**Annex to liaison note to IALA ENAV WG3 on proposed technical clarifications to Recommendation ITU-R M.1371.**

**Date: 2017-08-23**

# Clarification of the description of Messages 25 and 26

## Background and rationale

It was noted that there is an inconsistency between the definition of Message 25 and Message 26 in Annex 5 and the definition of Message 25 and Message 26 in Annex 8 with regards to spare bits.

## Discussion

Meeting concluded that following action is necessary: review all tables and information regarding binary payloads and number of slots required for a specified number of bits. Make explicit assumptions regarding bit stuffing and verify that the assumptions are consistent across all tables.

## Proposal

Correspondence group including members of IALA ENAV WG3 to develop input to IALA ENAV21.

# Message 11 in the AIS Coast Station (“ACS”)

## Background and rationale

AIS Coast Station shall not be regarded as Base Station by a receiving AIS station. The ACS shall thus autonomously transmit Message 11 rather than Message 4.

## Discussion

Message 11 is identical of Message 4 but may currently only be transmitted on request by Message 10. This should be changed to allow autonomous transmission by ACS. It is further necessary to change the occurrences of “limited base station” to read “AIS coast station”.

## Proposal

Amend Annex 8 clause 3.2 as follows:

“3.2 Message 4: Base station report

Message 11: coordinated universal time and date response

Should be used for reporting UTC time and date and, at the same time, position. A base station should use Message 4 in its periodical transmissions. Message 4 is used by AIS stations for determining if it is within 120 NM for response to Messages 20 and 23. A mobile station should output Message 11 only in response to interrogation by Message 10.

Message 11 is only transmitted by AIS Coast Station (ACS) or as a result of a UTC request message (Message 10). The UTC and date response should be transmitted on the channel, where the UTC request message was received.

…”

# Change the name “Limited Base Station” to “AIS Coast Station”

## Background and rationale

Change of name is required to differentiate the full base station controlling the VDL and AIS Coast Station which should not be allowed to have control over the VDL.

## Discussion

## Proposal

Meeting suggests to replace the reference of “Limited Base Station” to read “AIS Coast Station” in ITU-R M.1371 future edition Annex 1 Clause 2.1.3 as follows:

“2.1.3 AIS Coast Station (no VHF data link control functionality)”

# AIS SAR airborne station should not become the semaphore

## Background and rationale

AIS SAR airborne station should not become the semaphore due to the likelihood that an airborne station is a fast moving target and thus not a suitable synchronization source.

## Discussion

## Proposal

Meeting suggests to amend Annex 2 Clause 3.1.3.3.2 as follows:

“3.1.3.3.2 Mobile station operation as a semaphore

When a mobile station determines that it is the semaphore (see § 3.1.1.4 and § 3.1.3.4.3), it should decrease its reporting interval to MAC.SyncMobileRate. It should remain in this state until the semaphore qualifying conditions have been invalid for the last 3 min. The Class B “SO” and AIS SAR aircraft station should not act as the semaphore.”

# Clarify the number of spare bit in IFM0 using Message 26 to ensure byte alignments

## Background and rationale

The definition of IFM0 using Message 26 as described in ITU-R M.1371-5 Annex 5 is not in compliance with the definition of Message 26 in ITU-R M.1371-5 Annex 8 section 3.24 Table 82.

In the definition of Message 26, a field of four spare bits exists in front of the commstate for byte alignment. This field is missing in ITU-R M.1371-5 Annex 5 section 5.1 Table 28.

