TEXAS D.O.T. USES HARDENED ETHERNET SWITCHES AND WIRELESS FOR TRAFFIC CONTROL

An Industrial Ethernet Application

TECHNOLOGY TODAY

Traffic management and video monitoring systems are evolving rapidly. As metro populations increase, traffic delays and emergency services responses must be continually improved. Increasingly sophisticated city-wide traffic monitoring and management systems are required. Serial data lines, which have been used for relaying traffic information in the past, are too slow to provide the type of video information necessary for immediate response to traffic incidents. Ethernet is growing in popularity in the traffic industry to proactively manage traffic incidents such as those at busy intersections, and to re-route traffic quickly and effectively.

ABOUT TEXAS D.O.T.

The state of Texas has one of the largest state-maintained highway systems in the US. Over 75% of vehicle-miles traveled in Texas are on Texas Department of Transportation (TxDOT) maintained roadways. In fact, TxDOT maintains almost 7000 traffic signals in the state. TxDOT's responsibility includes the intersections off the main highway exit ramps. 150 such intersections are located off the exit ramps of the highways in-and-around the FT. Worth metropolitan area.
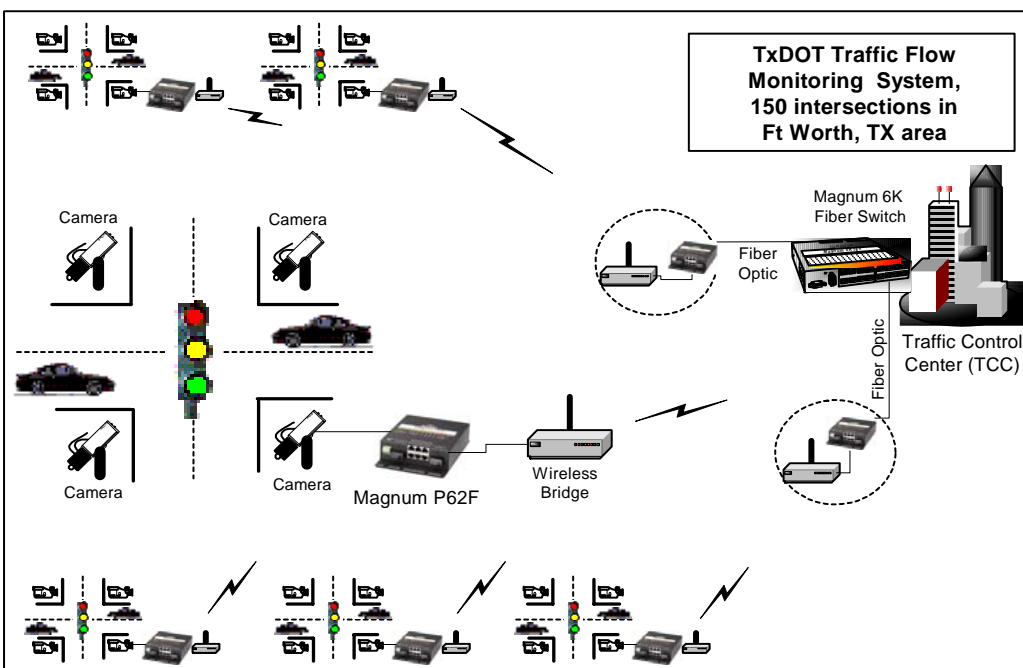
THE CHALLENGE

To monitor and manage traffic flow, and to view accidents for better emergency response, TxDOT wanted to send video back to the Ft Worth Traffic Control Center (TCC) from 150 of the busiest intersections in the city. When there was a problem at one of the intersections off of a Ft Worth exit ramp, traffic tended to back up onto the main highway and slow traffic along an extended section of the highway.

As the new part of the traffic management system, TxDOT decided to implement video cameras at different points in the intersections. Network managers had determined that installed serial communications lines were simply not fast enough to allow traffic controllers to get the video information and respond in time. Besides bandwidth and cost, an additional challenge was availability. The equipment needed to be installed and operated in temperature un-controlled outdoor boxes, and to operate reliably under harsh weather conditions. TxDOT elected to use hardened industrial-grade Ethernet switches and wireless Ethernet throughout the intersections and in the communications grid back to the Traffic Control Center (TCC).

