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|  | ASIA-PACIFIC TELECOMMUNITY | Document No: |
| **The 2nd Meeting of the APT Conference Preparatory Group for WRC-23 (APG23-2)** | **APG23-2/INF-33** |
| 19 – 23 April 2021, Virtual/Online Meeting | 15 April 2021 |

Chairman, DG on AI 1.8

**brief on wrc-23 agenda item 1.8**

(Note: *This brief was developed for information purpose only. It does not necessarily express the view of APG-23*)

**Agenda Item 1.8**

*to consider, on the basis of ITU R studies in accordance with Resolution* ***171 (WRC-19)****, appropriate regulatory actions, with a view to reviewing and, if necessary, revising Resolution* ***155 (Rev.WRC-19)*** *and No.* ***5.484B*** *to accommodate the use of fixed-satellite service (FSS) networks by control and non-payload communications of unmanned aircraft systems;*

**Relevant Resolutions and Responsible/Contributing ITU-R Groups**

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| **Resolution 171 (WRC 19)**  *Review and possible revision of Resolution 155 (Rev.WRC-19) and No. 5.484B in the frequency bands to which they apply* | Resolves  to invite the ITU Radiocommunication Sector:   1. to continue and complete in time for WRC-23 relevant studies of the technical, operational and regulatory aspects, based on the frequency bands mentioned in resolves 1 of Resolution 155 (Rev.WRC-19), in relation to the implementation of Resolution 155 (Rev.WRC-19), taking into account the progress obtained by ICAO in the completion of SARPs on use of the FSS for the UAS CNPC links; 2. to review No. 5.484B and Resolution 155 (Rev.WRC-19) taking into account the results of the above studies,   **invites the 2023 World Radiocommunication Conference**  to revise, if necessary, No. 5.484B and Resolution 155 (Rev.WRC-19) and take other necessary actions, as appropriate, on the basis of the studies conducted under Resolution 155 (Rev.WRC-19) and resolves to invite the ITU Radiocommunication Sector above,  **instructs the Secretary-General to bring this Resolution**  to the attention of the Secretary-General of ICAO. |
| **RESOLUTION 155 (REV.WRC-19)** Regulatory provisions related to earth stations on board unmanned aircraft which operate with geostationary-satellite networks in the fixed-satellite service in certain frequency bands not subject to a Plan of Appendices 30, 30A and 30B for the control and non-payload communications of unmanned aircraft systems in non-segregated airspaces\* | Resolves:   1. that assignments to stations of GSO FSS networks operating in the frequency bands 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.5 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Regions 1 and 3 and 19.7-20.2 GHz (space-to-Earth), and in the frequency bands 14-14.47 GHz (Earth-to-space) and 29.5-30.0 GHz (Earth-to-space), may be used for UAS CNPC links in nonsegregated airspace\*, provided that the conditions specified in resolves below are met; 2. that ESIMs on board UA may communicate with the space station of a GSO FSS network operating in the frequency bands listed in resolves 1 above, provided that the class of the ESIM on board UA is matched with the class of the space station and that other conditions of this Resolution are met (see also instructs the Director of the Radiocommunication Bureau 3 below); 3. that the frequency bands specified in resolves 1 shall not be used for the UAS CNPC links before the adoption of the relevant international aeronautical SARPs consistent with Article 37 of the Convention on International Civil Aviation, taking into account instructs the Director of the Radiocommunication Bureau 4; 4. that administrations responsible for an FSS network providing UA CNPC links shall apply the relevant provisions of Articles 9 (necessary provisions need to be identified or developed) and 11 for the relevant assignments, including, as appropriate, assignments to the corresponding space station, specific and typical earth station and ESIM on board UA, including the request for publication in the International Frequency Information Circular (BR IFIC) of items referred to in resolves 2 and the course of actions identified in that resolves in order to obtain international rights and recognition as specified in Article 8; 5. that earth stations of UAS CNPC links shall operate within the notified and recorded technical parameters of the associated satellite network, including specific or typical earth stations of the GSO FSS network(s) as published by the Radiocommunication Bureau (BR); 6. that earth stations of UAS CNPC links shall not cause more interference to, or claim more protection from, other satellite networks and systems than specific or typical earth stations as indicated in resolves 5 as published by BR; 7. that, in order to apply resolves 6 above, administrations responsible for the FSS network to be used for UAS CNPC links shall provide the level of interference for the reference assignments of the network used for CNPC links upon request by an administration authorizing the use of UAS CNPC links within its territory; \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \* May also be used consistent with international standards and practices approved by the responsible civil aviation authority. 