

FIBER: I.T.S. NOT JUST FOR BREAKFAST ANYMORE

Optical fiber backbones have become the transmission medium of choice in urban and rural I.T.S. systems worldwide.

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Modern I.T.S. (Intelligent Transportation System) networks require ever-increasing data rates and payload carrying capabilities to facilitate real-time communications between a wide variety of field devices and traffic control centers (TCCs). Single-mode optical fiber-based I.T.S. infrastructures are displacing twisted pair copper and coax for both data and video transmission requirements in urban and rural jurisdictions worldwide.

Single Channel I.T.S. Transmission of Video and Data

Video transmission for surveillance of intersections, ramps and tunnels, incident detection/verification and replacement of loop sensors is an increasingly popular I.T.S. tool. High quality links for point-to-point FM baseband transmission over single-mode fiber from fixed or PTZ-equipped roadside cameras are widely available for distances up to 90 km. Traffic congestion around Atlanta's I-285 for the 1996 Summer Olympic Games was minimized by Georgia DOT's use of more than 400 remote roadside cameras via Force's **CCTVLinx™** Series surveillance links.

While point-to-point data transmission for I.T.S. over fiber has been commonplace since the mid-1980's, more complex and robust architectures are increasingly being utilized for communications with variable message signs, loop sensors, traffic signal controllers and camera PTZ mounts. Force's **MODEMLinx™** Series bidirectional RS-232/422 data transceivers are currently installed in a number of



major I.T.S. projects. Virginia DOT has over 200 links installed in a linear bus/daisy chain topology in Washington, DC's I-66/I-95 corridor. Utah DOT is in the process of implementing a redundant self-healing ring architecture utilizing over 1,000 links in its I-15 Corridor Reconstruction Project through downtown Salt Lake City, in preparation for the 2002 Winter Olympic Games.

Multiple Channel I.T.S. Transmission of Video, Audio and/or Data

In larger and/or more dense jurisdictions, optical fiber backbones have become the transmission medium of choice for simultaneous, real-time transmission of multiple channels of video, audio and/or data from field devices to the TCC. Current analog FM-based (4-16 video channels) FDM product offerings suffer from crosstalk between channels, signal degradation over distance, lack of signal regeneration capability and the inability to perform adequately in complex network architectures. These factors negate the use of analog FM FDM fiber backbones in today's I.T.S. networks.

While many DOT's have implemented telco-standard SONET digital backbones into wide area I.T.S. networks in recent years, a significant number of other transportation authorities have found that proprietary time-division multiplexed (TDM) digital backbones offer a robust, yet cost-effective (up to 40% savings) alternative to SONET in typical metro area I.T.S. networks.

Force's high capacity, third generation Comlux® Series backbones are currently installed in major transportation projects in CA, DC, GA, MD, NJ and VA and have been utilized by hundreds of broadcast, CATV, telco and distance learning operations worldwide since 1990. **Comlux®** Series backbones provide for transmission of up to 64 channels (at 3.1 Gb/s) of uncompressed, full motion video, and their associated data and audio channels, over a single optical fiber. The system also transports multiple channels of DS3/T3, DS1/T1, MPEG-2 compressed video, POTS telephone, audio intercom and Ethernet datacom services. The system can be easily configured to accommodate point-to-point, point-to-multipoint, add/drop/multiplex, star, ring and redundant ring architectures, making it the ideal multichannel transport platform for the majority of today's I.T.S. network applications.

Conclusion

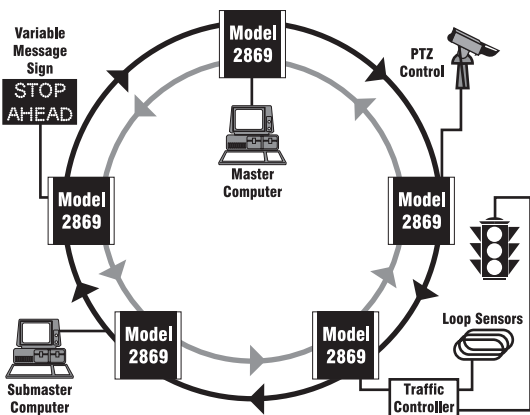
In addition to its oft-cited advantages (i.e. bandwidth, durability, ease of installation, immunity to EMI/RFI and harsh environmental conditions, long-term economies, etc.), optical fiber is better suited to accommodate today's increasingly complex I.T.S. architectures than copper alternatives. In smaller jurisdictions, connecting individual field devices directly to the TCC via optical fiber is often very cost effective. However, in those jurisdictions where areas are large and/or very dense, field multiplexing of multiple signals via digital TDM onto a single optical fiber is often the only practical alternative.

Ed Kopakowski is vice president of Sales & Marketing at Force, Incorporated. He originally prepared the paper from which this article is excerpted for the 1998 publication of Intelligent Transport Systems.

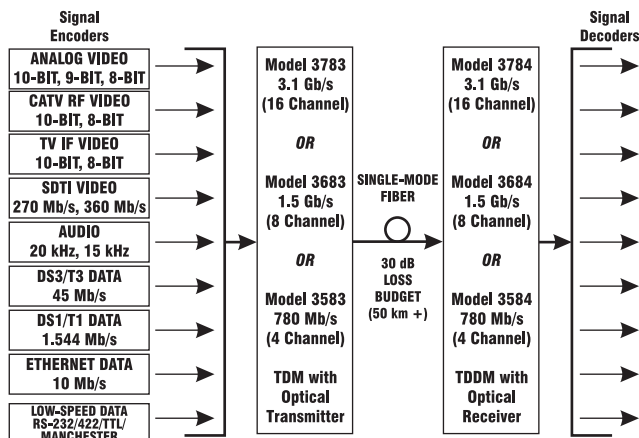
I.T.S. FIBER OPTIC TRANSMISSION REQUIREMENTS?

- Video, Audio, Data • Digital or Analog • Single or Multichannel

Self-Healing Ring Topology: Data



COMLUX® Multichannel Fiber Optic Transport Topology: Video/Audio/Data



Also Available as Linear Bus/Daisy-chain Configuration

- Point-to-Point
- Point-to-Multipoint
- Add/Drop/Mux
- Star
- Ring
- Redundant Ring

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