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| **U.S. Radiocommunications Sector**  **Fact Sheet** | |
| **Working Party:** ITU-R WP 5B | **Document No:** USWP5B26-24 |
| **Ref:** AI 1.4 of WRC-23 (Resolution 247) | **Date:** 30 March 2021 |
| **Document Title:** Working document toward PDN Recommendation ITU-R M.[AMS-CHARACTERISTICS 1 780-1 850 MHz] | |
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| **Purpose:** To initiate work towards developing sharing characteristics for AI 1.4 studies resulting in a new Recommendation ITU-R M.[AMS-CHARACTERISTICS\_1 780-1 850 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 the band 1 780-1 850 MHz.  This contribution initiates the effort on developing a working document toward PDNRecommendation ITU-R M.[AMS-CHARACTERISTICS\_1 780-1 850 MHz]. | |
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| **Radiocommunication Study Groups** |  |
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| **XX May 2021** |
| **English only** |
| **United States of America** | |
| working document toward PDN Recommendation ITU-R M.[AMS-CHARACTERISTICS\_1780-1850 MHz]. | |

**1 Introduction**

The United States of America would like to propose a working document toward PDN Recommendation ITU-R M.[AMS-CHARACTERISTICS\_1780-1850 MHZ] to update the use in the band with the latest radar technical characteristics.

Annex 1 contains the technical characteristics for the Aeronautical Mobile Service in the 1780-1850 MHz.

Annex 2 contains a draft liaison statement from WP 5B to WP 5D for WRC-23 agenda item 1.4.

Attachment revisions are presented for consideration.

RECOMMENDATION ITU-R M.[AMS Characteristics\_1 780-1 850 MHz]

Technical characteristics and protection criteria for the aeronautical mobile service systems operating within the 1 780-1 850 MHz frequency band

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

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, disaster management, etc., applications;

*b)* that AMS has been and is currently operating in the 1 780-1 850 MHz frequency range based on the applications, availability of hardware components, and propagation characteristics, the 1 780-1 850 MHz frequency range 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 RR No. **5.384A** and **5.388** identifies the use of the 1 710-2 025 MHz band for International Mobile Telecommunications (IMT);

*c)* that identification of the 1 710-2 025 MHz band 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 Radio Regulations;

*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 No. **9.21**, having particular regard to troposcatter systems;

recommends

**1** 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.

# 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.

Annex 1 decribes the technical characteristics of aeronautical mobile systems (AMS) at 1 780-1 850 MHz band.

Annex 1  
  
Technical characteristics and protection criteria of AMS data links (ADL)

in the band 1 780-1 850 MHz

# 1 Operational deployment for AMS data links (ADL) in the band 1 780-1 850 MHz

Aeronautical mobile data links are operated between ground stations and aircraft stations, and can be deployed anywhere within a country whose administration has authorized their use in accordance with regulations.

ADL 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 ADLs 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.

# 2 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.

## 2.1 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.

## 2.2 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.

# 3 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 aeronautical mobile service systems operated 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 | M.1851 | | Omni | M.1851 | Omni | M.1851 |
| 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 (ITU-R Recommendation 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 | |

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| Annex 2  Working Party 5B |
| Draft REPLY LIAISON STATEMENT to working party 5D |
| WRC-23 agenda item 1.4 Characteristics of Aeronautical Mobile Service (AMS) systems operating in the frequency bands 1 780-1 850 MHz |

Working Party (WP) 5B thanks WP 5D for the liaison statement ([5B/142](https://www.itu.int/md/R19-WP5B-C-0142/en)). WP 5B has initiated the process of developing a Recommendation ITU-R M.[AMS-CHARACTERISTICS\_1 780-1 850 MHZ]. This Recommendation is intended to be used for sharing studies between High Altitude Platform for International Mobile Telecommunication Base Station (HIBS) and AMSs operating in 1 780-1 850 MHz band under WRC-23 agenda item 1.4. The Table in the attachement provides the technical characteristics of the AMS systems in the 1 780-1 850 MHz band. WP 5B looks forward to continued collaboration with WP 5D on the progress of WRC-23 agenda item 1.4.

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| **Status:** For information and action as appropriate | |
| **Contact:** | **E-mail:** |

Attachment 1

TABLE 1

Typical technical characteristics of representative aeronautical mobile service systems operated 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 | M.1851 | | Omni | M.1851 | Omni | M.1851 |
| 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 (ITU-R Recommendation 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 |