PUBLIC NOTICE

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WIRELESS TELECOMMUNICATIONS BUREAU AND OFFICE OF ENGINEERING AND TECHNOLOGY CALL FOR PAPERS ON THE PROPOSED SPECTRUM ACCESS SYSTEM FOR THE 3.5 GHZ BAND

GN Docket No. 12-354

As announced previously, the Wireless Telecommunications Bureau (WTB) and Office of Engineering and Technology (OET) (the Bureaus) will host a workshop on **Tuesday, January 14, 2014 from 9am-3:30pm EST** (Workshop) to further explore the technical requirements, architecture, and operational parameters of the proposed Spectrum Access System (SAS) for the 3550-3650 MHz band (3.5 GHz Band).[1] The primary goal of the Workshop is to seek public input on a minimum set of high level system requirements and functional parameters for the SAS. With this Public Notice, the Bureaus request that interested parties submit papers discussing technical aspects of the SAS in advance of the workshop.

In December 2012, the Commission adopted a Notice of Proposed Rulemaking that proposed to make available at least 100 megahertz of spectrum in the 3.5 GHz Band for shared, commercial uses, including small cell networks.[2] The 3.5 GHz NPRM proposes a three-tier, license-by-rule authorization framework that would facilitate rapid broadband deployment while protecting existing incumbent users of the 3.5 GHz Band.[3] Under this proposal, access to the 3.5 GHz Band would be governed by a dynamic SAS, building on the TV White Spaces database concept.[4]

The 3.5 GHz NPRM proposes that the SAS would manage three service tiers: (1) Incumbent Access; (2) Priority Access (PA); and (3) General Authorized Access (GAA). Incumbent Access users would include authorized

[1] *See* Wireless Telecommunication Bureau and Office of Engineering and Technology Announce Workshop on the Proposed Spectrum Access System for the 3.5 GHz Band, GN Docket No. 12-354, *Public Notice* , DA 13-2018 (September 30, 2013) (Announcing the original workshop date of December 11, 2013); Wireless Telecommunication Bureau and Office of Engineering and Technology Announce Date Change for Workshop on the Proposed Spectrum Access System for the 3.5 GHz Band, GN Docket No. 12-354, *Public Notice*, DA 13-2152 (November 8, 2013) (Announcing that the workshop date would be changed to January 14, 2014).

[2] *See* Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, GN Docket No. 12-354, *Notice of Proposed Rulemaking and Order*, 27 FCC Rcd 15594 (2012) (3.5 GHz NPRM).

[3] *See id.*, 27 FCC Rcd at 15612-21, ¶¶ 53-77.

[4] The Commission also released a Public Notice that set forth a revised licensing framework which elaborated on many of the licensing concepts set forth in the NPRM and the extensive record in this proceeding. *See* Commission Seeks Comment on Licensing Models and Technical Requirements in the 3550-3650 MHz Band, GN Docket No. 12-354, *Public Notice*, __FCC Rcd __ (2013) (Revised Framework Public Notice).

federal and grandfathered Fixed Satellite Service (FSS) users currently operating in the 3.5 GHz Band.[5] These users would have protection from harmful interference from all other users in the 3.5 GHz Band.[6] In the Priority Access tier, the 3.5 GHz NPRM proposes that the Commission authorize certain users with critical quality-of-service needs (such as hospitals, utilities, and public safety entities) to operate with some interference protection in portions of the 3.5 GHz Band at specific locations.[7] Finally, in the GAA tier, users would be authorized to use the 3.5 GHz Band opportunistically within designated geographic areas. GAA users would be required to accept interference from Incumbent and Priority Access tier users.[8]

Both the 3.5 GHz NPRM and the Revised Framework Public Notice describe, and seek comment on, key operational characteristics of small cell networks and discuss, in general terms, the requirements of the SAS. However, we believe it would be in the public interest to seek further input from interested stakeholders on system level capabilities, technical parameters, and other requirements for the proposed SAS. To that end, this notice provides more specific guidance about the objectives and scope of the upcoming workshop and invites all interested parties to develop detailed technical papers addressing the specific issues discussed herein.

A detailed agenda, including discussion topics and panelists, will be released prior to the Workshop.

SAS Background:

The effectiveness of the proposed dynamic spectrum sharing regime depends on proper spectrum authorization and management among the various users that would operate in the 3.5 GHz Band. The proposed SAS is essential to realizing this goal.

