GUIDELINES FOR THE VISUALISATION OF INLAND AIS RELATED DATA IN INLAND ECDIS DISPLAYS

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1   INTRODUCTION

The current edition 2.3 of the Inland ECDIS standard defines the colours and symbols to be used for the visualisation of received AIS targets and the time out values of the target information. The requirements are partially deviating from the information mode to the navigation mode.

Other data like (Inland) ship static and voyage related data as well as certain dynamic data items, received application specific messages and the display and input of own ship data are not yet covered by the Inland ECDIS standard.

This document shall provide guidelines for the visualisation of those data in order to support safe and easy usage of Inland AIS data in Inland ECDIS displays on board a vessel. These guidelines complement the existing Inland ECDIS and VTT Standards and have only recommendatory character.

2   REFERENCES

The content of this document is partially based on or refers to:

Document title	Organization	Publication date
Directive 2005/44/EC of the European Parliament and of the Council of 7 September 2005 on harmonised river information services (RIS) on inland waterways in the community	EU	7.9.2005
Commission Regulation (EC) No 415/2007 of 13 March 2007 concerning the technical specifications for vessel tracking and tracing systems referred to in Article 5 of Directive 2005/44/EC of the European Parliament and of the Council on harmonised river information services (RIS) on inland waterways in the Community	EU	13.3.2007
Commission implementation regulation (EU) No 689/2012 of 27 July 2012 amending Regulation No 415/2007 of 13 March 2007 concerning the technical specifications for vessel tracking and tracing systems referred to in Article 5 of Directive 2005/44/EC of the European Parliament and of the Council on harmonised river information services (RIS) on inland waterways in the Community	EU	27.7.2012
Commission Regulation (EC) No 909/2013 of 10 September 2013 concerning the technical specifications for the electronic chart system and information system for inland navigation (Inland ECDIS) to in Article 5 of Directive 2005/44/EC of the European Parliament and of the Council on harmonised river information services (RIS) on inland waterways in the Community	EU	10.09.2013
Commission Regulation (EU) No 164/2010 of 25 January 2010 on the technical specifications for Electronic Reporting in inland navigation	EU	25.01.2010
IMO Resolution MSC.232(82), Appendix 3; REVISED PERFORMANCE STANDARDS FOR ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEMS (ECDIS)	IMO	December 2006
International Standard IEC 62388, Maritime navigation and radiocommunication equipment and systems - Shipborne radar - Performance	IEC	June 2013

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Document title	Organization	Publication date
requirements, methods of testing and required test results		
International Standard IEC 62288, Maritime navigation and radiocommunication equipment and systems - Presentation of navigation-related information on shipborne navigational displays - General requirements, methods of testing and required test results	IEC	July 2014
Recommendation ITU-R M.1371, "Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band"	ITU	February 2014
International Standard IEC 61993-2, Edition 2 "Maritime navigation and radio communication equipment and systems – Automatic Identification System, Part 2: Class A shipborne equipment of the universal automatic identification system (AIS)"	IEC	October 2012
International Standard IEC 61162-1, "Maritime navigation and radio communication equipment and systems - Digital interfaces - Part 1: Single talker and multiple listeners"	IEC	August 2016
"Part 1: Single talker and multiple listeners"		Nov. 2010
"Part 2: Single talker and multiple listeners, high speed transmission"		Sept. 1998
UNECE Location code (RECOMMENDATION No. 16)	UNECE	1998
UNECE Ship type code (RECOMMENDATION No. 28) [not all ship type codes are used in VTT]	UNECE	2014 / 2010
CCNR Technical clarifications on Inland AIS	CCNR	2008
Minimum requirements for Inland ECDIS devices in information mode and comparable chart display devices for using Inland AIS data on board	CCNR	2014

3   GENERAL REQUIREMENTS

The following requirements shall apply for Inland ECDIS applications both Information and Navigation mode. It shall also be applicable for other charts displays.

