

Recap

- ❑ Initial Workshop-I held on September 18, 2014 at the Volpe Center
 - Overview of DOT GPS Adjacent Band Compatibility Assessment Plan and plans/timeline for implementation
 - Presentation on GPS use cases and list of representative GPS receivers
 - Description of GPS receiver and antenna needed information from manufacturers
- ❑ One-on-One telecons with manufacturers since Workshop-I

One-on-One discussions

- ❑ Conducted One-on-One discussions with several GPS receiver manufacturers after Workshop-I
- ❑ Provided a presentation with condensed information from the last workshop outlining the Volpe planned approach as it relates to the DOT GPS Adjacent Band Compatibility Assessment Plan and the essential information needed
- ❑ Considering development of a 'uniform' GPS receiver test plan
- ❑ Discussed development of GPS receiver interference masks

Moving Forward

- ❑ Plan to continue the GPS Adjacent Band Compatibility Assessment in partnership with industry through Public Workshops (Will be Announced via Federal Register Notice)
- ❑ Next workshop envisioned for Late February/Early March 2015

Tentative Topics for Workshop-III

- ❑ Progress on defining spectrum masks
- ❑ Progress on test plan for Set-1 Receivers (i.e., current GNSS receivers in the L1 band)
- ❑ Progress on testing schedule
- ❑ State of down-selection candidate receivers from use case information
- ❑ Preliminary results of base-station (downlink) interference modeling for near-the-ground GPS applications

Topics

- ❑ Approach to Efficiently Obtain Receiver Mask Data
- ❑ Leveraging Previously Collected Data
- ❑ Propagation Models
- ❑ Role of Limited Receiver Simulation

Approach to Efficiently Obtain Receiver Mask Data

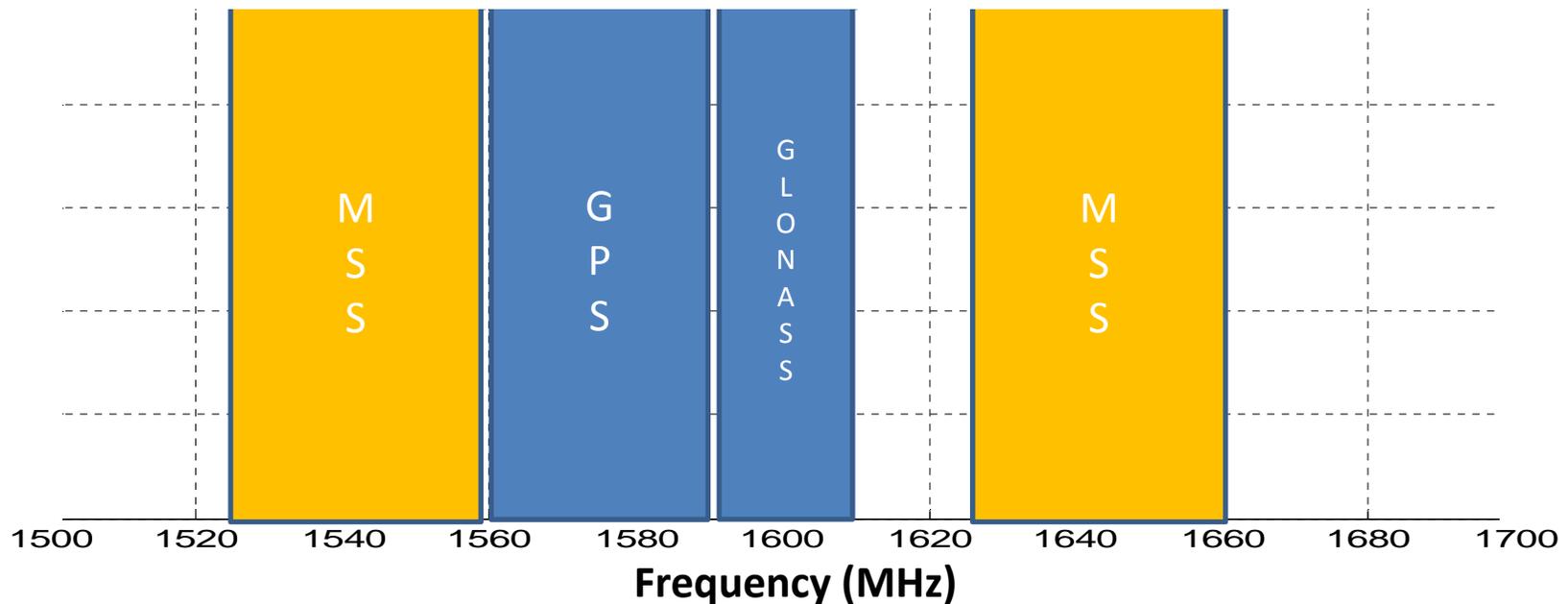
- ❑ In the previous workshop, general test guidelines were discussed to obtain individual receiver masks that will be used to derive masks for receiver categories
- ❑ In order to ensure that the relevant data is collected for the downstream analysis and minimize the chance of retesting, the current thinking is to develop a detailed uniform test plan
- ❑ Over the next few months, the Volpe Center will develop a test plan that will be coordinated with industry as part of the overall GPS Adjacent Band Compatibility Assessment effort.

Approach to Efficiently Obtain Receiver Mask Data (Cont'd)

- ❑ The first phase of the test plan will focus on defining wired tests, with the antenna characteristics information to be integrated via analysis.
- ❑ The extent to which wireless tests are going to be performed will be clearer as the level of contribution from manufacturers, government agencies, and other partners is better known

Approach to Efficiently Obtain Receiver Mask Data (Cont'd)

- The tests are expected to cover existing Multi-GNSS receivers in the L1 Band and the MSS bands



Leveraging Previously Collected Data

- ❑ A significant amount of testing was conducted which led to the final TWG and NPEF reports
- ❑ Information and lessons learned from this effort will be considered during the development of the current test plan
- ❑ Discussion on whether previously collected data can be used as part of the current effort

RF Propagation Models

- ❑ The power aggregation calculations of an interaction scenario require a clear definition of propagation models.
- ❑ There are numerous propagation models with varying levels of fidelity and complexity.
- ❑ The intent is to use conservative propagation models with low to moderate complexity that can be implemented using a number of closed form expressions rather than ray tracing tools or other solvers that require detail terrain data.

RF Propagation Models (Cont'd)

- We propose the following approach
 - Use 2-ray path-loss for short distances to protect against constructive interference
 - Transition to a free space path-loss model for longer distances

- This approach should offer reasonable protection for GNSS receivers under varying environments.

Role of Limited Receiver Simulation

- We will potentially use simulations of the front end and up to the correlator for the purpose of performing sensitivity analysis to address:
 - Addressing potential differences in test results: Is the difference explainable by the expected variability of the 1 dB compression point for RF amplifiers of the same model as well as uncertainty on the filters cutoffs and roll offs.
 - Along the same lines identifying the uncertainty on a mask developed from measuring one or a limited number of samples for a particular receiver model to ensure that all units are protected from interference
 - Translating CW interference mask results (and or broadband results) to a mask for a signal with spectral characteristics that are different than what was tested.

Summary

□ Next steps are:

- For the purpose of obtaining and validating GPS receivers interference masks, to move ahead with the development of the test plan
- Start the implementation of the aggregation analysis
- Develop receiver simulations of the front-end up to the correlator for the purpose of sensitivity, tradeoff analysis, and help extend the tested masks to spectral shapes that might not have been considered during testing. Such models will be used after reasonable validation with collected test data

Questions?