INVENTORY FOR HARMONISED INLAND AIS APPLICATION SPECIFIC MESSAGES IN EUROPE

GUIDELINES OF THE VTT EXPERT GROUP

Edition 1.2

Version: 12-07-2017

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1 PURPOSE OF THIS DOCUMENT

The Vessel Tracking and Tracing (VTT) standard already defines two Application Specific Messages (ASM) which are a feature of the Inland AIS mobile station without need for an external application so usable on the mobile station through the Minimum Keyboard Display (MKD)

Namely these messages are:

- Inland ship static and voyage related data (see VTT standard)
- Number of persons on board (see VTT standard)

The VTT standard defines information needs on top of these Inland AIS messages. These can be implemented using Application Specific Messages input, processed, stored and displayed using external applications such as Inland ECDIS.

These Inland ASM are maintained and published as guidelines by the VTT Expert Group.

The purpose of this Inland ASM collection is to allow European-wide, homogeneous services for the users of inland waterways and to ease the implementation of Inland ASM on side of the equipment manufacturers.

The following Inland ASM have been defined and approved by the VTT expert group:

- ETA message (Chapter 3.2)
- RTA message (Chapter 3.3)
- EMMA warning message – discontinued – (Chapter 3.4)
- Water Level message (Chapter 3.5)
- Signal Status message – discontinued – (Chapter 3.6)
- Signal Lights message (Chapter 3.7)
- Present Bridge clearance message (Chapter 3.8)
- Control Message (Chapter 3.9)

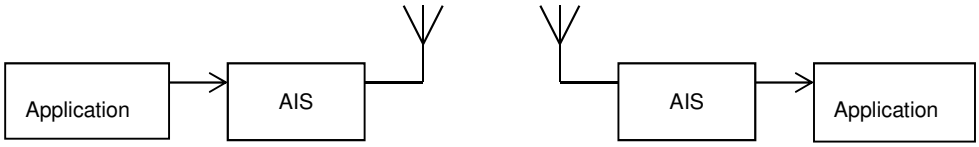
2 INTRODUCTION

AIS was originally developed as a means for positive identification and tracking of vessels. This was accomplished by transmitting and receiving static, dynamic, and voyage-related data of vessels, as well as short safety-related messages. In addition AIS may use binary messages for transmission of Application Specific Messages (ASM) as a means for certain types of limited communications.

AIS messages where the data content is defined by the application are ASM.

AIS allows the transfer of ASM via the VHF Data Link (VDL) as a means of communication for external applications as specified in ITU-R M.1371. It will be a form of data exchange between externally connected users of two or more AIS stations. AIS will just function as the carrier of the information, the AIS stations involved act as dedicated modems. Examples of this are the binary Messages 6, 8, 25 and 26. The data content does not affect the operation of the AIS. AIS is a means for transferring the data content between stations. A functional message's data structure consists of an application identifier (AI) followed by the application data.

The following picture illustrates the use of ASM.



In general there are the following modes of using ASM. These modes can be handled by all types of AIS stations.

1. Addressed ASM (using AIS Message 6) which will be transmitted from any AIS station to one specific receiving AIS station.
2. Broadcast ASM (using AIS Message 8) which will be transmitted from any AIS station to all other receiving AIS stations within the receiving range.

In addition to the two general modes of ASM two additional modes are introduced in ITU-R M.1371. Those new modes of ASM cannot be used by older types of AIS stations which probably do not recognise received messages of these types. Both modes cannot be acknowledged.

3. Single slot ASM (using AIS Message 25) which can be addressed or broadcast from any AIS station.
4. Multiple slot ASM with Communication State (using AIS Message 26) which can be addressed or broadcast from any AIS station.

Warning: Mode 3 and 4 are not commonly used by the majority of existing AIS mobile stations today and in the near future. Thus the use of those modes shall be avoided or restricted to special conditions. It is not recommended to use Mode 3 and 4 for the transmission of inland related information.

