

GAO

Report to the Committee on Commerce,  
Science, and Transportation  
U.S. Senate

July 2004

# MARITIME SECURITY

## Partnering Could Reduce Federal Costs and Facilitate Implementation of Automatic Vessel Identification System



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# Highlights

Highlights of [GAO-04-868](#), a report to the Committee on Commerce, Science, and Transportation, U.S. Senate

## Why GAO Did This Study

As part of international efforts to ensure maritime safety and security—and to carry out its mandates under the Maritime Transportation Security Act of 2002—the U.S. Coast Guard is developing an automatic identification system (AIS) that should enable it to monitor ships traveling to and through U.S. waters. For AIS to operate nationwide, ships need equipment to transmit and receive AIS signals, and the Coast Guard needs shore stations and designated radio frequencies to keep track of the ships' identities and movements. Yet unresolved frequency issues between the Coast Guard and a private company, MariTEL, have come before the Federal Communications Commission (FCC).

GAO reviewed federal agencies' progress in developing AIS nationwide and identified certain challenges and opportunities in completing the work.

## What GAO Recommends

To help reduce federal costs and speed development of AIS nationwide, GAO recommends that, depending on the FCC's response, the Coast Guard seek and take advantage of opportunities to partner with local private and public organizations willing to develop AIS facilities on shore at their own expense.

[www.gao.gov/cgi-bin/getrpt?GAO-04-868](http://www.gao.gov/cgi-bin/getrpt?GAO-04-868).

To view the full product, including the scope and methodology, click on the link above. For more information, contact Margaret Wrightson at (415) 904-2000 or [WrightsonM@gao.gov](mailto:WrightsonM@gao.gov).

## MARITIME SECURITY

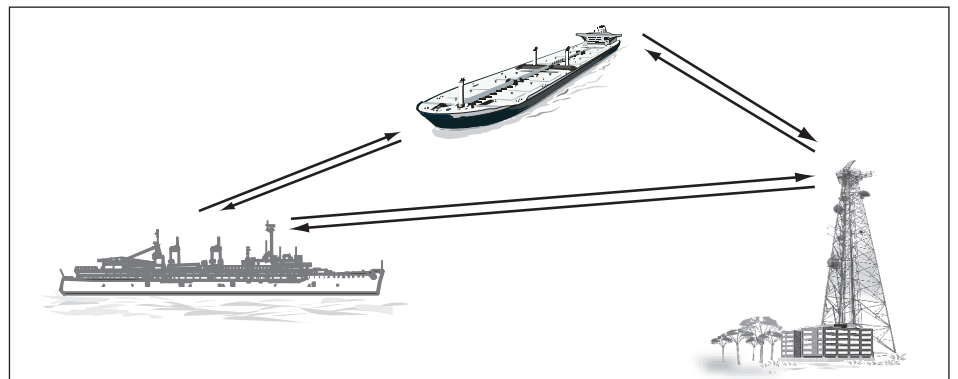
# Partnering Could Reduce Federal Costs and Facilitate Implementation of Automatic Vessel Identification System

## What GAO Found

Because the Coast Guard is in the early stages of progress toward nationwide AIS development, the total cost and completion time are uncertain. The Coast Guard has taken advantage of opportunities to bring AIS into service quickly in 10 areas where vessel-monitoring technology already exists, and it is simultaneously defining and planning for full nationwide coverage. The Coast Guard has only preliminary cost estimates for a nationwide system, because geographic and other factors will affect installation at different locations. The Coast Guard estimates that planning and testing will be completed, and a request for proposals from potential contractors issued, between December 2004 and February 2005.

The Coast Guard faces both challenges and potential opportunities in its development of a nationwide AIS. Nationwide development depends in part on how FCC resolves a continuing dispute between federal agencies and MariTEL over issues including who should have access to the internationally designated AIS frequencies and for what uses. To help protect its licensed rights to certain frequencies, MariTEL generally seeks either sole control over the international standard AIS frequencies or shared control with ships and the federal government. The federal government seeks a resolution that will reserve the internationally designated frequencies for AIS use by government and nongovernment entities. FCC expects to respond in summer 2004. This response—and whether it leads to any additional actions on the part of the interested parties—could affect the overall cost and pace of nationwide AIS development. Depending on FCC's response, one factor that offers an opportunity to reduce federal costs is that some local port entities are willing to assume the expense and responsibility for AIS construction if they can use AIS data, along with the Coast Guard, for their own purposes.

