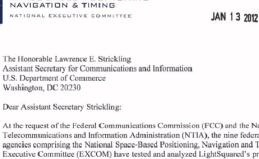# GPS Spectrum Topics

ICG-8, Dubai

November, 2013

January 2012 Space-Based PNT Executive Committee

- January 13, 2012 National Space-Based Positioning, Navigation, and Timing (PNT) Executive Committee (EXCOM) co-chair letter to National Telecommunications and Information Administration (NTIA) proposed to draft new Global Positioning System (GPS) spectrum interference standards:

  – Inform future proposals for non-space, commercial uses in the bands adjacent to the GPS signals.

  – Ensure such proposals are implemented without affecting existing and evolving uses of space-based PNT that are vital to economic, public safety, scientific, and national security needs.

GPS Adjacent Band Compatibility Assessment

- **DOT Deputy Secretary Tasking:**

  - Collaborate to develop a spectrum protection plan which provides a framework to define the processes and assumptions for development of GPS spectrum protection criteria on behalf of GPS civil users.

- **GPS Adjacent Band Compatibility Assessment will identify the processes for:**

  - Deriving adjacent-band power limits, as a function of offset frequency, necessary to ensure continued operation of all applications of GPS services.

  - Determining similar levels for future GPS receivers utilizing modernized GPS and interoperable Global Navigation Satellite System (GNSS) signals.

Methodology

- **Using FCC/NTIA-defined planned application in frequency bands adjacent to GPS**

  - Deployment scenario
  - Transmitter characteristics
  - Signal structure

- **Determine GPS receiver interference tolerances**

  - Set 1: Current receivers - Aviation standards (MOPS) or measured results for most GPS receivers which do not have defined standards

  - Set 2: Develop for next-generation multi-frequency/multi-constellation GNSS receivers

- **Define interaction scenarios**

  - GPS receiver use/location (airborne, urban, rural, etc.)

  - Terrestrial transmitter density

❖ **Specify adjacent band power limits for proposed new application as a function of frequency offset from GPS**

Near-Term Focus

- **Frequency Bands Adjacent to GPS L1**
  - Focus on an LTE concept

- **Leverage Receiver Categories used in 2011 Technical Working Group (TWG)**
  - Aviation*
  - Cellular
  - General Location/Navigation
  - High Precision
  - Timing
  - Networks
  - Space

   * Certified avionics to be addressed by RTCA

❖ **Develop a Family of Curves on the Maximum Aggregate Power Level as a function of frequency offset from GPS**

Near-Term Focus (Continued)

- **Interaction Scenarios**
  - Need to consider separation distances and geometry from transmitter to GPS users for various applications
  - Location/Height of GPS receivers

- **Propagation Model**
  - Need to evaluate model(s) to apply

- **Develop Data Collection/Test Program**
  - Work with Government/Industry on a realistic timetable given resource constraints
  - Address how to handle proprietary information

Joint Task Group (JTG) 4-5-6-7

Background:

- Established by World Radio Conference 2012 (WRC-12) by the International Telecommunication Union (ITU) to consider additional spectrum allocations the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT)

- GPS Directorate goal is to protect all GPS bands and adjacent bands from being proposed as candidate bands for reallocation or sharing with IMT; various US agencies and international GNSS providers share this interest in protecting GNSS bands

Current Status:

- Completed the 4th JTG Meeting in October 13, two meetings remain before the JTG finalizes its inputs to WRC-15

- Next meeting: 20-28 Feb 14; Geneva, Switzerland

- GPS Watch items: 1300-1400 MHz , 2025-2110 MHz and 2200-2290 MHz (USB), 1525-1559 MHz (Adjacent to L1), and any new submissions