

Office of Vessel Traffic Management



Providing navigation safety
information for America's
waterways

Jorge Arroyo / David DuPont
Regulatory Project Officers
U.S. Coast Guard
Washington, DC



Expansion of AIS
Carriage Requirements
Public Meeting
5 November 2003
New Orleans, LA

Good _____ and welcome to our Public Meeting regarding the possible "Expansion of AIS Carriage Requirements." My name is Jorge Arroyo and I'm the AIS Regulatory Project Officer from Coast Guard Headquarters, Office of Vessel Traffic Management. It is a pleasure to be with you here today.

Overview

- **AIS Presentation**
 - **What, Why, How**
- **AIS Discussion**
 - **Our 10 Questions**
 - **Who, Where, When**
 - **Why Not**
 - **Open Forum, Town Hall**

Here's is an overview of what we intend to do at this meeting.

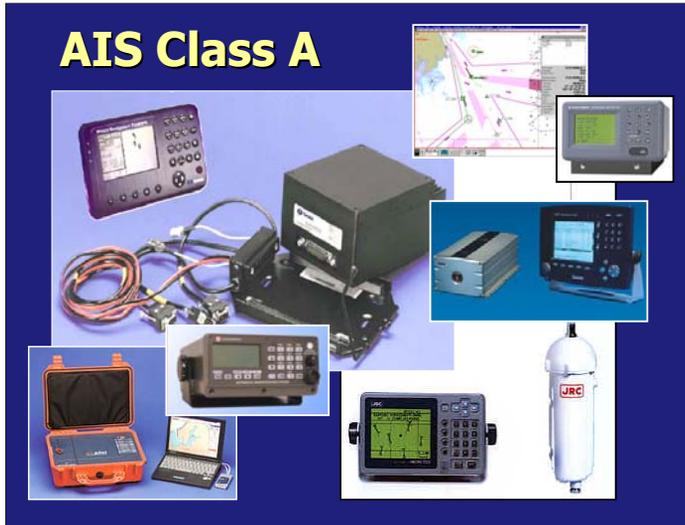
First, I'd like to give you a brief presentation of the "What, why, and hows" of AIS and give a quick synopsis of what has been done and we continue to work on regarding AIS.

Then we will focus on your participation here today, that is to discuss the 10 questions we posed in our "Request for Comments"; the "Who, where, and whens" and certainly your "why not."

Before we begin let me go over the ground rules.

This will be an open forum, all comments are welcome and encouraged. We exhort civility and brevity. Prior to commenting please identify yourself and your organization (should you represent one). Should we be compelled by time constraints and the number of commenters in the audience, we may have to limit your comments to three (3) minutes each. Hopefully, we will not have to resort to this and we will have a fruitful and informative group discussions where all will have ample time to express themselves.

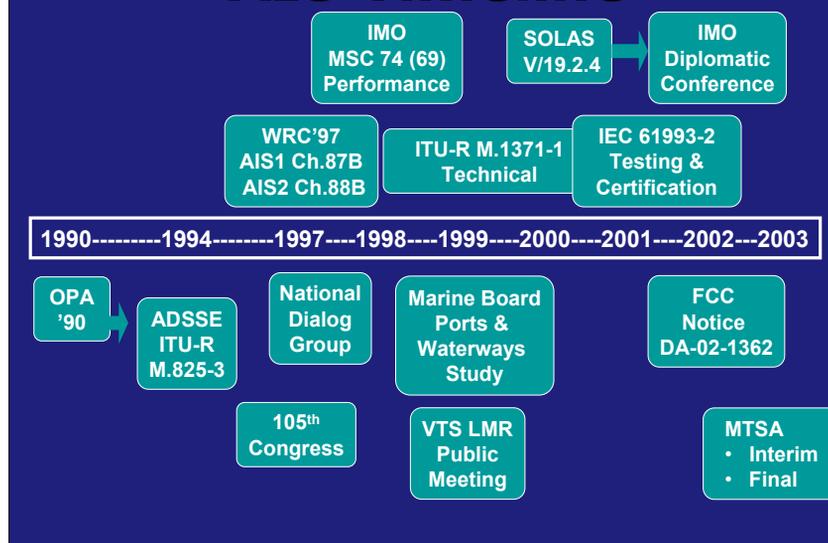
AIS Class A



What is AIS?

