

**PLENARY MEETING**

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**Working Group 5**

**PROPOSED MODIFICATIONS TO THE DRAFT CPM REPORT**

**CHAPTER 5, AGENDA ITEM 9.1, ISSUE 9.1.8**

**AGENDA ITEM 9.1**

9 *to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention:*

9.1 *on the activities of the Radiocommunication Sector since WRC-12;*

NOTE: Eight issues have been identified by CPM15-1 under this agenda item.

**5/9.1.8 Resolution 757 (WRC-12)**

*Regulatory aspects for nanosatellites and picosatellites*

**(WP 7B / WP 4A, SC, (WP 5A), (WP 6A))**

**5/9.1.8/1 Executive summary**

Resolution **757 (WRC-12)** called for studies by ITU-R “to examine the procedures for notifying space networks and consider possible modifications to enable the deployment and operation of nanosatellites and picosatellites, taking into account the short development time, short mission time and unique orbital characteristics”.

Efforts should be undertaken to help increase knowledge and raise awareness about the applicable regulatory procedures for satellite networks among those entities involved in development and launch of nanosatellites and picosatellites.

The existing provisions of the Radio Regulations (RR) related to the coordination and notification of satellite network filings may need to be modified to take into account the short time scales and orbital parameter uncertainties prior to launch for many nanosatellite and picosatellite missions. This work could be carried out as an explicit item under the standing agenda item of a future WRC for the consideration of regulatory procedures for notifying satellite networks. Given that nanosatellites and picosatellites use the same frequency bands as those of other space services, it is important that any changes to the RR do not lead to the potential for harmful interference to other services, and that the accommodation of nanosatellite and picosatellite systems should not inadvertently affect the regulatory procedures for other satellite systems.

### **5/9.1.8/2 Background**

WRC-12 adopted Resolution **757 (WRC-12)** which *resolves* to invite WRC-18 to consider whether modifications to the regulatory procedures for notifying satellite networks are needed to facilitate the deployment and operation of nanosatellites and picosatellites, and to take the appropriate actions, and *invites* ITU-R to examine the procedures for notifying space networks and consider possible modifications to enable the deployment and operation of nanosatellites and picosatellites, taking into account the short development time, short mission time and unique orbital characteristics.

The work was allocated to Working Party 7B as the responsible group. Working Party 4A and the Special Committee are contributing groups, and Working Parties 5A and 6A are interested groups.

Nanosatellites and picosatellites are being used for a wide variety of missions and applications, including remote sensing, space weather research, upper atmosphere research, astronomy, communications, technology demonstration, amateur radio and education, as well as commercial applications, and therefore may operate under various radiocommunication services.

There is an interest in utilizing the potential benefits offered by small satellites, including those referred to as nanosatellites or picosatellites. These technologies allow many projects to be developed quickly and deployed with lower cost than with traditional satellites. Because these technologies introduce new entrants to the space sector, such as universities and research institutions, there is a risk that a lack of knowledge or familiarity with the existing ITU satellite filing rules and procedures (RR Articles **9** and **11**) and their applicability to nanosatellites and picosatellites will contribute to difficulties such as harmful interference which could be difficult to resolve if the BR are unaware of the satellite operation.

Recent system developer experiences have shown that the development, deployment and launch arrangement timelines for some nanosatellite and picosatellite systems may be much shorter than for traditional satellite systems. This creates a challenge for providing the mission specific orbital parameters which are required for compiling the Advance Publication Information (API) in a timely fashion.

Furthermore, some nanosatellites and picosatellites currently use spectrum allocated to the amateur satellite service and the meteorological satellite service although they are not strictly designed for these services.

### **5/9.1.8/3 Summary of technical and operational studies and relevant ITU-R Recommendations**

Report ITU-R SA.2312 addresses the characteristics of nanosatellites and picosatellites and, for each characteristic, indicates both the differences and commonalities with traditional satellites. This Report provides answers to the 3 questions asked as part of Question ITU-R 254/7. Nanosatellite and picosatellite technologies have provided unprecedented access to space by way of their reduced deployment timelines and costs. Further, standardization of certain physical aspects allows increased flexibility for their deployment as secondary payloads.

