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ECONOMIC COMMISSION FOR EUROPE

INLAND TRANSPORT COMMITTEE

Working Party on Inland Water Transport

International Standard for Tracking and Tracing on Inland Waterways (VTT)

Resolution No. 63

Revision 1

UNITED NATIONS
New York and Geneva, 2015

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Amendments to Resolution No. 63, "International Standard for Tracking and Tracing on Inland Waterways (VTT)"

Resolution No. 82

(adopted by the Working Party on Inland Water Transport on 14 November 2014)

The Working Party on Inland Water Transport,

Recalling its Resolution No. 57 on Guidelines and Recommendations for River Information Services as amended by Resolution No. 73 (ECE/TRANS/SC.3/165/Rev.1) and desiring to promote the rapid establishment of harmonized River Information Services on the European inland waterway network,

Believing that the safety and efficiency of vessel traffic and the protection of the environment could be further improved through the establishment of automatic vessel tracking and tracing systems on all inland waterways of UNECE member States,

Bearing in mind the report of the Working Party on the Standardization of Technical and Safety Requirements in Inland Navigation on its thirtieth session (ECE/TRANS/SC.3/WP.3/60, paras. 9–11),

1. *Decides* to replace the text of the annex of Resolution No. 63 with the text contained in the annex of this resolution,

2. *Recommends* Governments to base the development and introduction on their inland waterways of systems for vessel tracking and tracing on the technical specifications reproduced in the annex to this resolution,

3. *Requests* Governments to inform the Executive Secretary of the Economic Commission for Europe whether they accept this resolution,

4. *Requests* the Executive Secretary of the Economic Commission for Europe to place the question of the application of this resolution periodically on the agenda of the Working Party on Inland Water Transport.

Annex

Technical Specifications for Vessel Tracking and Tracing Systems in Inland Navigation

Contents

Foreword

The concept of River Information Services (RIS) has emerged from several European research projects, aiming at increasing safety and efficiency of inland waterway transport.

The European Commission, the Central Commission for the Navigation of the Rhine (CCNR) and the Danube Commission have recognized the need for means of automatic exchange of navigational data between vessels and between vessels and shore for automatic identification and tracking and tracing solutions in inland navigation.

In maritime navigation, the International Maritime Organization (IMO) has introduced the Automatic Identification System (AIS). All seagoing vessels on international voyage falling under the provisions of Chapter V, Safety of navigation, of the International Convention for the Safety of Life at Sea (SOLAS) must be equipped with AIS since the end of 2004. The Guidelines and Recommendations for River Information Services (RIS Guidelines 2011) of the World Association for Waterborne Transport Infrastructure (PIANC), the European Union and CCNR define Inland AIS as important technology and constitute a basis for pan-European Guidelines and Recommendations, adopted by the United Nations Economic Commission for Europe (UNECE) in October 2004 as Resolution No. 57, and revised in 2012.

In 2003 the European RIS Platform established the international Expert Group on Tracking and Tracing (VTT Expert Group). The main task of this Group is the development and maintenance of Europe-wide harmonized technical specifications for vessel tracking and tracing systems for inland navigation. Because of mixed traffic areas it is important that the technical specifications and procedures for inland shipping should be compatible with already defined standards and procedures for seagoing navigation.

To serve the specific requirements of inland navigation, AIS has been further developed to the so-called Inland AIS Standard while preserving full compatibility with IMO's maritime AIS and already existing standards in inland navigation.

Future developments could lead to alternative vessel tracking and tracing systems, which however have to be compatible with maritime AIS.

In this document, chapter 1 describes the functional requirements related to vessel tracking and tracing in inland navigation. Chapter 2 describes the Inland AIS standard, including the standard inland tracking and tracing messages. Annexes A-F to these technical specifications contain, respectively:

A. An overview of definitions of services and players

B. European Multiservice Meteorological Awareness system (EMMA) codes

C. Examples of signal status

D. Digital interface sentences for Inland AIS

E. Electronic Reporting International (ERI) ship types

F. Overview of information required by the user and the data fields, which are available in the defined AIS messages.

References

The content of this document is based on:

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	07.09.2005
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	13.03.2007
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	27.07.2012
Recommendation on Electronic Chart Display and Information System for Inland Navigation (Inland ECDIS), edition 2.3, Resolution No. 48, revision 2	UNECE	12.10.2012
Guidelines and Recommendations for River Information Services, edition 3.0, Resolution No. 57, revised	UNECE	14.10.2011
Guidelines and Criteria for Vessel Traffic Services on Inland Waterways, Resolution No. 58	UNECE	21.10.2004
International Standards for Notices to Skippers and for Electronic Ship Reporting in Inland Navigation, Resolution No. 60 as amended by Resolution No. 70	UNECE	15.10.2010
IMO MSC.74(69) Annex 3, “Recommendation on Performance Standards for a Shipborne Automatic Identification System (AIS)”	IMO	12.05.1998
IMO Resolution A.915(22), “Revised Maritime Policy and Requirements for a future Global Navigation Satellite System (GNSS)”	IMO	29.11.2001
Research project Consortium Operational Management Platform River Information Services (COMPRIS) final report and underlying final work package documents	European Commission	12.02.2006
Recommendation ITU-R M.1371–4, “Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band”	ITU	04.2010
International Standard IEC 61993–2, edition 2.0, “Maritime navigation and radiocommunication equipment and systems — Automatic Identification System (AIS), Part 2: Class A shipborne equipment of the universal automatic identification system (AIS) — Operational and performance requirements, methods of test and required test results”	IEC	19.10.2012
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“Part 1: Single talker and multiple listeners”, 2nd edition	IEC	25.11.2010
“Part 2: Single talker and multiple listeners, high speed transmission”	IEC	09.1998
United Nations Code for Trade and Transport Locations, UN/LOCODE, 2012–2	UNECE	07.03.2013
Codes for the identification of ships, Recommendation No. 10, second edition	UNECE	19.03.1997
Technical Clarifications on Vessel Tracking and Tracing Standard for Inland Navigation, and Test Standard for Inland AIS	CCNR	
Standard for Electronic Ship Reporting in Inland Navigation edition 1.2	CCNR	19.10.2006

Abbreviations

ADN	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
AI	Application Identifier
AIS	Automatic Identification System
AIS-SART	AIS-Search and Rescue Transmitter
ASCII	American Standard Code for Information Interchange
AtoN	Aid to Navigation
CCNR	Central Commission for the Navigation of the Rhine
CEVNI	European Code for Inland Waterways
COG	Course over Ground
COMPRIS	Consortium Operational Management Platform River Information Services
CSTDMA	Carrier Sense Time Division Multiple Access
DAC	Designated Area Code
DC	Danube Commission
DGNSS	Differential GNSS
DSC	Digital Selective Calling
DTE	Data Terminal Equipment
ECDIS	Electronic Chart Display and Information System
EMMA	European Multiservice Meteorological Awareness System
ENI	Unique European Vessel Identification Number
ERI	Electronic Reporting International
EPFS	Electronic Position Fixing System
ETA	Estimated Time of Arrival
FI	Functional Identifier
GLONASS	(Russian) Global Navigation Satellite System
GlW	Reference water level in Germany (Gleichwertiger Wasserstand)
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GUI	Graphical User Interface
HDG	Heading
HSC	High-Speed Craft
IAI	International Application Identifier

IALA	International Association of Lighthouse Authorities
ID	Identifier
IEC	International Electrotechnical Commission
IMO	International Maritime Organization
ITU	International Telecommunication Union
MHz	Megahertz (Megacycles per second)
MKD	Minimum Keyboard and Display
MMSI	Maritime Mobile Service Identifier
PA	Position Accuracy
PI	Presentation Interface
PIANC	World Association for Waterborne Transport Infrastructure
RAI	Regional Application Identifier
RAIM	Receiver Autonomous Integrity Monitoring
RIS	River Information Services
RNW	Regulierungs Niederwasser (granted water level during 94 % the year)
ROT	Rate of Turn
RTA	Requested Time of Arrival
RTCM SC 104	Radio Technical Commission for Maritime Services Special Committee on Differential Global Navigation Satellite Systems (DGNSS)
Rx	Receiver
SAR	Search and Rescue
SOG	Speed over Ground
SOLAS	International Convention for the Safety of Life at Sea
SOTDMA	Self -Organized Time Division Multiple Access
SQRT	Square Root
SSD	Ship Static Data
STI	Strategic Traffic Image
TDMA	Time Division Multiple Access
TI	Rate of Turn Indicator
TTI	Tactical Traffic Image
Tx	Transmitter
UDP	User Datagram Protocol
UN	United Nations
UN/LOCODE	United Nations Code for Trade and Transport Locations

UTC	Universal Time Coordinated
VDL	VHF Data Link
VHF	Very High Frequency
VSD	Voyage Static Data
VTM	Vessel Traffic Management
VTS	Vessel Traffic Services
WGS-84	World Geodetic System from 1984
WIG	Wing-In-Ground craft

1. The use of vessel tracking and tracing in inland navigation

1.1 Introduction

In maritime navigation, IMO has introduced the automatic identification system (AIS). All seagoing vessels on international voyage falling under SOLAS Chapter V must be equipped with AIS since the end of 2004. The guidelines for the planning, implementation and operational use of River Information Services define Inland AIS as an important technology. Because of mixed traffic areas the standards, technical specifications and procedures for inland shipping must be compatible with already defined standards, technical specifications and procedures for seagoing navigation.

To serve the specific requirements of inland navigation, AIS has been further developed to the so called Inland AIS technical specification while preserving full compatibility with IMO's maritime AIS and already existing standards in inland navigation.

The purpose of this introductory chapter is to define all necessary functional requirements related to vessel tracking and tracing in inland navigation.

An overview of fields of interest and users is provided in section 1.2. The information needs for each field of interest are described. The functional requirements are based on CEVNI, and other rules and regulations for navigation on inland waterways, as well as expert consultations and industry best practices.

Three groups of information are distinguished:

- Dynamic information: information changing every few seconds or minutes;
- Semi-dynamic information: information changing a few times per voyage;
- Static information: information changing less than a few times per year.

For each group of information different ways of information exchange can be identified:

- Vessel tracking and tracing systems shall exchange particularly dynamic information;
- Electronic reporting devices, such as e-mail, are meant to exchange the semi-dynamic information;
- Databases are meant to provide static information which can be retrieved via the internet or other data carriers.

In the following sections information which can be exchanged by vessel tracking and tracing systems between ships and between ships and shore is described in detail. The information needs are described relating to tracking and tracing. However, for most of the tasks additional information, such as geographical information, detailed cargo information, address information is required. This kind of information will be provided by other systems.

1.2 Scope

The table below gives an overview of the fields of interest dealt with in this document. Each field of interest is split up into tasks and for each task the users are defined.

Table 1.1
Overview of fields of interest, tasks and users

Field of interest	*Task*	*User*
Navigation	Medium term: Looking minutes up to hours ahead outside onboard radar range	Conning skipper
	Short term: Looking minutes ahead within onboard radar range	Conning skipper
	Very short term: Looking from seconds up to 1 minute ahead	Conning skipper
Vessel Traffic Management	VTS	VTS operator, conning skipper
	Lock operation	Lock operator, conning skipper
	Lock planning	Lock operator, conning skipper, shipmaster, fleet manager
	Bridge operation	Bridge operator, conning skipper
	Bridge planning	Bridge operator, conning skipper, shipmaster, fleet manager
Calamity Abatement Service		Operator of calamity centre, VTS operator, lock operator, bridge operator, conning skipper, shipmaster, competent authority
Transport Management	Voyage planning	Shipmaster, freight broker, fleet manager, terminal operator, conning skipper, VTS operator, lock operator, bridge operator, RIS operator
	Transport logistics	Fleet manager, shipmaster, consignor, consignee, supply forwarder
	Port and terminal management	Terminal operator, shipmaster, supply forwarder, port authority, competent authority
	Cargo and fleet management	Fleet manager, consignor, consignee, supply forwarder, freight broker, shipmaster

Field of interest	*Task*	*User*
Enforcement	Cross border	Customs, competent authority, shipmaster
	Traffic Safety	Competent authority (police authorities), shipmaster
Waterway and port infrastructure charges		Competent authority, shipmaster, fleet manager, waterway authority
Fairway information services	Meteorological information	Conning skipper
	Signal status	Competent authority, shipmaster, fleet manager
	Water-level	Competent authority, shipmaster, fleet manager, conning skipper

In the following sections, for each field of interest and task the users and the information needs are described in detail.

