U.S. International Diplomatic Initiatives and Opportunities on GNSS Issues

National Space-Based PNT Advisory Board 8th Meeting

Ray E. Clore
Senior Advisor on GNSS
Office of Space and Advanced Technology
U.S. Department of State

June 9, 2011

U.S. National Space Policy

Space-Based PNT Guideline: Maintain leadership in the service, provision, and use of GNSS

- Provide civil GPS services, free of direct user charges
  - Available on a continuous, worldwide basis
  - Maintain constellation consistent with published performance standards and interface specifications
  - **Foreign PNT services may be used to augment and strengthen the resiliency of GPS**
- Encourage global ***compatibility*** and ***interoperability*** with GPS
- Promote transparency in civil service provision
- Enable market access to industry
- Support international activities to detect and mitigate harmful interference

Planned Space-Based PNT Systems

- Global Constellations
  - **GPS (24+)**
  - GLONASS (30)
  - Galileo (27+3)
  - Compass (27+3 IGSO + 5 GEO)
- Regional Constellations
  - QZSS (3)
  - IRNSS (7)
- Satellite-Based Augmentations
  - **WAAS (3)**
  - MSAS (2)
  - EGNOS (3)
  - GAGAN (2)
  - SDCM (2)

U.S. Objectives with Other Space-Based PNT 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
- **Promote fair competition** in the global marketplace

Pursue through Bilateral and Multilateral Cooperation

Bilateral Cooperation

- **U.S.-China** operator-to-operator coordination under International Telecommunication Union (ITU) auspices
  - Bilateral Meetings in 2007, 2008, 2009, 2010
  - Completed ITU coordination in September 2010
  - Plan to share agenda topics in near future for possible civil space-based PNT discussions
- **U.S.-Japan** Joint Statement on GPS Cooperation 1998
  - Annual Plenary Meetings
  - Quasi-Zenith Satellite System (QZSS) designed to be fully compatible and highly interoperable with GPS
  - Bilateral agreements for QZSS monitoring stations in Hawaii and Guam
  - Japan to host ICG-6 in September 2011

Bilateral Cooperation (continued)

- **U.S.-India** Joint Statement on GNSS Coop. 2007
  - Technical Meetings focused on GPS-India Regional Navigation Satellite System (IRNSS) compatibility and interoperability held in 2008 and 2009
  - Large potential market for space-based PNT goods and services
  - Space-based PNT issues to be part of agenda for July 13-14 Civil Space Joint Working Group in Bangalore

- **U.S.-Australia** Joint Delegation Statement on Cooperation in the Civil Use of GPS in 2007
  - Bilateral meeting in Washington, D.C., October 26-27, 2010
  - GNSS and applications included in expanded space cooperation as discussed in October 27, 2010 Joint Announcement

Bilateral Cooperation (continued)

- **U.S.-Russia** Joint Statement issued December 2004
  - Compatibility/interoperability: Infrequent talks last few years; U.S. encouraged adoption of CDMA signal at L5
  - Search/rescue: Next working group meeting in U.S. in September – technical progress towards next gen capabilities
  - GOR mandate to equip official vehicles with GLONASS or GPS/GLONASS receivers – proposed import tax on GPS only receivers
- **U.S.-EU** GPS-Galileo Cooperation Agreement of 2004
  - U.S. deposited entry-into-force note on June 6, 2011
  - All EU Member States have ratified – only await EU Parliament acceptance under Lisbon treaty powers for final ratification
  - Galileo a regional system with 18 sats by 2014 – Full global constellation in 2019-2020
  - EU seeks "high level" meeting to promote closer cooperation

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 interested Member States of the United Nations
  - International organizations/associations

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

ICG Providers Forum

- Six space segment providers listed previously are members
- Purpose:
  - Focused discussions on **compatibility and interoperability**, encouraging development of complimentary systems
  - Exchange detailed information on systems & service provision plans
  - Exchange views on ICG work plan and activities
- Providers have agreed that all GNSS signals and services must be compatible and open signals and services should also be interoperable to the maximum extent possible
  - Working definition of **compatibility** includes respect for spectral separation between each system's authorized service signals and other systems' signals
  - **Interoperability** definition addresses signal, geodetic reference frame realization, and system time steerage considerations

APEC GNSS Implementation Team

- Established by the APEC Transportation Working Group in 2000
- Mission is to promote implementation of regional GNSS augmentation systems to enhance inter-modal transportation, by:
  - Expediting the implementation of GNSS in all economies
  - Advancing the development of an Asia Pacific approach to GNSS implementation to encourage cooperation that will enhance safety and efficiency
  - Seeking from all economies the expertise to ensure the success of GNSS implementation
  - Cooperating with non-APEC organizations as necessary to provide for seamless implementation
- U.S. hosted the 14th APEC GIT meeting 21-24 June 2010 in Seattle, WA
- Next meeting scheduled for Brisbane, Australia, June 12-17, 2011

Outcome of APEC GNSS Implementation Team-14

- Met in Seattle (21-24 June 2010)
  - Co-Chairs Noppadol Pringvanich (Thailand) and Karen Van Dyke (USA)
  - 12 economies and 85 participants attended
- Attendees included:
  - Governments, GNSS industry, International Federation of Surveyors, European Commission, UN Office on Outer Space Affairs
- Adopted a Strategy for 2010-2015
  - Focus on seamless intermodal transportation
- Adopted new action items and called for development of project proposals in four areas:
  - Regulatory Roadmap for Performance Based Navigation (Aviation) – USA
  - Multi-GNSS Constellation – Japan
  - Regional Receiver Autonomous Integrity Monitoring (RAIM) Prediction System – Thailand
  - Space Based Augmentation System Cooperation Opportunities – Korea

Summary

- U.S. Space-Based PNT Policy and GPS constellation remain reliable foundations for all civil users
- The U.S. actively engages in bilateral, and multilateral cooperation on satellite navigation issues
- Good progress on compatibility and basic interoperability issues
- Open to considering suggestions on how non-U.S. space-based PNT services may be used to augment and strengthen the resiliency of GPS