Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band	)	GN Docket No. 15-319

Re: Proposal of Comsearch for Certification as an ESC operator; Request for Supplemental Information (GN Docket 15-3 19)

To: Marlene H. Dortch
Office of the Secretary, Federal Communications Commission

UPDATE TO
COMMSCOPE PROPOSAL
TO BE DESIGNATED AS AN
ENVIRONMENTAL SENSING CAPABILITY OPERATOR

In response to FCC inquiry in the above-captioned proceeding[1], and the FCC's request for supplemental information, CommScope[2] hereby submits this update to our proposal to develop and manage an Environmental Sensing Capability (ESC) system.

[1] 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 (DA 15-1426) (Public Notice) *30 FCC Rcd 14170* (2015), and *Report and Order And Second Further Notice of Proposed Rulemaking*, (Order) GN Docket No. 12-354, 30 FCC Rcd 3959, 80 FR 34119 (2015)

[2] Previous filings have been under the Comsearch name. Since Comsearch and CommScope are essentially the same entity. Hereafter, we will use the CommScope name.

Introduction

CommScope welcomes the opportunity to submit this update to proposal to be designated as an ESC operator. While we believe we have addressed all of the Commission's questions as detailed below, we welcome the opportunity to engage the Commission in additional discussion as needed.

CommScope Response to FCC Questions

As stated in our initial proposal, CommScope is able to perform all of the duties and responsibilities of ESC administrator outlined in the Public Notice. To help simplify our response, we have shown below each question from the Commission's request with our response below:

1. How will the ESC process sensor data? Please include information on sensor technology, frequency range, instantaneous bandwidth, technical description of the sensor, detection decision process, receiver sensitivity, received signal threshold, detection probability, and receiver resiliency to front-end saturations and burn-out. Please include a description of how the ESC will account for the impacts of nearby CBSDs on the system noise floor.

- **Sensor Technology**: The CommScope ESC sensor is a Software Defined Radio (SDR) module enclosed by IP67 enclosure with power over Ethernet (PoE) and Ethernet/IP based backhaul.
- **Frequency Range**: 70MHz to 6 GHz.
- **Instantaneous Bandwidth:** We will comply with DoD requirements.[3]
- **Technical Description of the Sensor:** The sensor includes a high-performance RF front-end, a baseband processor and co-processor. The baseband processor runs Radar pulse detection algorithms to detect the presence of Radar pulses, chirped or unchirped, as well as the carrier frequency of the Radar pulse. This all takes place in real time. The co-processor manages Radar detection, Radar declaration and ESC-Core communication processes. All sensor components are industrial temperature range compliant. The sensor is powered via PoE and dissipates heat through thermal conduction to IP67 enclosure.

[3] We note that the Instantaneous Bandwidth requirement is still under discussion among stakeholders.

- **Technical Description of Detection Decision Process:**
  - Our ESC sensor continuously monitors the 3550-3650 MHz band for presence of a Radar pulse.
  - When a Radar pulse is identified, the ESC sensor will attempt to identify the Radar waveform from the predefined set of waveforms, as defined in NTIA 17-527, Table 1, and confirm that it is a valid Radar waveform.
  - The ESC will declare the identified Radar waveform as a Radar event and will send an encrypted message to ESC core.
- **Receiver Sensitivity:** -93dBm.
- **Received Signal Threshold:** -89dBm/MHz
- **Detection Probability:** 99.99%, assuming Radar peak signal is -89dBm/MHz and CBRS average noise is kept below -109dBm/MHz (per NITA Test Procedures).
- **Receiver Resiliency to Front-End Saturations and Burn-out:** The RF front-end is preceded by an RF limiter that clips the signal power to a level that insures the RF front-end input will be limited to a level below its maximum input power rating and prevent physical burn-out damage. The ESC sensor also utilizes Automatic Gain Control (AGC) to add signal attenuation when needed to prevent front-end RF saturation.
- **Accounting for Impacts of Nearby CBSDs on System Noise Floor:**
  - The ESC sensor continuously monitors the noise floor and determine if it reaches the power detection threshold of -89dBm/MHz.
  - If noise floor approaches the power detection threshold, the ESC sensor will report a "CBSD interference the event" to the ESC core.

