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Protecting the 6 GHz Frequency Band for Utilities and Critical Infrastructure

Application Note

Background

Many electric utilities, including public power utilities, rely on the 6 GHz band of spectrum for wireless communications to operate critical electric infrastructure. In April 2020, the Federal Communications Commission (FCC) approved an order to allow the operation of unlicensed devices in this band.

The FCC approved making 1,200 megahertz of the 6 GHz band (5.925–7.125 GHz) available for unlicensed use to aid the expansion of the next generation of wireless internet technology, Wi-Fi 6E. The order authorized indoor low-power operations for the entire 1,200 megahertz plus standard power devices in 850 megahertz within band. This ruling by the FCC is playing a critical role in developing the network of physical objects – things – embedded with technologies for the purpose of connecting and communicating with other devices and systems via the internet, commonly referred to as the Internet of Things (IoT).

By opening the 6 GHz band for unlicensed use, the amount of spectrum available for Wi-Fi technology has increased by nearly a factor of five. The FCC believes that by clearing out broad swaths of mid-band spectrum for unlicensed use, new technologies and services will deliver innovative solutions to American consumers and simultaneously advance the Commission's goal of making broadband connectivity available to all Americans.

Until the recent FCC decision, the 6 GHz band had been primarily populated by, among others, microwave services used to support utilities, public safety, and wireless backhaul communications networks. Now the incumbent service providers must share the spectrum with unlicensed devices. What this means for utilities operators is increased potential for added interference from thousands of new devices covering the spectrum resulting in limited capacity and network interruptions.

Potential Problems

Although the FCC decision was welcomed with great praise from proponents of advancing IoT applications, it spelled trouble for utility providers across the nation. The overarching problem with expanding the use of the mid-band spectrum can be broken down into two primary issues: 1) stunted innovation and 2) Interference.

Utilities rely on the stability of their networks so they can update, modernize, repair and restore their services, and the expansion of 6 GHz denies them from tapping into potential advancements in their own networks that could improve the way they provide essential energy and water services. For example, future "smart" power technologies that could be developed to revolutionize the way consumers make informed decisions about how they channel and consume power may be snuffed out due to lack of spectrum real estate. For such technologies to thrive, the utilities must be able to adequately expand their capacity in the 6 GHz band without worrying about the congestion caused by new users.

Additionally, interference to current networks poses the biggest and most immediate risk to utilities providers and their consumers. Prior to the recent expansion of the mid-band spectrum, utility providers could rest assured their communications would travel swiftly and without interference.

Now, with the large swaths of next-gen technologies rushing the mid-band, the reliability of critical utility communications networks managing the nation's electricity is threatened. The 6 GHz microwave systems currently used by utilities infrastructure providers supports voice and data transmission that is used when safety personnel are upgrading, maintaining and restoring their infrastructure.

The microwave systems operating in the mid-band spectrum serve as the telecommunications bedrock for utility networks carrying critical information for their safety personal and various applications and services. Any interference in those networks due to increased traffic threatens the safe, reliable and secure delivery of essential services to the public by utilities providers.

In theory, the FCC's authorization of the Automated Frequency Coordination (AFC) process would ensure protection against harmful interference from unlicensed operations, however, theories are only theories – not facts. In practice AFC systems can be inaccurate, incomplete, unavailable due power losses or internal outages, and/or GPS signals used in the systems may not work if blocked by nearby buildings or other obstructions.

In instances where AFC systems fail to mitigate signal interference, microwave systems can experience degradation in their links and reduced capacity for some time, which could lead to major disruptions for utilities providers.

Utilities Wireless Antenna Design Considerations

Given the severity of the current situation, one must consider key details when selecting antennas for use in their critical utility networks. RadioWaves offers a diverse product range of high-quality microwave antennas that operate in the 6 GHz band for Point-to-Point and Point-to-Multipoint applications supporting all unlicensed and licensed band requirements. RadioWaves is known globally for their high performance, reliable construction and design and flexible delivery capabilities.

RadioWaves portfolio of Flat Panel, Sector and Parabolic antennas feature exceptional front-to-back ratios for overcoming signal interference and boosting your networks' range and performance. These robust microwave antennas also feature high-gain and minimal side-lobes for increasing signal efficiency and decreasing signal interference from your network to other networks.

For more information on RadioWaves products for Utilities applications, visit radiowaves.com or contact us at +1 978 459-8800.