Well here's various pictures of AIS models available today; what are know as Class A AIS devices. I'll discuss further what this means as I proceed with the presentation.

AIS Timeline



Before I discuss the what and how of AIS, it may be beneficial to tell you about the why. Many of you may think AIS is something new. This slide, however, depicts our AIS timeline. It clearly shows that this effort is something that is a long time coming, something we have been working on for over a decade...

Let me go through each one of these milestones and explain how they have all contributed to where we are today.

In 1990, Congress passed the **Oil Pollution Act (OPA '90)**, which amended the Ports & Waterways Act to make all participation in VTS mandatory (it was voluntary in some VTS prior to) and directed the USCG to seek ways to have "dependent surveillance" of all tankers transiting Prince William Sound & Valdez, AK. To that end, the Coast Guard developed what was known as **Automated Dependent System (ADS)**.

- In 1994, we published rules for **ADSSE (Automated Dependent System Shipborne Equipment)**, a transponder-based system that relies upon what is known as "Digital Selective Calling" (DSC) to track and monitor all tankers over 20,000 DWT transiting VTS Prince William Sound, AK; and the first mention of our desire to operate similar systems nation-wide.

- In 1997, the World Radio Conference (**WRC '97**), the international forum that allocates frequency spectrum, designates what are now known as **AIS 1 and AIS 2, VHF Ch. 87B (161.975 MHz) & Ch. 88B (162.025 MHz), respectively.**

- Also in 1997, the **105th Congress**, in the House Report regarding the CG Appropriations Bill of 1997... stated that "[AIS] technology should be the foundation of] any future VTS system. The AIS technology employs on-board transponders, electronic charts, and Differential Global Positioning System technology to provide direct, vessel-to-vessel, voiceless electronic data communications. The Committee strongly believes that this technology will significantly improve navigational safety, not just in select VTS target ports, **but throughout the navigable waters of the United States.** The Committee encourages the Coast Guard **to continue working with its PAWSS stakeholders**, during the development and implementation of this national system, to ensure that it provides the greatest amount of navigational and environmental safety for the broadest geographical area at the lowest cost to the American taxpayers." H.R. Rep. No. 236, 105th Cong., 1st Sess. (1997).

- In that effort to work with our stakeholders, we convened a **National Dialog Group (NDG)**, comprised of representatives from most segments of marine industry, private and public. The report originated from the sessions stated: "Dialog participants strongly endorse the widespread use of Automatic Identification Systems (AIS) employing Differential Global Positioning System (DGPS) and on-board transponder technologies. These technologies provide a foundation for effective navigation safety, both within and outside areas where VTS systems are determined to be necessary. They also provide for improved vessel-to-vessel information exchange in ports and waterways in which no VTS system is established. Dialog participants believe that national use of AIS technology on the greatest number of vessels is essential both as a foundation of a VTS system, where such a system is necessary, and as the basis for improving navigation safety. Dialog participants strongly urge the USCG to take the lead both domestically and internationally in developing equipment and procedural standards that will promote universal use of AIS technology."

- In 1998, the International Maritime Organization (IMO), Marine Safety Committee, at its 69th Session (**MSC74(69)**), set forth Performance Standard for what they call "Universal Automatic Identification System" that "should be capable of providing to ships and to competent authorities, information from the ship automatically and with the required accuracy and frequency, to facilitate accurate tracking. Transmission of the data should be with the minimum involvement of ship's personnel and with high level of availability." That among other things, it should be capable of operating in "assigned, polling (controlled), and autonomous and continuous" mode, in near real-time (2-12 seconds), dynamic, static, and voyage-related information from each ship.



