NEVADA DEPARTMENT OF TRANSPORTATION WIRELESS COMMUNICATIONS PROBLEMS SOLVED

By Mark D. Pate, Nevada Department of Transportation

2017 was a good year for the Nevada Department of Transportation (NDOT) District III Communications department and Redline Communications' (www.rdlcom.com) broadband wireless solution. NDOT District III is in the northeast rural part of the state with responsibility for thousands of lane, miles of wide open highways.

The NDOT Communications department is responsible for all the Intelligent Transportation System (ITS) devices - Digital Message Signs (DMS), Road Weather Information Systems, Road Warning Signage, such as 'chains and snow tires required' or 'ice over bridges or through tunnels', traffic flow monitoring, video-to-public monitoring cameras, and ancillary battery back-up and generator back-up systems at our remote communication sites. These devices are reporting back to data-gathering traffic operations centers for viewing live video feeds of current road conditions, and for remote or automatic activation of roadway signage.

NDOT District III has had very good success deploying sophisticated wireless infrastructure and using our two-way Enhanced Digital Access Communication System (EDACS) radio network for controlling, monitoring, or viewing video. But much of our equipment in the field was dated and approaching the end of its life cycle. New wireless technology surpasses the capabilities of our then-current network.

NDOT District III's wide open highways

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In 2016, we started looking at different and more modern network microwave communications systems that had to be software defined to be point-to-point (PTP) and/or point-to-multipoint (PMP) configurations. Such systems had to be able to transport a 300 megabit per second (Mbps) circuit back to our main location in Elko, Nevada.

We had some initial success with a system we previously selected, but soon ran into problems. It seemed that other vendors had the idea to deploy unlicensed network microwave resources in the same areas where we already had existing network communications systems. The problem was that the available frequency channels were not wide enough for compatibility between these systems.

The other issue we had to solve was interoperating with our required Virtual Local Area Network (VLAN) architecture and design. Other unlicensed wireless systems had problems working within this architecture to transfer data. We encountered numerous problems with video glitching, and remote devices going to sleep and not responding without a constant ping applied to them.

NDOT installing Redline's Virtual Fiber™ radios on a DMS along I-80

After ten months of working with other vendors' customer support, and failed attempts at resolving problems we had with their equipment, we contacted Redline. I was put in touch with Charlie Loverso, Redline Territory Manager, Western United States.

We met with Charlie for the first time in November 2016. He had traveled to our office in Elko, in the heart of District III, from Salt Lake City, Utah. It is important to note that this was the first time a vendor had ever come to our location to understand our needs and plans. Charlie asked about our network and what we were trying to achieve. At this point, we already had some five year old Redline products deployed elsewhere; they were working well but we really had no real experience with Redline's Virtual Fiber™ product line and no validation of how well it would work in our area.

I had originally scheduled an hour and a half of my time to meet with Charlie. I thought that would be sufficient to get the ball rolling and to hear what he had to say.

I figured he would be off and I would hear back after he talked to an engineer to figure out what was possible. I was completely wrong.

The meeting ended up being three hours long with a field trip and a white board drawing of the planned network layout. It was extremely gratifying to have a vendor take such an interest in what we were trying to accomplish and offer us knowledgeable information on its product capabilities and dynamic deployment possibilities from the very first consultation.

Two weeks later, Charlie contacted me with a map of deployment possibilities that his Technical Solutions Manager, Chris Ballinger, had developed and asked if they could come out in two weeks to go over the plan, and for Chris to get a real sense of the topography and frequency congestion challenges. In addition, Charlie offered to give us an equipment demonstration, and hands-on training for equipment configuration and set-up.

This was great! We had not even committed to purchasing anything yet. Still, this company was going all out to ensure that if we bought their

products, it would solve the issues we were trying to overcome compared to what was already deployed to the field.

After three days with Charlie and Chris working out in the field, identifying possible issues with the plan, and a half-day strategizing the deployment of equipment for the best possible network, we asked them to give us a quote.

Author, with Redline's Chris Ballinger, installing a Connect-OW for Road Warning signage

We went with a RDL-3100 XG PTP system as our backbone connection from our network operations center to our network hub.

This network hop gives us 289 Mbps data throughput. From our hub, we used four RDL-3000 XP Edge radios to reach our distant DMS signs at each end of Elko.

From these DMS signs, we used RDL-3000 XP Elte-MTs to connect to RDL-3000 XP Connect-OWs for control of highway advisory signs that we turn on and off remotely.

We also deployed a PMP network made up of RDL-3000 XP Ellipse base stations connecting to RDL-3000 Elte-MTs and RDL-3000 XP Connect-OWs

as subscriber units from our hub to cover the north end of Elko and to the south into Spring Creek, a suburb of the Elko area

RDL-3000 XP Ellipse

RDL-3000 XP Connect-OW

RDL-5000

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The deployment phase took place in early 2017, starting in February and finishing in April. At this point, I was totally prepared to be on our own. If we ran into any complications, I figured the best response I was going to have was a bunch of phone calls back and forth between technical support and myself since that was the normal stance other vendors had taken with us before. Wrong again!

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Redline's Chris Ballinger conducting a training session for NDOT Technical staff in Elko

Both Charlie and Chris traveled to our location once more to ensure we deployed the equipment and configured it properly for the first week of installation of the main systems that the other systems would be built around. They also trained our staff in the proper configuration, testing, and troubleshooting of the equipment. My department, over the next few weeks, deployed the rest of the network, and with great delight. If we had a technical issue or needed advice, Chris was always just a phone call or a quick email away.

As of this December 2017 writing, we have had nothing but great success with our investment in Redline network radio equipment. Not only has the radio equipment performed well, we have benefited greatly because of the support, engineering, and excellent customer service that Redline provided before, during and after our deployment.

We have since moved forward and replaced other vendor's PTP and PMP network radios with the same achievements made against our battle with a diminishing unlicensed frequency spectrum in our area and wireless network compatibility with our data network architecture.

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ABOUT REDLINE COMMUNICATIONS

Redline Communications is the creator of powerful wide-area wireless networks for the world's most challenging applications and locations. Used by Oil & Gas companies, militaries, municipalities and telecom service providers, Redline's powerful and versatile networks securely and reliably deliver voice, data, M2M and video communications for mission-critical applications.