

Leveraging the Automatic Identification System (AIS) for ship reporting of weather observations

SOCP Summer Meeting

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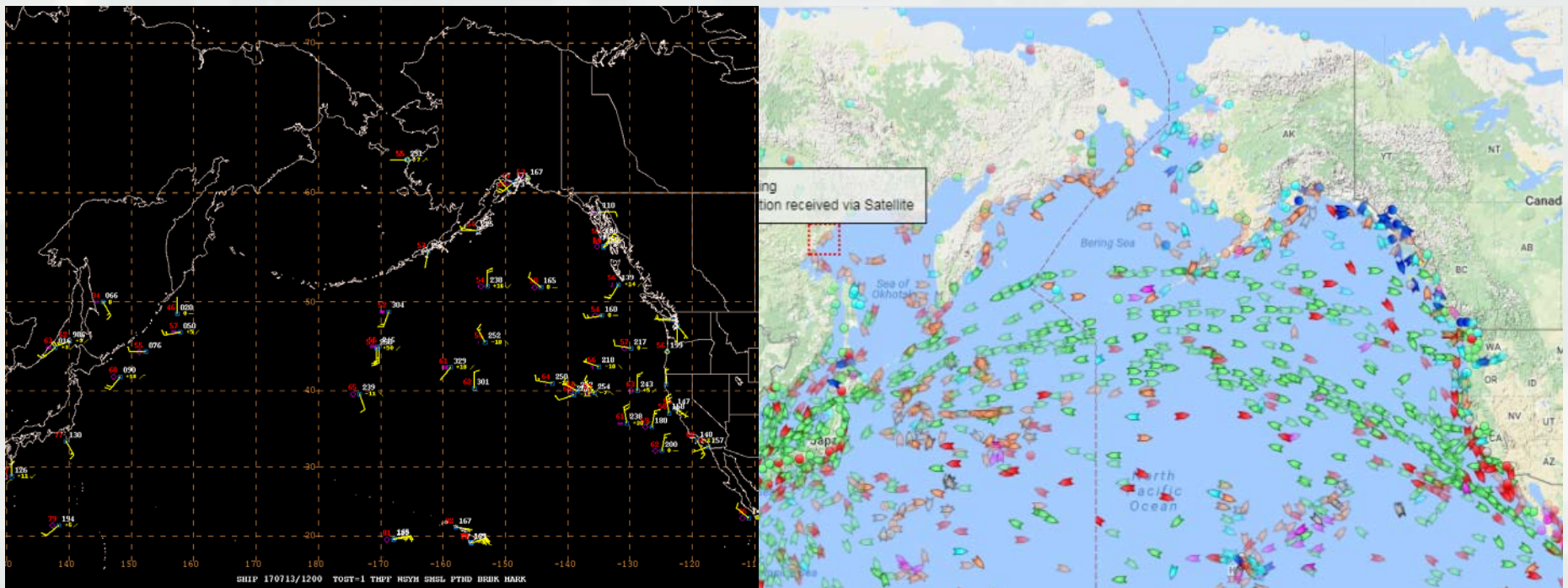
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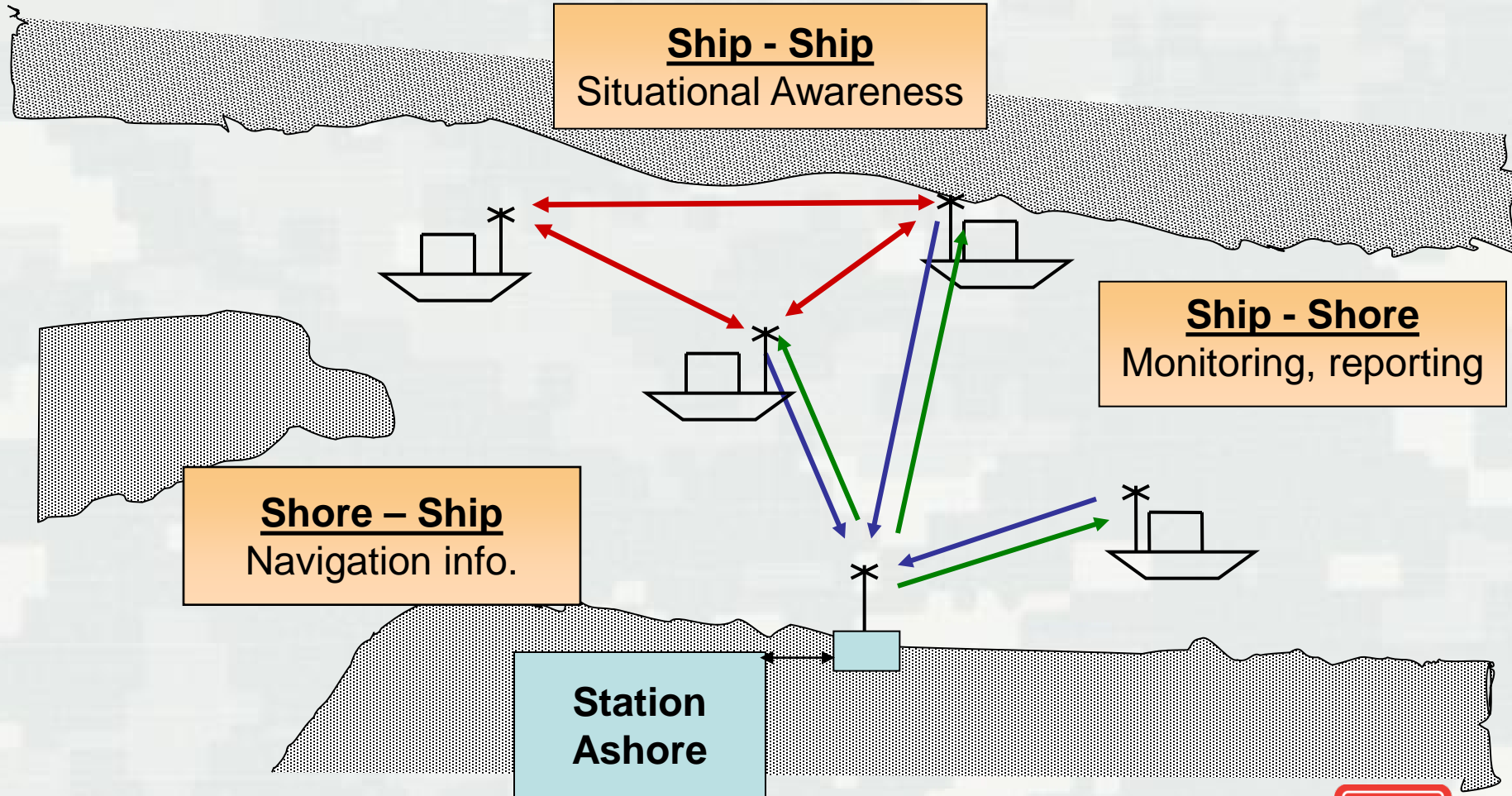
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Problem

