



Fiberoptics for Videoconferencing

For a number of years we have been exposed to various methods for transmitting bi-directional signals over fiber for a wide variety of applications. This versatility of fiber continues to make it even more ubiquitous in the AV market than ever before. By using appropriate transmission equipment, videoconferencing applications over fiber are capable of providing not only high-quality transmission of video and audio but also transporting a complex assortment of multiple, real-time video conferences over the same fiber.

By utilizing the various 'layers' of signal multiplexing over fiber, videoconferencing has capabilities never envisioned on a copper infrastructure. The time-division-multiplexing (TDM) layer is the obvious method for combining the video, audio and possibly camera PTZ control over a single fiber for a typical peer-to-peer video conference. The wavelength division multiplexing (WDM) layer provides the bi-directional conferencing capability over one fiber. Adding either CWDM or DWDM technology (coarse & dense WDM) significantly expands the flexibility of fiber to handle multiple real-time video conferences from various locations over one fiber. In a corporate environment you might first think that multiple real-time video conferences over one fiber may not seem practical. However, other video conferencing applications where multiple, private independent conferences may take place include remote visitation and remote arraignment in the correctional market. There is essentially no difference between corporate and correctional video conferences other than the location and situation. At any correctional facility there may be multiple stations where remote visitation would take place. Again, using the various electrical and optical multiplexing technologies, all of these visitations or conferences can occur simultaneously in real-time over one fiber. Additional stations can easily be added over the same fiber without impacting the existing system functionality or operation. This is obviously applicable to private industry as well where multiple conferences can be simultaneously managed on one fiber.

Real-time remote arraignment is clearly another market for utilizing fiber in this manner. In some locations it is likely that the courthouse and the correctional facility where the detainees are located may be miles apart. In many cases fiber connection between these locations is accomplished with dark telecom fibers leased to the court system at a high monthly cost. Minimizing the number of leased fibers is essential to controlling recurring expenses. By utilizing these multiplexing methods not only can a number of arraignments be held simultaneously, but other video conferencing stations can be incorporated as well as cameras and other security features – all over the same, single fiber in real time. Point-to-point fiber networks for these conferencing applications are preferred so that real-time communication is maintained.

Networking is another option for transporting video conference information over fiber but, as with all networked systems, potential issues with signal quality and latency are always a concern. If fiber networking is being considered, it's important to ensure that the video conferencing network be a dedicated network and not part of the existing IT network. In this manner, you have complete control over the activity and capacity of the network. The network bandwidth of these signals can be quite high, especially when using HD video.

If networked conferencing is important, the signals can be converted to an IP format after received and recorded at the headend location in real time. In this type of 'hybrid' system architecture, the quality of the signals (video & audio) is maintained as long as possible and practical before being converted to an IP format. In addition any latency issues between the video & audio are minimized.

As previously mentioned, since fiber is also 'technology proof', different quantities and types of signals can be easily multiplexed on an individual fiber. This offers the facility expansion capabilities not available in traditional copper solutions.

Taking advantage of fiber's signal agnostic nature, it is very straightforward to upgrade the video signals from composite to HD, for example, for telepresence applications using the same, existing fiber. Done over a non-fiber network, caution would have to be taken to ensure that the existing network or copper infrastructure could support this upgrade.

Fiber continues to be a major influence in not only the type and complexity of systems we deploy but also, taking into account its capabilities and versatility, on how we envision new and emerging system architectures.

If you have any questions or if you have any particular topic on fiber optics you would like to know more about, please send an email to emiskovic@meridian-tech.com.