



Fibre to the home

The Fibre to the Home Council has been testing out Jakob Nielsen's law about the rapid growth of bandwidth — and a sample of European countries shows that it does predict demand, writes Joeri Van Bogaert

Test of new law proves bandwidth will be used



Joeri Van Bogaert: improvements in broadband speeds are having a direct impact on consumer use of bandwidth

All fibre-to-the-home investment debates typically feature two basic questions about bandwidth: Who needs all that bandwidth and what will they use it for?

On his way out of BT in July last year, chairman Christopher Bland confronted this very question. At the time he questioned whether "most consumers" would actually need broadband speeds of any more than 16 or 24 megabits.

The UK's Broadband Stakeholders Group subsequently took a different view, reporting the latter speeds — facilitated by BT investments in ADSL2+ last mile technology — would be too slow to meet the demands of high-demand homes and businesses by 2012.

The rest, as they say, is history: Bland has since been overtaken by BT's £1.5 billion investment plan into 50-100 megabits a second fibre — see page 10.

The conclusion I draw from this is simple. Whatever the demand is — or is perceived to be — investment decisions are already being made on the basis that it will increase over time.

So what evidence are these investment decisions based upon? Is supply stimulating demand? Do current IT applications and consumption patterns exist to support such huge increases in bandwidth from pedestrian two-megabit ADSL to ultra-fast fibre broadband?

Silicon versus fibre parallels

The pace of development of computer processing power was made understandable to the majority when Gordon Moore devised his law and propelled his surname into technical semi-stardom.

Moore's Law tells us that — until further notice at least — computing power (the number of transistors on a processor, to be precise) will double every two years.

That increase doesn't just benefit computers of course, but also mobile phones, digital cameras, games consoles, media players ... the list is almost endless.

Why anyone would ever want to use such an increase in computing power is rarely, if ever, ques-

tioned. Applications get more powerful, smart phones get smarter, pictures and movies get sharper. It is as if the integrity of Moore's Law depends upon the demands being placed upon processing power. Without such demands, perhaps no-one would continue the innovation curve.

Less known, yet of at least as much importance, is telecommunications' equivalent: Nielsen's Law of Internet Bandwidth.

First postulated by Jakob Nielsen in 1998, it operates along similar, straightforward principles to Moore's, but with a wide-ranging research study undertaken in collaboration with Ventura Team, the FTTH Council Europe has been the first to ask the question: what is its correlation with demand?

The FTTH Council Europe's ground-breaking study into current broadband trends has found that improvements in broadband connectivity speeds are having a direct impact on consumer use of bandwidth, with demand per broadband home growing at almost 20% a year over the last five years.

The research is believed to be the first of its kind to directly test the hypothesis of Nielsen's Law of Internet Bandwidth against patterns of fibre and ADSL broadband usage in Europe.

Our exercise involved examining data from broadband markets in Poland, Spain, Sweden, the UK and France, and supplementing this with further research among users, ISPs and senior industry contacts. International comparisons were also made, including with US and New Zealand markets.

Law breaker, or abider?

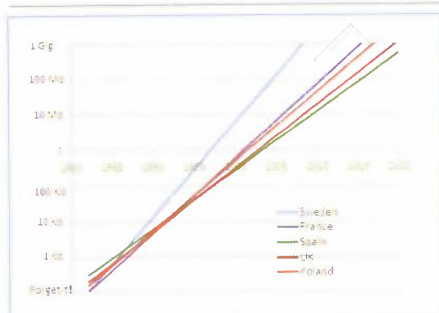
While Moore sees computing power growing 50% a year, Nielsen states that the physical bandwidth available to a high-end user grows at 50% per year. For the first time, the Council intended to find out if this increase in available speed is true and is related to an increase in consumer demand and usage.

In summary, the FTTH Council Europe report findings are as follows:

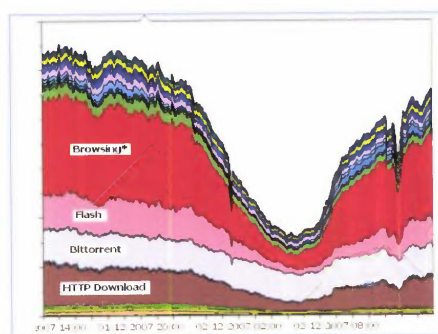
- European broadband access speeds are rising at 50%+ a year;
- high-end broadband usage — that is, consumption rather than access speed — per home is growing at 20% a year;
- FTTH broadband homes drive three times more traffic than ADSL in Europe.