Note: The order of the information needs within each task does not imply different importance of information. The accuracy of the information needs is summarized in a table at the end of this chapter.

1.3 Navigation

Vessel tracking and tracing can be used to support the active navigation on board.

The process navigation can be split into three phases:

- Navigation, medium term ahead;
- Navigation, short term ahead;
- Navigation, very short term ahead.

For each phase the user requirements are different.

1.3.1 Navigation, medium term ahead

Navigation a medium term ahead is the navigation phase in which the skipper observes and analyses the traffic situation looking some minutes up to an hour ahead and considers the possibilities of where to meet, pass or overhaul other vessels.

The traffic image needed is the typical ‘looking around the corner’ feature and is mainly outside the scope of the onboard radar range.

Exchanged traffic information consists of:

- Identification**;**
- Name**;**
- Position (actual)**;**
- Speed over Ground**;**
- Course over Ground/direction**;**
- Destination/intended route;
- Vessel or convoy type;

- Dimensions (length and beam);
- Number of blue cones/lights;
- Loaded/unloaded;
- Navigational status of the vessel (anchoring, mooring, sailing, restricted by special conditions, etc.).

The update rate depends on the task and the status of the vessel. The maximum update rate is 2 seconds.

1.3.2 Navigation, short term ahead

Navigation a short term ahead is the decision phase in the navigation process. In this phase, traffic information has relevance for the process of navigation, including collision avoidance measures, if necessary. This function deals with observing other vessels located in close proximity to the vessel. Exchanged traffic information consists of:

- Identification;
- Name;
- Position (actual);
- Speed over Ground (accuracy 1 km/h);
- Course over Ground/direction;
- Heading;
- Special manoeuvre indicator (blue sign);[1]
- Destination/intended route;
- Vessel or convoy type;
- Dimensions (length and beam);
- Number of blue cones/lights;
- Loaded/unloaded;
- Navigational status of the vessel (anchoring, mooring, sailing, restricted by special conditions, etc.).

The actual traffic information on position, identification, name, direction, Speed over Ground, course, heading and special manoeuvre indicator (blue sign) will be exchanged continuously at least every 10 seconds. For some routes, the authorities will set a predefined update rate (maximum 2 seconds).

1.3.3 Navigation, very short term ahead

Navigation a very short term ahead is the operational navigation process. It consists of execution of the decisions that were made beforehand, on the spot and monitoring their effects. Traffic information needed from other vessels, especially in this situation, is related to the vessel's own conditions, such as relative position, relative speed, etc.

[1] This sign is used when vessels agree to cross to starboard (see article 6.04 of the European Code for Inland Waterways (CEVNI)).

In this phase, the following highly accurate information is needed:

- Relative Position;
- Relative Heading;
- Relative Speed;
- Relative Drift;
- Relative Rate of Turn.

Based on the above-mentioned requirements, it becomes clear that for the time being, very short term navigation cannot make use of tracking and tracing information.

1.4 Vessel Traffic Management

Vessel Traffic Management comprises at least one of the elements defined below:

- Vessel Traffic Services;
- Lock planning and operation;
- Bridge planning and operation.

1.4.1 Vessel Traffic Services (VTS)

Within Vessel Traffic Services different services can be distinguished:

- Information service;
- Navigational assistance service;
- Traffic organization service.

In the next paragraphs**,** user needs related to traffic information are described.

1.4.1.1 Information service

The information service is provided by broadcasting information at fixed times and intervals or when deemed necessary by the VTS or at the request of a vessel. Such information may include, for example, reports on the position, identity and intentions of other traffic; waterway conditions; weather; navigational hazards; or any other factors that may influence the vessel's transit.

For information services, an overview of traffic in a network or on a fairway stretch is needed. The traffic information will comprise vessel information such as:

- Identification;
- Name;
- Position (actual);
- Course over Ground/Direction;
- Limitations of navigable space;
- Destination/intended route;
- Vessel or convoy type;
- Dimensions (length and beam);
- Number of blue cones/lights;

- Loaded/unloaded;
- Number of persons on board (in case of an incident);
- Navigational status of the vessel (anchoring, mooring, sailing, restricted by special conditions, etc.).

The competent authority shall set the predefined update rate.

1.4.1.2 Navigational assistance service

Navigational assistance service informs the skipper about difficult navigational or meteorological circumstances or provides assistance in case of defects or deficiencies. This service is normally rendered at the request of a vessel or by the VTS when deemed necessary.

To provide individual information to a skipper, the VTS operator needs an actual detailed traffic image.

Information provided by vessel tracking and tracing systems is:

- Identification;
- Name;
- Position (actual);
- Speed over Ground;
- Course over Ground/Direction;
- Special manoeuvre indicator (blue sign);
- Destination/intended route;
- Vessel or convoy type;
- Dimensions (length and beam);
- Draught;
- Air draught (in case of obstacles);
- Number of blue cones/lights;
- Loaded/unloaded;
- Navigational status of the vessel (anchoring, mooring, sailing, restricted by special conditions, etc.).

Any other information needed consists of environmental, geographic information and notices to skippers.

The actual traffic information on identification, position, direction, speed, course and special manoeuvres (blue sign) has to be exchanged continuously (every 3 seconds, almost real time or another predefined update rate set by the competent authority).

All other information shall be made available on demand of the VTS operator or in special circumstances (on event).

1.4.1.3 Traffic organization service

The traffic organization service concerns the operational management of traffic and the forward planning of vessel movements to prevent congestion and dangerous situations, and is particularly relevant in times of high traffic density or when the movement of special

transports may affect the flow of other traffic. The service may also include establishing and operating a system of traffic clearances or VTS sailing plans or both in relation to priority of movements, allocation of space, mandatory reporting of movements in the VTS area, routes to be followed, speed limits to be observed or other appropriate measures which are considered necessary by the VTS. The traffic organization service requirements for the traffic image are the same as those described in section 1.4.1.2.

1.4.2 Lock planning and operation

In the following sections, the lock planning processes — long and medium term — and lock operation process are described.

1.4.2.1 Lock planning, long term

Lock planning a long term ahead deals with the planning of a lock a few hours up to a day ahead.

In this case, traffic information is used to improve information on waiting and passing times at locks, and are originally based on statistical information.

Traffic information needed for long term lock planning is:

- Identification;
- Name;
- Position (actual);
- Course over Ground/Direction;
- Estimated Time of Arrival (ETA) at lock;
- Requested Time of Arrival (RTA) at lock;
- Vessel or convoy type;
- Dimensions (length and beam);
- Draught;
- Air draught;
- Number of blue cones/lights;
- Navigational status of the vessel (anchoring, mooring, sailing, restricted by special conditions, etc.).

The ETA should be available on demand or should be exchanged if a deviation from the original ETA is exceeded beyond the value predefined by the competent authority. RTA is the response to an ETA report.

1.4.2.2 Lock planning, medium term

Lock planning a medium term ahead deals with the planning of a lock up to two or four lock cycles ahead.

In this case, traffic information is used to map the arriving vessels to the available lock cycles and to inform the skippers about the RTA (Requested Time of Arrival) based on the planning.

Traffic information needed for medium term lock planning is:

- Identification;

- Name;
- Position (actual);
- Speed over Ground;
- Course over Ground/Direction;
- ETA at lock;
- RTA at lock;
- Vessel or convoy type;
- Dimensions (length and beam);
- Number of assisting tug boats;
- Draught;
- Air draught;
- Number of blue cones/lights;
- Navigational status of the vessel (anchoring, mooring, sailing, restricted by special conditions, etc.).

The ETA should be available on demand or should be exchanged if a deviation from the original ETA is exceeded beyond the value predefined by the competent authority. All other information should be available at the time of first contact or on demand. RTA is the response to an ETA report.

1.4.2.3 Lock operation

In this phase, the actual locking process takes place.

To facilitate the lock operational process, the following traffic information is required:

- Identification;
- Name;
- Position (actual);
- Speed over Ground;
- Course over Ground/Direction;
- Vessel or convoy type;
- Number of assisting tug boats;
- Dimensions (length and beam);
- Draught;
- Air draught;
- Number of blue cones/lights;
- Navigational status of the vessel (anchoring, mooring, sailing, restricted by special conditions, etc.).

The actual traffic information on identification, position, direction, speed and course must be exchanged either continuously or at an update rate predefined by the competent authority.

1.4.3 Bridge planning and operation

In the following sections, the bridge planning processes — medium and short term — and bridge operation process are described.

1.4.3.1 Bridge planning, medium term

The bridge planning process in the medium term deals with the optimization of the traffic flow in such a way that the bridges are opened in time for passing of vessels (green wave). The time looking ahead varies between fifteen minutes and two hours. The time frame will depend on the local situation.

Traffic information needed for medium term bridge planning is:

- Identification;
- Name;
- Position (actual);
- Speed over Ground;
- Course over Ground/Direction;
- ETA at bridge;
- RTA at bridge;
- Vessel or convoy type;
- Dimensions (length and beam);
- Air draught;
- Navigational status of the vessel (anchoring, mooring, sailing, restricted by special conditions, etc.).

The ETA and position should be available on demand or should be exchanged if a deviation from the original ETA is exceeded beyond the value predefined by the competent authority. All other information should be available at the time of first contact or on demand. RTA is the response to an ETA report.

1.4.3.2 Bridge planning, short term

In the case of short term bridge planning process, decisions are made on the strategy for opening of the bridge.

Traffic information needed for short term bridge planning is:

- Identification;
- Name;
- Position (actual);
- Speed over Ground;
- Course over Ground/Direction;
- ETA at bridge;
- RTA at bridge;
- Vessel or convoy type;
- Dimensions (length and beam);

- Air draught;
- Navigational status of the vessel (anchoring, mooring, sailing, restricted by special conditions, etc.).

Actual traffic information on the position, speed and direction, should be available on demand or set at an update rate predefined by the competent authority, e.g. every five minutes. ETA and position should be available on demand or should be exchanged if a deviation from the original ETA is exceeded beyond the value predefined by the competent authority. All other information should be available at the time of first contact or on demand. RTA is the response to an ETA report.

1.4.3.3 Bridge operation

In this phase the actual opening and passing of the vessel through the bridge takes place. To facilitate this process the following traffic information is required:

- Identification;
- Name;
- Position (actual);
- Speed over Ground;
- Course over Ground/Direction;
- Vessel or convoy type;
- Dimensions (length and beam);
- Air draught.

The actual traffic information on identification, position, direction, speed and course has to be exchanged either continuously or at an update rate predefined by the competent authority.

1.5 Calamity Abatement

Calamity abatement in this context focuses on repressive measures: dealing with real accidents and providing assistance during emergencies. To facilitate this process the following traffic information is required:

- Identification;
- Name;
- Position (actual);
- Course over Ground/Direction;
- Destination;
- Vessel or convoy type;
- Number of blue cones/lights;
- Loaded/unloaded;
- Number of persons on board.

In the case of an accident, the traffic information can be provided automatically or on request of a calamity fighter.

1.6 Transport Management

This service is divided into four activities:

- Voyage planning;
- Transport logistics;
- Port and terminal management;
- Cargo and fleet management.

1.6.1 Voyage planning

Voyage planning in this context focuses on the en route planning. During the voyage the skipper will check his original planned voyage.

For this process the following traffic information is needed:

- Position (actual, own vessel);
- Speed over Ground (own vessel);
- Destination/Intended route;
- ETA at lock/bridge/next sector/terminal;
- RTA at lock/bridge/next sector/terminal;
- Dimensions (length and beam) (own vessel);
- Draught (own vessel);
- Air draught (own vessel);
- Loaded/unloaded.

This traffic information is needed on demand or in case of a special event such as a relevant change in the ETA or RTA.

1.6.2 Transport Logistics

Transport logistics consist of the organization, planning, execution and control of transport.

For these processes, the following traffic information is needed:

- Identification;
- Name;
- Position (actual);
- Course over Ground/Direction;
- ETA at destination.

All traffic information is needed on demand of the vessel owner or logistics players.