**AIS Sends Detailed Vessel Information via Radio Signals (arrows) from Ship to Ship and Ship to Shore**



Source: CorelDraw, Adobe Illustrator, and U.S. Coast Guard.

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## **Abbreviations**

AIS	automatic identification system
FCC	Federal Communications Commission
IMO	International Maritime Organization
MOA	memorandum of agreement
MTSA	Maritime Transportation Security Act of 2002
NTIA	National Telecommunications and Information Administration
UHF	ultrahigh frequency
VHF	very high frequency
VTC	vessel traffic center
VTS	vessel traffic service

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United States Government Accountability Office  
Washington, DC 20548

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July 23, 2004

The Honorable John McCain  
Chairman  
The Honorable Ernest Hollings  
Ranking Minority Member  
Committee on Commerce, Science,  
and Transportation  
United States Senate

To abide by international navigation safety agreements and federal law, promote safe navigation, and help secure America's ports and waterways from terrorism, the U.S. Coast Guard is developing an automatic identification system (AIS) for monitoring vessels as they approach and travel in U.S. waters. This system, which uses radio signals sent from ship to ship and from ship to shore on designated frequencies, is required by the Maritime Transportation Security Act (MTSA) of 2002<sup>1</sup> and by the International Maritime Organization (IMO).<sup>2</sup> For AIS to operate as the Coast Guard and international bodies intend, vessels need to install equipment that can send and receive AIS signals, stations on shore need to be built and staffed to monitor signals from vessels, and designated radio frequencies must be available for signal transmission. While the Coast Guard's stated goal is to extend AIS coverage throughout U.S. waters, AIS coverage in the United States is currently limited primarily to 10 areas where, to aid safety and navigation, ship traffic is already monitored by vessel traffic service (VTS) systems. These areas, where vessels are monitored by radar and other means from a central location, do not include many of the nation's major ports—for example Boston, Baltimore, or Charleston—and encompass only a fraction of the nation's 12,375 miles of coastline and 25,000 miles of river or inland shoreline. In addition, the Federal Communications Commission (FCC)—the federal agency responsible for regulating interstate and international communications by

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<sup>1</sup>Pub. L. No. 107-295, 116 Stat. 2064, 2082-2084 (2002).

<sup>2</sup>IMO, an agency of the United Nations to which the United States belongs, is the international body responsible for improving maritime safety, including combating acts of violence or crime at sea. In December 2002, IMO adopted amendments to the International Convention for Safety of Life at Sea, 1974, to which the United States is also a party, requiring certain ships to carry AIS equipment to enhance maritime security.

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radio, television, wire, satellite and cable—in 1998 auctioned the licenses to certain maritime radio frequencies, including the two frequencies designated by the International Telecommunication Union<sup>3</sup> for worldwide AIS communications, to a private company, MariTEL, Inc., for a 10-year term. Since then, the Coast Guard and MariTEL have negotiated over use of those frequencies and other issues.

In September 2003, we identified a number of challenges to the Coast Guard's development of AIS.<sup>4</sup> Given the system's importance to homeland security, this report discusses (1) the progress being made by the Coast Guard and other federal agencies in developing an automatic identification system that covers U.S. navigable waters and (2) challenges and opportunities that these agencies may encounter in completing their work.

To accomplish these objectives, we examined documents from federal and local government agencies and private companies, interviewed a wide range of officials, and visited locations where AIS is being implemented. We met with Coast Guard officials, including those responsible for administering the procurement of AIS equipment, defining the requirements for a nationwide system, and setting technical standards. We also met with or interviewed other federal officials, including FCC staff responsible for licensing the radio frequencies for AIS transmissions and St. Lawrence Seaway Development Corporation staff who help operate an integrated AIS in North America. We visited 3 of the 10 locations where the Coast Guard is currently installing AIS equipment.<sup>5</sup> We also attended a Coast Guard public meeting and an industry conference on AIS issues. We performed our work from October 2003 through June 2004 in accordance with generally accepted government auditing standards.

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## Results in Brief

Because the Coast Guard is early in its progress toward developing a nationwide AIS, the system's total cost and full development schedule are

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<sup>3</sup>The International Telecommunication Union is an international organization within the United Nations system in which governments and the private sector work together to coordinate the operation of telecommunication networks and services and to advance the development of communications technology.