For a description on the structure of ASM the ITU-M.1371 refers. This includes also a guideline for creating functional messages. As described, there are two types of ASM:

1. International Functional Messages (IFM)
   They are maintained by international agreement for global use. This type can be sub-divided by

   a. System applications related IFM which are part of AIS and designed to support AIS as system. They are maintained by ITU and published in ITU-M.1371.

   b. All other IFM which are maintained by IMO and published in IMO SN.1/Circ.289 (superseding SN/Circ.236 from 1 January 2013).
      IFM is recognised by Designated Area Code (DAC) = 1, followed by the Function Identifier (FI).

2. European Inland ASM
   Within Europe DAC 200 is used as a common DAC for official ASMs published in the inventory of UNECE.
   The DAC is followed by an FI to identify a specific application for Europe.
   The coordination of proposed new Inland ASM is done by the VTT Expert Group in order to ensure a harmonised approach on European inland waterways.

3. Regional Functional Messages (RFM)
   They are maintained by regional competent authorities. They can be used globally or in a defined area only. RFM is recognised by the DAC (based on the Maritime Identification Digits (MID) of the territory or geographical area of the responsible Administration). MID is assigned by ITU and is ranging from 201 till 799. The DAC is followed by an FI to identify a specific application for that particular region.

3 APPROVED APPLICATION SPECIFIC MESSAGES FOR INLAND WATERWAYS

3.1 Allocation of function identifiers (FI) within the Inland AIS branch

FI within the Inland AIS branch for approved messages

FI [1]	Version	Year of publication	Name of regional function message	Sent by	Broad-cast	Addres-sed	Notes	chapter
19	0	2017	Control Message	Shore	X			3.9
21	- [2]	2007	ETA at lock/bridge/ Terminal	Ship		X		3.2
22	- [2]	2007	RTA at lock/bridge/ Terminal	Shore		X		3.3
23	- [2]	2007	EMMA warning	Shore	X		No longer supported	3.4
24	- [2]	2007	Water level	Shore	X			3.5
25	0	2016	Present Bridge Clearance	Shore	X			3.6
40	- [2]	2007	Signal status	Shore	X		No longer supported	3.7
41	0	2016	Signal Station	Shore	X		Replacing FI 40	3.8

[1] FI ranges: 1-9 = reserved, 10-19 = general ship-borne usage, 20-39 = VTS/VTM usage, 40-54 = AtoN usage, 55-63 = Search and Rescue usage

[2] no version indicator available

3.2 Estimated Time of Arrival (ETA) message

Published:	**2007**	Version:	no version field in the message
DAC:	**200**	FI:	**21**
Sent from:	**Ship (default on)**	Sent to:	**Base Station**
Summary of changes:			
	This message cannot be changed due to lack of version indicator		

3.2.1 Introduction:

The ETA message shall be sent from vessel to shore (lock, open-able bridge or terminal) in order to inform that the vessel is heading towards the object and desires handling (locking, passing, berthing, transhipment, etc.) at the submitted date and time.

3.2.2 Additional Information / usage notes:

- An acknowledgement by the RTA message (Inland ASM FI 22) should be received within 15 minutes. Otherwise the ETA message should be repeated once. After additional 15 minutes the user shall be notified that no answer has been received.
- A virtual MMSI number matching the country of the destination addressed by the ETA (see 3.2.4) shall be used for each country, each national AIS network shall route messages addressed to other countries or different national AIS networks using this virtual MMSI number
- In case no virtual MMSI number is available, the ETA message shall be sent to the closest AIS Base Station
- UN country code, UN location code, Fairway section number, Object code and Fairway hectometre shall be derived from the ISRS code as part of the RIS Index published in the European Reference Data Management System (ERDMS).
- The ETA shall always be transmitted in UTC but for input and display converted in local time of the destination.
- The air draught shall be the minimum (e.g. with lowered wheelhouse / antenna mast) static air draught at speed = 0

