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| **The 4th Meeting of the APT Conference Preparatory****Group for WRC-23 (APG23-4)** | **APG23-4/OUT-15** |
| 15 – 20 August 2022, Bangkok, Thailand | 20 August 2022 |

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: APG23-4/INP-8(JPN), APG23-4/INP-15(AUS), APG23-4/INP-24(IRN), APG23-4/INP-35(KOR), APG23-4/INP-41(CHN), APG23-4/INP-46(THA), APG23-4/INP-52(NZL), APG23-4/INP-75(VTN).
* Information Documents: APG23-4/INF-02(ATU), INF-21(ASMG), INF-25(Asiasat), INF-28 Rev.1(CITEL), INF-44 (RCC), INF-48(CEPT).

**3. Summary of discussions**

**3.1 Summary of APT Members’ views**

**3.1.1 Japan– Document APG23-4/INP-8**

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.

**3.1.2 Australia - Document APG23-4/INP-15**

Australia supports progress of work on technical and regulatory issues under this agenda item.

**3.1.3. Iran- Document APG23-4/INP-24**

UAS control and non-payload communication (CNPC) links are under consideration at ITU-R in 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-12 dealt with terrestrial and satellite spectrum requirements for the operation of unmanned aircraft systems in non-segregated airspace and ensured that sufficient spectrum is available in particular for terrestrial links.

Up to now, the WP5B has developed several documents with regard to characteristics of stations in the space and terrestrial services and the protection of the terrestrial services as well. Meanwhile some Document have been developed to provide characteristics of unmanned aircraft system control and non-payload earth stations for use with space stations operating in the fixed-satellite Service. These documents are all in an inconclusive manner due to various difficulties and problems raised in the Draft CPM Text. On the other hand, the PDN Report ITU‑R M.[UA\_PFD], “review of power flux-density limits in accordance with resolves 16 of Resolution 155 (Rev.WRC-19)” the studies has not been completed because the protection of the mobile service has not been considered yet. Moreover, there has been no development in this document since about two years ago.

ICAO which play a crucial role in this agenda item is going to develop the SARPS. According to the key principles developed for UAS SNPC links in WP5B, in order to ensure the safety of flight of the UA, measures are required consistent with RR No. **4.10** to ensure freedom from harmful interference.

There are several entities each being involved in parts of the tasks to be implemented in this agenda item. After lengthy discussion, the ITU-R came to the conclusion that there should be only on single responsible for all tasks. This responsibility is currently being studies to be assigned to the notifying administration of the FSS network with which the UAS/ CNPC earth station communicate. However, due to the nature of the operation, the notifying administration of regular FSS networks/links may certainly 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. Consequently, many administrations believe that the issue of safety of flight is totally outside the possibility and capability of the notifying administration of the FSS network. This issue is one of the challenging elements of this Agenda Item. Moreover, in order that the above UAS/ CNPC function properly and efficiently the notifying administration of the FSS network with which UAS/ CNPC earth station communicate need to accept to execute such overall responsibilities which are currently distributed among various players and in turn perform internally the coordination and management of the responsibilities with all key players involved in the execution of the operation.

It is totally unclear that whether the Notifying administration of FSS network with which the UAS/ CNPC communicate would be ready to accept such a vast, huge and unclear responsibilities. Consequently, from the technical elaborations currently supplied by WP 5B, the discussions on the principles for UAS/ CNPC operation such as what administration could and should take on what responsibility in association with UAS/ CNPC operation had not yet been completed and it was decided that it would be necessary to have such discussions completed before progressing on specific text for a Resolution.

In contrast with other Agenda Items, the NO change is not a viable option to satisfy this agenda item as it would not be consistent with the text and language in the title of agenda item. The current Resolution 155 (WRC-19) is not implementable due to several inconsistencies, shortcoming and contradictions, some of which were raised by ICAO and some administrations. The only option that was before ITU-R was to revise the Resolution for which no agreement was reached. The preamble of the Draft Resolution has not yet been discussed. As for the operative /resolves parts only some elements were briefly discussed and partially agreed. The remaining parts including several Annexes to the Resolution were not discussed at all. In CPM23-2 there would be no time to complete the non-discussed and non-agreed parts since there would be extremely intense discussions which would be out of the available time of the CPM 23-2 to do so. Therefore, possible solution for this complicated Resolution is to suppress that together with suppression of Resolution 171 (WRC-19) and corresponding footnote 5.484B.

It should be emphasis that the interference management of frequency assignments and implementation of the Radio Regulations are matters to be dealt with by ITU Administrations. For which there are no clear arrangements and no conclusions. However, as it has been indicated in the output of ITU-R there is no clear idea how that interference management mechanism which does not currently exist would be implemented.

The following text is included at the beginning of the draft CPM text

# 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** associated with the safety of life / safety of flight could not be fulfilled by operation of such links in commercial FSS. Moreover, several administrations 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 associated with safety of life/ safety of flight. Therefore, this Administration strongly believes that the revision of the Regulations for UAS/ 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 **171 (WRC-19)** and corresponding footnote **5.484B** in line with Method A.

**3.1.4 Korea – Document APG23-4/INP-35**

The Republic of Korea supports Method B. The Republic of Korea is of the view that, when revising No. **5.484B** and Resolution **155 (Rev.WRC-19)** for satisfy this agenda item, it should be ensured that any potential changes to such regulatory provisions will not impact any other systems or services operating in accordance with the Radio Regulations.