<sup>4</sup>See U.S. General Accounting Office, *Maritime Security: Progress Made in Implementing Maritime Transportation Security Act, but Concerns Remain*, [GAO-03-1155T](#) (Washington, D.C.: Sept. 9, 2003).

<sup>5</sup>We visited VTS facilities at New Orleans, Louisiana; New York, New York; and Seattle, Washington.

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uncertain. The Coast Guard is taking a two-track approach to creating a nationwide system: first, installing AIS equipment in the 10 areas where vessel-monitoring systems already exist and, second, taking steps to expand the system to additional locations. As of June 2004, the Coast Guard was using a portion of the funds appropriated to it for acquisition, construction, and improvements toward completing the installation of AIS equipment in VTS areas and toward planning and testing of shore equipment to be installed outside VTS areas. The Coast Guard intends to use a portion of the appropriated funds to pay for its initial installations beyond the current 10 VTS areas as well. The President's budget request for fiscal year 2005 included \$4 million for AIS. As of May 2004, the Coast Guard's cost estimates for a nationwide system were preliminary, because geographic and other factors will affect installation of equipment at different locations. Nevertheless, the difference between current funding and the estimated total cost leaves a substantial amount still to be financed. The Coast Guard also estimates that planning and equipment testing will be completed between December 2004 and February 2005. The Coast Guard's planning process, which includes review of public comments about the scope and structure of the system, will determine, among other decisions, which navigable waterways need AIS coverage, what equipment must be installed for those waterways, and what financing options should be pursued.

The Coast Guard faces both challenges and opportunities in moving ahead with developing AIS nationwide. Development will depend in part on the specifics of an FCC response, expected in summer 2004, to address various unresolved AIS issues between several federal agencies and the private company MariTEL, including who should have access to the international designated AIS frequencies and for what maritime communications. After the Coast Guard and MariTEL failed to reach agreement on these issues in May 2003, MariTEL sought ways to help protect its licensed rights to certain frequencies. In general, the company seeks either sole control over the internationally designated AIS frequencies or shared control with the Coast Guard. The federal government is advocating an alternative proposal, under which FCC would allocate the internationally designated AIS frequencies exclusively to AIS for both government and nongovernment use. FCC's actions to address this situation—and whether it leads other parties to initiate any challenges or appeals of FCC's actions—could affect the overall cost and pace of nationwide AIS development. Depending on how FCC addresses the issues at hand and on whether FCC's actions are challenged or appealed, one important factor that could offer an opportunity to reduce the federal government's costs is whether certain local port entities that would benefit

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from access to AIS ship data would be willing to assume some or all of the expense and responsibility for AIS equipment installation. Port entities in Los Angeles–Long Beach, California; Tampa, Florida; and Portland, Oregon, have already demonstrated or expressed such willingness.

To help reduce federal costs and speed the development of AIS nationwide, we recommend that, depending on the outcome of the expected FCC response, the Commandant of the Coast Guard seek and take advantage of opportunities to partner with port entities willing to develop AIS systems at their own expense.

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## Background

AIS technology, which has been under development worldwide since the early 1990s to improve navigation safety, helps prevent collisions by enabling ships to electronically “see” and track the movements of similarly equipped ships and to receive pertinent navigational information from shore. Like other wireless technologies, AIS uses a portion of the radio frequency spectrum to carry information. In the United States, specific frequencies within the radio spectrum are allocated primarily by two agencies: FCC—an independent agency that regulates spectrum use for nonfederal users, including commercial, private, and state and local government users—and the National Telecommunications and Information Administration (NTIA), an agency within the Department of Commerce that regulates spectrum for federal government users. These agencies (1) decide how various frequencies are used and (2) assign the frequencies to specific users. FCC makes these assignments by issuing licenses to nongovernmental parties; NTIA does so by assigning specific frequencies to federal agencies that have radio communication needs.

AIS is designed to improve upon information available through vessel-monitoring systems already in use. Existing VTS systems apply radar, closed-circuit television, radios, and other devices to monitor and manage vessel traffic from a central onshore location, much as an air traffic control tower does (see fig. 1). An AIS unit consists of a global navigation satellite system; computer hardware and software; three radio receivers; and one radio transmitter-receiver, or transceiver. The unit gathers vessel information—including the vessel’s name, identification number, dimensions, position, course and speed,<sup>6</sup> destination, and cargo—from

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<sup>6</sup>AIS measures “speed over ground,” or the speed a vessel is traveling relative to a fixed position.



