United States Coast Guard
Waterways Management

Providing navigation safety information for America’s waterways

Jorge Arroyo
Office of Navigation Systems
U.S. Coast Guard
Washington, DC

Towing Safety Advisory Committee
Ft. Lauderdale, FL
May 7th, 2009
Shipboard AIS
AIS Rulemaking [Changes in Bold-type]

- 10/23/03 current AIS requirement (33 CFR 164.46)
- 07/01/03-01/09/04 sought AIS expansion comment
- 10/31/05 - notice expansion of AIS to all waters
- 12/16/08 NPRM …4/15/09 comment deadline

Could effect 17,442 vessels / 14,506 small biz’s, i.e.

- Commercial self-propelled vessels of > 65 feet
  - No exclusions
- Towing vessels > 26 feet & >600 hp
- Vessels with > 50 passengers (vice 150 for hire)
- Hi-speed passenger vessels (> 12 pax)
- Certain dredges & floating plants, &
- Vessel moving certain dangerous cargoes

### Estimated Expanded AIS Population

<table>
<thead>
<tr>
<th>Ship Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ships ≥65ft</td>
<td>2,973</td>
</tr>
<tr>
<td>Freight Ship</td>
<td>298</td>
</tr>
<tr>
<td>Industrial Ship</td>
<td>748</td>
</tr>
<tr>
<td>MODU</td>
<td>210</td>
</tr>
<tr>
<td>OSV</td>
<td>553</td>
</tr>
<tr>
<td>Research Vessel</td>
<td>97</td>
</tr>
<tr>
<td>School Ship</td>
<td>19</td>
</tr>
<tr>
<td>Tank Ship</td>
<td>122</td>
</tr>
<tr>
<td>Unclassified</td>
<td>385</td>
</tr>
<tr>
<td>Unknown</td>
<td>541</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Fishing ≥65ft</th>
<th>5,520</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documented</td>
<td>4,571</td>
</tr>
<tr>
<td>Undocumented (est.)</td>
<td>949</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Towing ≥26ft &amp; ≥600hp</th>
<th>4,560</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger</td>
<td>3,235</td>
</tr>
<tr>
<td>≥65ft</td>
<td>2,167</td>
</tr>
<tr>
<td>&lt;65 but ≥50 pax</td>
<td>1,082</td>
</tr>
<tr>
<td>&gt;30kts &amp; &gt;12 pax for hire</td>
<td>6</td>
</tr>
</tbody>
</table>

| Dredges               | 35    |
| Total (U.S.)          | 16,323|

| Foreign Flag ≥65ft    | 1,119 |
| Total (All)           | 17,442|
Noteworthy Proposed AIS Rule Changes...

Spells out ‘effective operating conditions’ which now includes the:

- ability to reinitialize the AIS
- ability to access AIS from conning position
- accurate broadcast of an official MMSI
- accurate input, upkeep, and updating
Noteworthy Proposed AIS Rule Changes...

• AIS (& assoc. sensors) shall remain on when:
  - underway
  - at anchor
  - moored in or near a channel or fairway

• Except if it compromises safety or security
  - Non-transmitting must be logged & reported
Noteworthy Proposed AIS Rule Changes...

• AIS is primarily for the person controlling the vessel, who must maintain a periodic watch

• AIS does not relieve you of sound, lights or shapes nor radiotelephone requirements

• AIS messaging must be in English & solely for navigation safety information

• AIS Pilot Plug requirement extended to any vessel subject to pilotage & limits the distance between it & an AC outlet to no more than 3’
Noteworthy Proposed AIS Rule Changes...

Applies to all navigable waters, no exemptions.

Individual yearly deviations/waivers permissible, but, only for vessels:

• that solely operate within a very confined area
e.g. shipyard, fleeting area, etc.

• on short & fixed schedules
e.g. a bank-to-bank river ferry service

• otherwise not likely to encounter other AIS
Noteworthy Proposed AIS Rule Changes...

CG type-approved Class B are permissible, but, not recommended on vessels that are:

• highly maneuverable
• navigate at high speed
• routinely operate in congested waters, or
• operate in close-quarter situations

Should cautionary note be mandatory provision?
AIS Comment Period...

