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| **The 5th Meeting of the APT Conference Preparatory****Group for WRC-23 (APG23-5)** | **APG23-5/OUT-14** |
| 20 – 25 February 2023, Busan, Republic of Korea | 25 February 2023 |

Working Party 2

**PRELIMINARY VIEWs on WRC-23 agenda item 1.8**

**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;*

1. **Background**

In compliance with Resolution **171 (WRC-19)**, under its agenda item 1.8, WRC-23 is to review and undertake a potential revision of Resolution **155 (Rev.WRC-19)** and No. **5.484B** in the frequency bands referred to in **Resolution 155 (Rev. WRC-19)**. The responsible working party for the preparatory work within ITU-R is WP 5B with WP 4A and WP 4B being contributing working parties. During the study cycle, WP 5B has worked in liaison with the contributing working parties as well as to WP 3M, WP 5A, WP 5C, and WP 7D and ICAO.

Since first being identified as a WRC agenda item by WRC-07, Unmanned Aircraft Systems (UAS) for Control and Non-Payload Communication (CNPC) links have been the subject of consideration by ITU-R at three consecutive Conferences since WRC-2012. The requirements of numerous UAS applications for communications beyond line of sight will necessitate the use of safe satellite communications to provide all, or components of, the CNPC for UAS. WRC-15 adopted RR No. **5.484B** and the associated Resolution **155 (WRC-15)** which provides regulatory and technical provisions for UAS CNPC operation through the identified regular FSS frequency bands. However, in this Resolution, WRC-15 also stipulates that WRC-23 shall review RR No. **5.484B** and this Resolution and until this has happened, the Bureau shall not process submissions for networks under this Resolution.

 The following is copied from the draft CPM text with the introductory/disclaimer part:

Quote

*“Due to the complexity of the agenda item and the difficulties caused to this work by COVID-19, it was not possible, despite all efforts being made during this study period, to complete the work on preparing draft Conference Preparatory Meeting (CPM) text in respect of this agenda item.*

*Sections 2/1.8/1-4 are completed and agreed as shown below.*

*Section 2/1.8/5 is completed in respect of Method A, one of the two methods identified under this agenda item. However, in respect of Method B, due to the complexity of the matter and due to lack of time, it was not possible to finalize the review of proposed revisions of Resolution* ***155 (Rev.WRC‑19)*** *which is an element of this method. Furthermore, requirement to change Appendix****4*** *of the Radio Regulations that would be consequential to revisions to Resolution* ***155******(Rev.WRC-19)*** *was not discussed”*

Unquote

After series of discussions, during the recent WP5B meeting held in July 2022, two methods to satisfy WRC-23 agenda item 1.8 have been identified. The below subsections give a description of each of these methods.

Quote

***“1.1. Method A***

*Method A proposes to suppress RR No.* ***5.484B*** *together with Resolution* ***155******(Rev****.****WRC-19)*** *as well as Resolution* ***171 (WRC-19)****.*

***Reasons:*** *Resolution* ***171 (WRC-19)*** *is requiring a review and possible revision of Resolution* ***155 (Rev.WRC-19)*** *since this in its current state does not enable operation of UA earth stations. This agenda item stems from agenda item 1.3 of WRC-12 and agenda item 1.5 of WRC-15 and consideration of the matter of WRC-19 which resulted in Resolution* ***171 (WRC-19)****. After more than ten years of extensive studies, there are still key problems that have not been resolved, in particular the contradiction between the safety nature of the operation of UAS and the non-safety status of the fixed-satellite service. With no satisfactory solution identified for the operation of UA earth stations, it therefore would be necessary to suppress RR No.* ***5.484B*** *together with Resolution****155 (Rev.WRC-19)*** *as well as Resolution* ***171 (WRC-19)****.*

***1.2. Method B***

*Method B intends to revise Resolution* ***155******(Rev****.****WRC-19)*** *in accordance with Resolution* ***171 (WRC-19)*** *and consequently suppress Resolution* ***171 (WRC19)****. In addition, this Method contains the revision of RR No.* ***5.484B*** *as an option.*

*Resolution* ***155*** *(****Rev.WRC-19****) is revised in view of the principles. In particular it is intended to;*