1.6.3 Intermodal port and terminal management

Intermodal port and terminal management considers the planning of resources in ports and at terminals.

Traffic information needed for these processes is described below:

- Identification;

- Name;
- Position (actual, with accuracy from 100 m up to 1 km);
- Course over Ground/Direction;
- ETA at port/terminal;
- RTA at port/terminal;
- Vessel or convoy type;
- Dimensions (length and beam);
- Number of blue cones/lights;
- Loaded/unloaded;
- Navigational status of the vessel (anchoring, mooring, sailing, restricted by special conditions, etc.).

The terminal and port manager will request traffic information or will agree that in predefined situations traffic information will be sent automatically.

1.6.4 Cargo and fleet management

Cargo and fleet management considers the planning and optimizes the use of vessels, arranging cargo and transportation.

Traffic information needed for these processes is described below:

- Identification;
- Name;
- Position (actual);
- Course over Ground/Direction (Upstream/downstream);
- Destination;
- ETA at lock/bridge/destination/terminal;
- RTA at lock/bridge/destination/terminal;
- Dimensions (length and beam);
- Loaded/unloaded;
- Navigational status of the vessel (anchoring, mooring, sailing, restricted by special conditions, etc.).

The shipper or vessel owner will ask for traffic information or traffic information will be sent in predefined situations.

1.7 Enforcement

The scope of the enforcement task described below is limited to the services concerning dangerous goods, immigration control and customs.

Information provided by vessel tracking and tracing systems is:

- Identification;
- Name;

- Position;
- Course over Ground/Direction;
- Destination/intended route;
- ETA at lock/bridge/border/terminal/destination;
- Vessel or convoy type;
- Number of blue cones/lights;
- Number of persons on board;
- Navigational status of the vessel (anchoring, mooring, sailing, restricted by special conditions, etc.).

Traffic information will be exchanged with the appropriate authorities. Traffic information exchange will take place on demand or at fixed predefined points or at special described circumstances defined by the competent authority.

1.8 Waterway and port infrastructure charges

At various locations in Europe, tolls are levied for the use of the waterway and ports.

Traffic information needed for these processes is described below:

- Identification;
- Name;
- Position;
- Destination/Intended route;
- Vessel or convoy type;
- Dimensions (length and beam);
- Draught.

Traffic information will be exchanged on demand or at fixed points defined by the competent waterway or port authority.

1.9 Fairway information services

In connection with fairway information services three services are described:

- Weather warnings in case of extreme weather conditions;
- Signal status;
- Water levels.

In the following sections, information provided by tracking and tracing systems is described.

1.9.1 Weather warnings (EMMA)

The ongoing project “EMMA” (European Multiservice Meteorological Awareness System) aims at standardizing weather warnings. Standardized symbols for meteorological warnings have been developed within the EMMA project and can be used for the display of

messages on the Inland Electronic Chart Display and Information System (Inland ECDIS) screen.

EMMA does not provide for continuous weather information, but only warnings in case of special meteorological situations. The warnings are provided for regions.

Only km/h (wind), °C (temperature), cm/h (snow), l/m²h (rain) and m (visibility range in fog) may be used for weather warnings.

The following information is needed:

- Start of validity period date;
- End of validity period date (indefinite: 99999999);
- Start time of validity;
- End time of validity;
- Fairway section begin and end coordinates (2x);
- Type of weather warning (see annex B);
- Minimum value;
- Maximum value;
- Classification of warning;
- Direction of wind (see annex B).

This information is only exchanged in special events, in case of extreme weather conditions.

1.9.2 Signal status

Vessel tracking and tracing systems can be used for the transmission of status of traffic signals in inland navigation.

Information to be exchanged consists of:

- The position of the signal;
- An identification of the kind of signal (single light, two lights, etc.);
- The direction of impact;
- The current status of the signal.

Examples of signals are given in annex C.

The distribution of information has to be restricted to a specific area.

1.9.3 Water level

Vessel tracking and tracing systems can be used for the transmission of actual water level information:

Information to be exchanged consists of:

- Gauge station;
- Water level value.

Information will be sent regularly or on demand.

1.10 Conclusion

The functional requirements describe user and data needs for each field of interest. Tracking and tracing systems will exchange predominantly dynamic information.

Table 1.2 provides an overview of the accuracy requirements of dynamic information related to the tasks described in this chapter.

Table 1.2
Overview of accuracy requirements dynamic data

Required accuracy	*Position*	*Speed over Ground*	*Course over Ground*	*Heading*
Navigation medium term ahead	15–100 m	1–5 km/h	-	-
Navigation short term ahead	10 m [2]	1 km/h	5°	5°
VTS information service	100 m – 1 km	-	-	-
VTS navigational assistance service	10 m [2]	1 km/h	5°	5°
VTS traffic organization service	10 m [2]	1 km/h	5°	5°
Lock planning long term	100 m – 1 km	1 km/h	-	-
Lock planning medium term	100 m	0.5 km/h	-	-
Lock operation	1 m	0.5 km/h	3°	-
Bridge planning medium term	100 m – 1 km	1 km/h	-	-
Bridge planning short term	100 m	0.5 km/h	-	-
Bridge operation	1 m	0.5 km/h	3°	-
Voyage planning	15–100 m	-	-	-
Transport logistics	100 m – 1 km	-	-	-
Port and terminal management	100 m – 1 km	-	-	-
Cargo and fleet management	100 m – 1 km	-	-	-
Calamity abatement	100 m	-	-	-
Enforcement	100 m – 1 km	-	-	-
Waterway and port infrastructure charges	100 m – 1 km	-	-	-

[2] In addition, the requirements of IMO Resolution A.915(22) regarding the integrity, availability and continuity for position accuracy on inland waterways shall be met.

2. Inland AIS Standard

2.1 Introduction

In maritime navigation, IMO has introduced the Automatic Identification System (AIS). As of 2005 all seagoing ships on international voyage falling under SOLAS Chapter V, Safety of navigation, must be equipped with AIS.

The European Parliament and the Council have adopted Directive 2002/59/EC establishing a community vessel traffic monitoring and information system for seagoing vessels carrying dangerous or polluting goods using AIS for Ship Reporting and Monitoring.

AIS technology is considered suitable also for automatic identification and vessel tracking and tracing in inland navigation. The real time performance of AIS and the availability of worldwide standards and guidelines are particularly valuable for safety-related applications.

To serve the specific requirements of inland navigation, AIS had to be further developed to the so-called Inland AIS Standard while preserving full compatibility with IMO's SOLAS AIS and already existing standards in inland navigation.

Because Inland AIS is compatible with the SOLAS AIS, it enables a direct data exchange between seagoing and inland vessels navigating in mixed traffic areas.

Using AIS for automatic identification and vessel tracking and tracing in inland navigation presents the following features.

AIS is:

- A maritime navigation system required for all ships falling under the provisions of SOLAS.
- A system that operates in direct ship-to-ship mode as well as in ship-to-shore and shore-to-ship mode.
- A safety system with high requirements regarding availability, continuity and reliability of data.
- A real-time system due to the direct ship-to-ship data exchange.
- An autonomously operating system, in a self-organized manner, without a master station. There is no need for a central controlling intelligence.
- A system based on international standards and procedures, i.e. IMO SOLAS chapter V regulations.
- A type approved system enhancing safety of navigation through the introduction of a certification procedure.
- A system interoperable with SOLAS AIS.

The purpose of this chapter is to define all necessary functional requirements, amendments and extensions to the existing SOLAS AIS in order to develop an Inland AIS for use in inland navigation.

2.2 Scope

The Automatic Identification System (AIS) is a shipborne radio data system exchanging static, dynamic and voyage-related vessel data between equipped vessels and between equipped vessels and shore stations. Shipborne AIS stations broadcast the vessel's identity, position and other data at regular intervals. By receiving these transmissions, shipborne or shore-based AIS stations within the radio range can automatically locate, identify and track AIS-equipped vessels on an appropriate display, such as a radar or Inland ECDIS. AIS systems are intended to enhance safety of navigation in ship-to-ship use, surveillance (VTS), vessel tracking and tracing, and calamity abatement support.

Several types of AIS stations can be distinguished:

(a) Class A mobile stations to be used by all sea going vessels falling under the SOLAS Chapter V carriage requirements;

(b) Class B SO/CS mobile stations with limited functionality to be used on e.g. pleasure craft;

(c) Class A derivatives having full Class A functionality on Very High Frequency Data Link (VDL) level with certain supplementary functions allowing them to be used by all vessels not falling under SOLAS carriage requirements (e.g. tugs, pilot vessels, inland vessels) — hereafter Inland AIS;

(d) Base stations, including shore-based simplex and duplex repeater stations.

The following modes of operation can be distinguished:

(a) Ship – ship operation: All AIS-equipped vessels are able to receive static and dynamic information from all other AIS-equipped vessels within the radio range;

(b) Ship – shore operation: Data from AIS-equipped vessels can also be received by AIS base stations connected to the RIS centre where a traffic image (Tactical Traffic Image (TTI) and/or Strategic Traffic Image (STI)) can be generated;

(c) Shore – ship operation: safety-related data from shore to vessel can be transmitted.

A characteristic of AIS is the autonomous mode, using Self Organizing Time Division Multiple Access (SOTDMA) without any need for an organizing master station. The radio protocol is designed in a way that vessel stations operate autonomously in a self-organized manner by exchanging link access parameters. Time is divided into 1 minute frames with 2250 time slots per radio channel which are synchronized by Universal Time Coordinated (UTC) time of Global Navigation Satellite System (GNSS). Each participant organizes their access to the radio channel by choosing free time slots considering the future use of time slots by other stations. There is no need for a central intelligence controlling the slot assignment.

An Inland AIS station consists in general of the following components:

(a) Very High Frequency (VHF) transceiver (1 transmitter/2 receivers);

(b) GNSS receiver;

(c) Data processor.

Universal shipborne AIS, as defined by IMO, ITU and IEC, and recommended for use in inland navigation, uses SOTDMA in the VHF maritime mobile band. AIS operates on the internationally designated VHF frequencies AIS 1 (161.975 MHz) and AIS 2 (162.025 MHz), and can be switched to other frequencies in the VHF maritime mobile band.

To serve the specific requirements of inland navigation, AIS has been further developed to the so-called Inland AIS while preserving full compatibility with SOLAS AIS and already existing standards in inland navigation.

Vessel tracking and tracing systems in inland navigation shall be compatible with SOLAS AIS. Therefore, AIS messages should contain:

(a) Static information, such as official ship number, call sign of vessel, name of vessel, type of vessel;

(b) Dynamic information, such as vessel's position with accuracy indication and integrity status;

(c) Voyage-related information, such as length and beam of vessel or convoy, presence of hazardous cargo on board;

(d) Inland navigation specific information, e.g. number of blue cones/lights according to ADN or Estimated Time of Arrival (ETA) at lock/bridge/terminal/ border.

For moving vessels an update rate for dynamic information on tactical level can be switched between SOLAS mode and inland waterway mode. In inland waterway mode, it may be increased to once every two seconds. For vessels at anchor, it is recommended to have an update rate of several minutes, or when information is amended.

AIS is an additional source for navigational information. As such AIS is not used as a substitute for navigational services such as radar target tracking and VTS, but rather provides additional support to them. A key advantage of AIS lies in enabling the surveillance and tracking of vessels equipped with it. Due to their different characteristics, AIS and radar complement each other.

2.3 Functional requirements

2.3.1 General requirements for Inland AIS

Inland AIS is based on maritime AIS developed in accordance with the provisions of SOLAS.

Inland AIS should cover the main functionality of SOLAS AIS while considering the specific requirements of inland navigation.

Inland AIS should be compatible with the SOLAS AIS and should enable a direct data exchange between seagoing and inland vessels navigating in a mixed traffic areas.

Specific requirements for Inland AIS, which are not part of SOLAS AIS, are listed below.

The Inland AIS design should take into account the Technical Clarifications on Vessel Tracking and Tracing Standard for Inland Navigation, and Test Standard for Inland AIS.

2.3.2 Information content

Generally, only tracking and tracing and safety-related information is transmitted via Inland AIS. Taking into consideration this requirement Inland AIS messages should contain the following information:

Items marked with "*" have to be handled differently than for seagoing ships.

