|  |
| --- |
| **US Radiocommunications Sector****Fact Sheet** |
| **Working Party:** WP 5B | **Document No:** USWP5B33-02 |
| **Ref:** Annex 12 to Document 5B/096 | **Date:** 04 Sep 2024 |
| **Document Title:** Working Document towards a PRELIMINARY DRAFT REVISION OF RECOMMENDATION ITU-R M.1371-5 Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile frequency band |
| **Author(s)/Contributors(s):**Jerry UlcekUS Coast Guard, Washington DCJohnny SchultzSev1Tech, Inc.Ross NorsworthyREC, Inc. | Phone : (202) 475-3607E-mail: Jerry.l.Ulcek@uscg.milPhone : (727) 403-4029E-mail: johnny.schultz@sev1tech.com Phone : (727) 515-8025E-mail: Ross\_Norsworthy@msn.com |
| **Purpose/Objective:** The purpose of this document is to provide some minor editorial corrections and clarifications for Recommendation ITU-R M.1371-5.  |
| **Abstract:** The USCG has completed a review of the current Draft Revision of Recommendation ITU-R M.1371-5. This recommendation has been open for over 2 study cycles and is nearly completed. This contribution provides some additional contributions, clarifications, and editorial corrections.  |

|  |  |
| --- | --- |
| **Radiocommunication Study Groups** |  |
|  |  |
|  |  |
| Source:  Annex 1 to Document 5B/819Reference**:** ITU-R M.1371-5  | **Document: USWP5B32-12** |
| **06 Mar 2024** |
| **English only** |
| United States of America |
| Working document towards a draft revision of Recommendation ITU-R M.1371-5 |

|  |  |
| --- | --- |
| **Radiocommunication Study Groups** |  |
|  |  |
|  |  |
| Source:  Annex 12 to Document 5B/96Reference**:** ITU-R M.1371-5  | **Document: USWP5B33-02** |
| **04 Sep 2024** |
| **English only** |
| United States of America |
| Working document towards a draft revision of Recommendation ITU-R M.1371-5 |

1. **Introduction**

This document proposes updated technical and editorial content to Recommendation ITU-R M.1371-5. These changes are a result of a review of the latest working document plus some additional contribution since the last WP5B meeting.

1. **Summary of changes**

Listed below are the proposed changes to Document 5B/096 Annex 12, which contribute to the revision of Recommendation ITU-R M.1371-5:

1. Added a new section to Annex 2, section 2.2 to include additional receiver blocking details.
2. Minor editorial changes to Annex 7, table A7-28 for AIS Message 21.
3. Updated the footnote on Table A7-35 to provide means for requesting Manufacture ID from NMEA.
4. A number of editorial and technical changes proposed in section A7-3.26 for AIS Message 28.
5. **Attachments**

The following attachment contains the proposed changes to Annex 12 of the chairman’s report. All track changes from Annex 12 have been accepted and only the new proposed changes are shown in track changes. Note that only the relevant sections have been included in this proposal.

|  |
| --- |
| **Annex 12 to Working Party 5B Chair's Report** |
| PRELIMINARY DRAFT REVISION OF RECOMMENDATION ITU-R M.1371-5 |
| **Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile frequency band** |

Note: no additional changes prior to this section.

## A2-2.2 Transceiver characteristics

The transceiver should perform in accordance with the characteristics set forth herein.

