e-navigation and Maritime Digital Infrastructure

CDR Hideki NOGUCHI

Vice Chair
IALA ENAV Committee

Maritime Traffic Department
JAPAN COAST GUARD

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e-navigation

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Electronic navigational and communication technologies and services

E-navigation is defined as

"the harmonized collection, integration, exchange, presentation and analysis of marine information on board and ashore by electronic means to enhance berth to berth navigation and related services for safety and security at sea and protection of the marine environment."

IMO Development

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- MSC81(2005): Proposal on development of an e-navigation strategy; *start of e-navigation*
- MSC85(2008): Strategy for the development and implementation of e-navigation; *definition, scope, vision, key strategy elements, etc.*
- MSC94(2014): e-navigation strategic implementation plan (SIP); *five prioritized solutions, 16 Maritime Service Portfolios, etc.*
- MSC95(2015): Proposal on implementing e-navigation; *five outputs approved and one output suspended*
  - *guidelines on Standardized mode of operation (s-mode);*
  - an update, by adding new modules, to the *revised performance standards for Integrated Navigation Systems (INS)*;
  - a revision of the *Guidelines and criteria for ship reporting*;
  - amendments to the *General requirements for shipborne radio equipment forming part of the global maritime distress and safety system (GMDSS) and for electronic navigational aids;*
  - guidelines on Harmonized display of navigation information received via communications equipment;
  - MSC Resolution to ensure the development of Maritime Service Portfolios (MSC96?)

IALA ENAV Committee

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IALA: International association for marine aids to navigation and lighthouse authorities

Technical Committees: ARM, ENG, ENAV and VTS

ENAV Committee: Established in 2006, more than 100 participants (The biggest Committee in IALA), 2 meetings in a year

Working Groups

1. Harmonization WG
   The development of internationally accepted and harmonized principles, concepts, infrastructure, data models and systems for e-Navigation

2. Implementation WG
   Monitor and where possible facilitate test beds and World-Wide implementation of e-Navigation

3. Telecommunication WG
   All telecommunication aspects including both terrestrial and space based radio communications, AIS, VDES, except radionavigation (PNT)

4. ENAV Services WG
   Content of e-Navigation services, non-technical aspects of e-Navigation and the added value services provide to the users

5. Position, Navigation and Timing (PNT) WG
   All aspects of Position, Navigation and Timing systems including resilience, reliability and integrity

Common Maritime Data Structure

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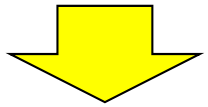
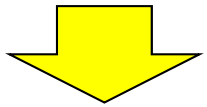
e-navigation Strategy:

Mariners require information pertaining to the planning and execution of voyages, the assessment of navigation risk and compliance with regulation. This information should be accessible from a single integrated system. Shore users require information pertaining to their maritime domain, including static and dynamic information on vessels and their voyages. This information should be provided in an internationally agreed common data structure.



Strategy Implementation Plan:

Common Maritime Data Structure (CMDS) is at the heart of e-navigation. It has been already agreed to use the IHO S-100 data model.



What information (or service) should be converted to data?

Common Maritime Data Structure

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Maritime Service Portfolios (MSPs): provisional list by SIP

No	Identified Services	No	Identified Services
MSP1	VTS Information Service	MSP9	Telemedical Assistance Service
MSP2	Navigational Assistance Service	MSP10	Maritime Assistance Service
MSP3	Traffic Organization Service	MSP11	Nautical Chart Service
MSP4	Local Port Service	MSP12	Nautical Publications Service
MSP5	Maritime Safety Information Service	MSP13	Ice Navigation Service
MSP6	Pilotage Service	MSP14	Meteorological Information Service
MSP7	Tugs Service	MSP15	Real-time Hydrographic and Environmental Information Service
MSP8	Vessel Shore Reporting	MSP16	Search and Rescue Service

IALA has already initiated the development of MSP 1, 2 and 3.
IALA has requested cooperation from WMO and IHO for the development of MSP 5.

