

Protecting 6 GHz Spectrum Usage by Public Power from Interference

Summary

Electric utilities typically own and operate their own communications systems (wireline and wireless) for mission-critical operations throughout the electric system. These private communications networks are designed to remotely control transmission, generation, and distribution assets to ensure the safe and reliable delivery of power to homes, businesses, and communities. Many electric utilities, including public power utilities, rely on the 6 gigahertz (GHz) band of spectrum for wireless communications to operate critical electric infrastructure. In April 2020, the Federal Communications Commission (FCC or Commission) approved an order to allow the operation of unlicensed devices in this band.

The American Public Power Association (APPA) has strong concerns with the Commission's order, which threatens the reliability of utility communications monitoring and controlling key utility infrastructure. APPA believes the FCC erred in opening the band to unlicensed operations without having conducted rigorous, real-world testing of technology to prevent interference to licensed utility operations in the 6 GHz band.

Background

The 6 GHz frequency band, also referred to as "mid-band spectrum," spans approximately 1,200 MHz of frequency band from 5.9 GHz through 7.1 GHz. Electric utilities and other critical infrastructure sectors use this spectrum for critical communications using microwave networks. Many utility licensees moved into the 6 GHz band in the 1990s after being required by the FCC to leave the 2 GHz band, which was being reallocated for personal communication and mobile satellite services. Utilities use microwave networks for fixed point-to-point communications because the technology allows large amounts of data to reliably travel long distances. These networks support real-time operations, including supervisory control and data acquisition

(SCADA) systems used to monitor and control generating units, transmission lines, and substation equipment. They are also used for system protection and voice communications between utility personnel in the field during natural disasters and other emergencies.

The attributes that make the 6 GHz band well suited for critical utility communications also make it susceptible to interference. Until very recently, no spectrum sharing was allowed in the band. Mounting pressure by large technology companies to open more bands of spectrum for unlicensed uses and federal policies that direct the National Telecommunications and Information Administration (NTIA) and FCC to facilitate spectrum sharing where possible, have resulted in electric utilities with critical communications networks in the 6 GHz band now having to share that spectrum. Large numbers of unlicensed devices operating the band are likely to cause interference. While spectrum sharing has worked in some bands with little impact on incumbent operators in those bands, spectrum sharing can cause interference to communications networks operating in the 6 GHz band.

Electric utilities are subject to mandatory reliability standards issued by the North American Electric Reliability Corporation (NERC) and enforced by the Federal Energy Regulatory Commission (FERC). They rely on their communications systems to ensure their compliance with these reliability standards. Any delay or degradation of communications signals on communication systems used by electric utilities in the 6 GHz band could lead to the disruption of power delivery and/or threaten the safety of workers and customers. Thus, utility communications must not experience harmful interference from unlicensed devices in the 6 GHz band and must maintain communications reliability to ensure the safe, reliable, and secure delivery of electric power and compliance with FERC/NERC reliability standards.

Regulatory Action

In October 2018, the FCC issued a Notice of Proposed Rulemaking (NPRM) to open the 6 GHz band to unlicensed spectrum sharing. The FCC stated in the NPRM, “proposed rules will allow a valuable spectrum resource to be more intensively used to benefit consumers while allowing the existing licensed uses of the 6 GHz band to continue uninterrupted.” To address interference concerns, the FCC proposed use of an “automated frequency coordination (AFC)” system to mitigate any potential interference (a suggestion made by technology companies seeking unlicensed use of the band). In February 2019, APPA and other major utility trade associations filed joint comments urging the FCC to “not allow unlicensed operations in the 6 GHz band because...the potential for interference is unreasonably high and therefore likely to present significant adverse impact[s] to critical infrastructure communications....” This could “put at risk the safety of life, health, and property that incumbent licensees help to protect.” The reply comments noted the efficacy of AFC technology is unsupported by evidence or experience, with no field testing having been conducted.

In response to critical infrastructure industry concerns, other regulatory agencies weighed in with the FCC. In September 2019, the Assistant Secretary of the Office of Electricity at the Department of Energy (DOE) sent a letter to NTIA and the FCC expressing concerns with the NPRM’s plan to rely on untested AFC technology. DOE cited an example of a similar system that was used in the 5.8 GHz band that did not work. DOE asked that adequate testing and safeguards be in place before making any changes in the band and offered the assistance of the National Laboratories. In December 2019, FERC sent a letter to the FCC asking it to consider requests made by electric utilities and state regulators for additional testing of the AFC system prior to moving forward. The FERC Commissioners noted the cross-dependencies between communications and bulk power system operations and shared that concerns were expressed on the possible impacts of unlicensed operations in the band on electric reliability at a FERC reliability technical conference.