The requirements defined in the Inland ECDIS standard shall be met.

Wherever coded data elements are provided for display to or input by the user only the translated clear text values shall be shown to the skippers.

Further it is recommended to allow intelligent search fields and optional filter parameters for all input fields which allow more than 10 different values from a pre-defined list.

In order to avoid the input of wrong or inconsistent data the applications shall integrate consistency-checks wherever possible and provide user guidance in case that values out of the range defined by the standard are input by users.

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3.1 Display of own vessel data

Inside the chart area the display shall present the following AIS information:

- Position of the own vessel
- Pointed vessel/convoy outline of the own vessel when heading information is available and shall be scale dependent.

In addition to the display of the AIS targets plus navigation data displayed on the chart, the Inland ECDIS application shall be able to constantly present the skipper with the following data, outside the chart area:

- Own vessel's position (River plus River-km taken from IENC, "N/A" if not known)
- Actual navigational status (in clear text as given by ITU-R M.1371). The Inland ECDIS application shall give an indication if the vessel is moving when the status is set to "at anchor" or "moored"
- Status of the blue sign in case of direct connection (set / not set) if not displayed in the own vessel symbol
- Speed over ground (SOG) [in km/h]
- Rate of Turn (ROT) (if available)
- Further it shall display a warning message or symbol in case of malfunctions of the Inland AIS unit:
  - if the connection to the Inland AIS mobile station has been lost (no VDO received for more than 5 seconds)
  - display of AIS alarms (VSWR, Tx malfunction, UTC indirect,…)
- The absence of DGPS data shall be indicated to the user (different level than warning/alarm) (on configuration)
- The actual dangerous cargo setting shall be indicated to the user (if not displayed in the own vessel symbol / on configuration)

In addition the following data shall be readable via a dedicated user action like program icon or menu dialogue:

- User ID (MMSI)
- Vessel Name
- Call sign
- ENI number
- IMO number
- Vessel and convoy type (in clear text according to table 2.7 Inland vessel data report as given by the Vessel Tracking and Tracing Standard)
- Type of ship and cargo (in clear text as given by ITU-R M.1371)
- Loading information (in clear text according to table 2.7 Inland vessel data report as given by the Vessel Tracking and Tracing Standard)
- Dangerous cargo indication (in clear text according to table 2.7 Inland vessel data report as given by the Vessel Tracking and Tracing Standard)
- Internal Reference Point in metre accuracy [A, B, C, D] (supported by graphical representation)
- Dimensions of vessel/convoy in decimetre accuracy (supported by graphical representation)
- Maximum present static draught in centimetre accuracy
- Destination (if available clear text based on RIS Index)
- ETA (the local time of the ECDIS PC shall be used as reference time zone and converted into UTC for use in the AIS)
- Type of EPFS (in clear text as given by ITU-R M.1371)
- Quality of speed information (high/low)
- Quality of course information (high/low)
- Quality of heading information (high/low)

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- Position Accuracy (DGPS / no DGPS)
- True Heading (HDT) (in degrees)
- Course over Ground (COG) in degrees
- AIS Version Indicator
- Blue sign connected (yes/no as automatically detected by the AIS unit)
- Time since last received VDO message (red colour if greater than 5seconds)
- Number of crew members on board
- Number of passengers on board
- Number of supporting personnel on board
- Total number of people on board (automatically calculated)

3.2   Configuration of own vessel data

The Inland ECDIS application shall allow easy changing of the following data from the main navigation screen:

- Actual navigational status (from a pull-down menu, in clear text as given by ITU-R M.1371). Any changes shall be directly programmed into the Inland AIS station.

