

Resolution 609 (Rev. WRC-07) Consultation Meeting
4 October 2018

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

(Abuja, Nigeria, October 2018)

The Fifteenth Resolution 609 (Rev. WRC-07) Consultation Meeting was convened, pursuant to the requirements of Resolution 609 (Rev. WRC-07), at the Nigeria Air Force Conference Center in Abuja, Nigeria, on 2-4 October 2018. A list of participants is available on the Resolution 609 Forum page on the ITU web site. Approximately 69 delegates (including two partial online attendees) from government and industry, along with a representative of the Radiocommunication Bureau (BR), attended the meeting. The meeting was officially opened by the honourable Minister for Communications, Barr. Dr. Abdur-Raheem Adebayo Shittu.

The following actions were taken in regard to Resolution 609:

1. The Meeting agreed to modify the Terms of Reference. A copy of the Terms of Reference is available in the Resolution 609 Forum maintained by the BR on the ITU web site (<http://www.itu.int/ITUR/space/res609/>).
2. The Meeting decided that the Sixteenth Resolution 609 (Rev. WRC-07) Consultation Meeting will be convened at a venue to be determined, for a period of three working days, tentatively on or around 3-5 September 2019.
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 Consultation Meeting. 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 Consultation Meeting within the specified deadlines, that it would not be necessary for the same technical information to be provided anew to the future Consultation Meeting. The only requirement is a confirmation of these characteristics pursuant to §12 of the Terms of Reference.

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 Terms of Reference. Characteristics of RNSS Systems considered under this calculation are contained in Attachment 3 (Word document), and the per-system epfd of each RNSS system is contained in Attachment 4 (Excel spreadsheet).

7. In September 2016 for the work of Thirteenth Resolution 609 CM, India had provided updated epfd data for the IRNSS non-GSO systems, which had triggered certain questions, subsequently planned to be addressed at the next Resolution 609 CM (see section 7 of the Record of Decisions of the Fourteenth Resolution 609 CM). In its input to the Fifteenth Resolution 609 CM, India provided a revised version of its epfd data for the IRNSS non-GSO systems, which was cross-checked by other contributors to the Meeting. The Meeting agreed to use this revised IRNSS single-system epfd data in the aggregate epfd calculations mentioned in No. 6.

7bis. It was noted that for certain systems, such as those using an IGSO, it may be required to provide additional information on the orbit epoch time related with RAAN and argument of latitude to allow proper modeling of the orbit. The Meeting invited participants to consider the possibility to provide this data in the Attachment 3 characteristics.

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 -121.89 dB(W/(m²·MHz)), i.e. 0.39 dB below the Resolution 609 limit of -121.50 dB(W/(m²·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 Radiocommunication Bureau that contains the results of the calculations mentioned above, and directed that this Report be communicated to the BR in the manner contemplated in § 14 of the Terms of Reference. A copy of the Report to the Radiocommunication Bureau has been posted to the Resolution 609 Forum that is maintained by the BR on the ITU web site (<http://groups.itu.int/Default.aspx?alias=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 Consultation Meetings comply with the deadlines established in the Terms of Reference.

11. 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. The Meeting confirmed that all space stations of RNSS networks and systems, considered for inclusion in the aggregate epfd calculation, pursuant to § 6, do not exceed the pfd level in

recommends 1 of Recommendation 608 (Rev.WRC-07). A new section 7bis was added to the ToR for the Consultation Meeting to explicitly invite administrations to conduct this pfd analysis using submitted data rather than data from the filings.

12. 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.

13. 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/m²) 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).

14. 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.
- Geographical analysis of peak aggregate RNSS epfd areas with a view to informing future RNSS systems about areas where RNSS emissions are closest to the epfd limit.

The Meeting agreed to continue the discussion on methods to avoid exceedance of the aggregate epfd limit at future meetings.

15. The Meeting received updates on the status of some of the RNSS systems and networks operating or planned to operate in the band 1 164-1 215 MHz. This updated information based on received contributions is shown in the document:

"RNSS_systems_or_networks_status_15thCM.docx". The Meeting noted that the use of the band 1 164-1 125 MHz 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 Res. 609 Forum but not attached to this Record of Decisions.

16. 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 Terms of

Reference 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. The Meeting agreed that the dates and venue for the meeting should be determined with as much notice as possible for all delegates.

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

18. The Meeting expressed its sincere gratitude to the Administration of Nigeria and NIGCOMSAT Ltd for hosting the meeting and extended special thanks to the Vice Convener, Dr. Lasisi Lawal, and his team especially the Nigerian Program Director (Executive Director, Engineering Services of NIGCOMSAT Ltd; Mr. Kazeem Kolawole Raji), co-organizers (Nigerian Air Force, Nigerian Army and Defence Space Administration) for their hard work, gracious hospitality and support given to all the participants before and during the Consultation Meeting.

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 1 MHz.

Attachment 3 (Word document): RNSS System Characteristics provided and confirmed to have met 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.