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VIA ELECTRONIC FILING

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street SW
Washington, DC 20554

Re: *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354.

Dear Ms. Dortch:

On January 30, 2015 Iyad Tarazi and Kurt Schaubach of Federated Wireless, Inc. met via teleconference with John Leibovitz and Paul Powell of the Wireless Telecommunications Bureau. During the meeting, Federated Wireless reviewed its recent efforts to foster a multi-stakeholder group within the Wireless Innovation Forum in support of developing the functional, operational, security and test certification standards for spectrum access systems, devices, and sensors. Federated Wireless also exchanged thoughts with Commission staff regarding the proposed rules for Contained Access Facilities ("CAF") in the above-referenced proceeding.

Federated Wireless strongly supports the Commission's proposal for Contained Access Facilities ("CAF") whereby users who meet certain criteria would be afforded interference protections within in the secondary access tier.¹ Use of wireless services within buildings represents a substantial share of wireless usage overall, yet access to reliable service within buildings remains limited. In-building wireless systems using licensed spectrum are expensive to deploy and operate. The incentives for constructing these in-building systems are problematic due to divergent interests and resources between mobile network operators, who own the spectrum, and the building owners, who control access to the facilities. To prevent technology or service provider lock-in, building owners require "neutral host" solutions, which substantially increases the cost and complexity of a deployment. Today, more than eighty percent of all wireless traffic originates or terminates within buildings, yet just two percent of all buildings are served with dedicated systems using licensed spectrum.²

¹ See Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, Further Notice of Proposed Rulemaking, FCC 14-49 ("FNPRM") ¶¶ 58-61 and infra §96.35

² See for example research conducted by ABI Research, Cisco (Cisco Service Provider Wi-Fi: A Platform for Business Innovation and Revenue Generation), and CommScope (CommScope Redefines In-building Wireless with ION-E)

Wi-Fi remains the prevalent solution for wireless service within buildings. The benefits of unlicensed spectrum and Wi-Fi are undeniable, but the ever-increasing scale and density of Wi-Fi systems coupled with explosive data traffic growth make it an untenable solution for the enterprise into the future. Congestion results in spotty and unpredictable service quality, and these issues are most acute in urban, commercial areas where the need for wireless service within buildings is in greatest demand.³ Despite Wi-Fi technology advances, deploying a large-scale Wi-Fi system presents many challenges including coverage, capacity, density, and security.⁴ Persistent problems have made it difficult for hospitals to achieve the necessary service levels and realize a return on investment in the form of reduced costs, increased operational efficiency, and improved staff productivity.⁵

While the flexible licensing framework and eligibility criteria for the 3.5 GHz band will produce significant public interest benefits, Federated Wireless believes that the spectrum needs of the enterprise deserve specific attention. Enterprises are unlikely to be interested in Priority Access Licenses and such use by the enterprise does not achieve the Commission's broader goal for increased spectrum access and efficiency.⁶ Conversely, while the General Authorized Access ("GAA") tier does provide broad access to spectrum in the 3.5 GHz band, investment in wireless systems for the enterprise are unlikely without some certainty that sufficient spectrum is available, on a reserved basis, to fully serve the facility.

The CAF proposal has the potential to attract significant investment, from non-traditional sources, in wireless infrastructure using the 3.5 GHz band. It will allow enterprises to provide services with reserved spectrum according to their specific needs, and such isolated and localized use of spectrum can be accommodated without significantly impacting the availability of spectrum within the GAA pool. To that end, Federated Wireless submits the following comments on the Commission's CAF proposal.

The Contained Access User

The FNPRM suggests limiting the eligibility of a Contained Access Facilities to critical users "such as hospitals, public safety organizations, and local governments".⁷ If the CAF proposal is expanded to include a variety of commercial needs, it holds the potential to overcome many of the current barriers to wireless services for the enterprise. Similar interests have been expressed by a variety of commenters in support of qualifying commercial users as Contained

³ The FCC is well aware of Wi-Fi congestion issues. See for example *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band* Statement of Chairman Julius Genachowski in ET Docket No. 13-49.

⁴ *The Whys and Hows of Deploying Large-Scale Campus-wide Wi-Fi Networks*, 2012, Aruba Networks White Paper

⁵ *5 Wi-Fi Performance Challenges in Hospitals*, 7Signal, March 17, 2014, available at <http://7signal.com/blog/5-wi-fi-performance-challenges-in-hospitals/>

⁶ Federated Wireless agrees with Google's observations that enterprises are not likely to be interested in wide area licenses, see Notice of ex parte of Google, Inc. in GN Docket No. 12-354 (filed November 24, 2014).

⁷ Without formally listing the requirements for qualifying as a Contained Access User, the FNPRM does suggest some guidelines on the qualifications that the Commission may adopt. See FNPRM at ¶ 60.

Access Users.⁸ Extending CAU eligibility to commercial use would allow the Commission to address the need identified by these users without disrupting the carefully balanced PAL design.

Extending CAU eligibility would also avert potential administrative issues arising from an attempt to categorize what is in the public interest or a critical use. Does an electrical generation plant constitute a “critical user” or does a private university serve the “public interest”? Narrowing the eligibility creates an unnecessary administrative burden on the Commission, as any categorization is not likely to be sufficiently clear or comprehensive to address all possible CAF use-cases.

