

IPTV: QUALITY OR QUANTITY?

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When a subscriber asks for a second IPTV set-top box (STB), telephone companies (telcos) may soon be forced to answer: “*Sorry Mr. Customer; if we give you a second STB, it will affect the quality of your signal!*” Although the global telecom industry has not yet reached this stage in IPTV customer service, the situation does highlight the need to ensure that telephone companies are prepared for this possibility.

There are a number of different things that can be done to the network – from improving the copper layer or DSL layer through to the encoding of video – but telcos must decide which, if not all, must be planned for and implemented to solve the IPTV quality vs. quantity issue. To ensure low subscriber churn, what makes the most sense? Multiple simultaneous video streams (i.e., quantity) or high-quality video? Of course, everyone will aim for both, but is it possible?

This is where *very-high-speed digital subscriber line, version 2* (VDSL2) comes in. Defined by ITU-T G.993.2, this blazing-fast technology allows service providers to offer data rates as high as 100 Mbit/s (compared to 24 Mbit/s with ADSL2+). Although to achieve 100 Mbit/s, the length of the copper loop must be quite short, with VDSL2, telcos can start seriously competing against the cable (CATV) and satellite companies, as this allows them to offer simultaneous high-definition television (HDTV), bundled with high-speed Internet and voice-over-Internet protocol (VoIP) — commonly known as *triple-play services*.

Quantity

With VDSL2, telcos can provide many different user-oriented packages for triple-play services. Various profiles or bandplans can be offered; each subject to rate/reach limitations. For example, to achieve 100 Mbit/s downstream, copper loops must be less than 300 m (1000 ft) long. Of course, it cannot be assumed that just because a loop is shorter than 300 m it will support VDSL2 up to 100 Mbit/s but, with these speeds, it is very conceivable for telcos to be able to offer some very desirable packages sooner rather than later. With the public’s increasingly unquenchable thirst for more, VDSL2 certainly paves the way in satisfying these demands.

Applications	Downstream Requirement	Upstream Requirement
HDTV (three per home at 12 Mbit/s each)	36 Mbit/s	1 Mbit/s
Standard TV (three per home at 3 Mbit/s each)	9 Mbit/s	1 Mbit/s
VOD - HDTV (one viewer at 12 Mbit/s)	12 Mbit/s	1 Mbit/s
VoIP (three per home at 128 kbit/s each)	0.4 Mbit/s	0.4 Mbit/s
Internet (Data) (web surfing, online gaming, P2P file-sharing, social networking)	10 Mbit/s	10 Mbit/s
Video conferencing (for telecommuters)	4.5 Mbit/s	4.5 Mbit/s
Total	71.9 Mbit/s	17.9 Mbit/s

Telcos also have to consider that Internet data is usually bursty when it comes to web-surfing, unless the user is into online gaming, peer-to-peer file-sharing or social-networking websites. In these cases, the subscriber's bandwidth requirements are constant and potentially bandwidth-intensive. Multiply this by the number of subscribers doing the same thing, and there's a definite potential for bandwidth over-subscription in the backhaul!

Quality

There are many physical impairments or external influences that can affect the performance of the established VDSL2 connection, and these can make it impossible to offer adequate data rates as high as 100 Mbit/s. With VDSL2, telcos must have sound pre-qualification and troubleshooting/repair practices in place — more so than with ADSL2+ and certainly more so than with legacy VF testing. Migrating from VF directly to VDSL2 is like a four-year-old going from riding a bike with training wheels to driving a 400 HP sports car. In short, it cannot be done without affecting service quality.

Impairments	External Influences
Bad splices	Impulse noise
Split pairs	Crosstalk
Bridge taps	Water

Impairments and external influences will not only affect quality (impulse-noise hits will knock off a DSL frame carrying the program clock reference of the MPEG TS), but will also affect quantity. That same impulse-noise hit forces the DSL modems to work harder to compensate for cyclic redundancy check (CRC) and forward error correction (FEC) errors. If the CRC and FEC error counts are high enough, the modems will retrain to a lower, more manageable data rate. If the telco is offering multiple HDTV streams, that retraining of the modem may be significant enough to reduce the offering to a single HDTV stream.

Finding Your Answer: The Key to Long-Term Success

To assist telcos offering triple-play services, EXFO provides test solutions built for FTTH and FTTH deployments. The AXS-200/600 Series offers several different solutions depending on the deployment architecture of the telephone company. The AXS-200/635 is a full-feature solution combining not only copper test capabilities for VDSL2 pre-qualification and troubleshooting/repair to 30 MHz, but also VDSL2/ADSL2+ modem emulation including Ethernet (for FTTH) link capability for triple-play testing. Using its broad range of measurements, the AXS-200/635 can help you find your answer to the question of quantity vs. quality.

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