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| U.S. Radiocommunications Sector  Fact Sheet | | |
| **Working Party:** ITU-R WP 5B | **Document No:** USWP5B33-04 | |
| **Ref:** Resolution **775 (WRC-23)**, [5B/98](https://www.itu.int/md/R23-WP5B-C-0098/en) | **Date:** August 15, 2024 | |
| **Document Title:** Draft Liaison Statement to ITU-R Working Party 5C - Studies in Relation to WRC-27 agenda item 1.10 | | |
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| **Purpose/Objective:** This contribution proposes technical and operational characteristics of maritime and aeronautical mobile service applications in the frequency bands 71-76 GHz and 81-86 GHz. | | |
| **Abstract:** In accordance with Resolution **775**, this contribution offers the characteristics of a representative maritime and aeronautical mobile service operating in the frequency bands 71-76 GHz and 81-86 GHz, including the receiver characteristics and protection criteria necessary to inform studies to determine power flux-density (pfd) and equivalent isotropically radiated power (e.i.r.p.) limits to be included in Article 21 for satellite services (fixed-satellite service (FSS), mobile-satellite service (MSS) and broadcasting-satellite service (BSS)) to protect the current and planned fixed and mobile services in the frequency bands 71-76 GHz and 81-86 GHz. | | |

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| **Radiocommunication Study Groups** |  |
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| **Subject:** Draft Liaison Statement to ITU-R Working Party 5C - Studies in Relation to WRC-27 agenda item 1.10 | 03 October 2024 |
| English only |
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| United States of America | |
| DRAFT REPLY LIAISON STATEMENT TO WORKING PARTY 5C  Technical characteristics and protection criteria for WRC-27 agenda item 1.10 | |

Working Party 5B (WP 5B), as a contributing group to WRC-27 agenda item 1.10, has received a liaison statement from WP 5C ([5B/98](https://www.itu.int/md/R23-WP5B-C-0098/en)) requesting technical and operational characteristics of systems under 5B’s purview operating on a primary basis in the 71-76 GHz and 81-86 GHz frequency bands. In the attachment, the United States provides a draft reply liaison statement providing system characteristics for aeronautical mobile service operations.

These systems, which support broadband access on ships and aircraft, were recently approved as part of the United States’ Federal Communications Commission [rulemaking](https://www.fcc.gov/document/fcc-updates-rules-708090-ghz-bands-0) process in the 70/80 GHz band.

# ATTACHMENT

LIASON STATEMENT TO WORKING PARTY 5C

**Studies under WRC-27 agenda item 1.10**

Working Party 5B (WP 5B) would like to thank WP 5C for its liaison statement contained in [5B/98](https://www.itu.int/md/R23-WP5B-C-0098/en) requesting technical and operational characteristics of systems under 5B’s purview operating on a primary basis in the 71-76 GHz and 81-86 GHz frequency bands.

WP 5B would note that in some countries, new aeronautical mobile systems are operating to provide critical connectivity from base station transmitters to aircraft and ships in motion using tracking antennas that ensure a reliable link. Systems providing point-to-point services to platforms in motion in these bands rely on a base station transmitter operating a link to a platform, either an aircraft or a ship. The aircraft or ship utilizes highly directional antennas for a return link and these platforms can provide service over tens or hundreds of kilometers. In addition, these platforms may utilize intermediary links to extend the range. The links in this platform can include aircraft-to-aircraft links and ship-to-aerostat, aerostat-to-ship, shore-to-aerostat, aerostat-to-shore, and ship-to-ship links.

Representative technical characteristics for airborne data links in the AMS for the frequency range 71-76 GHz and 81-86 GHz are provided in the attachment.

WP 5B looks forward to the continued collaboration with WP 5C on the studies supporting WRC-27 agenda item 1.10.

