Talk Group

Specialists in Public Safety Communications Since 1979

ADCOMM Engineering Company

Bridging the Gap Between Operations and Technology®

3929 184th Place SE
Bothell, WA 98012-8827
Voice 425•489•0125 Fax 425•488•3952
www.adcommeng.com

Vol. 16 No. 2 ©November 2016

Klickitat County - Double Upgrade

—Joe P. Blaschka, Jr., P.E.

Created in 1859, Klickitat County, Washington, remains an interesting mix of old and new. One of the very first large-scale power generating wind generators built by Boeing was installed in Klickitat County in 1980 as a trial system, now hundreds generate power there. Klickitat County includes approximately 30 miles of the Columbia River Gorge National Scenic Area and the headquarters for one of the major drone companies in the United States. It is a mix of high tech and natural beauty. The elevation ranges from just a bit over sea level to over 5,000 feet.

All of this resulted in a very complex radio system environment. As Klickitat County developed, especially along the Columbia River areas, the need for more reliable radio communications became critical, especially portable radio coverage. ADCOMM was selected to assist Klickitat County in improving their radio communications infrastructure and new 9-1-1 dispatch center. The combination of the high elevation and the approximate 60-mile paths from western Klickitat County to the City of Portland resulted in a severe shortage of VHF frequencies. ADCOMM looked at other frequency alternatives such as UHF. However, the very rugged terrain made other options less than optimum. In the end, Klickitat County went with a VHF simulcast system.

The county is long and narrow with approximately 1,900 square miles of area. The deep Columbia River Gorge made providing radio coverage along the state highway and the towns along the river difficult. In the end, the system designed and implemented has 11 sites and eight channels with simulcast used throughout the network as shown in the map above.

The radio system is a mix of JPS voting, Harris SynchroCast, and Tait base stations. ADCOMM's design approach is to use -48 VDC power wherever possible. Figures 1 and 2 show some of the equipment in the system.

Along with the new radio system, the County also built a new 9-1-1 center (see Figure 3). Their old center was in the jail area, was very crowded, and there was little room for equipment. The dispatch cen-

FIGURE 1. JPS Voting Equipment

PLEASE SEE ***Klickitat*** ON PAGE 2

Industry News ...

Klickitat

CONTINUED FROM PAGE 1

FIGURE 2. Harris SynchroCast

FIGURE 3. Klickitat County New Dispatch Building

ter supports four dispatchers, a supervisor's position, and the 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 the nature of Klickitat County.

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

The dispatchers moved from a location with little daylight to one with great views of the surrounding countryside as shown in the photos. The dispatch center uses high ceilings and lots of daylight to provide a more open feeling in the working area. The windows are on the north side of the building so the amount of direct sunlight coming into the dispatch area is minimized (see Figure 4).

FIGURE 4. Dispatch Center Console Area

Mount Adams and the beautiful Klickitat County country side are prominent features from the dispatch center location (Figure 5).

FIGURE 5. View From the Dispatch Center; Mt. Adams in the Distance

"If you come to a fork in the road, take it." Yogi Berra

—R. Scott Peabody, P.E.

For many organizations, the fork in the road is the daunting task of choosing a new radio system as several radio manufacturers have announced the end of life of their previous generation of radio equipment. One good path for many organizations is digital mobile radio or DMR for short.

DMR

DMR is an open digital radio standard specified for professional mobile radio users developed by the ETSI (European Telecommunications Standards Institute, pronounced "Et-see") with use throughout the world. The standard has developed since its initial ratification in 2005, but DMR remains true to its original design goals as a low-cost, entry level radio system for commercial use. DMR is available for conventional operation ("Tier II") as well as for trunked operation ("Tier III"); "Tier I" systems are not available in the United States.

Benefits of DMR

Many of the benefits of DMR are derived from the use of an air link technology called TDMA (time division multiple access). One radio channel provides two talk paths enabling DMR to double the capacity of legacy 12.5 kHz radio systems and still comply with the FCC narrowbanding mandate. Figure 1compares a legacy radio system with three repeaters and a DMR Tier II system using the same three radio frequencies. Alternatively, one of the DMR repeaters could be eliminated to provide more capacity and yield lower radio infrastructure costs with less radio repeaters, combining equipment, and rack space.

