Record of Decisions Taken at the Thirteenth Resolution 609 (Rev. WRC-07) Consultation Meeting

(Auckland, New Zealand, September 2016)

The Thirteenth Resolution 609 (Rev. WRC-07) Consultation Meeting (CM) was convened, pursuant to the requirements of Resolution 609 (Rev.WRC-07), at the Rendezvous Hotel in Auckland, New Zealand, on 6-8 September 2016. A list of participants is available on the Resolution 609 Forum page on the ITU web site. Approximately 29 delegates from government and industry, along with a representative of the Radiocommunication Bureau (BR), attended the meeting.

The following actions were taken in regard to Resolution 609:

1. The Meeting agreed to keep the Terms of Reference (ToR) unchanged. A copy of the ToR is available in the Resolution 609 Forum that is maintained by the BR on the ITU web site (http://www.itu.int/ITU-R/go/space-resolution609/en).

2. The Meeting decided that the Fourteenth Resolution 609 (Rev. WRC-07) CM will be convened at a venue to be determined, for a period of three working days, tentatively on **5-7 September, 2017**.

3. The Meeting kept the format for the List of System Characteristics which is contained in Attachment 1 hereto, so as to contain the indication whether the system or network has been brought into use or is anticipated to be brought into use within 18 months after the start of the tentative dates of the next CM. The following points describe the List of System Characteristics required to be submitted by Administrations:

a. Section I-9 of Attachment 1 contains the format of the results of the epfd calculation for each RNSS individual system, in MS Excel format (see Attachment 2, worksheet named "sheet 1_epfd_1_step"), using 1-degree steps in latitude and longitude. For non-GSO systems, administrations should also provide the time step and the number of time steps simulated.
b. The system spectral adjustment factors (SAF) provided under Section I-8 of Attachment 1 should be in MS Excel format (see Attachment 2, worksheet named "sheet 2_SAF").

4. The Meeting agreed with respect to the systems that had provided technical characteristics to a prior CM within the specified deadlines, that it would not be necessary for the same technical information to be provided anew to the future CM. The only requirement is a confirmation of these characteristics pursuant to modified §12 of the ToR.

5. The Meeting compared the results (obtained using 1-degree data) from the different tools used to determine the aggregate epfd produced by all considered RNSS systems. After discussions regarding the assumptions and methodologies used by each tool, the Meeting

agreed on the specific epfd matrix to be retained for each RNSS system, with results obtained through the different tools being comparable. The Meeting agreed to continue the cross-verification of each tool and detailed methodologies for the single system/network epfd calculation.

6. The Meeting calculated the maximum aggregate epfd produced by all RNSS systems that provided/confirmed characteristics in accordance with the procedure contained in the ToR (see Attachment 4).

7. For the work of Thirteenth Resolution 609 CM, India provided additional off-axis e.i.r.p. density per comments in Section 12(b) of the 12th CM Record of Decisions. India also provided updated epfd data for IRNSS non-GSO system, INSAT-NAVR-GS and INSAT-NAV-NGSA. During cross-checking and validation of single system epfd, there were questions regarding this updated data set. As India was not present at the Thirteenth CM, the Meeting contacted India via correspondence and asked for India's views on using IRNSS epfd data from the 12th CM with an understanding that India would provide updated epfd data for the IRNSS non-GSO system to the Fourteenth CM. India graciously accepted this proposal and, therefore, the epfd data from the 12th CM was used to calculate maximum aggregate epfd. The Meeting invites administrations to continue to cross-check the IRNSS epfd calculations.

8. The Meeting determined that under its aggregate epfd calculations mentioned in No. 6, the maximum epfd of all satellites associated with the referenced RNSS systems would not exceed -121.98 dB(W/(m^2·MHz)), i.e.0.48 dB below the Resolution 609 limit of -121.50 dB(W/(m^2·MHz)). The Meeting noted that this result is based on the use of worst-case assumptions in terms of interference from RNSS into ARNS.

9. The Meeting agreed on a Report to the BR that contains the results of the calculations mentioned in Nos. 6 and 8, above, and directed that this Report be communicated to the BR in the manner contemplated in §14 of the ToR. A copy of the Report to the BR has been posted to the Resolution 609 Forum that is maintained by the BR on the ITU web site (http://groups.itu.int/res-609).

10. The Meeting agreed that it is important, for the orderly operation of the Resolution 609 (Rev. WRC-07) consultation process and to ensure the achievement of accurate calculation results, that administrations providing information to CM comply with the deadlines established in the ToR.

11. The Meeting received for information a copy of the BR determination of compliance with the pfd criterion as per *instructs* BR 2 from Resolution 609 (Rev. WRC-07). The Meeting will continue to invite the BR to include two additional columns in the table:

- One indicating the date that the administrations reported that the frequency assignments have been brought into use
- Another column indicating the compliance with the pfd criterion taking into account the systems or networks characteristics which are available through the Resolution 609 submissions.

