Introduction of the Activities of Compatibility Sub Group of Working Group A in International Committee on GNSS (ICG)

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Takahiro MITOME (Japan), Dominic HAYES (EC)

Compatibility

Refers to the ability of global and regional navigation satellite systems and augmentations to be used separately or together without causing unacceptable interference and/or other harm to an individual system and/or service:

- The International Telecommunication Union (ITU) provides a framework for discussions on radiofrequency compatibility. Radiofrequency compatibility should involve thorough consideration of detailed technical factors, including effects on receiver noise floor and cross-correlation between interfering and desired signals;
- Compatibility should also respect spectral separation between each system's authorized service signals and other systems' signals. Recognizing that some signal overlap may be unavoidable, discussions among providers concerned will establish the framework for determining a mutually acceptable solution;
- Any additional solutions to improve compatibility should be encouraged.

Remark: This definition was given at ICG meeting.

Objectives of Compatibility Sub-Group

- work on the compatibility issues among GNSS systems;
- work on the protection of RNSS(*) spectrum from the interference from radio sources other than RNSS, since some aspects of the compatibility are related and is becoming more important recently;
- work on information sharing about status of ITU (**) activities, one of whose missions is to ensure the rational, equitable, efficient and economical use of radio-frequency spectrum;

* RNSS: Radio-Navigation Satellite Service, which is the ITU term to describe the category of spectrum allocations and includes both GNSS and regional navigation satellite systems.

** ITU: International Telecommunication Union

Compatibility Issues

- **Interference Analysis:** Some interference analysis results were shared to assist the understanding of the interference effects among GNSS systems.

- **Prepared information regarding ITU frequency coordination procedure among satellite systems:** In order to promote efficient frequency coordination among GNSS systems, the details of ITU frequency coordination procedure were clarified. Possible improvement of this procedure was also discussed.

- **Compatibility issues among GNSS systems are understood to be resolved by bilateral discussions between each system, unless new issues are raised.**

Protection of RNSS Spectrum

- **Review of regulatory status of RNSS allocations:** Due to the increased interest of RNSS spectrum protection, there was a request to review the regulatory status of RNSS allocations to be sufficiently used for safety of life applications. The result of the review was that the regulatory status of the frequency bands of 1164-1215 MHz, 1559-1610 MHz and 5010-5030 MHz is appropriate for this purpose.
- **Protection from unintentional emissions including non-radio device/equipment:** Since this kind of emission can cause interference into RNSS receivers in some cases and is outside of the ITU Radio Regulations, applicable limits for this kind of emissions were checked ⇨ **Continued**
- **Receiver performance and adjacent band compatibility:** Relevant activities on this issue are kept monitored.

⇨ **Continued**

Information sharing about ITU activities

- **To avoid potential interference into RNSS from new radio spectrum allocations/identifications:** New spectrum for IMT is under discussion in ITU (WRC-15 agenda item 1.1). It is encouraged to ensure the protection of existing and future RNSS operations from new IMT spectrum allocations/identifications. Current preparation status for WRC-15 (scheduled on 2 to 27 November 2015) contains no concern on the in-band and adjacent band interference into RNSS.

- **This activity will be continued until WRC-15. Future agenda items for WRC-19 will also be monitored for potential threats to protect RNSS spectrum.**

Summary

Sub-group has been and will keep working on;

- Compatibility issues among GNSS systems,
- RNSS spectrum protection including protection of RNSS receiver operations from the viewpoint of legal/regulatory status review,
- Monitoring of ITU activities which may potentially impact GNSS operations.

