City of San Francisco Selects Magnum P62F Hardened Switch for Ethernet-based Traffic Control Project

A Traffic Management and Ethernet Application

TECHNOLOGY TODAY

Traffic control systems traditionally used serial lines and modems for the interconnection of outdoor traffic data devices with the central Traffic Operations Center (TOC). New requirements for high-speed data, including live cameras, call for re-thinking of traditional practices.

Serial data technology is being displaced with Ethernet packet data technology because of Ethernet's low components cost, high bandwidth, interoperability, and reliability. New hardened Ethernet products have been developed for deployment in industrial applications where temperatures, dirt, and electrical interference exceed the standards accepted for commercial Ethernet products. Hardened Ethernet products adapt well to traffic control systems, providing more flexible and affordable communications systems with the high bandwidth required for today's technology advances.

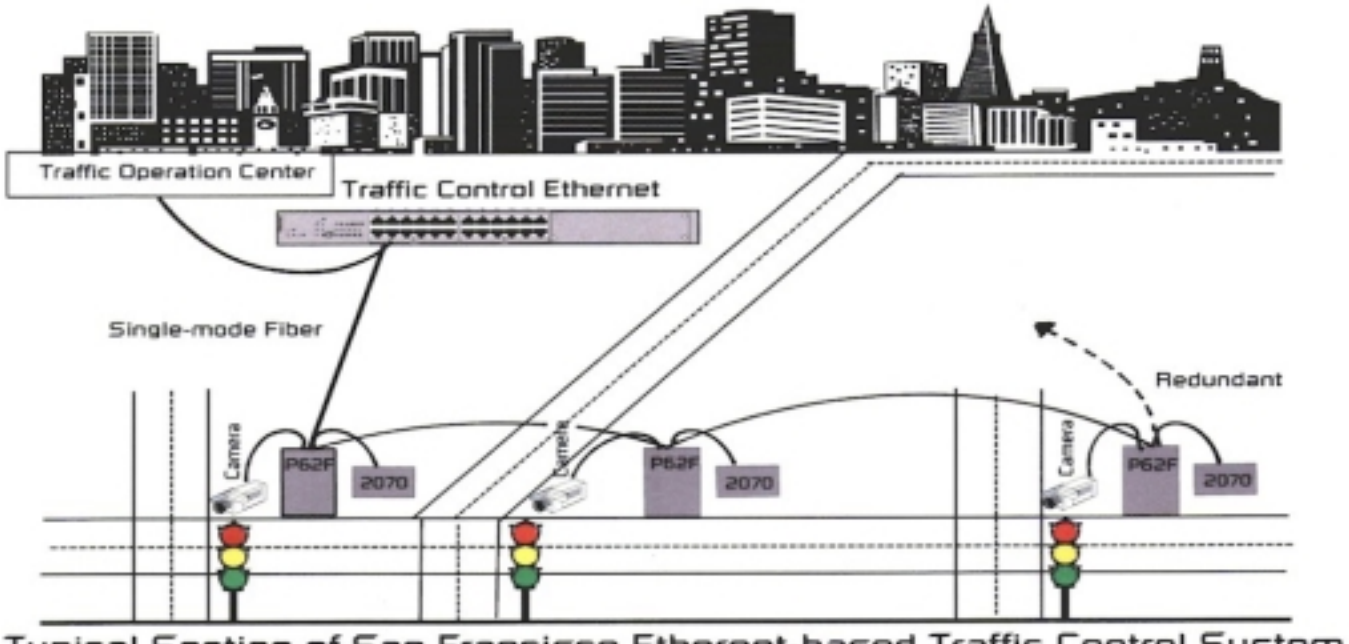
ABOUT THE CITY OF SAN FRANCISCO

San Francisco, Calif., has approximately 800,000 residents living together on a picturesque, hilly, and rather small peninsula. Economic development over the last few years has contributed to ever-increasing traffic congestion. Handling of emergency vehicles, security and surveillance, pedestrian and motorist safety, and gridlock have become critical city government issues. The City of San Francisco looked for ways to improve its traffic management control process.

