



PUBLIC NOTICE

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WIRELESS TELECOMMUNICATIONS BUREAU AND OFFICE OF ENGINEERING AND TECHNOLOGY CONDITIONALLY APPROVE FOUR ENVIRONMENTAL SENSING CAPABILITY OPERATORS FOR THE 3.5 GHZ BAND

I. INTRODUCTION

1. With this Public Notice, the Wireless Telecommunications Bureau (WTB) and Office of Engineering and Technology (OET) conditionally approve four entities: CommScope; Federated Wireless, Inc. (Federated Wireless); Google, Inc. (Google); and Key Bridge Wireless LLC (Key Bridge) as Environmental Sensing Capability (ESC) operators in the 3550-3700 MHz band (3.5 GHz Band).¹ The ESC operators will manage a sensor system designed to detect the presence of federal incumbent radar transmissions in the 3550-3650 MHz portion of the 3.5 GHz Band and communicate that information to one or more Spectrum Access Systems (SAS) in accordance with the Commission's rules.² The ESC will enable more dynamic sharing between federal and non-federal users in the band, particularly in coastal areas.

II. BACKGROUND

2. On April 17, 2015, the Commission adopted a *Report and Order and Second Further Notice of Proposed Rulemaking (3.5 GHz First Order)* that established a new Citizens Broadband Radio Service in the 3.5 GHz Band.³ The Citizens Broadband Radio Service will share the band with federal and non-federal Incumbent Access tier users, as part of a broader three-tiered sharing framework enabled by one or more Spectrum Access Systems (SAS). SASs will serve as advanced, highly automated frequency coordination systems that will assign spectrum within the band and coordinate access between and among the three tiers of users.⁴ An ESC will detect signals from federal radar systems and, based on ESC inputs, SASs will instruct commercial users to vacate channels as necessary to prevent harmful interference to federal operations.

¹ Conditional approval in this context means that an applicant can submit an ESC for system testing and final certification.

² See 47 C.F.R. § 96.67.

³ See *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, Report and Order and Second Further Notice of Proposed Rulemaking, 30 FCC Rcd 3959 (2015) (*3.5 GHz First Order*).

⁴ Seven parties submitted proposals to act as a SAS Administrator: Amdocs, Inc.; Commscope; CTIA; Federated Wireless; Google; iPosi; Key Bridge, and Sony, Inc. WTB / OET conditionally approved the proposals on Dec. 21, 2016. See *Wireless Telecommunications Bureau and Office of Engineering and Technology Conditionally Approve Seven Spectrum Access System Administrators for the 3.5 GHz Band*, GN Docket No. 15-319, *Public Notice*, 31 FCC Rcd 13355 (WTB / OET 2016).

3. The *3.5 GHz First Order* established that WTB and OET,⁵ in close consultation with the Department of Defense (DoD) and the National Telecommunications and Information Administration (NTIA), would oversee the review, certification and approval of ESC systems. Consistent with the Commission's instructions, on December 16, 2015, WTB / OET released a Public Notice describing the application submission process and provided detailed guidance as to how applicants should demonstrate their ability to perform the functions of an ESC operator.⁶ Specifically, consistent with the Commission's instructions,⁷ the *SAS / ESC Proposal Public Notice* described a two-step review process for ESC proposals.⁸ First, applicants are required to submit a proposal describing their SAS and / or ESC. Once that proposal is conditionally approved by WTB and OET, prospective ESC operators may submit their ESCs for testing and final certification.

4. The Public Notice requested that ESC proposals include: the scope of the functions the ESC would perform; demonstration of the prospective ESC operator's technical and financial expertise; technical diagrams showing the ESC architecture; proposed propagation and sensing methodologies; a description of security methods, including software and firmware updates; and an affirmation that the prospective ESC operator will comply with applicable rules.⁹

5. The "first wave" of proposals were due May 16, 2016,¹⁰ and as of that date, six parties submitted proposals to act as an ESC operator: CommScope; CTIA; Federated Wireless; Google; iPosi; and Key Bridge.¹¹ WTB and OET, in coordination with NTIA and DoD, reviewed these proposals in detail and sought feedback and additional information from applicants to supplement and update their proposals. No parties filed comments on the proposals.¹²

