Next-gen broadband at your service

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Faster, smarter broadband networks are on the way, thanks to European research. The next step will be to usher in compelling services for European consumers. Already companies are eager to get their hands on the technologies developed by the MUSE project.

The work of European researchers on the first phase of the MUSE project accelerated the deployment of faster broadband networks in Europe (see 'Europe's next-generation broadband').

But the second phase of the project, which finished in March 2008, took the concept even further. It developed enhanced services and ensured that the product of phase I, the Global System for Broadband (GSB), can evolve to keep pace with emerging technologies and services.

"We really went quite far in phase II, developing some very advanced systems, but many of them are already quite mature and ready for pre-deployment validation," says Peter Vetter, coordinator of the EU-funded MUSE project.

Impressive achievements

The list of achievements is impressive. MUSE phase II developed a solution to support fixed-mobile convergence, multimedia services like IPTV, or internet television. It developed an innovative and compelling 'network intelligence' and provided solutions for plugging services and service providers into a network.

It also pushed back some fundamental boundaries in both vDSL and fibre-optic hardware.

Fixed-mobile convergence means that people can access their broadband service from wherever they are or use just one device for their telephone and video calls. At home, it uses the fixed line network, saving money. Once you leave the house it switches to a mobile network.

“It is almost seamless. The picture might freeze for a frame or two, but you do not need to reconnect the call or to use a password or anything like that,” Vetter explains.

The improvements to IPTV are very sophisticated, too. “The problem with TV over copper wire [the telephone network] is that you get bursty noise. That can result in lost frames or a frozen image. It is okay for data, because the system can just resend, but it is not good enough for video.”

So MUSE phase II developed intelligence in the access network. It is aware of the type of content being transmitted, and can retransmit lost data if required, before a viewer sees a problem.

They took the system further. “Many of the IPTV services offer time-delayed viewing, where you can watch something after it is first broadcast. We know most people watch the most popular shows, like news, sport and soap operas, between half an hour and an hour after they broadcast. That can cause a lot of sudden bandwidth usage, slowing down the network.

“So we developed a cache system in the access network, closer to the home. It saves bandwidth on the metro network.” It is as if subscribers are given a free Personal Video Recorder (PVR) or TiVo with their subscription, except the network stores the content instead of a hard disk

sitting on your television and you do not need to programme it in advance."

Residential gateways, too

MUSE also developed an architecture for residential gateways. Right now, the residential gateway in most houses is simply a modem or a router, but in the future it will include servers and databases for storing content.

Cleverly, and very subtly, the MUSE gateway architecture also handles authentication, configuration, quality of service, increased security for the homeowner's services, and automated remote management so consumers should experience fewer problems when setting up a new service. It is a big plus to the system.

The project also developed various business scenarios with different service providers, whether the network owner, the ISP, a television company, corporate services, or even a combination of all these. Based on these scenarios, they worked on a variety of network interfaces, to make the network solutions flexible for any of these deployment scenarios.

As if that were not enough, MUSE phase II also pushed back the technical limits on many of the technologies for broadband. They pushed vDSL technology in standardisation so it can achieve 100Mbit/ (instead of 10s of Mbit/s) and be more robust against impulse noise.

They pushed optical fibre, so it can carry 10Gb/s, and extended its potential range, from 20km to 100km. Right now, the fibre tree is split between 32 or 64 houses, but MUSE proved that it could be pushed to split between 500 or 1000. In almost every area the project touched, it improved or enhanced the required protocols, software and hardware.

Unsurprisingly, industry is banging on MUSE's door to get at the results. "There are lot of companies working in bilateral arrangements to validate many of the technologies we worked on," confirms Vetter. "Intelligence in the access network, in particular, responds to current problems faced by the telecoms companies and service providers. I don't think it will be too long before some of these enhanced services are deployed."

"Other areas are more long term, and work continues on almost every aspect of MUSE. But ultimately it will mean better broadband access and services for Europe. And the system is designed to evolve, too, so it should be able to keep pace with new developments."

And that means Europe's surfers will get next-generation broadband, at their service.

This article is part one of a two-part feature on MUSE, a project funded by the Sixth Framework Programme for funding.

Ref: P. Vetter et al., "Recommendations for a Multi-Service Access Architecture from the European MUSE project", Bell Labs Technical Journal 13 (1), 2008, pp. 11-28.
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