In addition the following data shall be editable via a dedicated user action like program icon or menu dialogue:

- Vessel and convoy type (in clear text according to table 3.4 "Inland vessel data report" as given by the Vessel Tracking and Tracing Standard) making use of the conversion table in Appendix C "Inland Vessel and Convoy Types" in the VTT Standard
  - Hierarchical input starting with selection of the vessel type
    - Vessel (single)
      - Motor freighter
      - Container vessel
      - Motor tanker (show remaining matching vessel types)
      - Gas tanker
      - Passenger vessel (show remaining matching vessel types)
      - Tug (show remaining matching vessel types)
      - Other vessel types (show remaining matching vessel types)
    - Convoy
      - Motor freighter tug (show remaining matching vessel types)
      - Motor tanker tug (show remaining matching vessel types)
      - Pushtow (show remaining matching vessel types)
      - Pushtow tanker/gas (show remaining matching vessel types)
      - Tug (show remaining matching vessel types)
    - Otherwise (show remaining matching vessel types)
  - Alternatively an intelligent text field to enter the full-text description of the ERI ship type or a full list of ship types could be implemented.
- If the external application supports the Convoy Message ASM, the configuration of the formation code should be integrated into the overall configuration of the vessel and convoy type.
- Type of ship and cargo (in clear text as given by ITU-R M.1371) shall be automatically derived from Vessel and Convoy type according to conversion table in Appendix C "Inland Vessel an Convoy Types" of the VTT Standard Edition 2.0. It is recommended to display the extended description of vessel types as provided by UN recommendation 28
- Loading information (in clear text from selection menu, according to table 2.7 Inland vessel data report as given by the Vessel Tracking and Tracing Standard)

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- Dangerous cargo indication (in clear text from selection menu, according to table 2.7 Inland vessel data report as given by the Vessel Tracking and Tracing Standard)
- Internal Reference Point / dimensions of vessel/convoy in decimetre accuracy (supported by an appropriate graphical representation)

    o If vessel type has been set to vessel/unknown no further configuration will be available:
        ▪ The application shall automatically calculate the A, B, C, D values according to the following formulas:
            • $A = LS - BI$ (rounded upwards)
            • $B = BI$ (rounded upwards)
            • $C = CI$ (rounded upwards)
            • $D = BS - CI$ (rounded upwards)
    o If vessel type has been set to convoy:
        ▪ Input of convoy length (LC) in decimetre accuracy
        ▪ Input of convoy beam (BC) in decimetre accuracy
        ▪ Input of convoy extension on bow side (EA)
        ▪ Input of convoy extension on stern side (EB)
        ▪ Input of convoy extension on board side (EC)
        ▪ Input of convoy extension on starboard side (ED)
        ▪ The application shall automatically calculate the A, B, C, D values according to the following formulas:
            • $A = LS - BI + EA$ (rounded upwards)
            • $B = BI + EB$ (rounded upwards)
            • $C = CI + EC$ (rounded upwards)
            • $D = BS - CI + ED$ (rounded upwards)
        ▪ Figure 1 presents a graphical summary of the described approach.
    o The overall dimension of a convoy must not be smaller than the size of the main vessel
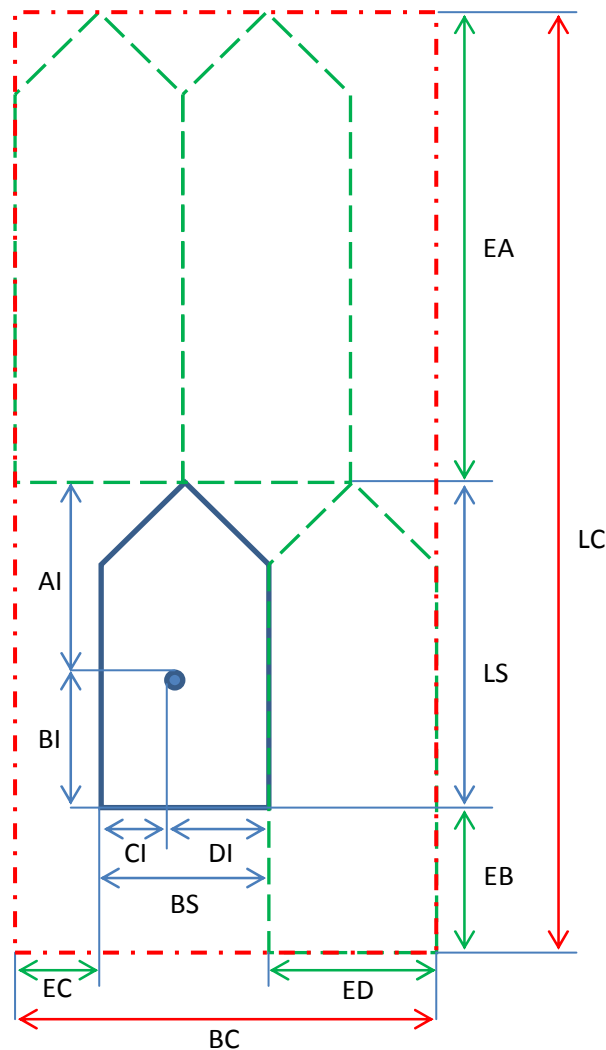   o In addition user pre-defined standard convoy setups can be stored and selected

