ICG/REC/2018

WG-S RECOMMENDATION #1
Recommendation 13S-1 for ICG Decision

Prepared by: **Working Group S**

Date of Submission: **08 November 2018**

Issue Title: **Performance Standard Template**

Background/Brief Description of the Issue:

At ICG-6 (2011), WG-A(S) approved Recommendation 4.1 to develop a template for individual GNSS providers to consider when defining open service performance. The goal was to reach consensus on a minimum common set of parameters with each system using its own definitions and calculation methods. Establishment of such a set of parameters ensures that GNSS service providers are harmonized in the services they provide, as well as supportive of transparency in GNSS service commitments to users. The Performance Standards Guideline Document has been developed and thoroughly reviewed by WG-S members in a deliberate and steady process over several years, and is a document that can help guide service providers in the development and revision of their performance standards.

Discussion/Analyses:

In 2016 at ICG-11, a team was created to fulfill the provision of Recommendation 4.1. Later that year, the team conducted a survey of members to determine which parameters were essential to be included in all standards (minimum common set), and which were optional. From the result of the survey, the team created a Guidelines document which went through extensive reviews by all team members, and the organizations they represent, and the final set was unanimously approved by all members of the team in June 2018. The document was then submitted to the WG-S for their consideration at their inter-sessional meeting in July.

Recommendation:

The ICG recommends adoption of the "Guidelines for Developing Performance Standards" document as a template for all providers to consider when developing their performance standard (or their revisions or updates).

Attachment: PerformanceStandardsGuidelines(V1.0).docx "Guidelines for Developing Performance Standards"

Attachment

Guidelines for Developing Performance Standards

(Version 1.0)

Introduction

This document outlines guidance for creating open service performance standards for Global and Regional Navigation Satellite Systems (GNSS/RNSS). It was developed by the International Committee on GNSS, Working Group S (Systems, Signals, and Services), Subgroup for Interoperability and Service Standards, Performance Standards team. It is intended to be used by ICG member service providers.

GNSS/RNSS Service Providers in the ICG have agreed each to provide a performance standard document describing the level of service of the GNSS/RNSS for its stage of operation. This service applies only to the signal in space and not to actual receiver, atmospheric, or local effects. The Standard will incorporate the parameters identified in this guidance document, although the document format, definitions, and textual content are at the discretion of the service provider.

In this document, the term “performance standard” is used. Some organizations may refer to it by other terms, such as a service standard, open service standard, or service definition document. For the purpose of this document these terms are considered synonymous.

Document Sections

At a minimum, the Performance Standard should contain sections for each of the following:

Purpose. Description of the purpose of the document, describing why it is being produced and what it intended to provide.

Scope. Description of the scope of the document and what it is intended to cover given the state of the existing GNSS/RNSS service. Examples are range accuracy and availability, positioning and timing accuracy and availability, and continuity.

Service Definition. Definition of the service that is being provided, such as open service or standard positioning service.

GNSS/RNSS System Overview. Description of the GNSS/RNSS system from a high-level view, its components and capabilities.

Service Characteristics and Minimum Usage Assumptions. Description of the characteristics of the signal in space service, including signal interface specification with reference to where this information can be found, performance characteristics (including signal health settings), and user equipment assumptions.

Key Terms and Definitions. Identification and definitions for the key terms and parameters used in the Standard.

References. Detailed references to any of the documents mentioned in the Standard.

Performance Standards & Service Definition.

The Performance Standard should describe the system service levels for the following parameters, grouped by categories. Parameters identified as [Key] are required to be included in the Standard. Those identified as [Optional] are recommendations for consideration, and may or may not be included. For each parameter, the Standard shall provide a definition that is unambiguous and testable.

Satellite domain

Slot Availability (maintenance of satellites to orbital slot parameters) [Optional]
Terrestrial Service Volume Coverage [Key]
Space Service Volume Coverage [Optional]

Range domain

Range Accuracy (all signals) [Key]
Range Accuracy (by Age of Data) [Optional]
Range Integrity [Optional]
Range Availability [Key]
Range Rate Accuracy [Optional]
Range Acceleration Accuracy [Optional]
Range Rate Integrity [Optional]
Range Acceleration Integrity [Optional]

Position domain

This section applies if position is provided as a service. This section requires a statement of receiver assumptions, such as elevation mask angle, ability to track all in view, single or dual frequency.

DOP Availability [Key]
Position Accuracy (Global Average & Worst Site)[Optional]
Position Availability [Key]

Time domain

Time transfer accuracy [Key]
UTC time dissemination accuracy [Key]

Continuity

Signal in Space Continuity [Optional]
Note: Continuity standard could be implemented after sufficient period for data collection following declaration of full operational capability of the system.

Other

Broadcast Polar Motion [Optional]
GNSS/RNSS Time Offset [Optional]
UT1-UTC Offset [Optional]
Carrier Phase Coherency [Optional]

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WG-S RECOMMENDATION #2
Recommendation 13S-2 for ICG Decision

Prepared by: **Working Group S**

Date of Submission: **08 November 2018**

Issue Title: **IADC MEO/IGSO Orbital Debris Mitigation Study**

Background/Brief Description of the Issue:

There are guidelines for post-mission disposal for GEO and LEO region, however, there are no specific guidelines for GNSS/RNSS MEO and IGSO satellites post-mission disposal from international organizations.

Discussion/Analyses:

In the past few meetings of WG-S, reports on GNSS satellites disposal orbit for space debris mitigation were presented. Observation shows some GNSS retired spacecrafts are very likely close to other GNSS operational orbits. For system orbit safety, information on orbital debris mitigation plans need to be exchanged on a regular basis, and it requires the service providers to develop guidelines for GNSS MEO and IGSO satellite disposal together.

Recommendation:

The ICG recommends *that the IADC, in coordination with system providers and WG-S, conduct a study focused on Medium Earth Orbit and inclined Geosynchronous orbit debris mitigation and the current plans of GNSS providers*

Considering options for GNSS satellites (MEO/IGSO disposal like:
Stable Disposal (Graveyard Orbit)
Unstable Disposal (eccentricity growth)
Active de-orbit (use of solar sails, low thrust propulsion)

To analyze for each option for all GNSS (MEO/IGSO) for the next 200 years:
Risk of collision with own GNSS satellites
Risk of collision with satellites of other GNSS satellites
Risk of collision with GEO and IGSO satellites
Risk of collision with LEO satellites

The IADC will be asked to report/share progress annually with/ to the ICG through WG-S

System Providers will continue to exchange information on their GNSS orbital debris mitigation plans in WG-S and identify experts to participate in the IADC study