
Organizational Model and Procedures for Multilateral Coordination of GNSS Compatibility

International Committee on GNSS (ICG-5)

Working Group A

Sub Group

Turin, Italy

xx October 2010

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Background and Objectives

- On 7 June 2010, the Co-chairs of ICG Working Group A conducted a workshop focused on multisystem GNSS compatibility for the benefit of the Providers' Forum. One of the purpose of this workshop was to inform possible recommendations to the ICG on multilateral coordination of GNSS compatibility.
- A subgroup of WG-A was formed and asked to prepare recommendations for the WG-A co-chairs and Providers' Forum consideration at ICG-5 (Turin, Italy, 18-22 October 2010).

Considerings

- Scope/Need of multilateral coordination of GNSS compatibility should be discussed.
- Framework of multilateral coordination of GNSS compatibility should be discussed.
 - Whether frequency coordination among GNSS should be conducted in bilateral way or multilateral way (In either way, the frequency coordination procedure in ITU must be followed. The effectiveness of multilateral coordination should be discussed with the recognition of ITU coordination procedure.)

Points of Discussions

1. Scope/Need of Multilateral Coordination of GNSS Compatibility:

Because ICG will discuss only civil signals, this sub-group discussion will not go beyond this scope.

L5/B2/E5 and L1/B1/E1 can be a good start point to discuss multilateral framework because of common interest (all of GNSS operators have a plan to use).

2. Study of Possible Organizational Model for Coordination of GNSS Compatibility:

The study results was summarized in “Basic Knowledge” in the Attachment.

3. Possible Outcome of Multilateral Coordination of GNSS Compatibility :

It would be appropriate to produce coordination agreements as the outcome to avoid potential disadvantages due to the co-existence of multiple GNSS systems in the same frequency bands.

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Current Discussion Status

- GNSS Providers have common understanding that it is important to share each system plans and signal characteristics to know the interference environment.

Note 1: At the workshop on 7 June 2010, some providers indicated the potential needs for the following two items. Further studies are required to define these technical limits and investigate the interference environment among GNSS in more details.

- to limit the increasing the noise floor
- to avoid unnecessary increasing of the number of satellite more than a saturation limit (no performance benefit point)

Note 2: The possibility that ICG becomes a “international regulatory body” was discussed. It is important to know that most of “international regulatory body” produce international standards. Relevant knowledge about “international regulatory body” must be shared. Also possible multilateral coordination framework must be investigated.

Note3: ICG could be a kind of standardization body to promote GNSS by developing some kind of standards – This is a separated issue from multilateral coordination

Proposals to WG A

The following items should be discussed at WG A;

- Only Civil signals will be in the scope of multilateral coordination. The bands centred on 1176 MHz (L5/B2a/E5a), 1207 MHz (B2b/E5b/L3) and 1575.42 MHz (L1/B1/E1) can be good starting points to discuss multilateral framework because of common interest (all of GNSS operators have a plan to use).
- Sub-group has not reached an definitive conclusion on the multilateral coordination framework. Further work will be required - As a long term plan (in case of ORM, it took several years to reach the agreement of MoU since multilateral idea is started to discuss), multilateral coordination framework with possible mandate must be investigated further.

Suggestions for Further Steps

In case that WG A accepts the proposals in the previous slide, the further steps should be discussed. Some candidates of these are shown below;

- 1) To perform detailed investigation on the need and possible scope of multilateral coordination by studying the potential disadvantage due to the co-existence of multiple GNSS systems in the same frequency bands (for example, study of the saturation limits including methodology to define the saturation limits and margin of the current GNSS development plan against the saturation limits)
- 2) To investigate multilateral coordination framework including possible mandate for this participation, conformity with some conditions to enter this multilateral discussion and effectiveness of this multilateral coordination agreement

Attachment

- Discussions on the multilateral coordination should be conducted with the basic knowledge and background contained in this Attachment

Basic Knowledge

- In order to assess the possible directions, basic knowledge about Standard and Multilateral Coordination must be shared.

Note:

Some kind of standard (*) for GNSS may work for the promotion of multi GNSS use. But standard may not be the outcome of multilateral coordination. However, the relevant basic knowledge about Standard is also summarized for the comprehensive understandings.

*: For example, to specify common performance like URE, minimum number of visible satellites in one system and integrity performance

Basic Knowledge

- International Standard – (1 of 3)

- International Standard has some kind of “POWER”.
- It is important to know HOW international standard has “POWER” .
- This basic knowledge must be shared in GNSS Providers’ Forum and which method should be taken should be discussed in order to develop our proposals to WG A.
- As the basic knowledge, de jure standard, Forum standard and de facto standard (narrow sense) must be recognized. (In a broad sense, both Forum standard and de facto standard (narrow sense) are called as “de facto standard (broad sense)”. On the other hand, both de jure standard and Forum standard are called as “consensus standard”.)

