

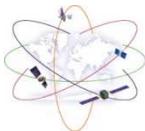


IGMA Subgroup Activity Report

IGMA Sub Group Co-chairs,
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November 11, 2013
[ICG-8 meeting@Dubai](#)

ICG-7 Recommendation (7A.4.1)

- The task of the current IGMA sub-group of WG-A (with B & D participation) should be to:
 - Determine Service Parameters to Monitor
 - Determine what gaps exist in current monitoring
 - Recommend what should be monitored by:
 - Individual GNSS monitoring/control segments
 - Shared sites of 2 or more GNSS through bilateral agreements
 - Global monitoring of Multi-GNSS parameters
 - Propose an Organizational Approach that:
 - Avoids Duplication
 - Considers the role of the current/planned IGS and
 - Defines the Relationship of the proposed organization to ICG





Subgroup meetings

- *Three Subgroup meetings were held;*
 - *September 17, 2013 @ Nashville*
 - *5 in site, 3 via internet from Australia, China, IGS, Japan, Russia, US*
 - *October 29, 2013 Teleconference*
 - *9 in different locations over the world, Australia, China, ESA, IGS, Japan, US*
 - *November 9, 2013 @ Dubai*
 - *5 in site, 2 via internet from China, IGS, Japan, US*



Investigation of parameters

We focused on

- *listing the parameters which should be monitored by the international network in terms of GNSS performance provided by each service provider.*
- *Following to the discussion during WG-A intercessional meeting in June, Vienna, GNSS OS PS template provided by U.S. was used for the reference document, parameters were picked up from the document.*
- *Some parameters which were not shown in OS PS template were proposed.*



Approach

- *Subgroup members were requested to propose the parameters.*
 - *IGS provided the list of parameters which have already being monitored by their operational network as well as a pilot project called as “MGEX” for multiple constellations.*
 - *China provided the parameters which they are planning and some have already being monitored by iGMAS network.*
 - *Japan proposed the set of parameters based on three categories considering parameters usage and their benefits for users.*
- *Three proposed parameters were to be compiled into one...But;*
 - *EU, Russia and US inputs have not been submitted in advance of ICG-8.*
 - *We need more time to finalize making the common parameters list.*

Proposed Parameters by Japan (as an example)



- What kind of parameters are desirable to be monitored by NOT single system monitoring network, but large scale monitoring network under international collaboration?
- Considering the necessity, benefit to use IGMA, parameters can be categorized followings;

Category-1

- Need higher accuracy on products such as precise orbit, clock offset and site position which are used for the reference values.

Category-2

- Need independent assessment and evaluation on GNSS performance, and/or adding robustness to use multiple sources.

Category-3

- Need multiple system monitoring to assure interoperability among GNSSs.

Proposed Parameters by Japan (as an example)



- Category-1
 - Precise orbit, clock offset, site position and ERP
 - as reference values for accuracy assessment
 - UTC Accuracy and UTC Integrity
 - To evaluate the difference of the time system between UTC and each GNSS.
 - It is important to evaluate the time system of the each GNSS to UTC with the same process and same standard as each GNSS tends to control their time system with their own UTC which is controlled by each provider.
 - The difference of the frame of reference between each GNSS
 - To evaluate the difference of the frame of reference between each GNSS and international frame of reference system such as ITRF.
 - Though each GNSS keeps their effort to manage their own frame of reference with ITRF, it is preferable to be evaluated based on the same procedure and with the same frame of reference
 - This could be a recommendation from WG-D.

Proposed Parameters by Japan (as an example)



- Category-1 (Cont.)
 - Differential Code Bias(DCB),
 - It is necessary to calculate the DCB of each GNSS by the same procedure and to evaluate them.
 - Phase Center Variation(PCV) and Phase Center Offset(PCO) of satellite antenna.
 - It is necessary to calculate the PCV/PCO of each GNSS by the same procedure and to evaluate them.
 - Inter-Frequency Bias, Inter-Signal Bias

Proposed Parameters by Japan (as an example)



- Category-2

- URE Integrity

- To evaluate independently whether URE exceeds NTE or not, by post processing analysis.
 - Real-time integrity monitor should be done by each provider and/or augmentation system.

- Future integrity parameter (ISM)

- ARAIM concept suggests less time critical integrity message which requested to be generated by independent operator.
- Though each GNSS evaluates this by themselves, it is recommended to have a redundancy. A rule to specify how to handle the issue when the evaluation shows the different result between each GNSS and international evaluation, is necessary.

Proposed Parameters by Japan (as an example)



- Category-3

- GNSS OS SIS GNSSOE Accuracy

- To evaluate the difference of the time system among each GNSS.
- It is estimated that each GNSS evaluates their own time system partially based on their own necessity and procedure. It is required to evaluate their time system by the same procedure.
- Instead of Time offset between two GNSSs, Offset from the Common Time System (ex. Rapid UTC) may be a future option.



Compiling parameters

- A Working Document was drafted, it includes following;
 - Parameters proposed by IGS, China and Japan
 - Table summarizing existing network's characteristics which was presented by Matt Higgins in ICG-7
 - for future investigation which parameters should be monitored by IGMA or not, as well as how to implement under collaboration among the existing networks and efforts.
 - Need further update
 - As an example, iGMAS will keep doing M&A research including other parameters which are not mentioned in the current working document. Depending on users' requirements, some of them would be considered to add into the current template document.

Compiling parameters



- Working Doc.
 - Need further update (Cont.)
 - Collecting and reflecting additional input from EU, Russia and US.
 - Interacting with OS PS investigation, need several iterations or update



Next Step

- Adding US and Russia's proposal into the current working document.
- Working Doc. will be circulated to Subgroup members and providers in order to get feedbacks such as;
 - discriminating common parameters to be monitored by IGMA from others to be monitored Providers and/or SBAS operators' ground control system
 - Setting priority on them for implementation

Next Step



- IGMA Workshop or dedicated session in IGS Workshop on June, 2014 will be planned to do further discussions.



● Thanks for your attentions!



GNSS OS PS Template

- *ICG Work Plan on Open Service Information Sharing states;*
 - *The Working Group will also develop a template that each individual GNSS provider may consider using in their publication of signal and system information, the policies of provision, and the minimum levels of performance offered for open services.*
- *U.S. provided a template document for Open Service Performance Standard (OS PS) based on the “GPS Standard Positioning Service (SPS) Performance Standard (GPS SPS PS)”*
- *Providers were requested to review it. Compatibility Subgroup in WG-A is taking a role to establish the common template document*