
United States Coast Guard

Office of Navigation Systems



"We Help Mariners Get There"

Jorge Arroyo | U.S. Coast Guard | Washington, DC | jorge.arroyo@uscg.mil



Homeland
Security



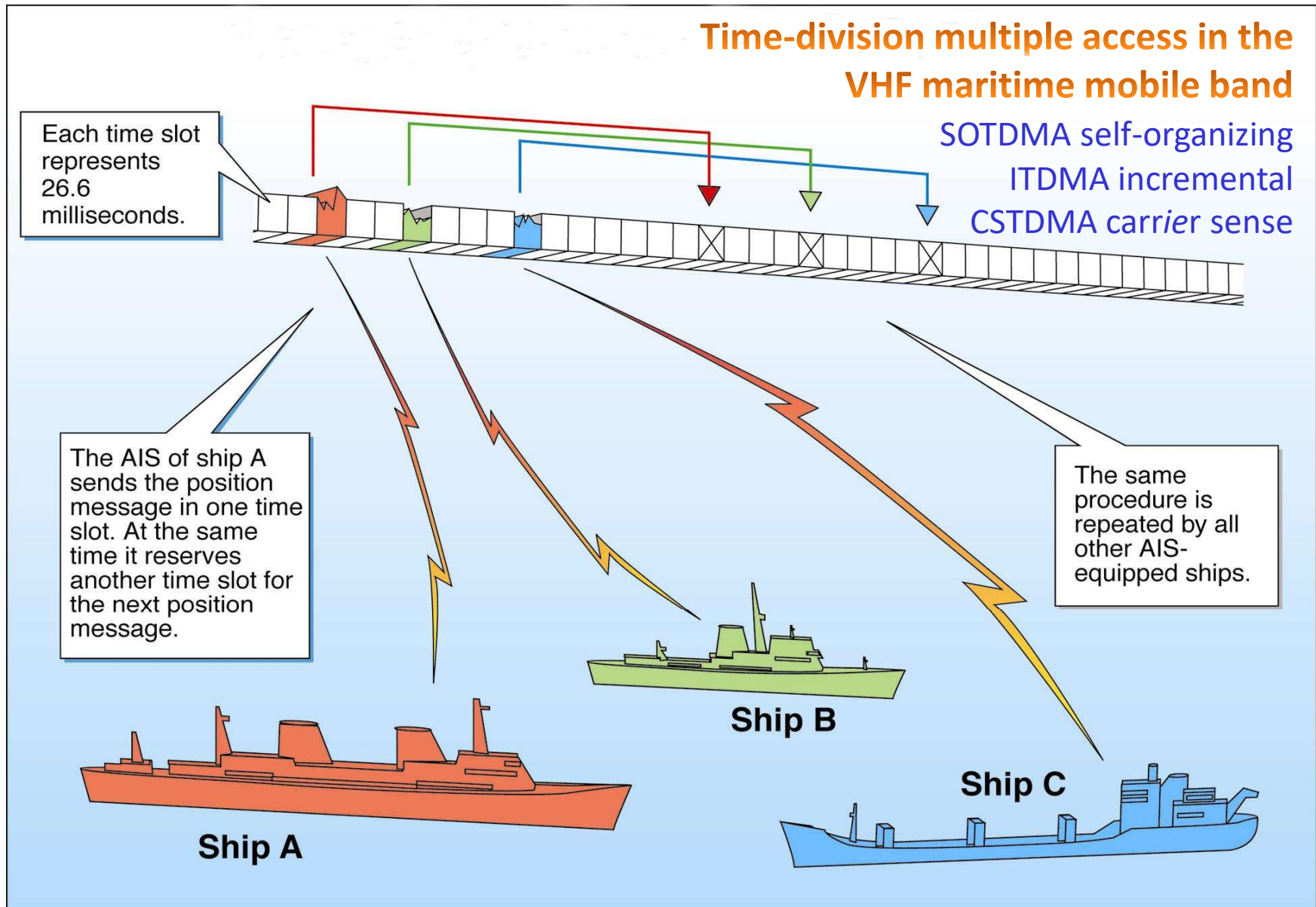
Automatic Identification System (AIS)

- Mandatory since April, 2016 for all commercial vessels > 65'
- 1,100 fishing boats/day use it...
- 72% are not properly encoded, 12% lack dimensions
- F/V may use Class B's vice costlier A's, but, maybe shouldn't