Notes from AIS Timeline slide continued

- In 1998, we also conducted a public meeting in New Orleans seeking input in re-establishing a VTS for the Lower Mississippi River - one that would rely upon AIS as its primary sensor and communication system. By relying upon AIS, we could reap economies from only having to operate a handful of AIS shore sites vice the estimated 19 radar sites that would be required to provide the same level of surveillance.
- From 1998 through 2001, AIS took a great leap forward with the work conducted by the International Telecommunications Union (ITU), with the creation and subsequent adoption of an AIS Technical Standard, known as **ITU-R M.1371-1**, that defined how an AIS device was to operate.
- It led to the work of the International Electrotechnical Commission (**IEC 61993-2**) standards for testing and test results, which leads to certification and type approval.
- In 1999, we commissioned the **Marine Board** of the **National Academy of Science** to look into "Applying Advanced Information Systems to Ports and Waterways Management." They concluded that "Consistent traffic management depends on all vessels, or at least all vessels of certain sizes using specific waterways, carrying the same basic information systems and operating them according to uniform standards. To achieve the committee's vision of the future, all major vessels must be required to carry certain advanced navigation information systems [AIS] so they can participate in traffic management schemes and navigate safely in and out of all U.S. ports."
- In 2000, IMO amended Chapter V of the Safety of Life at Sea Convention (SOLAS), a major overhaul of navigation requirements, which among other things, by **Regulations 19.2.4**, mandates the use of AIS on most ships internationally and certain ships domestically on phased-implementation schedule that began in 2002 and was extended to 2008.
- In 2002, the Federal Communications Commission (FCC) published a notice (**FCC Notice DA-02-1362**) that permits the use of VHF AIS 1 & 2 per the authority of the ships VHF station license.
- In December 2001, and, at the behest of the U.S., the IMO convened an Inter-sessional Working Group that led to an **IMO Diplomatic Conference**, held in December 2002, which resolved to implement various measures to increase maritime security; amongst which was the acceleration of the SOLAS AIS schedule promulgated in V/19.2.4 (2000) to one that would now require AIS carriage, by December 21, 2004, on all vessels on international voyage subject to the convention.
- In November 2002, Congress passes its own set of maritime security initiatives in the **Marine Transportation Security Act of 2002 (MTSA)**, which mandated the use of AIS on all navigable waters of the U.S. {I'll go into this in more detail further on}.
- We have implemented this by a series of rules: an **interim rule** published on July 1, 2003 (68 FR 39353), and a **final rule** published October 22, 2003 (68 FR 60559); and a **Notice: Request for Comments** (68 FR 39369) which brings me here today. Let me now review these respective AIS carriage requirements in further detail with you.

Safety of Life at Sea

Chapter V, Regulation 19.2.4

- Purpose
 - Collision avoidance
 - VTS tool
 - Means for Vessel & Cargo Identification
- Applicability – 7/1/02 (new ships)
 - All passenger ships / tankers – 7/1/03
 - All ships 300+ GT – 12/31/04
 - On international voyages
 - All ships 500+ GT – 7/1/08
 - Domestic voyages



First, let's show you the requirements as set forth in SOLAS.

AIS is intended to reduce the likelihood of collisions by permitting the voiceless exchange of near real-time navigation information between vessels, vessels and shore-side vessel traffic service centers, and, provide a means for nations to obtain vessel and cargo information for ships transiting their waters.

Internationally, and in accordance with SOLAS regulation V/19.2.4, mandatory carriage of AIS will be phased in between 2002, 2004, and 2008. The SOLAS AIS carriage requirements are applicable to all ships of 300 gross tons and greater engaged on international voyages, cargo ships of 500 gross tons and greater *not* engaged on international voyages and all tankers and passenger ships.

Maritime Transportation Security Act

§ 70114. Automatic identification systems

On the navigable waters of the United States, *each...*

- **Self-propelled commercial vessel of at least 65 ft.**
- **Towing vessel of more than 26 ft. and 600 hp**
- **Passenger vessels as determined by the Secretary**
- **Any other vessel the Secretary deems necessary for the safe navigation of the vessel.**

shall be equipped with and operate an AIS
under regulations
prescribed by the Secretary.