2.3.2.1 Static vessel information

Static vessel information for inland vessels should have the same parameters and the same structure as SOLAS AIS as far as applicable. Unused parameter fields should be set to "not available".

Inland specific static vessel information should be added.

Static vessel information is broadcast autonomously from the vessel or on demand and consists of the following:

• User Identifier (MMSI)	(SOLAS AIS)
• Name of Ship	(SOLAS AIS)
• Call Sign	(SOLAS AIS)
• IMO number *	(SOLAS AIS/ not available for Inland vessels)
• Type of Ship and Cargo *	(SOLAS AIS/amended for Inland AIS)
• Overall Length (decimetre accuracy)*	(SOLAS AIS/amended for Inland AIS)
• Overall Beam (decimetre accuracy)*	(SOLAS AIS/amended for Inland AIS)
• Unique European Vessel Identification Number (ENI)	(Inland AIS extension)
• Type of vessel or convoy (ERI code)	(Inland AIS extension)

2.3.2.2 Dynamic vessel information

Dynamic ship information for inland vessels should have the same parameters and the same structure as SOLAS AIS as far as applicable. Unused parameter fields should be set to "not available".

Inland specific dynamic vessel information should be added.

Dynamic vessel information is broadcast autonomously from the vessel or on demand and consists of the following:

• Position (WGS-84)	(SOLAS AIS)
• Speed (SOG) (quality information)*	(SOLAS AIS)
• Course (COG) (quality information)*	(SOLAS AIS)
• Heading (HDG) (quality information)*	(SOLAS AIS)
• Rate of Turn (ROT)	(SOLAS AIS)
• Position Accuracy (GNSS/DGNSS)	(SOLAS AIS)
• Time of electronic position fixing device	(SOLAS AIS)
• Navigational status	(SOLAS AIS)
• Blue sign status	(Inland AIS extension/regional bits in SOLAS AIS)

- Quality of speed information (Inland AIS extension/derived from ship sensor or GNSS)
- Quality of course information (Inland AIS extension/derived from ship sensor or GNSS)
- Quality of heading information (Inland AIS extension/derived from certified sensor (e.g. gyro) or uncertified sensor)

2.3.2.3 Voyage-related vessel information

Voyage-related vessel information for inland vessels should have the same parameters and the same structure as SOLAS AIS as far as applicable. Unused parameter fields should be set to "not available".

Inland specific voyage-related vessel information should be added.

Voyage-related vessel information is broadcast autonomously from the vessel or on demand and consists of the following:

- Destination (ERI location codes) (SOLAS AIS)
- Category of hazardous cargo (SOLAS AIS)
- ETA (SOLAS AIS)
- Maximum present static draught* (SOLAS AIS/amended for Inland AIS)
- Hazardous cargo classification (Inland AIS extension)
- Loaded/unloaded vessel (Inland AIS extension)

2.3.2.4 Traffic management information

Traffic management information is for specific use in inland navigation. This information is transmitted when required or on demand to/from inland vessels only.

2.3.2.4.1 ETA at lock/bridge/terminal

ETA at lock/bridge/terminal information is transmitted as an addressed message from ship to shore.

- Lock/bridge/terminal ID (UN/LOCODE) (Inland AIS extension)
- ETA at lock/bridge/terminal (Inland AIS extension)
- Number of assisting tugboats (Inland AIS extension)
- Maximum present static air draught (Inland AIS extension)

2.3.2.4.2 RTA at lock/bridge/terminal

RTA at lock/bridge/terminal information is transmitted as an addressed message from shore to ship.

- Lock/bridge/terminal ID (UN/LOCODE) (Inland AIS extension)
- RTA at lock/bridge/terminal (Inland AIS extension)

2.3.2.4.3 Number of persons on board

The number of persons on board is transmitted preferably as an addressed message from ship to shore on demand or on event.

- Total number of persons on board (SOLAS AIS)
- Number of crew members on board (Inland AIS extension)
- Number of passengers on board (Inland AIS extension)
- Number of shipboard personnel on board (Inland AIS extension)

2.3.2.4.4 Signal status

Signal status information is transmitted as a broadcast message from shore to ship.

- Signal Position (WGS-84) (Inland AIS extension)
- Signal Form (Inland AIS extension)
- Light Status (Inland AIS extension)

2.3.2.4.5 EMMA warnings

EMMA Warning Information is transmitted as a broadcast message from shore to ship.

- Local weather warnings (Inland AIS extension)

2.3.2.4.6 Water levels

Water level information is transmitted as a broadcast message from shore to ship.

- Local water level information (Inland AIS extension)

2.3.2.4.7 Safety-related messages

Safety-related messages are transmitted when required as broadcast or addressed messages.

2.3.3 Reporting interval of information transmission

The different information types of Inland AIS should be transmitted with different reporting rates.

For moving vessels on inland waterways, the reporting rate for dynamic information can be switched between SOLAS mode and inland waterway mode. In inland waterway mode it can be increased to once every two seconds. In mixed traffic areas such as seaports, it shall be possible to decrease the reporting rate for dynamic information by the competent authority to ensure a balance in reporting behaviour between inland vessels and SOLAS ships. The reporting behaviour shall be switchable by TDMA commands from a base station (automatic switching by TDMA telecommand via message 23, Group Assignment Command, ITU-R M.1371–4) and by commands from shipborne systems, e.g. Minimum Keyboard and Display (MKD), Electronic Chart Display and Information System (ECDIS) or onboard computer, via interface, e.g. IEC 61162 (automatic switching by shipborne system command). For static and voyage-related information, it is recommended to have a reporting rate of several minutes, on demand, or if information is amended.

The following reporting rates are applicable:

Static vessel information	Every 6 minutes, when data has been amended or on demand
Dynamic vessel information	Depends on navigational status and ship operating mode, either inland waterway mode or SOLAS mode (default), see table 2.1
Voyage-related vessel information	Every 6 minutes, when data has been amended or on demand
Traffic management information	As required (to be defined by competent authority)
Safety-related messages	As required

Table 2.1
Update rate of dynamic ship information

Ship dynamic conditions	*Nominal reporting interval*
Ship status "at anchor" and not moving faster than 3 knots	3 minutes[3]
Ship status "at anchor" and moving faster than 3 knots	10 seconds[3]
Ship operating in SOLAS mode, moving 0–14 knots	10 seconds[3]
Ship operating in SOLAS mode, moving 0–14 knots and changing course	3 1/3 seconds[3]
Ship operating in SOLAS mode, moving 14–23 knots	6 seconds[3]
Ship operating in SOLAS mode, moving 14–23 knots and changing course	2 seconds
Ship operating in SOLAS mode, moving faster than 23 knots	2 seconds
Ship operating in SOLAS mode, moving faster than 23 knots and changing course	2 seconds
Ship operating in inland waterway mode, moving[4]	assigned between 2 seconds and 10 seconds

Note: An Inland AIS mobile station operates either in inland waterway mode (group assignment by Message 23) or in SOLAS mode (autonomous mode, no group assignment active).

2.3.4 Technology platform

The technical solution of Inland AIS is based on the same technical standards as SOLAS AIS (as specified in ITU-R M.1371–4 and IEC 61993–2).

The use of Class A mobile station derivatives or Class B "SO" mobile station derivatives using SOTDMA techniques are recommended as platform for Inland AIS. The use of the Class B "CS" using CSTDMA techniques is not admitted, as it does not guarantee the same performance as Class A or Class B "SO" equipment. Class B "CS"

[3] When a mobile station determines that it is the semaphore (refer to ITU-R M.1371, annex 2, § 3.1.1.4), the reporting rate should increase to once per 2 seconds (refer to ITU-R M.1371, annex 2, § 3.1.3.3.2).

[4] Shall be switched by the competent authority using message 23, when the ship enters inland waterway area.

devices cannot ensure the successful transmission to radio link nor do they provide the possibility to send Inland AIS specific messages defined in these technical specifications.

As long as no Class B "SO" devices are available, Inland AIS mobile equipment is a derivative of maritime AIS Class A mobile equipment in accordance with the provisions of SOLAS.

All AIS transponders installed on commercial vessels shall meet the requirements of the competent authority or of a recognized classification society.

2.3.5 Compatibility with Class A transponders

Inland AIS transponders must be compliant with IMO Class A transponders and must, therefore, be capable of receiving and processing SOLAS AIS messages (according to ITU-R M.1371–4 and IALA technical clarifications on ITU-R M.1371–4) as well as the messages defined in section 2.4 of these technical specifications.

The Digital Selective Calling (DSC) transmitting (tx) capability and the provision of an MKD are not required for Inland AIS transponders, but the MKD functionality as well as the DSC channel management functionality are required. Manufacturers may remove the respective hard- and software from the Class A transponders.

2.3.6 Unique identifier

In order to guarantee compatibility with maritime vessels, the Maritime Mobile Service Identifier (MMSI) number must be used as a unique station identifier (radio equipment identifier) for Inland AIS transponders.

2.3.7 Application identifier for Inland AIS application specific messages

To serve the specific information requirements for inland navigation, application specific messages are used.

The application specific messages consist of the standard AIS framework (message ID, repeat indicator, source ID, destination ID), the application identifier (AI = DAC + FI) and the data content (variable length up to a given maximum).

The 16-bit application identifier (AI = DAC + FI) consists of a 10-bit Designated Area Code (DAC): international (DAC = 1) or regional (DAC $\geq$ 10), a 6-bit function identifier (FI) and allows for 64 unique application specific messages.

For Inland AIS application specific messages the DAC "200" is used. Inland AIS application specific messages under the DAC "200" are maintained by VVT Expert Group in order to harmonise the allocation of those messages.

2.3.8 Application requirements

It is necessary to input and display Inland AIS Messages (binary coded). This should be handled by an Application (preferably with a GUI capable of interfacing the AIS transponder) at the Presentation Interface (PI) or in the transponder itself. Possible data conversions (e.g. knots into km/h) or information concerning all ERI codes (location, ship type) should be handled there.

Furthermore the transponder or the relevant application should be capable of storing inland specific static data in the internal memory, in order to secure information when the unit is without power supply.

In order to program inland specific data into the transponder standard input sentences are defined in annex D, Digital interface sentences for Inland AIS.

Inland AIS equipment shall provide as a minimum an external RTCM SC 104 interface for the input of DGNSS correction and integrity information.

2.3.9 Type approval

Inland AIS equipment shall be type-approved for compliance with these technical specifications.

2.4 Protocol amendments for Inland AIS

2.4.1 Message 1, 2, 3: Position reports (ITU-R 1371–4)

Table 2.2
Position report

Parameter	*Number of bits*	*Description*
Message ID	6	Identifier for this Message 1, 2 or 3
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 any more
User ID	30	MMSI number
Navigational status	4	0 = under way using engine, 1 = at anchor, 2 = not under command, 3 = restricted manoeuvrability, 4 = constrained by her draught, 5 = moored, 6 = aground, 7 = engaged in fishing, 8 = under way sailing, 9 = reserved for future amendment of navigational status for ships carrying dangerous goods (DG), harmful substances (HS) or marine pollutants (MP), or IMO hazard or pollutant category C (high-speed craft (HSC)), 10 = reserved for future amendment of navigational status for ships carrying DG, HS, or MP, or IMO hazard or pollutant category A (wing-in-ground craft (WIG)); 11–13 = reserved for future use,14 = AIS-SART (active), 15 = not defined = default (also used by AIS-SART under test)
Rate of Turn (ROT_{AIS})	8	0 to +126 = turning right at up to 708° per min or higher 0 to –126 = turning left at up to 708° per min or higher Values between 0 and 708° per min coded by $ROT_{AIS} = 4.733\ SQRT(ROT_{sensor})$ degrees per min where ROT_{sensor} is the Rate of Turn as input by an external Rate of Turn Indicator (TI). ROT_{AIS} is rounded to the nearest integer value. +127 = turning right at more than 5º per 30 s (No TI available) –127 = turning left at more than 5º per 30 s (No TI available) –128 (80 hex) indicates no turn information available (default). ROT data should not be derived from COG information.
Speed over Ground	10	Speed over Ground in 1/10 knot steps (0–102.2 knots) 1 023 = not available; 1 022 = 102.2 knots or higher[5]

[5] Knots should be calculated in km/h by external onboard equipment.