- Back Up Slides -

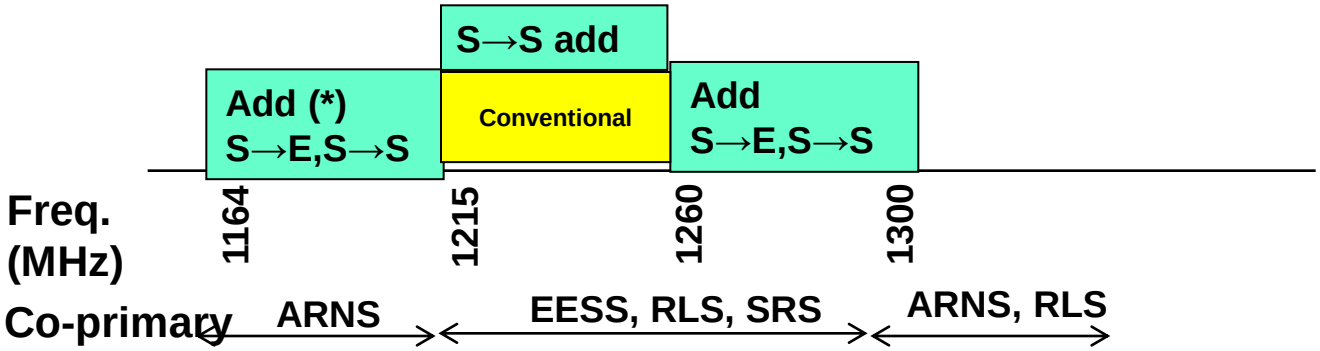
RNSS Allocations

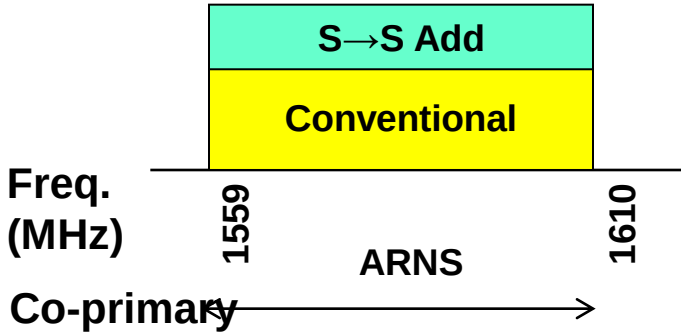
- **RNSS allocations before and after WRC-2000:** New RNSS allocations were introduced at WRC-2000. Resolution 609 process was also introduced at WRC-03.

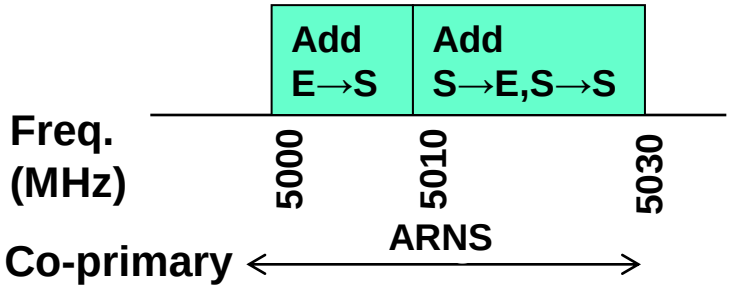
Conventional

Added at WRC-2000

***:Res 609 apply**







S→E:
Space to Earth
S→S:
Space to Space
E→S:
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ARNS: Aeronautical Radio-Navigation Service, EESS: Earth Exploration Satellite Service, RLS: Radio Location Service, SRS: Space Research Service

ITU-R Recommendations (1 of 2)

➢ ***List of ITU-R Recommendations related to RNSS (1 of 2)***

- **ITU-R M.1318-1** - Evaluation model for continuous interference from radio sources other than in the radionavigation-satellite service to the radionavigation-satellite service systems and networks operating in the 1 164-1 215 MHz, 1 215-1 300 MHz, 1 559-1 610 MHz and 5 010-5 030 MHz bands
- **ITU-R M.1642-2** - Methodology for assessing the maximum aggregate epfd at an aeronautical radionavigation service station from all radionavigation-satellite service systems operating in the 1 164-1 215 MHz band
- **ITU-R M.1787-2** - Description of systems and networks in the radionavigation-satellite service and technical characteristics of transmitting space stations operating in the bands 1 164-1 215 MHz, 1 215-1 300 MHz and 1 559-1 610 MHz
- **ITU-R M.1831-1** - A coordination methodology for RNSS inter-system interference estimation

ITU-R Recommendations (2 of 2)

➢ ***List of ITU-R Recommendations related to RNSS (2 of 2)***

- **ITU-R M.1901-1** - Guidance on ITU-R Recommendations related to systems and networks in the radionavigation-satellite service operating in the frequency bands 1 164-1 215 MHz, 1 215-1 300 MHz, 1 559-1 610 MHz, 5 000-5 010 MHz and 5 010-5 030 MHz
- **ITU-R M.1902** - Characteristics and protection criteria for receiving earth stations in the radionavigation-satellite service (space-to-Earth) operating in the band 1 215-1 300 MHz
- **ITU-R M.1903** - Characteristics and protection criteria for receiving earth stations in the radionavigation-satellite service (space-to-Earth) and receivers in the aeronautical radionavigation service operating in the band 1 559-1 610 MHz
- **ITU-R M.1905** - Characteristics and protection criteria for receiving earth stations in the radionavigation-satellite service (space-to-Earth) operating in the band 1 164-1 215 MHz
- **ITU-R M.2030** - Evaluation method for pulsed interference from relevant radio sources other than in the radionavigation-satellite service to the radionavigation-satellite service systems and networks operating in the 1 164-1 215 MHz, 1 215-1 300 MHz and 1 559-1 610 MHz frequency bands