

Achieving Quality IPTV over DSL

Extract from one of the latest Broadband Forum's Marketing Reports (White Papers)

DSL has provided for the delivery of broadband services since the mid-1990s. By the fourth quarter of 2010, the world had over 350 million DSL lines in service, accounting for over 65% of the total broadband access market. In such a competitive access environment, differentiation is fundamental to business and driving revenue. To that end, IPTV has been considered a technology with major potential for providing new and attractive services, and delivery of high quality IPTV content becomes a necessity for continued growth and viability of DSL access.

Most TV viewers have high expectations with respect to their Quality of Experience (QoE) for television services. This expectation translates into equally stringent requirements for Quality of Service (QoS) of the underlying delivery mechanisms. The viewer expects to have their required QoE and expects the underlying technology to be easy to use, stable, and flexible. In this context, it is critical to apply measures which drive copper access to provide the highest levels of line speed, signal quality and service stability.

IPTV over DSL must continue to enhance its capabilities in order to compete with TV services provided by terrestrial TV, hybrid fiber coaxial cable services, fiber to the home and satellite delivery of TV. This white paper outlines the issues raised by IPTV over DSL in terms of the users' experience, the technical requirements, and the tools both current

and emerging that allow DSL to support IPTV services successfully to millions of viewers.

IPTV over Digital Subscriber Lines (DSL) is a solution to delivering high quality services such as live and interactive television over a broadband connection. With hundreds of millions of DSL lines in service, maintaining and improving quality of the DSL broadband access to support stringent IPTV requirements is key in retaining customers and driving additional revenue services.

The impact of quality in IPTV is not only applicable for the installed base of DSL, as DSL penetration continues to grow and IPTV requirements become more stringent, IPTV over DSL solutions are met with increasing challenges:

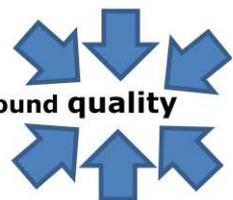
- Increasing bandwidth demand as HDTV and 3DTV content become popular
- The number of televisions in the home is growing
- Customer expectations of service responsiveness and selection are growing

How can IPTV over DSL meet these expectations and challenges while simultaneously facing competitive TV services offered by cable and satellite technologies? The Broadband Forum's *Technical Report TR-126* addresses requirements for QoE and QoS for triple play (Voice, Video and High Speed Internet) services. *MR-180* discusses



Quality drives user choices „Why have you chosen us?“

- ✓ digital picture & sound quality
- ✓ all-in-one solution
- ✓ promotional offer



Source: European IPTV Service Provider Customer Survey

▶ several methods to address the Quality of Experience (QoE) challenges faced by a successful IPTV over DSL deployment within a TR-126 context.

Quality of Experience and Quality of Service challenges facing IPTV over DSL

In a customer survey at a European Service Provider with over 500 thousand IPTV users (the majority of them having broadband connection via DSL), quality was the decisive factor in users choosing their Service Provider. In particular issues of viewer control, data/image quality, service interruption/failures, security and privacy were the important quality criteria for the viewers.

The challenge for quality increases even more with deployment of interactive video applications, the advent of 3DTV, support of user-created content and the simple proliferation of multiple HDTV streams to the customer premise. In this context, user-QoE expectations translate into network-QoS requirements such as:

- **System reliability:** If there's a failure, how long does it take to recover?
- **Signal noise and impairment:** will the service stream be delivered free of defects to ensure high quality video?
- **System capacity:** Is there enough bandwidth to deliver the service to begin with?
- **Bandwidth stability:** Is the bandwidth stable enough to ensure the sustained delivery of high quality video?
- **Transmission delay and variability:** Is the video service responsive or is it affected by delay or jitter?

The QoS requirements above combine with the network operator's operational requirements to define the whole picture; do the benefits of improving QoS exceed the costs to the network operator? These significant operational issues include:

- Complexity of service installation
- Ability to diagnose and repair problems
- Availability of tools that monitor the network and report service status.

In order to effectively address IPTV quality issues, it is important to understand the source and cause of IPTV signal degradation. When distributing video over IP networks,

visual artifacts and degradations can be experienced by end-users, as a result of QoS issues due to physical layer transmission impairments or IP transport issues. These degradations and impairments may be due to impulsive noise, cable quality, radio frequency interference, crosstalk and fluctuating noise. Further, these degradations can be exacerbated by the use of an incorrect cable type, or installation practice such as improper home wiring.

While certain degradations affecting the image or sound quality of IPTV can be caused by problems with the DSL physical access, others derive from the video and audio compression parameters chosen at the headend TV and other mechanisms in the other network elements that provide the end-to-end transport. Problems can include packet loss, link failure, or jitter. They can be introduced throughout the network or by the end-user devices; by the TV headend, routers, network engineering decisions and encoder settings. Often, these problems arise as a trade off between reliability of the IPTV stream and the bandwidth requirements of the service delivery network.

Bandwidth and the viewer experience

In the IPTV architecture, compressed video streams range from 1.5 Mbits/s (for SD flows) up to 20 Mbit/s, for HD or 3DTV streams. Common video compressing or encoding techniques are MPEG-2 and H.264. Both define MPEG frames that carry the video streams from the head-end TV all the way to the customer's set top box.

The figure below summarizes the issues related to QoS and QoE that may be experienced when dealing with an IPTV-based network.

The full version of this report is available from: <http://www.broadband-forum.org/marketing/download/mktgdocs/MR-180.pdf>

Comments or questions about this Broadband Forum Marketing Report should be directed to: info@broadband-forum.org

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