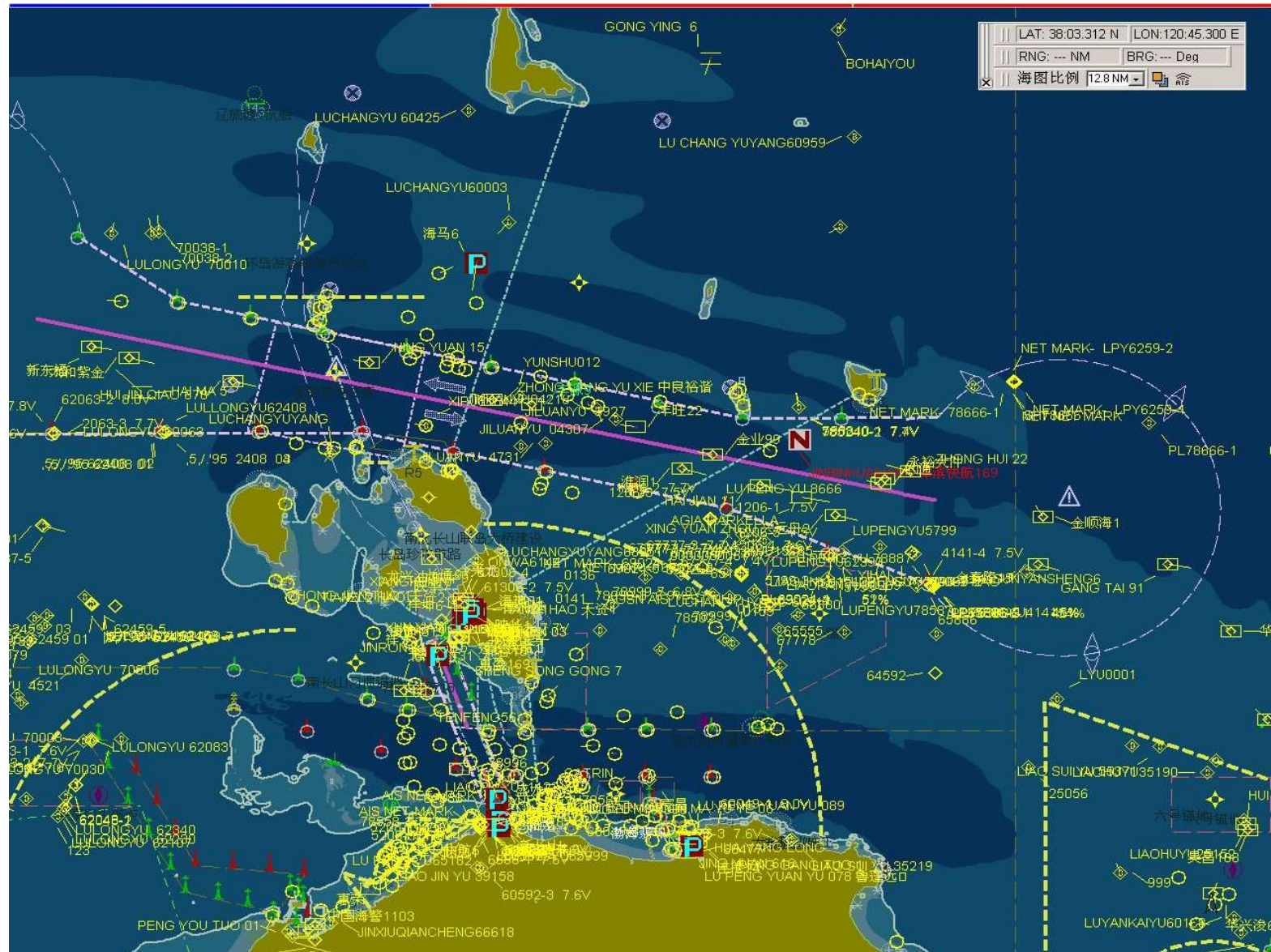


We are starting to see AIS net locators...per our AIS FAQ#18, most being sold on the internet are not FCC certified... thus are illegal to use in the USA!

Why you shouldn't use uncertified/untested AIS's



It's a world-wide issue!



Radiocommunication Study Groups



Source: Document 5B/TEMP/243

Subject: WRC-19 AI 1.9.1

Annex 29 to
Document 5B/538-E
20 June 2018
English only

Autonomous Marine Radio Devices

Annex 29 to Working Party 5B Chairman's Report

LIAISON STATEMENT TO THE INTERNATIONAL MARITIME ORGANIZATION, THE INTERNATIONAL ASSOCIATION OF MARINE AIDS TO NAVIGATION AND LIGHTHOUSE AUTHORITIES, THE WORLD METEOROLOGICAL ORGANIZATION, THE COMITÉ INTERNATIONAL RADIO-MARITIME AND INMARSAT PLC.

Autonomous maritime radio devices and identities in the maritime mobile service

ITU-R Working Party 5B (WP 5B), at its meeting on 21st May – 1st June 2018 continued the work on WRC-19 AI 1.9.1 on autonomous maritime radio devices (AMRD) and considered to revise Recommendation ITU-R M.585-7. WP 5B provides relevant draft documentation to International Maritime Organization (IMO), International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), World Meteorological Organization (WMO), Comité International Radio-Maritime (CIRM) and Inmarsat Plc..

1) General AIS Errors: Includes MMSI, IMO Number, Call Sign or Name differences, vessel length of 0 meters, undefined ship type or draft of 0.0 meters

Service Category	Error	Correct	Total	Error %
-----	-----	-----	-----	-----
Cargo	277	1642	1919	14%
Commercial	1898	858	2756	69%
Fishing	1914	737	2651	72%
Government	300	420	720	42%
Passenger	475	643	1118	42%
Recreational	3831	8651	12482	31%
Tanker	60	676	736	8%
Towing	1987	2080	4067	49%
-----	-----	-----	-----	-----
Total	10742	15707	26449	41%

AIS Type	Error	Correct	Total	Error %
-----	-----	-----	-----	-----
Class A AIS	5227	6322	11549	45%
Class B AIS	5515	9385	14900	37%

Vessel Flag	Error	Correct	Total	Error %
-----	-----	-----	-----	-----
Domestic	9893	12851	22744	43%
Foreign	849	2856	3705	23%

2) AIS MMSI Errors:

Service Category	Error	Correct	Total	Error %
Cargo	59	1860	1919	3%
Commercial	206	2550	2756	7%
Fishing	251	2400	2651	9%
Government	11	709	720	2%
Passenger	48	1070	1118	4%
Recreational	486	11996	12482	4%
Tanker	7	729	736	1%
Towing	172	3895	4067	4%
Total	1240	25209	26449	5%

