|  |  |
| --- | --- |
| **US Radiocommunication Sector**  **FACT SHEET** | |
| **Working Party:** ITU-R WP 5B | **Document No:** USWP5B31-10 |
| **Reference:** SG05/89, 5B/737 | **Date:** 11 April 2023 |
| **Document Title:** Draft new Recommendation ITU-R M.[AMS CHARACTERISTICS\_1 780-1 850 MHz] - Technical characteristics and protection criteria for systems operating in the aeronautical mobile service within the frequency range 1 780-1 850 MHz | |
| **Author(s)/Contributor(s):**  Andrew Meadows  AFSMO    Dominic Nguyen  eSimplicity for AFSMO  Kellen Gibson  DSO  Ryan Saunders  DSO  Dan Jablonski  Johns Hopkins Applied Physics Lab | Phone: 334-467-4720  E-mail: andrew.meadows.1@us.af.mil  Phone: 703-606-7394  E-mail: [dominic.nguyen@esimplicity.com](mailto:dominic.nguyen@esimplicity.com)  Phone: 301-225-3794  E-mail: [kellen.k.gibson.civ@mail.mil](mailto:kellen.k.gibson.civ@mail.mil)  Phone: 410-919-2722  E-mail: ryan.saunders4.civ@mail.mil  Phone: 301-335-6192  Email: <Dan.Jablonski@jhuapl.edu> |
| **Purpose/Objective:** The purpose of this document is to finalize a new Recommendation ITU-R M.[AMS-CHARACTERISTICS\_1 780-1 850 MHz]. | |
| **Abstract:** Currently, there are no ITU-R Recommendations available for Aeronautical Mobile Services in the frequency band 1 780-1 850 MHz. During Study Group 5 meeting in November 2022, Russia insisted on adding statistical considerations to the preamble of the recommendation or adding time percentage language to the protection criteria section. This contribution provides an answer to Russian concern and proposes to elevate the status to Draft New Recommendation. | |
| **Fact Sheet Preparer:** Dominic Nguyen | |

|  |  |
| --- | --- |
| **Radiocommunication Study Groups** | Logo  Description automatically generated |
|  |  |
|  |  |
| Source: Study Group 5 document 89, and WP 5B/737  Subject: Draft new Recommendation ITU-R M.[AMS CHARACTERISTICS\_1 780-1 850 MHz] | **Document 5B/XX** |
| **XX July 2023** |
| **English only** |
| |  | | --- | | United States of America | | DRAFT NEW RECOMMENDATION ITU-R M.[AMS CHARACTERISTICS\_1 780-1 850 MHZ] |   **1 Introduction**  The United States of America would like to provides an answer to Russian concerns and proposes this document be elevated to draft new Recommendation ITU-R M.[AMS CHARACTERISTICS\_1 780-1 850 MHZ] and sent to SG 5 for approval. | |

|  |
| --- |
| Attachment |
| **Working Party 5B** |
| draft new RECOMMENDATION ITU-R  M.[AMS Characteristics\_1 780-1 850 MHz] |
| **Technical characteristics and protection criteria for systems operating in the aeronautical mobile service within the frequency range 1 780-1 850 MHz** |

(202X)

**Scope**

This Recommendation provides information on the technical characteristics and protection criteria for systems operating in the aeronautical mobile service (AMS) planned to or currently operating within the frequency range 1 780-1 850 MHz for use in sharing and compatibility studies as needed.

**Keywords**

Aeronautical mobile service, technical characteristics, protection criteria

**Abbreviations/Glossary**

AMS: Aeronautical mobile service

RR: Radio Regulations

The ITU Radiocommunication Assembly,

*considering*

*a)* that systems and networks operating in the aeronautical mobile service (AMS) are used for airborne data-links, including video to support remote sensing, including but not limited to earth sciences, land management, and disaster management applications, as well as telemetry;

*b)* that based on the applications, availability of hardware components, and propagation characteristics, the frequency range 1 780-1 850 MHz facilitates the use of current or planned operating systems and networks for such applications,

*recognizing*

*a)* that the frequency range 1 710-1 980 MHz is allocated on a primary basis in all three ITU Regions to the fixed and mobile services;