Now, let me show you some of the provisions of the MTSA.

{Read slide}

As to what type of passenger vessels (50 or more, 6-pack) etc., this is left to the Secretary, i.e., the Coast Guard.

AND ANY OTHER VESSEL the Secretary deems necessary... as you can see this is very broad authority, however, with very limited discretion.

Finally, let me highlight, “under regulations” prescribed. In other words, while this is law, we still have to develop regulations to implement these provisions. At such time it will be your opportunity to comment and influence the rule.

Maritime Transportation Security Act

Timeline

- **On and after January 1, 2003**
 - vessels built after that date
- **On and after July 1, 2003**
 - tankers
 - passenger vessels (SOLAS certificated)
 - towing vessels moving a tank vessel
- **On and after July 1, 2003**
 - vessels over 50,000 GT
- **On and after December 31 2004**
 - all others

By when is this suppose to happen?

Here is the timeline mandated by the MTSA...

{Read slide}

Note, all others must have AIS "on and after Dec. 31, 2004."

Potential MTSA Population

Vessel Service	SOLAS	Towing	Over 65'	Total
Fishing Boat	4	-	3,800	3,804
Freight Ship	245	-	144	389
Industrial Vessel	21	-	8	29
MODU	2	-	-	2
Oil Recovery	-	-	36	36
OSV	55	-	715	770
Passenger	89	-	2,655	2,744
Tank Ship	120	-	35	155
Towboat/Tugboat	13	6,427	-	6,440
Total	549	6,427	7,393	14,369

Here's a breakdown of the POTENTIAL vessels that are within the grasps of the MTSA. Note, the fishing fleet number is a broad estimate. We do not have an accurate database to derive the exact population. It is a considerable number, approximately 1/3 of the world-wide AIS SOLAS population — manufacturers and installers, please take note.

AIS Carriage Requirements Interim Rule

- SOLAS vessels IAW SOLAS V/19.2.4
 - **Adopts 150+ GT threshold for Passenger Vessels**
- Self-propelled commercial vessels 65+ ft. on international voyage, **NLT Dec'04**
- In VTS areas, **Phased-in: Dec'03, July'04, NLT Dec'04**
 - **Self-propelled commercial vessel 65+ ft.**
 - **Towing vessel 26+ ft. and 600+ hp**
 - **Passenger vessel 100+ GT or certificated to carry 50+ passengers**

On July 1, 2003, we published in the Federal Register, an interim rule (68 FR 39353), which harmonized the requirements of SOLAS and the MTSA, as stated, is applied as follows:

{read slide}

To be phased-in in each VTS areas to coincide with their outfitting with AIS capabilities through our VTS Modernization Project known as the "Ports & Waterways Safety System Project"; the schedule then was:

NLT Dec. '03: VTS St. Marys River

NLT July '04: VTS Berwick Bay, Mississippi River, Port Arthur, Prince William Sound, VMRS Los Angeles/Long Beach

NLT Dec. '04: VTS Houston-Galveston, New York, San Francisco, Puget Sound

AIS Carriage Regulations Final Rule

- On International voyage, NLT Dec 31, 2004
 - Tankers, Passenger 150+ GT, All others 300+ GT
 - IAW SOLAS V/19.2.4
 - Self-propelled commercial vessels 65+ ft.
 - Except fishing and passenger vessels
- In VTS areas, NLT Dec 31, 2004
 - Self-propelled commercial vessel 65+ ft.
 - Except fishing and passenger vessels certificated to carry 150 or less passengers
 - Towing vessel 26+ ft. and 600+ hp
 - Vessel certificated to carry 150+ passengers

On October 22, 2003, we published in the Federal Register, a final rule (68 FR 60559), which amended our interim rule based on the 144 comments we received from 66 commenters. {read slide}

In essence, the rule mirrors the interim rule except as noted in "orange." As you can see, we have exempted fishing and passenger vessels on international voyage and those certificated to carry 150 or less passengers within VTS areas. We also established a uniform compliance date -- Dec. 31, 2004 -- for each VTS area. These vessels are exempted, however, as we will see in our questions, they are still subject to the MTSA mandates and under consideration for AIS carriage requirements.