## Discussion

## Proposal

Meeting suggests two changes ( a) and b) ) as follows:

1. amend Annex 5 Table 28 as follows:

TABLE 28

International function message 0 using Message 26, broadcast or addressed binary message

| Parameter | Number of bits | Description | |
| --- | --- | --- | --- |
| Message ID | 6 | Identifier for Message 26; always 26 | |
| 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 | MMSI number of source station | |
| Destination indicator | 1 | 0 = Broadcast (no Destination ID field used)  1 = Addressed (Destination ID uses 30 data bits for MMSI) | |
| Binary data flag | 1 | Always 1 | |
| Destination ID | 0/30 | Destination ID if used. | If Destination indicator = 0 (Broadcast), no data bits are needed for Destination ID.  If Destination indicator = 1, 30 bits are used for Destination ID and spare bits for byte alignment. |
| Spare | 0/2 | Spare (if Destination ID used) |
| DAC | 10 | International DAC = 110 = 00000000012 | |
| FI | 6 | Function identifier = 010 = 0000002 | |
| Text sequence number | 11 | Sequence number to be incremented by the application.  All zeros indicates that sequence numbers are not being used | |
| Text string | 6-936/972 | 6-bit ASCII as defined in Table 47, Annex 8. When using this IFM, the number of slots used for transmission should be minimized taking into account Table 29.  For Message 26 the maximum is 936 for Addressed or 972 for Broadcast. | |
| Padding bits | Max 7 | Not used for data and should be set to zero. The number of bits should be either 1, 3, 5 or 7 to maintain byte boundaries.  NOTE 1 – When a 7-bit spare is needed to satisfy the 8-bit byte boundary rule, the 6-bit spare will be interpreted as a valid 6‑bit character (all zeros is the “@” character). This is the case when the number of characters is: 3, 7, 11, 15, 19, 23, 27, etc. | |
| Spare | 4 | Not used. Should be set to zero. Reserved for future use. | |
| Communication state selector | 1 | 0 = SOTDMA communication state follows  1 = ITDMA communication state follows | |
| Communication state | 19 | SOTDMA communication state (see § 3.3.7.2.1, Annex 2),  if communication state selector flag is set to 0, or ITDMA communication state (§ 3.3.7.3.2, Annex 2), if communication state selector flag is set to 1 | |
| Total number of application data bits | 128-1 064/  96-1 064 | 128-1 064 bits for Addressed, or 96-1064 bits for Broadcast. | |

1. amend Annex 8 Table 82 as follows:

TABLE 82

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Number of bits | Description | | |
| Message ID | 6 | Identifier for Message 26; always 26 | | |
| Repeat indicator | 2 | Used by the repeater to indicate how many times a message has been repeated. Refer to § 4.6.1, Annex 2; 0-3; default = 0; 3 = do not repeat any more | | |
| Source ID | 30 | MMSI number of source station | | |
| Destination indicator | 1 | 0 = Broadcast (no Destination ID field used) 1 = Addressed (Destination ID uses 30 data bits for MMSI) | | |
| Binary data flag | 1 | 0 = unstructured binary data (no Application Identifier bits used) 1 = binary data coded as defined by using the   16-bit Application identifier | | |
| Destination ID | 0/30 | Destination ID (if used) | | If Destination indicator = 0 (Broadcast); no data bits are needed for the Destination ID.  If Destination indicator = 1; 30 bits are used for the Destination ID and 2 spare bits for byte alignment. |
| Spare bits | 0/2 | Spare (if Destination ID used) | |
| Binary data | Broadcast Maximum 104 | Application identifier  (if used) | 16 bits | Should be as described in § 2.1, Annex 5 | |
|  | Addressed Maximum 72 | Application binary data | Broadcast Maximum 88bits Addressed Maximum 56 bits | Application specific data(1) | |
| Binary data added by 2nd slot | 224 | Allows for 32 bits of bit-stuffing(1) | | | |
| Binary data added by 3rd slot | 224 | Allows for 32 bits of bit-stuffing(1) | | | |
| Binary data added by 4th slot | 224 | Allows for 32 bits of bit-stuffing(1) | | | |
| Binary data added by 5th slot | 224 | Allows for 32 bits of bit-stuffing(1) | | | |
| Spare | 4 | Not used. Should be set to zero. Reserved for future use. | | | |
| Communication state selector flag | 1 | 0 = SOTDMA communication state follows 1 = ITDMA communication state follows | | | |
| Communication state | 19 | SOTDMA communication state (see § 3.3.7.2.1, Annex 2), if communication state selector flag is set to 0, or ITDMA communication state (§ 3.3.7.3.2, Annex 2), if communication state selector flag is set to 1 | | | |
| Maximum number of bits | Maximum 1 064 | Occupies up to 3 slots, or up to 5 slots when able to use FATDMA reservations. For Class B “SO” mobile AIS stations the length of the message should not exceed 3 slots. Class B “CS” mobile AIS stations should not transmit | | | |