III. DISCUSSION

6. Based on our review of the proposals, including additional information submitted by the applicants, WTB and OET conditionally approve the proposals of CommScope; Google Inc.; Federated Wireless; and Key Bridge to act as ESC operators,¹³ subject to the conditions and processes described below. Through their proposals, these four entities have demonstrated their technical and financial

⁵ The Commission delegated authority to WTB / OET to oversee the ESC approval process and facilitate the testing and development of multiple ESC operators. See *3.5 GHz First Order*, 30 FCC Rcd at 4067, 4060, paras. 369-373, 386. See 47 C.F.R. §§ 0.241(j), 0.331(f).

⁶ See *Wireless Telecommunications Bureau and Office of Engineering and Technology Establish Procedure and Deadline for Filing Spectrum Access System (SAS) Administrator(s) and Environmental Sensing Capability (ESC) Operator(s) Applications*, GN Docket No. 15-319, Public Notice, 30 FCC Rcd 14170, 14174-76 (WTB / OET 2015) (*SAS / ESC Proposal Public Notice*).

⁷ See *3.5 GHz First Order*, 30 FCC Rcd at 4067, paras. 371-372.

⁸ See *SAS / ESC Proposal Public Notice*, 30 FCC Rcd at 14174-77.

⁹ See *id.* at 14173-74.

¹⁰ See *Wireless Telecommunications Bureau and Office of Engineering and Technology Extend "First Wave" Filing Deadline Spectrum Access System (SAS) Administrator(s) and Environmental Sensing Capability (ESC) Operator(s) Proposals*, GN Docket No. 15-319, Public Notice, 31 FCC Rcd 3553, 14174-76 (WTB / OET 2016).

¹¹ CTIA withdrew its application on November 17, 2017. See Letter from Paul Anuszkiewicz, Vice President, Spectrum Planning, CTIA to Marlene H. Dortch, Secretary, FCC in GN Docket No. 15-319 (filed Nov. 17, 2017).

¹² WTB / OET released a Public Notice establishing a May 31, 2017 deadline for "second wave" SAS and / or ESC proposals. Two parties filed proposals to act as an ESC operator, which are still under review. See *Wireless Telecommunications Bureau and Office of Engineering and Technology Establish "Second Wave" Deadline for Proposals From Prospective Spectrum Access System (SAS) Administrator(s) and Environmental Sensing (ESC) Operator(s)*, Public Notice, GN Docket No. 15-319, 32 FCC Rcd 2973 (WTB / OET 2017).

¹² See 47 CFR §§ 0.241(j), 0.1331(f) (delegating authority to WTB / OET to oversee the ESC approval process and facilitate the testing and development of multiple ESC operators).

¹³ iPosi did not fully address how it will comply with the Commission's rules and requirements, and, therefore, has not met the criteria for conditional approval at this time.

capability, as required by the *SAS / ESC Proposal Public Notice*, to move on to the next phase of the approval process. Specifically, we conditionally approve each of the four applicants listed above as ESC operators in the 3.5 GHz Band subject to the following:

- Each conditionally approved ESC operator must comply with all current and future Commission rules, instructions, and procedures.
- Each conditionally approved ESC operator must comply with all instructions issued by WTB / OET consistent with Sections 0.241(j) and 0.331(f) of the Commission's rules.¹⁴
- All conditionally approved ESC operators must comply with requests for additional information from the Commission or WTB and OET.
- All conditionally approved ESC operators must comply with further guidance from NTIA and DoD, as specified by the Commission, including any addendums to the ESC test procedures report published by ITS.¹⁵
- All conditionally approved ESC operators must attend workshops and meetings convened by the Commission or WTB and OET. Workshop or meeting topics may include: (1) ESC development and operations; (2) ESC testing and certification procedures; and (3) other topics relevant to the ongoing development of the ESC.¹⁶
- If a conditionally approved ESC operator relies on third party or proprietary specifications or standards for its proposed ESC, these specifications or standards must be consistent with the relevant Commission rules.¹⁷ All such specifications and standards will be reviewed by WTB and OET to ensure consistency with the Commission's rules.
- As specified by the Commission, all conditionally approved ESC operators must provide external testing interfaces to enable WTB, OET, NTIA, and DoD to utilize that interface and verify that the ESC design complies with the relevant rules.
- Each conditionally approved ESC operator must declare before pre-certification / certification testing,¹⁸ the maximum input power (dBm) at the antenna port to the ESC sensor: a) at which receiver saturation does not occur; and b) at which the ESC sensor may be lab tested without physical damage, i.e., burnout, occurring.¹⁹