* *clearly separate between the responsibilities of ICAO and ITU,*
* *consider how to ensure the safety of flight while recognizing the issue of RR No.* ***4.10****,*
* *remove ambiguities contained in Resolution* ***155******(Rev.WRC-19)****,*
* *clarify that UAS CNPC is an operation under the primary FSS while avoiding adverse effects to terrestrial stations,*
* *maintain the existing procedure for the FSS network coordination as well as for bilateral coordination agreements,*
* *provide a process to treat cases of interference caused by UA Earth station.*

*As an option RR No.* ***5.484B*** *would be updated to improve the clarity to the services and systems to which the footnote applies.*

***Reasons:*** *After considering the progress obtained by the International Civil Aviation Organization (ICAO) in the process of establishing and preparing Standards and Recommended Practices (SARPs) for the safe operation of unmanned aircraft systems, the studies to protect the terrestrial services from harmful interference, revisions Resolution* ***155 (Rev.WRC-19)*** *are proposed to satisfy this agenda item. The intention being that compliance with the Resolution would ensure that all required ITU-R technical, operational, and regulatory conditions are met, and would not adversely affect existing and future FSS networks or terrestrial services.*

*Under this method, different options for revising Resolution* ***155 (Rev.WRC-19)*** *are proposed.”*

Unquote

The relevant material could be found at 5B/649 Annex 3.

**2. Documents**

* Input Documents: APG23-5/INP-9(THA), APG23-5/INP-15(JPN), APG23-5/INP-37(IRN), APG23-5/INP-53(VTN), APG23-5/INP-57(AUS), APG23-5/INP-64(KOR), APG23-5/INP-74(NZL), APG23-5/INP-79(INS), APG23-5/INP-89(CHN).
* Information Documents: INF-39(CEPT), INF-43 (CITEL), INF-45 (RCC), APG23-4/INF-02(ATU), INF-21(ASMG), INF-25(Asiasat),

**3. Summary of discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 Thailand (Kingdom of) – Document APG23-5/INP-9**

Thailand is of the view that further ITU-R developments of, among other things, safety of life aspect and protection of terrestrial services, in accordance with Resolution **171 (WRC-19)** should be completed in order to consider appropriate regulatory actions up to the extent of revising Resolution **155 (Rev.WRC-19)** and RR No. **5.484B**, if necessary, to accommodate the use of FSS for the UAS CNPC links, taking into account the development of SARPs by ICAO.

**3.1.2 Japan - Document APG23-5/INP-15**

Japan supports ongoing studies being carried out by ITU-R WP 5B in relation to Agenda Item 1.8 in accordance with Resolution 171 (WRC-19).

Japan is of the view that the protection of existing primary services in the same/adjacent bands of the frequency bands where UAS CNPC is expected to be used should be ensured.

**3.1.3. Iran (Islamic Republic of) - Document APG23-5/INP-37**

# Status of text provided by Working Party 5B for the draft conference preparatory meeting Report on WRC-23 agenda item 1.8

*Due to the complexity of the agenda item and the difficulties caused to this work by COVID-19, it was not possible, despite all efforts being made during this study period, to complete the work on preparing draft Conference Preparatory Meeting (CPM) text in respect of this agenda item.*

*Sections 2/1.8/1-4 are completed and agreed as shown below.*

*Section 2/1.8/5 is completed in respect of Method A, one of the two methods identified under this agenda item. However, in respect of Method B, due to the complexity of the matter and due to lack of time, it was not possible to finalize the review of proposed revisions of Resolution* ***155 (Rev.WRC‑19)*** *which is an element of this method. Furthermore, requirement to change Appendix****4*** *of the Radio Regulations that would be consequential to revisions to Resolution* ***155******(Rev.WRC-19)*** *was not discussed*

According to the Principles developed by WP 5B and to some extent understood and agreed regarding the operation of UAS CNPC links, together associated with of RR 4.10 relating to the safety of life/safety of flight could not be fulfilled by operation of such links by commercial FSS. Moreover several administration are of strong views that the application of RR 4.10 is assigned to Member States of the ITU and NOT to ICAO since the latter only is responsible for preparation of SARPS which is associated with safety of life/ safety of flight Some countries are of the view that ICAO should not be involved in the application of Safety of life/safety of flight. Therefore, this Administration strongly believes that the revision of the Regulations for UA CNPC links will confront fundamental difficulties and obstacles and the only way to satisfy this Agenda item is to suppress Resolution 155 ( Rev. WRC -19), Resolution 171WRC-19) and corresponding footnote 5.484B in line with Method A.