TABLE A2-3

Minimum required time division multiple access transmitter characteristics

| **Transmitter parameters** | **Requirements** |
| --- | --- |
| Carrier power error | ± 1.5 dB  |
| Carrier frequency error | ± 500 Hz |
| Slotted modulation mask  | ∆*fc* < ±10 kHz: 0 dBc±10 kHz < ∆*fc* < ±25 kHz: below the straight line between −25 dBc at ±10 kHz and –70 dBc at ±25 kHz±25 kHz < ∆*fc* < ±62.5 kHz: –70 dBc  |
| Transmitter test sequence and modulation accuracy | < 3 400 Hz for Bit 0, 1 (normal and extreme)2 400 Hz ± 480 Hz for Bit 2, 3 (normal and extreme)2 400 Hz ± 240 Hz for Bit 4 … 31 (normal, 2 400 ± 480 Hz extreme)For Bits 32 … 1991 740 ± 175 Hz (normal, 1 740 ± 350 Hz extreme) for a bit pattern of 01012 400 Hz ± 240 Hz (normal, 2 400 ± 480 Hz extreme) for a bit pattern of 00001111 |
| Transmitter output power versus time | Power within mask shown in Fig. A2-2 and timings given in Table A2-4 |
| Spurious emissions | –36 dBm 9 kHz … 1 GHz–30 dBm 1 GHz … 4 GHz |
| Intermodulation attenuation (base station only) | ≥ 40 dB |

TABLE A2-4

Definitions of timing for Figure A2-2

|  |  |  |  |
| --- | --- | --- | --- |
| **Reference** | **Bits** | **Time(ms)** | **Definition** |
| *T*0 | 0 | 0 | Start of transmission slot. Power should NOT exceed –50 dB of *Pss* before *T*0 |
| *TA* | 0-6 | 0-0.625 | Power exceeds –50 dB of *Pss* |
| *TB* | *TB1* | 6 | 0.625 | Power should be within +1.5 or –3 dB of *Pss*  |
| *TB2* | 8 | 0.833 | Power should be within +1.5 or –1 dB of *Pss (start of training sequence)* |
| *TE* (includes 1 stuffing bit) | 233 | 24.271 | Power should remain within +1.5 or –1 dB of *Pss* during the period *TB2* to *TE* |
| *TF* (includes 1 stuffing bit) | 241 | 25.104 | Power should be –50 dB of *Pss* and stay below this |
| *TG* | 256 | 26.667 | Start of next transmission time period |

TABLE A2-5

Minimum required time division multiple access receiver characteristics(1)

| **Receiver parameters** | **Requirements** |
| --- | --- |
| Sensitivity  | 20% PER @ –107 dBm |
| Error behaviour at high input levels | 1% PER @ –77 dBm1% PER @ –7 dBm |
| Adjacent channel selectivity | 20% PER @ 70 dB |
| Co-channel selectivity | 20% PER @ 10 dB |
| Spurious response rejection | 20% PER @ 70 dB |
| Intermodulation response rejection | 20% PER @ 74 dB |
| Spurious emissions | –57 dBm (9 kHz to 1 GHz)–47 dBm (1 GHz to 4 GHz) |
| Blocking | 20% PER @ 86 dBBlocking signal AIS signal-15 dBm -101 dBm-5 dBm -91 dBm+5 dBm -81 dBm+15 dBm -71 dBm+26 dBm -60 dBm |
| (1) For Class B “SO”, Table 3 in Annex 6 applies. |

Note: no additional changes prior to this section.

**A7-3.19 Message 21: Aids-to-navigation report**

This message should be used by an Aids to navigation (AtoN) AIS station. This station may be mounted on an aid‑to‑navigation or this message may be transmitted by a fixed station when the functionality of an AtoN station is integrated into the fixed station. This message should be transmitted autonomously at a Rr of once every three (3) min or it may be assigned by an assigned mode command (Message 16) via the VHF data link, or by an external command, or after any parameter value has changed. This message should not occupy more than two slots.

The IALA Navguide stipulates: “A floating aid to navigation, which is out of position, adrift or during the night is unlighted, may itself become a danger to navigation. When a floating aid is out of position or malfunctioning, navigational warnings must be given.” Therefore, a station, which transmits Message 21 should also transmit a safety related broadcast message (Message 14) upon detecting that the floating AtoN has gone out of position or is malfunctioning, at the Competent Authority’s discretion.