Parameter	*Number of bits*	*Description*
Position Accuracy	1	The Position Accuracy (PA) flag should be determined in accordance with ITU-R M.1371–4 1 = high (≤ 10 m) 0 = low (>10 m) 0 = default
Longitude	28	Longitude in 1/10 000 min (±180° , East = positive (as per 2's complement), West = negative (as per 2's complement). 181° (6791AC0 hex) = not available = default)
Latitude	27	Latitude in 1/10 000 min (±90° , North = positive (as per 2's complement), South = negative (as per 2's complement). 91° (3412140 hex) = not available = default)
Course over Ground	12	Course over Ground in 1/10 (0–3 599) 3 600 ($E10_h$) = not available = default 3 601–4 095 should not be used
True Heading	9	Degrees (0–359) (511 indicates not available = default)
Time Stamp	6	UTC second when the report was generated by the Electronic Position Fixing System (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)
Special manoeuvre indicator (blue sign)	2	0 = not available = default 1 = not engaged in special manoeuvre = blue sign not set 2 = engaged in special manoeuvre = blue sign is set 3 = not used(i.e. regional passing arrangement on inland waterway)[6]
Spare	3	Not used. Should be set to zero. Reserved for future use.
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 ITU-R M.1371–4
Communication State	19	See ITU-R M.1371–4
Total number of bits	**168**	**Occupies 1 slot**

[6] Should only be evaluated if the report is coming from an Inland AIS vessel and if the information is derived by automatic means (direct connection to switch).

2.4.2 Message 5: Ship static and voyage-related data (ITU-R 1371–4)

Table 2.3
Ship static and dynamic data report

Parameter	*Number of bits*	*Description*
Message ID	6	Identifier for this Message 5
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 any more
User ID	30	MMSI number
AIS version indicator	2	0 = Station compliant with Recommendation ITU-R M.1371–1 1 = station compliant with Recommendation ITU-R M.1371–3 2–3 = Station compliant with future editions
IMO number	30	1–999999999; 0 = not available = default – Not applicable for SAR aircraft[7]
Call Sign	42	7 × 6 bit ASCII characters, "@@@@@@@" = not available = default.
Name	120	Maximum 20 characters 6 bit ASCII, see ITU-R M.1371–4; @@@@@@@@@@@@@@@@@@@@ = not available = default. For SAR aircraft, it should be set to "SAR AIRCRAFT NNNNNNN" where NNNNNNN equals the aircraft registration number
Type of Ship and Cargo	8	0 = not available or no ship = default 1–99 = as defined in ITU-R M.1371–4 100–199 = reserved, for regional use 200–255 = reserved, for future use Not applicable to SAR aircraft[8]
Overall dimension/reference for position	30	Reference point for reported position; Also indicates the dimension of ship (m) (see ITU-R M.1371–4) For SAR aircraft, the use of this field may be decided by the responsible administration. If used it should indicate the maximum dimensions of the craft. As default should A = B = C = D be set to "0" [9, 10, 11]

[7] Should be set to 0 for inland vessels.
[8] Best applicable ship type should be used for inland navigation.
[9] The dimensions should be set to the maximum rectangle size of the convoy.
[10] The decimetre accuracy of the inland information should be rounded upwards.
[11] The reference point information has to be taken out of the SSD NMEA-record by distinguishing the field "source identifier". Position reference point information with source identifier AI, has to be stored as internal one. Other source identifiers will lead to reference point information for the external reference point.

Parameter	*Number of bits*	*Description*
Type of Electronic Positioning Fixing Device	4	0 = undefined (default) 1 = GPS 2 = GLONASS 3 = Combined GPS/GLONASS 4 = Loran-C 5 = Chayka 6 = Integrated Navigation System 7 = surveyed 8 = Galileo 9–14 = not used 15 = internal GNSS
ETA	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 For SAR aircraft, the use of this field may be decided by the responsible administration
Maximum present static draught	8	In 1/10 m, 255 = draught 25.5 m or greater, 0 = not available = default; in accordance with IMO Resolution A.851 Not applicable to SAR aircraft, should be set to 0 [10]
Destination	120	Maximum 20 characters using 6-bit ASCII; @@@@@@@@@@@@@@@@@@@@ = not available For SAR aircraft, the use of this field may be decided by the responsible administration[12]
DTE	1	Data terminal equipment (DTE) ready (0 = available, 1 = not available = default)
Spare	1	Spare. Not used. Should be set to zero. Reserved for future use
Total number of bits	**424**	**Occupies 2 slots**

2.4.3 Message 23: Group Assignment Command (ITU-R M.1371–4)

The Group Assignment Command is transmitted by a base station when operating as a controlling entity. The message shall be applied to a mobile station within the defined region and as selected by "Ship and Cargo Type" or by "Station Type". The receiving station shall consider all selected fields concurrently. It controls the following operating parameters of a mobile station: transmit/receive mode, reporting interval and the duration of a quiet time.

[12] The UN/LOCODE location codes and ERI terminal codes should be used.

Table 2.4
Group Assignment Command

Parameter	*Number of bits*	*Description*
Message ID	6	Identifier for Message 23; always 23
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 any more
Source ID	30	MMSI of assigning station
Spare	2	Spare. Should be set to zero. Reserved for future use.
Longitude 1	18	Longitude of area to which the group assignment applies; upper right corner (north-east); in 1/10 min (±180°, East = positive, West = negative).
Latitude 1	17	Latitude of area to which the group assignment applies; upper right corner (north-east); in 1/10 min (±90°, North = positive, South = negative).
Longitude 2	18	Longitude of area to which the group assignment applies; lower left corner (south-west); in 1/10 min (±180°, East = positive, West = negative).
Latitude 2	17	Latitude of area to which the group assignment applies; lower left corner (south-west); in 1/10 min (±90°, North = positive, South = negative).
Station type	4	0 = all types of mobiles (default); 1 = Class A mobile station only; 2 = all types of Class B mobile stations; 3 = SAR airborne mobile station; 4 = Class B “SO” mobile stations only; 5 = Class B ”CS” shipborne mobile station only; 6 = inland waterways; 7–9 = regional use; 10–15 = for future use
Type of Ship and Cargo	8	0 = all types (default) 1–99 see ITU-R M.1371–4 100–199 reserved for regional use 200–255 reserved for future use
Spare	22	Not used. Should be set to zero. Reserved for future use.
Tx/Rx mode	2	This parameter commands the respective stations to one of the following modes: 0 = TxA/TxB, RxA/RxB (default); 1 = TxA, RxA/RxB, 2 = TxB, RxA/RxB, 3 = reserved for future use
Reporting interval	4	This parameter commands the respective stations to the reporting interval given in Table 2.5 below.
Quiet time	4	0 = default = no quiet time commanded; 1–15 = quiet time of 1 to 15 min.
Spare	6	Not used. Shall be set to zero. Reserved for future use
Total number of bits	**160**	**Occupies one time period**

Table 2.5
Reporting interval settings for use with Message 23

Reporting interval field setting	*Reporting interval for Message 18*
0	As given by the autonomous mode
1	10 minutes
2	6 minutes
3	3 minutes
4	1 minute
5	30 seconds
6	15 seconds
7	10 seconds
8	5 seconds
9	Next shorter reporting interval
10	Next longer reporting interval
11	2 seconds (not applicable to Class B “CS” stations)
12–15	Reserved for future use

Note: When the dual channel transmission is suspended by Tx/Rx mode command 1 or 2, the required reporting interval should be maintained using the remaining transmission channel.

2.4.4 Application specific messages (ITU-R 1371–4)

To enable the data exchange required for inland navigation Inland AIS application, specific messages have been defined.

The Regional Application Identifiers (RAI) of the Inland AIS application specific messages consist of the Designated Area Code (DAC) 200 and Function Identifier (FI) as defined in this section.

2.4.4.1 Allocation of Function Identifiers (FI) within the Inland AIS branch

Functional Identifiers (FI) within the Inland AIS branch shall be allocated and used as described in ITU-R M.1371–4. Every FI shall fall within one of the following groups of application fields:

- General Usage (Gen);
- Vessel Traffic Services (VTS);
- Aids to Navigation (AtoN);
- Search and Rescue (SAR).

Table 2.6
FI within the Inland AIS branch

FI	*FIG*	*International Function Message*	*Sent by*	*Broadcast*	*Addressed*	*Description*
10	Gen	Inland vessel static and voyage-related data	Vessel	X		See 2.4.4.2.1 Inland specific Message FI 10: Inland vessel static and voyage-related data
21	VTS	ETA at lock/bridge/terminal	Vessel		X	See 2.4.4.2.2 Inland specific Message FI 21: ETA at lock/bridge/terminal
22	VTS	RTA at lock/bridge/terminal	Shore		X	See 2.4.4.2.3 Inland specific Message FI 22: RTA at lock/bridge/terminal
23	VTS	EMMA warning	Shore	X		See 2.4.4.2.5 Inland specific Message FI 23: EMMA warning
24	VTS	Water level	Shore	X		See 2.4.4.2.6 Inland specific Message 24: Water level
40	AtoN	Signal status	Shore	X		See 2.4.4.2.7 Inland specific Message 40: Signal status
55	SAR	Number of persons on board	Vessel	X	X (preferably)	See 2.4.4.2.4 Inland specific Message FI 55: Number of persons on board

Some FI within the Inland AIS branch should be reserved for future use.

2.4.4.2 Definition of inland specific messages

2.4.4.2.1 Inland specific Message FI 10: Inland vessel static and voyage-related data

This message should be used by inland vessels only, to broadcast vessel static and voyage-related data in addition to Message 5. The message should be sent with binary Message 8 as soon as possible (from the AIS point of view) after Message 5.

Table 2.7
Inland vessel static and voyage-related data report

	Parameter	*Number 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. 0–3; 0 = default ; 3 = do not repeat any more
	Source ID	30	MMSI number of source station
	Spare	2	Not used. Should be set to zero. Reserved for future use.
Binary data	Application Identifier	16	As described in Table 2.6
	Unique European Vessel Identification Number	48	8*6 bit ASCII characters 000000 = ENI not assigned = default
	Length of vessel/convoy	13	1–8000 (rest not to be used) length of vessel/convoy in 1/10m; 0 = default
	Beam of vessel/convoy	10	1–1000 (rest not to be used) beam of vessel/convoy in 1/10m; 0 = default
	Vessel or convoy type	14	Numeric ERI classification (codes): Vessel or convoy type as described in annex E, ERI ship types 0 = not available = default
	Hazardous cargo	3	Number of blue cones/lights 0–3; 4 = B flag; 5 = default = unknown
	Maximum present static draught	11	1–2000 (rest not to be used) draught in 1/100m, 0 = default = unknown
	Loaded/unloaded	2	1 = loaded, 2 = unloaded, 0 = not available/default, 3 should not be used
	Quality of speed information	1	1 = high, 0 = low/GNSS = default[13]
	Quality of course information	1	1 = high, 0 = low/GNSS = default[13]
	Quality of heading information	1	1 = high, 0 = low = default[13]
	Spare	8	Not used. Should be set to zero. Reserved for future use.
	Total number of bits	**168**	**Occupies 1 slot**

The details regarding the ERI ship type coding can be found in annex E.

2.4.4.2.2 Inland specific Message FI 21: ETA at lock/bridge/terminal

This message should be used by inland vessels only, to send an ETA report to a lock, bridge or terminal in order to apply for a time slot in resource planning. The message should be sent with binary Message 6.

[13] Shall be set to 0 if no type approved sensor (e.g. gyro) is connected to the transponder.

An acknowledgement by Inland branch function Message 22 should be received within 15 minutes. Otherwise, the Inland branch function Message 21 should be repeated once.

Table 2.8
ETA at lock/bridge/terminal report

	Parameter	*Number 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 any more
	Source ID	30	MMSI number of source station
	Sequence number	2	0–3
	Destination ID	30	MMSI number of destination station[14]
	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. Reserved for future use.
Binary data	Application Identifier	16	As described in Table 2.6
	UN country code	12	2*6 bit characters; 0 = not available = default
	UN location code	18	3*6 bit characters; 0 = not available = default
	Fairway section number	30	5*6 bit characters; 0 = not available = default
	Terminal code	30	5*6 bit characters; 0 = not available = default
	Fairway hectometre	30	5*6 bit characters; 0 = not available = default
	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
	Maximum present static air draught	12	0–4000 (rest not used), in 1/100m, 0 = default = not used
	Spare	5	Not used. Should be set to zero. Reserved for future use.
	Total number of bits	**248**	**Occupies 2 slots**

[14] A virtual MMSI number should be used for each country, each national AIS network should route messages addressed to other countries using this virtual MMSI number.

