



U.S. Space-Based PNT International Cooperation

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

**Savannah, Georgia
September 15-16, 2008**

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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?)



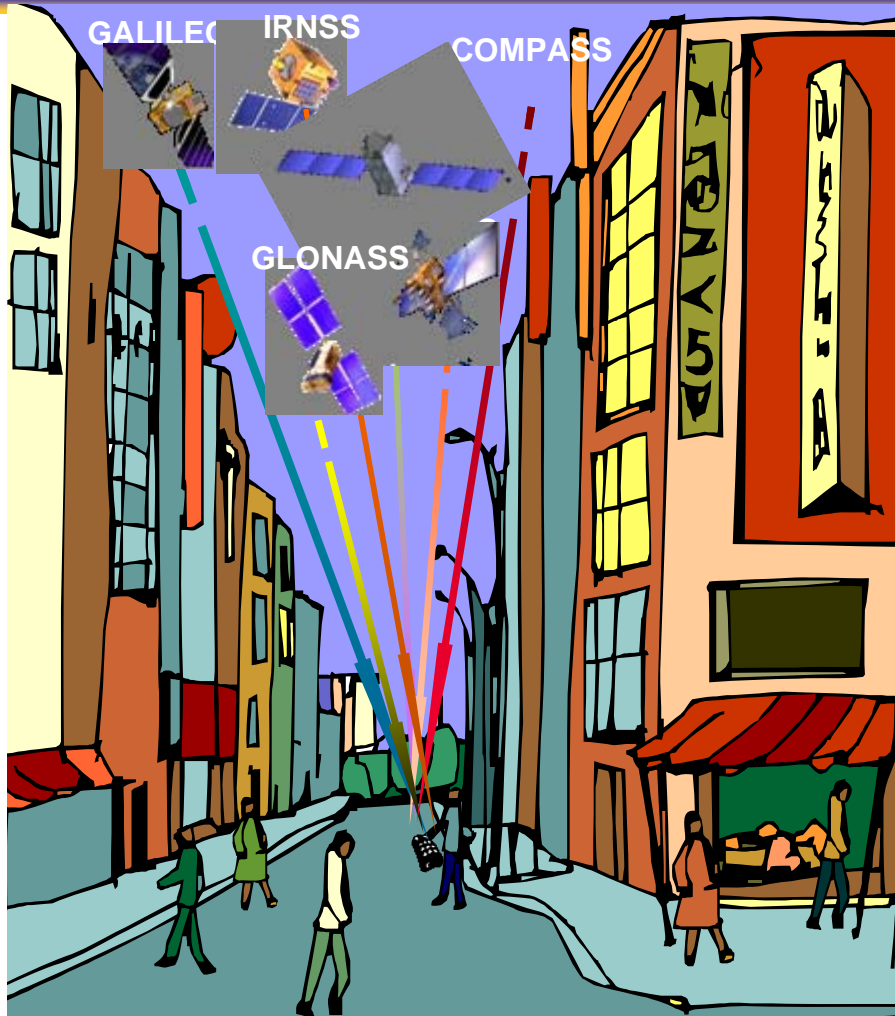
U.S. Objectives in Working with Other GNSS Service Providers

- 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



U.S. - Europe Cooperation

- U.S.-EU agreement signed in 2004 provides solid foundation for cooperation
- Four working groups were set up under the agreement:
 - Technical, trade, and security issues working groups have met
- Improved new civil signal (MBOC) adopted in July 2007
- Next Plenary Meeting planned for October 2008



June 26, 2004, press conference at U.S.-EU Summit in Ireland (U.S. Sec. of State Colin Powell, Irish Foreign Minister Brian Cowen, EU Vice-President Loyola De Palacio)



U.S. - Russian Federation Cooperation

- U.S.- Russia Joint Statement issued in December 2004
- Negotiations for a U.S.-Russia Agreement on satellite navigation cooperation have been underway since late 2005
- Several very productive technical working group meetings have been held:
 - Russia WG-1 chair proposed adopting two new civil CDMA signals at L1, L5 to be interoperable with GPS
 - Still under discussion within the Russian Government
 - Next WG-1 meeting is planned for December 2008



U.S. - Japan Cooperation

- Japan's status as a world leader in GPS applications and user equipment makes it an important partner
- Regular policy consultations and technical meetings on GPS cooperation began in 1996 and led to the 1998 Clinton-Obuchi Joint Statement
- Both countries have benefited from the close relationship:
 - QZSS is designed to be compatible and interoperable with GPS
 - U.S. working with Japan to set up QZSS monitoring stations in Hawaii and Guam
- Next plenary meeting is planned in Nov. 2008



U.S. - India Cooperation

- Policy and technical consultations on GPS cooperation underway since 2005
 - One aim is to ensure **interoperability** between **GPS augmentation system WAAS** and India's planned **GAGAN augmentation system based on GPS**
 - Another important topic is **ionospheric distortion and solutions**
- U.S.-India Joint Statement on GNSS Cooperation issued in February 2007 in Washington
 - Bi-lateral meeting held in Bangalore in September 2007
 - Technical Meeting focused on **GPS-IRNSS compatibility and interoperability** held in January and July 2008



International Committee on Global Navigation Satellite Systems (ICG)

- Emerged from 3rd UN Conference on the Exploration and Peaceful Uses of Outer Space July 1999
 - Promote the use of GNSS and its integration into infrastructures, particularly in developing countries
 - Encourage compatibility and interoperability among global and regional systems
- Members include:
 - GNSS providers (U.S., EU, Russia, China, India, Japan)
 - Other Member States of the United Nations
 - International organizations/associations





International Committee on Global Navigation Satellite Systems (ICG)

- ICG-2 held in September, 2007 in India
- Established **Providers Forum** to address common issues
- Began implementation of the ICG Work Plan within established working groups:
 - A. Interoperability and compatibility
 - B. Enhancement of performance of GNSS services
 - C. Information dissemination, education, outreach & coordination
 - D. Interaction with monitoring & reference station network organizations
- U.S. will host the 3rd ICG in December 2008
 - <http://www.geolinks.org/ICG3/>



ICG Providers Forum

- Six space segment providers listed previously are members
- Purpose:
 - Focused discussions on **compatibility and interoperability**, encouraging development of complimentary systems
 - Exchange of detailed information on systems and service provision plans
 - Exchange views on ICG work plan and activities
- Consensus reached at the first meeting on general definitions for compatibility and interoperability
 - Including spectral separation between each system's authorized service signals and other systems' signals

<http://www.unoosa.org/oosa/en/SAP/gnss/icg.html>



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, regional, and multi-lateral cooperation on space-based navigation issues
- **International cooperation** in the context of National Space-Based PNT Policy principles is a **top priority** for the U.S. Government



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