AIS Type	Error	Correct	Total	Error %
Class A AIS	549	11000	11549	5%
Class B AIS	691	14209	14900	5%

Vessel Flag	Error	Correct	Total	Error %
Domestic	1024	21720	22744	5%
Foreign	216	3489	3705	6%

3) AIS Zero-Length Vessel Errors:

Service Category	Error	Correct	Total	Error %
Cargo	29	1890	1919	2%
Commercial	623	2133	2756	23%
Fishing	327	2324	2651	12%
Government	105	615	720	15%
Passenger	86	1032	1118	8%
Recreational	979	11503	12482	8%
Tanker	9	727	736	1%
Towing	369	3698	4067	9%
Total	2527	23922	26449	10%

AIS Type	Error	Correct	Total	Error %
Class A AIS	1217	10332	11549	11%
Class B AIS	1310	13590	14900	9%

Vessel Flag	Error	Correct	Total	Error %
Domestic	2323	20421	22744	10%
Foreign	204	3501	3705	6%

AUTOMATIC IDENTIFICATION SYSTEM U.S. ENCODING GUIDE



AUTOMATIC IDENTIFICATION SYSTEM is a valuable navigation safety radio communication tool. However, its usefulness is undermined by the broadcast of inaccurate, improper or outdated data. This Encoding Guide is intended to assist mariners in the proper entry of AIS data. Mariners are reminded that U.S. regulation requires that each AIS be maintained in effective operating condition, which includes accurate input and upkeep of AIS data parameters. Failure to do so may subject a vessel to civil penalties; to avoid such action AIS Users should ensure their system is up-to-date and encoded according to the guidance contained here.

Dynamic Data...should be provided via systems that are type-certified, properly installed, maintained and operational³

- External Electronic Positioning Fixing System (EPPS), Heading, and Rate of Turn (ROT) data should be integrated into the AIS, per SOLAS Regulation V/19.2, on vessels on international voyage (SOLAS-certified) of 150 gross tonnage or greater; of 300 gross tonnage or greater, and of 50,000 gross tonnage or greater, respectively. An external EPPS is **not** required on vessels that solely operate domestically.
- Pilot Plug, on vessels required to embark pilots, **must** be readily available and easily accessible from the primary conning position of the vessel and permanently affixed (not an extension cord) and adjacent (within 3 feet) to a 120-volt 50/60 Hz AC power receptacle (NEMA 5-15).

Safety-Related Text Messaging...should be short, concise, and used only to exchange pertinent navigation safety-related information

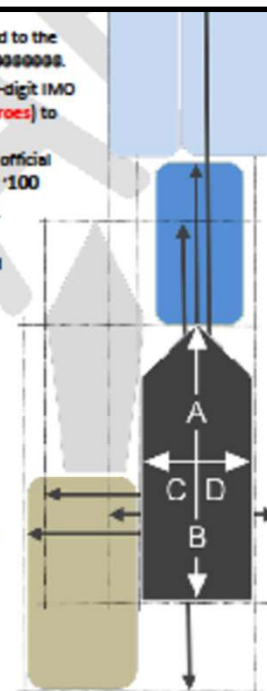
- AIS safety-related text messages (SRM) must be in English and used solely to exchange navigation safety information.
- Although not prohibited, AIS text messaging **should not** be relied upon as the primary means for distress (MAYDAY) or urgent (PAN PAN) communications.⁴
- Keep SRM concise and as short as possible (less than 90 characters). The use of abbreviations is acceptable and highly encouraged; see the Notice to Mariners, USCG Local Notice to Mariners, Light List, and U.S. Nautical Chart No. 1 for a listing of common abbreviations.
- Testing or repair facilities, when conducting on-air testing, should also periodically broadcast an AIS SRM stating: "TEST BCST". Repair related testing should be kept to a minimum and **not** exceed one hour per day.

Static Data...should reflect the vessel's radio license or documentation at installation, and be password-protected⁵

- Names exceeding 20 characters (the parameter is truncated, **not** abbreviated, and include all characters. For example, the tug JOLLY ROGER 0-12 include vessel type precursors, e.g. F/V, M/V except public vessels, i.e. CG, CBP, USN, LAPD not officially named, input 'USA#' followed number, e.g. USA#NY1234YZ. If unnumbered tenders), use your parent vessel's name for numerical designator that distinguishes you; example, the first tender for the cruise ship should be inputted as JOLLY ROGER OF THE message 248 call-sign parameter should reflect JOLLY ROGER OF THE SEA's MMSI preceded by 1000.
 - Maritime Mobile Service Identity (MMSI) should reflect the MMSI assigned to the vessel by Federal Communications Commission (FCC) its agents.
 - Call-sign should reflect the call-sign assigned to the vessel by the FCC; absent a call-sign, input 00000000.
 - IMO Number⁶ should reflect the assigned 7-digit IMO number. Use leading zeroes (**not trailing zeroes**) to fill the parameter, e.g. 0001234567. Absent an IMO assignment, input your U.S. official documentation number preceded by either '100' or '1000', e.g. 1001234567, 1000123456.
 - Type of positioning source should reflect the actual system in use, i.e. GPS, combined GPS-GLONASS, etc.
 - Type of vessel should reflect the appropriate Ship Type (see accompanying table).
 - Antenna Position | Vessel Dimensions should be inputted in meters (**not feet**) and reflect the overall dimensions of the vessel, expressed as the distance fore (A), aft (B), to port (C), and to starboard (D) to the positioning-system antenna used by AIS; the intersection of the two white lines in the diagram.
- For U.S. Ship Type 37 (see Table) dimensions should reflect the overall rectangular area of the vessel and its tow—as portrayed by the extended dark arrows within the rectangles in the diagram.