TABLE A7-28

| **Parameter** | **Number of bits** | **Description** |
| --- | --- | --- |
| Message ID | 6 | Identifier for Message 21 |
| Repeat indicator | 2 | Used by the repeater to indicate how many times a message has been repeated. See § 4.6.1, Annex 2; 0-3; 0 = default; 3 = do not repeat any more |
| Source ID | 30 | Identity (in the MMS) of the source of the message (see RR Art. **19** and Rec. ITU-R M.585) |
| Type of aids-to-navigation | 5 | 0 = not available = default; refer to appropriate definition set up by IALA; see Table 74 |
| Name of Aids-to-Navigation | 120 | Maximum 20 characters 6-bit ASCII, as defined in Table 47“@@@@@@@@@@@@@@@@@@@@” = not available = default.The name of the AtoN may be extended by the parameter “Name of Aid-to-Navigation Extension” below |
| Position accuracy | 1 | 1 = high (≤10 m) 0 = low (>10 m)0 = defaultThe PA flag should be determined in accordance with Table 50 |
| Longitude  | 28 | Longitude in 1/10 000 min of position of an AtoN (±180°, East = positive, West = negative181 = (6791AC0h) = not available = default) |
| Latitude | 27 | Latitude in 1/10 000 min of an AtoN (±90°, North = positive, South = negative91 = (3412140h) = not available = default) |
| Dimension/reference for position | 30 | Reference point for reported position; also indicates the dimension of an AtoN (m) (see Fig. A7-2*s* and § A7-3.19.1) |
| Type of electronic position fixing device | 4 | 0 = not available = default1 = GPS2 = GLONASS3 = Combined GNSS4 = Loran5 = Chayka6 = INS 7 = manually inputted = surveyed or charted position. (The accurate position enhances its function as a radar reference target) = Galileo9 = BDS10 & 11 = not used, reserved for future use12 = integrated PNT system13 = inertial navigation system14 = terrestrial radio navigation system15 = internal GNSS |
| Time stamp | 6 | UTC second when the report was generated by the EPFS (0-59 or 60) if time stamp is not available, which should also be the default value or 61 if positioning system is in manual input mode or 62 if electronic position fixing system operates in estimated (dead reckoning) mode or 63 if the positioning system is inoperative) |
| Off-position indicator | 1 |  0 = on position; 1 = off position.This flag should only be considered if time stamp is equal to or below 59. For a floating aid, it denotes that the AtoN exceeds the zone parameters set on installation when the field value is 1.For a fixed aid, it denotes that internal GNSS position of the AtoN exceeds the zone parameter set on installation when the field value is 1, i.e. suspected GNSS anomaly. |
| AtoN status | 8 | Reserved for the indication of the AtoN status, refer to IALA Recommendation R0126, *The Use of the AIS in Marine AtoN Services*00000000 = default |
| RAIM-flag | 1 | RAIM (Receiver autonomous integrity monitoring) flag of electronic position fixing device; 0 = RAIM not in use = default; 1 = RAIM in use see Table 50 |
| Virtual AtoN flag | 1 | 0 = default = physical AtoN at indicated position; 1 = virtual AtoN, does not physically exist, and represents a Synthetic AtoN when the Repeat indicator is also set to 1. |
| Assigned mode flag | 1 | 0 = Station operating in autonomous and continuous mode = default1 = Station operating in assigned mode |
| Spare | 1 | Should be set to zero. Reserved for future use |
| Name of Aid-to-Navigation Extension | 0, 6, 12, 18, 24, 30, 36, … 84 | This parameter of up to 14 additional 6-bit-ASCII characters for a 2-slot message may be combined with the parameter "Name of Aid-to-Navigation" at the end of that parameter, when more than 20 characters are needed for the name of the AtoN or to just provide for the AtoN designation. When used for the later, the parameter should start with “@@@/###/???” and the characters that follow are the AtoN designation, e.g. LB1, to denote Lighted Buoy 1. This may be portrayed itself or as an extension of the AIS AtoN Name when it is being portrayed. This parameter should be omitted when no more than 20 characters for the name of the A-to-N are needed in total. Only the required number of characters should be transmitted, i.e. no @-character should be used. |
| Spare | 0, 2, 4, or 6 | Used only when parameter “Name of Aid-to-Navigation Extension” is used. Should be set to zero. The number of spare bits should be adjusted in order to observe byte boundaries |
| Number of bits | 272-360 | Occupies two slots |

Note: no additional changes prior to this section.

