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SN/Circ.236
28 May 2004

GUIDANCE ON THE APPLICATION OF AIS BINARY MESSAGES

1   The Maritime Safety Committee, at its seventy-eighth session (12 to 21 May 2004), approved SN/Circ.236 on Guidance on the application of AIS binary messages as prepared by the Sub-Committee on Safety of Navigation at its forty-ninth session (30 June to 4 July 2003).

2   Automatic Identification System (AIS) is a working system for ship identification and tracking that has the capability of the service of binary messages. The concept, functional requirements, and technical constraints are described in annex 1.

3   The Sub-Committee on Safety of Navigation, at its forty-ninth session selected seven (7) binary messages as shown in annex 2 to this circular to be used as a trial set of messages. The idea is to use this set of 7 messages for a trial period of 4 years with no change. It should be noted that 4 additional system-related messages identified in Recommendation ITU-R M.1371 are needed for the operation of the system.

4   The criteria for selecting the 7 trial messages were:

   .1   demonstrated operational need;

   .2   a cross-section of users, including ships, VTS, pilots, and port authorities; and

   .3   messages already developed for format and content.

5   In addition, messages were limited to a maximum number of 3 slots to reduce the potential for overloading the AIS frequencies designated for IMO.

6   In addition to these 7 messages and 4 system-related messages, the Sub-Committee agreed to allow 2 additional messages in the 4-year trial period to test the process of introducing new binary messages to users, manufacturers and the Organization.

7   By the end of the trial period, all SOLAS ships and a large number of non-SOLAS vessels, are expected to be equipped with AIS, allowing IMO to evaluate the benefit and practicability of AIS binary messages, as well as the loading of AIS frequencies.

8   If the evaluation is positive, the use of binary messages could be extended. Should a Member Government see the need to propose a new binary message, it should address to the Sub-Committee a demonstrated operational need and provide the proposed format and content of the message. Then, the Organization may accept, assign an identifier and publish it in an updated SN circular for the benefit of the maritime industry.

9   Member Governments are invited to bring the annexed information to the attention of all concerned.

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ANNEX 1

GUIDANCE ON AIS BINARY MESSAGES

1   This document provides an overview of the purpose and scope of AIS Binary Messages and their applications.

System Requirements

2   Binary Messages may be transmitted and received by shipborne mobile AIS devices and AIS base stations that are equipped to process these messages. Shore-based stations may receive ships' Binary Messages and distribute them to other ships and/or users.

3   The display capability of AIS binary messages is not part of the mandatory functions of the MKD (Minimum Keyboard and Display). The display of the information content of binary messages may require hardware additional to the AIS and dedicated software.

Purpose and scope of AIS Binary Messages

4   Automatic Identification System (AIS) was originally and is primarily a means for positive identification and tracking of vessels, e.g. by transmitting and receiving static, dynamic and voyage-related data of ships, as well as short safety related messages. In addition, AIS will be beneficial to the safety of navigation and protection of the environment by monitoring the maritime traffic and by providing various basic services. In particular, AIS may use Binary Messages as a means for certain types of limited communication. These messages will be dedicated to specific applications, which must be approved by IMO.

5   Binary Messages may be either Addressed Binary Messages or Broadcast Binary Messages. Recommendation ITU-R M.1371 specifies the technical characteristic and the structure of the binary messages. The content is tailored to different applications. IMO defines this content. To avoid system overload, the number of binary messages should be limited. Therefore, Binary messages should be approved only if there is a high operational need for them. These messages have to be distinguished from Addressed Safety Related Messages and Broadcast Safety Related Messages both of which allow the exchange of format-free ASCII-text.

6   Binary Messages may provide a variety of capabilities for pre-defined information packages. For example, they may permit:

-        ships to report information to other ships and shore stations,

-        shore stations to report navigation information, conditions and warnings,

-        ship reporting to be simplified.

7   Moreover, binary messages may reduce verbal communications and enhance reliable information exchange and reduce operator's workload. Binary Messages are not intended to replace standard services such as GMDSS and SAR.