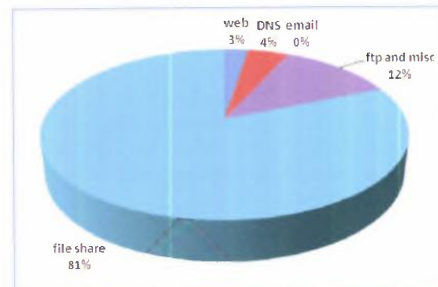
FIBRE TO THE HOME



The UK almost exactly matches Nielsen's predictions. Sweden is 10 years ahead of other countries



Traditional ADSL traffic pattern for a mid-sized ISP show browsing, including Flash from YouTube and HTTP downloads, dominate



Weekday late morning off-peak traffic on a consumer fibre network

The first part of the research tested Nielsen's Law from a technology perspective. It was found that a decade after it was first conceived, Nielsen's Law is still working well as a guide to the trend in broadband access speeds, as the growth rate of 50% a year held true as an average across the European countries evaluated.

The chart illustrates the trend curves for broadband access speeds in five countries, clearly showing Sweden as perhaps 10 or so years ahead of the others. The UK almost exactly matches Nielsen's predictions — the rate is 49.87% compared to Nielsen's 50% target — while the remaining countries are very similar. France fares better than most, and this is largely related to its recent acceleration in FTTH adoption over the last 12 months affecting projections over the coming three to five years.

Secondly, the study tested Nielsen's Law from a usage perspective, examining European broadband traffic patterns across a sample of 100,000 broadband homes using FTTH. The results of this research show that high speed broadband usage is growing at an

annual rate of 20%. This usage relates to the total traffic volume over a given period of time; or from a long-term average bitrate.

To further qualify this growth in consumer demand for increased bandwidth, the study compared fibre broadband usage with ADSL across four European countries and found that fibre homes currently drive three times more traffic than ADSL homes. The simple question of demand seems to have a simple answer; when customers have faster connections they use them more.

This rise in usage when networks are fibre is significant at this stage of market evolution. Already there is a large difference between the traffic used by ADSL and fibre users, and this despite the fact that many of the mass market applications that will realise the potential of fibre are not even available yet.

The Council expects this to increase significantly as fibre adoption continues to increase across Europe and further services are developed with fibre in mind.

High speeds equal low latencies

For many applications it is not only the sheer throughput but — more so — the latency involved in the transfer of large amounts of data which can only be reduced by high access bitrates. In the same way that the gigabit ethernet interface on most modern PCs is not there in order to generate a sustainable traffic of one gigabit a second, but in order to reduce the time required to transfer large files, the top speed of FTTH connections is not necessarily its intended continual or average speed.

If you've ever indulged in Gran Turismo or World of Warcraft online, you'll understand the critical importance of low latency. Gaming response times are largely governed by human eye-hand reactions, to the tune of about 100 milliseconds. The processing power and screen refresh capabilities of your gaming platform, meanwhile, will contribute another 75 milliseconds of latency.

Both of these factors constitute a level playing field for all gamers, no matter where they are or what connection they are using. However, using a fibre connection adds almost no meaningful latency — merely a few milliseconds.

On a good ADSL connection however, ADSL firewall traversal and line delays add another 100 milliseconds. Slim margins perhaps, but when online gaming is consistently listed among the top entertainment pursuits of a hundred million or so European 11-24 year-olds, it's an advantage most would like the opportunity to enjoy.

Games are not the only applications where latency and quality of service counts; far from it. High-quality — multipoint — video-conferencing, online multimedia communications and other real-time services might not be quite as trendy as World of Warcraft, but they have at least the same or higher requirements when it comes to network latency or transfer quality.

In the Swedish market, much comparable data is available enabling us to evaluate the differing mix of user behaviours between traditional DSL ISPs and fibre-network operators.

The second and third charts show how browsing — including Flash and HTTP download — dominate the traffic of a mid-sized Swedish ADSL ISP, while traffic on a Swedish consumer fibre network is largely composed of file-sharing or peer-to-peer sessions.

The comparison indicates that all consumer broadband users demand entertainment services, while in the fibre model the larger available bandwidth and speed of connectivity is enabling the access and exchange of large files, presumably because uploading and downloading are so much more rapid.

The far side of the chasm

In the past, discussions related to fibre-technology deployment could be divisive. Some staunchly defend and advocate fibre as the ultimate aim for 21st century broadband development; others reject it out of hand. Our research makes the case in favour, but not by itself.

Crucially, it sheds light upon the unseen business cases that European incumbents themselves have closely evaluated and agreed. Markets succeed when they meet a need. Today the voices within our industry supporting the need for fibre are in the majority, and they've committed significant investment to back it up. ■

Joeri Van Bogaert is president of the FTTH Council Europe.

The FTTH Council Europe will continue its research into significant trends in broadband consumer behaviour. Findings will be announced at the FTTH Council Europe's next annual conference to be held in Copenhagen on February 11-12 2009.

For more information, go to www.conference.ftthcouncil.eu

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