3.2.3 Structure:

Parameter	Bit	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. Default = 0; 3 = do not repeat any more
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 set to zero
Binary data	Application Identifier	16	DAC = 200 FI = 21
	UN country code	12	2*6 Bit characters
	UN location code	18	3*6 Bit characters
	Fairway section number	30	5*6 Bit characters
	Object code	30	5*6 Bit characters
	Fairway hectometre	30	5*6 Bit characters
	ETA at lock/bridge/terminal	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
	number of assisting tugboats	3	0 - 6, 7 = unknown = default
	Air draught	12	0 - 4000 (rest not used), in 1/100m, 0 = default = not used
	Spare	5	not used. Should be set to zero
	Total	**248**	**occupies 2 slots**

3.2.4 List of virtual MMSI numbers:

V-MMSI	Country
002039991	Austria
n.a.	Belgium
n.a.	Bulgaria
n.a.	Germany
n.a.	Moldova
002268000	France
n.a.	Croatia
n.a.	Hungary
n.a.	The Netherlands
n.a.	Italy
n.a.	Luxembourg
n.a.	Poland
n.a.	Romania
n.a.	Slovak Republic
n.a.	Switzerland
n.a.	Czech Republic
n.a.	Ukraine
n.a.	Russian Federation
n.a.	Serbia

3.3 Requested Time of Arrival (RTA) message

Published:	**2007**	Version:	no version field in the message
DAC:	**200**	FI:	**22**
Sent by:	**Shore**	Sent to:	**Ship**
Summary of changes:			
	This message cannot be changed due to lack of version indicator		

3.3.1 Introduction:

The RTA message shall be sent as answer to a previously received ETA message (Inland ASM FI 21) from shore to the vessel to confirm the requested time of arrival, or to propose a different schedule.

3.3.2 Additional Information:

- As an answer to an ETA message, the RTA shall be sent within 15, maximum 30 minutes after the reception of the initial ETA message.
- An RTA message might also be solely initiated by a shore application, e.g. a lock, to inform the addressed ship of the requested time of arrival. An optional ETA message may be sent from vessel to shore to confirm the proposed RTA. If the vessel agrees with the RTA, the time of arrival in the ETA answer shall match with the RTA. In this case no further confirmation RTA shall be expected.
- UN country code, UN location code, Fairway section number, Terminal code and Fairway hectometre shall be derived from the ISRS code as part of the RIS Index published in the European Reference Data Management System (ERDMS).
- The RTA shall always be transmitted in UTC but for input and display converted in local time of the destination.

3.3.3 Structure:

Parameter	Bit	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. Default = 0; 3 = do not repeat any more
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 set to zero

Binary data	Application Identifier	16	DAC = 200, FI = 22
	UN country code	12	2*6 Bit characters
	UN location code	18	3*6 Bit characters
	Fairway section number	30	5*6 Bit characters
	Terminal code	30	5*6 Bit characters
	Fairway hectometre	30	5*6 Bit characters
	RTA at lock/bridge/terminal	20	Recommended 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
	Lock/bridge/terminal status	2	0 = operational 1 = limited operation 2 = out of order 3 = unknown
	spare	2	not used. Should be set to zero
	Total	**232**	**occupies 2 slots**

3.4 EMMA message

Published:	**2007**	Version:	no version field in the message
DAC:	**200**	FI:	**23**
Sent by:	**Shore**	Sent to:	**Ship**

Summary of changes:

This message cannot be changed due to lack of version indicator

This message is obsolete and shall not be used

Refer to edition 1.2 of the VTT standard for legacy information

3.5 Water Level message

Published:	**2007**	Version:	no version field in the message
DAC	**200**	FI	**24**
Sent by:	**Shore**	Sent to:	**Ship**

Summary of changes:

This message cannot be changed due to lack of version indicator

3.5.1 Introduction:

This message should be used to inform skippers about actual water levels in their area. It is additional short term information to the water levels distributed via Notices to Skippers. The update rate shall be defined by the competent authority. It is possible to transmit the water levels of more than 4 gauges using multiple messages.

3.5.2 Additional Information:

- This message should be sent from shore only, to give water level information to all vessels in a certain area. The message should be sent at regular intervals.
- The UN country code and the national unique gauge ID shall be derived from the ISRS code of the gauge station code as part of the RIS Index published in the European Reference Data Management System (ERDMS).
- The water level information shall be coded as the difference value of the gauge to the reference water level (e.g. GIW in Germany, RNW on the Danube) as positive or negative value. The Least significant Bit (LSB) of the water level code is used to indicate if the water level is higher or lower as the reference water level. Therefore the definition is different to the usual bit-coding of integer values.