Use of AIS Binary Messages

8   The use of Binary Messages is optional. Binary Messages may be generated manually or automatically. Pre-defined forms for each binary message type may be used to easily generate the message.

9   Since the use of binary messages places an additional load on the VHF data link, care must be taken not to impair the main functions of AIS for ship identification and tracking. In this regard, longer binary messages may adversely impact the VHF data link and should be avoided.

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ANNEX 2

APPLICATION 1
Message "METEOROLOGICAL AND HYDROLOGICAL DATA"

Parameter	No. of bits	Description
Message ID	6	Identifier for Message 8; always 8
Repeat Indicator	2	Used by the repeater to indicate how many times a message has been repeated.
Source ID	30	MMSI number of source station
Spare	2	Not used. Should be set to zero.
IAI	16	**DAC = 001; FI = 11**
Latitude	24	Measuring position, 0 to + /- 90 degrees, 1/1000th minute
Longitude	25	Measuring position, 0 to + /- 180 degrees, 1/1000th minute
Date and time	16	Time of transmission, Day, hour, minute, (ddhhmm in UTC)
Average wind speed	7	Average of wind speed values for the last 10 minutes. 0-120 kts, 1 kt
Wind gust	7	Wind gust is the maximum wind speed value reading during the last 10 minutes, 0 - 120 kts, 1 kt
Wind direction	9	0 - 359 degrees ,1 degree
Wind gust direction	9	0 – 359 degrees, 1 degree
Air temperature	11	Dry bulb temperature - 60.0 to + 60.0 degrees Celsius 0.1 of a degree
Relative humidity	7	0 – 100%, 1%
Dew point	10	- 20.0 - + 50.0 degrees, 0.1 degree
Air pressure	9	800 – 1200 hPa, 1 hPa
Air pressure tendency	2	0 = steady, 1 = decreasing, 2 = increasing
Horizontal visibility	8	0.0 – 25.0 NM, 0.1 NM
Water level (incl. tide)	9	Deviation from local chart datum, . –10.0 to + 30.0 m 0.1 m
Water level trend	2	0 = steady, 1 = decreasing, 2 = increasing
Surface current speed (incl. tide)	8	0.0 – 25.0 kts 0.1 kt
Surface current direction	9	0 – 359 degrees, 1 degree
Current speed, #2	8	Current measured at a chosen level below the sea surface, 0.0 – 25.0 kts, 0.1 kt
Current direction, #2	9	0 – 359 degrees, 1 degree
Current measuring level, #2	5	Measuring level in m below sea surface , . 0 –30 m 1 m
Current speed, #3	8	0.0 – 25.0 knots, 0.1 knot
Current direction, #3	9	0 – 359 degrees, 1 degree
Current measuring level, #3	5	Measuring level in m below sea surface, 0 – 30 m 1 m
Significant wave height	8	0.0 – 25.0 m, 0.1 m
Wave period	6	Period in seconds, 0 – 60 s, 1 s
Wave direction	9	0 – 359 degrees, 1 degree
Swell height	8	0.0 – 25.0 m, 0.1 m
Swell period	6	Period in seconds, 0 – 60 s, 1 s
Swell direction	9	0 – 359 degrees, 1 degree
Sea state	4	According to Beaufort scale (manual input?), 0 to 12, 1
Water temperature	10	-10.0 - + 50.0 degrees, 0.1 degree
Precipitation (type)	3	According to WMO
Salinity	9	0.0 – 50.0 ‰, 0.1‰
Ice	2	Yes/No
Spare	6	
Total Number of bits	352	Occupies 2 slots

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Purpose

This message allows the distribution of meteorological and hydrological information. Should there be no positional information or time of measurement, this message should not be transmitted. If there is no data available, default value to be transmitted is the highest available binary value for that particular data field. It is to be displayed as 'not available' (not 9999 or zero or similar). This message takes 2 slots. Not all the information specified in the tables will be available at all stations. The interval between the broadcasting of this message should not exceed 12 minutes. Attribute of message: broadcast, shore station transmitting, no acknowledgement required.

