Receiver Test Selection Criteria

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Volpe The National Transportation Systems Center

Advancing transportation innovation for the public good

U.S. Department of Transportation
Office of the Secretary of Transportation
John A. Volpe National Transportation Systems Center

BLUF: Industry Help is Needed!!

- The DOT requests that GPS manufacturers submit receivers for test in the following TWG categories:
  - Aviation (non-certified), cellular, general location/navigation, high precision, timing, networks, and space-based receivers
- Each receiver should be accompanied by use cases defining its regions of operation
  - Dense urban, urban, suburban, and/or rural
- The use cases also should identify how its applications are vital to economic, public safety, scientific, and/or national security needs
  - Of interest also will be factors supporting why this particular receiver model is important, e.g., quantity in use, economic impact, etc.
- An estimate also is needed of how long this (set 1) receiver type will be in use before replacement with newer (set 2) models

Quote from ABC Assessment Plan

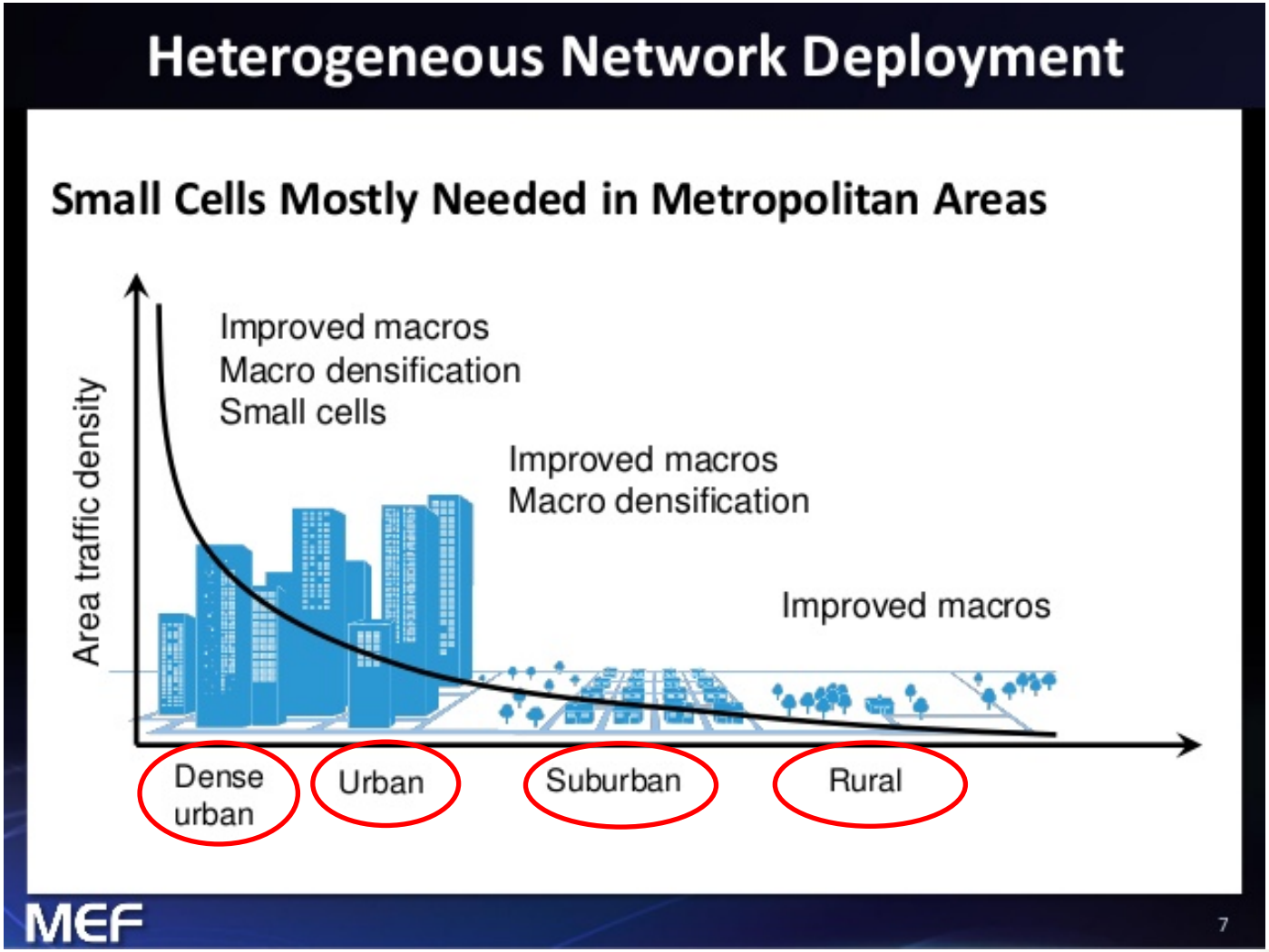
Other GPS receivers do not have established receiver standards that include interference rejection masks and definition of the metrics for determining what constitutes interference. For those receivers, testing performed as a function of frequency offset and characteristics of the interfering signal will be required to develop an interference mask. This effort will be required for each "type" of GPS receiver (e.g., high precision, timing, etc.). In order to minimize the required time and resources, the approach will leverage, to the extent feasible, the work already done by the FCC-mandated LightSquared Technical Working Group (TWG). Specifically, this Plan will use the TWG definition of different receiver types and catalog of representative receiver models for each of those types. Unfortunately, the testing accomplished by the TWG focused on a very specific planned application at very specific frequencies, so additional data collection will likely be required based upon the definition(s) developed in Section 3.1.1.

