

Wireless Innovation Forum Spectrum Sharing Committee Overview

WinnComm 2015

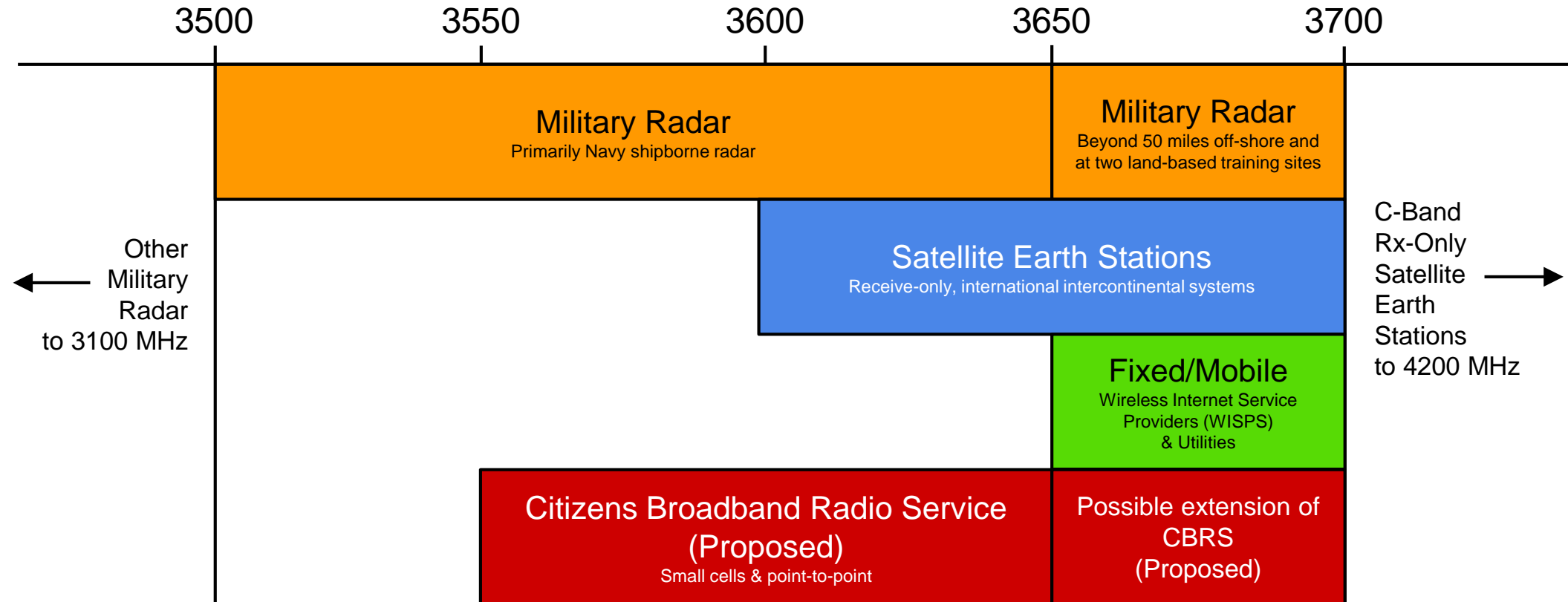
24 March

3.6 GHz: Abundance from Scarcity

3.6 GHz High-Level Overview

- **Proposed new FCC rules to open the 3.6 GHz band for sharing**
- **Up to 150 MHz of new broadband spectrum, shared with existing incumbents who will be protected from interference**
- **Proposed rules support small-cell networks with interference management and higher QoS**
- **Rules also support small-cell personal networks or other applications not requiring centralized interference management**
- **First band that implements federal spectrum sharing and three-tier architecture recommendations of the PCAST Report**
- **Through the Spectrum Sharing Committee, WinnForum is performing a key role in helping to transform 3.6 GHz from a regulatory experiment to reality**