USCG AIS Encoding Guide

* Minimizes Updates



Voyage Related Data...should be inputted as necessary to always indicate up to date conditions

- Navigation Status, i.e. at anchor, underway, engaged in fishing, etc. should always be up-to-date.

Note, vessels engaged in towing should use: Navigation Status '11' when towing astern, or '12' when pushing ahead or alongside.

- Remember to change your status when at anchor or moored. Doing so reduces the AIS reporting rate from 2-10 seconds to once every 3 minutes; which mitigates network congestion and improves overall AIS range.
- Static Draft should be inputted in meters (**not feet**) and reflect the vessel's actual or maximum draft.
- Estimated Time of Arrival (ETA) to destination; or voyage departure time, if moored or anchored; or operational termination time (i.e. workboats); should be inputted in Universal Time Coordinated (UTC), **not** local time.
- Destination⁷ and your origination should be inputted using 3-character UN location codes (UNLOCODE⁸) for (per IMO SN/Circ.244) or 4-character U.S. GUID⁹ codes, as follows:

Origination-Destination using UNLOCODE only

USNYC-NLRTM ...one-way voyage New York City to Rotterdam
USNYC-DUSNYC ...a voyage to and fro, e.g. dinner cruise
USHOU-CUSHOU ...operating solely within a well defined area, e.g. fleet area, vessel traffic service area, etc.

Origination-Destination using UNLOCODE and USGUID
CNSHA-USAQVCY ...for Shanghai to San Francisco Pier 35

Origination-Destination using USGUID only

USAQVCY-CQ6L ...a scheduled route, i.e. Staten Island Ferry
USAQVCY-DQVCY ...a voyage to and fro, e.g. dinner cruise
USAQVNR-C-C ...anchored, moored, or on station (e.g. MODU, FPSO)

Note, the difference in symbology { ^ } > | < < < < }¹⁰

¹ See <http://wireless.fcc.gov/services/index.htm> (Ship Radio Stations)

² Obtained at www.imo.org/pressroom/pressreleases.aspx

³ Per IMO SN/Circ. 227 & 224 or NMEA 0400 Installation Guidelines

⁴ Any port or offshore place in which a vessel is bound to embark or disembark cargo, crew or passengers; or anchor or maintain station for considerable period of time (i.e. Outer Continental Shelf activity)

⁵ Find Country (ISO 3166) & United Nations Location Codes (UNLOCODE) at: www.uneca.org/cefact/locode/welcome.html

⁶ Find U.S. Geographic Unique Identifiers (USGUID) for ports, places, berths, routes, and waterways at: www.navcen.uscg.gov/?pageName=locode

⁷ If AIS lacks angle brackets (>) substitute with parenthesis () | X | O | (| (|)

⁸ See 47 CFR 80.1109-Distress, urgency, and safety communications

Know your password, you will need it to encode your AIS



2-digit numeric codes for Type of Ship are composed from 1st and 2nd digit columns or as defined in columns 3x or 5x.
The terms used are as defined in IMO SOLAS, 46 U.S.C. 2101 or 33 CFR 140.10. Blue and/or italic text denotes amplifying text not found in the original source (ITU-R M.1371-5)

1 st digit	2 nd digit	[3x] others "engaged in"	[5x] special craft
0 – Not available	0 – All ships of this type	30 – Fishing vessels, including processors, but, not tenders (see type "53")*	50 – Pilot vessel
1 – Reserved for future use	1 – Carrying DG, MC or AFR, IMO-based or pollutant-category X R 140.10. Blue and/or italic text denotes amplifying text not found in the original source (ITU-R M.1371-5)	31 – Towing astern and the length of tow is under 200 meters (656 ft.) or its breadth is 25 meters (82 ft.) or less*	51 – Search and rescue vessels, i.e. USCG boats, USCG Auxiliary, assistance towers
2 – WIG		[3x] others "engaged in"	[5x] special craft
		30 – Fishing vessels, including processors, but, not tenders (see type "53")*	50 – Pilot vessel
3 – Other vessels engaged in actions denoted in column [3x]		31 – Towing astern and the length of tow is under 200 meters (656 ft.) or its breadth is 25 meters (82 ft.) or less*	51 – Search and rescue vessels, i.e. USCG boats, USCG Auxiliary, assistance towers
4 – HSC (Hi-speed Craft) or passenger ferries		32 – Towing astern and length of the tow exceeds 200 meters (656 ft.) or breadth exceeds 25 m (82 ft.)*	52 – Tugs, light boats, push-boats, towboats or workboats, that do not engaged in towing
5 – Special craft, per column [5x]		33 – Engaged in dredging, or underwater operations, such as salvaging, surveying, sampling, other types of scientific research, but, not diving)*	53 – Fish, offshore or port tenders
6 – Passenger ships other than HSC and passenger ferries; including off-shore supply vessels (OSV)		34 – Engaged in diving operations; or other types of operations	54 – Commercial response vessels with anti-pollution facilities or tow*
7 – Cargo (freight) ships, including articulated (ATB) and integrated tug-barge (ITB) vessels	7 – Reserved for future use	37 – Pleasure craft	57 – Spare-for assignments to local vessels that are engaged in towing ahead or alongside, and whose dimensions (ABCD values) represent the overall area of the vessel including its tow*
8 – Tankers, including articulated (ATB) and integrated tug tank barge (ITB) vessels	8 – Reserved for future use	38 – Reserved for future use	58 – Medical transports (as defined in the 1949 Geneva Convention and Additional Protocols) or similar public safety or first response vessels
9 – Other types of ship	9 – No additional information 99 – autonomous or remotely-operated unmanned craft	39 – Reserved for future use	59 – Ships according to RR Resolution No. 18 (Mob-83)

*Remember to also update your Navigation Status accordingly, i.e. Nav Status: 3 = restricted maneuverability; 8 = under sail; 11 = towing astern; 12 = pushing ahead/alongside, etc.