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shipboard instruments or from manual input and transmits it to receiving AIS stations installed on other ships or on shore. Radio frequencies, or channels, carry the information. AIS also requires considerable infrastructure on shore—including antennas and base stations equipped with electric power, transceivers, computers, and displays—to monitor vessel activity and transmit information or instructions back to vessels. In the United States, such infrastructure now exists only in areas where VTS systems operate.

**Figure 1: Staffed VTS Control Room, Houston, Texas**



Source: U.S. Coast Guard.

MTSA and Coast Guard regulations require that certain vessels on U.S. navigable waterways<sup>7</sup> install AIS equipment between January 1, 2003, and

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<sup>7</sup>The St. Lawrence Seaway Development Corporation and its Canadian partner, the St. Lawrence Seaway Management Corporation, also require use of AIS by certain vessels in Seaway waters. This joint U.S.-Canadian system operates on channels 87B and 88B under assignments from NTIA and Industry Canada. See St. Lawrence Seaway Development Corporation regulations at 33 C.F.R. § 401.20.

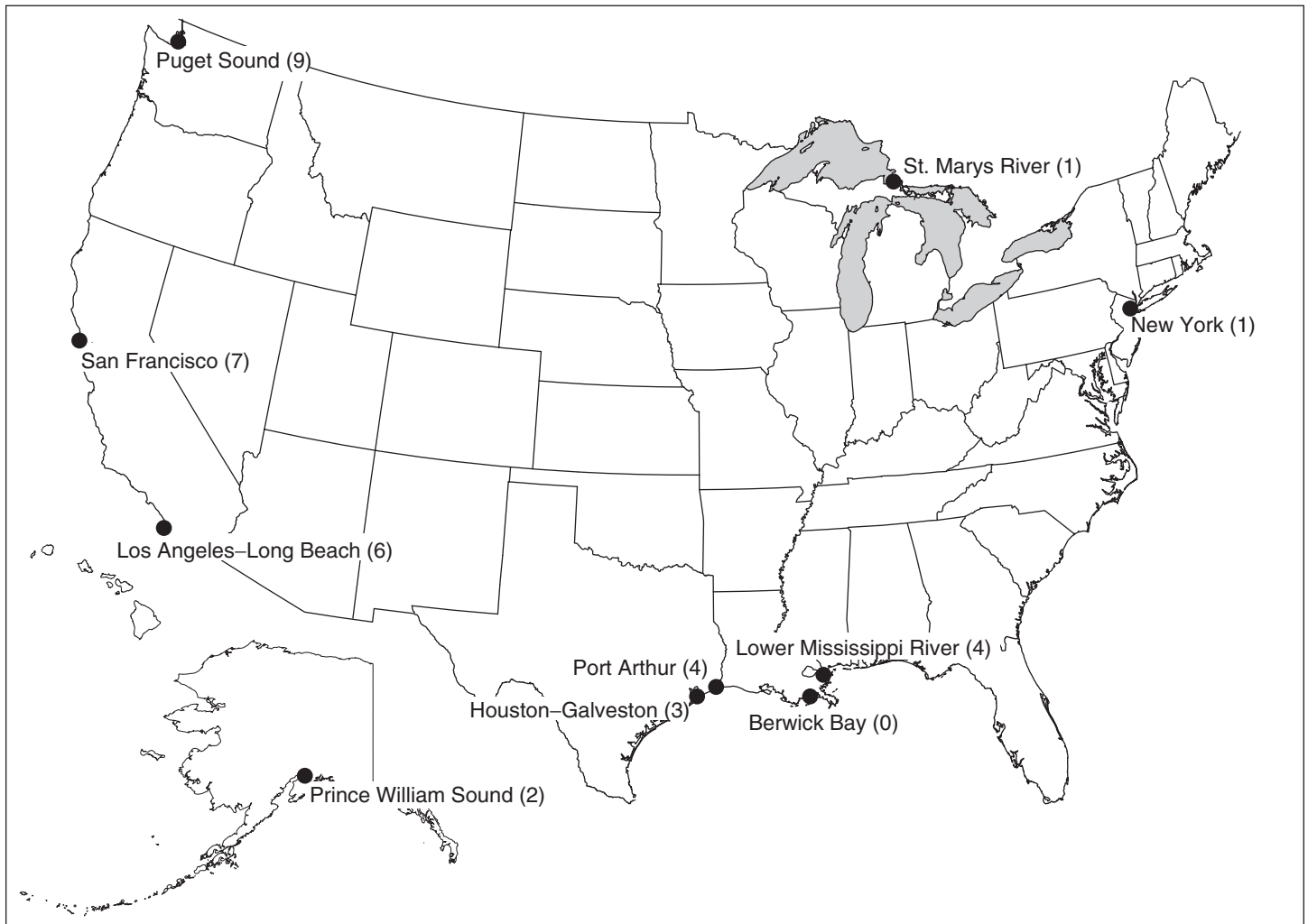
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December 31, 2004.<sup>8</sup> Coast Guard regulations implementing the law provide that vessels include (1) commercial vessels 65 feet long or more on international voyages, including all tankers regardless of tonnage; (2) passenger vessels of 150 tons or more; and (3) commercial vessels on strictly domestic U.S. voyages in the 10 VTS areas, which encompass approximately 10 percent of the U.S. ports recognized by the Department of Transportation's Maritime Administration (see fig. 2). Currently excluded from Coast Guard regulations are fishing vessels and passenger vessels certified to carry 150 or fewer passengers. Regardless of itinerary, any private vessels not in commercial service, such as a pleasure craft, less than 300 gross tons are not required by Coast Guard regulations to carry AIS equipment.