3.5.3 Structure:

	Parameter	Bit	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. Default = 0; 3 = do not repeat any more
	Source ID	30	MMSI number
	Spare	2	Not used, should be set to zero. Reserved for future use.
Binary data	Application Identifier	16	As described in Table 2.6
	UN country code	12	UN country code using 2*6-Bit ASCII characters; 0 = not available = default
	Gauge ID	11	National unique ID of gauge 1-2047, 0 = default = unknown
	Water level	14	Bit 0: 0 = negative value, 1 = positive value Bits 1-13: 1-8191, in 1/100m, Bits 0-13: 0 = unknown = default
	Gauge ID	11	National unique ID of gauge 1-2047, 0 = default = unknown
	Water level	14	Bit 0: 0 = negative value, 1 = positive value Bits 1-13: 1-8191, in 1/100m, Bits 0-13: 0 = unknown = default
	Gauge ID	11	National unique ID of gauge 1-2047, 0 = default = unknown
	Water level	14	Bit 0: 0 = negative value, 1 = positive value Bits 1-13: 1-8191, in 1/100m, Bits 0-13: 0 = unknown = default
	Gauge ID	11	National unique ID of gauge 1-2047, 0 = default = unknown
	Water level	14	Bit 0: 0 = negative value, 1 = positive value Bits 1-13: 1-8191, in 1/100m, Bits 0-13: 0 = unknown = default
	Total	**168**	**occupies 1 slot**

3.6 Signal Status message

Published:	**2007**	Version:	no version field in the message
DAC:	**200**	FI:	**40**
Sent by:	**Shore**	Sent to:	**Ship**

Summary of changes:

This message cannot be changed due to lack of version indicator

This message is outdated and deprecated

Refer to edition 1.2 of the VTT standard for legacy information

3.7 Signal Station message

Published:	**2016**	Version:	0
DAC:	**200**	FI:	**41**
Sent by:	**Shore**	Sent to:	**Ship**

Summary of changes:

0 – initial version, replacing FI 40

3.7.1 Introduction:

This message should be sent from a competent authority only, to inform about the status of different light signals at signal stations to all vessels in a certain area. The information should be displayed on an external display such as Inland ECDIS application as dynamic symbols. This message is an updated version of the “Light status message” (FI40) which cannot be updated due to the lack of a version indicator.

3.7.2 Additional Information:

- This message should only been send by a competent authority from shore only. The message should be sent at regular intervals.
- The ISRS code indicates the position of the signal and shall allow the match with the IECDIS display. It consists of UN country code, Fairway section number, Object code and fairway hectometre and is derived from the RIS Index as published in the ERDMS. The object code is used in a reduced way. The first two characters of the ISRS code for signal stations which are always “Si” are not transmitted. The type of traffic signal station and the number of signal station according to the RIS Index encoding guide are transmitted separately using the codification given in the table below. The IENC application has to recover the ISRS code and match it with the right ISRS code of the IENC, taking into consideration that the UN location code is missing.
- The light status is coded from left to right from light signal 1 to 9.