For further information or additional copies visit www.navcen.uscg.gov or email cgnav@uscg.mil

***** DRAFT ***** Redistribution with or without USCG indicia is permissible and encouraged ***** DRAFT *****



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Automatic Identification System

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 - Class A Position Report
 - Class A Static & Voyage Data
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 - AIS ATON Report
- Long Range AIS Report
- Nationwide AIS (NAIS)
- AIS Requirements
- Reference Information
 - AIS Encoding Guide
- Frequently Asked Questions

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- Nationwide DGPS
- Nationwide AIS (NAIS)
- AIS (Overview, Messages, etc.)
- Long Range Identification and Tracking
- Local Notice to Mariners
- Light Lists
- Civil GPS Service Interface Committee
- LORAN C (archive)

Subscribe / Report (free)

- Local Notice to Mariners (Weekly)
- GPS Operational Summary (Daily)

AIS FREQUENTLY ASKED QUESTIONS

1. What is AIS?
2. What is an MMSI, how do I get one, and how do I program my AIS?
3. What is the AIS rule and are there alternatives to the rule for small businesses?
4. Do AIS Class B devices meet current USCG AIS carriage requirements?
5. How does AIS help to increase security (and what is NAIS)?
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?

AIS FAQ#2
Note our
Encoding
Guide

2. What is an MMSI, how do I get one, and how do I program my AIS? A unique and official 9-digit Maritime Mobile Service Identity (MMSI) number is required for every AIS station. To obtain one see our [MMSI page](#). While special attention should be taken in installing an AIS (see [IMO Safety of Navigation Circular 227, GUIDELINES FOR THE INSTALLATION OF A SHIPBORNE AUTOMATIC IDENTIFICATION SYSTEM](#)), its initial programming is relatively straightforward; please see our [USCG AIS Encoding Guide](#) for further instructions. Note, AIS information programmed into the unit (i.e. MMSI, call-sign, name, etc.) should reflect the vessel's official data as provided in its radio station license or state registration (for those vessels licensed by rule).

After initial programming, users must ensure their AIS is always in effective operating condition and broadcasting accurately (33 CFR §164.46(d)). Failure to do so could subject a person to civil penalties not to exceed \$25,000 (46 U.S.C. 70119). Note, each USCG type-approved AIS has an internal built-in integrity tester that mitigates the need to send TEST text messages. For further guidance on the programming and use of AIS text messages please read [USCG Safety Alert 05-10](#).

20. Can I use my AIS in an emergency or for distress messaging?
21. Is the Coast Guard broadcasting AIS Aids to Navigation Reports?
22. Have an AIS question not answered here?

1. What is 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.

www.navcen.uscg.gov or **Search: AIS FAQs**



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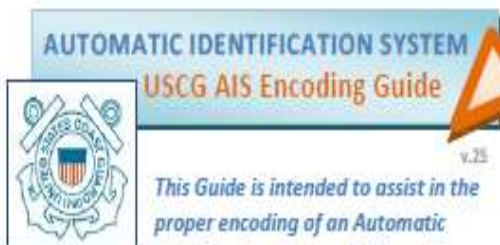
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- Types of AIS
- AIS Messages
 - Class A Position Report
 - Class A Status Report
 - Class B Position Report
 - Long Range Identification
 - AIS ATON
 - AIS Base Station
 - Nationwide AIS
 - NAIS Data Report



This Guide is intended to assist in the proper encoding of an Automatic Identification System (AIS) used in

AIS FREQUENTLY ASKED QUESTIONS

- What is AIS?
- How do I register (obtain a MMSI's), install, encode, and verify my AIS?
- What is the AIS rule and are there alternative methods?

Static Data...should be encoded as vessel's official name

- Maritime Mobile Service (MMSI) assigned to the vessel by the FCC
- Vessel Names that exceed (not truncated) to 15 characters; thence the last 4 characters

For more information on AIS, our Vessel Information Verification Service, our FAQ's or to download our AIS Encoding Guide, visit www.navcen.uscg.gov or Google: USCG NAVCEN

Lack or improper use of AIS may subject you to civil penalties.

Vessel Information Verification Service

Vessel Flag: US
US Official No.: 555380
Vessel Owner: PIKUS, PATRICK J

Record Last Updated:
06-Nov-2017 09:51:19

Legend

Green text indicates no known errors. Red text indicates known errors.

