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September 26, 2016

VIA HAND DELIVERY

Mr. Brian Regan
Associate Bureau Chief
Wireless Telecommunications Bureau
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 20554

Re: *Proposal of CTIA for Certification as a SAS Administrator and ESC Operator; Request for Supplemental Information dated September 2, 2016, GN Docket No. 15-319*

In response to the Request for Supplemental Information from the Wireless Telecommunications Bureau and the Office of Engineering and Technology dated September 2, 2016, CTIA hereby submits the attached amendment to “CTIA’s Proposal to be Designated as a Spectrum Access System Administrator (“SAS”) and an Environmental Sensing Capability (“ESC”) Operator,” originally submitted to the Commission on May 16, 2016.

CTIA hereby requests that certain information being produced in its response to the Request for Supplemental Information (the “Confidential Information”) be withheld from public disclosure pursuant to Section 0.459 of the Commission’s Rules.¹ CTIA’s response contains highly sensitive, proprietary information that CTIA has not and will not make available for public inspection, and the disclosure of which would result in substantial competitive harm. As such, the Confidential Information is eligible to be withheld from public disclosure under Freedom of Information Act (“FOIA”) Exemption 4, which covers “trade secrets and commercial or financial information [that are] privileged or confidential.”² CTIA is filing concurrently a version of this amendment redacted

¹ 47 C.F.R. § 0.459(a)(1).

² 5 U.S.C. § 552(b)(4).



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for public inspection through the Commission's Electronic Comment Filing System.

Information in support of this request for confidential treatment and in response to Section 0.459(b) of the Commission's rules, 47 C.F.R. § 0.459(b), is provided below.

1. 47 C.F.R. § 0.459(b)(1): Identification of the specific information for which confidential treatment is sought. CTIA seeks confidential treatment for those portions of its amendment that have been marked as Confidential – Not For Public Inspection and redacted from the public version of this submission. Specifically, CTIA requests confidential treatment of the following responses in the attached amendment: (1) the second to fourth paragraphs in response no. 11, regarding CTIA's procedures and timelines for the suspension or relocation of a Citizens Broadband Radio Service Device ("CBSD") operating within the same frequency as a federal incumbent; (2) the second paragraph of response no. 12, which describes the parameters exchanged between the Environmental Sensing Capability ("ESC") and SAS; and (3) response no. 15, which describes CTIA's SAS fee structure. The Confidential Information in response nos. 11, 12 and 15 contains commercially sensitive information about CTIA's internal procedures, proprietary technical information, and pricing associated with SAS service.
2. 47 C.F.R. § 0.459(b)(2): Identification of the Commission proceeding in which the information was submitted or a description of the circumstances giving rise to the submission. CTIA is submitting the enclosed information in response to the Request for Supplemental Information from the Wireless Telecommunications Bureau and the Office of Engineering and Technology dated September 2, 2016, in GN Docket No. 15-319.
3. 47 C.F.R. § 0.459(b)(3): Explanation of the degree to which the information is commercial or financial, or contains a trade secret or is privileged. The Confidential Information submitted by CTIA in response nos. 11, 12 and 15 contains sensitive commercial information, including proprietary technical information, internal procedures, and pricing. Such information "would customarily be guarded from competitors." 47 C.F.R. § 0.457(d)(2). Disclosure of such information to the public or competitors would



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compromise CTIA's efforts to develop and introduce SAS service without public disclosure.

4. 47 C.F.R. § 0.459(b)(4): Explanation of the degree to which the information concerns a service that is subject to competition. In its Report and Order and Second Further Notice of Proposed Rulemaking in this proceeding, the Commission declared that it intends to "foster a diverse, competitive marketplace of SAS providers."³ Disclosure of CTIA's sensitive service offering and pricing information would provide those potential competitors with crucial information and an unfair competitive advantage.
5. 47 C.F.R. § 0.459(b)(5): Explanation how disclosure of the information could result in substantial competitive harm. If the Confidential Information were to be disclosed, CTIA's efforts to develop SAS service would be undermined, potentially resulting in substantial competitive injury. In a competitive market for the provision of SAS service, public disclosure of the Confidential Information indicating the service CTIA proposes to provide, and the pricing for that service, would provide other potential service providers with an unfair advantage in competing for service contracts.
6. 47 C.F.R. § 0.459(b)(6): Identification of any measures taken by the submitting party to prevent unauthorized disclosure. CTIA has not made the Confidential Information publicly available.
7. 47 C.F.R. § 0.459(b)(7): Identification of whether the information is available to the public and the extent of any previous disclosure of the information to third parties. CTIA has not made the Confidential Information publicly available.
8. 47 C.F.R. 0.459(b)(8): Justification of the period during which the submitting party asserts that material should not be available for public disclosure. Due to its sensitive nature, and the risk of competitive harm, CTIA requests that the Commission withhold the Confidential Information indefinitely.

