



Worldwide Global Navigation Satellite System (GNSS) Interoperability

**Civil Global Positioning System (GPS)
Service Interface Committee**

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2004 U.S. Space-Based PNT Policy

(Excerpts focused on International Relations)

Goals:

- U.S. space-based PNT systems and services remain essential components of internationally accepted PNT services
- Promote U.S. technological leadership in applications involving space-based PNT services

To achieve this, the United States Government shall:

- Encourage foreign development of PNT services/systems based on GPS
 - Seek to ensure foreign space-based PNT systems are **interoperable** with civil GPS and augmentations
 - At a minimum, ensure **compatibility**

The Secretary of State shall:

- Promote the use of civil aspects of GPS and its augmentation services and standards with foreign governments and other international organizations
- Lead negotiations with foreign governments and international organizations regarding civil PNT matters



Planned GNSS

- **Global Constellations**
 - GPS (24+)
 - GLONASS (24)
 - Galileo (27)
 - Compass (35)
- **Regional Constellations**
 - QZSS (3)
 - IRNSS (7)
- **Satellite-Based Augmentations**
 - WAAS (3)
 - MSAS (2)
 - EGNOS (3)
 - GAGAN (3)
 - SDCM (2?)



U.S. Objectives in Working with Other GNSS Service Providers

- Ensure **compatibility** – ability of U.S. and non-U.S. space-based PNT services to be used separately or together without interfering with each individual service or signal
 - Radio frequency compatibility
 - Spectral separation between M-code and other signals
- Achieve **interoperability** – ability of civil U.S. and non-U.S. space-based PNT services to be used together to provide the user better capabilities than would be achieved by relying solely on one service or signal
 - Primary focus on the common L1C and L5 signals
- Ensure a level playing field in the global marketplace

Pursue through Bi-lateral and Multi-lateral Cooperation



The Goal of RNSS Civil Interoperability



- Ideal interoperability allows navigation with one signal each from four or more systems with no additional receiver cost or complexity

Interoperable = Better Together than Separate



Progress on Interoperability

- **Bi-lateral discussions**
 - China (ITU- RF compatibility only)
 - European Union
 - India
 - Japan
 - Russia
- **Multi-lateral Cooperation**
 - Asia Pacific Economic Cooperation (APEC)
 - International Committee on GNSS/Providers Forum



Summary

- As new space-based GNSS are emerging globally, **interoperability** is the key to “success for all.”
- U.S. is actively engaged in bi-lateral and multi-lateral discussions and cooperation on space-based navigation issues.
- U.S. encourages increasing international convergence towards interoperability of all current and planned GNSS and augmentations.



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