ID Discrepancies: NONE
Static Discrepancies: LENGTH DIFF/ZERO DRAFT
[Click here to view discrepancy definitions.](#)

Broadcast Data

Name: POLAR STAR
IMO No.: 0
MMSI No.: 367311460
Call Sign (CLSN): WTG9594

Static Data

Standard Length: 15.21 (meters)
ANT Distance A: 3 (meters)
ANT Distance B: 6 (meters)
ANT Distance C: 5 (meters)
ANT Distance D: 1 (meters)
Draft: 0 (meters)
Ship Type CD: 90
Ship Description: Other
Positioning System: GPS

Official Data

Name: POLAR STAR
IMO No.: 0
MMSI No.: 367311460
Call Sign (CLSN): WTG9594

Close window

Contact Us

cgnav@uscg.mil

- Electronic Positioning Fixing System (EPFS), Transmitted Heading (THD), and Rate of Turn (ROT) sensors. per 33

Use leading zeroes (not trailing zeros) for U.S. vessels without an IMO assignment
e.g. 0001234567



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AIS FREQUENTLY ASKED QUESTIONS

1. What is AIS?
2. What is an MMSI, how do I get one, and how do I program my AIS?
3. What is the AIS rule and are there alternatives to the rule for small businesses?
4. Do AIS Class B devices meet current USCG AIS carriage requirements?
5. How does AIS help to increase security (and what is NAIS)?
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?

14. Do AIS Class B devices meet current USCG AIS carriage requirements? Maybe. Per 33 CFR 164.46(b)(2), use of an AIS Class B device, in lieu of a mandatory Class A device, is permissible, but, only on: dredges; fishing industry vessels; and, vessels certificated to carry less than 150 passengers, that do not operate in a Vessel Movement Reporting System (VMRS) area defined in Table 161.12(c) or at speeds in excess of 14 knots. See a comparison of Class A and Class B/CS AIS.

11. Why am I unable to see an AIS vessels' name or other static information (dimensions, call sign, etc.)?
12. Why do I sometimes see more than one vessel with the same MMSI or vessel name (i.e. NAUT)?
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?
16. How can I get a copy of an AIS presentation I saw (or heard about it) that was given at...
17. Where can I get AIS data?
18. Reserved for future use.
19. What is AIS Channel Management?
20. Can I use my AIS in an emergency or for distress messaging?
21. Is the Coast Guard broadcasting AIS Aids to Navigation Reports?
22. Have an AIS question not answered here?

1. What is 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.

**AIS FAQ#14
Class A/B
Comparison
Table**

www.navcen.uscg.gov or **Search: AIS FAQs**

Comparison of AIS Class A and B

Shipboard AIS	Class A	Class B/SO	Class B/CS
Transmit Power (Watts)	12.5 W / 2 W (low-power)	5 W / 2 W (low-power)	2 W
Primary Access Scheme	Self-organizing Time-Division Multiple Access (SOTDMA)	SOTDMA	Carrier-sense TDMA non-competing with SOTDMA units
Position Reporting Rate	Either every 2, 3 ½, 6 or 10 s based on speed and course change. Every 3 min. when ≤ 3 kts.	Either every 5, 15 or 30 s based on speed (2-14, 14-23, >23 kts) Every 3 min. when ≤ 2 kts.	Every 30 s Every 3 min. when ≤ 2 kts.
Static Data Reporting Rate	Every 6 min	Every 6 min	Every 6 min
Frequency Range	25 kHz bandwidth between 156.025 MHz to 162.025 MHz	25 kHz bandwidth between 156.025 MHz to 162.025 MHz	25 kHz bandwidth at minimum between 161.500 MHz to 162.025 MHz
Dedicated DSC Receiver for Channel Management	Yes	Yes	Time-shared
Position Source / WGS-84 to 1/10,000 of minute of arc	Internal Global Navigation Satellite System & connection to an External Electronic Positioning System (EPFS)	Internal GNSS	Internal GNSS
Digital Interfaces	2 Input-Output & Multiple Presentation Outputs	Optional	Optional
Display	Multiple Keyboard Display (MKD)	MKD	Optional
Safety Text Messaging	Receive & Transmit	Receive & Transmit	Transmit Optional, and only with non-alterable pre-configured messages
Application Specific Messaging	Receive & Transmit	Receive & Transmit (up to 3 slots)	Receive Optional, cannot Transmit
Transmit Data	All	No Rate of Turn, Navigation Status, Destination, ETA, Draft, or IMO#	No Rate of Turn, Navigation Status, Destination, ETA, Draft, or IMO#
International Electrotechnical Commission (IEC) Certification Standard	IEC 61993-2	IEC 62287-2	IEC 62287-1