*b)* that Radio Regulations (RR) Nos. **5.384A** and **5.388** identifies the use of the frequency range 1 710-2 025 MHz for international mobile telecommunications;

*c)* that RR No. **5.386** provides a primary allocation to the space operation (Earth-to-space) and space research (Earth-to-space) services in Region 2 (except Mexico), in Australia, Guam, India, Indonesia and Japan on a primary basis, subject to agreement obtained under RR No. **9.21**, having particular regard to troposcatter systems;

*d)* that the use of the AMS in the 1 780-1 850 MHz does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations,

*~~e)~~* ~~that the application of protection criteria may require consideration for inclusion of the statistical nature of the criteria and other elements of the methodology for performing compatibility studies (e.g., antenna scanning including motion of the transmitter and propagation loss). Further development of these statistical considerations may be incorporated into future revisions of this and other related Recommendations, as appropriate,~~

*recommends*

that the technical characteristics and protection criteria for systems operating in the AMS given in the Annex 1 should be used in performing sharing and compatibility analyses.

ANNEX 1

**Technical characteristics and protection criteria for data links operating in the aeronautical mobile service in the frequency range 1 780-1 850 MHz**

[1 Introduction 2](file:///C:\Users\Dominic%20Nguyen\Downloads\R19-SG05-C-0089!!MSW-E.docx#_Toc99551671)

[2 Operational deployment 2](file:///C:\Users\Dominic%20Nguyen\Downloads\R19-SG05-C-0089!!MSW-E.docx#_Toc99551672)

[3 Technical characteristics of aeronautical mobile systems 3](file:///C:\Users\Dominic%20Nguyen\Downloads\R19-SG05-C-0089!!MSW-E.docx#_Toc99551673)

[3.1 Transmitter and receiver characteristics 3](file:///C:\Users\Dominic%20Nguyen\Downloads\R19-SG05-C-0089!!MSW-E.docx#_Toc99551674)

[3.2 Antenna characteristics 3](file:///C:\Users\Dominic%20Nguyen\Downloads\R19-SG05-C-0089!!MSW-E.docx#_Toc99551675)

[4 Protection criteria 3](file:///C:\Users\Dominic%20Nguyen\Downloads\R19-SG05-C-0089!!MSW-E.docx#_Toc99551676)

**1 Introduction**

Systems and networks operating in the AMS are used for airborne datalinks to support remote sensing, etc., applications. Aeronautical mobile data link systems are operated between ground stations and aircraft stations.

**2 Operational deployment**

Data links operating in the aeronautical mobile service includes transmission from and to, either aircraft stations or a ground terminal considered as an aeronautical station. These transmissions could use bidirectional air‑to‑ground links, or relay through another airborne platform using an air-to-air data links. Links can be either simplex or duplex. The link lengths vary greatly in these applications. Although some of the link lengths may be relatively short, many of the link lengths approach the radio line‑of‑sight distance. The operational altitude of airborne platforms equipped with these datalinks can vary up to 20 000 m.

The ground terminals may be at a permanent location, or they may be transportable. Transportable ground terminals can be moved to meet operational needs and the duration of use while it remains at a particular location is dependent upon operational requirements.

A single ground terminal may simultaneously support several aircraft stations at the same time via different links.

**3 Technical characteristics of aeronautical mobile systems**

Typical technical characteristics for representative airborne data links for the frequency range 1 780‑1 850 MHz are provided in Table 1.

**3.1** **Transmitter and receiver characteristics**

The aeronautical mobile systems operating or planned to operate within the frequency range 1 780‑1 850 MHz typically use digital modulations. A given transmitter may be capable of radiating more than one waveform.

**3.2 Antenna characteristics**

A variety of different types of antennas are used by systems in the frequency range 1 780-1 850 MHz. Antennas in this range are generally of a variety of sizes and vary between the airborne component of the link and the ground-based component of the link. The airborne antenna gains are typically between 3 and 16 dBi. The ground-based antenna gain can typically be between 3 and 31 dBi.