**Reasons:** Resolution **171 (WRC-19)** is requiring a review and possible revision of Resolution **155 (Rev.WRC-19)** since this in its current state does not enable operation of UA earth stations. This agenda item stems from agenda item 1.3 of WRC-12 and agenda item 1.5 of WRC-15 and consideration of the matter of WRC-19 which resulted in Resolution **171 (WRC-19)**. After more than ten years of extensive studies, there are still key problems that have not been resolved, in particular the contradiction between the safety nature of the operation of UAS and the non-safety status of the fixed-satellite service. With no satisfactory solution identified for the operation of UA earth stations, it therefore would be necessary to suppress RR No. **5.484B** together with Resolution **155 (Rev.WRC-19)** as well as Resolution **171 (WRC-19)**.

**3.1.4 Viet Nam (Socialist Republic of) – Document APG23-5/INP-53**

Viet Nam supports ongoing studies being carried out by ITU-R WP 5B in relation to Agenda Item 1.8 in accordance with Resolution **171 (WRC-19)**.

Viet Nam is of the view that the protection of existing primary services in the same/adjacent bands of the frequency bands where UAS CNPC is expected to be used should be ensured

**3.1.5 Australia – Document APG23-5/INP-57**

Australia supports progressing work in the ITU-R under this agenda item and supports the Key Principles for UAS CNPC operation as outlined in the draft CPM text (Document 5B/649N3).

Australia supports the development of the Standards and Recommended Practices (SARPs) by the ICAO to be established for the use of FSS networks by UAS CNPC links.

The SARPs established by ICAO for UAS CNPC should have no impact on existing agreements for FSS networks between notifying administrations reached during the coordination process, nor future coordination of FSS networks in accordance with RR Articles **9** and **11**.

**3.1.6 Korea (Republic of) – Document APG23-5/INP-64**

The Republic of Korea supports Method B in the draft CPM Report. And the Republic of Korea is of the view that, when revising RR No. **5.484B** and Resolution **155 (Rev.WRC-19)** to satisfy WRC-23 agenda item 1.8, it should be ensured that any potential changes to such regulatory provisions should not adversely affect any other systems or services operating in accordance with the Radio Regulations. The Republic of Korea is also of the view that the proposed regulatory text for Method B needs further consideration.

**3.1.7 New Zealand – Document APG23-5/INP-74**

New Zealand supports Method A, to suppress RR No. **5.484B**, Resolution **155** **(Rev.WRC-19)** and Resolution **171** **(WRC-19)**.

**3.1.8 Indonesia (Republic of) – Document APG23-/INP-79**

Indonesia is of the view that the UAS shall not cause harmful interference to existing primary services in the same and adjacent bands of the frequency bands where UAS control and non-payload communications (CNPC) is expected to be used.

The use of FSS frequency band by UAS, adjacent to the frequency band for CNPC, shall not cause any implication for manned spacecraft under safety-of-life regulation.

**3.1.9 China (People’s Republic of) – Document APG23-/INP-89**

China supports studies being conducted in ITU-R in accordance with Resolution 155 (Rev.WRC-19) and Resolution 171 (WRC 19).

China proposes to adopt Method A as the solution of AI 1.8 based on the fact that the safety-of-life issue related to UAS CNPC operation are not appropriately addressed and the responsibilities of administrations involved in the operation of UAS CNPC systems, especially those in respect of the safety-of-life aspects are not defined clearly.

**3.2** **Summary of issues raised during the meeting**

APT Members note that, Method B does not have necessary regulatory provision and other material in order to properly respond to the requirement of this agenda item. In particular, the questions on how to ensure safety of life/safety of flight through regular non-safety FSS links without changing the status of these, the responsibilities of different administrations/organizations/entities involved in the operation of UAS CNPC systems, the interference management mechanism of frequency assignments, and the ways to protect existing primary services including terrestrial services are issues that have not yet been settled.