3.7.3 Structure:

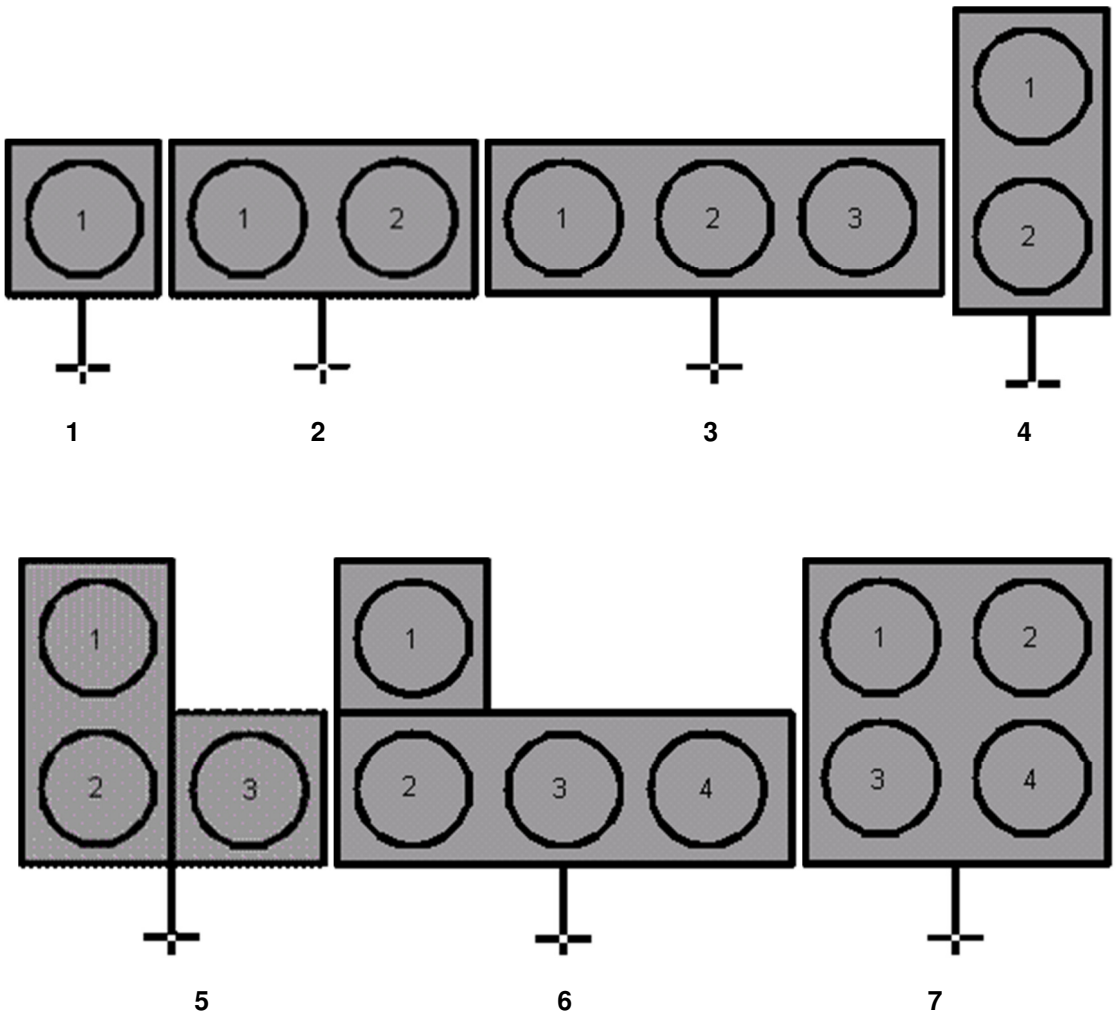
	Parameter	Bit	Description
	Message ID	6	Identifier for Message 8; always 8
	Repeat Indicator	2	Used by the repeater to indicate how many times a message has been repeated. Default = 0; 3 = do not repeat any more
	Source ID	30	MMSI number
	Spare	2	not used, should be set to zero
Binary data	Application Identifier	16	DAC = 200, FI = 41
	Version indicator	3	The version number of the message default = 0, rest for future use
	UN country code	12	2*6 Bit characters, digits 1 and 2 of the ISRS code
	Fairway section number	17	bit coded numerical value 1-99999, 0=unknown, rest not used, digits 6 to 10 of the ISRS code
	Object reference code - type of signal station	3	0-7; 0 = default = unknown, 1 = sistat_8 (Bridge), 2 = sistat_6 (Lock), 3 = sistat_10 (Traffic), 3 = sistat_2 (Port), rest reserved for future use not used, digits 13 and 14 of the ISRS code
	Object reference code - number of signal station	4	0-16; 0-9 = number of signal station, 10 = default = unknown, rest not used, digit 15 of the ISRS code
	Fairway hectometre	17	bit coded numerical value 1-99999, 0=unknown, rest not used, digits 16 to 20 of the ISRS code
	Signal form	4	0-15, 0 = unknown = default, 1-14 signal form according to Figure 3-1
	Orientation of signal	9	0-511, 0 – 359 = orientation in degrees, 511 = not available = default, rest not used
	Direction of impact	3	1 = upstream, 2 = downstream, 3 = to the left bank, 4 = to the right bank, 0 = unknown = default, rest not used
	Light Status	30	Status (1 to 7) of up to 9 lights per signal according to Figure 3-1, 0 = default = unknown, 8-9 not used, 000000000 = default, 777777777 maximum, rest not used
	Spare	10	not used. Should be set to zero
	Total	**168**	**occupies 1 slot**

