Wireless in a World of Connectivity

By Michael Irvin

"You can't have a traffic network without communications," emphasizes Rob Jennings, Traffic Engineering Technologist for the Portland Bureau of Transportation. "And when you have a network as expansive as ours, reliability and speed are critical."

For the city of Portland, Jennings' reference of expansive to describe the breadth of their traffic network becomes clearer when you understand all the components that Traffic Operations monitors and manages.

"We have a lot more than just controllers on our network," Jennings states. "We have a multitude of cameras, we have variable message signs, we have Bluetooth readers for data collection, we have air quality monitoring equipment, we have all sorts of stuff."

As with many preliminary installations, Portland's traffic network was initially built with an emphasis on economy. Their initial deployment consisted of a fiber optic trunk encircling the city with unmanaged switches throughout. While the design met their initial requirements, they did experience some unforeseen issues as a result of their decision to deploy unmanaged switches in all their controller cabinets.

"We had a flood of issues with network storms," recalls Jennings. "Recently, we've upgraded to a managed network system that is far more reliable which has simplified our lives dramatically."

The experience that Jennings describes is all too typical today where budgets are scrutinized and trimmed in an effort to reduce capital expenses. Yet at what cost? For many, it comes at the expense of the quality of service (QoS) available to network users.

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Improvements that the Portland Bureau of Transportation implemented included deploying multiple VLANs (Virtual Local Area Networks), bandwidth management, and traffic prioritization, all dramatically improved the QoS experienced by users across the network.

Yet even with all of the investments that the city made to enhance their traffic network, the reality was that with the existing fiber loop, there were some places that were simply not in range or where physical wire could not be run. It is in these situations that Portland turned to wireless communications to complete their traffic network.

"For the most part, we use wireless in point-to-point configurations," Jennings said. "Occasionally we used point-to-multipoint, but for the most part we use wireless hops where we can't get wire in or where it is inconvenient or too difficult to put wire or fiber in."

Screen capture from wireless video feed.

Broadband wireless is becoming more prevalent across the nation for a number of reasons, cost and ease of installation typically are at the top of the list. Agencies and municipalities are well aware that communication options and alternatives exist. There are products available that leverage copper phone lines and therefore are quick to install, but their throughput is limited at 35Mb, where wireless can go substantially higher, especially if you have good line of sight.

"Wireless, even though the units are more expensive, is cheaper for us to deploy," says Jennings. "By the time you pay someone to either string cable, put in conduit, or account for the cost of fiber terminations, wireless ends up being substantially less expensive than other alternatives, without compromising performance. While broadband is not as fast as fiber, it's definitely faster than copper—by a factor of three in an ideal situation."

Jennings does note that broadband wireless is not without its limitations. "We live in Oregon, so there are a lot of trees, and with trees come line of sight issues." Jennings further elaborates, "Our challenge is trying to find a good mounting location where you can get point-to-point line of sight."

Screen capture from fiber feed.

Where line of sight is not an issue, the performance of broadband wireless can best be illustrated in the scenarios in which cities like Portland are utilizing these devices. Whether it is an enabler for essential communications for another department like Utilities, Public Safety, or Environmental Services, communication bandwidth is a shared asset, all on the same trunk.

So when locations were identified where conduit was damaged beyond repair and physical wire could not be installed, the Bureau turned to broadband wireless transceivers to make the connection to video cameras Traffic Operations intended to manage and monitor.

"We chose the radios we did for a number of reasons," Jennings clarifies. "While we are only shooting about 300 feet point-to-point, we wanted a unit that could support up to 300Mb in throughput, but was manageable so that we had the option of optimizing the port speed for

our cameras. As result, we don't have any issue with latency and the video viewed in our Traffic Operations Center is indistinguishable from fiber feeds. We couldn't be happier."

"Let's face it, wireless communications are a valuable part of our overall network strategy," says Jennings. "It's faster than copper, it's easier to install, and it's less expensive to install than fiber. It's a great solution for those locations where it's just impossible or impractical to get fiber installed."