Figure 1: Input parameters for vessel / convoy dimensions

- Maximum present static draught in centimetre accuracy (shall be automatically converted into the maximum present static draught for AIS Msg. 5)
- Destination
    - (ideally) the application shall provide a comfortable input for an ISRS location code
        - Variant 1
            - Optional filter by country (list of European Inland navigation countries, automatic filtering by 2 digit UN country code)
            - Optional filter by fairway section code (list of available rivers for the selected country, automatic filtering by 5 digits fairway section code)
            - Optional filter by Function code (list of the following functions:
                - Port/harbour: hrbare, hrbbsn, ptare, termnl
                - Berth: berths_3, berths_1
                - Anchorage area: achare, achbrt
                - Built-up areas: BUAARE
                - Mooring facilities/pontons: morfac, ponton
        - Variant 2

- Intelligent full-text search for location name based on optional filters taken from the RIS Index
  - Variant 3
    - Selection of the destination based on a map display where all ISRS locations are displayed and can be selected
      - Output of the ISRS code matching the user selection
      - If no applicable ISRS code could be found an ISRS code can be selected that is the closest to the destination.
      - If this is not feasible then a new ISRS code can be entered or a free text. When doing this a warning shall be displayed.
- The ETA shall be entered using a calendar tool with automatic UTC conversion:
  - (the local time of the ECDIS PC shall be used as reference time zone and converted into UTC for use in the AIS). The ECDIS application should inform the user that the time zone for provision is the time zone of the PC.
- Number of crew members on board
- Number of passengers on board
- Number of supporting personnel on board

The following data set shall not be configurable at all or only in case of password protection:

- User ID (mandatory field, must not left blank, only numerical values with exactly 9 digits shall be allowed)
- Vessel Name (limitation to 20 6-Bit ASCII characters as given by ITU-R M.1371)
- Call sign (limitation to 7 6-Bit ASCII characters as given by ITU-R M.1371)
- ENI number (only numerical values with exactly 8 digits with optional leading zero converted into 6-Bit ASCII characters as given the Vessel Tracking and Tracing Standard)[1]
- IMO number (only numerical values with exactly 9 digits shall be allowed)
- Configuration of own vessel dimensions
  - Input of own vessel length (LS) in decimetre accuracy
  - Input of own vessel beam (BS) in decimetre accuracy
  - Distance from the GNSS antenna to board side (CI) in decimetre accuracy
  - Distance from the GNSS antenna to the stern (BI) in decimetre accuracy
- Type of EPFS (selection from clear text options as given by ITU-R M.1371)
- Quality of speed information (high/low) (only relevant if external sensor connected, high – if type approved external sensor in use)
- Quality of course information (high/low) (only relevant if external sensor connected, high – if type approved external sensor in use)
- Quality of heading information (high/low) (only relevant if external sensor connected, high – if type approved external sensor in use)

Before any parameters of the Inland AIS mobile station are edited in the Inland ECDIS application it shall be ensured that the values stored in the Inland AIS mobile station are imported. Ideally this takes place during the start phase of the Inland ECDIS application. During operation the parameters of the Inland AIS mobile station in the Inland ECDIS application shall be updated with the values received by the AIVDO messages. This ensures a consistent handling of AIS parameters in setups with multiple PIs. After configuration of all values it shall be possible to save the values and write them back into the Inland AIS station using the input sentences of IEC 61993-2 and the VTT standard.