(1) Binary data should always end to the byte boundary.

# Definition of garbled slot

## Background and rationale

The AIS Repeater standard (IEC 62320-3) uses the concept of garbled slots. The definition of garbled slots is missing in ITU-R M.1371 and should be incorporated there.

## Discussion

## Proposal

Meeting suggests following changes (a) and b))

1. Amend Annex 2 Clause 3.1.6 as follows:

“3.1.6 Slot state

Each slot can be in one of the following states:

– Free: meaning that the slot is unused within the receiving range of the own station. Externally allocated slots that have not been used during the preceding three frames are also Free slots. This slot may be considered as a candidate slot for use by own station (see § 3.3.1.2).

- Garbled: A slot shall be considered garbled if it contains no decodable message and has an RSSI of greater than 16 dB above the noise floor (see Annex 7 § 4.3.1.3)

– Internal allocation: meaning that the slot is allocated by own station and can be used for transmission.

– External allocation: meaning that the slot is allocated for transmission by another station.

– Available: meaning that the slot is externally allocated by a station and is a possible candidate for slot reuse (see § 4.4.1).

– Unavailable: meaning that the slot is externally allocated by a station and cannot be a candidate for slot reuse (see § 4.4.1).”

1. amend Annex 2 4.4.1 as follows:

“4.4.1 Intentional slot reuse by the own station

A station should reuse time slots only in accordance with this paragraph and only when own position is available.

When selecting new slots for transmission, the station should select from its candidate slot set (see § 3.3.1.2) within the desired SI. When the candidate slot set has less than 4 slots, the station should intentionally reuse available slots, in order to make the candidate slot set equal to 4 slots. Slots may not be intentionally reused from stations that indicate no position available. This may result in fewer than 4 candidate slots. The intentionally reused slots should be taken from the most distant station(s) within the SI. Slots allocated or used by base stations should not be used unless the base station is located over 120 NM from the own station. When a distant station has been subject to intentional slot reuse, that station should be excluded from further intentional slot reuse during a time period equal to one frame.

Slot reuse provides candidate slots for random selection. This process attempts to increase the candidate slot set to a maximum of four. When the candidate slot set has reached four, the candidate slot selection process is complete. If four slots have not been identified after all the rules have been applied, this process may report less than four slots. Candidate slots for reuse should be selected using the following priorities beginning with Rule 1 (also see the Slot selection rules flow diagram – Fig. 22).

When insufficient free slots are available, and there are slots that contain energy levels that exceed a free slot without a decodable message, then they shall be considered “garbled slots”. The algorithm shall then select “garbled slots” according to the lowest energy level first.

Add to the Free slot set (if any) all slots that are:

Rule 1a: Free (see § 3.1.6) on selection channel and Available(1) (see § 3.1.6) on the other channel.

Rule 1b: Garbled (see § 3.1.6) on selection channel and Available(1) (see § 3.1.6) on the other channel.

Rule 2a: Available(1) on selection channel and Free on the other channel.

Rule 2b: Available(1) on selection channel and Garbled on the other channel.

Rule 3: Available(1) on both channels.

Rule 4a: Free on selection channel and Unavailable(2) on the other channel.

Rule 4b: Garbled on selection channel and Unavailable(2) on the other channel.

