

From the UTC Public Policy Division

Re: FCC Issues Draft Report and Order Authorizing Unlicensed Use of 6 GHz Band
Date: April 2, 2020

Summary. The draft Report and Order authorizes outdoor and indoor unlicensed operations. Outdoor operations would be authorized to use 850 MHz of the band and would be controlled by automated frequency coordination (AFC). Indoor operations would be authorized to use the entire band and potential interference would be mitigated only by output power restrictions. The issue of very low power (VLP) unlicensed operations will be considered as part of a further notice of proposed rulemaking (FNPRM). Also, the Commission will consider increasing the power for indoor operations without AFC.

Discussion. The FCC authorizes outdoor and indoor operations at the following power levels, and as further described in detail below:

Table 3: Expanded Unlicensed Use of the 6 Gigahertz Band

Device Class	Operating Bands	Maximum EIRP	Maximum EIRP Power Spectral Density
Standard-Power Access Point (AFC Controlled)	U-NII-5 (5.925-6.425 GHz)	36 dBm	23 dBm/MHz
Client Connected to Standard-Power Access Point	U-NII-7 (6.525-6.875 GHz)	30 dBm	17 dBm/MHz
Low-Power Access Point (indoor only)	U-NII-5 (5.925-6.425 GHz)	30 dBm	5 dBm/MHz
Client Connected to Low-Power Access Point	U-NII-6 (6.425-6.525 GHz) U-NII-7 (6.525-6.875 GHz) U-NII-8 (6.875-7.125 GHz)	24 dBm	-1 dBm/MHz

Standard Power Outdoor Operations

The outdoor devices will be controlled by AFC. On the AFC issue, the FCC agreed with UTC and utilities that argued for a centralized approach, and found that that this is consistent with its approach with the TV Whitespace technology. It also agreed that it will provide better oversight by the FCC, as well as reduce design complexity of the AFC. The AFC will rely on data in the FCC’s Universal Licensing System (ULS). The FCC will require that applicants for temporary fixed links submit the details of their operations (transmitter and receiver location, antenna height, antenna azimuth, antenna make and model, etc.) in the Universal Licensing System prior to transmission if they desire to be protected from potentially receiving harmful interference from standard-power access points in the U-NII-5 and U-NII-7 bands. The AFC will determine frequency and channel availability at the maximum permissible power of 36 dBm for standard-

power access points, as well as at lower power levels in steps of no greater than 3 dB below the maximum 36 dBm permissible EIRP, down to a minimum level of 21 dBm for client devices. Standard power access points will be required to include an internal geo-location capability to determine their geographic coordinates, rather than relying on a professional installer to determine them. These geo-location capabilities may not work where GPS is unavailable, so the FCC is allowing manufacturers to use external sources for the devices to obtain geolocation using wireless or cables to connect with the source of the geolocation coordinates. The FCC will also allow the standard power access point to determine its height above ground either automatically by the device or manually by a professional installer. The interval for standard power access points to coordinate with the ULS will be on a daily basis, consistent with the timeframe that the ULS data is updated. If ULS goes down or the access point is otherwise unable to contact it, the FCC will permit the device to continue operating until 11:59 p.m. of the following day.

The FCC is creating an industry led multi-stakeholder group to study technical and operational issues in the 6 GHz Band, which will address such issues as interference detection and mitigation, AFC system and standard power access point security measures, AFC system testing and certification procedures and ensuring that AFC systems contain complete and up-to-date incumbent data. The FCC encourages but does not require the members of the industry that lead the group to allow other interested stakeholders, such as incumbent licensees, to participate. The FCC will designate entities to serve as AFC operators, and it will allow multiple AFC operators to serve in this capacity. AFC operators will be authorized for a five year term. The FCC will not require that these AFC systems synchronize data with each other. The FCC reasoned that there is no need for the AFC systems to share information about registered standard-power access points with each other because the FCC is not requiring AFC operators to consider aggregated interference.

The AFC system itself will rely on underlying assumptions about propagation analysis. On that point, the FCC determined that the AFC systems will use different models: specifically it will use free-space model for short distances (separation distances of 30 meters or less); WINNER II for medium distances (urban, suburban, and rural environments), and irregular Terrain Model for longer distances (distances between 1 km and 2000 km). The interference protection criteria will be -6 dB interference to noise power (I/N ratio), but the FCC expressly stated that it is not making a determination that any signal received with an I/N greater than -6 dB would constitute “harmful interference.” As noted above, the FCC will not consider aggregated interference from multiple access points to point-to-point microwave links. However, the FCC will include some adjacent channel protection in addition to co-channel protection when the AFC system is calculating its exclusion zone.