Basic Knowledge

- International Standard – (2 of 3)

Category	Description (Source of POWER)	Example (<u>Underlined is GNSS related</u>)
De Jure Standard	is developed by official standardization organizations such as ITU, IEC and ISO. Has legal rights. (entitled to legal rights such as treaties)	ITU (Radio Regulation, ITU-R Recommendation, etc.) <u>ITU-R Recommendation M.1787</u>
Forum Standard	is developed by standardization forum. (respected by the participation of most of the stakeholders in the relevant industries)	DVD Forum, IEEE, 3GPP (But, in 3G mobile, 3GPP standard and IEEE standard are referred from ITU-R Recommendation. By this, 3G mobile has actually legal rights.)
De Facto Standard (narrow sense)	Achieved a dominant position without formal approval by way of a standardization process (supported by the market due to the strengths of such products/services)	Microsoft Windows <u>IS-GPS-200D, IS-GPS-705, IS-GPS-800</u>

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Basic Knowledge

- International Standard – (3 of 3)

Category	Advantage w.r.t. GNSS	Disadvantage w.r.t. GNSS
De Jure Standard	Because it is entitled to legal rights such as treaties, it is effective all over the world.	It takes time (e.g. 2-3 years) to develop this standard. Harmonization with non-GNSS stakeholders is inevitable.
Forum Standard	It can be developed within only GNSS stakeholders It usually takes less time than de jure standard.	How to get POWER is uncertain.
De Facto Standard (narrow sense)	One organization can control everything.	How to get POWER is uncertain. May not be suitable for multi-GNSS discussion

Basic Knowledge

- Models for Multilateral Discussions (1 of 2) -

Example Models	Description	Note
Resolution 609 Consultation Meeting	Administrations operating or planning to operate RNSS systems ensure the aggregate interference from all RNSS systems will not break the protection level of ARNS (Aeronautical Radio-Navigation Service) systems.	The objective is to solve the sharing between radio services. Whether multilateral GNSS discussion can be suitable to this framework must be investigated.
SFCG (Space Frequency Coordination Group)	The principal result is the adoption of resolutions and recommendations which are informal agreements and may be used by space agencies. System characteristics is also shared.	The effectiveness of SFCG recommendations depends upon voluntary acceptance and use by member agencies.
ORM (Operator Review Meeting)	Multilateral coordination among MSS operators based on Memorandum of Understanding (MoU) developed by administrations which is the representative of the corresponding ITU filings.	Agreements based on the MoU are confidential. Agreements are sent to Radiocommunication Bureau of ITU to notice the result of the frequency coordination

Basic Knowledge

- Models for Multilateral Discussions (2 of 2) -

Example Models	How it works	Note
Resolution 609 Consultation Meeting	There is a mandate to participate in the meeting by the Radio Regulation, which is a part of international treaties.	Use of frequency band cannot be authorized without getting into this process.
SFCG (Space Frequency Coordination Group)	Although this is voluntary basis, this framework works because all members (mostly national space agencies) have almost the same interest and there is almost no conflicts among them.	Before space agencies submit ITU filings to ITU, it is encouraged to present those information in SFCG.
ORM (Operator Review Meeting)	<p>There is a practical mandate to participate in the meeting in accordance with MoU(*) and the coordination procedure in the Radio Regulation</p> <p>*: ITU filing is required to sign the MoU.</p>	To get the frequency assignment, Resolution 49 (Rev.WRC-07) due diligence information (contract of satellite procurement and launch service) and evidence of spectrum requirements etc. are required.

Background on Frequency Coordination Procedure in ITU (Bilateral)

- Frequency coordination procedure is based on ITU filings
- Frequency coordinations are conducted on bilateral basis
- Each Administrations (ex. FCC in case of US) are responsible for the frequency coordinations
- Once the coordination is completed, the summary record with the agreed condition is sent to Radiocommunication Bureau of ITU.
- After all the coordinations are completed, the corresponding ITU filing is listed in MIFR (Master International Frequency Register) and obtain the special rights to be protected -> This is a kind of International radio license.

