements, from the existing cable specifications: halogen-free, pairs, quads, configuration, etc.

Phase 3: The Group then apply what we have learned to carry out a second diagnostic (II) wherein enhanced or improved cables were substituted to older ones to achieve superior performance. Doing this, we are no longer looking at the cable in terms of mere "cable parameters," but for its contribution to higher data speeds and broadband performance.

Until now, there was no way to pretest cable performance in actual operating conditions.

Thus, there is not just a single solution, but each operator's business case has its own enhanced xDSL cable solution. If routing or distance is a prime concern, Nexans can show how this can be done the most effectively. Or, if data speeds are the priority, the team demonstrates how this can be achieved, as well.

What is significant is that the difference between diagnosis I and diagnoses II (III, IV, V, etc) shows how Nexans can create value for a particular DSL network and therefore measurable value for operators in terms of additional services to be delivered or additional subscribers to be reached within the framework of a Triple Play Strategy

This kind of customer support is a “first” for a cable manufacturer. It provides clear proof that Triple Play can be delivered to potential customers. It also backs up telecom marketing activities aimed at attracting new customers.

The Application Centre not only tests cables and infrastructure design, it also tests components, including Nexans components and others chosen by the customer. Eventually, it will play an important role in developing new components and equipment for telecom infrastructure. This is a clear benefit for operators and equipment vendors in terms of CAPEX & OPEX savings.



7. Benefits for the operator

The DSL Application Centre generates a number of important benefits to operators offering Triple Play. First of all, there is a possibility of expanding the number of subscribers because of longer reach and more density. Also, subscriber satisfaction will be high since enhanced cables and better service configurations will guarantee quality of service and improved performance. Then, Triple Play will be equally achievable for a wider population. Given higher capacity, a number of sophisticated services will be eventually added to the bundle, perhaps transparent mobile telephony delivered over the Internet, or multi-channel, high-definition TV.

8. Conclusion:

Enhancement of copper cable infrastructure has become a 'must' for most telecom operators who are reaching a mature phase in terms of Triple Play strategy, and also for others who want to anticipate and apply this same strategy in a more aggressive manner. This will lead some of them towards convergence: Triple Play on fixed line, and Triple Play delivered over mobile services, i.e. so-called Quadruple Play.

Nexans DSL solutions can both upgrade the outside copper network by replacing an aging infrastructure with enhanced DSL copper. This can be done either progressively, through ongoing repair and maintenance operations; or more proactively through the partial replacement of the vital last links within the framework of a strong commitment to VDSL/VDSL2 symmetrical broadband.

Thus, Nexans' telecom solutions are designed to support the broadband strategies of both operators and equipment vendors along two projected lines of development:

- Enhanced xDSL copper cables, interconnectivity, and services
- FTTx cable solutions including cost-efficient fiber optic micro blown cable technology to move the DSLAM closer to the subscriber by deploying optical fiber.

Nexans' telecom strategy is oriented towards value creation for its customers. The DSL Application Centre clearly demonstrates this by taking products, connectivity, installation and services one step further. By perfectly replicating a connection from Central Office to the Customer Premises it concretely shows in advance what a newly upgraded and reconfigured infrastructure can positively achieve.