As suggested in the FNPRM, the CAU should be required to receive approval from the Commission. Approval for CAU status should be derived from ownership rights to some contiguous property, i.e., the Contained Access Facility. The administration of the approvals could be either through the Spectrum Access System Administrator, or the Commission directly, and validated through readily available commercial property ownership records.

The Contained Access Facility

Enterprise applications, such as campuses and industrial facilities, often necessitate indoor and outdoor wireless uses.⁹ Therefore, it would be more natural for a CAF to encompass both the indoor and outdoor areas. The CAF should be defined as any contiguous boundary that encompasses both indoor and outdoor locations. While the 3.5 GHz band does provide for high spatial reuse, the CAF should satisfy other minimum conditions – for example it should be at least 500 square meters in area and should include all of the vertical space (e.g., building floors) within the facility – to ensure that the interference protection afforded to the CAF can be effectively realized. Considering these factors, the CAF boundary can be defined as a collection of geographic points in two dimensions.

Frequencies assigned by the SAS to the CAF should be reserved for use by the authorized CAU within the CAF boundary and accordingly would not be made available otherwise (i.e., to other GAA users) within the boundary. The requestor must certify to the SAS that it will use the reserved frequencies for Contained Access Use within each requested geographic location. Frequencies assigned to the CAF should be reserved for a period of one year, and should be subject to renewal so long as the requestor utilizes the assigned frequencies, as monitored by the SAS.

Consistent with the Commission’s proposal in §96.35(b)(2) in the FNPRM, all other rules applicable to GAA users should apply to CAF use and the CAF user(s) should have no explicit expectation of interference protection from, and should not cause harmful interference to, other GAA users. Within the building, the reservation of the frequencies alone provides *de facto* interference protection from other GAA uses. The propagation characteristics of the 3.5 GHz band coupled with the substantial additional loss that will occur as the RF signal travels through

⁸ See Comments of PCIA in Response to *Licensing PN* in GN Docket No. 12-354 (filed December 5, 2013) (*PCIA Licensing PN Comments*) at 5-6.

⁹ See Comments of The Utilities Telecom Council to the FNPRM, p. 14, and Comments of The American Petroleum Institute to the FNPRM, p. 11.

the building exterior will create significant RF isolation among the CAF users within the facility and other GAA uses beyond the CAF boundary.

While outdoor locations included in the CAF will potentially be exposed to more interference from other GAA uses beyond the facility boundaries, the burden of protection from interference remains with the CAU. It is possible that outdoor use within a CAF may afford no greater interference protection over conventional GAA uses. However, the fact that the frequencies assigned both within buildings and in outdoor locations of the CAF are fully coordinated does provide potential performance gains (e.g., minimizes complex inter-frequency handovers as CAF users move between indoor and outdoor locations).

Nothing is lost by permitting CAUs from also deploying devices outdoors as part of their CAF plan, in the limiting case they are managed by the SAS as conventional GAA users. However, allowing each CAU to make their independent determination of how best to manage the deployment of indoor and outdoor devices, to address their specific interference and coverage considerations, is expected to be more efficient than restricting CAF networks to only indoor operation.

Unauthorized operations within the CAF premises would be limited using the operational and identification information for Citizens Broadband Radio Services Devices (“CBSDs”) already available to the SAS.

The SAS can effectively manage CAF spectrum use

The SAS can effectively manage frequency assignments, according to the same rules established for the GAA tier in general, for a large number of CAF-eligible facilities. It is not necessary to reserve a portion of GAA spectrum for CAF use, rather the CAU should be permitted to aggregate as much of the spectrum available in GAA pool. Spectrum aggregation is essential to ensure sufficient spectrum is available to the CAU to meet traffic demands while will allowing the CAU to opportunistically allocate, or reuse, spectrum inside the CAF boundary so as to best manage interference to and from other GAA uses.

The computation complexity of CAF assignments can be easily managed by the SAS, even for a very large number of CAF frequency allocations. As other Commenters have noted, the CAF concept is analogous to the fixed protection zones afforded to authorized wireless microphones Television White Spaces, which have been implemented and administered by TVWS database providers with success.¹⁰

In summary, the Commission's CAF proposal has the potential to significantly improve the spectrum utilization and efficiency and to realize additional economic benefits with the 3.5 GHz band. To further advance these goals and to reduce the administrative burden on the Commission, CAU eligibility should be extended to commercial users. Additionally, CAFs should be allowed to encompass both indoor and outdoor areas to reflect typical usage conditions of the enterprise, should include all of the vertical space (e.g., building floors) within the facility, and should meet a minimum size constraint. Finally, as the SAS can effectively manage both

¹⁰ See Motorola Solutions *Licensing PN* Comments at 3-4.

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GAA and CAF spectrum assignments at very large scale, the rules proposed in the FNPRM and the additional recommendations herein could be readily satisfied.

Pursuant to the Commission's rules, this notice is being filed in the above-referenced docket for inclusion in the public record. Please contact me should you have any questions.

Respectfully submitted,

/s/ Kurt Schaubach
Kurt Schaubach
Chief Technology Officer
Federated Wireless, Inc.

Cc: John Leibovitz
Paul Powell