Background on ITU-R Recommendations (1 of 2)

ITU-R *Recommendations* establish an international standard that can be referenced for:

- Frequency sharing and compatibility studies
- Protection of spectrum on a domestic regulatory basis
- Guidance in the design of systems
- Establishing interference protection policy
- A *starting point* in coordination discussions

However, ITU-R *Recommendations* are not mandatory:

- Unless explicitly “Incorporated by Reference” in the ITU-R *Radio Regulations*

Radio Regulations are mandatory:

- International Treaty status
- Established at World Radiocommunication Conferences (WRC)

Background on ITU-R Recommendations (2 of 2)

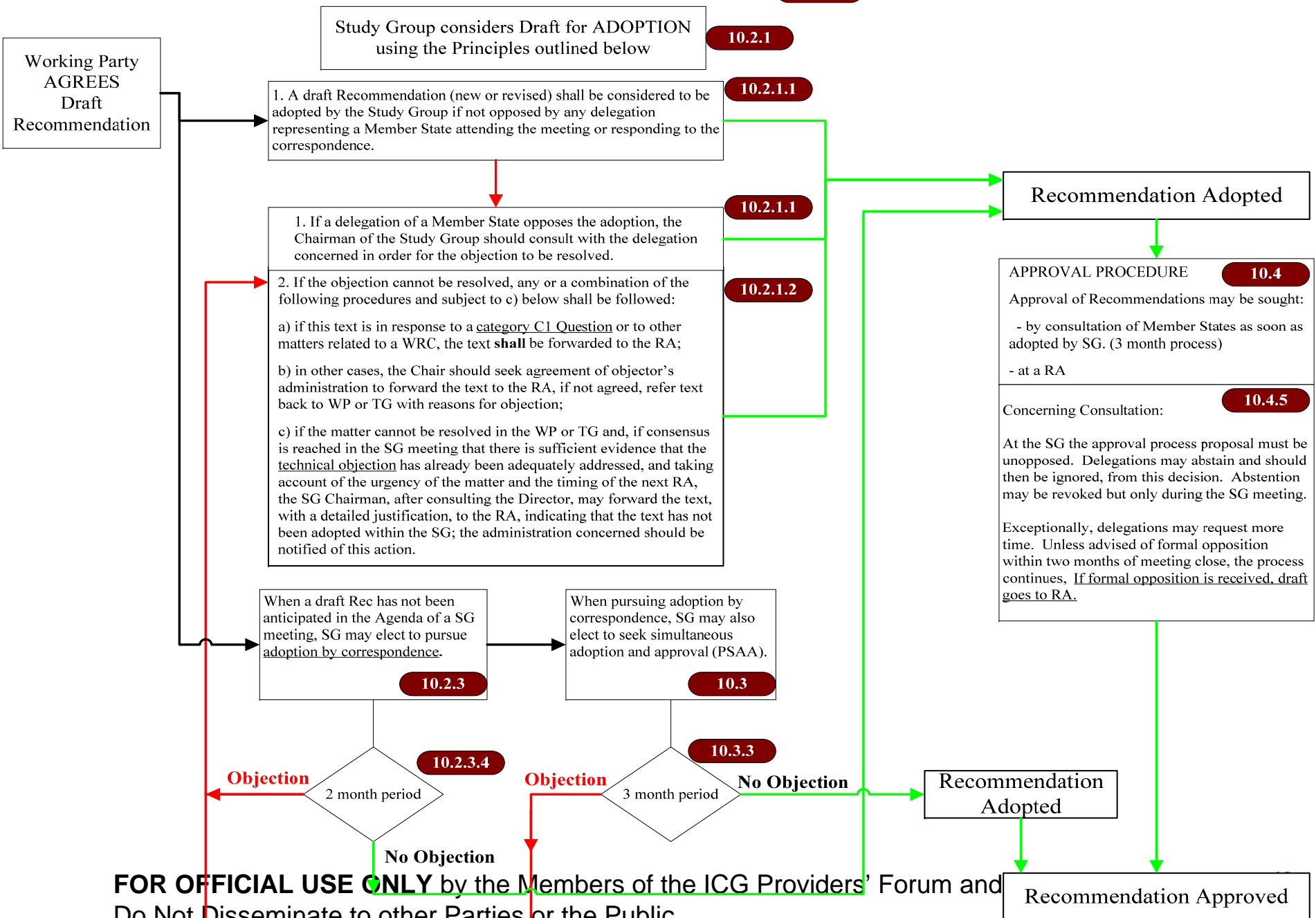
ITU-R Recommendations are developed by ITU-R *Working Parties*:

- Usually in response to ITU-R Questions or WRC Agenda
- Typically it takes several WP meetings to finalize a Draft New Recommendation (DNR)
- WPs usually meet 2 or 3 times per year, and pass their completed DNRs up to its parent ITU-R *Study Group* for adoption
- Final approval comes after ITU-R Member countries have a chance to review the adopted DNR
- The whole process can easily take 1½ to 3 years (or longer)

ITU-R Recommendation (New or Revised) and Question Approval Process

(also applied to Recommendation deletion)

No. = Relevant section from ITU-R Res. 1-5



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