- Weather forecasters need more observations
- Small fraction of vessels provide voluntary observations
- Observations are usually manually collected
- Communication of observations from vessel to weather offices can be problematic



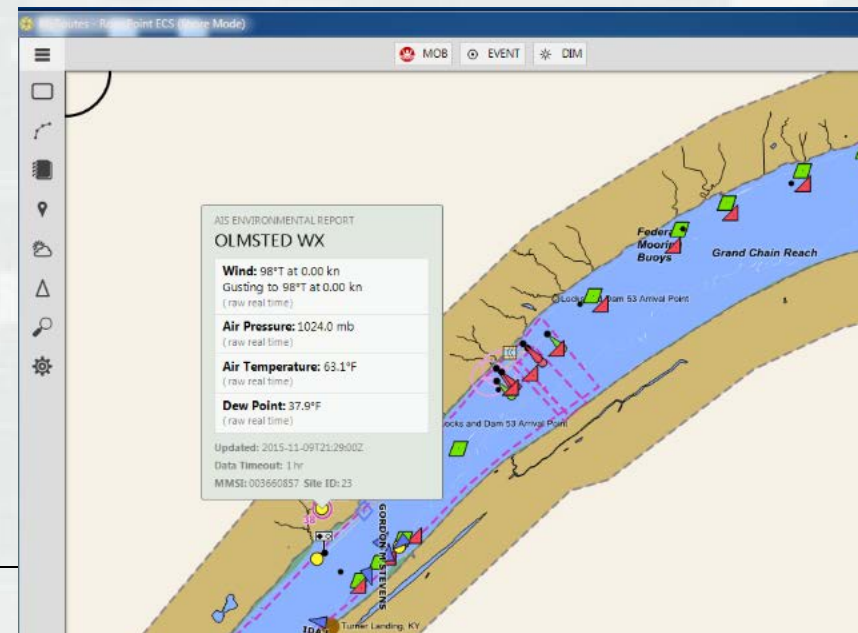
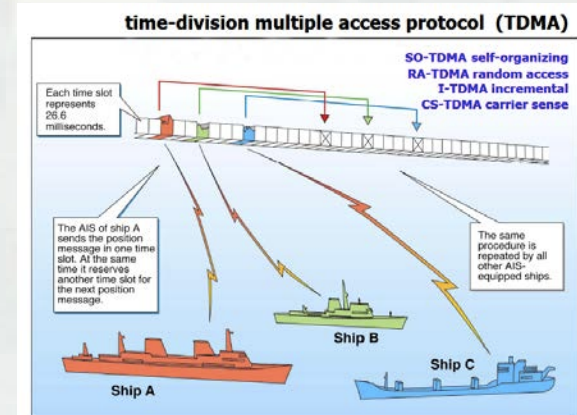
Automatic Identification System (AIS)