8. that earth stations of UAS CNPC links of a particular FSS network shall not cause more interference to, or claim more protection from, stations of terrestrial services than specific or typical earth stations of that FSS network as indicated in resolves 5 that have been previously coordinated and/or notified under relevant provisions of Articles 9 and 11; 9. that the use of assignments of an FSS satellite network for UAS CNPC links shall not constrain other FSS networks during the application of the provisions of Articles 9 and 11; 10. that the introduction of UAS CNPC links shall not result in additional coordination constraints on terrestrial services under Articles 9 and 11; 11. that earth stations on board UA shall be designed and operated so as to be able to accept the interference caused by terrestrial services operating in conformity with the Radio Regulations in the frequency bands listed in resolves 1 without complaints under Article 15; 12. that earth stations on board UA shall be designed and operated so as to be able to operate with interference caused by other satellite networks resulting from application of Articles 9 and 11; 13. that, in order to ensure safety-of-flight operation of UAS, administrations responsible for operating UAS CNPC links shall: – ensure that the use of UAS CNPC links be in accordance with international SARPs consistent with Article 37 of the Convention on International Civil Aviation; – take the required measures, consistent with No. 4.10, to ensure freedom from harmful interference to earth stations on board UA operated in accordance with this Resolution; – act immediately when their attention is drawn to any such harmful interference, as freedom from harmful interference to UAS CNPC links is imperative to ensure their safe operation, taking into account resolves 11; – use assignments associated with the FSS networks for UAS CNPC links (see Figure 1 in Annex 1), including assignments to space stations, specific or typical earth stations and earth stations on board UA (see resolves 2), that have been successfully coordinated under Article 9 (including provisions identified in resolves 4) and recorded in the Master International Frequency Register with a favorable finding under Article 11, including Nos. 11.31, 11.32 or 11.32A where applicable, and except those assignments that have not successfully completed coordination procedures under No. 11.32 by applying Appendix 5 § 6.d.i; – ensure that real-time interference monitoring, estimation and prediction of interference risks and planning solutions for potential interference scenarios are addressed by FSS operators and UAS operators with guidance from aviation authorities; 14. that, unless otherwise agreed between the administrations concerned, UA CNPC earth stations shall not cause harmful interference to terrestrial services of other administrations (see also Annex 2 to this Resolution); 15. that, in order to implement resolves 14 above, power flux-density (pfd) hard limits need to be developed for UAS CNPC links; possible examples of such provisional limits to protect the fixed service are provided in Annex 2; subject to agreement between the administrations concerned, that annex may be used for the implementation of this Resolution; 16. that the pfd hard limits provided in Annex 2 shall be reviewed and, if necessary, revised by WRC-231; 17. that, in order to protect the radio astronomy service in the frequency band 14.47-14.5 GHz, administrations operating UAS in accordance with this Resolution in the frequency band 14-14.47 GHz within line-of-sight of radio astronomy stations are urged to take all practicable steps to ensure that the emissions from the UA in the frequency band 14.47-14.5 GHz do not exceed the levels and percentage of data loss given in the most recent versions of Recommendations ITU-R RA.769 and ITU-R RA.1513; 18. to consider the progress obtained by ICAO in the process of preparation of SARPs for UAS CNPC links, to review this Resolution at WRC-23, taking into account the results of the implementation of Resolution 156 (WRC-15), and to take necessary actions as appropriate; 19. that the ITU Radiocommunication Sector (ITU-R) studies on technical, operational and regulatory aspects in relation to the implementation of this Resolution shall be completed, together with the adoption of relevant ITU-R Recommendations defining the technical characteristics of CNPC links and conditions of sharing with other services,   **Invites the ITU Radiocommunication Sector:**  to conduct, as a matter of urgency, relevant studies of technical, operational and regulatory aspects in relation to the implementation of this Resolution1,  **Instructs the Secretary-General:**  to bring this Resolution to the attention of the Secretary General of ICAO, invites the International Civil Aviation Organization to provide to the Director of BR, in time for WRC-23, information on ICAO efforts regarding implementation of UAS CNPC links, including the information related to the development of SARPs for UAS CNPC links. |

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| **Responsible group** | **Contributing group** |
| WP 5B | WP 4A, WP 4B, WP 3M, WP 5A, WP 5C, and WP 7D |

**1. Background Information**

WRC-23 is to review and undertake a potential revision of Resolution **155 (Rev.WRC 19)** and No. **5.484B** in the frequency bands to which they apply.