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[1] In deviation from the VTT standard the ENI regulation only allows for numerical values

3.3 Display of other vessels

The Inland ECDIS standard ed. 2.3 does sufficiently describe the display of other vessels on the IENC.

In case convoy information is received through the Convoy Message ASM the convoy formation and outline may be displayed (only for the vessels sending heading information).

The full set of Inland AIS target information shall be accessible via a target list dialogue and/or by mouse action on a specific target.

When Inland AIS data is displayed all coded data items shall be translated into clear text according to the VTT standard.

3.4 AIS Repeater Station

AIS Repeater stations may be used in some areas at the waterways. AIS Repeater stations are store and forward repeaters.

The occurrence of repeated AIS messages shall be considered by the display system.

Typically the repeat of messages is within 4 s. Messages containing a time stamp older than 30 s will not be repeated. Messages can be repeated three times maximum. Repeated messages are indicated by the repeat indicator set to >0 (= 1 to 3).

Only the most recent message of a vessel shall be displayed. Older messages which may be received from a repeater station shall be discarded in this case.

4 HANDLING OF APPLICATION SPECIFIC MESSAGES (ASM)

Next to the Inland ship static and voyage related data message whose input and display has already been handled in chapter 3 the VTT Standard defines several other Application Specific Messages which are supported either directly in the Inland AIS mobile station and/or in the connected Inland ECDIS application.

FI	FIG	Name of International Function Message	Sent by	Broadcast	Addressed
10	Gen	Inland Ship Static and voyage related data	Ship	x	
19	Gen	Control Message	Shore	x	
21	VTS	ETA at lock/bridge/terminal	Ship		x
22	VTS	RTA at lock/bridge/terminal	Shore		x
~~23~~	~~VTS~~	~~EMMA warning~~ (no longer supported)	~~Shore~~	~~x~~	-
24	VTS	Water Level	Shore	x	
25	VTS	Present Bridge Clearance	Shore	x	
~~40~~	~~A-to-N~~	~~Signal Status~~ (no longer supported)	~~Shore~~	~~x~~	-
41	A-to-N	Signal Station	Shore	x	
55	SAR	Inland Number of Persons on board	Ship	x	x (preferably)

Table 1: Overview of Inland specific ASMs

In addition IALA is maintaining a register of international ASMs at http://www.e-navigation.nl which contains maritime as well as inland navigation related ASMs.

4.1 FI 19: Control Message

The Inland ECDIS application shall provide an overview which ASM are currently allowed or forbidden by the competent authority through the Control Message.

The Inland ECDIS application shall automatically enable/disable ASM functions according to the information coming from the Control Message.

4.2 FI 21: ETA at lock/bridge/terminal

The ETA/RTA function shall be available to user either by using a dialogue window or by map interaction where all ISRS locations are displayed and can be selected. If a RIS Index or a related IENC object code are available, the location name and object name shall be shown in clear text. After selection of the desired location it shall be possible to select ETA from a context menu.

If the destination is entered manually without map interaction the procedures defined for the entry of the destination field (see chapter 3.2). Just the use of a free text is only applicable as long as it is conforming to the ISRS structure.

All fields shall allow intelligent search functionality. The chosen location object shall then be automatically translated into the UN country code, UN location code, Fairway section number, terminal code and fairway hectometre as required by the standard.