In respect of application of RR **4.10**, several administrations in ITU-R meetings expressed the view that this is the responsibility of ITU whereas ICAO is responsible for preparation of SARPs which inter alia is associated with safety of life/flight. However, the basis of the study in both ITU-R and ICAO on required safety aspects referred to in RR **4.10** is unstable as several fundamental issues are yet being discussed.

It was also pointed out that FSS is not suitable for a link with high safety requirement, since a large number of different FSS satellite systems operate in the same frequency band at the same time and these systems often interfere with each other, even between those successfully coordinated satellite networks since those occasional interferences are not considered to affect the quality of communication seriously. Utilizing unreliable link in non-segregated airspaces is even more dangerous because it will pose a risk of collision with all aircrafts in the relevant airspace or the people on the ground. Furthermore, due to the nature of the operation, the notifying administration of regular FSS networks/links will be not in the position to apply RR No. **4.10** to any assignment pertaining in the link used for UAS CNPC as it would change the regulatory status of that commercial regular assignment with respect to other assignments.

With respect of the responsibilities of different administrations/organizations/entities involved in the operation of UA CNPC earth stations, ITU-R concluded that there should be only one single responsible administration for all tasks. This responsibility is currently being studied to be assigned to the notifying administration of the FSS network with which the UA CNPC earth station communicate. Nonetheless, the discussions on the principles for UAS CNPC operation such as what administration could and should take on what responsibility in association with other elements of UAS CNPC operation has not yet been completed, and such discussions are necessary to be completed before progressing on specific text for a Resolution.

The output of ITU-R also shows that there is no clear idea how the interference management system and function could be implemented and who could be responsible to address the overall responsibility of the interference management system.

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

APT Members are of the view that there are several issues yet to be addressed and agreed upon if Method B is to be pursued.

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

Some APT Members support Method A in the draft CPM text, to suppress RR No. **5.484B**, Resolution **155 (Rev.WRC-19)** and Resolution **171 (WRC-19)**.

Some APT Members support Method B in the draft CPM text, to revise Resolution **155 (Rev.WRC-19)** in accordance with Resolution **171 (WRC-19)** and consequently suppress Resolution **171 (WRC19),** recognizing that the proposed regulatory text for Method B yet to be further developed and agreed upon.

**6. Issues for Consideration at Next APG Meeting**

APT Members are encouraged to review the result of the CPM meeting as well as the issues raised in section 3.2, and to contribute their views to the next APG meeting in order to develop common APT views and possible common APT proposals for WRC-23, if any.

**7. Views from Other Organisations**

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

**7.1.1 ASMG** - **Document APG23-4/INF-21**

UAS CNPC links should operate in accordance with the protection and safety of life standards of the International Civil Aviation Organization and provided that: UAS CNPC links shall not operate if the conditions for safe operation issued by the International Civil Aviation Organization cannot be met; Provision **No. 4.10** doesn’t apply to the use of UAS CNPC links by FSS networks; No additional restrictions are imposed on ground systems; Not affecting existing coordination agreements between administrations that were concluded during FSS satellite coordination process or future coordination process in the bands concerned by requesting additional protection than agreed in the current coordination procedures.

In the absence of a satisfactory solution for the operation of the UA earth stations, support the deletion of RR Footnote **5.484B**, Resolution **155 (Rev.WRC-19)** as well as Resolution **171 (WRC-19)**.

**7.1.2 ATU** - **Document APG23-3/INF-39**

The APM23-2 agreed to support the review and possible revision of Resolution **155 (Rev.WRC-19)** and No. **5.484B** in the frequency bands to which they apply. Specifically, support the application of safety of life standards with UAS CNPC links and ensure that the requirements of ICAO with respect to UAS CNPC links operations are considered, as well as ensure the protection of the current systems operating in terrestrial and space services without adversely affecting these services.

**7.1.3 CEPT** - **Document APG23-5/INF-39**

CEPT acknowledges the opportunities of the use of networks of the FSS for UAS CNPC links and CEPT is of the view that UAS CNPC links using FSS in non-segregated airspace shall operate:

* in accordance with ICAO SARPs;
* under successfully coordinated assignments for FSS applications notified with class of earth station “UG”.