• Public Meetings
  - Washington, DC – March 5th, 2009
    • 30+ attendees, 11 commenters
  - Seattle, WA – March 25th, 2009
    • 30+ attendees, 12 commenters

• Comment period closed: April 15th, 2009

• Public Submissions
  - 80+ submitters, 70+ regarding AIS
Some AIS Public Comments or Concerns

• Undue economic burden
• Not capturing total economic impact—ECS added
• Don’t need it…I’ve never collided…I have VMS
• Not here…not needed…exempt my waterway
• Will not help security…all vessel needed
• Exempt tows >1200hp, assist towers, pax >150
• Waivers indefinite or >1 year
Some AIS Public Comments or Concerns

• Continuous operation on unmanned moored vessel
• Carriage on floating plants and/or other vessel that lack onboard power
• AIS Class B yes...on hi-speed vessels no
• AIS conning information from display-less Class B
• Would attract vessels and/or disclose fish areas
• Extend implementation period >7 months
### Docket Details

**Title:** Vessel Requirements for Notices of Arrival and Departure, and Automatic Identification System  
**Type:** Rulemaking  
**Sub Type:** Commercial Vessels  
**Disposition:** Pending  
**Action Office:** G-LRA  
**Docket Subject:** Vessel Requirements for Notices of Arrival and Departure, and Automatic Identification System  
**Docket Parties:**  
**DMS Docket No.:**  
**RIN:**  
**Docket Close Date:** null date

### Documents

<table>
<thead>
<tr>
<th>Document ID</th>
<th>Title</th>
<th>Date Posted</th>
<th>Type</th>
<th>Views</th>
<th>Add Comments</th>
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<tbody>
<tr>
<td>USCG-2005-21869-0002</td>
<td>Regulatory Analysis &amp; Initial Regulatory Flexibility</td>
<td>12/15/2008</td>
<td>SUPPORTING &amp; RELATED MATERIALS</td>
<td></td>
<td></td>
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<tr>
<td>USCG-2005-21869-0002_1</td>
<td>Regulatory Analysis &amp; Initial Regulatory Flexibility</td>
<td>12/15/2008</td>
<td>SUPPORTING &amp; RELATED MATERIALS</td>
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<td></td>
</tr>
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</table>
FREQUENTLY ASKED QUESTIONS

1. What is the AIS?
2. What is the AIS rule?
3. Are there alternatives to the AIS rule for small businesses?
4. How much does an AIS cost?
5. How does AIS help to increase security?
6. When must AIS be in operation?
7. Does the installation of the AIS require additional equipment in order for the AIS to operate properly?
8. Will it be necessary to have electronic navigational charts for use with the AIS?
9. If a fishing vessel has a Vessel Monitoring System (VMS), is that an acceptable substitute for the AIS?
10. Why have some AIS units stopped broadcasting valid position reports?
11. Why am I unable to see an AIS vessel's name or other static information (dimensions, call sign, etc.)?
12. Why do I sometimes see only one vessel with the same MMSI or vessel name (i.e. NAUTY)?
13. I just purchased and installed an AIS Class B, will AIS Class A user 'see' me?
14. Do AIS Class B devices meet current USCG AIS carriage requirements?
15. Is the USCG considering expanding AIS carriage to other vessels or outside of VTS areas?

1. What is the AIS? Per 47 CFR §80.5 AIS is a maritime navigation safety communications system standardized by the International Telecommunication Union (ITU) and adopted by the International Maritime Organization (IMO) that provides vessel information, including the vessel's identity, type, position, course, speed, navigational status and other safety-related information automatically to appropriately equipped shore stations, other ships, and aircraft; receives automatically such information from similarly fitted ships; monitors and tracks ships; and exchanges data with shore-based facilities. Read more on what it is, how it works, what it broadcasts, and the messages it uses, etc.

2. What is the AIS rule? The U.S. Coast Guard has developed rules applicable to both U.S. and foreign-flag vessels that require owners and operators of most commercial vessels to install and use the AIS. The AIS rule is part of our domestic and international effort to increase the security and safety of maritime transportation. See 33 CFR parts 26, 161, 164, and 165. Current AIS regulations, 33 CFR §164.46, became effective on November 21, 2003, and require that all vessels denoted 33 CFR § 164.46(a) be outfitted with an USCG type-approved and properly installed AIS no later than December 31, 2004. Read more.