2.4.4.2.3 Inland specific Message FI 22: RTA at lock/bridge/terminal

This message should be sent by base stations only, to assign a RTA at a lock, bridge or terminal to a certain vessel. The message should be sent with binary Message 6 as reply to Inland branch function Message 21.

Table 2.9
RTA at lock/bridge/terminal report

	Parameter	*Number 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 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. Reserved for future use.
Binary data	Application Identifier	16	As described in Table 2.6
	UN country code	12	2*6 bit characters; 0 = not available = default
	UN location code	18	3*6 bit characters; 0 = not available = default
	Fairway section number	30	5*6 bit characters; 0 = not available = default
	Terminal code	30	5*6 bit characters; 0 = not available = default
	Fairway hectometre	30	5*6 bit characters; 0 = not available = default
	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 (e.g. obstructed by technical conditions, only one lock chamber available, etc.) 2 = out of order 3 = not available
	Spare	2	Not used. Should be set to zero. Reserved for future use.
	Total number of bits	232	Occupies 2 slots

2.4.4.2.4 Inland specific Message FI 55: Number of persons on board

This message should be sent by inland vessels only, to inform about the number of persons (passengers, crew, shipboard personnel) on board. The message should be sent with binary Message 6**,** preferably on event or on demand**,** using International Application Identifier (IAI) binary functional Message 2.

Alternatively the standard IMO binary Message “number of persons on board” (IAI number 16) could be used.

Table 2.10
Number of persons on board report

	Parameter	*Number 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 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. Reserved for future use.
Binary data	Application Identifier	16	As described in Table 2.6
Binary data	Number of crew members on board	8	0–254 crew members, 255 = unknown = default
Binary data	Number of passengers on board	13	0–8190 passengers, 8191 = unknown = default
Binary data	Number of shipboard personnel on board	8	0–254 shipboard personnel, 255 = unknown = default
Binary data	Spare	51	Not used, should be set to zero. Reserved for future use.
	Total number of bits	168	Occupies 1 slot

The following messages need further discussion**.**

2.4.4.2.5 Inland specific Message FI 23: EMMA warning

The EMMA warning shall be used to warn skippers using graphical symbols on the Inland ECDIS screen of heavy weather conditions. The following message is capable of transmitting the EMMA data using the AIS channel. It will not replace the Notices to Skippers warnings.

This message should be sent by base stations only, to give weather warnings to all vessels in a certain area. The message should be sent with binary Message 8 on demand.

Table 2.11
EMMA warning report

	Parameter	*Number 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. 0–3; 0 = default; 3 = do not repeat any more
	Source ID	30	MMSI number of source station
	Spare	2	Not used. Should be set to zero. Reserved for future use.
Binary data	Application Identifier	16	As described in Table 2.6
	Start date	17	Start of validity period (YYYYMMDD), Bits 18–10: year since 2000 1-255; 0 = default) Bits 9–6: month (1–12; 0 = default) Bits 5–1: day (1–31; 0 = default)
	End date	17	End of validity period (YYYYMMDD), Bits 18–10: year since 2000 1-255; 0 = default) Bits 9–6: month (1–12; 0 = default) Bits 5–1: day (1–31; 0 = default)
	Start time	11	Start time of validity period (HHMM) UTC Bits 11–7: hour (0-23; 24 = default) Bits 6–1: minute (0-59; 60 = default)
	End time	11	End time of validity period (HHMM) UTC Bits 11–7: hour (0–23; 24 = default) Bits 6–1: minute (0–59; 60 = default)
	Start longitude	28	Start of the fairway section; 0 = not available = default
	Start latitude	27	Start of the fairway section; 0 = not available = default
	End longitude	28	End of the fairway section; 0 = not available = default
	End latitude	27	End of the fairway section; 0 = not available = default
	Type	4	Type of weather warning: 0 = default/unknown, others see annex B: EMMA codes Table B.1
	Min value	9	Bit 0: 0 = positive, 1 = negative value = default Bits 1–8 = value (0–253; 254 = 254 or greater, 255 = unknown = default)
	Max value	9	Bit 0: 0 = positive, 1 = negative value = default Bits 1–8 = value (0–253; 254 = 254 or greater, 255 = unknown = default)
	Classification	2	classification of warning (0 = unknown/default, 1 = slight, 2 = medium, 3 = strong/heavy) according to annex B: EMMA codes, Table B.2
	Wind direction	4	direction of wind: 0 = default/unknown, others see annex B: EMMA codes**,** Table B.3
	Spare	6	Not used. Should be set to zero. Reserved for future use.
	Total number of bits	256	Occupies 2 slots

2.4.4.2.6 Inland specific Message FI 24: Water level

This message should be used to inform skippers about actual water levels in their area. It contains 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 four gauges using multiple messages.

This message should be sent by base stations only, to give water level information to all vessels in a certain area. The message should be sent with binary Message 8 at regular intervals.

Table 2.12
Water level report

	Parameter	*Number 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. 0–3; 0 = default; 3 = do not repeat any more
	Source ID	30	MMSI number of source station
	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 according to ERI specification; 0 = not available = default
	Gauge ID	11	National unique ID of gauge[15] 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 = unknown = default[16]
	Gauge ID	11	National unique ID of gauge[15] 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 = unknown = default[16]
	Gauge ID	11	National unique ID of gauge [15] 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 = unknown = default[16]
	Gauge ID	11	National unique ID of gauge [15] 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 = unknown = default[16]
	Total number of bits	**168**	**Occupies 1 slot**

[15] Should be defined by ERI for each country.
[16] Difference value referring to reference water level (GlW in Germany, RNW on the Danube).

2.4.4.2.7 Inland specific Message FI 40: Signal status

This message should be sent by base stations only, to inform about the status of different light signals to all vessels in a certain area. The information should be displayed on an external Inland ECDIS display as dynamic symbols. The message should be sent with binary message 8 at regular intervals.

Table 2.13
Signal status report

	Parameter	*Number 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. 0–3; 0 = default; 3 = do not repeat any more
	Source ID	30	MMSI number of source station
	Spare	2	Not used. Should be set to zero. Reserved for future use.
Binary data	Application Identifier	16	As described in Table 2.6
	Signal position longitude	28	Longitude in 1/10 000 min (±180° , East = positive, West = negative. 181° (6791AC0 hex) = not available = default)
	Signal position latitude	27	Latitude in 1/10 000 min (±90 ° , North = positive, South = negative, 91° (3412140 hex) = not available = default)
	Signal form	4	0,15 = unknown = default, 1–14 signal form according to annex C: Example of signal status
	Orientation of signal	9	Degrees (0-359) (511 indicates not available = default).
	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 (light 1 to light 9 from left to right, 100000000 means colour 1 at light 1) per signal according to annex C: Example of signal status. 000000000 = default, 777777777 maximum, rest not used
	Spare	11	Not used. Should be set to zero. Reserved for future use.
	Total number of bits	**168**	**Occupies 1 slot**

An example of signal status is given in annex C: Example of signal status.

Annex A

Definitions

A.1 Services

River Information Services (RIS)

A European concept for harmonized information services to support traffic and transport management in inland navigation, including the interfaces to other transport modes.

Vessel Traffic Management (VTM)

Vessel traffic management is providing information orally**,** electronically as well as giving directions in interaction with and response to vessels in a traffic flow to optimize smooth (efficient) and safe transport.

Vessel traffic management should comprise at least one of the below defined elements:

- Vessel traffic services;
- Information services;
- Navigational assistance services;
- Traffic organization service;
- Lock planning (long and medium term);
- Lock operation;
- Bridge planning (medium and short term);
- Bridge operation;
- Navigational information.

Vessel Traffic Services (VTS)

This service is implemented by the competent authority and designed to improve the safety and efficiency of vessel traffic and protect the environment.

The service should have the capability to interact with the traffic and to respond to traffic situations developing in the area.

VTS should comprise at least an information service and may also include others, such as a navigational assistance service, or a traffic organization service, or both, defined as below:

- An information service is a service to ensure that essential information becomes available in time for onboard navigational decision-making**.**
- A navigational assistance service is a service to assist onboard navigational decision-making and to monitor its effects. Navigational assistance is especially of importance in reduced visibility or difficult meteorological circumstances or in case of defects or deficiencies affecting the radar, steering or propulsion. Navigational

assistance is given in due form of position information at the request of the traffic participant or in special circumstances when deemed necessary by the VTS operator.

- A traffic organization service is a service to prevent the development of dangerous vessel traffic situations by managing traffic movements and provide for the safe and efficient flow of vessel traffic within the VTS area. (*Source*: International Association of Lighthouse Authorities (IALA) VTS guidelines)

VTS area

VTS area is the delineated, formally declared service area of the VTS. A VTS area may be subdivided in sub-areas or sectors. (*Source*: IALA VTS guidelines)

Navigational information

Navigational information is information provided to the skipper on board to support in onboard decision-making. (*Source*: IALA VTS guidelines)

Tactical Traffic Information (TTI)

Tactical Traffic Information (TTI) is information affecting the skipper's or the VTS operator's immediate decisions with respect to in the actual traffic situation and the close geographic surroundings. A tactical traffic image contains position information and specific vessel information of all targets detected by a radar presented on an Electronic Navigational Chart and — if available — enhanced by external Traffic Information, such as information delivered by an AIS. TTI may be provided on board of a vessel or on shore, e.g. in a VTS Centre. (*Source*: Guidelines and Recommendations for River Information Services, Resolution No. 57, revised)

Strategic Traffic Information (STI)

Strategic Traffic Information (STI) is information affecting the medium and long term decisions of RIS users. A strategic traffic image contributes to the planning decision capabilities regarding a safe and efficient voyage. A strategic traffic image is produced in a RIS centre and delivered to the users on demand. A strategic traffic image contains all relevant vessels in the RIS area with their characteristics, cargoes and positions, reported by VHF voice reporting or electronic ship reporting, stored in a database and presented in a table or on an electronic map. Strategic Traffic Information may be provided by a RIS/VTS centre or by an office. (*Source*: Guidelines and Recommendations for River Information Services, Resolution No. 57, revised)

(Vessel) Tracking and Tracing

- (Vessel) Tracking means the function of maintaining status information of the vessel, such as the current position and characteristics, and — if needed — combined with information on cargo and consignments.
- (Vessel) Tracing means the retrieving of information concerning the whereabouts of the vessel and — if needed — information on cargo, consignments and equipment. (*Source*: Guidelines and Recommendations for River Information Services, Resolution No. 57, revised)

Vessel traffic monitoring

Vessel traffic monitoring is providing important information relating to the movements of relevant vessels in a RIS area. This includes information about vessel's identity, position, (type of cargo) and port of destination.

Logistics

The planning, execution and control of the movement and placement of people and/or goods and the supporting activities related to such movement and placement within a system organized to achieve specific objectives. (*Source*: Consortium Operational Management Platform River Information Services (COMPRIS) WP8 Standardization)

A.2 Players

Shipmaster

The person responsible for the overall safety of the vessel, cargo, passengers and crew and thereby for the voyage plan of the vessel and the condition of the vessel, the cargo, respectively passengers and the quality and quantity of the crew.

Conning skipper

The person who navigates the vessel according to voyage plan instructions of the shipmaster (*Source*: (COMPRIS) WP2, Architecture)

VTS operator

A person, appropriately qualified by the competent authority, performing one or more tasks contributing to the services of the VTS (*Source*: IALA guidelines on VTS in Inland Waters).

The person who monitors and controls the fluent and safe progress of traffic within the area around the VTS Centre (*Source*: COMPRIS WP2, Architecture)

Competent authority

The competent authority is the authority made responsible for safety, in whole or in part, by the government, including environmental friendliness and efficiency of vessel traffic. The competent authority usually has the task of planning, arranging funding and of commissioning of RIS. (*Source*: Guidelines and Recommendations for River Information Services, Resolution No. 57, revised)

RIS authority

The RIS authority is the authority responsible for management, operation and coordination of RIS, interaction with participating vessels and safe and effective provision of the service. (*Source*: Guidelines and Recommendations for River Information Services, Resolution No. 57, revised)

RIS operator

A person performing one or more tasks contributing to the services of RIS.