AIS capabilities

that may be leveraged for wx observations

- AIS transmit from vessels
- Reception by shore-based network(s)
- Reception by satellite
- Existing weather messages
 - ▶ Met hydro (old)
 - ▶ Environmental (complex)
 - ▶ Wx report from ship





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Ref. T2-OSS/2.7.1

SN.1/Circ.289
2 June 2010

GUIDANCE ON THE USE OF AIS APPLICATION-SPECIFIC MESSAGES

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

2 The Sub-Committee on Safety of Navigation, at its forty-ninth session (30 June to 4 July 2003), selected seven (7) binary messages as shown in annex 2 to SN/Circ.236 to be used as a trial set of messages for a period of four years with no change. It was noted that four additional system-related messages were identified in Recommendation ITU-R M.1371 for the operation of the system.

3 The Sub-Committee on Safety of Navigation, at its fifty-fifth session (27 to 31 July 2009), after evaluating the use of binary messages in the trial period defined in SN/Circ.236, agreed on Guidance on the use of AIS Application-Specific Messages, including messages which are recommended for international use.

4 The Maritime Safety Committee, at its eighty-seventh session (12 to 21 May 2010) concurred with the Sub-Committee's views and approved the Guidance on the use of AIS Application Specific Messages, as set out in annex.

5 Member Governments are invited to bring the annexed Guidance to the attention of a concerned.

6 This circular revokes SN/Circ.236 as from 1 January 2013.

Table 1
Summary of AIS Application-Specific Messages
recommended for international use

| FI | Message Name | Comments | Section |
|----|--|---|---------|
| 11 | Met/Hydrological | SN/Circ.236 Trial message 1; not to be used after [1 Jan 2013] | -- |
| 12 | Dangerous cargo indication | SN/Circ.236 Trial message 2; not to be used after [1 Jan 2013] | -- |
| 13 | Fairway closed | SN/Circ.236 Trial message 3; not to be used after [1 Jan 2013] | -- |
| 14 | Tidal window | SN/Circ.236 Trial message 4; not to be used after [1 Jan 2013] | -- |
| 15 | Extended ship static and voyage-related data | SN/Circ.236 Trial message 5; not to be used after [1 Jan 2013] | -- |
| 16 | Number of persons on board | SN/Circ.236 Trial message 6; corrected | 5 |
| 17 | VTS-generated/synthetic targets | SN/Circ.236 Trial message 7; renamed to "VTS-generated/Synthetic targets" | 6 |
| 18 | Clearance time to enter port | New message | 7 |
| 19 | Marine traffic signal | New message | 8 |
| 20 | Berthing data | New message | 9 |
| 21 | Weather observation report from ship | New message | 10 |
| 22 | Area notice – broadcast | New message | 11 |
| 23 | Area notice – addressed | New message | 11 |
| 24 | Extended ship static and voyage-related data | New message | 4 |



- Weather observation report from ship
 - ▶ 2 types
- Developed with WMO
 - ▶ Uses common coding scheme
- Need to compare with identified required parameters

10 Weather observation report from ship

10.1 This message provides weather information observed on a ship in navigation.

10.2 Two different messages can be transmitted:

- .1 Weather observation report from ship; or
- .2 WMO Weather observation report from ship.

10.3 Table 10.1 outlines the parameters associated with the Weather observation report from ship message.

10.4 Table 10.2 outlines the parameters associated with the WMO Weather observation report from ship message.

10.4.1 The WMO Weather observation report from ship message is intended for ships which have been recruited by national meteorological services to undertake weather observations at sea in accordance with the provisions of SOLAS chapter V, regulation 5, and the World Meteorological Organization's Voluntary Observing Ship (VOS) Scheme. Because national meteorological services are the intended primary users of this message it has been developed to reflect the coding principles prescribed by WMO in its Binary Universal Form for the Representation of meteorological data (BUFR), and as contained in Part B of WMO Publication No.306, (Manual Codes, Volume I.2). The parameters coded in this message are therefore not fully compatible with the recommendations set out in ITU M.1371-3.