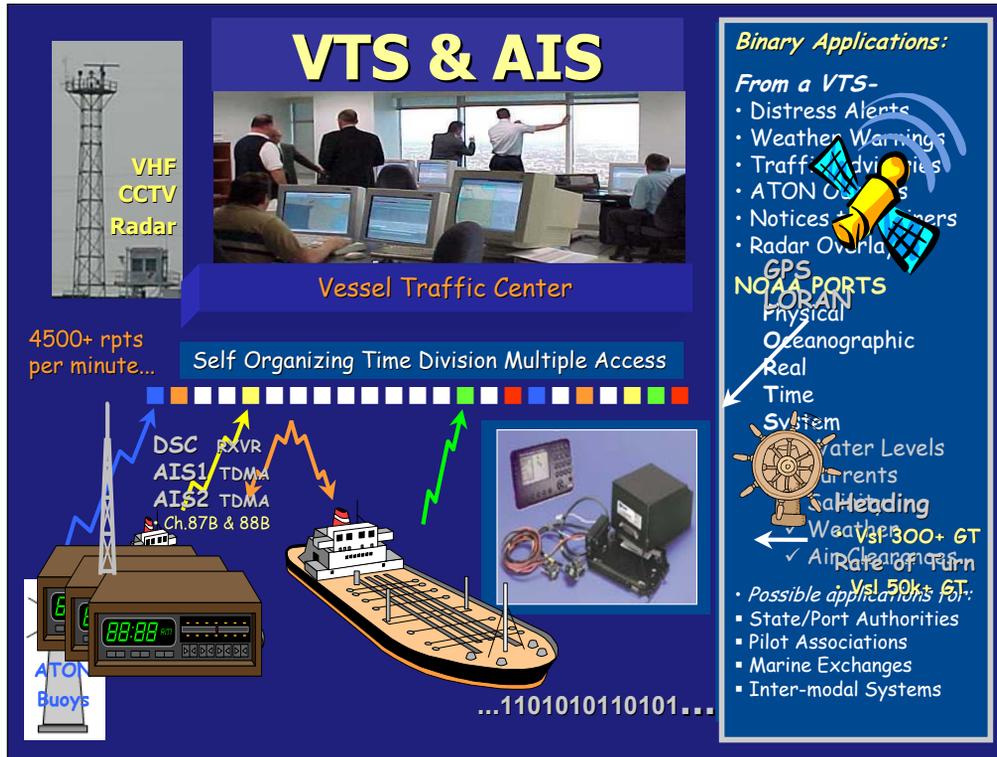
Maritime Transportation Security Act

§ 70114. Automatic identification systems

The Secretary may--

- exempt vessels if it finds that AIS is not necessary for the safe navigation of the vessel on the waters on which the vessel operates; and
- waive AIS requirements if deemed not needed for safe navigation on specific waters.

I'd be remiss to not also mention that the MTSA did provide for us provisions for exemptions (per vessel) and waivers (per waterway). This is something we will also address further when we get to the questions. Note, that our legal folks have deemed the exemptions are only applicable on a case-by-case basis (i.e. per vessel) and not a means to provide a "blanket" exemption per class of vessel. Also, let me highlight the waters waiver is where it is deemed not needed for "safe navigation" and does not address or provide for "security considerations."



Now, let me take a couple of minutes to give you a brief synopsis of how AIS works...

Traditionally, VTS and ships have relied upon radar and cameras, for surveillance and tracking, VHF radiotelephone as their sole method of communication - to the tune of over 7 million position reports provided to U.S. VTS yearly! AIS is the latest black box technology that will certainly change this paradigm.