³ *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Report and Order and Second Further Notice of Proposed Rulemaking, 30 FCC Rcd 3959, 4063 ¶ 354 (2015).



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9. 47 C.F.R. § 0.459(b)(9): Any other information. The public interest will be served if the Commission treats CTIA's submission as confidential and withholds it from public inspection. Such treatment will allow CTIA to continue developing its SAS service while permitting the Commission to review CTIA's Proposal.

CTIA appreciates the time and consideration given to its proposal and hereby reiterates its intention to comply with the Commission's orders and Part 96 rules in executing the functions of SAS Administrator and ESC Operator. Please do not hesitate to contact the undersigned with any questions.

Respectfully submitted,

/s/ Paul Anuskiewicz

Vice President, Spectrum Planning

Thomas C. Power

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cc: Paul Powell
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Amendment to CTIA’s Proposal to be Designated as a Spectrum Access System (“SAS”) Administrator and an Environmental Sensing Capability (“ESC”) Operator

- 1. WTB/OET recently released a Public Notice establishing the final methodology for determining Grandfathered Wireless Protection Zones. Please update your proposal to describe how your SAS will protect Grandfathered Wireless Broadband Licensees accordingly. (§ 96.53(m))**

CTIA Response:

Grandfathered Wireless Broadband Licensees will be afforded protection from harmful interference from Citizens Broadband Radio Service (“CBRS”) users registered on the CTIA SAS. The CTIA SAS will incorporate into its registration system the Grandfathered Wireless Protection Zone contours provided by the FCC. The CTIA SAS will manage 3650-3700 MHz frequency allocations and power levels granted to all Citizens Broadband Radio Service Devices (“CBSDs”) registered on its system. The CTIA SAS will adjust the CBSDs to account for radio frequency (“RF”) emissions from CBSDs registered with third-party SASs, such that the aggregate power of co-channel CBSDs shall be no greater than -80 dBm/10 MHz within all Grandfathered Wireless Protection Zones.

- 2. Regarding SAS-SAS coordination, describe how the SAS will make the necessary CBSD registration information available to other SASs while obfuscating CBSD license ID. (pgs. 16-18) (§96.55(a)(3))**

CTIA Response:

CTIA has been working collaboratively with other leading SAS applicants to create a framework for sharing appropriate CBSD registration information among SAS administrators, consistent with FCC Rule 96.55(a)(3). We are confident that these discussions will be finalized soon, and we will have a robust framework to present to the Commission. At that time, CTIA will modify its application to describe that framework.



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- 3. Describe the protocols the SAS will use in order to directly interface with any FCC database containing information required for SAS operations. (§96.55(d))**

CTIA Response:

Once the FCC makes the data available in machine-readable form, CTIA shall use the WInnForum communications security (“COMSEC”) standard defined secured protocol to interface with any FCC database containing information required for SAS operation.

- 4. Describe how the SAS will process and retain acknowledgements by all entities registering CBSDs that they understand the risk of possible interference from federal incumbents. (§96.55(e))**

CTIA Response:

The CTIA SAS will require all entities registering CBSDs on the SAS to acknowledge and affirmatively agree to the following statement, either in the contract establishing SAS service, during individual CBSD registration, or both, depending on the nature of the customer involved:

“CBSD base station/access point registrant understands that CBSDs operating in the 3.5 GHz band (from 3550 to 3700 MHz) may be subject to possible interference from Incumbent Operators in the band. Priority Access Licensee (PAL) CBSD registrant further understands that CBSD registered with the SAS may be denied access to frequency channels and/or required to operate at lower power levels in order to avoid causing harmful interference to Incumbent Operators or other Priority Access Licensees in the band. General Authorized Access (GAA) CBSD registrant further understands that CBSD registered with the SAS may be denied access to frequency channels and/or required to operate at lower power levels in order to avoid causing harmful interference to



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Incumbent Operators, Priority Access Licensees, and other GAA CBSDs in the band.”

