

GPS – Galileo Cooperation Agreement

**Presentation for US/UN GNSS
Workshop**

Vienna, Austria

December 13-16, 2004

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GPS-Galileo

- **Each system managed, operated, and funded independently**
- **GPS and Galileo will be compatible and, for civil users, interoperable at the user level**
 - Geodesy nearly identical ~ 2cm
 - Timing different but each system will transmit timing offsets
 - Radio frequency compatible
- **Level playing field allows manufacturers to build “dual system” civil receiver**
 - Civil users can choose to use GPS, Galileo, or combination based on their needs

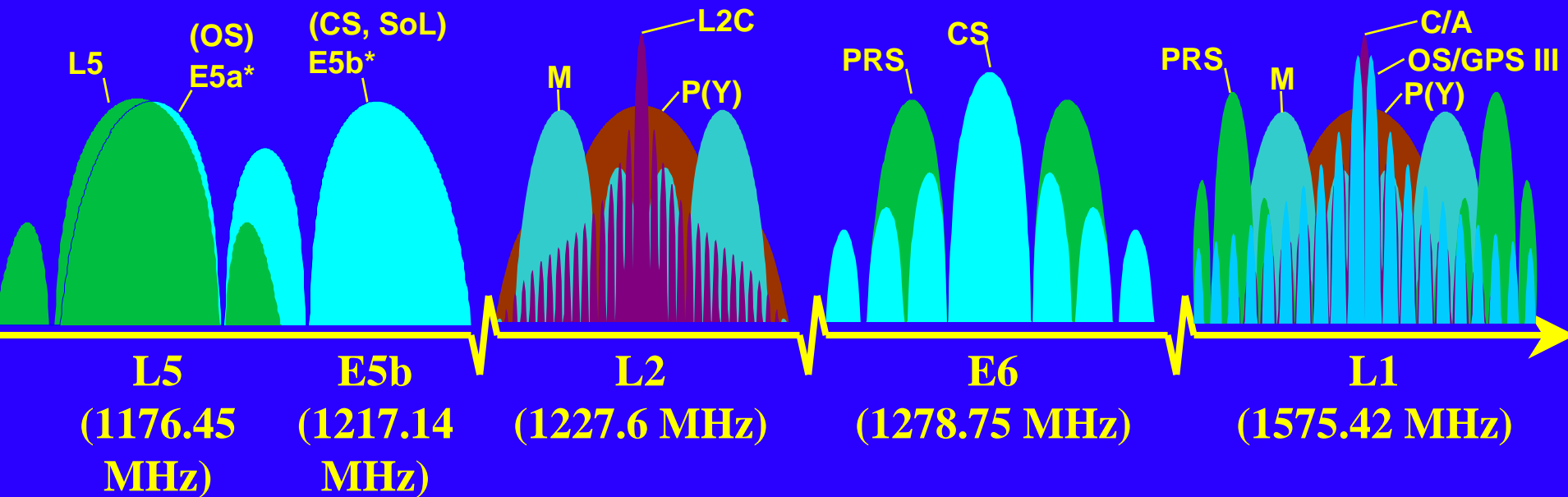
National Security Compatibility

- **EC agreed to use signal structures for Galileo PRS and Open Service signals that satisfy national security compatible criteria**
 - **Criteria, assumptions and methodology contained in reference documents signed by both sides**
 - **Consultations required if one Party changes signal structure and the Party believes it exceeds the criteria**

GPS-Galileo

- **Agreed to baseline signal structures for L1**
 - Common BOC(1,1) signal – broadcasted by up to 60 satellites
 - GPS will continue to broadcast C/A code as well as BOC(1,1) for GPS III
 - Galileo PRS at BOC(15,2.5) cosine phase modulation
- **Each system's signals will be compatible with the other systems**
 - They will “do no harm” to the other system's
- **Civil signals will be interoperable**
 - A “dual system” receiver should be able to use any combination of GPS and Galileo signals to derive a solution

