

DFS User Solves Weakened Radio Frequency Performance

DFS acquired a 450MHz radio frequency for Northern Palm Beach County Improvement District when we first installed their SCADA system 29 years ago. It operated flawlessly under the stringent requirements we demand for our radio communications, but as the decades went by, the efficiency of their radio channel began to falter. Foliage that had been immaterial or non-existent in 1991 was spreading. Buildings sprung up where empty lots had been. These gradual changes resulted in communications problems that began to degrade NPBCID's ability to efficiently render the vital services of stormwater and flood protection to their community.

Operations supervisor, Rick Musgrove, said that there were more radio off-lines than he could have ever imagined. Operations expenses related to the increased manpower and the overtime needed to deal with these problems were increasing. That's when Musgrove and his coworker, Ross Keith, took steps to replace the radios in their three decade-old SCADA system with new, 200MHz VHF equipment. DFS acquired a new licensed frequency and provided and installed over 70 new Telemetry Interface Modules with high-speed radios. It's not surprising that

What Happened To My 450MHz Radio Channel?

That 450MHz radio channel that operated your SCADA system for decades might not be delivering the same, reliable communications that it once did. What happened? A little background will help to explain.

History - The FCC originally set aside 25KHz UHF bands from 300 – 460MHz for voice operations. Since users' systems varied in quality, they established 12.5KHz guard bands to act as a buffer between each channel. By the 1970s, these channels, which were also licensed for data, were becoming scarce in populous areas. So, the FCC, noting the improvement in radio technology, began to allow data transmissions on those 12.5KHz guard bands, as long as they: did not exceed 2 watts of power; their antennas did not exceed 20 feet in height and; most importantly, they did not interfere with any voice channel. This last restriction was an absolute. DFS and other SCADA providers began using these guard bands in many areas because there were literally no other frequencies available. DFS developed technology that would allow robust communications in spite of the power and antenna limitations.

The Problem - In 2004, the FCC announced that available UHF frequencies in high population areas were nearly non-existent. They implemented a procedure known as "narrow-banding," and decided to split the 25KHz channels in half. At the same time, they changed the status of the 12.5KHz guard bands to that of a regular channel. The FCC allowed about nine years for users to make the transition to the new, narrower channels and warned that, at some time in the future, these voice and data channels will be split again, into 6.25KHz channels.

It's important to understand that narrow-banding has a measurable negative effect on the efficacy of a radio system. Each time a bandwidth is halved, the signal fade margin is reduced by 3dB. A fade margin may be described as the amount of signal that can be lost, by weather, interference, foliage growth or degradation of aging equipment, before communications begin to fail. DFS has always targeted 20dB as our ideal fade margin, so a loss of 3dB would result in a 15% loss of signal margin. A margin loss of 30% can be anticipated when the FCC decides to implement the second round of narrow-banding.

The Solution - In the 1990s, DFS, having experienced the frustrations of the disappearing 450MHz channels, "discovered" the almost unused 200MHz frequency band. We petitioned the FCC to allow us to use part of it for SCADA and they agreed. While this frequency band

Musgrove says the results are better than he ever expected. With all things being equal, a 200MHz system will deliver a signal with 11dB greater strength than a UHF system. "Now nothing ever affects the radio communications," Rick said. And overtime expenses have all but disappeared.

We're thankful for loyal, longtime customers like NPBCID, and we cherish the opportunity to continue offering them our support.

is also limited to 2 watts of power, it offers significant advantages:

- All 200MHz licenses are 25 – not 12.5 – MHz channels;
- Voice transmissions are not permitted;
- Frequencies are readily available and interference is rare;
- When all conditions are equal, a VHF system in the 200 MHz range will provide a signal margin gain of 11dB over a 450MHz system.

DFS has helped many of our users, whose 450MHz frequencies have become unreliable due to narrow-banding or powerful interference from other transmitters, change to the more robust, more steadfast 200MHz band. Ask us how.



Ask about DFS's lifetime warranty on products and systems.