CSMAC WG-1 Report 17 Jan 2013

1695-1710 MHz Meteorological-Satellite

WG-1 Participation

- Co-Chairs
  - Ivan Navarro, DOC/NOAA
  - Steve Sharkey, T-Mobile
- CSMAC Liaisons
  - Dennis Roberson
  - Mark McHenry
- FCC and NTIA Points of Contact
  - Ed Drocella, NTIA
  - Robert Weller, FCC
  - Navid Golshahi, FCC
- Over 70 Participants Representing Federal Users, Industry and Other Interested Parties

Overview

- Purpose: “to explore ways to lower the repurposing costs and/or improve or facilitate industry access while protecting federal operations from adverse impact.
- Approach: “begin using the Fast Track and 1755-1850 MHz reports as the basis for starting work point … consider whether it can improve upon those assumptions with “real-world” knowledge of network operations.”
- Areas of focus include:
  - Revising Long-Term Evolution (“LTE”) technical parameters for interference models to more accurately reflect real world deployment scenarios
  - Review operating parameters of Federal systems
  - Modify simulation model to reflect updated parameters
  - Assess the feasibility of reducing the exclusion zones identified in the fast track report for maximizing availability of the spectrum in major markets.
  - Develop recommendations for sharing rules consistent with the agreed outcome of the WG-1 analyses
- Discussions have been cooperative and productive, significantly furthering understanding of both system types, as a general matter, leading to:
  - Refined NTIA analysis shows a significant reduction in size of required separation distances compared to Exclusion Zones in Fast Track Report
  - General agreement that operation within the Protection Zones would be permitted subject to case-by-case coordination and meeting the specified conditions to allow such operation and the availability of suitable enforcement mechanisms.

Method of Work – Technical Committee

- Created to review and revise LTE UE characteristics, based on "real-world" knowledge of network operations
  - Includes industry and Government representatives from all WGs as well as other experts
  - Significant time spent defining the appropriate uplink LTE parameters
- Detailed Technical Discussions Built Trust and Confidence in Parameters and Approach for Both Federal and Industry Representatives
  - Foundational work – a basis for interference analysis in all WGs
  - Work and output of Technical Committee is complete and is included in WG-1 report
- Output includes:
  - Refined UE operating parameters, including power distribution curves that more closely represent real operation
  - Accurate Base Station Parameters
  - Out-of-band emissions for analysis
  - Propagation models used for UE power Cumulative Distribution Function

Method of Work – Interference Analysis

- Based on revised LTE inputs, NTIA has revised interference analysis
  - Separation distances in the Fast Track Report have been reduced by 21 – 89%
  - Each site's analysis included at least 500 Monte Carlo trials to minimize the variance in the interference model results
  - Analysis results include Minimum Distance, Mean Distance and Maximum Distance reflecting variation in scenarios
    - Analysis results will require validation through field testing prior to rulemaking for general implementation.
- LTE is highly configurable and dynamic
  - Interference protection rules should leverage LTE's configurability and dynamic capabilities, where implementable
  - Numerous system and operator controls, including wide range of dynamic power control, can be applied to protect federal operations and mitigate potential for interference
  - Deployment specific conditions create challenges in precisely modeling potential for interference in a general discussion, further testing will be required on a case-by-case basis
- Protection Zones versus Exclusion Zones
  - Ability to coordinate industry operation with the protection zones as long as certain conditions can be met
  - Continues to fully protect Government Operations since operation within Protection Zones is only permitted following coordination and agreement

Framework for Sharing Rules for the 1695-1710 MHz Band (1 of 3)

- Protects satellite downlink receivers in the 1695-1710 MHz band and the adjacent 1675-1695 MHz band based on Protection Zones
  - Commercial licensee operations within the Protection zone will be permitted following a successful coordination process concluding that such commercial operations will not cause any loss of capability at the federal site, and meeting certain other conditions
  - If coordination for commercial licensee operation within the Protection Zone is unsuccessful, commercial licensee operations within the Protection Zone will not be permitted
  - Requirement to not cause harmful interference (loss of capability) to identified federal sites still applies to operations in either circumstance
- Presumed protection based on coexistence criteria, including aggregate Interference Power Spectral Density (IPSD) Limits, to be determined for each receiver location