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| **Status:** For action to WP 5C | |
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**Attachment**

**Representative Characteristics of AMS Operations in the 70/80 GHz bands**

## 1 Receiver characteristics

Receivers operating in these band for end points in motion have typical characteristics of other receivers in the band, with the difference being that they may be pointed above the horizon and therefore must be protected from emissions from earth-to-space links. Receivers use a target C/N of 15 dB, with a 7dB noise figure. Channelization plans for 71-76 GHz and 81-86 GHz would be Recommendation ITU-R F.2006, which provides different channel sizes from 250 MHz up to 5 GHz and includes a plan for 1.25 GHz segmentation. Typical operating bandwidths for the AMS are 500-1000 MHz. The target thermal noise is -164 dBm/Hz and the target RX power is -92dBw.

## 2 Antenna characteristics

A variety of different types of antennas are used by systems in the frequency ranges 71-76 GHz and 81-86 GHz. Antennas in this band are generally of a variety of sizes (0.3 to 0.6 m) and vary between the airborne component of the link and the ground-based component of the link. The airborne antennas gain is typically in the range 44-51 dBi and will be in operation at elevations between 10,000 and 50,000 feet. The ground-based antenna gain is typically near 51 dBi. Horizontal, vertical and circular polarizations are used with circular as the preferred polarisation.

If antenna characteristics provided in Table 1 are sufficient, these characteristics should be used in sharing analyses. If additional characteristics are required, the first source of the data should be measured antenna characteristics. ITU F.699 patterns are used for the mobile antennas given that these platforms can operate within the context of a coordinated fixed service.

# 3 Protection criteria for the aeronautical mobile service

When operating near the maximum radio line-of-sight distance separation between the transmitter and receiver, the performance of the communication link is often noise limited. An increase in receiver effective noise of 1 dB would constitute significant degradation communication range, equivalent to a reduction in communication range of approximately 10% in a free‑space propagation environment.

Such an increase effective receiver noise corresponds to an (*I* + *N*)/*N* ratio of 1.26, or an *I*/*N* ratio of about −6 dB. This represents the required protection criterion for these systems from all sources of interference.

TABLE 1

Representative technical characteristics of the aeronautical mobile service systems

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | Units | System ATG or GTA Airborne | System ATG or GTA Ground | System ATA Airborne |
| Tuning range | | GHz | 81-86 | 71-76 | 71-76 & 81-86 |
| RF selectivity | 3 dB | MHz | 100 | 100 | 100 |
| 20 dB | MHz | 500 / 750 / 1000 | 500 / 750 / 1000 | 500 / 750 / 1000 |
| 60 dB | MHz | 5000 | 5000 | 5000 |
| IF selectivity | 3 dB | MHz | 100 | 100 | 100 |
| 20 dB | MHz | 500 / 750 / 1000 | 500 / 750 / 1000 | 500 / 750 / 1000 |
| 60 dB | MHz | 5000 | 5000 | 5000 |
| NF | | dB | 7 | 7 | 7 |
| Sensitivity | | dBm | −75 to −80 | −80 to −90 | −75 to −80 |
| Image rejection | | dB | 20 | 20 | 20 |
| Spurious rejection | | dB | 20 | 20 | 20 |
| Antenna gain | | dBi | 51 | 51 | 51 |
| 1st sidelobe | | dBi | 5 @ 0.7° for horizontal  5 @ 1.1° for vertical | 5 @ 0.7° for horizontal  5 @ 1.1° for vertical | 5 @ 0.7° for horizontal  5 @ 1.1° for vertical |
| Polarization | |  | RHCP1 & LHCP2 | RHCP1 & LHCP2 | RHCP1 & LHCP2 |
| Antenna pattern/type | |  | Parabolic or phased array | Horn | Parabolic or phased array |
| Horizontal BW | | degrees | 0.5 | 0.5 | 0.5 |
| Vertical BW | | degrees | 0.9 | 0.5 | 0.9 |
| Antenna model | |  | Recommendation  ITU F.699 | Recommendation  ITU F.699 | Recommendation  ITU F.699 |