2. What approach will the ESC employ (e.g., hardware upgrades, firmware updates) to detect new federal radar waveforms that may be deployed in the future? Please include the likely timeframe for implementation of these approaches.

CommScope's ESC will detect Radar pulse width (PW), bandwidth, pulse repetition rate (PRR) and center frequency or carrier over a 100 MHz bandwidth within a 60 second time window. The ESC will employ decision logic to detect and declare a Radar event, which could be a minimum of single burst of Radar pulses with some PW and PRR. The ESC will attempt to identify the Radar pulse burst from the set of waveforms identified in Table 1 of NTIA TM 17-527.[4] In the event the detected Radar burst is not identified as part of waveforms in Table 1, then the ESC shall report as Radar event and indicate it as an unidentified Radar waveform. Since our ESC sensor is a software defined radio, new waveforms can be handled by upgrading the software remotely via the encrypted backhaul link with the ESC core.

[4] See, *Procedures for Laboratory Testing of Environmental Sensing Capability Sensor Devices*, NTIA Technical Memorandum 17-527 [DRAFT].

3. How will the ESC determine and communicate the points or areas to be protected once radar operation is detected by the sensors? Please indicate if and how the solution aligns with any operational security requirements communicated by NTIA or DoD.

The CommScope ESC system is composed on an ESC core sub-system as well as a network of sensors that are deployed along the coast of the U.S. and Puerto Rico. Each sensor is associated with at least one dynamic protection area (DPA). DPA-sensor associations are determined based on the location of the ESC sensors relative to the DPA locations.

Each sensor monitors the 3550-3560 MHz frequency band for incumbent Radar activity. If activity is detected, the sensor informs the ESC core sub-system using a secure communication channel. The ESC core subsystem, in turns notifies the CommScope SAS using a secure communication channel. The sensor continues to update the core with the detection status of the incumbent activity. Once the sensor no longer detects the incumbent Radar activity, the ESC core will wait at least two hours after the detected federal incumbent radar activity to notify the SAS of the deactivation of a DPA.

The ESC-to-SAS notification contains the following information:

(1) the frequency range over which the activity was detected,

(2) the ID(s) of the DPAs where the activity was detected, and

(3) a detection flag.

This approach aligns with the following NTIA/DoD requirements:

- Detection events are obfuscated,
- All ESC interfaces are secure,
- ESC-to-SAS communication is limited to authorized data.

CommScope will rely upon the following third party specifications and standards to meet FCC rules and requirements:

<u>Wireless Innovation Forum:</u>

WINNF-TS-0112-V1.3.0	Operational and Functional Requirements
WINNF-TS-0065-V1.1.0	CBRS Communications Security Technical Specification
WINNF-TS-0071-V1.0.0	CBRS Operational Security Technical Specification
WINNF-TS-0016-V1.1.0	SAS to CBSD Protocol Specification
WINNF-TS-0096-V1.2.0	SAS to SAS Protocol Specification
WINNF-TS-0061-V1.1.0	SAS Test and Certification Specification
WINNF-TS-0122-V1.0.0	CBSD Test and Certification Specification

<u>DoD:</u>

"DoD Draft Requirements for 3550 MHz Environmental Sensing Capability Test and Certification"

NTIA:
"Distinction Between Radar Declaration and Pulse Burst Detection in 3.5 GHz Spectrum Sharing Systems" (NTIA Technical Memorandum TM-17-526) [DRAFT]
"Procedures for Laboratory Testing of Environmental Sensing Capability Sensor Devices" (NTIA Technical Memorandum 17-527) [DRAFT]

Conclusion

CommScope is pleased to submit our follow-up responses to the Commission's questions. We note that the FCC's guidelines for SAS and ESC testing certification are also still being developed with all stakeholders. CommScope is an active participant in all of these efforts.

Respectfully Submitted,

/s/ H. Mark Gibson

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Date: October 17, 2018