TABLE A7-35

**Manufacturer identification field**

|  |  |  |
| --- | --- | --- |
| **Bit** | **Information** | **Description** |
| (MSB)41 ……... 24  (18 bits) | Manufacturer’s ID | The Manufacturer’s ID bits indicate the manufacture’s mnemonic code consisting of three 6-bit ASCII characters (1) |
| 23 ……... 20  (4 bits) | Unit Model Code | The Unit Model Code bits indicate the binary coded series number of the model. The first model of the manufacture uses “1” and the number is incremented at the release of a new model. The code reverts to “1” after reaching to “15”. The “0” is not used |
| 19 ……... 0 (LSB) (20 bits) | Unit Serial Number | The Unit Serial Number bits indicate the manufacture traceable serial number. When the serial number is composed of numeric only, the binary coding should be used. If it includes figure(s), the manufacture can define the coding method. The coding method should be mentioned in the manual |
| (1) NMEA mnemonic manufacturer codes should be used for Message 24B Manufacturer ID. Manufacturers may request this code via NMEA at <https://www.nmea.org/nmea-0183.html>. |

Note: no additional changes prior to this section.

**A7-3.26 Message 28: Aid-to-Navigation Report (Single-slot message)**

Message 28 provides similar information as AIS Message 21, but in one slot versus two slot, and can be used to report MAtoN direction and speed or provides extended information on the AtoN (i.e., it’s height) and what it’s marking (i.e., hazardous area). It should be accompanied by a Message 24A to provide the charted name. It can be accompanied by a Message 8 and/or 12, to provide additional details on what the AtoN is marking. It can also broadcast an addressed Message 6 and/or 14 to communicate to the monitoring entity.

This message may also be sent by a vessel to report an AtoN off-position or discrepant or other navigational hazard or obstruction; or to confirm its position and status.