Lock operator

The person who monitors and controls the fluent and safe progress of traffic around and through a lock and who is responsible for the locking process in itself. (*Source*: COMPRIS WP2, Architecture)

Bridge operator

The person who monitors and controls the fluent and safe progress of traffic around a moveable bridge and who is responsible for the operation of a movable bridge. (*Source*: COMPRIS WP2, Architecture)

Terminal operator (synonym: stevedore)

A party responsible for the execution of loading, stowing and discharging (unloading) of vessels. (*Source*: COMPRIS WP8 Standardization)

Fleet manager

A person planning and observing the actual (navigational) status of a number of vessels moving or working under one command or ownership.

Operator in calamity centres of emergency services

The person who monitors, controls and organizes the safe and smooth fighting of accidents, incidents and calamities.

Consignor (synonym: cargo shipper or sender)

The merchant (person) by whom, in whose name or on whose behalf a contract of carriage of goods has been concluded with a carrier or any party by whom, in whose name or on whose behalf the goods are actually delivered to the carrier in relation to the contract of carriage. (*Source*: COMPRIS WP8 Standardization)

Consignee

The party mentioned in the transport document by whom goods, cargo or containers are to be received. (*Source*: Transport and Logistics Glossary (P&O Nedlloyd) and COMPRIS WP8 Standardization)

Freight broker (Synonym: freight forwarder)

The person responsible on behalf of the transport supplier for the physical transport of the goods to be executed. The freight broker offers transport capacity to shippers on behalf of the transport supplier and is this way mediator between supply forwarder and shipmaster. (*Source*: COMPRIS WP2, Architecture)

Supply forwarder

The person who is responsible on behalf of the shipper for the organization of the physical transport of the goods that should be exchanged. The supply forwarder offers cargo to transporters on behalf of the shipper. (*Source*: COMPRIS WP2, Architecture)

Customs

The department of the civil service that deals with the levying of duties and taxes on imported goods from foreign countries and the control over the export and import of goods, e.g. allowed quota on prohibited goods. (*Source*: Transport and Logistics Glossary (P&O Nedlloyd)

Annex B

EMMA codes

Table B.1
Weathertypecode

Code	*Description*	***AIS***
WI	Wind	**1**
RA	Rain	**2**
SN	Snow and ice	**3**
TH	Thunderstorm	**4**
FO	Fog	**5**
LT	Low temperature	**6**
HT	High temperature	**7**
FL	Flood	**8**
FI	Fire in the forests	**9**

Table B.2
Weathercategorycode

Code	*Description*	***AIS***
1	Slight	**1**
2	Medium	**2**
3	Strong, heavy	**3**

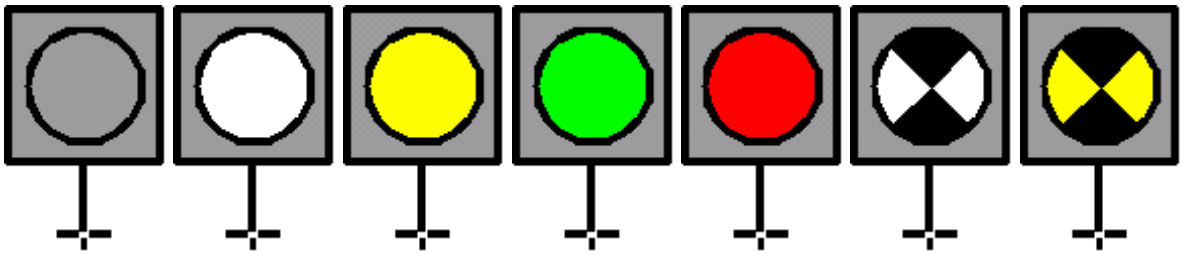
Table B.3
Winddirectioncode

Code	*Description*	***AIS***
N	North	**1**
NE	North-East	**2**
E	East	**3**
SE	South-East	**4**
S	South	**5**
SW	South-West	**6**
W	West	**7**
NW	North-West	**8**

Annex C

Example of signal status

C.1 Light status

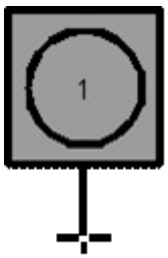


1 2 3 4 5 6 7

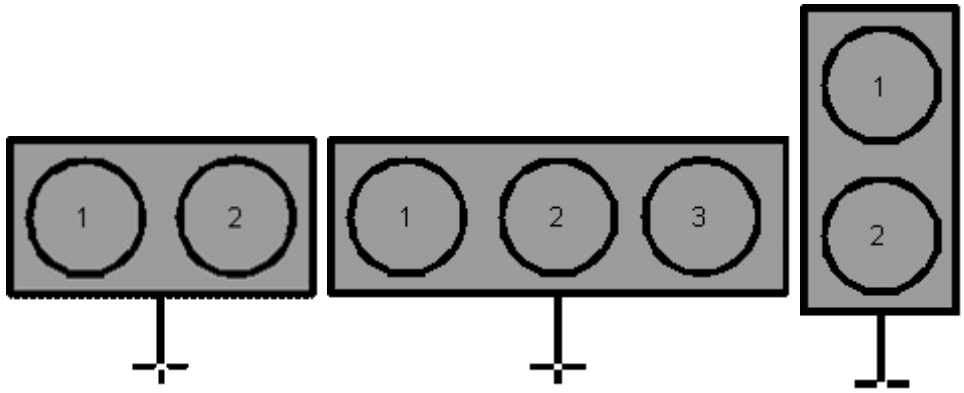
The examples show a grey background in a square of a fixed size of about 3 mm x 3 mm at all display scales with a “post” like it is used for the present static signal in the presentation library. The white point in the centre of the post indicates the position and the post itself allows the user to read 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.

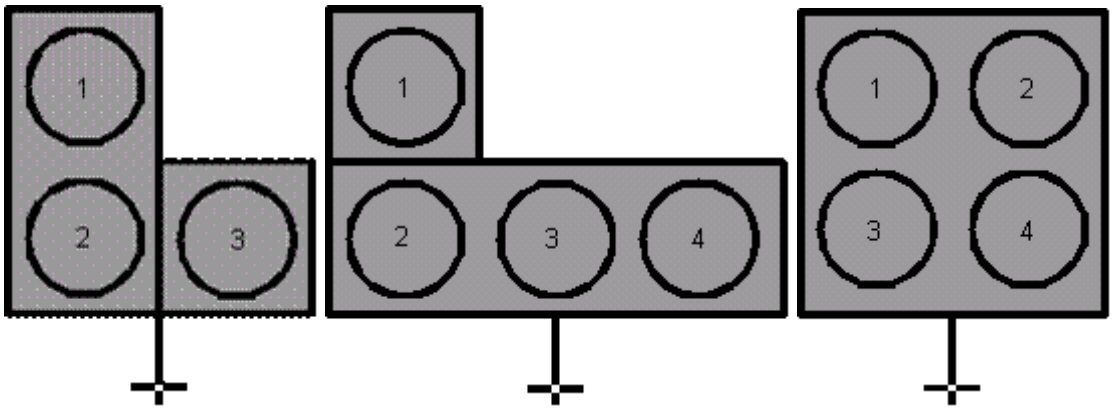
C.2 Signal forms



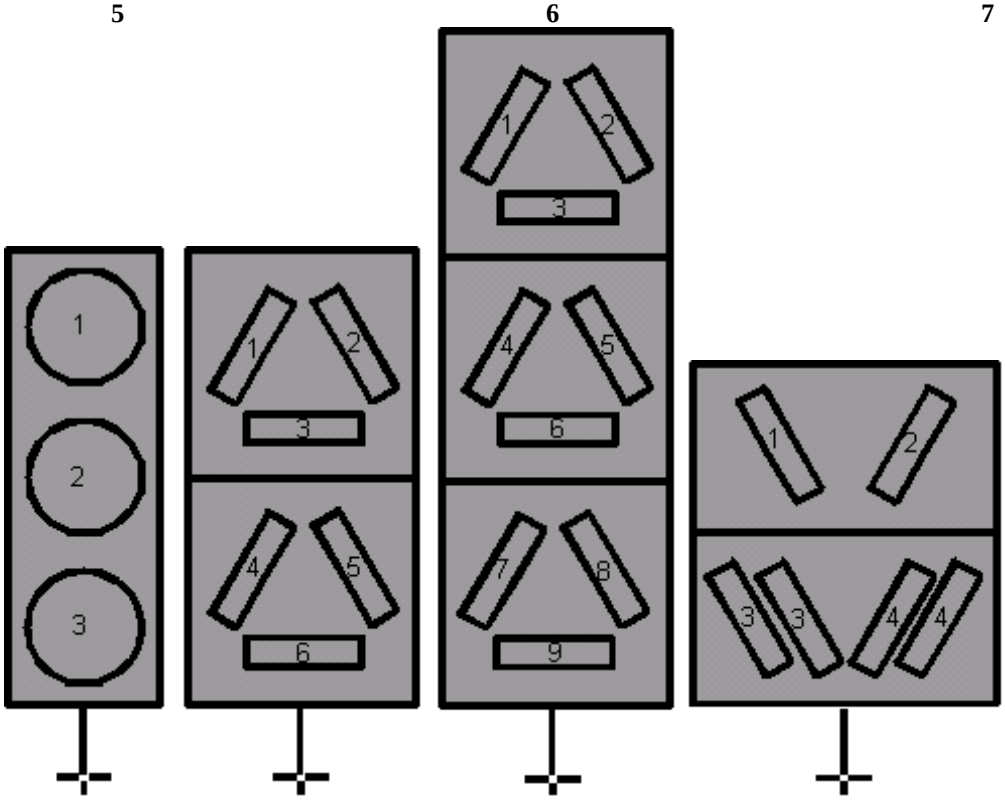
1



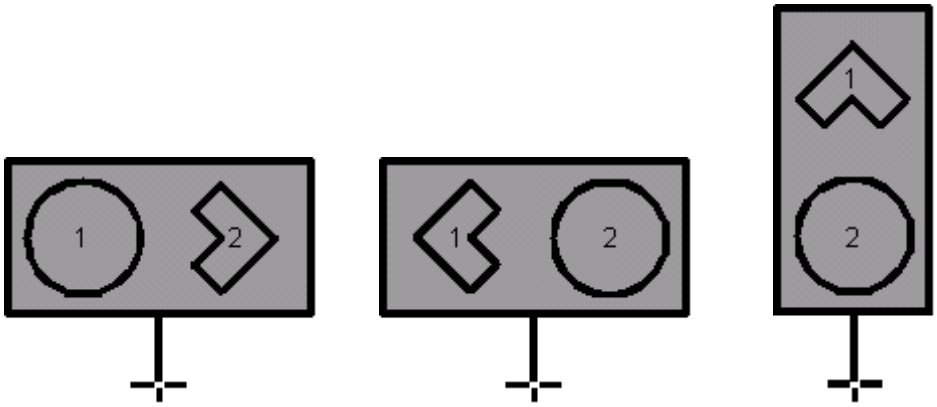
2 **3** **4**



5 **6** **7**



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.

Annex D

Digital interface sentences for Inland AIS

D.1 Input sentences

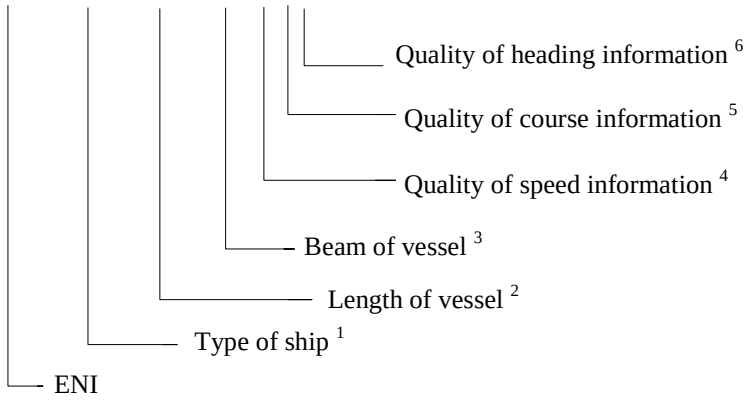
The serial digital interface of the AIS is supported by existing IEC 61162 sentences and new IEC 61162 similar sentences. The detailed descriptions for the digital interface sentences are found in IEC 61162.