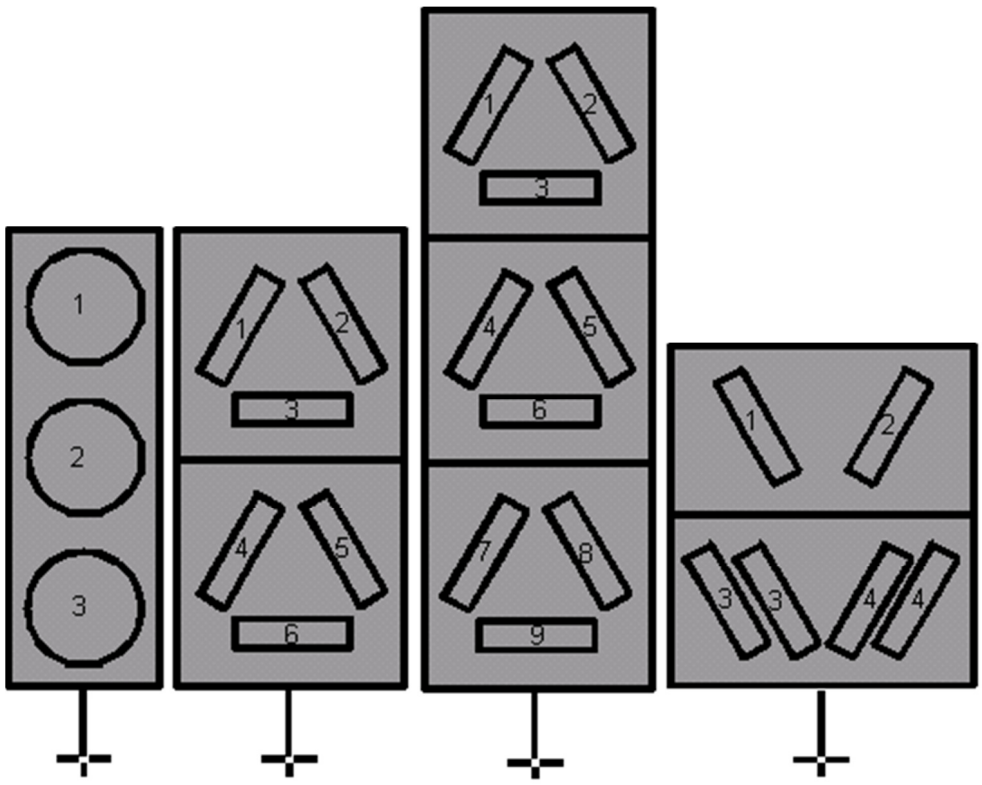
3.7.4 Reference tables:

The examples show a grey background in a square of a fixed size of about 3 mm x 3 mm at all display scales with a “post” like it is used for the present static signal in the presentation library. The white point in the centre of the post indicates the position and the post itself allows the user to read the direction of impact. (At a lock, for example, there are often signals for vessels leaving the lock chamber and vessels entering the lock chamber on the inner and the outer side of the door construction) However, the manufacturer of the display software can design the shape of the symbol and the background colour.