CTIA will retain records of the acknowledgement, either in the form of the signed contract in the case of large-scale customers, or in the form of individual CBSD registration records indicating the date and time of the acknowledgement.

- 5. Describe how the SAS will access the FCC Equipment Authorization System database and verify the FCC identification information of a CBSD prior to authorization. (pg. 13) (§96.57(c), 96.61)**

CTIA Response:

Once the FCC makes the data available in machine-readable form, CTIA shall implement the WinnForum COMSEC standard defined secured protocol to interface with the FCC Equipment Authorization System database to verify FCC identification information of a CBSD immediately upon registration and prior to authorization.

- 6. Describe your protocols or affirm your intent to make non-federal non-proprietary information available to the public. (pg. 12) (§ 96.63(j))**

CTIA Response:

CTIA affirms its intent to make non-federal non-proprietary information available to the public.



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- 7. Describe the protocols the SAS will use in order to respond to instructions from the President of the United States or another designated federal government entity. (pg. 12) (§ 96.63(l))**

CTIA Response:

CTIA shall respond to instructions issued directly by the President of the United States, or through such person or persons as he/she designates for the purpose, or through the Commission, issued pursuant to 47 U.S.C. § 606.

The CTIA SAS shall respond to written or verbal orders from the President of the United States or another designated federal government entity in the following manner:

1. CTIA shall consult with its contacts at the FCC to confirm the source and validity of the orders.
2. If, due to Force Majeure, confirmation is not possible, CTIA shall use its best judgment to determine the validity of the orders.
3. Upon confirmation (or CTIA determination in event of Force Majeure), the CTIA SAS shall take action in accordance with the orders issued.
4. Actions which the CTIA SAS will be able to take upon receiving orders from the President of the United States or another designated federal government entity include:
 - Temporarily or permanently adding or modifying Exclusion Zones;
 - Temporarily or permanently adding or modifying Protection Zones; and/or
 - Requiring all CBSDs registered on the CTIA SAS to cease operation.

- 8. Please affirm that the ESC will be operated by a non-governmental entity. (pg. 12) (§ 96.67(c)(1))**

CTIA Response:

CTIA's ESC will be operated by a non-governmental entity. CTIA is a tax-exempt non-profit corporation organized under Section 501(c) of the Internal Revenue



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Code. CTIA's chosen vendor(s) to support SAS and ESC operations will be (a) non-governmental entity(ies) based in the United States.

- 9. Provide more details to demonstrate how the SAS will protect [Fixed-Satellite Service] FSS Earth Stations from harmful interference and comply with each subsection of Section 96.17. If the SAS will permit excessive CBSD emissions upon mutual agreement, please discuss how the SAS will obtain the terms of this agreement and how it will communicate the terms promptly to other SAS Administrators. (pg. 16) (§ 96.17)**

CTIA Response:

The CTIA SAS shall define FSS Exclusion Zones as the areas in a 150 km radius around the FSS earth station sites listed at <https://www.fcc.gov/general/35-ghz-band-protected-fixed-satellite-service-fss-earth-stations>.

Compliance with FCC Rule 96.17(a)(1):

The CTIA SAS will load Grandfathered Wireless Broadband Protection Areas into its geographic database upon being provided with that information from an FCC database.

Compliance with FCC Rule 96.17(a)(2):

Upon CBSD registration and each frequency grant, the CTIA SAS shall use RF propagation model(s) appropriate for the geographic area to calculate potential CBSD co-channel interference with incumbent FSS earth stations operating in the 3600-3700 MHz band.

The CTIA SAS will calculate potential co-channel interference. If the calculated aggregate passband RF power spectral density produced by emissions from all co-channel CBSDs (within 150 km of the FSS earth station) exceeds a median Root Mean Squared ("RMS") value of -129 dBm / MHz, then the CTIA SAS will direct the CBSD in question to use a lower emitted power level such that the co-channel interference limit is not reached, or to use an alternate non-interfering frequency assignment.



