Report of the First Meeting of the International Committee on Global Navigation Satellite Systems (ICG) Providers Forum

Hosted by the Indian Space Research Organization

Bangalore, 4 September 2007

INTRODUCTION

In its resolution 61/111 of 14 December 2006, the General Assembly noted with appreciation that the International Committee on Global Navigation Satellite Systems (ICG) had been established on a voluntary basis as an informal body to promote cooperation, as appropriate, on matters of mutual interest related to civil satellite-based positioning, navigation, timing and value-added services, as well as the compatibility and interoperability of global navigation satellite systems, while increasing their use to support sustainable development, particularly in developing countries.

At the first meeting of the ICG held in Vienna on November 1-2, 2006, and in response to a recommended action in the committee's work plan, providers of global and regional navigation satellite systems proposed establishing a Providers Forum to enhance compatibility and interoperability among current and future systems. On this basis, an ad hoc Providers Forum meeting co-chaired by the United States and India was held on September 4, 2007, immediately preceding the 2nd meeting of the ICG. China, the European Community, Japan and the Russian Federation were also present at the meeting. In addition to co-chairs opening remarks and opening statements by each provider, the meeting's agenda included system and service updates from each provider as follows:

> **China:** Compass/BeiDou Navigation Satellite System (CNSS)
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> **European Community:** European Satellite Navigation System (Galileo) and European Geostationary Navigation Overlay Service (EGNOS)
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> **India:** GPS and GEO Augmented Navigation System (GAGAN) and Indian Regional Navigation Satellite System (IRNSS)
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> **Japan:** Quasi-Zenith Satellite System (QZSS) and MTSAT (Multi-functional Transport Satellite) Satellite-based Augmentation System (MSAS)
>
> **Russian Federation:** Global Navigation Satellite System (GLONASS) and Wide-area System of Differential Corrections and Monitoring (SDCM)
>
> **United States:** Global Positioning System (GPS) and Wide-area Augmentation System (WAAS)

Consistent with the template for information sharing among providers that was circulated prior to the meeting (see Attachment), many system providers also shared their views on compatibility and interoperability, spectrum protection and other items to be addressed under the work plan of the ICG.

CONCLUSIONS

Continuation of the Providers Forum

At the conclusion of the meeting, the above participants agreed to establish the Providers Forum as a mechanism to continue discussions on important issues addressed by the ICG that require focused inputs from system providers. The forum is not a policy-making body, but provides a means to promote discussion among system providers on key technical issues and operational concepts such

as compatibility and interoperability, protection of GNSS spectrum; orbital debris/orbit de-confliction; and other matters related to the work of the ICG. The participants also agreed to meet again, no later than the next meeting of the ICG, to be held in 2008 in the United States, and potentially on the margins of the next session of the Scientific and Technical Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space in February 2008. The United Nations Office for Outer Space Affairs, as the Secretariat for the ICG, will continue to act as the focal point for Providers Forum meeting preparations. The Chair of the Providers Forum will rotate among the members on an annual basis.

Service Provision from Current and Planned Global Navigation Satellite Systems

Information exchanged at the Providers Forum revealed that all current and future providers are committed to their plans to deploy and/or modernize their respective global and regional satellite navigation systems having the following important characteristics:

- Service to users is provided or will be provided from all systems in radiofrequency spectrum bands internationally allocated for radionavigation satellite services (RNSS) in L-band (960-1300 MHz and 1559-1610 MHz). Two systems will also broadcast a navigation signal in S-band (2491.005 ± 8.25 MHz). The band 5000-5030 MHz may be used in the future by one or more systems.
- All systems broadcast or will broadcast an open service using one or more signals provided to users free of direct user charges.
- Many systems also broadcast authorized services specifically designed to meet the needs of authorized users in support of governmental functions.

Providers Forum participants also agreed that:

- Transparency in the provision of open services is desirable, and requires the open publication and dissemination of signal and system characteristics, in due time, required to allow manufacturers to design and develop GNSS receivers on a non-discriminatory basis.
- Discussions should emphasize cooperation regarding GNSS infrastructure (space and ground control/monitoring segments) for open services is desirable in order to permit open, free commercial competition in receiver and applications markets.
- System providers should strive to monitor the performance of their open signals and provide timely updates to users regarding critical performance characteristics such as timing accuracy, positioning accuracy and service availability.
- The protection of RNSS spectrum is vital to GNSS service provision. Therefore, adequate spectrum protection through domestic and international regulation should be pursued. In addition, steps to detect and mitigate interference to GNSS worldwide should be pursued.
- Physical separation of operational satellite constellations and end-of-life disposal orbits should also be examined.
- The concept of service guarantees should also be examined.

Principles of Compatibility and Interoperability

Global and regional system providers agreed that at a minimum, all GNSS signals and services must be compatible. To the maximum extent possible, open signals and services should also be interoperable, in order to maximize benefit to all GNSS users. In order to achieve compatibility and

interoperability, the Providers Forum has reached consensus on the general definitions of these principles as described below.

Compatibility refers to the ability of space-based positioning, navigation, and timing services to be used separately or together without interfering with each individual service or signal.

- Radiofrequency compatibility should involve thorough consideration of detailed technical factors, including effects on receiver noise floor and cross-correlation between interfering and desired signals. The International Telecommunications Union (ITU) provides the framework for discussions on radiofrequency compatibility.
- Compatibility should also involve spectral separation between each system's authorized service signals and other systems' signals.
- Any additional solutions to improve compatibility are encouraged

Interoperability refers to the ability of open global and regional satellite navigation and timing services to be used together to provide better capabilities at the user level than would be achieved by relying solely on one service or signal.

- Ideal interoperability allows navigation with signals from at least four different systems with no additional receiver cost or complexity.
- Common center frequencies are essential to interoperability, and commonality of other signal characteristics is desirable.
- Multiple constellations broadcasting interoperable open signals will result in improved observed geometry, increasing end user accuracy everywhere and improving service availability in environments where satellite visibility is often obscured.
- Geodetic reference frames and system time standards should also be considered.
- Any additional solutions to improve interoperability are encouraged.

Future Work of the Providers Forum

Global and regional system providers in attendance agreed to support the ICG and actively participate in its working groups formed to address its work plan. The United States agreed to prepare a draft work plan for the next meeting of the Providers Forum based on the results of this meeting and the second meeting of the ICG.

ANNEX

Template for Information sharing between Service Providers

I. System(s) Description

A. Space Segment – Technical parameters such as altitude and inclination or GEO slot position. As appropriate, it could also address satellite disposal procedures and orbit information, to establish a baseline for ensuring de-confliction with other constellations.

B. Ground Segment

C. Signals – current and planned signals

D. Performance – Performance standards vs. actual performance

E. Timetable for system deployment and operation

II Services Provided and Provision Policies

III Perspective on Compatibility and Interoperability

A. Definition of Compatibility and Interoperability

B. Efforts to ensure RF compatibility through bi-lateral and multi-lateral venues

C. Efforts to pursue interoperability through bi-lateral and multi-lateral venues

IV GNSS Spectrum Protection Activities

A. National-level RNSS spectrum regulation/management procedures

B. Views on ITU RNSS spectrum issues or WRC Agenda items – as appropriate or necessary

C. RNSS interference detection and mitigation plans and procedures

V ICG Participation

A. Discussion of the service providers involvement in ICG working groups and work plan activities

B. Views on future ICG focus areas and activities as appropriate.