Adding eATONs to the ATON Family

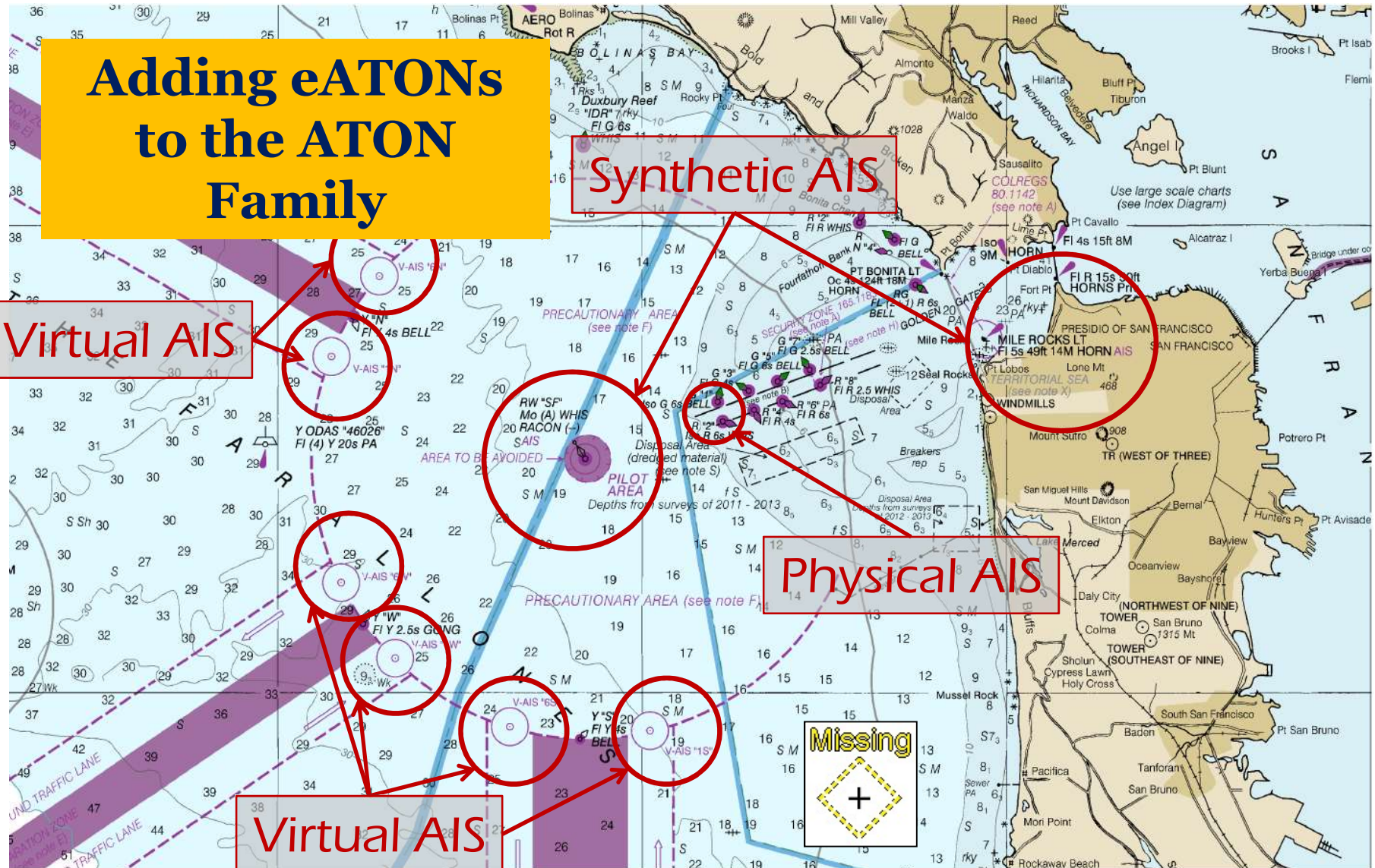
Synthetic AIS

Virtual AIS

Physical AIS

Virtual AIS

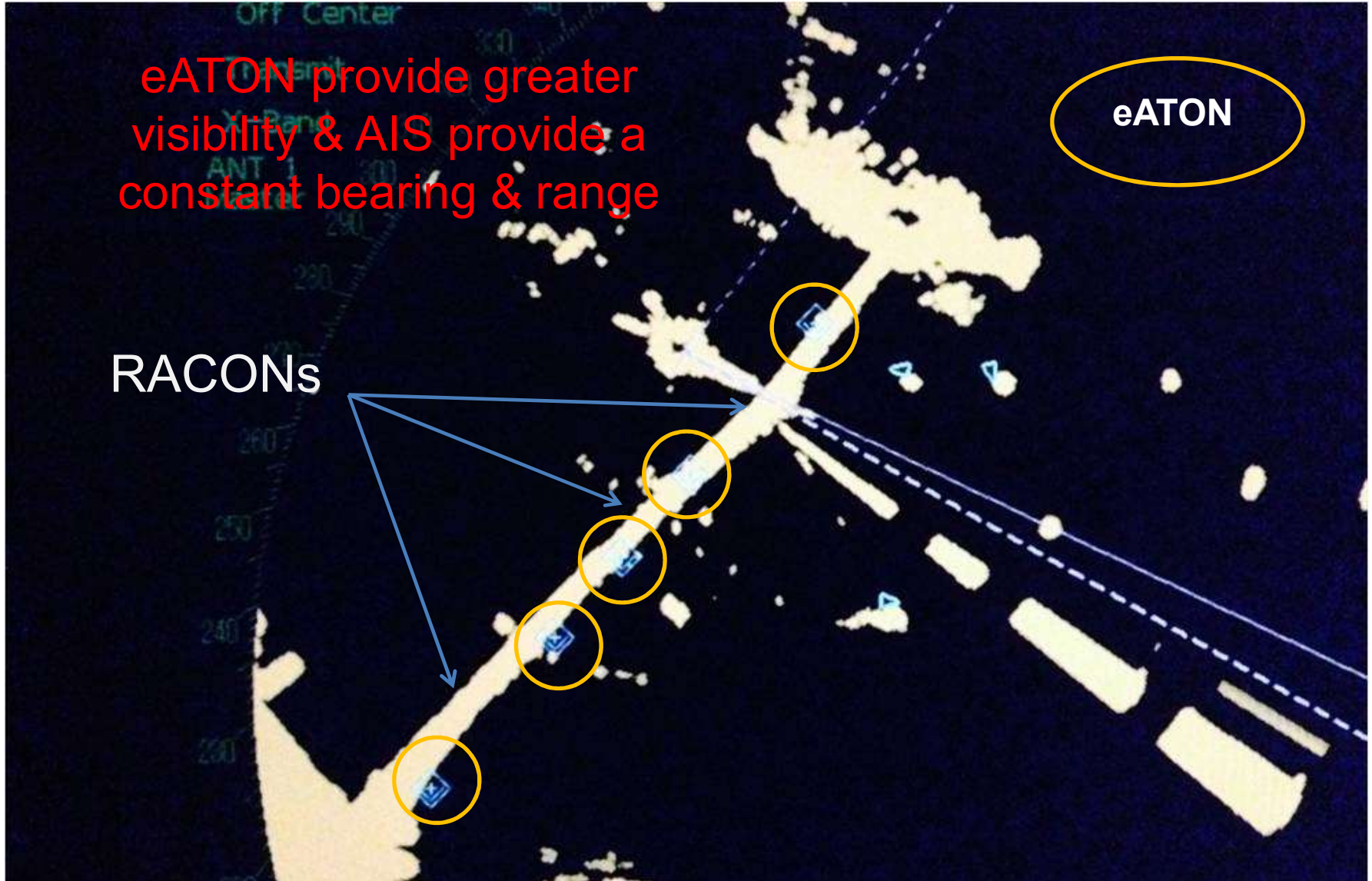
Missing



eATON provide greater
visibility & AIS provide a
constant bearing & range