**3.1.5 China – Document APG23-4/INP-41**

1. China supports studies being conducted in ITU-R in accordance with Resolution **155 (Rev.WRC-19)** and Resolution **171 (WRC 19)**. The frequency bands specified in *resolves 1* of Resolution **155 (Rev.WRC-19)** are also allocated to terrestrial and space services which are used by a variety of different systems. These existing services and their future development need to be fully protected, without the imposition of any additional constraints, from the operation of UAS CNPC.
2. The safety-of-life issue related to UAS CNPC operation should be appropriately addressed.
3. The responsibilities of administrations involved in the operation of UAS CNPC systems, especially those in respect of the safety-of-life aspects, should be defined clearly.

**3.1.6 Thailand – Document APG23-4/INP-46**

Thailand supports ITU-R studies currently carried out in accordance with Resolution **171 (WRC-19)** 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.

**3.1.7 New Zealand – Document APG23-4/INP-52**

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

**3.1.8 Viet Nam – Document APG23-4/INP-75**

Viet Nam supports studying on technical, operational, and regulatory aspects as indicated in Resolution **171 (WRC-19)**, with a view to 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.

Viet Nam supports Method B to revise Resolution **155 (Rev.WRC-19)** in accordance with Resolution **171 (WRC-19)** and consequently suppress Resolution **171 (WRC19)**.

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

APT Members note that, due to the complexity of the agenda item and the difficulties caused to this work by COVID-19, the work on preparing draft regulatory text for Method B has not been completed.

In particular, the questions on how to ensure safety of flight through regular non-safety FSS links, the responsibilities of different administrations/organizations/entities involved in the operation of UAS CNPC systems, the interference management mechanism of frequency assignments, and also the ways to protect terrestrial services are issues that have not yet been settled. From contributions to WP 5B making suggestions for revisions to Resolution **155 (Rev. WRC-19)** under Method B, there are diverging views expressed on the principles for solutions on the above issues as well as other issues and should CPM manage to complete the regulatory text for Method B, there might be different options in respect of several elements of the revision to Resolution **155 (Rev. WRC-19)**. This may have an impact on developing future APT Preliminary Views.

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

APT Members support ongoing studies being carried out by ITU-R in relation to Agenda Item 1.8 in accordance with Resolution **171 (WRC-19).**

**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),**
* Some other APT Members could support Method B or some of its derivatives to revise Resolution **155 (Rev.WRC-19)** and consequently suppress Resolution **171 (WRC19)** provided that draft revision of Resolution **155(Rev WRC-19)** is duly completed and agreed by Member States for submission to and consideration by WRC-23 so as to address in a satisfactory manner, all inconsistencies, shortcomings, ambiguities and contradictions identified by ITU-R.

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

* APT Members are encouraged to review the output from ITU-R with a view to complete the unfinished work so as to address all inconsistencies, shortcomings, ambiguities and contradiction identified by ITU-R.

**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 APG23-4/INF-48**

CEPT acknowledge 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 (see *resolves* 3of **Resolution 155 (Rev.WRC-19)**);
* Under successfully coordinated assignments for FSS applications notified with class of earth station “UG” (see *resolves* 2 and 13 of **Resolution 155 (Rev.WRC-19)**).

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 (see *resolves* 8of **Resolution 155 (Rev.WRC-19)**);
* The relevant existing agreements reached during FSS satellite coordination process (see *resolves* 6, 7, and 9of **Resolution 155 (Rev.WRC-19)**);
* The future coordination of FSS network during the application of provisions of Articles **9** and **11** of the RR (see *resolves* 8of **Resolution 155 (Rev.WRC-19)**);
* All cases which fall under RR **11.41** (see *resolves* 8of **Resolution 155 (Rev.WRC-19)**).

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 (see *resolves* 7 and 13 of **Resolution 155 (Rev.WRC-19))**;
* act immediately when their attention is drawn to any such harmful interference, taking into account *resolves* 11 and 12 of the **Resolution 155 (Rev.WRC-19)**; thus, the cases where harmful interference 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 (see *resolves* 17 of **Resolution 155 (Rev. WRC-19)**).

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 APG23-4/INF-28**

Some Administrations support completion of the studies called for by Resolutions **171 (WRC-19)** and **155 (Rev.WRC-19)** to define the conditions for operating UAS CNPC links in the FSS (see *resolves 19* of Resolution **155 (Rev.WRC-19)**) in the frequency bands for which No. **5.484B** already applies. Based on the results of studies, to consider revisions to Resolution **155 (Rev.WRC-19)**, in order to finalize the provisions needed to accommodate the use of FSS networks by UAS CNPC systems and to revise No. **5.484B** to clarify that the provisions apply to the use of earth stations on board unmanned aircraft.

An Administration is of the view that UAS CNPC links using FSS shall operate in accordance with ICAO SARPs. Additionally, the Administration supports a review of the current conditions for the use of FSS assignments, where this could allow for additional assignments to be available for UAS CNPC while meeting safety requirements. Particularly, further consideration should be given to grant the use of FSS frequency assignments recorded under No. **11.41** for UAS CNPC applications.

**7.1.5 RCC** - **Document APG23-4/INF-44**

The RCC Administrations are of the view that:

* For operation of control and non-payload communication links of UAS, only ITU registered frequency assignments to FSS satellite networks, for which the coordination has been successfully completed, shall be used;
* The control and non-payload communication links of UAS shall operate in accordance with ICAO international Standards and Recommended Practices (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.

**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.