AIS is not just a black box. It is a set of common components operated in a unique way. An AIS consists of a Central Processing Unit (CPU), four radios, a GPS, associated antennas, cable, BITE (Built In Integrity Tester) and a Minimal Keyboard Display (MKD). In addition to these components, AIS also accepts, and under SOLAS, requires inputs from on-board ship sensors, such as Global Navigation Satellite System, Transmitting Heading Device, and/or Rate of Turn indicator (an optionally: speed, pitch, heel and roll sensors).

It then compiles this dynamic sensor data with a ship's own static and voyage-related data, into message sentences that are transmitted and received by the radios associated with the AIS. These radios consist of one full-range VHF transceiver, one Digital Selective Calling (DSC) Ch. 70 receiver (used solely for frequency management), and, two Self-Organizing Time Division Multiple Access (SOTDMA) receivers.

SOTDMA protocol is what sets AIS apart from any other previously available maritime equipment. In essence, SOTDMA is cell phone technology operated on the VHF marine band. However, what sets it apart and, what ensures its optimal use for collision avoidance, is not that different to cell phones, which manage their capacity and range by the number and distance from "cells", AIS & SOTDMA operate differently.



Notes from VTS & AIS slide continued

AIS self-organizes itself. In other words, each unit controls its cell size. As more vessels come into a ship's cell, those vessels that are close aboard are given higher priority than those further away.

How does it do so? By assigning unique slots to these vessels, within the 4,500 available slots per minute. This also sets AIS apart from precursor systems that it either relied upon receiving a shore-side "trigger" to make the system broadcast, i.e., transponder, or are set to a fixed broadcast schedule, i.e., time, because both are unable to mitigate multiple units from "stepping" on or over each other.

What will a AIS broadcast?

It will send out 'Dynamic Information' {read slide} in almost real-time, autonomously and continuously, without user intervention every 2-12 seconds dictated by the vessels speed and heading change (three minutes at anchor). It also transmits, every six minutes the ships static, i.e., identification and vessel unique data, and voyage related data (unique to its current voyage) {read slide}. Finally, it also allows for the transmission and receipt of short, i.e., 128-character, safety-related text messages.

Because we are operating in the "digital domain," AIS data is outputted to a whole host of "out plug," which will permit the display of this data, not only on the MKD (depicted in the top photo, but, also into radars, ARPA, ECDIS, and proprietary displays, i.e., laptops).

Another feature that sets AIS apart from all other marine technologies before it, is the use of "binary applications." These software applications will allow for an immense amount of pertinent data and information {read slide} to be provided to the mariner as, and when, they need it. Let me explain further...{next slide}.

Binary Messages and Functional Identifiers



What may a "binary application" look like?

Here's a possibility -- you have an electronic chart with a tide station depicted. By clicking on a station, a pop-up window could arise, that would give you tidal information for that station. The possibility and realm of data and information that may be provided by "binary applications" is yet to be tapped, but is highly promising. Over 200 binary messages have already been identified for unique uses for VTS, Search and Rescue (SAR), and other maritime organizations.

AIS Ongoing Efforts

- **AIS Standards – work continues**
 - Class B, Displays, Binary Applications
- **FCC / CG Type Approvals (NVIC 08-01)**
 - 11 to date, 1 pending
- **Final Rule – Published Oct. 22nd**
 - Letter sent to Congress re: unreasonableness
- **Requests for Comments – Jan. 5th (97 to date)**
- **Public Meetings**
 - Nov 5th, New Orleans; Nov 13th, New Bedford, MA; Dec 9th, Seattle
- **Shore-side Infrastructure**
 - VTS Modernization Project (PAWSS)
 - Maritime Domain Awareness (MDA) Network

Now, let me tell you what efforts are ongoing...

{see slide}

Although all the standards regarding Class A devices are completed, work continues on Class Bs, Display Integration (e.g. radar, ECDIS, ECS), and in the development of “binary applications.”

Type approvals continue on a steady pace with 11 models FCC & USCG certified to date and at least one other in the process.

