Case Study

Infrastructure

In order to meet street-monitoring requirements issued by the Department of Homeland Security, the **Maryland State Highway Administration** (SHA) would have to modernize their traffic-control system, transitioning from a closed-loop architecture to a centrally-managed IP network. The SHA needed a cost-effective solution that could be implemented quickly within their limited budget.

The old closed-loop system interconnected regional traffic signals using leased-line modems. The low-data-rate modems operate over copper twisted-pair cabling infrastructure, installed and working for years.

*The old closed-loop system had to be **manually** configured and controlled. An engineer had to be physically present at the central intersection to make any changes.*

The new system, which leverages modern IP-network technology, is designed to keep traffic moving at an optimized rate—in addition to monitoring the streets. The street-monitoring setup employs two primary sensor types:

- Video cameras mounted on traffic light support structures
- An inductor installed under the roadway halfway between intersections

The video camera determines if traffic is waiting at the intersection. The inductor senses the traffic's rate of flow. The sensors transmit their information to a control box located at a central intersection, which then adjusts the traffic-signal timing according to live conditions. To monitor and control the system, engineers can access not only the control box, but each individual device, over the IP network…from SHA headquarters.

Centralized

The greatest challenges to IP enabling a legacy system often involve cabling issues along with the distance limitations of standard Ethernet. Even though Ethernet technology serves as the backbone of IP connectivity today, the standard is limited to a maximum reach of 328 feet (100 meters) per network segment when operating over **Cat 5** or greater cabling. **Fiber**-optic cable can be used to resolve the distance limitation, yet installing it is costly and cumbersome. In this instance, it would cause untenable project delays with road closings, demolitions, cable-runs, and re-construction. **WiMAX**, a modern alternative for IP transport, is subject to electromagnetic interference, bandwidth instability, in addition to reliability and security concerns.

Because of such challenges, the way forward was looking pretty murky for the SHA project. Then Ed Wittman at the Maryland SHA discovered that Patton, an in-state manufacturer, offers networking devices that enable Ethernet to operate over single-twisted-pair cabling across distances of more than 3 miles (4.8 km). Cha-*CHING!* By re-using the existing copper network, the project could be completed much faster and at far lower cost than anyone had imagined….

After discussing the topology and unique requirements of the new highway network with Ed, Patton recommended the CopperLink™ CL1314MDE multidrop and CL1314R ruggedized long-range Ethernet extenders. Featuring an integrated 4-port Ethernet switch, the CL1314MDE can interconnect IP enabled cameras, controllers and sensors with an IP router installed in the equipment cabinet at each central-intersection. The SHA provides an Ethernet Everywhere (EE) Circuit to the router.

The CL1314MDE provides two WAN ports that interconnect neighboring intersections over the existing copper infrastructure. At the last hop, Patton's Ruggedized Long Range CopperLink CL1314R terminates the final Ethernet segment operating over the legacy copper cable.

With a CL1314MDE installed at each central intersection, the old closed-loop system becomes IP-enabled to interconnect all traffic signals, cameras, sensors, and controllers. The entire system can be managed remotely over the administration's IP network from SHA headquarters.