This annex contains information to be used in order to input the inland specific data (see 2.4 Protocol amendments for Inland AIS) into the Inland AIS shipboard unit.

D.2 Inland waterway static vessel data

This sentence is used to enter inland navigation static vessel data into an Inland AIS unit. For setting the inland static vessel data the sentence $PIWWSSD with the following content is used:

$PIWWSSD,cccccccc,xxxx,xxx.x,xxx.x,x,x,x*hh<CR><LF>

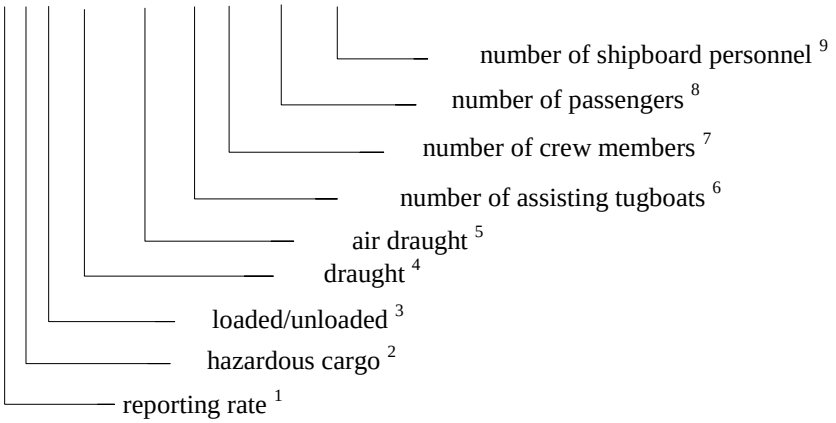


Note 1: ship type according to ERI classification (see annex E)
Note 2: length of vessel 0 to 800.0 metre
Note 3: beam of vessel 0 to 100.0 metre
Note 4: quality of speed information 1 = high or 0 = low
Note 5: quality of course information 1 = high or 0 = low
Note 6: quality of heading information 1 = high or 0 = low

D.3 Inland waterway voyage-related vessel data

This sentence is used to enter inland navigation voyage-related vessel data into an Inland AIS unit. For setting the inland voyage-related data the sentence $PIWWIVD with the following content is used:

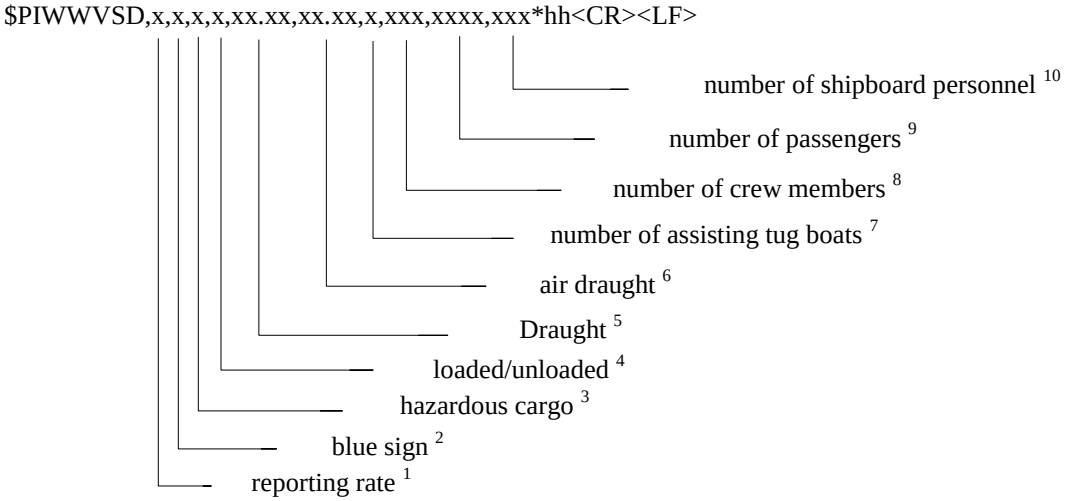
$PIWWIVD,x,x,x,xx.xx,xx.xx,x,xxx,xxxx,xxx*hh<CR><LF>



Note 1: See Table 2.5 Reporting rate settings, default setting: 0
Note 2: number of blue cones/lights: 0–3, 4 = B flag, 5 = default = unknown
Note 3: 0 = not available=default, 1 = loaded, 2 = unloaded, rest not used
Note 4: static draught of vessel 0 to 20.00 meters, 0 = unknown = default, rest not used
Note 5: air draught of vessel 0 to 40.00 meters, 0 = unknown = default, rest not used
Note 6: number of assisting tugboat 0–6, 7 = default = unknown, rest not used
Note 7: number of crew members on board 0 to 254, 255 = unknown = default, rest not used
Note 8: number of passengers on board 0 to 8190, 8191 = unknown = default, rest not used
Note 9: number of shipboard personnel on board 0 to 254, 255 = unknown = default, rest not used

Remark: The input sentence $PIWWVSD, which was formerly used in Inland AIS units developed prior these technical specifications, contains the parameter field “blue sign” which may raise conflicts with the parameter field “regional application flags” in the $--VSD sentence according to IEC 61162–1:VSD-AIS voyage static data.

It should no longer be implemented in new AIS transponders. However, for compatibility reasons, it should be supported by external applications.



Note 1: 0 = not available = default = factory settings, 1 = SOLAS settings, 2 = Inland waterway settings (2 sec), rest not used

Note 2: 0 = not available = default, 1 = not set, 2 = set, rest not used

Note 3: number of blue cones/lights: 0–3, 4 = B flag, 5 = default = unknown

Note 4: 0 = not available = default, 1 = loaded, 2 = unloaded, rest not used

Note 5: static draught of vessel 0 to 20.00 metres, 0 = unknown = default, rest not used

Note 6: air draught of vessel 0 to 40.00 metres, 0 = unknown = default, rest not used

Note 7: number of assisting tugboats 0–6, 7 = default = unknown, rest not used

Note 8: number of crew members on board 0 to 254, 255 = unknown = default, rest not used

Note 9: number of passengers on board 0 to 8190, 8191 = unknown = default, rest not used

Note 10: number of shipboard personnel on board 0 to 254, 255 = unknown = default, rest not used

Annex E

ERI ship types

This table is used to convert the UN ship types, which are used in Inland Message 10 to the IMO types which are used in IMO Message 5.

UN ship type					*IMO code*	
USEV/C	*M*	*Code*	*Subdivision*	*Name*	*First digit*	*Second digit*
No	8	00	0	Vessel, type unknown	9	9
V	8	01	0	Motor freighter	7	9
V	8	02	0	Motor tanker	8	9
V	8	02	1	Motor tanker, liquid cargo, type N	8	0
V	8	02	2	Motor tanker, liquid cargo, type C	8	0
V	8	02	3	Motor tanker, dry cargo	8	9
V	8	03	0	Container vessel	7	9
V	8	04	0	Gas tanker	8	0
C	8	05	0	Motor freighter, tug	7	9
C	8	06	0	Motor tanker, tug	8	9
C	8	07	0	Motor freighter with one or more ships alongside	7	9
C	8	08	0	Motor freighter with tanker	8	9
C	8	09	0	Motor freighter pushing one or more freighters	7	9
C	8	10	0	Motor freighter pushing at least one tank-ship	8	9
No	8	11	0	Tug, freighter	7	9
No	8	12	0	Tug, tanker	8	9
C	8	13	0	Tug, freighter, coupled	3	1
C	8	14	0	Tug, freighter/tanker, coupled	3	1
V	8	15	0	Freightbarge	9	9
V	8	16	0	Tankbarge	9	9
V	8	16	1	Tankbarge, liquid cargo, type N	9	0
V	8	16	2	Tankbarge, liquid cargo, type C	9	0
V	8	16	3	Tankbarge, dry cargo	9	9
V	8	17	0	Freightbarge with containers	8	9
V	8	18	0	Tankbarge, gas	9	0

UN ship type					*IMO code*	
USEV/C	*M*	*Code*	*Subdivision*	*Name*	*First digit*	*Second digit*
C	8	21	0	Pushtow, one cargo barge	7	9
C	8	22	0	Pushtow, two cargo barges	7	9
C	8	23	0	Pushtow, three cargo barges	7	9
C	8	24	0	Pushtow, four cargo barges	7	9
C	8	25	0	Pushtow, five cargo barges	7	9
C	8	26	0	Pushtow, six cargo barges	7	9
C	8	27	0	Pushtow, seven cargo barges	7	9
C	8	28	0	Pushtow, eight cargo barges	7	9
C	8	29	0	Pushtow, nine cargo barges	7	9
C	8	31	0	Pushtow, one gas/tank barge	8	0
C	8	32	0	Pushtow, two barges at least one tanker or gas barge	8	0
C	8	33	0	Pushtow, three barges at least one tanker or gasbarge	8	0
C	8	34	0	Pushtow, four barges at least one tanker or gasbarge	8	0
C	8	35	0	Pushtow, five barges at least one tanker or gasbarge	8	0
C	8	36	0	Pushtow, six barges at least one tanker or gasbarge	8	0
C	8	37	0	Pushtow, seven barges at least one tanker or gasbarge	8	0
C	8	38	0	Pushtow, eight barges at least one tanker or gasbarge	8	0
C	8	39	0	Pushtow, nine or more barges at least one tanker or gasbarge	8	0
V	8	40	0	Tug, single	5	2
No	8	41	0	Tug, one or more tows	3	1
C	8	42	0	Tug, assisting a vessel or linked combination	3	1
V	8	43	0	Pushboat, single	9	9
V	8	44	0	Passenger ship, ferry, red cross ship, cruise ship	6	9
V	8	44	1	Ferry	6	9
V	8	44	2	Red Cross ship	5	8
V	8	44	3	Cruise ship	6	9
V	8	44	4	Passenger ship without accommodation	6	9
V	8	45	0	Service vessel, police patrol, port services	9	9
V	8	46	0	Vessel, work maintenance craft, floating derrick, cable-ship, buoy-ship, dredge.	3	3
C	8	47	0	Object, towed, not otherwise specified.	9	9

UN ship type					*IMO code*	
USEV/C	*M*	*Code*	*Subdivision*	*Name*	*First digit*	*Second digit*
V	8	48	0	Fishing boat	3	0
V	8	49	0	Bunkership	9	9
V	8	50	0	Barge, tanker, chemical	8	0
C	8	51	0	Object, not otherwise specified.	9	9
				Extra codes for maritime means of transport		
V	1	50	0	General Cargo Vessel Maritime	7	9
V	1	51	0	Unit Carrier Maritime	7	9
V	1	52	0	Bulk Carrier Maritime	7	9
V	1	53	0	Tanker	8	0
V	1	54	0	Liquefied gas tanker	8	0
V	1	85	0	Craft, pleasure longer than 20 meters	3	7
V	1	90	0	Fast ship	4	9
V	1	91	0	Hydrofoil	4	9
V	1	92	0	Catamaran Fast	4	9

Annex F

Overview of information required by the user and the data fields, which are available in the defined Inland AIS messages

Required information by users	*Data field in Inland AIS message (Yes or No)*
Identification	Yes
Name	Yes
Position	Yes
Speed over Ground	Yes
Course over Ground	Yes
Special manoeuvre indicator (blue sign)	Yes
Direction	Could be derived from course over ground
Destination	Yes
Intended route	Could partly be derived from destination
ETA	Yes
RTA	Yes
Vessel or convoy type	Yes
Number of assisting tugboats	Yes, could be identified separately
Dimensions (length & beam)	Yes
Draught	Yes
Air draught	Yes
Number of blue cones/lights	Yes
Loaded/unloaded	Yes
Number of persons on board	Yes
Navigational status	Yes
Limitations of navigable space	Free text. Is not available
Relative position	Could be calculated based on position information of vessels
Relative speed	Could be calculated based on speed information of vessels
Relative heading	Could be calculated based on heading information of vessels
Relative drift	Is not available
Rate of Turn	Is not available