Despite these concerns, on April 23, 2020, the FCC voted to approve a final report and order (R&O) to open the 6 GHz spectrum band to unlicensed users. The FCC stated its belief that use of an AFC system will protect incumbent users from harmful interference by new unlicensed entrants. The Commission also stated it believes its decision to split the band to allow two types of unlicensed operations will protect incumbent

operators’ communications from harmful interference. In addition, in a nominal nod to the concerns expressed in the docket by stakeholders, the R&O created an industry led, multi-stakeholder group to study technical and operational issues in the 6 GHz band.

The FCC also issued a Further Notice of Proposed Rulemaking (FNPRM) that sought comment on expanding unlicensed operations in the 6 GHz band beyond what was done in the R&O. APPA and other utility trade associations filed joint comments expressing strong concerns with further opening the band to unlicensed uses before seeing whether spectrum sharing allowed by the R&O can occur in real-world conditions without causing harmful interference. By issuing the FNPRM at the same time it adopted the R&O, it is clear the Commission was unconcerned about the potential interference unlicensed operations could have on critical utility communications networks that control and monitor electric infrastructure that keeps the lights on. The FCC has not yet acted on the FNPRM.

APPA and other organizations challenged the FCC’s R&O before the U.S. Court of Appeals for the District of Columbia Circuit (D.C. Circuit) on the grounds that it fails to adequately protect incumbent license holders from interference. On December 28, 2021, the D.C. Circuit denied all but one petition for review, stating the petitioners “have failed to provide a basis for questioning the Commission’s conclusion that that the Order will protect against a significant risk of interference, just the kind of highly technical determination to which we owe considerable deference.” APPA and others may appeal this decision.

In addition to the litigation, in 2021, APPA and others jointly submitted a petition for rulemaking on low power indoor devices, as well as a stay request on such devices. The petition and stay request were based on information from an April 2021 Southern Company and the Electric Power Research Institute (EPRI) field test where they bought 6 GHz devices that are currently available in the marketplace to conduct real world testing to determine if they would cause interference to electric utilities’ communications systems in the band. The devices were operated near a Southern Company microwave link operating between Fortson and Columbus, Georgia, using the FCC thresholds for reportable interference. The tests showed that, even at low powered indoor use, the unlicensed devices “cause harmful interference to licensed fixed microwave systems” greater than the FCC’s acceptable levels. Those findings were presented to the FCC for consideration. The Commission has not acted on those requests.

Congressional Action

Congress has expressed concerns with the FCC's proposal to open the 6 GHz band to unlicensed use numerous times. Multiple letters were sent by senators and representatives, including those serving on the House Energy & Commerce Committee and Senate Energy & Natural Resources Committee, in 2019 and 2020, to FCC Chairman Ajit Pai raising concerns about potential interference from unlicensed use in the band and asking the Commission to protect current license holders from any such interference. Some of these letters also called for "rigorous testing of the proposed mitigation measure before any final decision is made." In all the FCC's short replies to these congressional inquiries, Chairman Pai asserted that the Commission would protect incumbent license holders in the band from harmful interference.

In addition, in 2019, Senator John Kennedy (R-LA) included language in the Senate Appropriations Committee's Subcommittee on Financial Services and General Government fiscal year 2020 appropriations bill stating that the committee "expects [the FCC] to ensure its plan does not result in harmful interference to incumbent users or impact critical infrastructure communications systems. The Committee is particularly concerned about the potential effects on reliability of the electric transmission and distribution system." In 2020, he also included language in the report accompanying the Consolidated Appropriations Act, 2021 that states the committee, "expects the FCC to ensure any mitigation technologies are rigorously tested and found to be effective in order to protect the electric transmission system." The language also required that the FCC report back to the committee in 90 days on its progress toward that goal.

APPA Position

APPA supports the FCC's goals of expanded access and usage of spectrum bands. However, the association strongly opposes opening the 6 GHz band to unlicensed users due to the unacceptable risk of interference to mission-critical electric utility communications networks used for SCADA systems that monitor and control transmission, generation units, and substations. There is no evidence that the AFC technology will perform as promised and prohibit interference. Moreover, there are no current reasonable alternative bands for utilities to migrate to if interference is not mitigated, while alternatives and ability to handle interference do exist in other bands for those unlicensed users currently seeking access to the 6 GHz band.

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The American Public Power Association is the voice of not-for-profit, community-owned utilities that power 2,000 towns and cities nationwide. We represent public power before the federal government to protect the interests of the more than 49 million people that public power utilities serve, and the 96,000 people they employ. Our association advocates and advises on electricity policy, technology, trends, training, and operations. Our members strengthen their communities by providing superior service, engaging citizens, and instilling pride in community-owned power.