CEPT is of the view that the safety aspects of UAS CNPC shall not have any impact on:

* the existing terrestrial services and their current and expected applications;
* the relevant existing agreements reached during FSS satellite coordination process;
* the future coordination of FSS networks during the application of provisions of Articles 9 and 11 of the RR;
* all cases which fall under RR 11.41

CEPT is of the view that in order to ensure safety-of-flight operation of UAS, the administrations responsible for the operation of UAS CNPC links under the ICAO SARPs shall:

* take the required measures to ensure freedom from harmful interference to earth stations on board UA;
* act immediately when their attention is drawn to any such harmful interference; thus, the cases where harmful interferences could not be mitigated by the administration responsible for operating UAS CNPC links and which lead to a loss of the UAS CNPC links would need to be addressed by airworthiness and flight operational procedures defined within ICAO.

CEPT is of the view that the pfd mask labelled as example b in Annex 2 of Resolution 155 (Rev. WRC-19) is appropriate to protect the terrestrial services.

CEPT is of the view that the RR No. 5.149 for the protection of Radioastronomy from harmful interference in the frequency band 14.47-14.5 GHz has to be taken into account.

CEPT recognises that ICAO is responsible for the safe operation of aircraft including UAS and is developing appropriate SARPs covering all aspects of safe operation of UAS including the required communication systems

CEPT recognizes that RR **4.10** does not apply to the use of networks of the FSS for the UAS CNPC links between Earth station on board the UA and the satellites. This implies that any administration notifying FSS network as well as any administration authorising the operation of stations of the terrestrial services in accordance with the RR in the frequency bands identified in resolves 1 of Resolution **155 (Rev.WRC-19)** have not responsibility for the safety of life for these.

CEPT is of the view that if the conditions for the safety operation of CNPC established by ICAO cannot be met with the existing FSS link as it stands, then this link should not be used by the UAS operator.

**7.1.4 CITEL** - **Document APG23-5/INF-43**

* An Administration provided Preliminary Proposal at recent CITEL meeting. This proposal is based on the studies carried out in line with Resolution 171 (WRC-19) and Resolution 155 (Rev.WRC-19) that define conditions for operating command and non-payload communication (CNPC) for unmanned Aerial systems (UAS) in the FSS in the frequency bands identified in No. 5.484B.
* MOD RESOLUTION 155 (WRC-19) “Regulatory provisions related to earth stations on board unmanned aircraft which operate with GSO networks in FSS in certain frequency bands not subject to a Plan of Appendix 30, 30A and 30B for CNPC of UAS in non-segregated airspaces”
* MOD 5.484B
* SUP RESOLUTION 171 (WRC-19) – Consequential to the results of studies at ITU-R in relation to this Resolution.

**7.1.5 RCC** - **Document APG23-4/INF-45**

The RCC Administrations are of the view that:

* for operation of UAS CNPC, only ITU registered frequency assignments to FSS satellite networks, for which the coordination has been successfully completed, shall be used;
* UAS CNPC links shall operate in accordance with ICAO SARPs, covering all aviation safety issues;
* the links of FSS networks which are not compliant with the ICAO SARPs requirements for UAS control and communications links, shall not be used for control and communications of UAS;
* revision of current Resolution 155 (Rev.WRC-19) or development of new Resolution shall be based on the results of the ITU-R compatibility studies for UAS CNPC links with the systems of existing services, operating within this band and if necessary in adjacent frequency bands;
* UAS CNPC links shall not cause more interference and shall not claim more protection than stations in FSS satellite networks which have been coordinated and registered in ITU;
* UAS CNPC links shall not restrict future development and impose additional restrictions on existing services, which have RR allocations within this band or adjacent frequency bands.

Method В from the draft CPM Report is preferable

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

**7.2.1 ICAO** - **Document APG23-3/INF-15**

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 in accordance with the Annexes of the Convention of the International Civil Aviation Organization (ICAO), ensuring the safety-of-life aspects of the use of UAS CNPC is the role of the responsible States;
* 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.