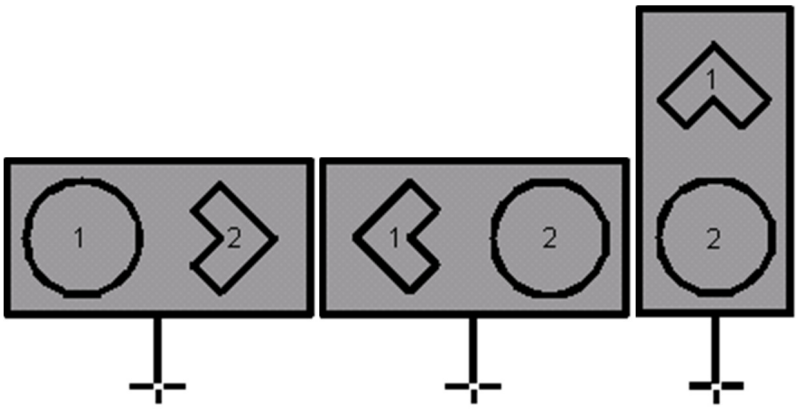
The status of a signal can be “No light”, “white”, “yellow”, “green”, “red”, “white flashing” and “yellow flashing” according to CEVNI.

Figure 3-1 signal forms





8 **9** **10** **11**



12 **13** **14**

For each of these signals there are a lot of possible combinations of lights. It is required to use

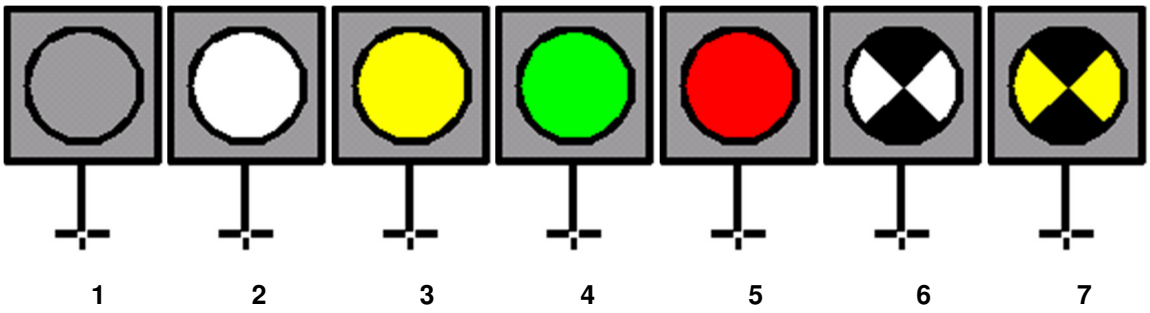
A number to indicate the kind of signal and

A number for each light on a signal to indicate its status

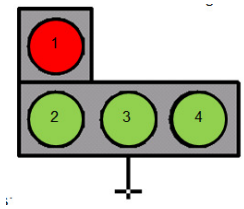
- 1 = no light,
- 2 = white,
- 3 = yellow,
- 4 = green,
- 5 = red,
- 6 = white flashing and

– 7 = yellow flashing.

Figure 3-2 light status codes



Example: Signal form: 6, light status: 544400000



3.8 Present Bridge Clearance message

Published:	**2016**	Version:	0
DAC:	**200**	FI:	**25**
Sent by:	**Shore**	Sent to:	**Ship**
Summary of changes:			
	0 – initial version		

3.8.1 Introduction:

This message shall be sent from shore only, to inform dynamically about the about the actual minimum vertical clearance of a certain bridge opening. The information shall be displayed on an external display such as Inland ECDIS.

3.8.2 Additional Information:

- This message should only been send by a competent/waterway authority from shore only.
- The ISRS code indicates the position of the signal and shall allow the match with the IECDIS display. It consists of UN country code, Fairway section number, Object code and fairway hectometre as published in the ISRS code as part of the RIS Index published in the European Reference Data Management System (ERDMS).
- The bridge clearance value is the actual measured distance from the water surface to the lowest part of the bridge opening according to the width of the fairway given in the IENC.
- The time to the last measurement is the known time in minutes from the measurement to the transmission over AIS.
- If an accuracy information is provided it has to be subtracted from the given actual bridge clearance in worst case. It must by no means seen as indication of additional actual bridge clearance.