Radio users experience benefits too with longer battery life. Using only one time slot, the portable radio transmitter is idle one half of the time. According to the DMR Association, a global trade organization promoting DMR, "By cutting the effective transmit time in half, two-slot TDMA can enable up to 40 percent improvement in talk time in comparison with analogue radios. (One manufacturer's product literature gives a talk time of 9 hours' operations for analogue mode but 13 hours for digital mode on the same radio)."[1] With the implementation of sleep and other power management technologies, even greater portable battery life can be achieved as seen in digital cellular phones.

DMR also offers advanced capabilities such as location-based (GPS) tracking, text messaging, and allows for third-party development of other applications. As with most standards-based implementations, some manufacturers

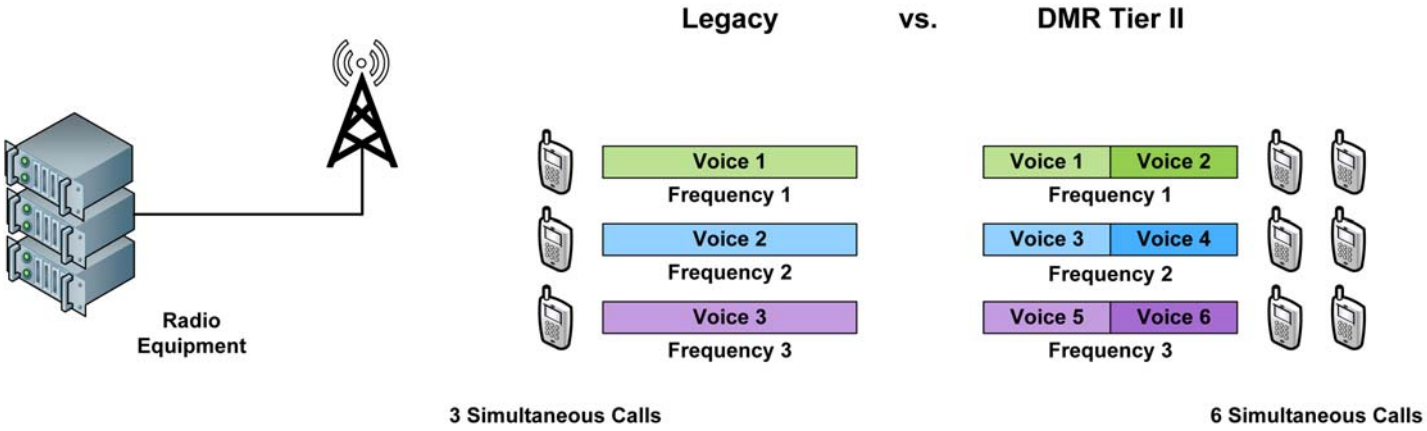

FIGURE 1. Capacity Comparison Between Legacy and DMR Radio Systems

have added proprietary "features" that may be incompatible with other vendors' radios.

DMR systems typically do not offer the redundancy or other important features that are available with public safety-grade systems such as P25. For instance, only one of the primary DMR suppliers has begun taking orders for DMR systems with simulcast capabilities.[2] Also, the ETSI standard does not itself support encryption, although some vendors have implemented encryption using standard algorithms.

DMR portable and mobile radios have a broader range of capabilities and price points. As a cost comparison, a well-known radio manufacturer provides a high-end portable DMR radio with OTAP (over-the-air programming) for its Tier III systems at half the cost of its low-end P25 radio (with OTAP). The high-end P25 portable with dual band capabilities, OTAP, and encryption is nearly 6-½ times the cost of the DMR high-end portable!

DMR Is Not Compatible With Project 25 (P25) Digital

While both "digital" systems, DMR and P25 are not compatible, like DMR, Project 25, better known as P25, is a suite of open standards for digital two-way radio communication. P25 is typically used by public safety agencies in North America with its design goal of interoperability.