Common Maritime Data Structure

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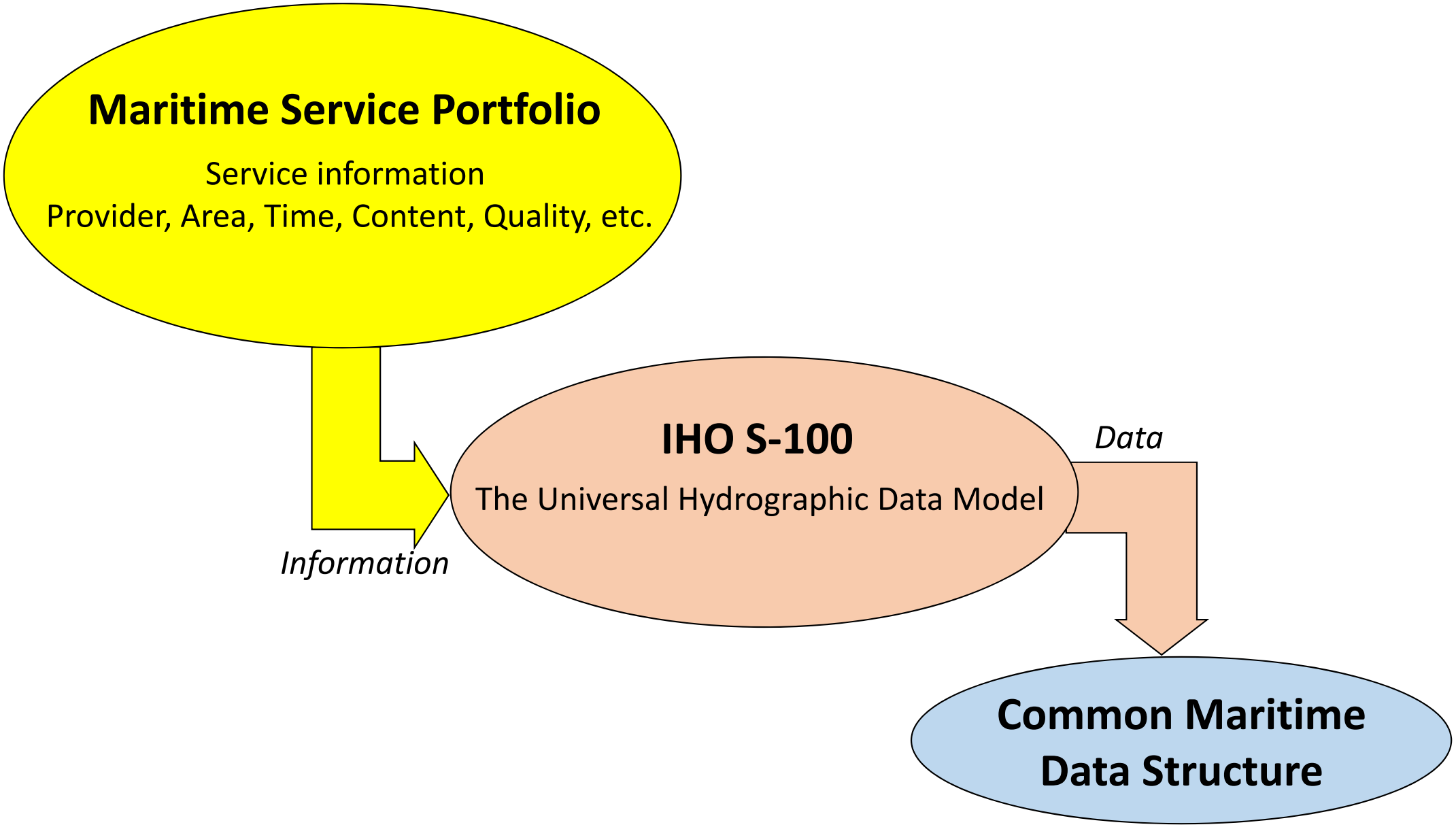

