

Going broadband with Cat 6A

It is now possible for it to deliver a large number of HDTV channels and high-speed Internet simultaneously.

For this month's column, I wanted to talk about the inherent capability of Category 6A cabling to support broadband communications over a frequency range extending up to 860 MHz.

We are now talking about the domain of traditional RG-6 coaxial cabling systems and, yes, it is possible to deliver a large number of HDTV channels and high speed Internet simultaneously for distances up to 100 metres over high performance Category 6A cabling.

The origin of broadband communications is the CATV cable industry. Traditional analog video (also called composite video) signals are delivered over coaxial cables on different carriers using a frequency band of 6 MHz for each composite video signal.

In North America, a composite video signal is formatted using the NTSC standard and includes the luminance and color information as well as the audio information.

Up to 134 composite video channels can be accommodated in the frequency spectrum from 54 MHz to 860 MHz.

A new ATSC (Advanced Television Systems Committee) digital television format will replace the analog NTSC television system on June 12, 2009 in the U.S., and August 31, 2011 in Canada.

The high definition television standards defined by the ATSC produce high definition, wide screen 16:9 images of up to 1920x1080 pixels in size (1080i/p) and many lesser resolution images, including NTSC SDTV: 480i (720x480 pixels split into two 240-line fields). ATSC also supports "theater quality" audio using the Dolby Digital AC-3 format to provide 5.1-channel surround sound.

Off-air (local) broadcasters use 8VSB modulation that can transfer the ATSC digital video signal at a maximum rate of 19.39 Mbit/s per channel. Cable television stations generally operate at a higher signal-to-noise ratio and can use 16VSB or 256-QAM modulation to achieve a throughput of 38.78 Mbit/s over the same 6 MHz channel.

The bottom line is that from six to 10 standard-definition sub channels or one to three high-definition sub channels can be broadcast on a single 6 MHz TV channel depending on the video coding (MPEG-2 or MPEG-4) and modulation technique that is used.

A recent survey performed by a market research company showed that faster Internet speeds were more important to subscribers than how many HD channels they offer. CATV companies provide high speed Internet service through cable modems.

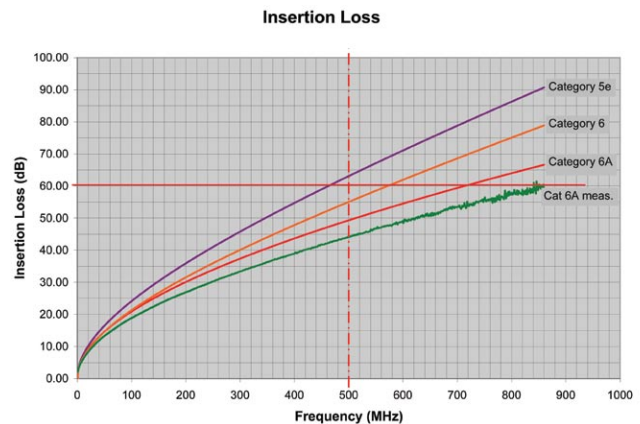
For downstream communications, the cable modem communicates with the head-end site using one or more 6 MHz channels between 88 and 860 MHz. For upstream communications the frequency band between 5 to 42 MHz is used. The latest DOCSIS 3.0 modems support downstream channel bonding (potentially offering 160 Mbps), IPv4 and IPv6, and advanced encryption services.

Z-band Inc. a technology company based in Carlisle, Pa., (www.z-band.com) is a pioneer in the industry for distributing broadband

signals over TIA 568 structured cabling systems in commercial buildings, including schools, hospitals, hotels, government agencies, financial institutions and entertainment facilities.

They have recently launched their 3rd generation 860 MHz, high definition video hub and intelligent balun system. The system delivers broadband communications over balanced 4-pair cabling, using pair 4 (pins 7 & 8) for downstream communications and pair 1 (pins 4 & 5) for upstream communications. If desired, pairs 2 and 3 (pins 1, 2, 3 & 6) can also be used to deliver IP based Ethernet signals through an auxiliary port. One of the advantages of this system is that it automatically adjusts the signal at an optimum level to compensate for cable distances and any moves, adds or changes.

So let's get back to the original question, what are the attributes of Category 6A cabling that make it ideally suited for broadband communications? One of the most important attributes is a low Insertion Loss.



For comparative purposes, I plotted the worst case Insertion Loss for Category 5e, 6 and 6A channels extended to 860 MHz for a length of 100 meters. I also plotted the Insertion loss on a Category 6A channel that was measured in our lab. The difference in results is surprising. Category 5e Insertion loss is 20 dB to 30 dB worse than Category 6A at 860 MHz. Another attribute that is much better for Category 6A compared to Category 5e is the pair balance, resulting in better noise immunity and more reliable transmission.

In summary, if you foresee the need for broadband communications over your network cabling, consider installing a Category 6A cabling system. You can see the difference.

CNS



Paul Kish is Director, Systems and Standards at Belden. The information presented is the author's view and is not official TIA correspondence.