

Can Private LTE Networks Replace Utility 6 GHz Microwave Systems?

BACKGROUND

Electric, water, and natural gas utilities of all shapes and sizes build, own, and maintain private communications networks that support the safe, reliable, and resilient delivery of essential, life-sustaining services. Utilities operate their own private networks in order to meet the stringent reliability expectations of their customers, expectations the commercial telecommunications sector cannot meet for a number of reasons.

A critical element to these networks is interference-free radio spectrum, a naturally occurring phenomenon required for any kind of wireless communications. To strengthen and secure these systems, utilities use numerous kinds of technologies and spectrum bands to underpin their critical infrastructure. In some instances, utilities need to communicate important situational information across long distances at high speeds. At other times, utilities must transmit different kinds of data over shorter distances to allow for greater customer interaction.

These needs will grow as utilities modernize their infrastructure and enable new technologies such as smart meters, distributed energy resources, and smart cities. Utilities therefore must use different spectrum bands, depending on the need and the data being sent.

UTILITY PRIVATE NETWORKS

Utility private communications networks are built to function nearly 100% of the time, as these systems underpin the delivery of essential electricity, water, and natural gas services. In order to ensure the safe, reliable and secure delivery of these services, utilities design, build, operate, maintain, and harden their communications networks against potential incidents so that they remain resilient in the event of an electricity outage. Utility private networks implement

extended backup power and diverse and redundant routing of traffic to ensure these communications networks remain operable during and after natural disasters to enable response and recovery.

While these systems are built to withstand natural and man-made disasters, a key federal agency—the Federal Communications Commission (FCC)—is proposing rules that could reduce the reliability of critical utility communications. As a result, utilities and other industry stakeholders may be forced to consider alternatives if the FCC proceeds with its controversial rulemaking, if any alternatives exist.

6 GHz BAND

Utility 6 GHz microwave systems serve as the backbone to carry traffic to and from wide-area radio communications systems that utilities currently use. Much the same way that 5G depends on fiber to backhaul traffic from small cell wireless systems, utilities use microwave as a high capacity pipe to carry traffic to other communications systems on their networks.

The FCC has proposed rules that would allow hundreds of millions of commercial wireless devices to operate in the band, potentially interfering with utility wireless communications systems. The risk of interference from unlicensed operations to these utility microwave systems could undermine the safety and reliability of electric, gas and water services.

PRIVATE LTE/900 MHz BAND

Some industry stakeholders and observers are wondering what suitable alternative communications options, if any, would be available to utilities if the FCC allows unlicensed operations in the 6 GHz band. Some observers have questioned whether an option exists in a separate FCC proposal to realign the 900 MHz spectrum band to allow utilities and other critical-

infrastructure industries to use the band for broadband LTE services.

IS 900 MHz AN OPTION FOR 6 GHz TRAFFIC?

While the proposed realignment of the 900 MHz band presents an opportunity for utilities to support some of their mission-critical utility applications, such as SCADA, it is not a substitute for the 6 GHz band. Utilities would continue to need high capacity backhaul communications that are provided by microwave systems that operate in the 6 GHz band.

Moreover, utilities may decide to continue to run certain applications, such as protective relaying (also called teleprotection) over microwave wireless systems for a variety of reasons, not the least of which would be reliability, redundancy, network diversity and security. Therefore, if utilities had access to private LTE broadband networks, they would still need to be able to use 6 GHz microwave systems to support their core operations.

The two types of wireless technologies—microwave and LTE—are not mutually exclusive. Each has its own advantages. Microwave systems offer a cost-effective, highly reliable, high-capacity alternative to using fiber for backhauling large amounts of traffic over long distances from one point to another or to multiple points. By comparison, a private LTE network using 900 MHz spectrum would offer wide-area coverage with relatively higher speeds and capacity compared with the narrowband radio systems that utilities use today.

To illustrate the point, imagine yourself trying to get a large volume of water to and from several fixed locations. You can set up large capacity pipes to get the water to those locations. Or you could set up so many sprinkler heads that you could eventually deliver the same volume of water to the fixed locations. You will also spread water all over the surrounding area. But you can get the job done. In this analogy 6 GHz is the pipe; 900 MHz is the sprinkler.

DIFFERENT USE CASES

Although both microwave and 900 MHz private LTE systems could be used to support utility applications, they are likely used in very different ways to support

different functions in different parts of the utility infrastructure/service territory. For example, microwave systems would be ideal for communicating with a substation or some other critical asset in a remote area. By the same token, a private LTE network could be more appropriate to support utility applications on distribution networks in more densely populated areas. But, even in those more densely populated areas, there would still be a need to use microwave systems where it is cost-effective, practical and secure to do so.

UTILITIES NEED OPTIONS

Ultimately, different utilities will have different communications needs depending on the geographic service territory they are serving and the demands they are trying to meet. The goal for policymakers is to support policies that give utilities the options they need to make choices about the communications networks that they will use. Right now, utilities have limited choices because they don't have access to broadband spectrum. But that does not mean that access to broadband spectrum would negate the need for microwave systems in the 6 GHz band.

ABOUT UTC

The Utilities Technology Council (UTC) is a global trade association dedicated to serving critical infrastructure providers. Through advocacy, education and collaboration, UTC creates a favorable business, regulatory and technological environment for companies that own, manage or provide critical telecommunications systems in support of their core business.

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