It is likely that the SAS would take dynamic inputs from incumbents and existing authorized users regarding their spectrum utilization. Based on such inputs and other factors, the SAS could communicate with existing and potential 3.5 GHz Band users about the availability of spectrum and certain operational parameters (see Figure 1). Similar to the approach taken in the TV White Space proceeding,[9] we assume infrastructure nodes, like Radio Access Networks Operation and Maintenance (RAN/O&M), Node B/Base Stations (eNB/BS), or Access Points (APs) would interact with the SAS and provide User Equipment/Mobile Stations/Access Terminals (UE/MS/AT's) with operational parameters and updates.

[5] *See id.*, 27 FCC Rcd at 15616-18, ¶¶ 65-69.

[6] *See id.*

[7] *See id.,* 27 FCC Rcd at 15618-20, ¶¶ 70-74.

[8] *See id.,* 27 FCC Rcd at 15620, ¶¶ 75-76.

[9] *See* Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band, ET Docket No. 04-186, *Second Memorandum Opinion and Order*, 25 FCC Rcd 18661 (2010).

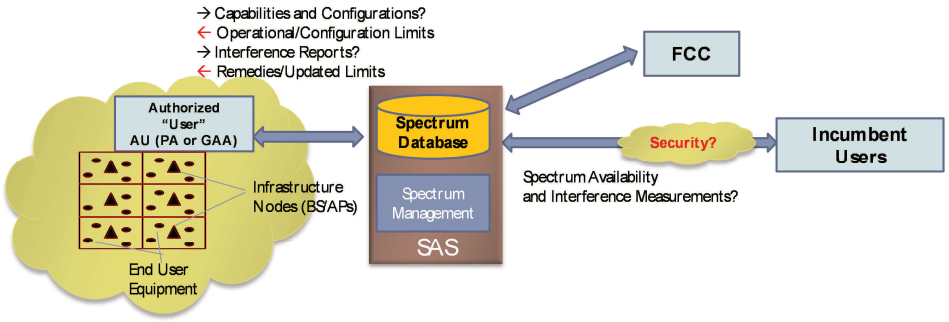

Figure 1: Spectrum Access System

As described in the 3.5 GHz NPRM, several high-level functions may be required for the proposed SAS to operate successfully.[10] First, the SAS would need access to a dynamic stream of location-specific spectrum usage and interference data. Second, it would need a baseline set of standardized methods for interpreting and operating on this data to determine allowable operations across the various tiers of users. Third, it would need to identify proper remedies to interference issues in a timely manner and communicate these instructions back to operational network nodes. Finally, the SAS could use additional data from connected network nodes to monitor, and if necessary, enforce compliance by participating network nodes. Figure 1 depicts a high-level illustration of some of these concepts.

To ensure consistent, predictable, and replicable system operation across different systems, some minimum standards regarding issues such as: (1) transmit and receive power levels; (2) co-channel interference thresholds; and (3) adjacent channel interference thresholds may need to be established. In addition, common methods of measuring, quantifying, encoding and communicating various technical information and interference events across systems using a variety of different technologies and deployment models may need to be implemented. These methods could take into account both co-channel and adjacent channel interference between nearby nodes, systems or devices that may not be synchronized or coordinated.

The Bureaus plan to organize the workshop around four Focus Areas that relate to the high-level functionalities described above. We encourage respondents to address one or more of these focus areas and to confine their submissions to the operation of the SAS as discussed in this Public Notice. To facilitate comparison of various proposals, respondents should structure their technical papers in a way that allows easy cross-referencing to the specific Focus Area descriptors (A.1., A.2., etc.) listed below.

Focus Area A: General Responsibilities and Composition of SAS

A.1. What should be the scope of the SAS's responsibilities for enabling and de-conflicting use of the 3.5 GHz Band? How should these responsibilities manifest within a given tier *(e.g.,* Priority Access, GAA) or between the different tiers? Should the SAS identify the available spectrum to *authorize* use in a particular location/frequency/time (similar to, but more expansive than the TV White Spaces approach) or should the SAS also *manage* the use of the band (*i.e.,* configure and/or set limits on various radio parameters to maximize efficient use of the band)?

A.2. What are the key system elements of the SAS (*e.g.,* database, signaling entities, etc.)? Who should have responsibility for each of these elements? Which system elements of the SAS require direct control by the Commission and which elements can be managed by third-party SAS provider(s) or other third parties? What level of oversight should the Commission exert over the functions of the SAS?

[10] *See* 3.5 GHz NPRM, 27 FCC Rcd at 15625-29, ¶¶ 95-108.