APPLICATION 2
Message "DANGEROUS CARGO INDICATION"

Parameter	No. bits	Description
Message ID	6	Identifier for Message 6, always 6
Repeat Indicator	2	Used by the repeater to indicate how many times a message has been repeated. Refer to § 4.6.1; 0 - 3; default = 0; 3 = do not repeat any more
Source ID	30	MMSI number of source station
Sequence Number	2	0 - 3; refer to § 5.3.1
Destination ID	30	MMSI number of destination station
Retransmit Flag	1	Retransmit Flag should be set upon retransmission: 0 = no retransmission = default; 1 = retransmitted.
Spare	1	Not used. Should be zero
IAI	16	**DAC = 001; FI =12**
Last Port of call	30	UN Locode 5 characters 6 bit ASCII "@@@@@" = not available = default
ATD from Last Port of Call	20	Actual Time of Departure; MMDDHHMM UTC
		Bits 19 – 16: month; 1 - 12; 0 = not available = default;
		Bits 15 – 11: day; 1 - 31; 0 = not available = default;
		Bits 10 - 6: hour; 0 - 23; 24 = not available = default;
		Bits 5 - 0: minute; 0 - 59; 60 = not available = default
Next Port of call	30	UN Locode 5 characters 6 bit ASCII "@@@@@" = not available = default
ETA at Next Port of Call	20	Estimated Time of Arrival; MMDDHHMM UTC
		Bits 19 – 16: month; 1 - 12; 0 = not available = default;
		Bits 15 – 11: day; 1 - 31; 0 = not available = default;
		Bits 10 - 6: hour; 0 - 23; 24 = not available = default;
		Bits 5 - 0: minute; 0 - 59; 60 = not available = default
Main Dangerous Good	120	Maximum 20 characters 6 bit ASCII "@@@@@@@@@@@@@@@@@@@@" = not available = default
IMD category of Main Dangerous Good	24	Maximum 4 characters 6 bit ASCII "@@@@" = not available = default
UN Number of Main Dangerous Good	13	1 - 3363 UN Number 3364- 8191 should not be used 0 = not available = default
Value of Quantity of Main Dangerous Good	10	0 = not available = default; 1 - 1023 = value of quantity
Unit of Quantity of Main Dangerous Good	2	0 = not available = default 1 = in kg 2 = in tons (10E3 kg) 3 = in 1.000 tons (10 E 6 kg)
Spare	3	Not used. Should be set to zero
Total Number of bits	360	Occupies 2 slots

Purpose:

This message should be used as a respond on a request for Dangerous Cargo Indication from a competent authority. The message content is essential to identify that harbour where the necessary documents for the dangerous goods cargo can be found, e. g. last and next port of call. The indication of main dangerous goods and its quantity gives at least an estimation of a potential danger. Intended Application: The data are for use of a competent authority only. Attributes of message: addressed, ship transmitting, no acknowledgement.

APPLICATION 3
Message "FAIRWAY CLOSED"

Parameter	No. of Bits	Description
Message ID	6	Identifier for Message 8; always 8
Repeat Indicator	2	Used by the repeater to indicate how many times a message has been repeated.
Source ID	30	Name of source station
Spare	2	Not used. Should be set to zero.
IAI	16	**DAC = 001; FI =** 13
Reason for closing	120	Maximum 20 characters 6-bit ASCII; „@@@@@@@@@@@@@@@@@@@@" = not available = default
Location of closing from	120	Maximum 20 characters 6-bit ASCII; „@@@@@@@@@@@@@@@@@@@@" = not available = default
Location of closing To	120	Maximum 20 characters 6-bit ASCII; „@@@@@@@@@@@@@@@@@@@@" = not available = default
Extension of closed area (radius)	10	extension; (valid range 0-1000, 1001 = not available = default)
Unit of extension value	2	0=[m], 1=[km], 2=[nm], 3=[cbl]
Closing from day	5	1-31; 0 = day not available = default
Closing from month	4	1-12; 0 = month unavailable = default;13-15 unused
From LT hour (appr)	5	0-23; 24 = LT hour not available = default; 25-31 not used
From LT minute (appr)	6	0-59; 60 = LT minute not available = default; 61-63 not used
To day	5	1-31; 0 = day not available = default
To month	4	1-12; 0 = month unavailable = default;13-15 unused
To LT hour (appr)	5	0-23; 24 = LT hour not available = default; 25-31 not used
To LT minute (appr)	6	0-59; 60 = LT minute not available = default; 61-63 not used
Spare	4	
Total number of bits	472	occupies 3 slots