Framework for Sharing Rules for the 1695-1710 MHz Band (2 of 3)

- Coordination Process - NTIA and FCC, in coordination with the affected federal agencies, will establish:
  - A nationally-approved interference prediction model, associated input parameters, and distribution of the aggregate IPSD Limit among commercial licensees
  - Coordination procedures, including an automated process, to the extent possible, to assess if the proposed commercial network will meet the IPSD limits, to facilitate coordination allowing commercial licensee operations within the protection areas
  - Procedures for implementing an on-going real-time monitoring to ensure the IPSD Limits are not being exceeded and that commercial operations can be adjusted immediately if they are.
- Criteria and procedures for coordination and operation within the protected zones, as well as enforcement mechanisms, must still be clearly defined and subsequently codified in the FCC rules and the NTIA manual, as appropriate
- All federal costs related to coordination and interference resolution activities and resources shall be part of the federal agencies' sharing cost estimate, fundable through the SRF (e.g., dedicated staff needed for coordination and analysis) and shall remain in place for as long as federal agencies operate in the established and defined Protection Zones

Framework for Sharing Rules for the 1695-1710 MHz Band (3 of 3)

- Testing program – A testing program is required to demonstrate the viability and effectiveness of proposed protection/mitigation methods before a commercial licensee may begin operations within a Protected Zone, where and to the extent coordination is successful. The testing program shall:
  - Validate co-channel and adjacent channel sharing assumptions model and interference mitigation methods prior to the adoption of technical rules
  - Validate, on a site-by-site basis, the effectiveness of proposed interference mitigation methods upon completion of the auction and prior to coordinated operation within Protection Zones
  - Mutual agreement and successful demonstration of proposed validation and verification methods
  - Clearly assign responsibility for verification test plans and schedules
  - Be adaptable for future or potentially changing satellite and commercial configurations
- Compliance and enforcement – An agreed upon mechanism must be established to ensure that wireless operators cease operations in the band until interference sources are identified and resolved
  - Commercial Operators to provide and maintain 24/7 point of contact should interference occur

Recommendation 1

(from Oct, 2012 CSMAC report)

Allocation of the 1695-1710 MHz to shared use should limit commercial systems operations in the band to mobile uplink use only

- WG analysis is based on this understanding
- 1695-1710 MHz is immediately adjacent to the AWS-1 uplink band and use of the band will maximize use for commercial services
- Any deviation from this requirement would significantly change analysis for protection of federal operations

Recommendation 2

(from Oct, 2012 CSMAC report)

Consider the option of assessing the feasibility of relocating federal government Receive Locations or Other Methods to Maximize Commercial Use of the Top 100 Markets by Population

- Seven of the sites identified in the fast track report are located within top 100 markets: Suitland , MD; Miami, FL; St. Louis, MO; Cincinnati, OH; Sacramento, CA; Pearl Harbor, HI; Omaha, NE
- NTIA's 'Fast Track' analysis, including federal agencies assessment, of the 1695-1710 MHz band did not include the feasibility of site relocation and associated cost impact
- Potential challenges to site relocation, such as identification of suitable locations, access to infrastructure and redundant backhaul that is not cost prohibitive, acceptable timelines for implementation, and ensuring site relocation does not impact the government mission
- Other methods that have not been studied but may be considered, such as receiver diversity, interference cancelling mechanisms, filtering, and shielding, noting that each method will have cost implications that must be assessed, should any of these options be considered
- If agreement is reached to consider other options besides geographic sharing, feasibility analyses including assessment of cost impact and implementation timelines, must be completed prior to auction and the establishment of the FCC rules for reallocation of this band

Recommendation 3

Adopt proposed framework for sharing the 1695-1710 MHz band and establish the FCC and NTIA-led Working Group to begin developing the coordination, testing, monitoring, and compliance processes, roles, and responsibilities

- Framework identifies numerous details which must be determined prior to development and adoption of technical and service rules for commercial licensees and beginning coordination of commercial operations within the protection areas
- Efforts need to begin immediately to address issues that need to be resolved before rules are adopted and the auction can begin (e.g., analysis verification and validation testing)
- Funding for these efforts, in particular testing and on-going monitoring, needs to be identified
- Efforts of CSMAC WG 1 will inform these efforts