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The CTIA SAS co-channel interference calculations shall be based upon FCC Rule 96.17(a)(2), which provides: “The aggregate passband RF power spectral density at the output of a reference RF filter and antenna at the location of an FSS earth station operating in the 3600-3700 MHz band, produced by emissions from all co-channel CBSDs (within 150 km) operating in the Citizens Band [sic] Radio Service shall not exceed a median RMS value of -129 dBm / MHz. The reference antenna system requires SAS to calculate antenna gain using 25.209 (a) (1) and 25.209 (a) (4),” and a reference RF filter between the feedhorn and LNA/LNB, with 0.5 dB insertion loss in the passband.”

Compliance with FCC Rule 96.17(a)(3):

Upon CBSD registration and each frequency assignment, the CTIA SAS will use RF propagation model(s) appropriate for the geographic area to calculate potential CBSD blocking interference with incumbent FSS earth stations operating in the 3600-3700 MHz band.

If the calculated aggregate RF power produced by emissions from all CBSDs (within 40 km of the FSS earth station) exceeds a median RMS value of -60 dBm, then the CTIA SAS will direct the CBSD in question to use a lower emitted power level, or an alternate non-interfering frequency assignment such that blocking interference limit is not reached.

The CTIA SAS blocking interference calculations will be based upon FCC Rule 96.17(a)(3), which provides: “The aggregate RF power at the output of a reference RF filter and antenna at the location of an FSS earth station operating in the 3600 – 3700 MHz band, produced by emissions from all CBSDs (within 40 km), shall not exceed a median RMS value of -60 dBm. The reference antenna system requires an SAS to calculate antenna gain using § 25.209(a)(1) and 25.209(a)(4), and a reference RF filter between the feed-horn and LNA/LNB, with a filter mask of 0.6 dB/MHz attenuation to 30.5 dB at 50 MHz offset below the lower edge of the FSS earth station’s authorized passband, and 0.25 dB/MHz



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attenuation to 55.5 dB at an offset greater than or equal to 150 MHz below the lower edge of the FSS earth station's authorized passband."

Compliance with FCC Rule 96.17(b)(1):

Upon CBSD registration and each frequency assignment, the CTIA SAS will use RF propagation model(s) appropriate for the geographic area to calculate potential CBSD Out-of-Band Emissions ("OOBE") interference with incumbent FSS earth stations used for satellite telemetry, tracking and control, and operating in the 3700-4200 MHz band.

The CTIA SAS will calculate potential OOBE interference. If the calculated aggregate passband RF power spectral density produced by emissions from all CBSDs (within 40 km of the FSS earth station) exceeds a median RMS value of -129 dBm / MHz, then the CTIA SAS will direct the CBSD in question to use a lower emitted power level, or an alternate non-interfering frequency such that OOBE interference limit is not reached.

The CTIA SAS OOBE interference calculations will be based upon FCC Rule 96.17(b)(1), which provides: "Out-of-Band Emissions into FSS: The aggregate passband RF power spectral density at the output of a reference RF filter and antenna at the location of a TT&C FSS earth station operating in the 3700 – 4200 MHz band, produced by emissions from all CBSDs (within 40 km) operating in the Citizens Band (sic) Radio Service shall not exceed a median RMS value of -129 dBm / MHz. The reference antenna system requires SAS to calculate antenna gain using § 25.209(a)(1) and 25.209(a)(4), and a reference RF filter between the feed-horn and LNA/LNB, with 0.5 dB insertion loss in the passband."

Compliance with FCC Rule 96.17(b)(2):

Upon CBSD registration and each frequency assignment, the CTIA SAS will use RF propagation model(s) appropriate for the geographic area to calculate potential blocking interference with incumbent FSS earth stations used for



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satellite telemetry, tracking and control, and operating in the 3700-4200 MHz band.

The CTIA SAS will calculate potential blocking interference. If the calculated aggregate RF power produced by emissions from all CBSDs (within 40 km of the FSS earth station) exceeds a median RMS value of -60 dBm / MHz, then the CTIA SAS will direct the CBSD in question to use a lower emitted power level, or an alternate non-interfering frequency assignment such that blocking interference limit is not reached.