3. Are there alternatives to the AIS rule for small businesses? No, there are no special provisions or alternatives in the AIS rules for small businesses. See Small Entity Compliance Guide to AIS.
AIS Rulemaking [Changes in Bold-type]

- 10/23/03, current AIS requirement published (33 CFR 164.46)
- 07/01/03-01/09/04, 3 meetings & comment period re: AIS expansion
- 10/31/05, agenda entry re: expansion of AIS to all navigable waters
- 12/16/08, NPRM published; 04/15/09, comment deadline (73 FR 78295)
  - Proposed compliance date: NLT 7 month after Final Rule
  - AIS prices: Class A, $2,800-5,000; Class B, $700-1,500
    - Installation cost will vary by display options & interfacing
    - SOLAS requires interfacing to GPS, THD, ROT, back-up power
  - Potentially could effect 17,442 vessels/14,506 small biz’s, i.e.
    - Commercial self-propelled vessels of > 65 feet
      - **No exclusions**
    - Towing vessels > 26 feet and > 600 hp
    - Vessels with > 50 passengers (vice 150 for hire)
    - **Hi-Speed vessels with > 12 passengers for hire**
    - Certain dredges & floating plants, &
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<td>Total (U.S.)</td>
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<tr>
<td>Foreign Flag ≥65ft</td>
</tr>
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<td><strong>Total (All)</strong></td>
</tr>
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Noteworthy Proposed AIS Rule Changes...

Spells out ‘effective operating conditions’ which now includes the:

- ability to reinitialize the AIS (i.e. password),
- ability to access AIS from conning position,
- accurate broadcast of an official MMSI,
- accurate input, upkeep, and updating
Noteworthy Proposed AIS Rule Changes...

Spells out that ‘effective operating conditions’ includes:

- AIS always on (& its associated devices) when
  - underway
  - at anchor, or
  - moored in or near a channel or fairway;

except when use would compromise safety or security
— which must be logged & reported to the USCG.
Noteworthy Proposed AIS Rule Changes...

• AIS is primarily for use of the person controlling the vessel, who must maintain a periodic AIS watch.

• AIS does not relieve one of duties regarding sound, lights or shapes nor radiotelephone requirements.

• AIS messaging must be in English & solely for navigation safety information.

• AIS Pilot Port/Plug requirement extended to any vessel subject to pilotage & limits the distance between it & an AC outlet to no more than 3 feet.
Noteworthy Proposed AIS Rule Changes...

Applies to all U.S. Navigable Waters, no exemptions.

Individual yearly deviations/waivers permissible, but, only for vessels:

- solely operate within a very confined area
  e.g. shipyard, fleeting area, etc.

- on short & fixed schedules
  e.g. a bank-to-bank river ferry service

- otherwise not likely to encounter other AIS users
Noteworthy Proposed AIS Rule Changes...

Use of CG type-approved Class B is permissible, however, not recommended on vessels that are:

• highly maneuverable
• navigate at high speed
• routinely operate in congested waterways, or
• operate in close-quarter situations

Should this recommendation be mandatory?

Homeland Security
<table>
<thead>
<tr>
<th>AIS Class A &amp; B Comparison</th>
<th><strong>Class A</strong></th>
<th><strong>Class B/CS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmit Power</td>
<td>2w</td>
<td>12.5w / 2w (low-power)</td>
</tr>
<tr>
<td>Reporting Rate</td>
<td>2 - 10 sec - speed and/or course dependent</td>
<td>30 sec. fixed</td>
</tr>
<tr>
<td>Communication Protocol</td>
<td>SO-TDMA</td>
<td>CS-TDMA</td>
</tr>
<tr>
<td></td>
<td>Self-Organizing amongst Class A’s</td>
<td>Carrier-Sense(s), polite to Class A’s</td>
</tr>
<tr>
<td>Frequency Range &amp; Bandwidth</td>
<td>156.025 -162.025 MHz @ 12/25 kHz DSC Required</td>
<td>161.500 - 162.025 MHz @ 25 kHz DSC &amp; 12.5 kHz Optional</td>
</tr>
<tr>
<td>Position Source</td>
<td>External GNSS &amp; Internal GPS</td>
<td>Internal GPS</td>
</tr>
<tr>
<td>Digital Interfaces</td>
<td>2 Input-Output Ports &amp; Multiple Outputs</td>
<td>Optional</td>
</tr>
<tr>
<td>Display</td>
<td>Multiple Keyboard Display (MKD)</td>
<td>Optional</td>
</tr>
<tr>
<td>Safety Text Messaging</td>
<td>Receive &amp; Transmit</td>
<td>Transmit Optional &amp; Pre-configured</td>
</tr>
<tr>
<td>Data</td>
<td>All</td>
<td>No Rate of Turn, Navigation Status, Destination, ETA, Draft, IMO #</td>
</tr>
<tr>
<td>CG Type-Approvals</td>
<td>22 Models - 16 Manufacturers</td>
<td>8 Models - 8 Manufacturers</td>
</tr>
<tr>
<td>Approximate Cost</td>
<td>$2,800 - 4,000</td>
<td>$700 - 1,500</td>
</tr>
</tbody>
</table>
Other USCG AIS on goings...