THE SOLUTION

The video traffic, up to 4 cameras per intersection, goes into a hardened Ethernet switch mounted in the traffic control box at each intersection. The video data is combined with traffic counters and data from other control devices, all of which is carried over the bi-directional Ethernet LAN. TxDOT then selected 9Mb-to-45Mb wireless Ethernet bridges placed at each intersection to communicate with the TCC. Some wireless bridges serve as data aggregation points, and some fiber optic cable is used to form a communications grid. Each intersection via each camera – in full motion with high resolution - can be viewed from the TCC using the communications grid. The TCC staff can literally see what is happening, as it happens.

TxDOT Traffic Flow Monitoring System, 150 intersections in Ft Worth, TX area

Camera

Camera

Camera

Camera

Magnum P62F

Wireless Bridge

Magnum 6K Fiber Switch

Fiber Optic

Fiber Optic

Traffic Control Center (TCC)

Texas, D.O.T.

THE SOLUTION (CONT.)

TxDOT chose GarrettCom's hardened Magnum P62 switches to provide Ethernet connectivity, 100Mb bandwidth, and reliable operation in extreme temperature weather environments. The Magnum P62 Switches were designed for outdoor deployment, and feature a unique thermal technique (patent pending) using the case as a heat sink in order to get the heat out of the electronics. The resulting lowered temperature electronics increases reliability.

The Magnum P62s are mounted inside the temperature-uncontrolled traffic control box at each intersection. Six RJ-45 Ethernet ports connect to the video cameras (typically four per intersection) and local traffic data devices, and to the wireless bridge. The Magnum P62's 100Mb data rate easily support the four video cameras with bandwidth available for additional traffic information and traffic control data. The local intersection P62 Switches provide the Ethernet connectivity necessary for Ethernet links to both the cameras and the local wireless bridge.

The same hardened P62 Switch model can be used as an aggregation point, bringing a group of intersections and wireless signals into one channel in the network grid. P62 models with two single-mode fiber ports are also placed outdoors at selected communications points in order to connect into high speed optical fiber cables that carry data back to the TCC and into a hardened Magnum Fiber Switch there.

THE RESULTS

The new video traffic management system enables TxDOT in Ft Worth to get accurate video images from 150 intersections quickly and accurately. The combination of wired and wireless Ethernet enables personnel at the Traffic Control Center to better manage traffic and reduce delays from accidents.

The video data system also helps TxDOT personnel to relay accurate information quickly to emergency response personnel including police, fire, and ambulance services.

The Magnum P62 Switch is a good fit for the harsh environments at the traffic intersections. Over a thousand of them are in use in traffic systems worldwide. The P62s operate normally in ambient temperatures up to 74°C and down to -40°C. The P62 case was engineered to function as a heat sink, drawing heat away from the internal electronics and dissipating it. And the P62 case is sealed against dirt and dust and insects and other contaminants for worry-free operation in heavy-duty environments. The P62's high reliability (Telecordia MTBF rating greater than 10 years) means that the units will not have to be replaced or serviced often.

ABOUT MAGNUM PRODUCTS

The **Magnum P62 Hardened Switch** features six 10/100 Mb switched RJ-45 copper ports and two 100 Mb fiber ports, and is designed to operate in temperature-uncontrolled environments. The steel case is used as a heat sink to support its use in environmentally challenged applications. The P62 supports single-mode or multi-mode fiber transceivers on a per-port basis to accommodate different cabling distances between sites. Twisted-pair only models are also available. Power input choices include: AC, 24VDC, -48VDC, and 125VDC.

ABOUT GARRETTCOM

GarrettCom, Inc. is the leading manufacturer of industrial and carrier-class Ethernet LAN products. GarrettCom offers a comprehensive line of NEBS and ETSI-certified switches for use in traffic control, telecommunications, industrial, and automation environments. The company's management software supports redundant rings and secure web-based access to local and remote networks. GarrettCom markets its products through a network of resellers, OEMs, system integrators, and distributors worldwide. For more information on GarrettCom and its products, visit **www.GarrettCom.com**.