

Recommendation 1 for Committee Decision

Prepared by: Working Group B

Date of Submission: 12 November 2013

Issue Title: Specifying and Characterizing an Interoperable GNSS Space Service Volume

Background/Brief Description of the Issue:

WG-B has continued the efforts addressed in Recommendation 6 of ICG-6 entitled “Interoperable GNSS Space Service Volume”. Since ICG-6, WG-B has made excellent progress in specifying the SSV and populating respective templates that will characterize the expected qualitative and quantitative characteristics of signals within an interoperable GNSS Space Service Volume. The SSV will open new science and technological opportunities through the use of robust, interoperable GNSS navigational signals in space, enabling missions that save lives, understand our Earth and the universe and provide economic advantages worldwide.

Discussion/Analyses:

WG-B has made significant progress in establishing an interoperable GNSS SSV during ICG-8 through significant pre-work, presentations at ICG-8 and additional robust contributions from the administrations of Russia and China. At ICG-8 several administrations presented their SSV signal templates and presented SSV performance expectations. During ICG-8, the WG-B team discussed the importance of common definitions and data needed from the GNSS constellations, in conjunction with the signal template data, to conduct consistent SSV performance analyses. We recommend that WG-B provide an additional template to develop these common definitions and data requirements and gather this data from the appropriate administrations.

Recommendation of Committee Action:

Recognizing the advantages of an interoperable GNSS SSV for the space user community, the ICG is invited to take notice that the WG-B team has taken several actions to compile definitions to support future analyses and gather template data approved by the GNSS system providers. The SSV template data, coupled with the other requested data and definitions, will enable users to analyze GNSS signal availability and navigation performance expectations for space vehicles flying in the SSV.

Providers are invited to send all action responses to the WG-B Co-chairs and Interagency Operations Advisory Group (IOAG) ICG representative. Until recommendation on SSV template is approved by ICG, the members agreed to keep this information within ICG forum. WG-B action items include:

- SSV Template Completion
 - WG-B team works with the service providers to complete and formally submit the SSV templates to WG-B co-chairs prior to the 2nd interim WG meeting.
 - Questions and discussion regarding the template will be addressed during a video conference to be held prior to the 1st interim WG meeting.
 - WG-B team members shall be prepared to discuss their template inputs at the 1st interim WG meeting.
- Maturity of Definition
 - WG-B team to develop definitions of the minimal service capability of the GNSS constellations (i.e. satellite orbit, number of satellites and constellation geometry). This will be used in conjunction with template data to perform unified GNSS SSV performance analyses.

- Spaceborne GNSS Receivers
 - WG-B encourages the development of interoperable multi-frequency space borne GNSS receivers that exploit the use of GNSS signals in space.
- Antenna/Electronics Characterization

Stable performance of the GNSS space segment over long time periods is crucial for the scientific community. The scientific community recommends:

- Minimizing phase and group delay variations of GNSS transmit antennas vs. angle during the design phase.
- Measure phase and group delay variations of GNSS transmit antennas vs. angle, and making this information available to the scientific community.
- Measure phase center and group delay center for GNSS transmit antennas vs. angle, and making this information available to the scientific community.
- Spacecraft electronics: Maintain strict coherence of phase and group delay between signals on the same spacecraft.

Recommendation 2 for Committee Decision

Prepared by: Working Group B

Date of Submission: 13 November 2013

Issue Title: Harmonization of TTFF Methodology

Background/Brief Description of the Issue:

The Time To First Fix (TTFF) is an essential GNSS signal performance Figure of Merit (FoM) fully transparent to the user. The TTFF is driven by a multiplicity of factors, including the GNSS signal and message structure, user receiver configuration and start condition of the user receiver. As a consequence an unambiguous definition of the TTFF is not commonly established.

Discussion/Analyses:

An unambiguous definition of the TTFF FoM is needed in order to assess the performance of the current GNSS and derive conclusions on required performance enhancements driven by the user communities. WG-B discussed on a potential methodology to formalize the TTFF determination, breaking it down into the start conditions cold start, long-off warm start, short-off warm start and hot start. The Working Group also identified the potential need of identifying specific requirements for some classes of receivers (one of them being space receivers). Also, any analytical methodology aiming to assess the impact of different signals and systems into a (multi-system) TTFF should concentrate on the contributions being mainly dependent on signal and system parameters and characteristics, taking reasonable (common) assumptions on technology driven factors (mainly receiver implementation).

Recommendation of Committee Action:

WG-B encourages the service providers and relevant experts to review the proposed TTFF methodology and provide recommendations for its complementation. When consensus on the TTFF definition and the relevant starting conditions has been achieved, the result shall be introduced into the ICG Glossary of Terms.

WG-A and WG-B are invited to consider the above in their future activities.