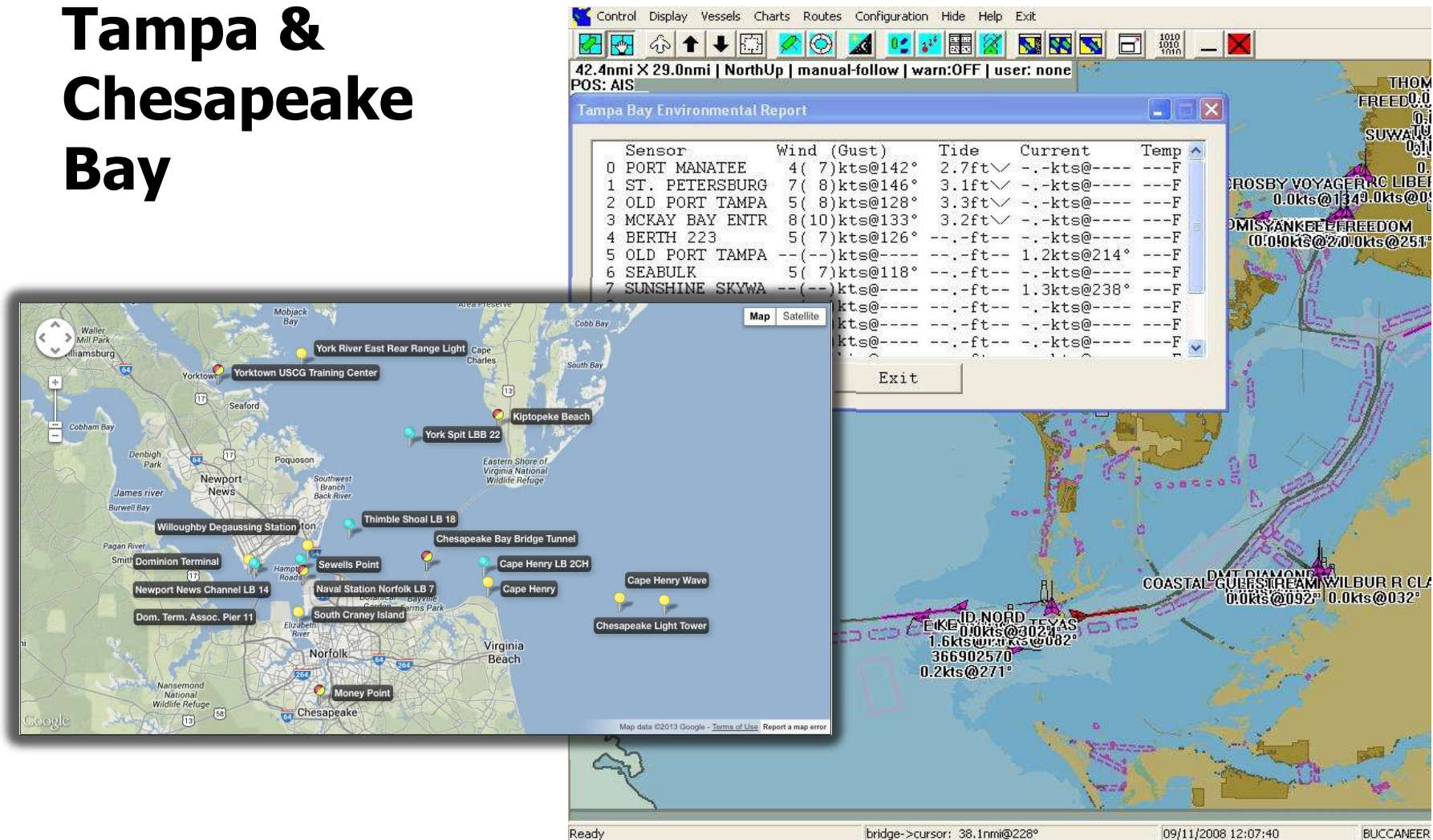
eATON

RACONs



NOAA PORTS

Tampa & Chesapeake Bay



Homeland
Security



United States Coast Guard

Office of Navigation Systems



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1-202-372-1563
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