12. The Meeting agreed to invite administrations to determine whether the pfd level in *recommends* 1 of Recommendation 608 (Rev.WRC-07) is exceeded by any space station of the corresponding RNSS systems, and to report the findings of this determination. An input contribution from Japan administration confirmed that all space stations of RNSS networks

and systems do not exceed the pfd level in *recommends* 1 of Recommendation 608 (Rev.WRC-07).

13. During the development of the RNSS systems in this band, there will be some temporary situations, such as the transition of some systems from one phase to another (e.g. regional to global service transition, orbital relocation, or satellite back up) that could affect the aggregate epfd. At present, recognizing the need to protect ARNS, the Meeting agreed to calculate the aggregate epfd by using the worst case epfd of such RNSS systems in both phases. Once the transition is completed, the aggregate RNSS emissions will decrease.

14. The Meeting determined that if there is a predicted exceedance of the maximum aggregate epfd by operational systems and networks, the first step to be taken in resolving the exceedance will be to have any administration with any operational satellite that exceeds the maximum per-satellite pfd level in Recommendation 608 (Rev. WRC-07) to reduce the maximum pfd produced at the surface of the Earth, for all angles of arrival, to or below -129 dB(W/m^2) in any 1 MHz band under free space propagation conditions. Only if this does not resolve the exceedance should other appropriate modifications be considered under *resolves 2* of Resolution 609 (Rev. WRC-07).

15. As the Resolution 609 process has continued, the results of the aggregate epfd calculation show that the epfd level from filed RNSS systems (some operational, some planned) is nearing the maximum aggregate epfd level specified in resolves 1 of Resolution 609 (Rev.WRC-07) . The Meeting agreed to consider the items listed below.

- use of actual operational link characteristics (e.g., maximum operational power levels, instead of filed parameters) should be continued to be encouraged;
- for compliance with the epfd limit specified for RNSS, new entrants are urged to take various actions including operation in other portions than the worst-case epfd frequency ranges in the band 1 164-1 215 MHz.
- revisions to the epfd calculation methodology to avoid the addition of different worst cases and revisiting some assumptions (e.g. orbit propagation model) may be considered in the future to produce more realistic results, rather than simple addition of worst-case of epfd calculation results of each system.

16. The Attachment 3 contains RNSS System Characteristics provided/confirmed to be met with the submission criteria in the ToR. The Meeting requested and received from the participants an update of the status of the development of their RNSS systems and networks operating or planning to operate in the band 1 164-1 215 MHz. The document 'RNSS_systems_networks_status_13thRes609CM' was updated based on the participants' submissions. The Meeting noted that the use of the band 1 164-1 125 MHz is by both non-geostationary and geostationary RNSS systems and networks today is substantial. Since the purpose of the status document is for information use only, it has been posted to the 13CM Resolution 609 Forum at: http://groups.itu.int/res-609, but not attached to this Record of Decisions.

17. The Meeting expressed the urgent need that all efforts are made to ensure that all administrations with filings and concrete plans to operate RNSS systems in the 1 164-1 215 MHz band participate fully and on a continuing basis in the mandatory Resolution 609 consultation process, including submitting materials in accordance with the ToR and attending the meetings. In this regard, the Meeting encouraged the Bureau to continue reaching out to those administrations with RNSS filings in the 1 164-1 215 MHz band that

have not participated fully and on a continuing basis in the Resolution 609 consultation process in an effort to get them to participate at their earliest opportunity where appropriate, and highlighting the mandatory nature of the Resolution 609 (Rev. WRC-07) Consultation Meeting for those systems/administrations with concrete plans to operate RNSS systems in the 1 164-1 215 MHz band.

18. The Meeting agreed to appoint Mr. Dominic Hayes as Convener and Dr. Lasisi Lawal as Vice Convener. The Meeting expressed its sincere gratitude to Dr. Xiadong Zhao and Dr. David Choi for their excellent leadership and dedicated service during their tenure as Convener and vice-Convener the past three years.

19. The Meeting expressed its gratitude to the ITU BR for their continued participation as an observer.

20. The Meeting expressed its gratitude to the Administration of the New Zealand for providing the meeting venue and gracious hospitality to the participants.

List of Attachments

Attachment 1 (Word document): Input format required for RNSS system characteristics.

Attachment 2 (Excel spreadsheet):

> Sheet 1 (“sheet 1_epfd_1_step”). Template for Section I-9 of Attachment 1, longitude/latitude (note orientation change) format for individual system epfd calculation results (1-degree steps).
> Sheet 2 (“sheet 2_SAF”). Template for Section I-8 of Attachment 1, spectral adjustment factors (SAF) relative to the worst 1MHz.

Attachment 3 (Word document): RNSS System Characteristics provided/confirmed to be met with the submission criteria in the Terms of Reference.

Attachment 4 (Excel spreadsheet): Simulated per-system epfd of each RNSS system using the 1-degree data available in attachment 3.