The CTIA SAS blocking interference calculations will be based upon FCC Rule 96.17(b)(2), which provides: “Blocking: The aggregate RF power at the output of a reference RF filter and antenna at the location of a TT&C FSS earth station operating in the 3700 – 4200 MHz band, produced by emissions from all CBSDs (within 40 km), shall not exceed a median RMS value of -60 dBm. The reference antenna system requires SAS to calculate antenna gain using § 25.209(a)(1) and 25.209(a)(4), and a reference RF filter between the feed-horn and LNA/LNB, with a filter mask of 0.6 dB/MHz attenuation to 30.5 dB at 50 MHz offset below the lower edge of the FSS earth station’s authorized passband, and 0.25 dB/MHz attenuation to 55.5 dB at an offset greater than or equal to 150 MHz below the lower edge of the FSS earth station’s authorized passband.”

Compliance with FCC Rule 96.17(c):

The CTIA SAS will monitor CBSD compliance with frequency and power level assignments to ensure incumbent and PAL protection areas are protected per Part 96 rules. In the event a non-complying CBSD is identified, CTIA will first inform the CBSD owner of a defective CBSD. If the defective CBSD is not repaired or replaced by the CBSD owner, and continues not to conform to SAS frequency and power level assignments for a period of one week, then CTIA will escalate the issue to the CBSD owner company management and inform the FCC of the issue.



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Compliance with FCC Rule 96.17(d):

N/A – This rule applies to FSS earth station licensees, not to SAS administrators.

Compliance with FCC Rule 96.17(e):

If a CBSD operator wishes to operate within areas that may cause interference to FSS earth stations, then that operator must work with the FSS licensee to come to a mutually acceptable written agreement. The CBSD operator must then provide that written agreement to the CTIA SAS. The CTIA SAS will have the ability to modify the maximum interference levels used in FSS earth station interference calculations to different values for specific FSS earth station locations. This can be used to allow higher interference levels should the FSS licensee agree to them. In such a case, the CTIA SAS will communicate the terms of the agreement to other SAS administrators in a format that will be decided by the multi-stakeholder forum (*i.e.*, the WInnForum).

Compliance with FCC Rule 96.17(f):

An FSS earth station licensee in the 3600-3700 or 3700-4200 MHz bands may request additional protection from the CTIA SAS by submitting a written request detailing specific instances of harmful interference with that licensee's FSS earth station. The request should include date(s) and time(s) of harmful interference, interference levels observed, and a description of the impact on the FSS licensee's operations. The CTIA SAS will then consider the FSS earth station licensee's request, consult its own records of observed interference levels in the area, and consult other SAS administrators if they have CBSDs in the area.

The CTIA SAS will grant an FSS earth station licensee's request unless significant evidence exists that interference levels should not have been an issue, in which case the CTIA SAS will refer the case to the FCC for resolution. In granting an FSS earth station licensee's request, the CTIA SAS will reduce the maximum interference level used in the FSS earth station interference calculations for that specific FSS earth station by an amount calculated to eliminate the harmful interference.



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10. Provide a description of how the SAS will obtain all registration data for FSS Earth Stations. (§96.17(d)(1))

CTIA Response:

Once the FCC makes the data available in machine readable form, CTIA shall use the WInnForum COMSEC standard defined secured protocol to interface with the FCC database containing all registration data for FSS Earth Stations required for SAS operation.

11. Describe how the SAS will confirm the suspension or relocation of a CSBD operating within the same frequency as a federal incumbent, including the timeline within this process for CSBD suspension or relocation. (pg. 4) (§§ 96.15(b)(4); 96.39(c)(2))

CTIA Response:

Upon ESC notification of Federal Incumbent activity impacting CBRS operations in a Census Tract, the CTIA SAS will immediately instruct any CSBD operating on a channel being used by a Federal Incumbent User to either cease operation or move to a different frequency not being used by a Federal Incumbent User.