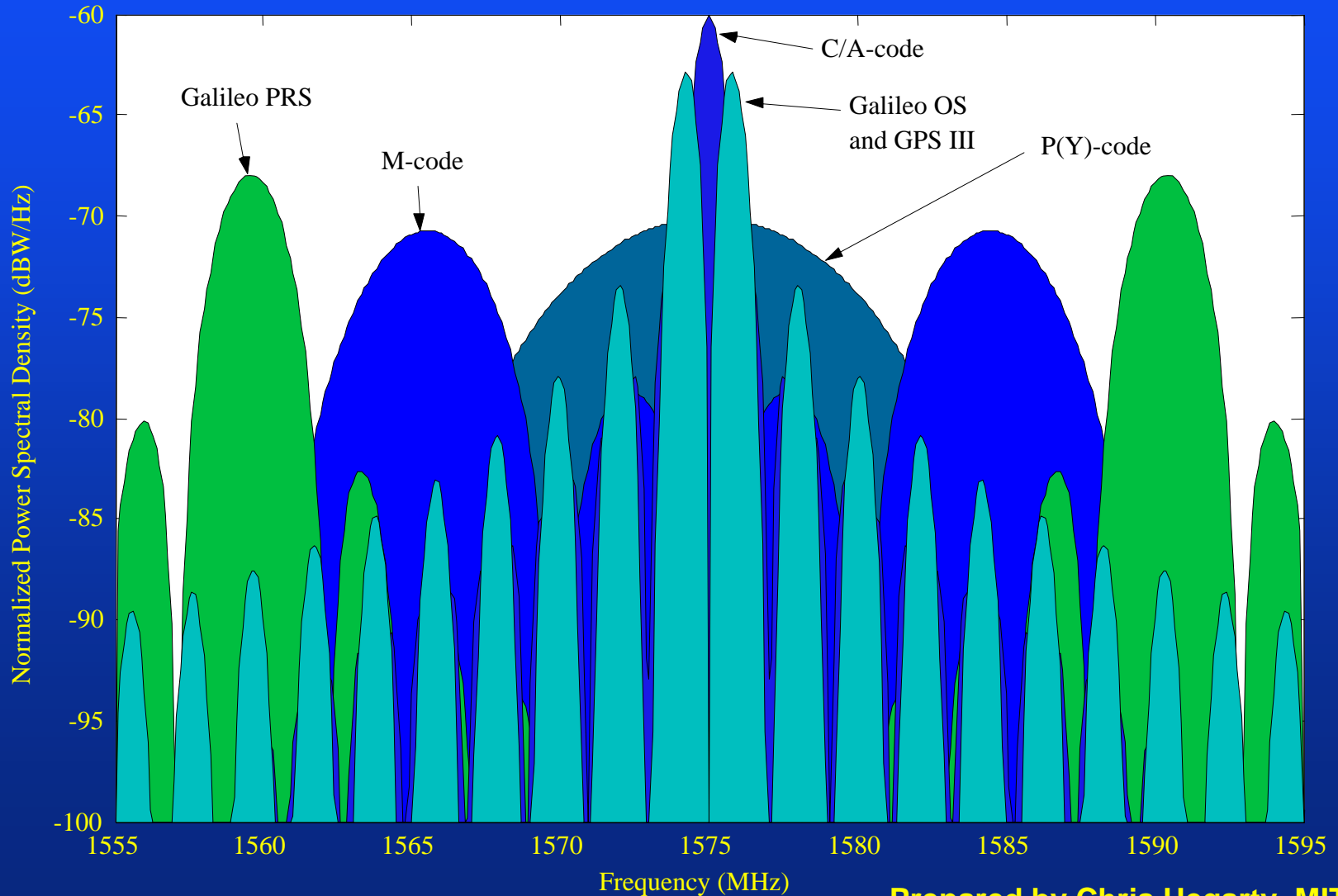
GPS and Galileo Signal Spectra



*BOC(15,10) modulation option shown for E5a/E5b.

Prepared by Chris Hegarty, MITRE

GPS and Galileo L1 Signal Spectra



Planned Baseline GPS and Galileo Signal Structures

- **GPS Service**
 - L5 – BPSK-10 centered at 1176.45 MHz [2006]
 - L2 – BPSK-1 centered at 1227.6 MHz [2005]
 - L1 – BPSK-1 centered at 1575.42 MHz [current] with an added BOC (1,1) [GPS III]
- **Galileo***
 - E5A/E5B – 2 x BPSK-10 or BOC (15,10) between 1164-1214 MHz
 - E6 – BPSK-5 & BOC (10,5) centered at ~ 1279 MHz
 - E2/L1/E1 – BOC (1,1) OS
BOC (15,2.5) cosine phased PRS centered at 1575.42 MHz

*(based on US/EC draft agreement & Galileo plans as currently understood by the U.S.)

GPS-Galileo

- **Open service signals provided without direct user fees and signal specification information available on a non-discriminatory basis**
 - Access to information for manufacturers may be subject to non-discriminatory commercial arrangement
 - GPS SPS civil service specifications will continue to be open and publicly available – no licensing fee
- **Encrypted civil signals (i.e. Galileo Commercial and potentially Safety-of-Life) may be subject to a licensing fee**
 - Parties shall endeavor to provide signals intended for safety of life services with the required level of safety as recognized by competent international bodies.

GPS-Galileo

- **Any fees for Safety-of-life services for aviation and maritime will be consistent with ICAO and IMO rules**
 - GPS civil services will continue to be free of direct user fees
- **Sets up working groups**
 - Trade and civil applications
 - Radio frequency compatibility and interoperability
 - Design and development of next generation
 - Security
- **No transfer of technology to third parties without permission of originating party**

GPS-Galileo

- **Consult prior to establishing standards, certification or licensing requirements, or regulations**
 - Unless mandating expressly authorized by ICAO or IMO
 - U.S. supports users' ability to choose the service or services that best meets their requirements
- **Non-discriminatory approach to trade in goods & services**
 - Measures with respect to goods and services related to civil satellite-based navigation and timing signals or services, augmentations, and value-added services should not be used as a disguised restriction on or an unnecessary obstacle to international trade

Summary

- **Cooperation agreement addresses national security, economic, and technical issues**
- **Protects compatibility**
- **Encourages civil interoperability**