As I’ve stated previously, we published our FR (68 FR 60559). In conjunction with that rule, we also published a “Small Entity Guide to AIS”, a color-coded PDF file that consolidates original, interim, and final regulatory text into one document, and, we have provided copies of our letter to Congress regarding comments that we received regarding the “unreasonableness” of the regulations.

As you know, since you are here, we have also published and have extended the deadline to our Request for Comments regarding “extension of AIS carriage requirements.”

We intend to have at least three public meetings (as denoted) in support of these requests and during this comment period.

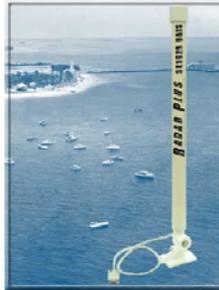
Finally, let’s say that we are also proceeding with the shore-side infrastructure, necessary to take full advantage of AIS.

As I mentioned previously, we are proceeding with our VTS modernization and hope to have completion of that project by 2005. We are now in the beginning phase of creating a nation-wide Maritime Domain Awareness (MDA) network that will tap into AIS among other things — our goal to have it up and running by 2006.

Class B - - ->

SEA LINKS

AIS Receivers



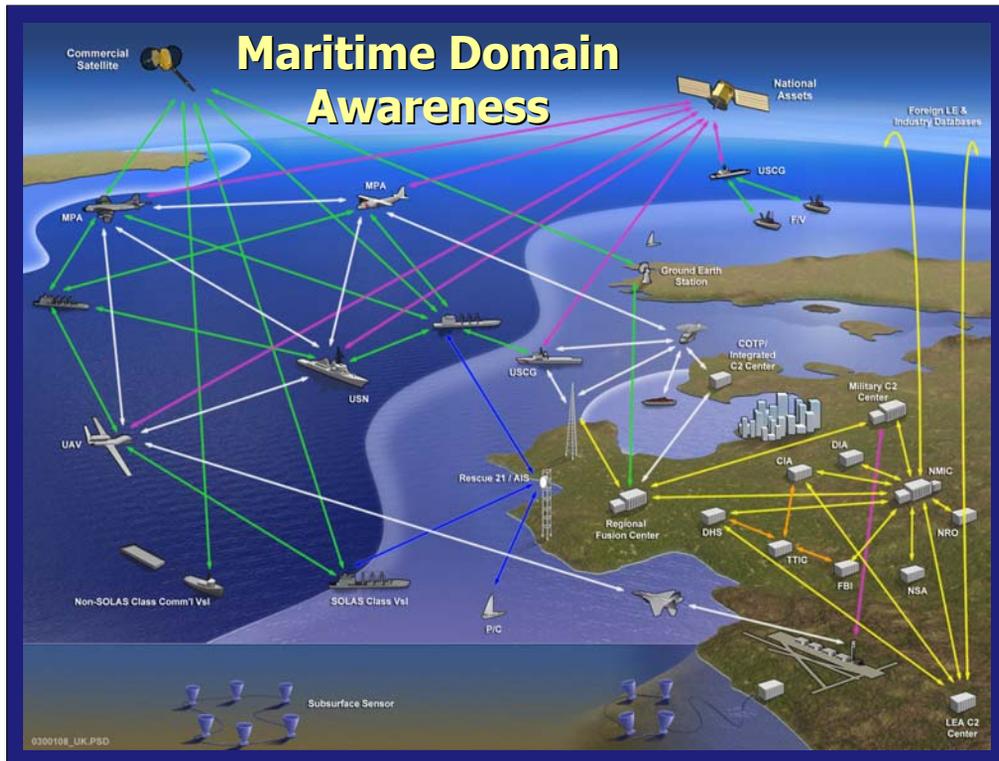
Here's what at least what one Class B will look like. Similar to an EPIRB, except note that's a USB plug you'll be able to plug into your computer/ECS.

And here's another product, we've been testing, an AIS receiver, for under \$2,000. It lets you receive AIS signals and display it on any NMEA compliant display.