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[END

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12. Please provide a detailed description of the SAS-ESC communication protocol and the parameters which are exchanged between the ESC and SAS. If a proprietary protocol is used, at a minimum provide the information exchanged between the ESC function and the SAS function. All ESC-SAS communication interfaces, including proprietary, will be tested. As a combined SAS-ESC applicant, CTIA should provide and explain testing interfaces to ensure all ESC and SAS requirements testing, including how the data transmission can be conducted securely. (pg. 8) (§§ 96.61(b); 96.63(d))

CTIA Response:

Communication Protocol:

The CTIA SAS and CTIA ESC will implement Transmission Control Protocol/Internet Protocol ("TCP/IP") and Transport Layer Security ("TLS") along with public key infrastructure ("PKI"), as defined by the WinnForum, to enable, authorize, and secure communications between the SAS and ESC.

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[END CONFIDENTIAL]

Testing Interfaces:

The requirements and test designs for ESC and SAS-ESC combination certifications are being defined in the WinnForum WG4 Certification Task Group in collaboration with the Department of Defense, NTIA, and other government agencies. CTIA, as a combined SAS-ESC applicant, will conform to the recommendations from these collaborative efforts.

13. Please explain in detail how the SAS will calculate and enforce PAL protection areas and ensure consistent enforcement across all SASs. (§ 96.57(e))

CTIA Response:

The CTIA SAS will use a standard grid density, as may be defined by the WinnForum, of gridded points that are within the PAL Protection Area (“PPA”) to be protected. These represent the sample points for the protection calculations. For each point, the CTIA SAS will take all nearby co-channel CBSD radiators, or potential radiators, in determining whether a channel grant should be made, and perform a point-to-point propagation assessment from each nearby radiator to the point. This assessment will assume a 1.5 meter height and 0 dBi reception antenna at that location. When all the appropriate “nearby” transmitters are properly summed (incoherent summation), the resultant power level shall be targeted at less than the – 80 dBm criteria. For very small urban PPAs, a full and completed grid may be used where the PPA is of small size. For medium or large PPAs, the sampled points may be limited by criteria that only evaluate grid points at the exterior portion (within the PPA polygon). This avoids evaluating very large numbers of interior points within possibly vast PPA areas (rural areas). These methods to determine required grid density and methods to



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select the appropriate gridded point areas may be defined by the WinnForum to ensure consistency of methodologies across SAs.

14. The proposal states that it will incorporate most of the WinnForum recommendations and guidelines in order to design and operate a spectrum management system. Specifically indicate which WinnForum reference documents and standards they will use and discuss whether there are any modifications above and beyond of those proposed by WinnForum. Please be specific on the proprietary solutions or methods that deviates them from WinnForum recommendations. (Appendix A; Appendix B)

CTIA Response:

CTIA plans to use all WinnForum specifications/standards and other pertinent industry standards compliant systems/products/components in its implementation. Any deviations from standards will be notified as and when implementation commences.

The WinnForum’s published documents at this time are:

WINNF-15-S-0065 Version 1.0.0 July 2016	<u>CBRS Communications Security Technical Specification</u>
WINNF-15-S-0071 Version 1.0.0 June 2016	<u>CBRS Operational Security Technical Specification</u>
WINNF-15-S-0112 Version 1.0.0 May 2016	<u>CBRS Operational and Functional Requirements</u>

In addition to the above-published specifications, there are several specification documents that are in “work-in-progress” status. CTIA, as an active contributor to the development of these specifications, intends to use



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systems/products/components compliant to these developing standards/specifications.

15. Provide more detail regarding your fee structure and acknowledge that the Commission, upon request, will review SAS fees and can require changes to those fees if they are found to be unreasonable. (pg. 7) (§ 96.65)

CTIA Response:

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[END CONFIDENTIAL]

CTIA acknowledges and agrees that the Commission, upon request, may review SAS fees and can require changes to those fees if they are found to be unreasonable.

16. Regarding the SAS's protocols for determining interference levels, please describe how your proposed use of CBSDs to provide signal strength and location information applies to federal incumbents. (pgs. 14-15) (§ 96.15)

CTIA Response:

Federal Incumbents will be protected from harmful interference first through the establishment of Exclusion Zones, and then by the establishment of Protection Zones, both per FCC Rule 96.15. The CTIA SAS will use its ESC sensor network to monitor for the presence of Federal Incumbent activity. If Federal Incumbent activity is observed, the CTIA SAS will shift CBSDs that might interfere to other available frequencies, and/or lower their radiated power, and/or cease their operation.