3500 - 3700 MHz Band



Citizens Broadband Radio Service

- **Small-cell access points, base stations, eNB's, etc., operating under CBRs are referred to as Citizens Broadband radio Service Devices (CBSDs)**
- **CBSDs are under control of a Spectrum Access System (SAS) that implements interference management rules among the three tiers**
- **End-user equipment is under control of a CBSD**
- **Rules are technology-agnostic**
 - Likely technologies for initial deployments include TD-LTE, Wi-Fi, WiMAX
 - Band overlaps 3GPP TD-LTE bands 42 (3400-3600 MHz) & 43 (3600-3800 MHz) and partially overlaps FD-LTE downlink band 22
 - Wi-Fi 802.11y standardized in 3655-3695 MHz for WISP applications

Proposed Three-Tier Architecture

- **Tier 1: Incumbents**
 - Receives interference protection from Tiers 2 and 3
- **Tier 2: Priority Access Licensee (PAL)**
 - Must protect Tier 1 from interference
 - Receives interference protection from Tier 3
 - Will be licensed on a geographic basis (census tracts proposed)
 - Mutually exclusive applications will be auctioned
 - One-year term; can aggregate up to five years
- **Tier 3: General Authorized Access (GAA)**
 - Must accept interference from Tiers 1 & 2 and other Tier 3 users
 - At least half channels will be reserved for GAA
 - Contained Access Facility (CAF):
 - Receives protection within an indoor or physically-contained location
 - Used for private internal communications only

Tier-to-Tier Interference Protection

To ↓ From →	Tier 1 (Incumbent)	Tier 2 (PAL)	Tier 3 (GAA)
Tier 1 Incumbent	No change	PAL must protect incumbents from interference	GAA must protect incumbents from interference
Tier 2 Priority Access Licensee (PAL)	No protection	Coordinated by Spectrum Access System	GAA must protect PAL from interference
Tier 3 General Authorized Access (GAA)	No protection	No protection	No protection

Spectrum Access System

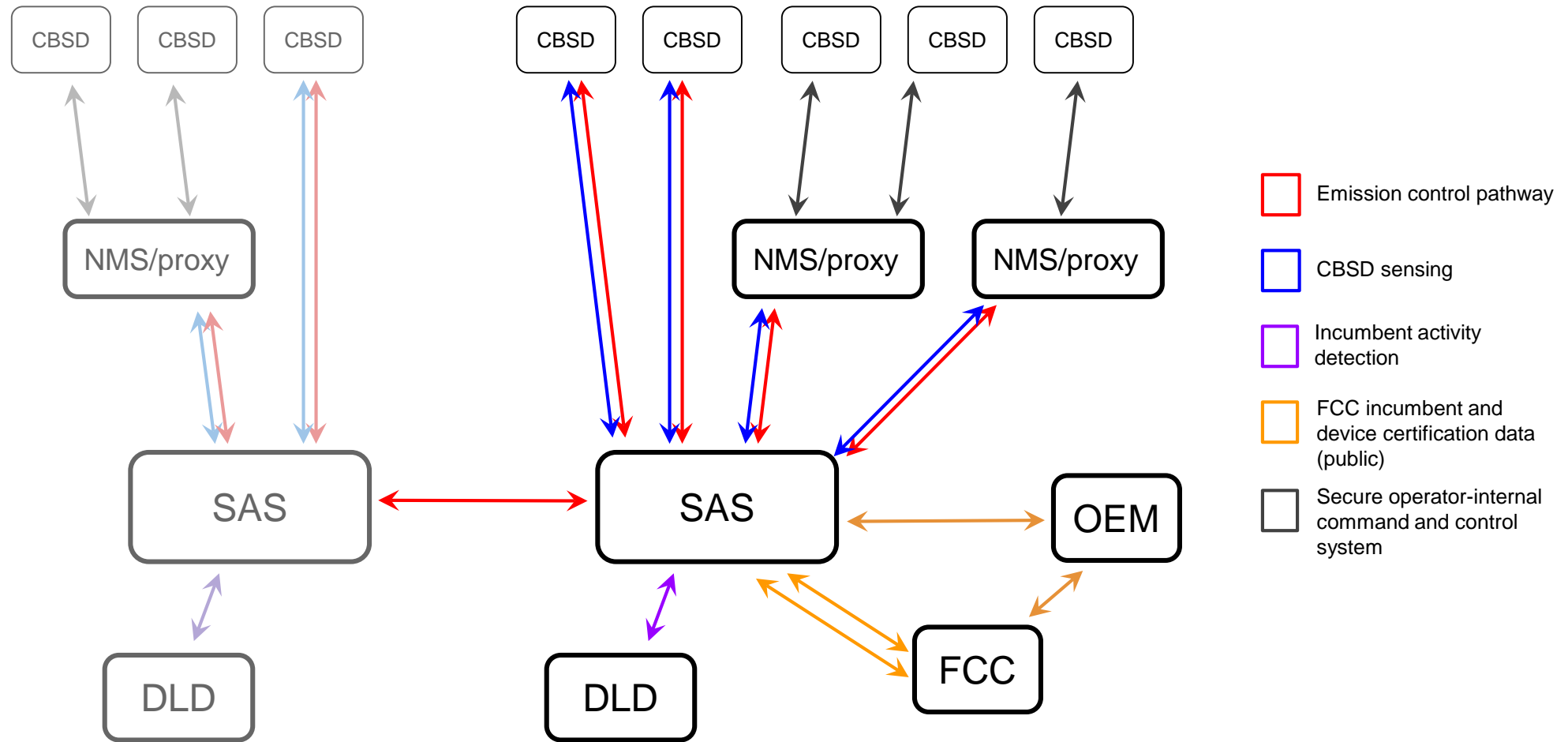
- **CBSDs must register with, and operate under the control of, a Spectrum Access System (SAS)**
- **A SAS serves the following purposes:**
 - Determine and provide CBSDs with list of available channels
 - Determine and communicate the maximum permissible transmit power for each CBSD
 - Register the identification information and location of CBSDs
 - Manage interference protections
 - Reserve GAA channels for use in a CAF
 - Ensure secure transmission of information between SAS and CBSDs