**4 Protection criteria**

An *I/N* ratio of about −6 dB is the suitable protection criteria for AMS systems. This represents the required protection criterion for the AMS systems. If multiple potential interference sources are present, protection of the AMS systems requires that this criterion is not exceeded due to the aggregate interference from the multiple sources.

TABLE 1

**Typical technical characteristics of representative systems operating in aeronautical mobile service in the frequency range 1 780-1 850 MHz**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Units** | **System 1 Airborne** | **System 1 Ground** | | | **System 2 Airborne** | | **System 2 Ground** | |
| **Transmitter** | | | | | | | | | |
| Tuning range | MHz | 1 780-1 850 | 1 780-1 850 | | | 1 780-1 850 | | 1 780-1 850 | |
| Power output | dBm | 35-39 | 30-39 | | | 42-50 | | 42 | |
| Emission bandwidth (3 dB) | MHz | 6 / 10 / 20 | 6 / 10 / 20 | | | 0.158 / 0.97 / 1.23 / 4.0 | | 0.158 / 0.97 / 1.23 / 4.0 | |
| **Receiver** | | | | | | | | | |
| Tuning range | MHz | 1 780-1 850 | 1 780-1 850 | | | 1 780-1 850 | | 1 780-1 850 | |
| IF Selectivity (3 dB) | MHz | 6 / 10 / 20 | 6 / 10 / 20 | | | 0.2 / 1 / 1.5 / 4.5 | | 0.2 / 1 / 1.5 / 4.5 | |
| Noise figure | dB | 3.5 | 3 | | | 2.5 | | 2.5 | |
| **Antenna** | | | | | | | | | |
| Antenna type |  | Omnidirectional | Omni-directional | Directional | | Omni-directional | Directional | Omni-directional | Directional |
| Antenna gain | dBi | 3 | 6 | 19 | 31 | 3.5 | 16 | 3 | 30 |
| 1st sidelobe | dBi | Not applicable | Not applicable | 6 | 11 | Not applicable | 9 | Not applicable | 17 |
| Polarization |  | Vertical | Vertical | Vertical | | Vertical | Vertical | Vertical | Vertical |
| Antenna pattern |  | Omni | Omni | Rec ITU-R M.1851 Cosine distribution | | Omni | Rec ITU-R M.1851  Uniform distribution | Omni | Rec ITU-R M.1851 Uniform distribution |
| Horizontal beamwidth | Degrees | 360 | 360 | 16 | 3.3 | 360 | 33 | 360 | 4.4 |
| Vertical beamwidth | Degrees | 90 | 90 | 16 | 3.3 | 35 | 33 | 40 | 4.4 |
| Antenna height | Meters | 20 000 | 10 | 10 | 10 | 20 000 | 20 000 | 10 | 10 |
| *I/N* protection criteria | dB | −6 | −6 | −6 | −6 | −6 | −6 | −6 | −6 |

TABLE 1 (*cont*.)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Units** | **System 3 Airborne** | **System 3 Ground** | |
| **Transmitter** | | | | |
| Tuning range | MHz | 1 780-1 850 | 1 780-1 850 | |
| Power output | dBm | 48.75 | 48.75 | |
| Emission bandwidth (3 dB) | MHz | 0.7 | 0.7 | |
| **Receiver** | | | | |
| Tuning range | MHz | 1 780-1 850 | 1 780-1 850 | |
| IF Selectivity (3 dB) | MHz | 1 | 1 | |
| Noise figure | dB | 3 | 3 | |
| **Antenna** | | | | |
| Antenna type |  | Omni | Omni | Omni |
| Antenna gain | dBi | 3 | 3 | 13 |
| 1st sidelobe | dBi | Not applicable | Not applicable | 6 |
| Polarization |  | Vertical | Vertical | Vertical |
| Antenna pattern |  | Omni | Omni | Biconical dipole  (Recommendation ITU-R F.1336) |
| Horizontal beamwidth | degrees | 360 | 360 | 360 |
| Vertical beamwidth | degrees | 180 | 180 | 10 |
| Antenna height | Meters | 15 000 | 10 | 10 |
| *I/N* protection criteria | dB | −6 | −6 | −6 |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_