While nanosatellites and picosatellites are most often recognized by their small physical dimensions and mass, there are several other technical aspects which make them different from more traditional satellite technologies. These may include short development times, short operational life, lower available electrical power, and a lack of on board propulsion. It should be noted that most of these characteristics, as well as physical dimensions and mass, are not part of the information to be submitted under RR Appendix **4**. Therefore, it is difficult to distinguish this class of satellites from others from the perspective of the **RR**.

Nevertheless, nanosatellites and picosatellites may be used for a variety of applications in a number of different satellite services. Currently, these applications are often, but not always, experiments, tests or technology demonstrations. As new concepts are continually being developed for nanosatellite and picosatellite applications, the differences between these satellites and traditional satellites become less distinct.

PDN Report ITU-R SA.[NANO/PICOSAT CURRENT PRACTICE] (Annex 7 to Doc. 7B/330) addresses the current regulatory practice for nanosatellites and picosatellites, and identifies the difficulties encountered in applying the RR. This Report is in response to the invitation to examine procedures for notifying space networks as called for in Resolution **757 (WRC-12)**.

This Report presents an overview of the current practice from various administrations, the BR, the International Amateur Radio Union as well as nanosatellite and picosatellite developers in the application of ITU satellite filing rules and procedures (RR Articles **9** and **11**) to nanosatellites and picosatellites.

It is found that one of the largest challenges in the current practice of filing satellites is the late knowledge of orbital parameters.

For the initiation of an advance publication of information (API) the orbital parameters are mandatory. Even when the required parameters are known, the schedule and pace at which many nanosatellite and picosatellite programs currently proceed may be more rapid than the regulatory timelines associated with the existing advance publication, coordination and notification process.

The minimum time required for the ITU filing procedures to process the API and corresponding comments before a network can be brought into use is typically about 8 months. In practice, the overall time needed to file a satellite network until entry into the Master International Frequency Register and launch can vary widely from one administration to another. Furthermore, the time to modify the satellite system parameters to address comments on the API has to be taken into account as well. On some occasions, nanosatellites and picosatellites have not been able to complete the regulatory procedures before launch.

Additionally, more familiarity with the applicable rules and procedures also is needed by some of those involved in developing and launching nanosatellites and picosatellites, for whom it may be the first time they have had to apply the filing procedures.

#### **5/9.1.8/4 Regulatory and procedural considerations**

In response to Resolution **757 (WRC-12)**, ITU-R developed two Reports on nanosatellite and picosatellite characteristics and current practice. These Reports conclude that while nanosatellites and picosatellites have a number of distinctive characteristics, the differences between these satellites and traditional satellites become less distinct when considering their spectrum requirements and the services under which these satellites can operate.

The ITU-R Study Groups have concluded that additional efforts should be undertaken by the BR, administrations, and others to help increase knowledge and raise awareness about the applicable regulatory procedures for satellite networks among those entities involved in development and launch of nanosatellites and picosatellites. Increased familiarity with the applicable rules could help ameliorate some of the regulatory challenges that operators have experienced with many nanosatellite and picosatellite operations.

Some administrations have taken steps domestically to advise nanosatellite and picosatellite operators of the applicable ITU filing requirements, and it could be explored how ITU may be able to provide additional support.

Another relevant response to this issue could be to consider modifications to the regulatory procedures for notifying satellite networks to accommodate nanosatellite and picosatellite missions. The existing provisions of the RR related to the coordination and notification of satellite network filings may need to be modified to take into account the short time scales and orbital parameter uncertainties prior to launch for many nanosatellite and picosatellite missions. This work could be carried out as an explicit item under the standing agenda item of a future WRC for the consideration of regulatory procedures for notifying satellite networks.

Additionally, given that nanosatellites and picosatellites use the same frequency bands as those of other space services, it is important that any changes to the RR do not lead to the potential for harmful interference to other services. Placing nanosatellites and picosatellites under a different regulatory regime could add complexity and an unnecessary burden to the regulatory procedures. Finally, any changes to the RR to accommodate nanosatellites and picosatellite systems should not inadvertently affect the regulatory procedures for other satellite systems.

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