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<sup>8</sup>See 33 C.F.R. 164.46 for which vessels need to carry AIS equipment.

**Figure 2: The 10 U.S. VTS Areas and Number of Ports within Each**



Source: GAO and the U.S. Coast Guard Navigation Center.

Note: Number of U.S. Maritime Administration-recognized ports within each VTS area in parentheses.

Conflict over the frequencies used for transmitting AIS signals in the United States has been developing for several years. In 1998, to promote flexibility in the use of maritime radio frequencies and to encourage development of competitive new services, FCC created and auctioned licenses to the remaining unassigned U.S. radio frequencies in the very

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high frequency (VHF) band reserved for maritime public correspondence communications.<sup>9</sup> For approximately \$7 million, MariTEL won the bid for these licenses. The announcements for the auction stated that potential bidders should be aware of international agreements and other issues that might affect the ability to use the licenses on the two specific internationally designated AIS frequencies, known as channels 87B and 88B. Issues that could affect the licenses were not explicitly laid out in the announcements, but potential bidders were directed to a prior FCC document and specific federal regulations for assistance in evaluating the degree to which such issues may affect spectrum availability. Different interpretations of issues such as these may have contributed to the conflict that continues to exist between MariTEL and the Coast Guard.

This conflict extends to the use of both frequencies. FCC regulations required the winning bidder to negotiate with the Coast Guard for the use of frequencies for AIS but did not specify any particular frequency. In March 2001, in response to FCC's auction requirements, MariTEL and the Coast Guard signed a memorandum of agreement (MOA) that allowed the use of channel 87B for AIS in U.S. waters. MariTEL terminated the MOA in May 2003, however, after disagreements arose over interpretations of the MOA's provisions, including technical properties of the frequencies that the Coast Guard could use for AIS. After termination of the MOA, MariTEL asserted that the Coast Guard had no authority to use channel 87B for AIS, but the Coast Guard maintains that an FCC announcement still gives it that authority.<sup>10</sup> With respect to channel 88B, MariTEL asserts, in general, that it obtained through the FCC auction the exclusive rights to channel 88B in certain areas within approximately 75 miles of the U.S.-Canadian border, and it has petitioned FCC for a declaratory ruling to that effect. The Coast Guard, NTIA, and the Department of Transportation disagree and assert, in general, that channel 88B has already been allocated on a primary basis to the federal government.

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<sup>9</sup>Maritime public correspondence services are provided by companies to subscribing customers for ship-to-ship and ship-to-shore communications. Such communications do not include a company's internal communications.

<sup>10</sup>MariTEL has filed a \$267 million damage claim with the Coast Guard for misappropriation of MariTEL's licensed frequencies.

