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| **World Radiocommunication Conference (WRC-15) Geneva, 2–27 November 2015** |  |
| **INTERNATIONAL TELECOMMUNICATION UNION** |  |
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| PLENARY MEETING | **Document 125-E** |
|  | **19 October 2015** |
|  | **Original: English** |
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| Germany (Federal Republic of) | |
| Proposals for the work of the conference | |
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| Agenda item 1.5 | |

1.5 to consider the use of frequency bands allocated to the fixed-satellite service not subject to Appendices **30**, **30A** and **30B** for the control and non-payload communications of unmanned aircraft systems (UAS) in non-segregated airspaces, in accordance with Resolution **153 (WRC‑12)**;

Introduction

ITU-R Working Party 5B (WP5B) performed detailed sharing studies with incumbent services to determine the conditions for the operation of radio links of unmanned aircraft systems (UAS) beyond radio line of sight (BLOS) control and non-payload communication (CNPC). UAS BLOS CNPC radio links were studied as an application of satellite systems and networks operating in the fixed-satellite service (FSS).

Study results show, that in order to remain inside the conditions given by the regulatory frame of the FSS and to ensure compatibility of stations operating on-board UA/RPA and stations operating in the fixed service (FS), certain technical and operational conditions have to be met. These technical, operational, and regulatory conditions were identified and are herewith proposed as an integral part of a new WRC Resolution.

Methodologies applied and assumptions taken for the studies are described in detail in an ITU-R Report, that for various reasons could not be finalised and approved at the last meeting of WP5B in Bucharest. However, some administrations, including the submitting administration, undertook the effort to complete the WD DN Report ITU-R M.[UAS-FSS], taking all contributions submitted to the Bucharest meeting into account, and submitted this Report to the next meeting of WP5B for adoption and onward submission to Study Group 5 for approval. This Report is available under ITU-R document reference 5B/886.

Based on the study results in this report, operational conditions and pfd-masks were derived that will protect FS stations operating in the frequency ranges 14/11GHz and 30/20 GHz. These conditions are provided as an Annex 2 to a draft new Resolution as shown below.

Therefore, the contributing administration proposes to replace Annex 2 of the draft new Resolution [115-A15], submitted as multi-country proposal with WRC-15 Document 115, by Annex 2 of the draft new Resolution [D-A15] provided here below.

Proposal

ADD D/125/1

Draft New Resolution [D-A15] (WRC-15)

Regulatory provisions related to earth stations on board unmanned aircraft operating in non-segregated airspaces with geostationary satellite networks in the fixed-satellite service in certain frequency bands not subject to   
a plan for the control and non-payload communications of   
unmanned aircraft systems

The World Radiocommunication Conference (Geneva, 2015),

…

Annex 2 to DRAFT NEW Resolution [D-a15] (WRC-15)

Protection of the fixed service and of other fixed-satellite service networks from UA CNPC emissions

# 1 Introduction

Because of the fundamental assumption made that to use the frequency bands allocated to the FSS the UAS CNPC link must operate within the same regulatory and performance limitations as any other FSS earth station and that, from an interference perspective, it must perform its function in exactly the same manner as any other FSS earth station, there are only a limited number of additional requirements, over and above those of a typical FSS earth station, that need to be imposed on UAS CNPC operations to ensure compatibility with other services sharing the same frequency bands. These additional requirements are listed in Sections 2, 3, and 4 of this Annex.

# 2 Protection of the fixed service

The fixed service is allocated by table entries and footnotes in several countries with a co-primary status to the FSS. Conditions of UA using CNPC shall be such that the fixed service is protected from any harmful interference as follows:

1 UA shall not operate at latitudes above 70 degrees

2 UA shall not operate on frequencies in the band 14.0 to 14.5 GHz in altitudes below 5000 ft

3 UA shall not operate on frequencies in the band 27.5 to 28.6 GHz in altitudes below 3000 ft

4 Earth station on UA shall comply with the two band-specific pfd masks described below

In the frequency range 14-14.47 GHz where used by fixed service networks, within line-of-sight of the territory of an administration, where fixed service networks are operating in this band, the maximum pfd produced at the surface of the Earth by emissions from a single UA shall not exceed:

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| --- | --- |
| -97.0 dB (W/(m2  ⋅ 14MHz)) | for θ ≤ 5° |
| -97.0 + 2.1 ⋅ (θ - 5°)2 dB (W/(m2  ⋅ 14MHz)) | for 5° < θ ≤ 7.5° |
| -91.7 + 25 ⋅ log10 (θ - 5°) dB (W/(m2  ⋅ 14MHz)) | for 7.5° < θ ≤ 53° |
| -49.7 dB (W/(m2  ⋅ 14MHz)) | for 53° < θ ≤ 90° |

where θ is the angle of arrival of the radio-frequency wave (degrees above the horizontal).

NOTE 1: The aforementioned limits relate to the pfd and angles of arrival that would be obtained under free-space propagation conditions.

In the frequency range 27.5-29.5 GHz where used by fixed service networks, within line-of-sight of the territory of an administration where fixed service networks are operating in this band, the maximum pfd produced at the surface of the Earth by emissions from a single UA shall not exceed:

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| --- | --- |
| -96.0 dB (W/(m2  ⋅ 14MHz)) | for θ ≤ 5° |
| -96.0 + 0.6 ⋅ (θ - 5°)2 dB (W/(m2  ⋅ 14MHz)) | for 5° < θ ≤ 9.4° |
| -84.4 dB (W/(m2  ⋅ 14MHz)) | for 9.4° < θ ≤ 90° |

where θ is the angle of arrival of the radio-frequency wave (degrees above the horizontal).

NOTE 1: The aforementioned limits relate to the pfd and angles of arrival that would be obtained under free-space propagation conditions.

# 3 Protection of other fixed-satellite service networks

Conditions of UA using CNPC shall be such that the FSS is protected from any harmful interference defined as follows:

UAS CNPC shall comply with Recommendation ITU-R S.524, or other coordinated levels agreed between administrations, at all times.

# 4 Protection of radio astronomy

No. 5.149 of the Radio Regulations urges administrations to take all practicable steps to protect the radio astronomy service from harmful interference in certain bands, including 14.47-14.5 GHz, noting that emissions from airborne stations can be particularly serious sources of interference to the radio astronomy service.

In the band 14.47-14.5 GHz, consultations will be needed between radio astronomy stations and UAS operating co-frequency UAS CNPC (Earth-to-space) within radio line-of-sight of radio astronomy service observatories in order to address potential incompatibilities.

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