The application requires the use of live video as a tool for traffic control. Live video offers the capability to provide instant traffic information for real-time management, but the data bandwidth required is up to 100 times greater than the capacity of traditional serial communications lines. In addition, reliability and redundancy were issues. In congested traffic conditions, a failure at any intersection can have widespread repercussions.

Four cameras at every intersection provide live video coverage whenever a traffic hotspot demands it. These cameras allow complete surveillance of traffic conditions. The cost of a communications bandwidth that could support up to 25 megabits per second per intersection for the video, however, would prove prohibitive using high-bandwidth communications protocols such as ATM, Frame Relay, and T1. Ethernet is a preferred protocol because the equipment itself is 10 percent less the cost of the alternatives.

The traffic control boxes at each intersection, where the communications equipment will be deployed, are in a temperature uncontrolled environment, requiring hardened, outdoor-ready Ethernet equipment. While traffic control equipment has always been designed for outdoors use, high-speed data communications gear traditionally resides in air-conditioned communications rooms. Special hardened communications equipment is required to support the operational temperature ranges, dust and dirt, and fog and humidity to which it would be exposed in a traffic control box.



Typical Section of San Francisco Ethernet-based Traffic Control System

City of San Francisco Traffic Management

The City of San Francisco required a hardened Ethernet switch with redundant fiber connections to the TOC and sufficient 10/100 copper ports to connect to the cameras and the 2070 Ethernet-ready traffic Controller. Because traffic control equipment runs on standard utility power lines, the Ethernet switch would also need to run on AC power to keep costs down. The cable for connecting with the TOC needed to resist EMI noise, offer secure transmission, and run for long distances without the need for repeaters.

THE SOLUTION

The approved design integrates a GarrettCom Magnum P62F Hardened Ethernet Switch with two single-mode 100 Mb fiber ports built-in, which is mounted inside the traffic control box at each intersection. The Magnum P62F's six copper ports connect to the Ethernet-ready video cameras and the Ethernet-enabled 2070 traffic Controller, which are also mounted in the traffic control boxes. The 2070s connect to the traffic signal lights, traffic counters and sensors, pedestrian signs and switches. A redundant mesh of fiber cables connects the Magnum P62F at each intersection with the TOC.

The Magnum P62F offers high reliability with a Telcordia MTBF rating of more than 10 years. The two built-in fiber ports support the redundancy required, and the hardened application fits within budgetary requirements. Its 100 Mb per second data rate easily supports even four video cameras with bandwidth to spare.

ABOUT MAGNUM P62F HARDENED SWITCH

The Magnum P62F Hardened Switch is specifically designed to operate in rugged environments. Its case is engineered as a heat sink, which allows it to be deployed in locations where temperatures can extend far beyond the range of human comfort and standard electronics specifications. The Magnum P62F has six 10/100 Mb switched RJ-45 ports and two 100 Mb fiber ports that allow the mixing of copper and fiber media in daisy-chained configurations that can be deployed over long distances.

Benefits for the application include:

- Ambient temperature rating of –40° to 160°F to withstand extreme weather conditions
- A sealed unit in a compact housing, impervious to dust and dirt
- Built-in fiber ports that support easy installation of daisy-chained units as the application expands
- Fiber media that is resistant to electrical noise, handles the long distances between the street intersections and the TOC
- Flexibility to interconnect PCs or laptops as well as industrial control devices from same Ethernet switch

Unlike most other hardened products, which are only available with DC power, the Magnum P62F Hardened Switch can be configured to connect to -48VDC, 24VDC, standard AC power, or 125VDC power sources. The Magnum PSX unit, a specially designed power source for extended temperature applications, supports AC power, with surge suppression.

ABOUT GARRETTCOM

GarrettCom, Inc., is the leading manufacturer of industrial and carrier-class Ethernet LAN products. GarrettCom offers a comprehensive line of ETSI and NEBS-certified switches and hubs for use in traffic control, telecommunications, industrial, and factory automation. 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.

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