Purpose

This message should be used to inform ships, in particular to give guidance to large vessels about temporary closed fairways or sections in ports. Attributes: broadcast, shore station transmitting, no acknowledgement.

APPLICATION 4
Message "TIDAL WINDOW"

Parameter	No. of bits	Description
Message ID	6	Identifier for Message 6; always 6
Repeat Indicator	2	Used by the repeater to indicate how many times a message has been repeated. 0-3; 0 = default; 3 = do not repeat anymore
Source ID	30	MMSI number of source station
Sequence Number	2	0-3.
Destination ID	30	MMSI number of destination station
Retransmit Flag	1	Retransmit Flag should be set upon retransmission: 0 = no retransmission = default; 1 = retransmitted.
Spare	1	Not used. Should be zero.
IAI	16	**DAC = 001; FI** = 14
UTC month	4	1-12; 0 = UTC month not available = default; 13-15 not used
UTC day	5	1-31; 0 = UTC day not available = default
Position #1 Lat	27	1/10 000 min (±90 degrees, North = positive, South = negative; 91 degrees = not available = default).
Position #1 Lon	28	1/10 000 min (±180 degrees, East = positive, West = negative; 181 degrees = not available = default).
From UTC hour	5	0-23; 24 = UTC hour not available = default; 25-31 not used
From UTC minute	6	0-59; 60 = UTC minute not available = default; 61-63 unused
To UTC hour	5	0-23; 24 = UTC hour not available = default; 25-31 not used
To UTC minute	6	0-59; 60 = UTC minute not available = default; 61-63 unused
Current direction predicted #1	9	Current direction in degrees. (valid range 0-359, 360 = not available = default).
Current speed predicted #1	7	Current speed in 0,1 knots. (valid range 0-126; 127 = not available = default).
Position #2 Lat	27	1/10 000 min (±90 degrees, North = positive, South = negative; 91 degrees = not available = default).
Position #2 Lon	28	1/10 000 min (±180 degrees, East = positive, West = negative; 181 degrees = not available = default).
From UTC hour	5	0-23; 24 = UTC hour not available = default; 25-31 not used
From UTC minute	6	0-59; 60 = UTC minute not available = default; 61-63 unused
To UTC hour	5	0-23; 24 = UTC hour not available = default; 25-31 not used
To UTC minute	6	0-59; 60 = UTC minute not available = default; 61-63 unused
Current direction predicted #2	9	Current direction in degrees. (valid range 0-359, 360 = not available = default).
Current speed predicted #2	7	Current speed in 0,1 knots. (valid range 0-126; 127 = not available = default).
Position #3 Lat	27	1/10 000 min (±90 degrees, North = positive, South = negative; 91 degrees = not available = default).
Position #3 Lon	28	1/10 000 min (±180 degrees, East = positive, West = negative; 181 degrees = not available = default).
From UTC hour	5	0-23; 24 = UTC hour not available = default; 25-31 not used
From UTC minute	6	0-59; 60 = UTC minute not available = default; 61-63 unused
To UTC hour	5	0-23; 24 = UTC hour not available = default; 25-31 not used
To UTC minute	6	0-59; 60 = UTC minute not available = default; 61-63 unused
Current direction predicted #3	9	Current direction in degrees. (valid range 0-359, 360 = not available = default).
Current speed predicted #3	7	Current speed in 0,1 knots. (valid range 0-126; 127 = not available = default).
Total number of bits	376	occupies 3 slots

Purpose

This message should be used to inform vessels about tidal windows which allow a vessel the safe passage of a fairway. The message includes predictions of current speed and current direction. In this example, three points of tidal information are given. Attributes of message: addressed, shore station transmitting, acknowledgement required.