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## The Coast Guard Has Taken Advantage of Opportunities for Quick AIS Installation, but Much Work Remains

The total cost and time frame for the development of a nationwide AIS remain uncertain. As of June 2004, the Coast Guard's efforts to install AIS equipment nationwide had followed two tracks: first, installing AIS quickly in the 10 VTS areas and, second, launching a widespread planning effort for the rest of the nation's navigable waters. Having taken advantage of existing facilities, electronic systems, and plans for AIS development to enhance safety in the 10 VTS areas, the Coast Guard plans to complete AIS implementation in those areas by December 2004. At the same time, the Coast Guard has begun to plan for U.S. waters outside the VTS areas, defining the goals, technical requirements, and waterways and vessels to be covered under a nationwide AIS. The Coast Guard expects planning for the technical requirements to be completed between December 2004 and February 2005. The Coast Guard also estimates that the nationwide system could cost between \$62 million and \$165 million.<sup>11</sup> According to the Coast Guard, the cost estimate is preliminary, because geographic and other factors are expected to significantly affect the cost of installation at different locations, and the impacts are yet to be determined.

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## First AIS Installations Have Taken Place Primarily in 10 VTS Areas

The first effort in the Coast Guard's two-track AIS development has involved installing, testing, and operating AIS equipment in the 10 VTS areas. To enable monitoring of vessels carrying AIS, the Coast Guard accelerated onshore AIS installation under way in its navigation safety program. A combination of existing facilities, equipment, plans, and funding has allowed rapid establishment of AIS in the VTS areas. Since much of the AIS infrastructure for conventional safety monitoring (e.g., to avert collisions) is the same for security monitoring (e.g., to avert acts of terrorism), bringing AIS into service involved primarily adapting and modifying existing systems to accommodate their additional security purpose. AIS facilities are completely operational at Berwick Bay, Louisiana; Los Angeles–Long Beach, California;<sup>12</sup> Prince William Sound, Alaska; and St. Marys River, Michigan. AIS is being tested along the lower Mississippi River in Louisiana, and it is partially operational at Houston–Galveston, Texas, and New York, New York. The facilities at Port Arthur, Texas; Puget Sound, Washington; and San Francisco, California, are under construction. The Coast Guard expects AIS installations at the VTS areas

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<sup>11</sup>These sums represent the present values of expected acquisition costs. Unless otherwise noted, all cost figures cited are present values.

<sup>12</sup>AIS in Los Angeles–Long Beach is fully functional, but it has not yet not been issued a license to transmit by FCC.

