ITUPublications
Recommendations

International Telecommunication Union
Radiocommunication Sector

# Recommendation ITU-R M.2176-0

**(02/2026)**

M Series: Mobile, radiodetermination, amateur and related satellite services

# Characteristics and protection criteria for the International Civil Aviation Organization standardized VHF datalink Mode 2 systems operating in the aeronautical mobile (route) service in the frequency band 136-137 MHz

## Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

## INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU had received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the appropriate ITU-R patent information available at https://www.itu.int/en/ITU-R/study-groups/Pages/itu-r-patent-information.aspx.

**Series of ITU-R Recommendations**

(Also available online at https://www.itu.int/publ/R-REC/en)

| Series | Title |
|---|---|
| **BO** | Satellite delivery |
| **BR** | Recording for production, archival and play-out; film for television |
| **BS** | Broadcasting service (sound) |
| **BT** | Broadcasting service (television) |
| **F** | Fixed service |
| **M** | **Mobile, radiodetermination, amateur and related satellite services** |
| **P** | Radio-wave propagation |
| **RA** | Radio astronomy |
| **RS** | Remote sensing systems |
| **S** | Fixed-satellite service |
| **SA** | Space applications and meteorology |
| **SF** | Frequency sharing and coordination between fixed-satellite and fixed service systems |
| **SM** | Spectrum management |
| **SNG** | Satellite news gathering |
| **TF** | Time signals and frequency standards emissions |
| **V** | Vocabulary and related subjects |

***Note***: *This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.*

*Electronic Publication*
Geneva, 2026

RECOMMENDATION ITU-R M.2176-0

# Characteristics and protection criteria for the International Civil Aviation Organization standardized VHF datalink Mode 2 systems operating in the aeronautical mobile (route) service in the frequency band 136-137 MHz

(2026)

**Scope**

This Recommendation provides the technical characteristics and protection criteria for the International Civil Aviation Organization (ICAO) standardized VHF datalink (VDL) Mode 2 (VDL Mode 2) communications systems operating in the aeronautical mobile (route) service (AM(R)S) in the frequency band 136-137 MHz. These technical characteristics and protection criteria should be used for sharing and compatibility studies with VDL Mode 2 systems.

**Keywords**

AM(R)S, VHF, VDL, protection criteria, air-to-ground communications, ground-to-air communications

**Abbreviations/Glossary**

| | |
|---|---|
| AM(R)S | Aeronautical mobile (route) service |
| ICAO | International Civil Aviation Organization |
| RR | Radio Regulations |
| VDL Mode 2 | VHF data link Mode 2 |
| VHF | Very high frequency |

**Related ITU Recommendation**

Recommendation ITU-R SM.1535 – The protection of safety services from unwanted emissions

The ITU Radiocommunication Assembly,

*considering*

*a)* that the frequency band 136-137 MHz is currently used by International Civil Aviation Organization (ICAO)-standardized VHF data link Mode 2 (VDL Mode 2) data communications worldwide for air-to-ground, air-to-air, and ground-to-air aeronautical safety communications;

*b)* that aeronautical safety communications are used in all areas that aircraft operate and land, and in all phases of flight;

*c)* that aircraft may be equipped with up to three aeronautical mobile (route) service (AM(R)S) radio stations utilizing a combination of voice and data radios;

*d)* that the upper VDL Mode 2 channel is centred on the frequency 136.975 MHz in accordance with ICAO Annex 10,

*recognizing*

*a)* that in high aircraft density areas, the utilization of VHF channels in the 117.975-137 MHz is highly congested;

*b)* that the ICAO develops standards and recommended practices for civil aviation;

*c)* that Annex 10 to the Convention on International Civil Aviation contains standards and recommended practices for aeronautical radiocommunication systems used by civil aviation;

*d)* that the AM(R)S is a safety service;

*e)* that No. **4.10** of the Radio Regulations (RR) stipulates that "Member States recognize that the safety aspects of radionavigation and other safety services require special measures to ensure their freedom from harmful interference; it is necessary therefore to take this factor into account in the assignment and use of frequencies";

*f)* that Recommendation ITU-R SM.1535 provides a guideline for the protection of safety services from unwanted emissions,

*recommends*

1 that the technical and operational characteristics of the VDL Mode 2 systems operating in the frequency band 136-137 MHz, allocated to the AM(R)S and described in Annex 1, should be considered for sharing and compatibility studies;

2 that the criterion of interfering signal power to receiver noise power level, $I/N = -6$ dB[1], should be considered to protect the VDL Mode 2 safety-of-life systems operating in the AM(R)S in the frequency range 136-137 MHz, and that this represents the aggregate protection level if multiple interferers are present.

# Annex 1

# Technical and operational characteristics of the VHF datalink Mode 2 systems operating in the aeronautical mobile (route) service in the frequency band 136-137 MHz

## 1 Introduction

The frequency band 136-137 MHz is allocated to the AM(R)S and is one of the communications bands for aeronautical safety data communications in the air-to-ground, air-to-air, and ground-to-air directions. These systems are internationally standardized by the ICAO for VDL Mode 2. These communications are used where air traffic services are available and in all phases of flight.

## 2 Technical characteristics of the VDL Mode 2 systems operating in the aeronautical mobile (route) service in the frequency band 136-137 MHz

The technical characteristics of representative VDL Mode 2 systems operating in the frequency band 136-137 MHz are presented in Table 1. Some stations use different antennas to transmit and to receive signals.

[1] This criterion does not include a safety margin.

TABLE 1

**Characteristics of VHF data link Mode 2 systems operating in the frequency band 136-137 MHz**

| Platform | Aircraft | Base station |
|---|---|---|
| Type of emission | Data | Data |
| Modulation type | D8PSK | D8PSK |
| Type of operation | Simplex | Simplex |
| Max antenna height (m) | 15 240 (MSL) | 15-50 (AGL)<br>(15 typical) |
| **Transmitter** | | |
| Power (W) | 18 to 25 | Typical 25 |
| Coverage radius (km) | 370 | 370 |
| Bandwidth (kHz) | 25 | 25 |
| Antenna gain (dBi) | 0 | 2.2 |
| Radiation pattern | Omni | Omni |
| Antenna polarization | Vertical | Vertical |
| Emission mask | ICAO SARPs, Annex 10, Vol. III, Part 1, Sections 6.3.3 (RR App. **3**) and 6.3.4 | ICAO SARPs, Annex 10, Vol. III, Part 1, Sections 6.2.3 (RR App. **3**) and 6.2.4 |
| **Receiver** | | |
| Noise figure (dB) | 6 | 6 |
| IF bandwidth (kHz) | 25 | 25 |
| Antenna gain (dBi) | 0 | 2.2 |
| Radiation pattern | Omni | Omni |
| Antenna polarization | Vertical | Vertical |