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A maintenance trip to assess antenna damage at one of the county's sites

Photos courtesy ADCOMM Engineering

Radio, Dispatch Center Upgrades

A dual upgrade project focused on radio communications and a 9-1-1 dispatch center in rugged Klickitat County, Washington. By Joe Blaschka Jr.

Klickitat County, Washington, founded in 1859, remains an interesting blend of old and new. One of the first large-scale Boeing wind generators was installed in Klickitat County in 1980 as a trial system; hundreds now generate power there. Ranching and farming are the major economic drivers, although the headquarters for a major drone company is also located in the county. The county includes about 30 miles of the Columbia River

Gorge National Scenic Area, as well as the 12,000-foot Mount Adams. Elevation ranges from just a bit over sea level to more than 5,000 feet. The county is a mix of high-tech and natural beauty.

As the county's population grew, so did the need for public-safety response and communications. The county's communications infrastructure did not receive much attention for several decades. When the FCC's 2013 regu-

latory changes required the county to move to narrowband operation on its existing VHF network, an already limited system became almost unusable. Change was needed in a hurry.

The Previous Technology

As Klickitat County developed, particularly along the Columbia River areas, the need for more reliable radio communications became critical, especially for portable radio coverage



This map shows the new simulcast system's 11 sites and two future sites in the county.

during wildland fire season. Klickitat County decided to improve its radio communications infrastructure. The combination of the high elevation and the approximate 60-mile paths from western Klickitat County to the city of Portland, Oregon, resulted in a severe shortage of VHF frequencies. Other frequency alternatives such as UHF were considered; however, the rugged terrain made the other options less than optimal. In the end, Klickitat County decided on a VHF simulcast system but not on a direct path.

The county is long and narrow with an area of about 1,900 square miles. The deep Columbia River Gorge makes radio coverage along the state highway and the towns along the river difficult. The new system has 11 sites and eight channels with simulcast used throughout the network as shown on the map on Page 22. There were several impediments to imple-

menting the system. The two most difficult challenges were that several sites had to be built or significantly upgraded, and a new dispatch center was needed because there was no room in the existing facility for new equipment.

Klickitat County had one existing dispatch center. Unfortunately, the dispatch center and equipment were located in the county jail behind the secure area, which made accessing the dispatch center difficult because officials had to wait to be "buzzed" in by the jail control room. In addition, the dispatch area was crowded, and the equipment room was a repurposed office supply storage area. The county had a significant challenge ahead of it.

Waiting a few years until a new dispatch center and new sites could be built was unacceptable for the radio communications. The county decided to license additional frequencies and then implement a multicast system for law enforcement at the existing jail dispatch location. The multicast system used the same input frequency for all of the sites but used different output frequencies. Even though all of the sites were unavailable, with multicast there isn't a simulcast overlap zone to worry about, so wider site spacing could be used. The new system provided a significant improvement and was deployed in a few months instead of years. The multicast network was used for about 18 months until final upgrades were complete.

New Facility and Network

Because there was no space in the existing dispatch facility, a new 9-1-1 center was needed. Building the 9-1-1 center and making radio site upgrades and construction were significant undertakings for the county; however,

the radio system could not be finished until these steps were completed. The dispatch center supports four dispatchers, a supervisor's position and administrative offices. It is also one of the radio sites. The goal of the center design was to develop a dispatch center building that was appropriate for the site and incorporated the nature of Klickitat County.

The dispatchers moved from a location with little daylight to one with great views of the surrounding countryside. The new dispatch center's high ceilings and abundant daylight provide a more open feeling in the working area. The windows are on the north side of the building, so direct sunlight coming into the dispatch area is minimized. Mount Adams and the beautiful Klickitat County countryside are prominently featured from the dispatch center location.

The new location provides secure parking, additional staff space and a break facility. The dispatch center is connected to the radio network by loop-protected microwave as well. The center is fully backed up with generator power, and all electronics and systems are protected by an uninterruptible power system (UPS).

As the dispatch center was being completed, the new radio network was also being installed and implemented. The goal was to time the radio system installation with the completion of the new dispatch center. The new equipment installed at the dispatch center included Motorola Solutions MCC 7500 consoles configured for conventional operation and a Combix enhanced 9-1-1 (E9-1-1) telephone system. The radio system is a mix of JPS Interoperability Solutions voting, GatesAir Synchrocast, and Tait Communications base stations. Aviat Networks microwave was used for the main loop with 960 MHz spurs connecting remote sites. ADCOMM Engineering's design approach is to use -48 VDC power wherever possible.

In the previous system, fire tone-out paging was done on the dispatch channel, which caused the normal conflicts between tone-outs and response communications. The county decided to move its paging to one of



The new dispatch center building

the FCC's designated paging channels: 152.0075 MHz. This frequency is still a wideband channel, so there are fewer power limitations, which significantly improves coverage. The channel is part of the simulcast system and provides good coverage across much of the county.

Important elements of the new system are remote monitoring and an extensive alarm reporting system. All the equipment can be monitored remotely through virtual private network (VPN) and Web access. The alarm units can send emails to the Klickitat County 9-1-1 director, maintenance contractor and engineers.

The new system has dramatically changed public-safety communications in Klickitat County. The system now has 11 sites and eight channels. The county road department decided to expand its system, so it now also has excellent countywide coverage.

Implementation Challenges

There are a few things to keep in mind for a project similar to the Klickitat County upgrade. Site environmental issues related to the FCC's Section 106 process can be troublesome. Many people are unaware of this process, and government entities, in particular, often think they do not need to follow this process. Klickitat County was following the FCC rules, but one of its sites ran into an issue

where a government entity did not follow the rules at another site, and the FCC found out about it. The FCC thought the two sites were the same and would not move forward on Klickitat County's site until the other site's issues were resolved. It took a considerable amount of work and more than a year to get the FCC to realize the two sites were different.

The county implemented the sites in a mostly serial fashion, greatly extending system implementation time. Implementing sites in a more parallel fashion would have saved at least a year off the implementation schedule.

Having the ability to monitor and control the sites and equipment remotely saved scores of hours during system implementation, commissioning and maintenance. It can take more than three hours to drive from one site to another site in the county, so having the alarm and remote access continues to save time when maintenance issues arise because the problem can be detected remotely before a technician heads out. This capability is well worth the extra money and time spent implementing it.

Making some improvements early in the project helped keep the users from getting too restless during the implementation process. That said, it is important to keep users apprised of project progress during



Juniper Point upgraded radio site

the implementation process. ■

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