In terms of security, the FCC will require that AFC systems and standard-power access points employ protocols and procedures to ensure that all communications and interactions between the AFC and standard-power access points are accurate and secure and that unauthorized parties cannot access or alter the database or the list of available frequencies and power levels sent to an access point. Standard power outdoor devices will be required to register with the AFC system when requesting a list of available operating frequencies and power levels, which the FCC

reasoned will provide another layer of protection by ensuring only authorized devices access the spectrum.

Low-Power Indoor Operations

Indoor operations will be permitted to operate over the entire 6 GHz band without the need for AFC-controlled access. In order to reduce the potential for interference the FCC is requiring LPI operations to be (1) limited to indoor operation; (2) required to use a contention-based protocol; and (3) subject to low-power operation. Of these, the power levels are the main form of protection, and the FCC set the limit at a maximum radiated power spectral density of 5 dBm per 1 megahertz and an absolute maximum radiated channel power of 30 dBm for the maximum permitted 320-megahertz channel (or 27 dBm for a 160-megahertz channel). In addition, to ensure that client devices remain in close proximity to the indoor access points, the FCC limited their PSD and maximum transmit power to 6 dB below the power permitted for the access points.

The FCC concluded that these power limits (and other restrictions) will operate to protect fixed microwave systems from interference by unlicensed indoor operations. In making this determination, the FCC largely agreed with technical studies by unlicensed stakeholders and disagreed with studies by opponents, including the CII User study that was filed by UTC, EEI, NRECA and APPA, as well as the American Gas Association, the American Water Works Association, and the Nuclear Energy Institute. The FCC also disagreed with legal arguments that it lacks authority to allow unlicensed operations to share the 6 GHz band if there is a significant potential for interference. Moreover, it stated that “the technical and operational limits we are adopting in this proceeding ensure that unlicensed devices will not have a significant potential for causing harmful interference to the users authorized to operate in the 6 GHz band.”

Further Notice of Proposed Rulemaking

The FNPRM seeks comment on two issues: first, the FCC proposes to authorize very low power (VLP) operations; and second, it seeks comment on increasing the power spectral density EIRP for low-power indoor operations from 5 dBm/MHz up to 8 dBm/MHz. Specifically, it asks what the power level should be for VLP operations, and suggests a maximum 7 dBm EIRP (for a 160-megahertz channel). In addition, it proposes requiring VLP to integrate its antenna and it asks for comment on whether VLP should be required to use a contention-based protocol such as Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA).

On the second issue regarding increasing the power for LPI operations, the FCC suggests using a higher power spectral density of 8 dBm/MHz with a maximum permissible EIRP of 33 dBm when a device uses a bandwidth of 320 megahertz in the U-NII-5 through U-NII-8 bands. For devices operating with bandwidths other than 320 megahertz, the maximum allowable total power would scale accordingly (e.g., 30 dBm with a bandwidth of 160 megahertz, 27 dBm with a bandwidth of 80 megahertz, 24 dBm with a bandwidth of 40 megahertz, and 21 dBm with a bandwidth of 20 megahertz). The FCC asks a number of related policy questions regarding increasing the power, and finally asks for comment on the benefits and costs of its proposal. Comments will be due 30 days after the FNPRM is published in the Federal Register. Reply comments will be due 60 days after the FNPRM is published in the Federal Register.

Conclusions and Next Steps

The Commission will consider adoption of the draft Report and Order during its April Open Commission Meeting, which is scheduled for April 23, 2020. UTC will continue to engage with the FCC to provide further information for the record regarding the significant interference potential to utility mission critical microwave systems in the 6 GHz band. UTC continues to remain concerned that LPI operations without AFC will cause interference to utility microwave systems, even when power is reduced to 5 dBm/MHz PSD. As such, LPI as well as outdoor operations must be controlled by AFC. UTC also believes that AFC needs to meet standards for performance and must be thoroughly tested before allowing unlicensed operations in the band. The FCC should oversee the activities of the multi-stakeholder group as it develops these standards for AFC, and utilities and other incumbents must be provided with sufficient representation in the group. UTC invites member input as it meets with the FCC on these issues.