Once the location has been selected it shall be possible to enter the ETA at the chosen location. The entry of the time shall be made according to the local time zone of the destination. The user shall be noticed that local time has to be used. The application shall then internally convert the time into UTC.

Then the number of assisting tug boats shall be selectable from a pull-down menu given the possible value from 0 to 6 or unknown.

Finally it shall be possible to enter the maximum present static air-draught in centimetre. Basic consistency checks shall verify that e.g. the value – if not 0 (not used) – is not smaller than 100cm.

If the send button is pressed the message shall be sent into the Inland AIS mobile station using the virtual MMSI number applicable for the current location. The list of virtual MMSI numbers in maintained in the ASM inventory document of the VTT EG.

If no virtual MMSI is available any ETA message shall be sent to the closest AIS Base Station.

4.3 FI 22: RTA at lock/bridge/terminal

The reception of an RTA answer shall be graphically indicated to the user. The ETA/RTA dialogue shall then show the location name (RIS Index location name and object name if available), the ETA and the received RTA (all local time). Further the operational status received in the RTA message shall be shown in clear text.

A reply button shall allow sending an updated ETA to the object. In that case all previously entered information shall be pre-filled that the user only needs to change the data which changed.

An RTA message might also be received without a previously sent ETA message.

4.4 FI 23: EMMA warning

The EMMA message is obsolete and shall not be used.

4.5 FI 24: water level message

Received water level data shall be accessible via a separate dialogue window. Only water level stations for which actual values have been received shall be shown in the overview. The water level gauge names shall be automatically converted from the gauge ID into the common name and shown in clear text as given by the RIS Index. The water levels shall be automatically converted from the difference value transmitted by Msg 24 into the real water level by adding the reference water level to the difference value.

Next to the water level the date and time of the last reception shall be shown according to the local time zone. Ideally it shall be possible to configure a maximum age for water level data. In case the age of the water level information exceeds that value the water level information shall no longer be shown in the application.

In addition it may be possible to show the actual water level and latest reception time in a text box, by doing a mouse-over or pick report at a certain water level gauge object on the IENC.

If the depth information and vertical clearance information of the chart is updated within the area of applicability of the gauge it has to be clearly indicated.

4.6 FI 40: Signal status

This message is outdated and depreciated. Message FI 41 shall be used instead.

4.7 FI 41: Signal Station

This message replaces message FI 40.

In case a signal status message is received the matching signal symbol shall be displayed instead of the matching (through the ISRS code) IENC object. Therefore it can only be displayed with an IENC match. Otherwise the message will be discarded.

The displayed orientation shall follow the value given in the Inland AIS message. It shall be possible to internally configure a maximum age for signal status messages. When the last received Inland AIS signal status message for a signal becomes older than the configured timeout interval the signal shall no longer be displayed.

The signal icon shall only be displayed with the same SCAMIN value as the matching IENC object.

4.8 FI 25: Present Bridge Clearance

Received vertical bridge clearance data shall be accessible via a separate dialogue window. Only bridges for which actual values have been received shall be shown in the overview. The bridge names shall be automatically converted from the ISRS code into the common name and shown in clear text as given by the RIS Index.

The vertical clearance values shall be automatically converted into meter values.

Next to the vertical clearance the date and time of the last measurement shall be shown according to the local time zone. The date and time shall be calculated using the time of the reception subtracted by the "time to the last measurement". Ideally it shall be possible to configure a maximum age for vertical bridge clearance data. In case the age of the vertical bridge clearance information exceeds that value the vertical bridge clearance information shall no longer be shown in the application.

If received the accuracy value shall be displayed in cm. In case accuracy value 0 is transmitted then no accuracy information shall be shown (not at all, also not with the value left blank).

In addition it may be possible to show the vertical bridge clearance measurement time and accuracy on top of the chart in a text box, by doing a mouse-over or pick report at a certain ridge opening object on the IENC.

4.9   Future Messages

- Convoy message

- Standardized Safety Related Message