7. We impose the above conditions to ensure that each conditionally approved applicant's ESC demonstrates compliance with Commission rules and instructions throughout all steps of the approval process. The failure of applicants to meet any of the conditions on an ongoing basis or to comply with future further guidance from the Commission could result in revocation of its conditional approval. Parties are permitted to amend their proposals at any time in GN Docket No. 15-319 and must

¹⁴ See 47 CFR §§ 0.241(j), 0.1331(f) (delegating authority to WTB / OET to oversee the ESC approval process and facilitate the testing and development of multiple ESC operators).

¹⁵ See *infra* n.20.

¹⁶ The NTIA Institute for Telecommunication Sciences laboratory in Boulder CO held an ESC Testing Open House on January 11, 2018.

¹⁷ Each conditionally approved ESC operator states that it relies on current or future WinnForum standards as part of its proposal. To the extent that the ESC operator incorporates any revisions to existing WinnForum standards into its system, such revisions must also be consistent with Commission rules.

¹⁸ Prior to testing each ESC's certification testing, each applicant will bring their ESC to the ITS Boulder laboratory for up to a week (40 working hours) of pre-certification testing. Unlike certification, the pre-certification results will not be used as part of the FCC authorization process but instead will allow conditionally approved ESC operators to gain experience in the testing environment prior to final certification.

¹⁹ See *e.g.*, John E. Carroll, NTIA Technical Report TR-17-525 "Non-Linear Effects of Testing High Power Radar Pulses on 3.5 GHz Low-Noise Amplifiers" (June 2017) <https://www.its.bldrdoc.gov/publications/3173.aspx>.

provide updates if there is new or changed information that is essential to approval and certification of their system.

8. We also note that, in November 2017, NTIA released a technical memorandum that describes the procedures for laboratory testing of ESC sensors.²⁰ Applicants should familiarize themselves with the procedures described in this memorandum before submitting their ESCs for laboratory testing.

IV. NEXT STEPS

9. As required in the *3.5 GHz First Order*, all conditionally approved ESC operators must submit their systems for testing before final certification,²¹ which may include a public testing period, testing of protections for incumbent systems, and field trials.²² Applicants must also submit proposed deployment plans to ensure adequate sensor coverage of given geographic regions. We will provide instructions and criteria for testing through one or more public notices. After the testing period is completed, each ESC will be subject to a trial period before receiving its final certification. The trial period is intended to ensure that the ESC is operating properly and in compliance with Commission rules. ESC operators that satisfy all of the conditions set forth herein and successfully complete all phases of system testing, field testing, and deployment review will be certified for commercial operations. As noted above, all applications, or portions of applications, seeking approval to be ESC operators remain pending.

²⁰ Frank H. Sanders, NTIA Technical Memorandum 18-527 “Procedures for Laboratory Testing Environmental Sensing Capability Sensor Devices” (Nov. 2017) <https://www.its.bldrdoc.gov/publications/3184.aspx>. While this document is not comprehensive of all publicly available guidance addressing ESC design and testing issues, it provides the most recent and accurate description of the testing procedures that will be used to test ESCs prior to final certification (“NTIA ESC Testing Procedures”). See also Frank H. Sanders, NTIA Technical Memorandum 18-256 “Distinction Between Radar Declaration and Pulse Detection in 3.5 GHz Spectrum Sharing Systems” (Oct. 2017) <https://www.its.bldrdoc.gov/publications/3182.aspx>.

²¹ See NTIA ESC Testing Procedures at pg. 7 (all ESC designs will be required to pass certification testing with radar test signals provided by NTIA).

²² See *3.5 GHz Order*, 30 FCC Rcd at 4067, para. 372.