The City of Sacramento

Actelis Keeps Traffic Moving Safely in California's State Capital

Many cities in the U.S. and around the world are installing a new generation of IP-based traffic cameras and controllers to improve road safety, reduce congestion and help drivers avoid traffic jams. Often, as in the city of Sacramento, Calif., systems installed during the 1990s needed upgrading to provide more sophisticated monitoring and control capabilities, but this placed much more of a burden on the network than it could handle. In many cases, relatively slow, legacy communication links are being replaced with state-of-the-art carrier Ethernet over copper access equipment.

New IP Cameras Needed Bigger Pipes

Like many other municipalities, the City of Sacramento had been managing nicely with dial-up modem links operating at speeds as low as 1200 baud for managing traffic signals. New traffic monitoring cameras, however, require more bandwidth. Sacramento is making a major move to IP-based devices and was in the process of a deploying a new network, as Shad Bennett, the City's head of traffic engineering & operations, pointed out: "The whole system is moving to IP, so we needed bigger pipes and had to bring in new controllers."

Also like many other cities, Sacramento had deployed a limited number of fiber-optic rings in the ground capable of providing high bandwidth connections straightaway, but only to cameras and other devices that lie close to the network. IP cameras near the fiber ring were initially connected, but that was only a start, because Sacramento wanted the capability to deploy cameras throughout the entire City. Copper cabling was already widely deployed, installed initially for telephone services, and as the City's telecommunications engineer, Ryan Billeci,

says, this provides far more extensive coverage than the fiber. "We have 50-80 miles of fiber in the ground, but hundreds of miles of copper."

The challenge was turning this copper asset into a media capable of supporting high-bandwidth communications. Sacramento needed a solution capable of complementing its fiber network and effectively upgrading the existing copper infrastructure into a next-generation network that would support existing and emerging applications, which they could deploy over the new fiber network.

Reach, Rate and Reliability

The City evaluated a number of options before selecting a field-proven carrier Ethernet access solution for copper infrastructures from Actelis Networks®, based on the IEEE's EFM (Ethernet in the First Mile) standard 2BASE-TL, using G.HDSL DSL modem technology. Unlike residential DSL products, the Actelis ML series of Ethernet Access Devices (EADs) offers symmetrical bandwidth at bit rates up to 100 Mbps, exploiting advanced Actelis patented technologies such as intelligent power back off to mitigate the effects of crosstalk interference between wires. The result is that Actelis' Ethernet access over copper delivered the necessary bandwidth over the local copper infrastructure, just as traditional Ethernet solutions can do within an internal enterprise network. For municipalities such as Sacramento, this is a huge advantage, because it means they can leverage the investment in their copper infrastructure alongside fiber to extend their existing Ethernet LAN infrastructure across the whole district of jurisdiction.

"We looked at a few vendors, and Actelis was the leader in the carrier Ethernet over copper space," says Billeci. "The choice was also made because of the proven robustness of the Actelis solution, because the hardened switch is able to operate in harsh environments. Equally as important was the ability of the Actelis ML EAD to bond up to eight copper pairs together, creating high bit rate pipes

Requirements

- Upgrade traffic monitoring and control platform to Ethernet-based network system

- Upgrade to large bandwidth to accommodate current and future equipment.

- Must be used in existing copper and fiber-optic infrastructure

Equipment Used

- ML600 Ethernet Access Device and ML100 Series in Point-to-Multipoint

Benefits

- Ease of deployment

- Ease of management

- Total IP-based traffic system control

- Capacity to handle current and future infrastructure demands

Actelis
Networks

up to 45 Mbps in capacity.

IP Monitoring and Control Cutting Journey Times

The City's new IP-based cameras are already starting to make a significant difference to citizens in the Sacramento area, according to Bennett, even if people are not directly aware of the technology. "These systems are going to be invisible to the public," says Bennett. "It's all about efficiency and detection. If a traffic signal fails, we can now pick that up easily and get it fixed more quickly and cost effectively."

The City of Sacramento tunes the timing of the traffic signals in response to changing conditions using Actelis Networks' Carrier Ethernet over Copper™ solution.

But the City can now do far more than just monitor traffic signals. For example, it can now tune the timing of the signals in response to changing conditions in order to optimize traffic flow and minimize congestion. The foundation for this was laid in 2001 when the City opened its Traffic Operations Center to monitor traffic conditions in four major transportation corridors in the Sacramento area: Watt, Sunrise, Madison and Greenback, which includes 300 intersections controlled by signals. The use of more sophisticated cameras combined with the emerging IP network is enabling staff to respond to events such as hazardous spills, accidents, or just general congestion by changing the timing of traffic signals with increasing scope for automating this process. These corridors are now monitored by 37 cameras communicating via the fiber-optic and copper network using machine vision technology to identify vehicles to count them as they go by.

IP Monitoring May Be Recruited for Law Enforcement

This ability to optimize traffic flow is crucial because congestion has increased enormously in the Sacramento area over the last decade, says Bennett. The result is that the sophisticated monitoring and control capabilities are also attracting interest for other agencies within the district, notably law enforcement. "We are looking to use the network for other surveillance purposes, and can cost-effectively deploy cameras and other broadband tools using our existing copper infrastructure," comments Bennett.

This is also being done in larger cities such as New York and London, where cameras originally installed to enforce toll roads, speed limits, and lane restrictions, may soon be made available to police for real-time traffic monitoring with automatic number plate recognition for use in tracking suspect vehicles.

Actelis Networks portfolio of award-winning Carrier Ethernet over Copper intelligent access equipment.

There is little doubt that cities such as Sacramento will derive ever greater benefits from their increasingly sophisticated traffic monitoring, surveillance and control networks, made possible by the ability to extend high bandwidth connections across complete districts.