In addition to our efforts at VTS, there are other areas where we or others have deployed AIS shore stations...
{see map}

Those in "blue" are possible cooperative efforts being currently being deployed by various pilot associations or port authorities.



What does the future have in store?

A complex, but well-coordinated and effectively choreographed consortium of inter-agencies, operating various sensors, resources, and centers, all contributing to our nation's Maritime Domain Awareness.

In order to achieve a maritime security environment that effectively differentiates between benign and threatening activities, the U.S. must have an awareness of all vessels – with their cargo and crew – that operate to and from U.S. ports, or transit our coastal waters.

The essence of this MDA is the timely possession of information and intelligence, and the ability to conduct surveillance and reconnaissance of all vessels, cargo, and people that operate in the maritime domain well before the potential threat enters our maritime boundaries.

Maritime domain awareness is the link between offshore homeland security operations and inshore port-related missions. Effective MDA demands, not only better collection of information and intelligence by multiple agencies, but, more importantly, fusion of that information and intelligence.

Questions

- (1) Recognizing that AIS may ultimately be required on all U.S. navigable waters, what particular waterways or ports should be implemented before others?**
- (2) Are there particular U.S. navigable waterways where the AIS requirements should be waived? Why?**

Now let's move on to the questions

As I said in the beginning, we will try to have an, informal, open forum—a town hall meeting.

I'll state the question and solicit your comments, if you wish to comment, just raise your hand, when I call you, please state your name (and the first time, you comment, your organization).

Per our ground rules, please be civil and brief. Let me thank you in advance and start ... Question 1.

Questions

- (3) AIS is not specifically mandated (by the MTSA) on all vessels. The MTSA, however, does allow the Secretary to require AIS on any vessel if deemed necessary for safe navigation. Should other vessels (e.g., commercial vessels under 65 feet in length, towing vessels under 26 feet and 600 horsepower, dredges and floating plants, recreational vessels, offshore facilities, non-self propelled vessels or barges, particularly those carrying hazardous cargo, or Mobile Offshore Drilling Units) be required to have AIS?

Questions

(4) SOLAS expects nations to implement their AIS carriage on their domestic fleet (vessels over 500 gross tonnage and passenger vessels not on international voyage) not later than July 1, 2008. However, the MTSA requires AIS by December 31, 2004. Knowing this, should certain vessels be granted temporary exemptions regarding the compliance dates in MTSA?

Questions

(5) Under what circumstances, if any, should a vessel be exempted from the AIS requirements per the MTSA exemption?

Questions

(6) SOLAS defines a passenger vessel as carrying 12 or more passengers. VTS regulations define VTS users as passenger vessels over 100 gross tons carrying 1 or more passengers or those certificated to carry 50 or more passengers. The MTSA allows the Secretary to determine the threshold (number of passengers for hire or not for hire) when determining which passenger vessels are required to have AIS. Should we expand AIS carriage beyond what is already defined in SOLAS and our rule?

Questions

- (7) Should the Coast Guard encourage or require the use of systems such as electronic chart display and information system (ECDIS) and electronic chart system (ECS) to display AIS information to enhance navigation safety? Are there other systems that could be used for this purpose?

Questions

(8) Would you be more likely to install an ECDIS or ECS on your vessel, to display AIS information, if the system could be used to comply with an existing requirement to carry nautical charts?

Questions

- (9) Our final rule, specifically exempted fishing vessels and certain passenger vessels from AIS carriage requirements. Other than costs, are there any specific reasons--particularly regarding safety or security--that warrant these vessels being excluded from AIS carriage? In particular, describe why these vessels should be treated differently from other commercial vessels over 65 feet in length?

Questions

(10) Recognizing that the cost of AIS are not insignificant, and are deemed by various commenters as being unreasonable, at what cost point would AIS be reasonable or not impose an undue burden?

Office of Vessel Traffic Management



Providing navigation safety information for America's waterways



JArroyo@comdt.uscg.mil
www.navcen.uscg.gov
Tel: 202.267.6277