Rule 5: Available(1) on selection channel and Unavailable(2) on the other channel.

(1) Available – Mobile Station (SOTDMA or ITDMA), or Base Station reserved slot (FATDMA or Message 4) beyond 120 NM.1

(2) Unavailable – Base Station reserved slot (FATDMA or Message 4) within 120 NM, or a Mobile Station reporting without position information.”

# Reporting rate when changing course

## Background and rationale

There is no means to determine if the vessel is changing course when there is no heading sensor available. As an alternative, the COG can be used to determine when the vessel is changing course.

## Discussion

## Proposal

Modify the following paragraphs of Annex 2 section 4.3.1.2:

“When a ship changes course, a shorter reporting interval should be required according to Table 1, Annex 1. Rr should be affected by changing course as described in this paragraph.

A change of course should be determined by calculating the mean value of the heading information (HDG) for the last 30 s and comparing the result with the present heading. When HDG is unavailable, the Course Over Ground (COG) may be used in place of the HDG when the vessel has a Speed Over Ground (SOG) greater of equal to 5 knots. If HDG is unavailable and SOG less than 5 knots, the Rr should not be affected.

If the difference exceeds 5°, a higher Rr should be applied in accordance with Table 1, Annex 1. The higher Rr should be maintained by using ITDMA to complement SOTDMA scheduled transmissions in order to derive the desired Rr. When 5° is exceeded, the reporting interval should be decreased beginning with a broadcast within the next 150 slots (see § 3.3.4.2.1) using either a scheduled SOTDMA slot, or a RATDMA access slot (see § 3.3.5.5).

The increased Rr should be maintained until the difference between the mean value of heading and present heading has been less than 5 for more than 20 s.

If no longer able to determine change of course during normal operation, the reporting schedule should revert to the default reporting interval, unless a new transmission schedule is ordered by assigned mode command.”

# EPFS values for AIS AtoN

## Background and rationale

It’s not clear if type of EPFS values 1-6 or 15 should be used for internal GNSS. Class A uses EPFS values 1-6 for the external sensor input. Different to Class A there is no sensor input on the AtoN. Therefore it seems to be appropriate to use the values 1-6 for the internal GNSS.

It should be clarified if type of EPFS values 1-6 or 15 should be used for internal GNSS.

## Discussion

## Proposal

Meeting proposes to amend Annex 8 Clause 3.19, Table 73 as follows:

TABLE 73

| 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 |
| ID | 30 | MMSI number, (see Article 19 of the RR and Recommendation 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 = default The PA flag should be determined in accordance with Table 50 |

TABLE 73 (*end*)

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Number of bits | Description | |
| 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) |
| Dimension/ reference for position | 30 | Reference point for reported position; also indicates the dimension of an AtoN (m) (see Fig. 41*bis* and § 4.1), if relevant(1) |
| Type of electronic position fixing device | 4 | 0 = Undefined (default) 1 = GPS 2 = GLONASS 3 = Combined GPS/GLONASS 4 = Loran-C 5 = Chayka 6 = Should not be used by AIS AtoN  7 = Manual input. For fixed AtoN and virtual AtoN, the charted position should be used. The accurate position enhances its function as a radar reference target 8 = Galileo 9-14 = not used 15 = Should not be used by AIS AtoN |
| 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 | For floating AtoN, only: 0 = on position; 1 = off position.  NOTE 1 – This flag should only be considered valid by receiving station, if the AtoN is a floating aid, and if time stamp is equal to or below 59. For floating AtoN the guard zone parameters should be set on installation |
| AtoN status | 8 | Reserved for the indication of the AtoN status  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 = real AtoN at indicated position; 1 = virtual AtoN, does not physically exist(2). |
| Assigned mode flag | 1 | 0 = Station operating in autonomous and continuous mode = default 1 = Station operating in assigned mode |
| Spare | 1 | Spare. Not used. 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. 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 | Spare. 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 |