Maritime Digital Communication

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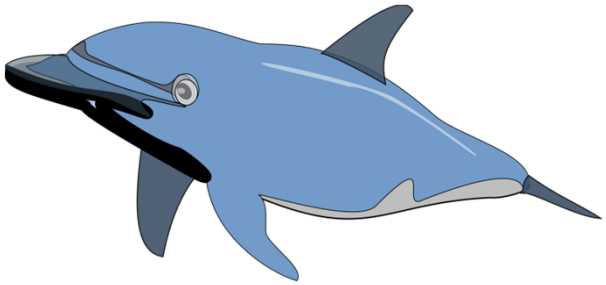
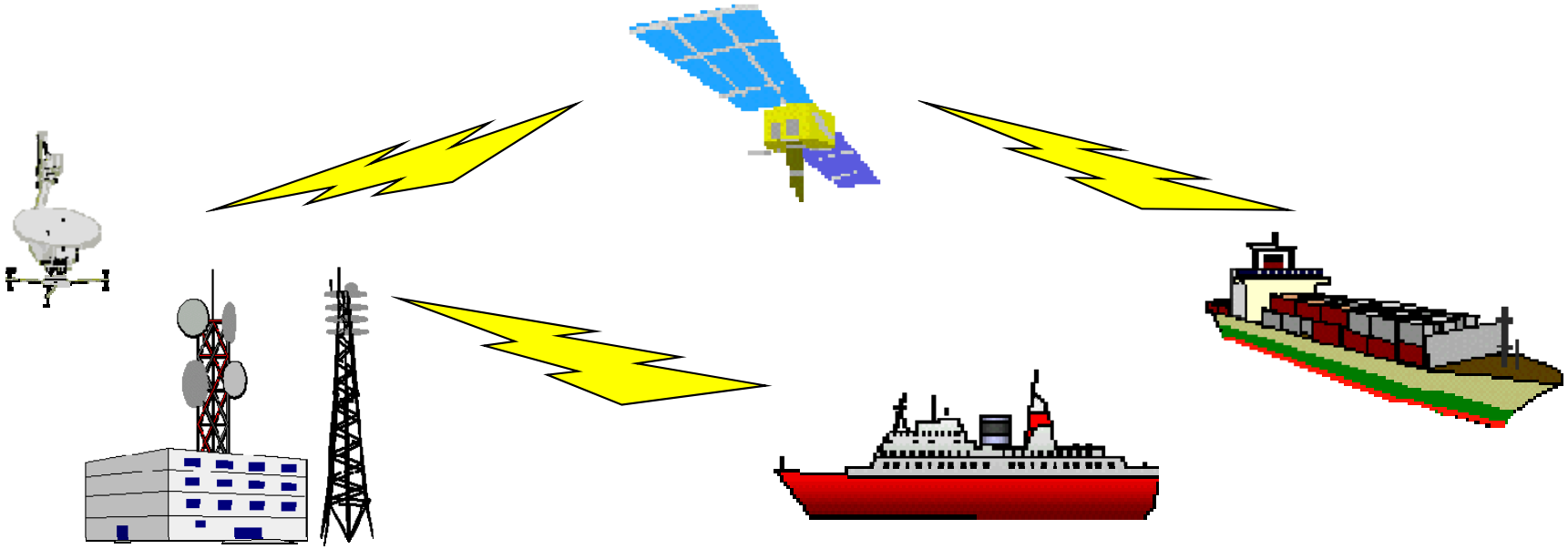
Now you have common structured data. So how to bring it to ships?

Ask them!



Radiocommunication!



But not just radiocommunication, DIGITAL communication!

Maritime Digital Communication

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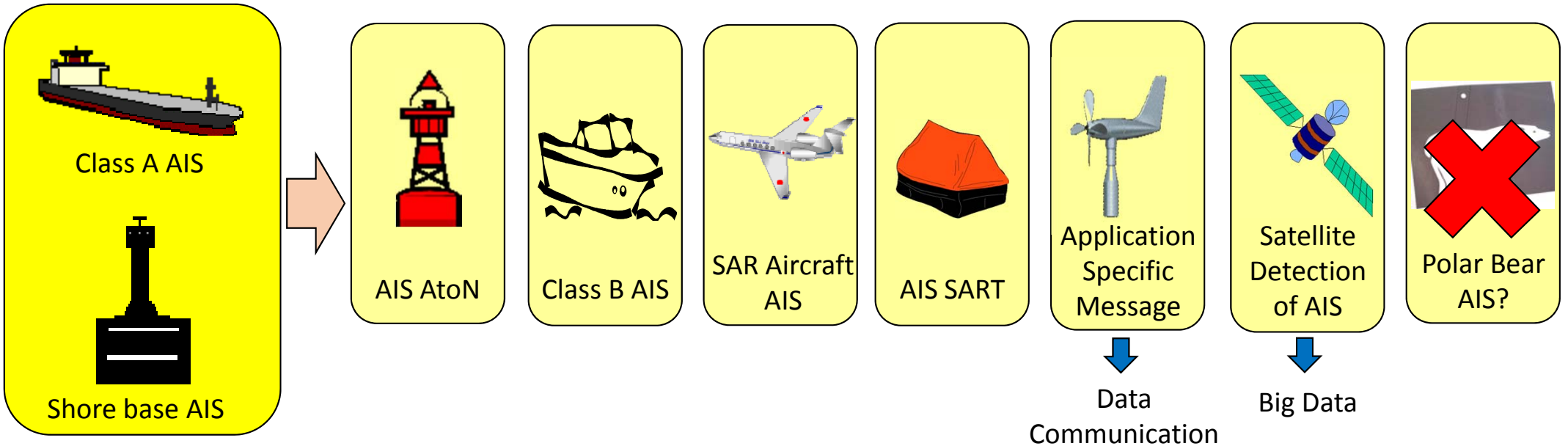
Automatic Identification System (AIS)

