Report of Working Group B: Enhancement of GNSS Services Performance

1. The Working Group on Enhancement of Global Navigation Satellite Systems (GNSS) Services Performance (WG-B) held its first meeting during the 2nd International Committee on GNSS (ICG) Meeting on 6 September 2007[1], its second meeting during the 3rd ICG Meeting on 11 December 2008[2] and its third meeting during the 4th ICG Meeting on 16 September 2009, in accordance to the ICG work plan[3].

2. At the third meeting the following presentations were given and discussed:

   a) A combined Global Positioning System (GPS)/GLObal Navigation Satellite System (GLONASS) Original Equipment Manufacturer (OEM) for mass market and the experience gained on its development. It was noted the progress made in the development of this technology to levels of integration and miniaturization getting closer to equivalent GPS units. Further progress on this direction will have a positive impact on the enhancement of current GNSS services;

   b) A user receiver technique based on multi-correlators that allows the detection of multipath in a simple manner and it is suitable for implementation in low complexity receivers. It was noted the innovative nature of the technique and the benefits of the incorporation of multi-correlators in the user equipment to cope with multipath problems;

   c) An application of GLONASS/GPS in the Russian Federation exploiting the synergy of navigation, telematics and Geographic Information System (GIS) to provide a range of services from fleet management to billing applications. It was noted the possibilities for enhancement of GNSS services offered by the integration of these technologies implemented already in many regions of the Russian Federation;

   d) A technique to support extension of GNSS coverage to in-door environments based on the exchange of estimated position information between users. It was noted the potential of peer-to-peer techniques to support indoor applications. The need to enable in-door navigation with fixed infrastructure and in-door mapping may still remain.

3. The status of the recommendations made by the working group in previous meetings (Ref ICG/WGB/DEC2008)[4] were considered. The group noted the progress made on multipath mitigation (recommendation ii, ICG-3 WGB report) and in-door coverage extension (recommendation iii, ICG-3 WG-B report) with the material presented at the meeting. The group also noted that introduction of combined receivers, as the presented GPS/GLONASS development, would have a positive impact in all recommendations. A paper (ref. 4C/xxx-E questions ITU-R 217-2/4 and ITU-R 288/4) on the use of Low-Density Parity Check Convolutional Codes (LDPC CC) for GNSS signals had been provided by India but it was not possible to be presented at the meeting. The chairman took an action to distribute the paper for comments.

4. A revision of the work-plan proposed by the chairman was discussed. The revision takes into account the progress in the definition of the activities of the ICG and the Providers' Forum. A past action (Ref. action B1 from original workplan) related with

[1] See United Nations General Assembly Document A/AC.105/901
[2] See United Nations General Assembly Document A/AC.105/928
[3] See United Nations General Assembly Document A/AC.105/879
[4] See http://www.unoosa.org/pdf/icg/2008/icg3/ICG_WGB_DEC2008.pdf

the development of a reference document on models and algorithms for ionospheric and tropospheric corrections is considered closed taking into account that significant work on this area has been already done by other bodies outside the ICG. However the working group agrees to express a recommendation to the ICG to follow up closely the different initiatives that are being undertaken at international level to characterize the ionosphere during the next period of maximum solar activity (2010 onwards) and to see on which way the ICG could support such initiatives with a view to develop further the knowledge of the ionospheric phenomena and its impact on GNSS. New actions addressing the problem of user integrity and the monitoring of other relevant techniques for enhancing GNSS performance have been added to the workplan. The chairman of WG-B took an action to collect further comments to this workplan from other WG-co-chairs and participants to WG-B not able to attend the meeting with a view to further consolidate the work plan at the fifth meeting of the ICG (ICG-5). The revised workplan was presented at the Plenary of ICG-4 and preliminarily adopted. The revised workplan is provided in Annex.

5. The next meeting of the group was proposed to be organized in the margins of the Munich GNSS Summit in March 2010. The chairmen took an action to organize the meeting and provide the agenda.

Annex I

REVISED WORK PLAN

WORKING GROUP B - Enhancement of Performance of GNSS Services (Leads, India and the European Space Agency)

As a unique combination of GNSS service providers and major user groups, the ICG and the Providers' Forum will work to promote and coordinate activities aimed at enhancing GNSS performance, recommending system enhancements and meeting future user needs. Specifically, the following actions will be taken by a working group co-led by India and the European Space Agency:

Action B1: Examine the problem of multi-path and related mitigation actions affecting both GNSS systems and user receivers, for static and mobile receivers and recommend any required system enhancements or actions that may contribute to alleviate this problem.

Action B2: Examine the extension of GNSS service to indoor applications and recommend any required system enhancements or actions that may support such extension.

Action B3: Examine the problem of user position integrity and the related solutions (e.g. ground integrity, satellite autonomous integrity, user Receiver Autonomous Integrity Monitoring (RAIM)), and recommend any required system enhancements or actions that may contribute to meet the user requirements.

Action B4: Monitor the techniques proposed by application developers and external augmentation service providers for enhancement of GNSS performance with a view to recommend any required system enhancements or actions that may support the realization of such techniques.

In the execution of its work, WG-B will coordinate its activities with other groups of the ICG, in particular with the Working Group A (WG-A) for those WG-B recommendations related with enhancements of interoperability across systems.

Attachment I

Recommendation for Committee Decision

Prepared by: Working Group B

Date of Submission: 09/17/09

Issue Title: Endorse WG-B revised workplan

Background/Brief Description of the Issue:

The revision takes into account the progress in the definition of the activities of the ICG and the Providers' Forum. A past action (Ref. action B1 from original workplan) related with the development of a reference document on models and algorithms for ionospheric and tropospheric corrections is considered closed taking into account that significant work on this area has been already done by other bodies outside the ICG.

Discussion/Analyses:

Comments received at WG-B incorporated in revision. Period of one month is open fir further comments.

Workplan is provided to the working groups co-chairs for comments.

WG-B co-chairs will finalize the workplan and propose to the ICG for endorsement at the earliest opportunity.

Recommendation of Committee Action:

WG-B recommends that ICG endorse the implementation of the revised workplan.

Attachment II

Recommendation for Committee Decision

Prepared by: Working Group B

Date of Submission: 09/17/09

Issue Title: Action B1 to be cancelled

Background/Brief Description of the Issue:

Action B1 of the WG-B workplan is proposed to be cancelled.

Discussion/Analyses:

To follow-up closely the different initiatives that are being undertaken at international level to characterize the ionosphere during the next period of maximum solar activity (2010 onwards).

Recommendation of Committee Action:

WG-B recommends that the ICG support initiatives with a view to develop further the knowledge of the ionospheric phenomena and its impact on GNSS.

Attachment III

Recommendation for Committee Decision

Prepared by: Working Group B

Date of Submission: 09/17/09

Issue Title: Planned WG-B Workshop

Background/Brief Description of the Issue:

Consistent with the revised work plan of WG-B, the working group will held the workshops prior to ICG-5.

Discussion/Analyses:

The workshop is planned to be held on the margins of the 2010 Munich Satellite Navigation Summit, Munich, Germany, 9 – 11 March 2010, on 8 March 2010.

Recommendation of Committee Action:

WG-B recommends that the ICG endorse its proposal to hold the workshop in preparation for ICG-5.