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| **The 5th Meeting of the APT Conference Preparatory**  **Group for WRC-23 (APG23-5)** | **APG23-5/OUT-24**  **(Rev.1)** |
| 20 – 25 February 2023, Busan, Republic of Korea | 25 February 2023 |

Working Party 3

**PRELIMINARY VIEWs on WRC-23 agenda item 9.1 (topic d)**

**Agenda Item 9.1 topic d):** *Protection of EESS (passive) in the frequency band 36-37 GHz from non-GSO FSS space stations (the 2nd section of the Annex to WRC-19 Document 535)*

**1. Background**

After the twelfth plenary meeting at WRC-19, the following was included in the 2nd section of the Annex to [WRC-19 Document 535](https://www.itu.int/md/R16-WRC19-C-0535/en) (Plenary Decision):

*Under studies considered for WRC-19 agenda item 1.6, a preliminary study on the protection of EESS (passive) sensors operating in the 36-37 GHz was submitted to the ITU-R. This preliminary study indicated that it may be necessary to not exceed an out-of-band e.i.r.p of −34 dBW/100 MHz, for all angles greater than 71.4 degrees from nadir, for FSS non-GSO space stations operating in the frequency band 37.5-38 GHz. In addition, interference into the cold calibration channel of the EESS (passive) sensor operating in the frequency band 36-37 GHz has not been studied.*

*WRC-19* *invites ITU-R to conduct further study of this topic and develop Recommendations and/or Reports, as appropriate, and Report back to WRC-23 to take action, if necessary.*

*Furthermore, WRC-19 agreed that modifications to Resolution* ***750 (Rev. WRC-19)*** *should not be considered under these studies since the frequency band 36-37 GHz is not referenced in No.* ***5.340****.*

Based on the above, CPM23-1 assigned ITU-R Working Party (WP) 7C as the responsible group for this Topic and ITU-R WP 7C has conducted the relevant studies accordingly.

At the recent meeting held in September/October 2022, ITU-R WP 7C developed the preliminary draft new (PDN) Report updating “PDN Report on studies related to the WRC-23 AI 9.1d)” of the WP 7C meeting in April/May 2022, and decided to carry forward the PDN Report to the next WP 7C meeting scheduled in October 2023. The PDN Report is attached to [Annex 23](https://www.itu.int/dms_ties/itu-r/md/19/wp7c/c/R19-WP7C-C-0459!N23!MSW-E.docx) to WP 7C Chairman’s Report, [Document 7C/459](https://www.itu.int/md/R19-WP7C-C-0459/en).

At the meeting, ITU-R WP 7C developed the draft CPM text for this Topic providing summary based on the “Working document towards a preliminary draft CPM text on WRC-23 AI 9.1, topic d)”. The draft CPM text is attached to [Annex 24](https://www.itu.int/dms_ties/itu-r/md/19/wp7c/c/R19-WP7C-C-0459!N24!MSW-E.docx) to WP 7C Chairman’s Report, [Document 7C/459](https://www.itu.int/md/R19-WP7C-C-0459/en).

In the draft CPM text for this Topic, there are two potential interference issues that were studied, while taking into account the fixed-satellite service (FSS) characteristics as follows:

* With regard to the interference into the sensing channel of EESS (passive) from non-geostationary-satellite orbit (non-GSO) FSS constellations operating in the frequency band 37.5-38 GHz at a lower altitude than EESS (passive) sensors, the results of one study considering two different non-GSO FSS systems indicate that an unwanted emission power density limit of −31 dBW/100 MHz in the frequency band 36-37 GHz would be needed. This would be applicable to non-GSO FSS constellations operating at altitudes below 970 km (maximum altitude of EESS (passive) sensors in this frequency band). The results of another study considering one non-GSO FSS system show that there is a minimum positive margin of 10-15 dB to the EESS (passive) protection criteria. Both studies consider a side lobe level of 0 dBi, no additional satellite body blockage loss, and no apportionment of the EESS (passive) protection criterion. When considering an additional 30 dB attenuation provided by the FSS satellite body, all studies conclude that no specific unwanted emission limit would be needed to cover this scenario;
* With regard to the interference into the cold calibration channel of EESS (passive) from non-GSO FSS constellations operating in the frequency band 37.5-38 GHz at a higher altitude than EESS (passive) sensors, the results of two studies considering three different non-GSO FSS systems indicate that an unwanted emission power density limit of −31 dBW/100 MHz in the frequency band 36-37 GHz would be needed, without apportionment of the EESS (passive) protection criterion. This would be applicable to non-GSO FSS constellations operating at altitudes above 407 km (minimum altitude of EESS (passive) sensors in this frequency band). Another study that considers a different set of operational FSS characteristics has shown that there is a minimum margin of approximately 7 dB to the EESS (passive) protection criteria when only assessing interference from the particular constellation considered, and this study concludes that no specific unwanted emission limit would be needed to cover this scenario.