International Standards (completed or in final stages)
- IEC 62288 – Nav Information on Shipboard Displays
- IEC 62388 – Radar
- IEC 62376 – ECDIS
- IEC 62287 – AIS Class B
- IEC 62320 – AIS Aid to Navigation (ATON)
- IEC 61097 – AIS Search & Rescue Transmitter (SART)
  - In Final Stage, we expect availability later this year
- IEC 61993-2 – AIS Class A, 2nd Generation AIS...in development...2010

VTS AIS Binaries Project (Receive & Transmission of AIS from ashore)
- ACOE Real-Time Current Velocity (RTCV) – 10 sites in the works
- Tampa Bay (NOAA PORTS)
- Stellwagen Bank (Right Whale Notifications)

Nation-wide AIS Project (NAIS)
- Increment 1 – Completed Oct’07
- Increment 2 – Awarded Dec’08, IOC ’11, FOC ’14
- Increment 3 – Satellite reception tests in progress
# Recommended AIS target symbols

<table>
<thead>
<tr>
<th>AIS target</th>
<th>Symbol number</th>
<th>Symbol</th>
<th>Description of symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIS target (sleeping)</td>
<td>1</td>
<td><img src="image1.png" alt="Symbol" /></td>
<td>An isosceles, acute-angled triangle should be used with its centroid representing the target’s reference position. The most acute apex of the triangle should be aligned with the heading of the target, or with its COG, if heading information is not available. The symbol of the sleeping target may be smaller than that of the activated target.</td>
</tr>
<tr>
<td>Activated AIS target</td>
<td>2A</td>
<td><img src="image2.png" alt="Symbol" /></td>
<td>An isosceles, acute-angled triangle should be used with its centroid representing the target’s reference position. The most acute apex of the triangle should be aligned with the heading of the target, or with its COG, if heading information is not available. The COG/COG² vector should be displayed as a dashed line starting at the centroid of the triangle. The heading should be displayed as a solid line of fixed length starting at the apex of the triangle. A flag on the heading indicates a turn and its direction in order to detect a target manoeuvre without delay. A path predictor may also be provided.</td>
</tr>
<tr>
<td>Selected target</td>
<td>3</td>
<td><img src="image3.png" alt="Symbol" /></td>
<td>A square indicated by its corners should be drawn around the target symbol.</td>
</tr>
<tr>
<td>Dangerous target</td>
<td>4</td>
<td><img src="image4.png" alt="Symbol" /></td>
<td>A bold line clearly distinguishable from the standard lines should be used to draw the symbol. The size of the symbol may be increased. The symbol should be displayed with vector, heading and rate of turn indication. The symbol should flash until acknowledged. The triangle should be red on colour displays.</td>
</tr>
<tr>
<td>Lost target</td>
<td>5</td>
<td><img src="image5.png" alt="Symbol" /></td>
<td>A prominent solid line across the symbol, perpendicular (for example at right angles) to the last orientation of the symbol should be used. The symbol should flash until acknowledged. The target should be displayed without vector, heading and rate of turn indication.</td>
</tr>
</tbody>
</table>

### Symbol Name and Description

<table>
<thead>
<tr>
<th>Symbol Name and Description</th>
<th>Symbol Graphic(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.11 AIS Search and Rescue Transponder</td>
<td><img src="image6.png" alt="Symbol" /></td>
</tr>
</tbody>
</table>

- An AIS Search And Rescue Transponder (SART) shall be presented as a circle with an 'X' inscribed inside it. The circle shall be 5 millimetres in diameter. The symbol shall be drawn using a thick dashed line style with the colour red. The symbol shall flash until acknowledged by the user. Once acknowledged, the symbol shall cease flashing.  