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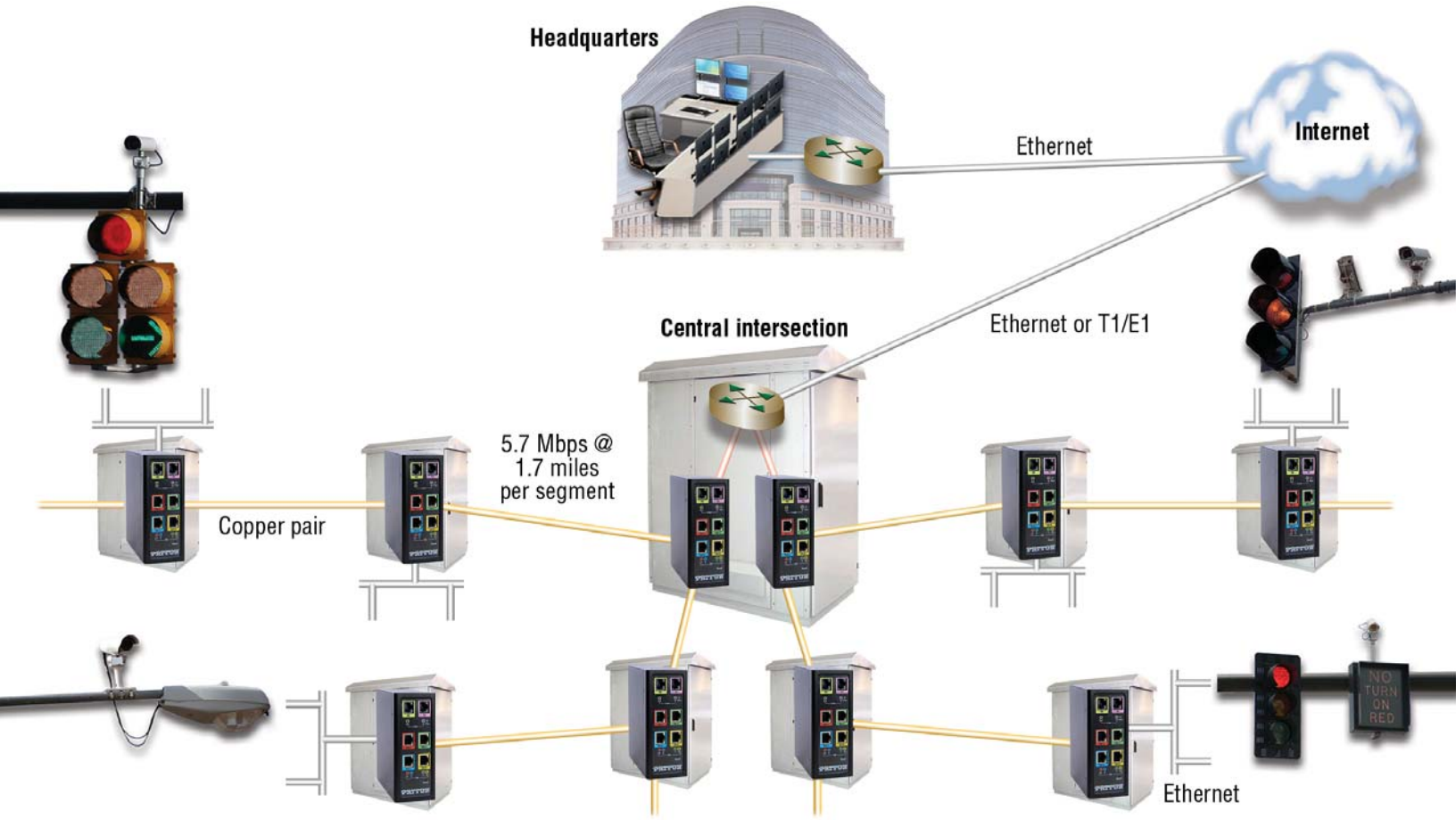
Application



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Products

CL1314MDE

CL1314R

- **High Speed**: Achieve speeds up to 5.7 Mbps.
- **Long Range Extension**: Extends Ethernet 1.7 miles (2.74 km) at 5.7 Mbps or 4.26 miles (6.86 km) at 192 kbps
- **Flexible Uses**: Can be used as a long distance Ethernet extension (repeater) and/or in Multidrop Ethernet (MDE) applications
- **Multi-rate Selection**: Just plug the units in and select the ideal user-configurable rate for your application.
- **CopperLink 2-Wire Connection**: Easy 2-wire CopperLink connection via built-in RJ-45 ports.
- **Extended Temperature**: -40 to 185 °F (-40 to 85 °C) operation
- **Ruggedized**: Aluminum enclosure designed to meet IP40 specifications
- **DIN Mount**: 35mm DIN clip included for convenient installations
- **Transparent LAN Bridging**: Transparently pass higher-layer protocols with support for 802.1Q VLAN tagging.
- **Automatic Learning, Aging, and Filtering**: Keeps local traffic local, ensuring efficient utilization of the long-range link.
- **Made in the USA**: This Patton equipment is designed by Patton engineers and built in our Gaithersburg, Maryland facility. Patton's American-made manufacturing process delivers high quality networking solutions with reliability you can trust.

PATTON® let's Connect!™

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