**2. Documents**

***Input Documents:*** [APG23-5/INP-10 (THA)](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.apt.int%2Fsites%2Fdefault%2Ffiles%2F2023%2F02%2FAPG23-5-INP-05_MC-46_Outcomes_0.docx&wdOrigin=BROWSELINK), [APG23-5/INP-16 (J)](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.apt.int%2Fsites%2Fdefault%2Ffiles%2F2023%2F02%2FAPG23-5-INP-16_Japan-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1A_9.1D_and_RES.655WRC-15.docx&wdOrigin=BROWSELINK), [APG23-5/INP-58 (AUS),](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.apt.int%2Fsites%2Fdefault%2Ffiles%2F2022%2F08%2FAPG23-4-INP-36_KOR_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_and_9.1Topic_a_and_d.docx&wdOrigin=BROWSELINK) [APG23-5/INP-65 (KOR)](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.apt.int%2Fsites%2Fdefault%2Ffiles%2F2023%2F02%2FAPG23-5-INP-65_Rep_of_Korea-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_and_9.1Topics_a_and_d.docx&wdOrigin=BROWSELINK)

***Information Documents:*** [APG23-5/INF-01 (WMO)](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.apt.int%2Fsites%2Fdefault%2Ffiles%2F2023%2F01%2FAPG23-5-INF-01_WMO_Position_on_WRC-23_Agenda.docx&wdOrigin=BROWSELINK), [APG23-5/INF-34 (Rev.1),](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.apt.int%2Fsites%2Fdefault%2Ffiles%2F2023%2F02%2FAPG23-5-INF-34Rev.1_Brief_on_AI_9.1.d.docx&wdOrigin=BROWSELINK) [APG23-5/INF-39 (CEPT)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-39_Status_of_CEPT_preparation_for_WRC-23_and_RA-23.pdf), [APG23-5/INF-43 (CITEL)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-43_CITEL_preparation_for_WRC-23.pdf), [APG23-5/INF-45](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-45_Status_of_RCC_preparation_to_the_WRC-23.pdf)(RCC)

**3. Summary of discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 Thailand (Kingdom of) -** [APG23-5/INP-10 (THA)](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.apt.int%2Fsites%2Fdefault%2Ffiles%2F2023%2F02%2FAPG23-5-INP-05_MC-46_Outcomes_0.docx&wdOrigin=BROWSELINK)

Thailand supports the conditions for the protection of EESS (passive) sensors operating in the frequency band 36-37 GHz from non-GSO FSS systems operating in the frequency band 37.5-38 GHz in accordance with the results of the ITU-R studies under this agenda item.

**3.1.2 Japan -** [APG23-5/INP-16 (J)](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.apt.int%2Fsites%2Fdefault%2Ffiles%2F2023%2F02%2FAPG23-5-INP-16_Japan-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_9.1A_9.1D_and_RES.655WRC-15.docx&wdOrigin=BROWSELINK)

Japan supports the results of studies in ITU-R.

**3.1.3 Australia (AUS) -** [APG23-5/INP-58 (AUS),](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.apt.int%2Fsites%2Fdefault%2Ffiles%2F2022%2F08%2FAPG23-4-INP-36_KOR_WP3_Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_and_9.1Topic_a_and_d.docx&wdOrigin=BROWSELINK)

Australia supports the protection of EESS (passive) sensors including cold-sky calibration in the band 36–37 GHz from non-GSO FSS operations in the band 37.5–38 GHz. Australia supports an approach of implementing the conditions identified in the results of ITU-R studies conducted under this agenda item as regulatory provisions to protect EESS (passive) sensors.

**3.1.4 Korea (Republic of) -** [APG23-5/INP-65 (KOR)](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.apt.int%2Fsites%2Fdefault%2Ffiles%2F2023%2F02%2FAPG23-5-INP-65_Rep_of_Korea-WP3-Preliminary_Views_on_WRC-23_Agenda_Items_1.12_1.13_1.14_and_9.1Topics_a_and_d.docx&wdOrigin=BROWSELINK)

The Republic of Korea supports the protection of the sensing channel and cold calibration channel of EESS (passive) operating in the band 36-37 GHz from non-GSO FSS systems operating in the band 37.5-38 GHz with an unwanted emission power density limit of -31 dBW/100 MHz based on the results of ITU-R studies.

* 1. **Summary of issue(s) raised during the meeting**

None.

**4. APT Preliminary View(s)**

APT Members support the protection of EESS (passive) sensors, including cold-sky calibration, in the band 36–37 GHz from non-GSO FSS operations in the band 37.5–38 GHz, with an unwanted emission power density limit, based on the results of ITU-R studies.

**5. Other View(s) from APT Members**

Some APT Members support an approach of implementing the conditions identified in the results of ITU-R studies conducted under this agenda item as regulatory provisions to protect EESS (passive) sensors.

