|  |  |
| --- | --- |
| U.S. Radiocommunications Sector  Fact Sheet | |
| **Working Party:** ITU-R WP 5B | **Document No:** USWP5B27-07 |
| **Ref:** 5B/355 Annex 23 | **Date:** 19 October 2021 |
| **Document Title:** Preliminary Draft New Recommendation ITU-R M.[AMS-CHARACTERISTICS 1 780-1 850 MHz] | |
| **Author(s)/Contributors(s):**  Andrew Meadows  AFSMO    Dominic Nguyen  eSimplicity for AFSMO  Kellen Gibson  DSO  John Ashley  MITRE for DSO  Ken Keane  Duane Morris  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: 703-983-6544  E-mail: [jashley@mitre.org](mailto:jashley@mitre.org)  Phone: 202-776-5243  Email: [KKeane@duanemorris.com](mailto:KKeane@duanemorris.com)  Phone: 301-335-6192  Email: <Dan.Jablonski@jhuapl.edu> |
| **Purpose:** To continue developing sharing characteristics for AI 1.4 studies resulting in a new Recommendation ITU-R M.[AMS-CHARACTERISTICS\_1 780-1850 MHz]. | |
| **Abstract:**  WRC-19 approved AI 1.4 for the WRC-23 agenda, which is to conduct sharing studies between High Altitude Platform Stations as IMT Base Stations (HIBS) and existing services in a number of frequency bands. Among the frequency bands under study for WRC-23 AI 1.4, there are no ITU-R Recommendations available for Aeronautical Mobile Services in band on 1780-1850 MHz. This contribution continues the effort on developing a working document towards Preliminary Draft NewRecommendation ITU-R M.[AMS-CHARACTERISTICS\_1780-1850 MHz] and elevating the status to Preliminary Draft New Recommendation. | |
| **Fact Sheet Preparer:** Dominic Nguyen | |

|  |  |
| --- | --- |
| **Radiocommunication Study Groups** |  |
|  |  |
|  |  |
| Source: Document 5B/355 Annex 23  Subject: Working document towards draft new recommendation ITU-R M.[AMS CHARACTERISTICS\_1 780-1 850 MHz] | **Document 5B/XX** |
| **XX November 2021** |
| **English only** |
| |  | | --- | | United States of America | | preliminary draft new recommendation ITU-R M.[AMS CHARACTERISTICS\_1 780-1 850 MHz] |   **1 Introduction**  The United States of America would like to elevate this document to preliminary draft new recommendation ITU-R M.[AMS CHARACTERISTICS\_1 780-1 850 MHZ].  The United States proposals are highlighted in yellow.  Attachment revisions are presented for consideration. | |
| ATTACHMENT  preliminary 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 | |

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

ADL: Aeronautical mobile service data link

AMS: Aeronautical mobile service

IMT: International mobile telecommunications

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

*c)* that identification of the frequency range 1 710-2 025 MHz for IMT, does not preclude the use of this band by any application of the services to which they are allocated and does not establish priority in the RR;

*d)* 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,

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

Systems and networks operating in the AMS are used for airborne data-links 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. 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 data-links 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 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 |

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