A.3. What are the key architectural decisions that could be affected by rules governing the SAS? To what extent should the SAS architecture be centralized or distributed? Are there specific enabling technologies that should be contemplated within the rules?

A.4. How can interoperability be ensured (between multiple SASs provided by multiple vendors and between SASs and Authorized Users (AUs) while leaving room for technological innovation and differentiation?

A.5. How would the SAS interact with incumbent systems?

Focus Area B: Key SAS Functional Requirements

B.1. What is the minimum set of information that must be exchanged among different elements of the SAS ecosystem in general and in particular between AUs and the SAS?

B.2. Which configuration and radio parameters (such as applying initial power level, power adjustment, initial frequency assignment, channel switch over, interference mitigations, etc.) would be defined as required obligations of the SAS?

B.3. Which network elements would directly interact with the SAS? What interfaces would need to be specified to facilitate these interactions?

B.4. What specific capabilities would need to be specified for the network nodes devices to provide information needed by the SAS (*e.g.*, location capability, dynamic power adjustment, tuning range, etc.)?

B.5. What mechanisms should be used for updates (from network devices to SAS and from SAS to network devices)? How frequently should these updates take place?

B.6. How can the SAS best ensure information security and privacy across the entire ecosystem?

B.7. If there are multiple Spectrum Access Systems, how could they be synchronized to deal with rapid changes in access to spectrum and the radio environment?

Focus Area C: SAS Monitoring and Management of Spectrum Use

C.1. What techniques could be used for the SAS to detect use (and misuse) of the spectrum in specific locations/frequencies/times? What criteria should be used to determine whether the spectrum is being used?

C.2. What techniques should the SAS employ to detect, locate, measure, and report inter-AU interference problems? What capabilities should be included in AU devices to facilitate these functions? What should be the basis for determining what constitutes interference? For example, should it be based on parameters established by the service that is being offered or some signal threshold? How should the SAS deal with intermittent or transient interference?

C.3. What enforcement mechanisms can be implemented in the SAS and authorized devices to ensure automatic compliance with any technical and service rules adopted in this proceeding?

Focus Area D: Issues Related to Initial Launch and Evolution of SAS and Band Planning

D.1. What functions should be required at launch? How should the SAS's capabilities evolve over time? What functions can be added later? How would such an evolution path anticipate backward compatibility of deployed equipment?

D.2. What are the key network deployment topologies the SAS should support at launch (*e.g.,* low-power small cells, backhaul, higher-power rural uses)? Can the SAS be designed to support multiple wireless technologies? Please provide technical details to distinguish various use and technology cases as they might, in turn, generate different requirements for the SAS.

D.3. Should there be a phased approach to flexible partitioning of the band between different use cases (*e.g*., low power small cells vs. wireless backhaul or between PA and GAA)? What are the tradeoffs and how we can ensure backward compatibility of devices as the band plan evolves?

D.4. How can we ensure that the SAS and band plan evolution maximize flexibility to accommodate multiple spectrum uses / topologies going forward while maintaining backward compatibility?

D.5. How should the system be developed and deployed? To ensure a successful launch, what strategies could be employed to test the capabilities of the SAS?

D.6. What provisions need to be established to address the possibility of an SAS experiencing a service outage or permanently discontinuing service?

Attendance. The workshop is open to the public, and will be held in the Commission Meeting Room at FCC Headquarters, located at 445 12th Street, SW, Room TW-C305, Washington, DC 20554. All attendees are advised to arrive approximately 30 minutes prior to the start of the workshop to allow time to go through our security process. Attendees are encouraged to pre-register by submitting their name and company affiliation via email to Cecilia Sulhoff (Cecilia.Sulhoff@fcc.gov) in order to expedite the check-in process the day of the event. Please use "3.5 GHz SAS Workshop" as the subject line in your email.

***Ex Parte* Rules.** As noted in the 3.5 GHz NPRM, this proceeding has been designated as a "permit-but-disclose" proceeding in accordance with the Commission's *ex parte* rules.

Filing Requirements. Submissions in response to this Public Notice must be filed by **Friday, January 3, 2014** for consideration in workshop discussion. While all submissions will be on record and will be considered for technical evaluation some may be selected for presentation during the workshop. All filings must refer to GN Docket No. 12-354. Submissions may be filed using the Commission's Electronic Comment Filing System (ECFS). *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

- Electronic Filers: Submissions may be filed electronically using the Internet by accessing the ECFS: http://fjallfoss.fcc.gov/ecfs2/.

- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.

  Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

  - All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.

  - Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743.

  - U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

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