Resolution **171 (Rev.WRC 19)** resolves to invite the ITU-R:

*“1 to continue and complete in time for WRC-23 relevant studies of the technical, operational and regulatory aspects, based on the frequency bands mentioned in resolves1 of Resolution 155 (Rev.WRC-19),in relation to the implementation of Resolution 155 (Rev.WRC-19), taking into account the progress obtained by ICAO in the completion of SARPs on use of the FSS for the UAS CNPC links;*

*2 to continue and complete in time for WRC-23 relevant studies of the technical, operational and regulatory aspects, based on the frequency bands mentioned in resolves1 of Resolution 155 (Rev.WRC-19),in relation to the implementation of Resolution 155 (Rev.WRC-19), taking into account the progress obtained by ICAO in the completion of SARPs on use of the FSS for the UAS CNPC links; 2 to review No.5.484Band Resolution 155 (Rev.WRC-19)taking into account the results of the above studies,”*

Resolution **155 (Rev.WRC 19)** assesses potential spectrum for unmanned aircraft systems (UAS). The studies need to take into account the progress of ICAO in the completion of SARPs on the use of FSS for UAS Control and Non-Payload Communication (CNPC) links.

The issue of CNPC has been under consideration in the ITU-R since 2007 where at WRC-12 the spectrum requirements for UAS (CNPC) in non-segregated airspace was dealt with. Resolution **155** was a result of Agenda Item 1.5 at WRC-15 that looked at the use of frequency bands allocated to the FSS not subject to Appendices 30, 30A and 30B for CNPC links for UAS in non-segregated airspaces.

At WRC-19 Resolution **155** **(Rev.WRC 19)** was updated to take into account the progress made in WP 5B during the WRC-19 study cycle; in response to the proposal of a new UAS CNPC pdf limit, the revised resolution invites the ITU-R to continue its study on the implementation of the presented PFD masks. Potential the frequency bands which may be used for UAS CNPC links are noted in Resolution **155 (Rev.WRC 19)**, being:

* 10.95-11.2 GHz (space-to-Earth);
* 11.45-11.7 GHz (space-to-Earth);
* 11.7-12.2 GHz (space-to-Earth) in Region 2;
* 12.2-12.5 GHz (space-to-Earth) in Region 3;
* 12.5-12.75 GHz (space-to-Earth) in Regions 1 and 3;
* 19.7-20.2 GHz (space-to-Earth);
* 14-14.47 GHz (Earth-to-space); and
* 29.5-30.0 GHz (Earth-to-space).

WP5B is the responsible group, according to the CPM23-1 results (CA/215), to address the ITU-R preparatory work for WRC-23.

**2. Information on on-going ITU-R Study**

The responsible group WP 5B has initiated the work by sending liaison statements to the contributing groups, WP 4A and WP 4B, as well as to WP 3M, WP 5A, WP 5C, and WP 7D to request information on technical/operational characteristics and protection criteria of services which they look over, and on propagation models.

WP 5B has also sent back questions to ICAO corresponding to the question sent from ICAO on some points to be clarified regarding Resolution **155 (Rev.WRC-19).** Since the majority of the time has been spent to develop answers to ICAO’s questions, other documents related to Agenda Item 1.8 such as the draft CPM text, Draft New Report ITU-R M.[UA\_PFD] and Working Document towards Preliminary Draft New Report/Recommendation ITU-R M.[UAS CNPC\_CHAR] have not yet been discussed in detail. For this reason, WP 5B agreed to establish a Correspondence Group in hope to make some progress by the next WP 5B meeting planned in May 2021.

The Correspondence Group has held two online meetings so far and has prepared a working document intended to support the work in preparations and studies for WRC-23 Agenda Item 1.8. The meetings were mainly devoted to the discussion on how to address the safety of flight/life condition of the UAS CNPC link, to the extent that is practicable and consistent with the operation of other space and terrestrial services, and unfortunately left many other topics to be discussed.

**3. Position of the Regional Group (if available)**

* ATU (TBD)
* ASMG (TBD)
* CEPT (TBD)
* CITEL (TBD)
* RCC (TBD)

**4. Position of International Organizations (if available)**

* ICAO
* To support ITU-R studies, as called for by Resolutions 155 (Rev.WRC-19) and 171 (WRC-19).
* To support the modification of No. 5.484B and Resolution 155 (Rev.WRC-19).
* ICAO is expecting that the decision of WRC-23 will result in a Resolution that:
  + clearly provides primary status;
  + removes any apparent inconsistencies;
  + acknowledges that States are responsible for ensuring the safety-of-life;
  + provides sufficient information to support and/or validate safety cases; and
  + ensures that safety cases do not need to be revisited as a result of future satellite co-ordination agreements.
* IMO