In practice, interoperability between P25 users takes planning and investment, but it can be achieved with P25. At least a basic level of compatibility exists between all vendors' P25 equipment, allowing end users to have a choice when selecting equipment. However, many vendors also offer proprietary "features," which if relied upon can consequently reduce equipment choices. All P25 Phase 2 radios are capable of also operating in Phase 1 mode, providing backward compatibility if configured properly. Further, all P25 radios are capable of analog operation. With proper equipment programming, user training, and procedures, this capability can improve interoperability with surrounding agencies still using analog systems.

P25 also comes in two flavors: *Phase 1* and *Phase 2*. P25 Phase 1 uses a 12.5 kHz narrowband-compliant frequency division multiple access (FDMA) digital air interface, whereby each channel supports a single talk-path. P25 Phase 2 is a newer technology that uses a 6.25 kHz-equivalent narrowband-compliant two-slot time division multiple access (TDMA) digital air interface to support two talk paths in each 12.5 kHz channel. Similar to DMR, P25 Phase II systems provide additional capacity and increase battery life over Phase I implementations.

"The future ain't what it used to be." Yogi Berra

Yogi interpreted this expression to mean, "I just meant that times are different. Not necessary better or worse. Just different." The sound of these newer narrowband digital systems isn't better or worse; it's just different. DMR and P25 systems convert analog voice to digital encoded voice through a process called *vocoding* ("voice encoding"). Compared to a traditional analog system, digitally vocoded audio improves the spectral efficiency at the cost of voice quality. One of the primary advantages of P25 is the ability to use standards-based encryption, with no loss in audio quality or range compared to unencrypted operation. By comparison, analog encryption techniques normally result in a reduction in audio quality and/or coverage.

Because of the way audio is reproduced, digital systems sound *different* than analog systems. Whether it is better or worse than analog is subjective, but suffice it to say it may take some users a short period of time to get used to the difference. In addition, because there is no discernable background noise or "static" in a digital system, if a user keys his or her radio but does not speak, other users may not know the channel is actually in use because it will remain silent. Also, there is no "squelch tail" with digital systems as there often is with analog repeaters. In general, digital systems have less user feedback about how well they are accessing the radio system than with analog systems.

"It's tough to make predictions, especially about the future." Yogi Berra

With its lower cost of infrastructure and feature-rich radios available from a wide range of suppliers, DMR is experiencing strong demand in the United States and international markets. It's tough to make predictions, but DMR looks like a winner for the foreseeable future.

---

[1] DMR Association Key Benefit, Longer Battery Life and Greater Power Efficiency, http://dmrassociation.org/key-benefits/

[2] It is anticipated simulcast technology will become more available in the future. There are two European vendors offering DMR simulcast technology today and other DMR manufacturers have it on their product roadmaps and they are taking orders for DMR simulcast systems now.

Meet ADCOMM's Newest Addition

As the newest member of the ADCOMM team, Dean Heistand is formerly the Technical Systems Supervisor at Kitsap County CENCOM. Dean brings with him 41 years of public safety communications and technology system management experience. Dean managed both the communications and computer/data systems at CENCOM, which included the implementation of a 15-tower site, multiple channel simulcast system, new dispatch center, and upgrades to the CAD and MCT systems. Dean was also heavily involved with the operational aspects that included dispatching part-time and serving 20 years as a firefighter/EMT, eventually placing him in a volunteer Fire Chief's role and serving on technical/operational user group and training committees. Dean's long term passion was to bridge the understanding between technical and operational expertise for the purpose of developing more useful and user-friendly technology to PSAPs and public safety field operations. Dean was also a key driver in the implementation of interoperability systems, which included Kitsap's eventual partnership with the Tri-County (Snohomish-King-Pierce-WSP/FBI) Regional Interoperability System (TRIS). Dean brings with him extensive experience at troubleshooting and resolving higher tier technical issues.

Dean's hobbies include anything outdoors and he loves to travel distances to explore new hiking trails as well as the study of arts, sciences, and natural history. He and his wife Janice, who were both raised in the Bremerton area, also cherish spending much time with their four adult children and ten grandchildren.

Check out our website: www.adcommeng.com