3.8.3 Structure:

	Parameter	Bit	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. Default = 0; 3 = do not repeat any more
	Source ID	30	MMSI number
	Spare	2	not used, should be set to zero (reserved for future use)
Binary data	Application Identifier	16	DAC = 200, FI = 25
	Version indicator	3	The version number of the message default = 0, rest for future use
	UN country code	12	2*6 Bit characters
	Fairway section number	17	bit coded numerical value 1-99999, 0=unknown, rest not used
	Object code	30	5*6 Bit characters
	Fairway hectometre	17	bit coded numerical value 1-99999, 0=unknown, rest not used

	Bridge Clearance	14	from water surface to lowest point of the bridge in the fairway [in cm] bit coded numerical value 1-9999, 0=unknown, rest not used
	Time to the last measurement [min]	10	age of bridge clearance value in minutes bit coded numerical value 0-720, 721=older than 12 hours, 722=unknown, rest not used
	Accuracy	5	bit coded numerical value indicating the accuracy of the bridge clearance 0=unknown, 1-30 = accuracy (+/-) in cm is better than the given value, 31=accuracy worse than +/- 30cm
	Spare	4	not used. Should be set to zero
	Total	**168**	**occupies 1 slot**

3.9 Control Message

Published:	**2017**	Version:	0
DAC:	**200**	FI:	**19**
Sent from:	**Shore**	Sent to:	**Ship**
Summary of changes:			
	0 - Initial version		

3.9.1 Introduction:

The Control message shall be sent from by the competent authority from shore only to allow or forbid the broadcasting of ASMs by vessels navigating on territories under their jurisdiction.

3.9.2 Additional Information / usage notes:

- Each ASM from ship in this inventory has a default “on” or “off” value. This value regulates whether that message shall be broadcasted or not prior to the reception of an applicable Control Message.
- The responsibility for initiating/withholding the broadcasting of an ASM from ship is at the external application (e.g. Inland ECDIS).
- Each Control Message can control one specific ASM (DAC+FI). If more than on ASM has to be controlled, multiple Control Messages are needed.
- A Control Message can only control the ASM behaviour for one country, given by the UN country code.
- A Control Message can optionally be geographically limited to a certain river (fairway section code) or a specific fairway section, defined by start and end river-kilometre.
- The competent authority has to define the timeout value for the Control Message. By setting the timeout value to 0 the message will never time out. That means the value is stored and will only be changed if a contrary Control Message is received.
- The Control message can set or change the reporting rate of the controlled ASM. The reporting rate defined in the Control Message precedes any default setting given in this inventory document
- The Control Message also applies for responses to the Interrogation on specific IFM (IFM 2).

3.9.3 Structure:

	Parameter	Bit	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. Default = 0; 3 = do not repeat any more
	Source ID	30	MMSI number
	Spare	2	not used, should be set to zero (reserved for future use)
Binary data	Application Identifier	16	DAC = 200, FI = 19
	Version indicator	3	The version number of the message default = 0, rest for future use
	UN country code	12	2*6 Bit characters UN Country code of applicable country
	Fairway section number	17	Bit coded numerical value, 1-99999, 0 = not applicable, to which control message it is applicable
	Fairway kilometre Start	12	Start kilometre of the fairway section where the control message applies bit coded numerical value, 0-4000, 4095 = the whole fairway section, rest not used
	Fairway kilometre End	12	End kilometre of the fairway section where the control message applies bit coded numerical value, 0-4000, 4095 = the whole fairway section, rest not used
	Application Identifier of controlled ASM	16	DAC and FI of the shipborne ASM to be controlled DAC = 200, FI = XXX
	Timeout Value	11	Timeout of the Control Message in minutes bit coded numerical value, 0 = forever until disabled message has been received, 1-2047 timeout in minutes, default = 120
	Reporting Interval	8	Reporting interval of the controlled ASM in minutes Bit coded numerical value, 0 = default = default value specified for the controlled ASM, 1-255 reporting interval
	Enable-Disable	1	0 = Disable message, default 1 = Enable message
	Spare	20	not used. Should be set to zero
	Total	**168**	**occupies 1 slot**