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APPLICATION 5
Message "EXTENDED SHIP STATIC AND VOYAGE RELATED DATA"

Parameter	No. of bits	Description
Message ID	6	Identifier for Message 8; always 8
Repeat Indicator	2	Used by the repeater to indicate how many times a message has been repeated.
Source ID	30	Name of source station
Spare	2	Not used. Should be set to zero.
IAI	16	**DAC =001; FI =**15
Air Draught	11	in 1/10 m, 2047 = height over keel 204.7 m or greater, 0 = not available = default
Spare	5	Not used. Should be set to zero.
Total Number of Bits	72	This message uses one slot

Purpose

This message should be used by a ship to report the height over keel.
Attributes: broadcast, ship transmitting, no acknowledgement.

APPLICATION 6
Message "NUMBER OF PERSONS ON BOARD"

Parameter	No. of bits	Description
Message ID	6	Identifier for Message 86; always 86
Repeat Indicator	2	Used by the repeater to indicate how many times a message has been repeated.
Source ID	30	Name of source station
Spare	2	Not used. Should be set to zero.
IAI	16	**DAC = 001; FI =**16
Number of Persons	13	Current number of persons on-board, including crew members: 0 – 8191; default = 0 = not available; 8191 = 8191 or more
Spare	3	Not used. Should be set to zero.
Total Number of Bits	72	This message uses one slot

Purpose

This message should be used by a ship to report the number of persons on board, e.g. on request by a competent authority.
Attributes: addressed, acknowledgement required.

APPLICATION 7
Message "PSEUDO-AIS TARGETS"

Parameter	No. of bits	Description
Message ID	6	Identifier for Message 8; always 8
Repeat Indicator	2	Used by the repeater to indicate how many times a message has been repeated.
Source ID	30	Name of source station
Spare	2	Not used. Should be set to zero.
IAI	16	**DAC = 001; FI =**17
VTS Target 1	120	Refer to table below; occupies 2 slots
VTS Target 2	120	Optional; refer to table below; occupies 2 slots
VTS Target 3	120	Optional; refer to table below; occupies 3 slots
VTS Target 4	120	Optional; refer to table below; occupies 3 slots
Total Number of bits	Max 536	3 slots

Each VTS Target should be structured as follows:

Parameter	No. Of Bits	Description
Type of Target Identifier	2	Identifier Type: 0 = The target identifier should be the MMSI number. 1 = The target identifier should be the IMO number. 2 = The target identifier should be the call sign. 3 = Other (default).
Target ID	42	Target Identifier. The Target ID should depend on Type of Target Identifier above. When call sign is used, it should be inserted using 6-bit ASCII. If Target Identifier is unknown, this field should be set to zero. When MMSI or IMO number is used, the least significant bit should equal bit zero of the Target ID.
Spare	4	Spare. Should be set to zero.
Latitude	24	Latitude in 1/1000 of a minute.
Longitude	25	Longitude in 1/1000 of a minute.
COG	9	Course over ground in degrees (0-359); 360 = not available = default.
Time Stamp	6	UTC second when the report was generated (0-59, or 60 if time stamp is not available, which should also be the default value)
SOG	8	Speed over ground in knots; 0-254; 255 = not available = default.
Total Number of bits	120	

A VTS target should only be used, when the position of the target is known. However, the target identity and/or course and/or time stamp and/or speed over ground may be unknown.

Purpose

This message should be used to transmit VTS targets. This message should be variable in length, based on the amount of VTS targets. The maximum of VTS Targets transmitted in one International FM 16 should be seven (7). Because of the resulting effects of VDL channel loading, the transmission of International FM 16 should be no more than necessary to provide the necessary level of safety.

Attributes: broadcast, VTS transmitting, no acknowledgement**.**

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