Dedicated Listening Devices

- Incumbent military radar activity will be sensed with special-purpose Dedicated Listening Devices (DLDs) deployed in coastal areas
- DLDs will alert their associated SAS to incumbent activity
- The SAS will dynamically reconfigure CBSDs in the area of incumbent activity to avoid interference to the radar



3.6 GHz Ecosystem Example



Spectrum Sharing Committee

Spectrum Sharing Committee: Scope

- **Serve as a common industry and government standards body to support the development and advancement of spectrum sharing technologies**
- **Initial focus on 3.6 GHz, with aims to advance this technology for all applicable spectrum bands that can benefit from it.**
- **This Committee is intended to facilitate the interpretation and implementation of FCC rulemaking to a level that allows industry and government parties to collaborate on implementation of a common efficient, well functioning ecosystem around this technology.**

History

- **July 2013**: Multi-stakeholder Group originally proposed in Wireless Innovation Forum's Comments to the FCC regarding the Public Notice on the TAC White Paper and Recommendations for Improving Receiver Performance
- **December 2013**: Group further elaborated in the Forum Comments to the FCC regarding Licensing Models and Technical Requirements in the 3550-3650 Band
- **June 2014**: Formation of the group identified in the Forum's FY2015 Operations Plan
- **July 2014**: Additional Elaboration provided in the Forum's comments to the FCC regarding the Further Notice of Proposed Rulemaking in the Matter of Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band
- **October 2014**: Initial Formation Meeting held in Washington DC
- **December 2014**: Second formation meeting held in Washington DC
- **January 2015**: Final formation meeting held in McLean, VA
- Working Groups meeting biweekly
- Next face-to-face Spectrum Sharing Committee meeting in late April (DC area)

Spectrum Sharing Committee: Scope

The main activities that will be conducted in the Committee include:

- Detailing common industry and government functionality and architecture for Spectrum Access Systems (SAS), sensors, and devices
- Interoperability requirements and protocol definition to allow for open competitive and well functioning systems
- Common framework for testing and integration of components of spectrum sharing technologies to allow for rapid certification and deployment and predictability, thus expanding the ecosystem and increasing utility of the spectrum
- Details of requirements, processes, and methods for protection of incumbent users as required by the spectrum rules
- Operational procedures definition for the well functioning of the system as it pertains to spectrum assignment, management and interoperability