**6. Issue(s) for Consideration at Next APG Meeting**

APT Members are encouraged to participate in CPM23-2 meeting which will be held in Geneva from 27 March to 6 April 2023, considering the outcomes from the meeting, to contribute to develop a PACP to APG23-6.

The ITU-R Working Party 7C meeting scheduled from 2 to 12 October 2023 in [Geneva] will be the last meeting to develop the preliminary draft new (PDN) Report on studies related to the WRC-23 AI 9.1, topic d. In addition, it is informed that the 3rd ITU Inter-regional Workshop on WRC-23 Preparation is also scheduled during [27-29 September 2023].

**7. Views from Other Organizations**

**7.1 Regional groups**

**7.1.1 CEPT –** [APG23-5/INF-39 (CEPT)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-39_Status_of_CEPT_preparation_for_WRC-23_and_RA-23.pdf)

CEPT supports the protection of EESS (passive) sensors operating in the frequency band 36-37 GHz from non-GSO FSS systems operating in the band 37.5-38 GHz.

CEPT supports an unwanted emission power limit of -31 dBW/100 MHz in the band 36-37 GHz for non-GSO FSS space stations operating at an apogee altitude above 407 km and below 2000 km in the frequency band 37.5-38 GHz for the protection of EESS (passive) cold calibration channels.

CEPT support the inclusion of that unwanted emission power limit in a new footnote of Article 5 of the Radio Regulation during WRC-23.

**7.1.2 CITEL-** [APG23-5/INF-43 (CITEL)](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-43_CITEL_preparation_for_WRC-23.pdf)

Some Administrations support further study to determine if it is necessary and feasible for non-GSO FSS stations (space-to-Earth) operating in 37.5-38 GHz as part of high-density and low-altitude FSS constellations to not exceed a maximum out-of-band EIRP of −34 dBW/100 MHz, for all angles greater than 71.4 degrees from nadir, into EESS (passive) operations in 36-37 GHz.

Additionally, these Administrations support a study of potential interference from these high-density and low-altitude non-GSO FSS space stations operating in 37.5-38 GHz into the cold calibration channel of EESS (passive)sensors operating in the 36-37 GHz frequency band. These Administrations endorsement support the agreement of WRC-19 that no modifications to Resolution 750 (Rev WRC-19) are to be considered under these studies since the frequency band 36-37 GHz is not referenced in No. 5.340.

One Administration is also of the view that changes to the Radio Regulations are outside the scope of Agenda Item 9.1.

One Administration supports the development of Reports and/or Recommendations for the protection of the EESS (passive) in the band 36-37 GHz, provided that no undue constraints are placed on non-GSO FSS satellite systems in the frequency band 37.5-39.5 GHz.

**7.1.3 RCC-** [APG23-5/INF-45](https://www.apt.int/sites/default/files/2023/02/APG23-5-INF-45_Status_of_RCC_preparation_to_the_WRC-23.pdf)(RCC)

The RCC Administrations support to limit maximum e.i.r.p. level of unwanted emissions of FSS space stations in order to ensure protection of EESS (passive) sensors operating in the frequency band 36-37 GHz (−34 dBW/100 MHz) from interference caused by non-GSO FSS space stations operating in the frequency band 37.5-38 GHz.

*Editor’s Note: The views from the following regional organizations are directly extracted from the Documents of the 2nd ITU Inter-regional Workshop on WRC-23 Preparation.*

**7.1.4 ASMG -** [**WRC-23-IRW-22/5**](https://www.itu.int/md/R19-2WSHWRC23-C-0005/en)**​** 

ASMG follows up studies to identify the necessary regulatory and technical issues that ensure protection of EESS sensors (passive) in the band 36-37 GHz from interference of N-GSO FSS space stations in the band 37.5-38 GHz.

**7.1.5 ATU-** [**WRC-23-IRW-22/2**](https://www.itu.int/md/R19-2WSHWRC23-C-0002/en)

Part 1: Common position:

Support and contribute to studies related to the protection of EESS (passive) sensors operating in the band 36-37 GHz from non-GSO FSS systems in the band 37.5-38 GHz, due consideration of operational aspects of non-GSO FSS systems, leading to Recommendations and/or Reports as appropriate.

Part 2: Way forward:

Request ATU administrations to Participate in the ITU-R studies, and to submit their views to the next meetings.

**7.2 International Organisations**

**7.2.1 WMO -** [APG23-5/INF-01 (WMO)](https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.apt.int%2Fsites%2Fdefault%2Ffiles%2F2023%2F01%2FAPG23-5-INF-01_WMO_Position_on_WRC-23_Agenda.docx&wdOrigin=BROWSELINK)

WMO supports the protection of EESS (passive) sensors (including for the cold-sky calibration) in the band 36–37 GHz from non-GSO FSS operations in the band 37.5–38 GHz. To achieve this, WMO supports the relevant conditions identified in the results of the ITU-R studies performed under this agenda item and their appropriate implementation as regulatory provisions in the RR to protect EESS (passive) sensors.

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