10.4.2 The WMO Weather observation report from ship message includes all the parameters that are typically reported by voluntary observing ships, as well as additional parameters reported by ships that are recruited to the VOS Scheme to report climate quality weather observations (indicated as VOSclim parameters in the message description). The message format also accords with formats being developed for use in connection with shipboard automatic weather stations.

Table 10.1
Weather observation report from ship

| Parameter | No. of bits | Description |
|------------------------|-------------|---|
| Message ID | 6 | Identifier for Message 8; always 8. |
| Repeat Indicator | 2 | Used by the repeater to indicate how many times a message has been repeated. 0 - 3 0 = default 3 = do not repeat anymore |
| Source ID | 30 | MMSI number of source station. |
| Spare | 2 | Not used. Should be set to zero. |
| IAI | 16 | DAC = 001; FI = 21 |
| Type of Weather report | 1 | Always 0 |
| Geographic Location | 120 | 20 characters 6-bits ASCII as defined in ITU-R M. 1371-3, Table 44 |



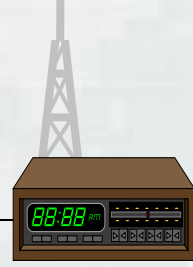
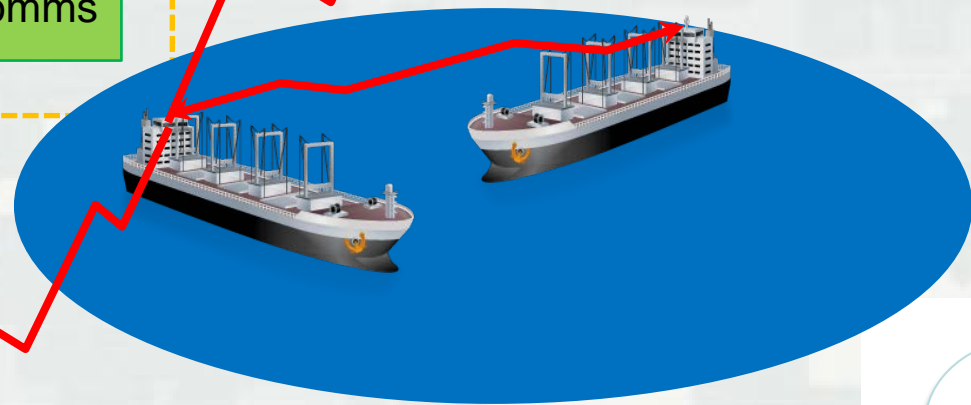
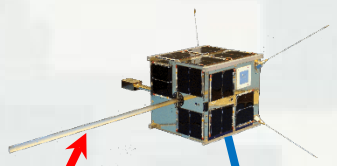
NMEA
Manual


Integration software

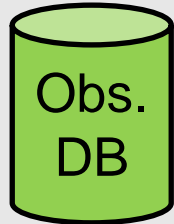
AIS
?