### Virtual AIS ATON:

- ![Symbol](image7.png)

### Real AIS ATON:

- ![Symbol](image8.png)

**NOTE:** Examples showing the default symbol for a buoy.

**NOTE:** Examples showing the symbol for an offshore platform.
Other USCG AIS on goings...

International Standards (completed or in final stages)
- IEC 62288 – Nav Information on Shipboard Displays
- IEC 62388 – Radar
- IEC 62376 – ECDIS
- IEC 62287 – AIS Class B
- IEC 62320 – AIS Aid to Navigation (ATON)
- IEC 61097 – AIS Search & Rescue Transmitter (SART)
  - In Final Stage, we expect availability later this year
- IEC 61993-2 – AIS Class A, 2nd Generation AIS...in development...2010

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NOAA PORTS Environmental Data via AIS in Tampa FL
Other USCG AIS on goings...

International Standards (completed or in final stages)

- IEC 62288 – Nav Information on Shipboard Displays
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Nation-wide AIS Project (NAIS)

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Nation-wide AIS Project Conceptual Overview

- Automatic reception of AIS information (vessel ID, location, status, and other navigational information) nationwide out to 2000nm
- Transmission out to 24nm from shore
- Correlation with other database systems for intelligence and operational decision makers
- Shared with others & displayed on a Common Operational Picture
USCG Marine Information for Safety & Law Enforcement (MISLE GIS)
USCG Marine Information for Safety & Law Enforcement (MISLE GIS)
AIS units logged/tracked each day by USCG network

1997: USCG adopts a VTS AIS strategy
   - Ports & Waterways Safety System acquisition
1998: USCG R&D Center and CGHQ seek to expedite
      AIS technology development and certification
2000: SOLAS AIS carriage requirements adopted
      - Phased deployment from 2002 - 2008
2002: Post 9/11, IMO advances AIS carriage to 12/31/04
      - Congress mandates AIS (MTSA 2002)
2003: USCG RDC prototype AIS network commences
2004: USCG Nationwide AIS (NAIS) deployment
2005: SOLAS and MTSA requirements in effect
2007: USCG NAIS Increment-1 deployed
AIS information displayed on a Common Operational Picture (COP) which is shared with other agencies
Other USCG AIS on goings...

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- IEC 62288 – Nav Information on Shipboard Displays
- IEC 62388 – Radar
- IEC 62376 – ECDIS
- IEC 62287 – AIS Class B
- IEC 62320 – AIS Aid to Navigation (ATON)
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  - In Final Stage, we expect availability later this year
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Satellite Reception of AIS

05:22:38 NOV 08 UTC / Vessel count: 11703
Current AIS Prices

Furuno FA150 AIS Transponder
Product ID: P1150-15  HRB 20-FA150
Furuno FA150 is a shipsborne Universal AIS (Automatic Identification System) Transponder capable of exchanging navigation and ship data between own ship and other ships or coastal stations.
Availability: Usually ships within 24 hours
List Price: $3,999.00  Our Price: $3,999.95

Milltech Marine Online Store

ACR Nauticast2 Class A AIS Transponder
The ACR Nauticast2 Class A Transponder is a class A unit that is specifically designed to fulfill non-SOLAS carriage requirements. This product is packaged in an All-in-One kit that includes the AIS transponder, VHF & GPS antennas, data cables, and pivot mounting kit. An ECDIS port adapter is included which can directly interface with your ECDIS display or marine navigation package. The system can be ordered for use with 12 or 24 volt DC power.
ACR-2609  $2,999.00  Add to Cart

AIS-1000 Class B “Send and Receive” AIS Transponder
$699.99 USD
Add To Cart

AIS-1000 Class B “Send and Receive” AIS Transponder
To Project List

Homeland Security
• SOLAS Chp. V changes took effect 2000
• IMO HSC mandates ECDIS
• IMO to mandate ECDIS on others by 2012
• CG&MT Act of 2004 mandates ECS in US
• U.S. ECS rulemaking in development
  - Will become part of SOLAS rulemaking
United States Coast Guard
Waterway Management

Questions

Thank You

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cgnav@uscg.mil
1-202-372-1563

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Washington, DC 20953