TABLE A7-41

| **Parameter** | **Bits** | **Description** |
| --- | --- | --- |
| Message ID | 6 | Identifier for this message; always 28. |
| Repeat indicator | 2 | Used by the repeater to indicate how many times a message has been repeated. |
| Source ID | 30 | Identity (in the MMSI) of the source of the message (see RR Art. **19** and Rec. ITU-R M.585) |
| Time stamp | 6 | UTC second when the report was generated by the EPFS (0-59) or 60 if time stamp is not available, which should also be the default value, or 61 if positioning system is in manual input mode, or 62 if electronic position fixing system operates in estimated (dead reckoning) mode, or 63 if the positioning system is inoperative) |
| Longitude | 28 | Longitude in 1/10 000 min of position of an AtoN (±180°, East = positive, West = negative, 181 = (6791AC0h) = not available = default) |
| Latitude | 27 | Latitude in 1/10 000 min of an AtoN (±90°, North = positive, South = negative, 91 = (3412140h) = not available = default) |
| Restricted Use Indicator | 2 | Denotes where the AtoN may be operated.0 = Unrestricted use = default1 = Use restricted to territorial waters of the flag state (of MMSI MID)2 = Use restricted the Exclusive Economic Zone (EEZ) of the flag state (of MMSI MID)3 = Use restricted as defined by its flag state (of MMSI MID)NOTE 1 - Use outside of a restricted area requires permission of the flag state competent authority.NOTE 2 - This parameter should not be available and reported as 0 if AtoN Report Originator = 1. |
| AIS AtoN Station Type | 3 | Denotes the type of AIS AtoN station. See IALA Recommendation R0126, The Use of the AIS in Marine AtoN Services, R1016, Mobile Marine Aids to Navigation (MAtoN) and IMO MSC Circular 1463, Policy on Use of AIS Aids to Navigation.0 = A physical AIS AtoN (floating)1 = A physical AIS AtoN (fixed)2 = A synthetic predicted AIS AtoN 3 = A synthetic monitored AIS AtoN 4 = A virtual AIS AtoN 5 = A mobile AIS AtoN 6 = A mobile self-propelled AIS AtoN 7 = Reserved for future use |
| Types of AtoN | 7 | 0 = not available = default 1 – 127 = refer to appropriate definition set up by IALA; (see Table *BIS 2*). |
| IALA AtoN MRN  | 17 | AtoN unique IALA Marine Resource Name (MRN). national identification number. The MMSI MID represents the nationality.000001-131 071, 0 = unassigned or unknown = default. See IALA Guideline G1143*, IALA MRN for AtoN*, e.g., urn:mrn:iala:aton:<ISO 3166-1 alpha-2 code for its nationality>:<national identification number>. |
| AtoN Dimensions Type | 2 | Defines what Dimensions A and B represent.0 = Type 1. AtoN Height and Width. Dimension A = represents a height above mean water (i.e., platform, structure, wind turbine, etc.), in 1-meter steps, 0-510, 511 = height greater than 510 meters; Dimension B = represents a circle radius from the broadcasted position encompassing the structure/object, in 10-meter steps, 0-126, 127 = a circle greater than 1260 meters. Used to convey the physical dimensions of a large AtoN or structure and assist its sightings. Dimension A = Dimension B = 0 = unknown = default.1 = Type 2. Mobile AtoN Vector. Dimension A = COG, in true degrees: 0-359 in 1 degree steps, 360 = COG unreported; 361 = dynamically positioned on station, COG unreported, 362 = purposedly adrift, COG unreported, 362 = self-propelled, COG unreported; 363 = tethered, COG unreported, 364 = COG unknown = default, 365-511 reserved for future use; Dimension B = SOG, in 1 knot steps, 0-59; 60 = SOG unreported; 61 = dynamically positioned on station, SOG unreported, 62 = purposedly adrift, SOG unreported, 63 = self-propelled, SOG unreported; 64 = tethered, SOG unreported, 65 = SOG unknown = default, 66-127 reserved for future use. 2 = Type 3. AtoN Area/Line. The broadcasted position represents the mid-point of the height and width of a rectangular area denoting the area of the AtoN description; Dimension A = length of a rectangle area or line, in 10-meter steps, 0 – 510, 511 = length greater than 5100 meters; Dimension B = width of the area, in 10-meter steps, 0 – 126, 127 = width greater than 1260 meters. If Dimension B = 0, then it represents a line. Dimension A = Dimension B = 0 = unknown = default.3 = Type 4. Swing Circle. Dimension A = Dimension B = 0 represents a point = default; Dimension A (in 1-meter steps, 0-127 meters) + Dimension B (in 10-meter steps, 0-1270 meters) = represents a radius from the broadcasted position to convey a large swing circle of this AtoN. NOTE: AtoN Dimension Types may alternate to provide more information about the AtoN, i.e., using Type 0 to provide the height and width of a Mobile AtoN, using Type 2 to provide the area a Mobile AtoN is marking, e.g., oil spill. |
| AtoN Dimensions A | 9 | 0-511 as defined by its AtoN Dimension Type (0 = default) |
| AtoN Dimension B | 7 | 0-127 as defined by its AtoN Dimension Type (0 = default) |
| AtoN Charted Status | 1 | Denotes whether the AtoN is charted or not.0 = AtoN is uncharted = default1 = AtoN charted |
| AtoN On-station Status | 4 | Denotes whether the AtoN is on-station or not.0 = On-station = default1 = On-station or on course (Mobile AtoN)2 = On-station, but damaged, occulted, submerged or otherwise not properly visible 3 = Off-station location unknown (also used to report when synthetic or virtual AIS reports are not being broadcasted)4 = Off-station, but reporting its current position5 = Off-station adrift6 = Off-station, removed or relocated7 = On-station, as a new or temporary AtoN8 = Unmarked navigation hazard, used by a vessel to inform of an unmarked navigation hazard. Type of AtoN should be denoted as 1 = reference point. Should be accompanied by a message 14 that provides a description of the hazard, e.g., floating container.9 = Unmarked obstruction (anything that restricts, endangers, or interferes with navigation). Type of AtoN should be denoted as 1 = reference point. Should be accompanied by a message 14 that provides a description of the hazard, e.g., vessel aground.10-15 = reserved for future use. |
| AtoN Status bits | 8 | Reserved for the indication of the AtoN status. SeeIALA Recommendation R0126, *The Use of the AIS in Marine AtoN Services*.00000000 = default |
| Rebroadcast Flag | 1 | Use to indicate whether this AtoN Report should be rebroadcasted upon receipt;-to extend the range of the original report.0 = do not rebroadcast = default 1 = rebroadcast this report |
| AtoN Report Originator | 1 | Denotes the originator of the report. 0 = competent authority originated report = default 1 = vessel originated report |
| AtoN Confirmation Flag | 2 | This parameter may be used by competent authorities to seek confirmation(s) on the position and/or status of this reported AtoN. If Source ID = 00MIDxxxx or 99MIDxxxx, 0 = no confirmation requested = default; 1 = confirmation requested.If a confirmation is requested, the latest request received by the vessel should be automatically retained for at least 24 hours or until overridden by a no confirmation requested message. If the vessel should come within [2000] m of the reported AtoN it should rebroadcast its latest confirmation request message unchanged or updated with the observed latitude, longitude, AtoN On-station Status, and AtoN Status bits. 0 = unknown or unable to confirm = default1 = reported latitude, longitude, AtoN On-station Status, and AtoN Status bits confirmed, unchanged2 = reported latitude, longitude, AtoN On-station Status, or AtoN Status bits confirmed and updated3 = reserved for future use |
| Spare | 5 | Should be set to zero. Reserved for future use |
| Number of bits | 168 | Occupies one slot |