- Originally developed for safety of navigation (SOLAS Chapter 5), not for radiocommunication (SOLAS Chapter 4)

- Digital data exchange technique (Time Divided Multiple Access: TDMA)
  2 VHF Channel, Data speed: 9600 bps, 2250 slots/channel, 1 slot contains 256 bit

- Possible to communicate data between a Shipborne station and a Shore based station

Expansion of AIS



Maritime Digital Communication

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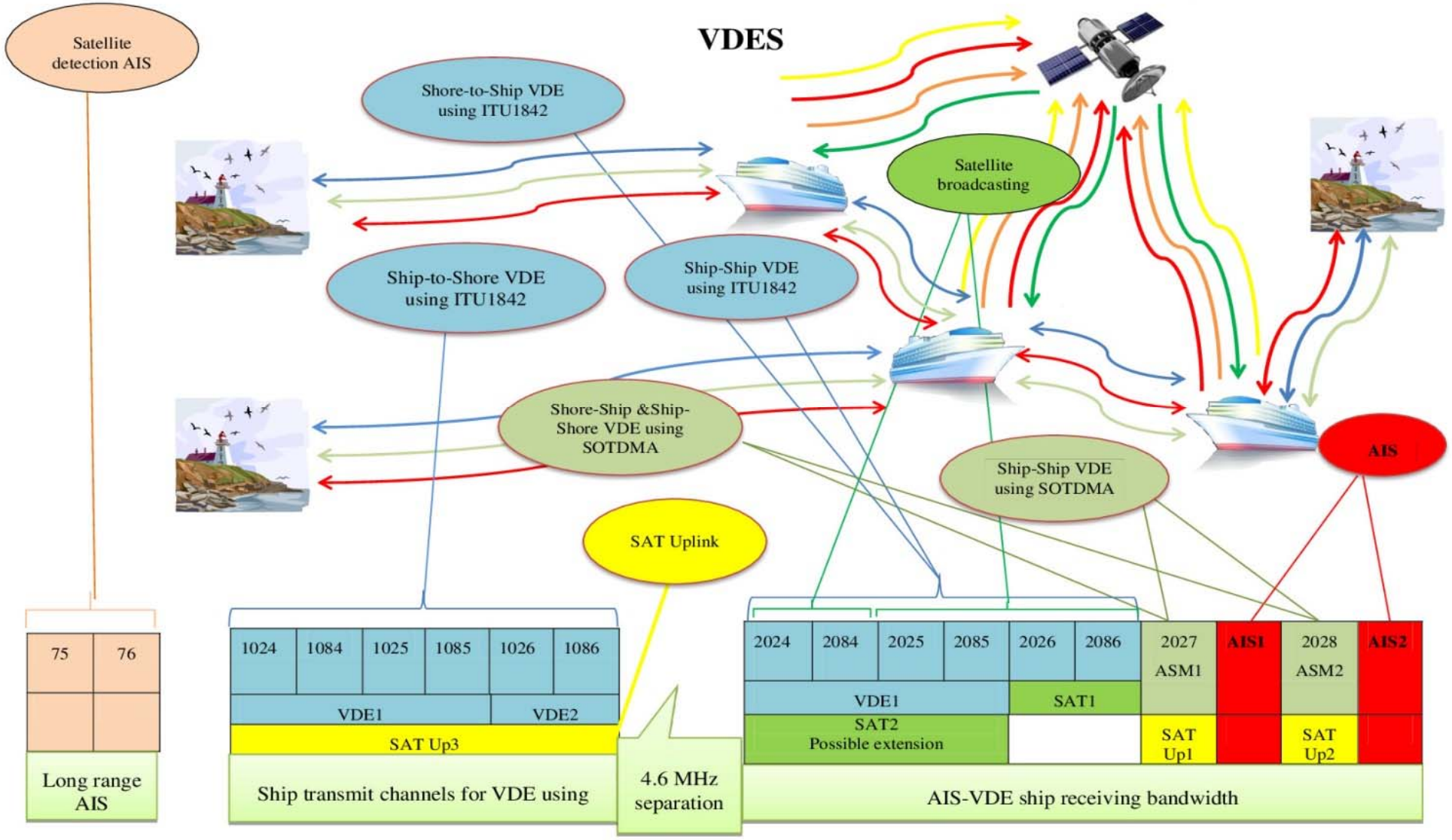
VHF Data Exchange System (VDES) for example