Spectrum Sharing Committee: Scope

- Emphasis on system interoperability and on achieving simplicity in interfaces and requirements, to advance innovation, competition, and time to market.
- The Committee is a standards and technical implementation forum for industry and government users and developers of the technology and spectrum.
- The Committee is not a policy-making, government certification or liability management body. The committee may, from time to time, make formal technical recommendations to the FCC or other regulatory bodies, to further standards development.
- All activities, recommendations, etc. will follow the Forum's standard policies and procedures

Participation to Date – 37 Organizations & Growing

Members

- Alcatel-Lucent Bell Labs*
- AT&T*
- Comsearch*
- Communications Research Centre, Canada
- Federated Wireless*
- Google*
- INTELSAT
- Keybridge Global*
- Lockheed Martin
- MITRE
- Motorola Solutions*
- Nokia Networks*
- Pathfinder Wireless*
- Shared Spectrum Company
- Spectrum Bridge
- Verizon*
- Vistology

Observers

- US NIST
- US NSWC
- US NTIA
- US DISA DSO
- US DoD/CIO
- WiMAX Forum

Guests

- ARRIS
- BAE Systems
- DMI
- Eckert Seamans Cherin & Mellott, LLC
- Ericsson
- Excelon
- iConnectiv
- PTI
- Roberson and Associates
- Satellite Industry Association
- Sprint Corporation
- T-Mobile
- Utilities Telecom Council

*** Denotes Steering Group Member**



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Working Groups Overview

W1 – Operational and Functional Requirements

- Lead: Andy Clegg, Google

W2 – Security Requirements

- Lead: Charles Clancy, Federated Wireless

W3 – Protocol Specifications

- Lead: Jesse Caulfield, Keybridge Global

W4 – Testing and Certification

- Lead: Kurt Schaubach, Federated Wireless

Additional subcommittees/work groups may be proposed to the steering group by members of the committee

Functional & Operational Requirements

- **Static channel assignments**
- **Homogeneous channel assignments**
- **Interference treatment of UE clouds**
- **Auction data**
- **Incumbent protections, including large-scale pre-emption**
- **Back-reporting of channel assignments**
- **Individual/aggregate requests**
- **SAS domains & nesting**
- **Interference reporting**
- **Physical device damage**

Other Working Group Activity

- **WG2 (Security)**
 - Developing threat scenarios
 - Protection of aggregate incumbent data
 - Privacy/security of user data
- **WG3 (Interfaces)**
 - SAS-to-SAS
 - SAS-to-user (Task Group, chaired by Nokia)
 - Technology-specific extensions
- **WG4 (Testing & Certification)**
 - What does certification mean?

Spectrum Sharing Committee: Steering Group

- **Manages the overall activity flow to ensure that consensus and agreement with results from the discussions is achieved on a timely basis.**
- **The main activities include:**
 - Defining the necessary subcommittees and adding new ones as required
 - Prioritization of work activities in the subcommittees
 - Setting objectives and desired outcome from each subcommittee
 - Approving activity scope and approach for each subcommittee
 - Approving the recommendations of each subcommittee
 - Managing the committee's annual operating budget and presenting to the Board of Directors for approval

Conclusion

The level of engagement we have achieved at the WInnForum, and working groups is exceeding all of our expectations, reinforcing that shared spectrum will present a seismic shift for in-building enterprise networks. Shared spectrum provides the enterprise with a speedier and more cost effective alternative that is seamless and secure, at a scale that Wi-Fi and carrier networks cannot.”

- Iyad Tarazi, Co-chair of the WInnForum Spectrum Sharing Committee

“The FCC is doing its part in establishing the regulatory framework, and protecting incumbent users. Now it is up to industry to develop the standards, processes, and innovative concepts to fully exploit this opportunity. With representation by carriers, innovative startups, equipment manufacturers, and database suppliers, we now have a forum to accomplish this rapidly.”

- Preston Marshall, Co-chair of the WInnForum Spectrum Sharing Committee