Table A7- 42

**Type of aids-to-navigation**

|  |  |  |
| --- | --- | --- |
|  | **Code** | **Definition (Type of aid to navigation)** |
|  | 0 - 31 | Refer to Table A7-29 |
| Mobile AtoN | 32 | Mobile AtoN fitted to Ocean Data Acquisition System (ODAS) |
| 33 | Mobile AtoN fitted to a Water Sampling and/or Monitoring Vehicle |
| 34 | Mobile AtoN fitted to a Research Vehicle |
| 35 | Mobile AtoN: Towed Cable, Pipe or Semi-submerged Object Marker |
| 36 | Mobile AtoN: Towed Vessel or Object |
| 37 | Mobile AtoN: Flotsam Marker, Large (greater than XX meters) |
| 38 | Mobile AtoN: Flotsam Marker, Small (less than XX meters) |
| 39 | Mobile AtoN: Fishing Apparatus |
| 40 | Mobile AtoN: Synthetic Target Marker  |
| 41 | Mobile AtoN: Protected Species Marker |
| 42 | Mobile AtoN: Military Operation Target Marker |
| 43 | Mobile AtoN: Dangerous Object |
| 44 | Mobile AtoN: Pollution Spill Marker |
| 45 | Mobile AtoN: Search & Rescue Datum Mark |
| 46 | Mobile AtoN: Datum Mark |
| 47 | Mobile AtoN: Operating Underwater (at times)  |
| 48 | Mobile AtoN: Underwater Operations Marker |
| 49 | Mobile AtoN: Military Operation or Restricted Area Marker N |
| 50 | Mobile AtoN: Military Operation or Restricted Area Marker E |
| 51 | Mobile AtoN: Military Operation or Restricted Area Marker W |
| 52 | Mobile AtoN: Military Operation or Restricted Area Marker S |
| 53 | Mobile AtoN: Dynamic Area Cardinal Marker N |
| 54 | Mobile AtoN: Dynamic Area Cardinal Marker E |
| 55 | Mobile AtoN: Dynamic Area Cardinal Marker W |
| 56 | Mobile AtoN: Dynamic Area Cardinal Marker S |
| 57-63 | Reserved for future use |
|  | 64-127 | Reserved for regional use |