Maritime Digital Infrastructure

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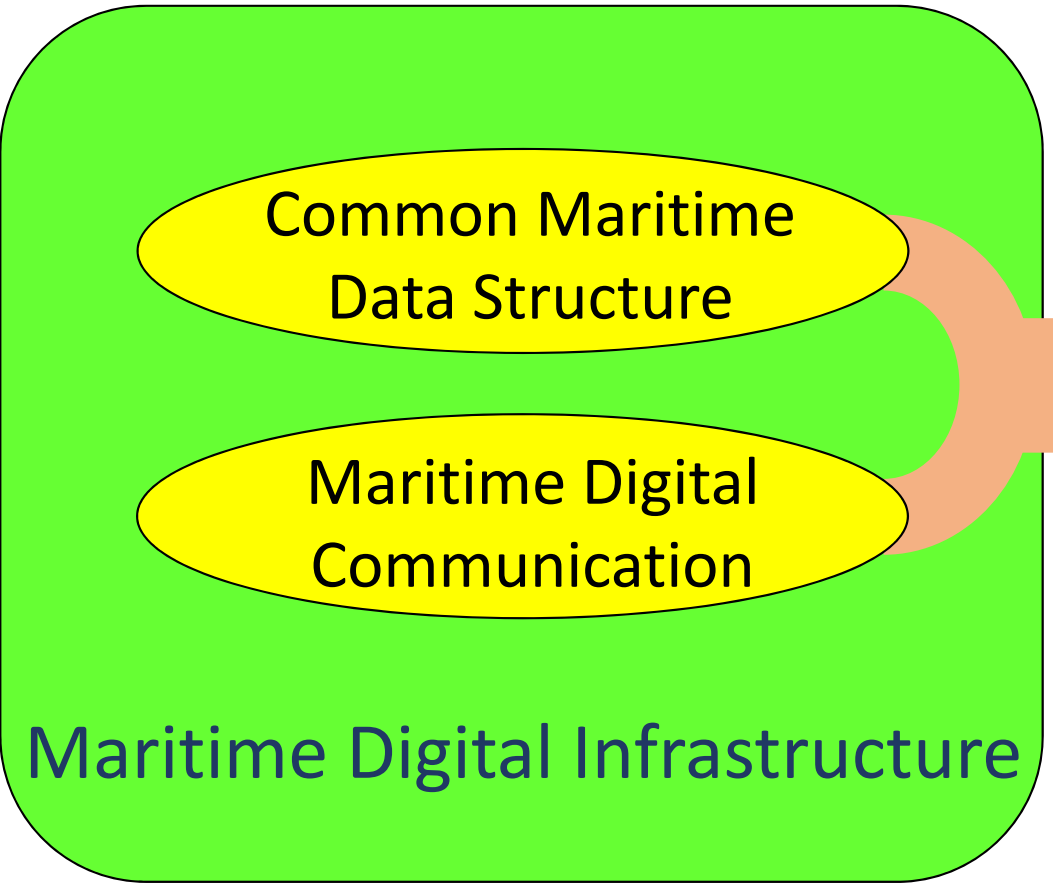