The GPS use cases define the operations and regions where the interference rejection mask is to be respected.

Receiver Types, Use Cases, Regions

- The TWG identified seven receiver types representative of the nonmilitary use of GPS in the United States:
  - Aviation (non-certified)
  - Cellular
  - General location/navigation
  - High precision
  - Timing
  - Networks
  - Space-based receivers
- GPS use cases are needed for the seven categories
- Regions are probably best defined by broadband communication requirements (see next slide)

Cell Requirements Define Regions



www.slideshare.net/zahidtg/mef-lteltea-small-cell-backhaul

EXCOM Co-Chair Letter to NTIA

SPACE-BASED POSITIONING
NAVIGATION & TIMING
NATIONAL EXECUTIVE COMMITTEE

JAN 13 2012

UNITED STATES OF AMERICA

The Honorable Lawrence E. Strickling
Assistant Secretary for Communications and Information
U.S. Department of Commerce
Washington, DC 20230

Dear Assistant Secretary Strickling:

At the request of the Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA), the nine federal departments and agencies comprising the National Space-Based Positioning, Navigation and Timing (PNT) Executive Committee (EXCOM) have tested and analyzed LightSquared's proposals to repurpose the Mobile Satellite Services (MSS) frequency band adjacent to Global Positioning System (GPS) frequencies to permit another nationwide terrestrial broadband service. Over the past year we have closely worked with LightSquared to evaluate its original deployment plan, and subsequent modifications, to address interference concerns. This cooperative effort included extensive testing and analysis of GPS receivers. Substantial federal resources have been expended and diverted from other programs in testing and analyzing LightSquared's proposals.

It is the unanimous conclusion of the test findings by the National Space-Based PNT EXCOM Agencies that both LightSquared's original and modified plans for its proposed mobile network would cause harmful interference to many GPS receivers. Additionally, an analysis by the Federal Aviation Administration (FAA) has concluded that the LightSquared proposals are not compatible with several GPS-dependent aircraft safety-of-flight systems. Based upon this testing and analysis, there appear to be no practical solutions or mitigations that would permit the LightSquared broadband service, as proposed, to operate in the next few months or years without significantly interfering with GPS. As a result, no additional testing is warranted at this time.

The EXCOM Agencies continue to strongly support the President's June 28, 2010 Memorandum to make available a total of 500 MHz of spectrum over the next 10 years, suitable for broadband use. We propose to draft new GPS Spectrum interference standards that will help inform future proposals for non-space, commercial uses in the bands adjacent to the GPS signals and ensure that any such proposals are implemented without affecting existing and evolving uses of space-based PNT services vital to economic, public safety, scientific, and national security needs.

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Deputy Secretary of Defense

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EXCOM Letter

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Where GPS Receivers Are Vital

GPS Receiver Type	Region				
	Dense Urban	Urban	Suburban	Rural	Space
Aviation (non-certified)					
Cellular					
General location/navigation					
High precision					
Timing					
Networks					
Space-based receivers					✓

- "Vital" relates to key needs supported by space-based PNT services:
  - Economic (commerce, construction, agriculture, banking, transportation, mapping, etc.)
  - Public Safety (fire, ambulance, police, e911, hazard monitoring, tracking, etc.)
  - Scientific (weather, earthquakes, geophysics, plate tectonics, sea level, etc.)
  - National Security (more than military, e.g., communication, banking, electric grid, weather, etc.)

Industry Help is Needed!!

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Where GPS Receivers Are Vital

- Real time Q&A during meeting produced the following:

GPS Receiver Type	Region					
	Dense Urban	Urban	Suburban	Rural	Marine	Space
Aviation (non-certified)	✓	✓	✓	✓		
Cellular	✓	✓	✓	✓	✓	
General location/navigation	✓	✓	✓	✓	✓	✓
High precision	✓	✓	✓	✓	✓	✓
Timing	✓	✓	✓	✓		✓
Networks	✓	✓	✓	✓		
Space-based receivers						✓

- Meeting comments from Garmin, Trimble, John Deere, NovAtel, USGS, JPL, and U.S. Coast Guard

End