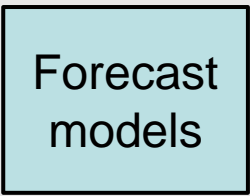


Other comms



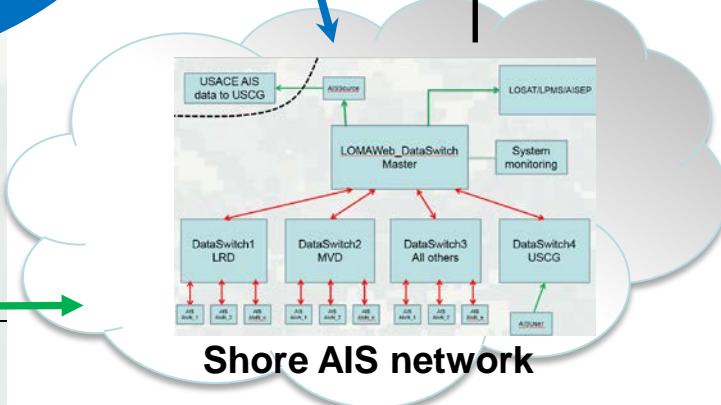

Forecaster

 Obs. DB

 Forecast models

Processing

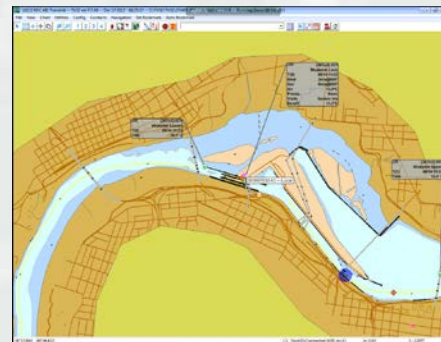
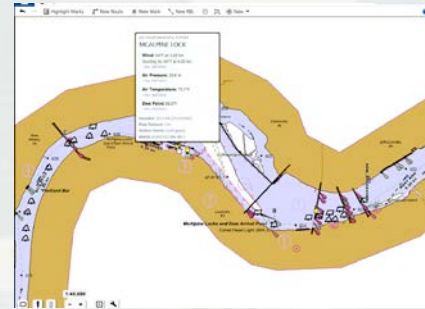
- Decode
- QA/QC
- Routing


Shore AIS network

The diagram shows a network structure with a central 'LOMAWeb_DataSwitch Master' box. It is connected to four 'DataSwitch' boxes: 'DataSwitch1 LRD', 'DataSwitch2 MVD', 'DataSwitch3 All others', and 'DataSwitch4 USCG'. Each DataSwitch is connected to multiple 'AIS' units. The master box also connects to 'USACE AIS data to USCG', 'LOSAT/LPMS/A/SEP', and 'System monitoring'.

Issues

- Portrayal on vessels
- Data formats
 - ▶ From sensor
 - ▶ From collection to met offices
- Routing
 - ▶ Who gets what data?
- Legal issues
 - ▶ Data access
 - ▶ Liability (ship to ship)
- Quality Assurance
 - ▶ Sensor calibration
 - ▶ Integrity - collection to delivery
 - ▶ Data validation



AIS Object Info

Object Selection
 ~ 3667632 - EM_3_R2

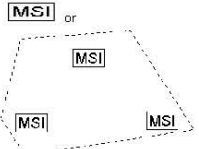
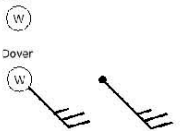


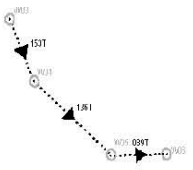


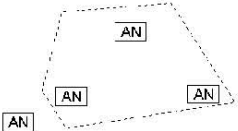


Environmental

| | |
|----------------------|---------|
| MMSI Number | 3667632 |
| Site ID | 3 |
| Report Type | 2 |
| Wind Speed | 1 kts |
| Wind Direction | 321 deg |
| Relative Water Level | n.a. |
| Absolute Water Level | n.a. |
| Current Speed | n.a. |
| Current Direction | n.a. |

Find Close

| AIS ASM Information | | | | |
|---------------------|----------------|-------------|---------|-------------------|
| Summary | Wind (Spd@Dir) | Air Temp | Tide | Current (Spd@Dir) |
| CANNELTON LOWE | | | 5.18m v | |
| RMR WEATHER | 000ks8312 | 9.4C 48.9F | | |
| CANNELTON UPPER | | | 2.89m v | |
| MARKLAND UPPER | | | 3.71m v | |
| MARKLAND LOWER | | | 6.06m v | |
| FORT KNOX | 005ks8010 | 12.4C 54.3F | | |
| MCALPINE UPPER | | | 3.81m v | |
| MCALPINE LOWER | | | 6.12m v | |
| MCALPINE LOCK | 001ks8286 | 13.7C 56.7F | | |

Time 11:22:44 Last Update 00:00:12 Status Normal 1 Ver: 02.01.01 Show Values

| ASM Function Identifier | Symbol Name |
|-------------------------|--|
| 17 | VTS-generated AIS ship targets – presented as AIS targets |
| 22, 23 | Maritime Safety Information, MSI  |
| 26, 31 | Meteorological information  |
| 31 | Tidal and water level information  |
| 19 | Signal station  |
| 27, 28 | Route information broadcast  |
| 20 | Berthing data  |
| 18 | Clearance time to enter port  |
| 22, 23 | Area notice  |
| 26 | Air gap  |
| 26, 31 | Environmental report  |

Suggested approach

- Establish pilot project(s)
 - ▶ Industry, gov't, equipment/software providers
- Build on existing capabilities
 - ▶ Sensors
 - ▶ AIS equipment (ship and shore)
- Use existing message(s)
- Develop “middleware” for testing
 - ▶ Interface with various sensors, process data into AIS message
- Collect lessons learned and best practices
- Input to standards and guidelines



Thank you for your attention!



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of Engineers®**

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