- e-navigation
- Modernization of GMDSS
- Big Data
- Marine Spatial Data
- Efficient and Sustainable Fishing
- Global Security

and More

Maritime Digital Infrastructure

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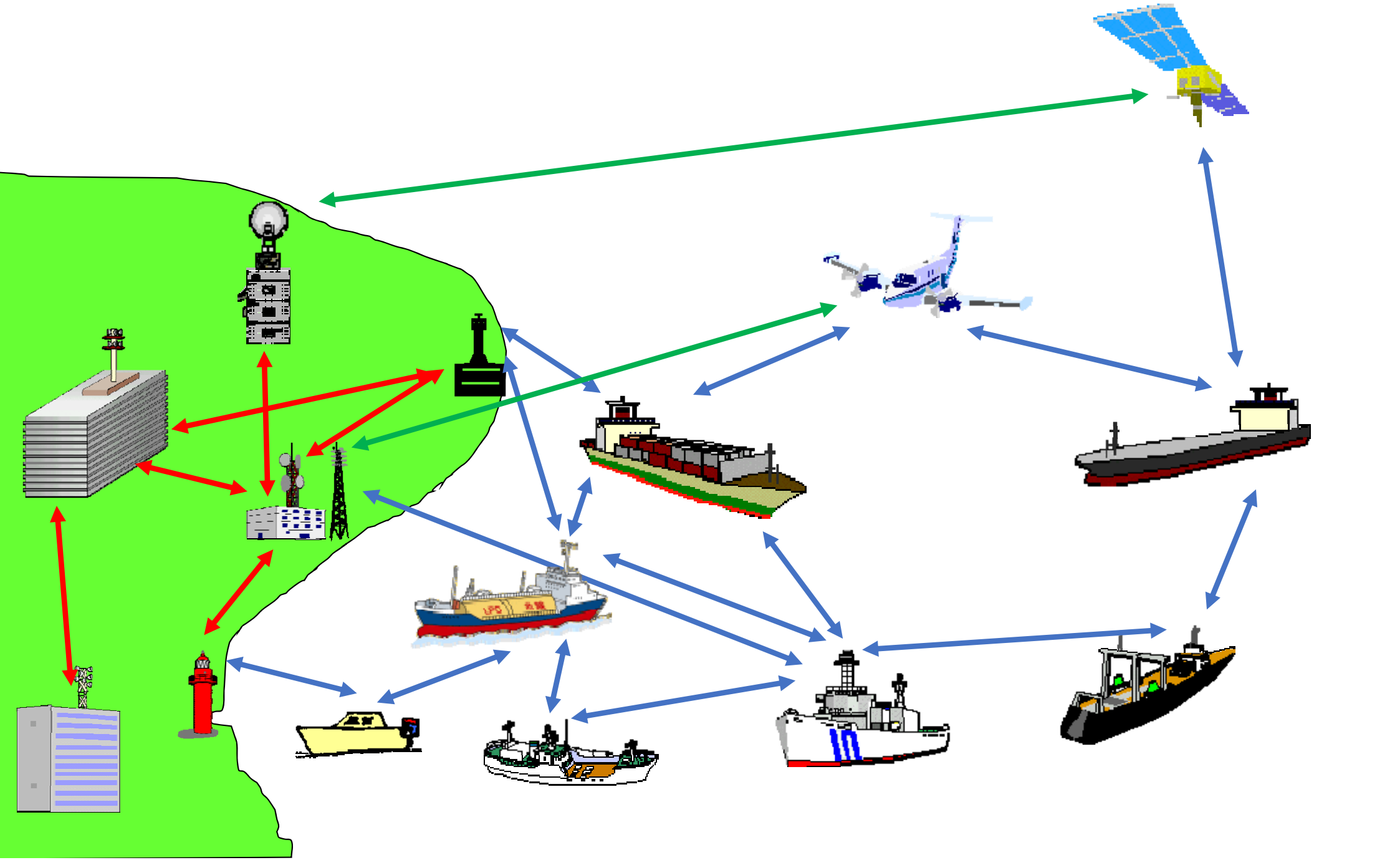

Maritime Digital Infrastructure

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Issues to be solved

- *Cyber security including identification, authentication, monitoring, etc.*
- *Governance including management, operation, maintenance, etc.*
- *Digital divide*
- *Cost*

Thank you for your attention