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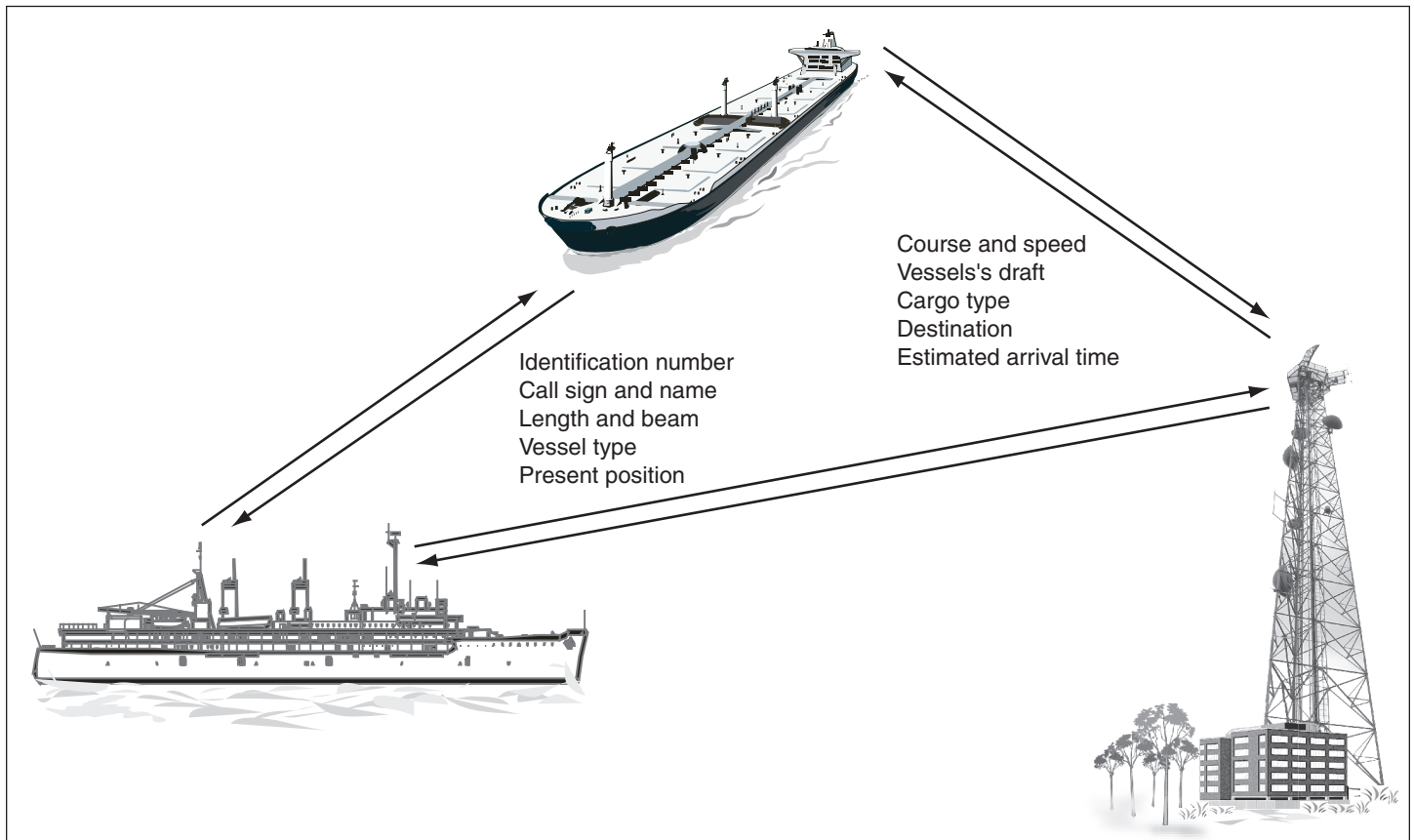
to be completed by December 2004.<sup>13</sup> To enhance safety and efficiency at the ports of Los Angeles and Long Beach, the Marine Exchange of Southern California, a nonprofit corporation formed to provide vessel arrival and departure information to the local maritime industry, took the initiative to install and pay for AIS on its own. The total cost to the Coast Guard for the installation of AIS equipment at the other 9 VTS areas comes to approximately \$20.5 million.

Bringing AIS into service in the 10 VTS areas should improve vessel-monitoring capability at these locations. Before AIS, VTS facilities relied on such means as radar, closed-circuit television, ship-to-shore voice communications via radio, and people with binoculars. Signals and other information from the monitoring equipment went to a central vessel traffic center (VTC), where the information was collated and where staff tracked ships' movements. With AIS, for a vessel equipped with a properly operating AIS transceiver, VTC staff have access to so-called static information, which rarely changes, such as dimensions, vessel name, and identification number; dynamic information, which changes continuously, such as course and speed; and voyage-specific information such as cargo type, destination, and estimated time of arrival (see fig. 3). This detail allows VTC staff to immediately identify any transmitting ship, particularly if it is on a collision course with another ship or if it is headed toward a hazardous or restricted area. In some VTS areas, AIS also extends monitoring coverage over a wider radius than originally covered by VTS. On the lower Mississippi River, for example, AIS will cover more than 240 miles along the river—from its mouth to Baton Rouge, Louisiana—rather than the 8 miles around New Orleans covered by the original VTS system. In New York, AIS equipment will allow vessels to be monitored farther out to sea than possible with radar monitoring.

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<sup>13</sup>The Department of Homeland Security's Science and Technology Directorate, working with the Coast Guard, built upon an existing AIS test facility in Miami to create a security demonstration project covering South Florida from Key West to Fort Lauderdale. The project, named Hawkeye, features coastal radar, visual and infrared cameras, and a ship-to-shore AIS in a surveillance system aimed at stopping smugglers and terrorists from entering South Florida ports.

**Figure 3: Information That Can Be Transmitted from Ship to Ship and Ship to Shore by Automatic Identification System Technology**



Source: CorelDraw, Adobe Illustrator, and U.S. Coast Guard.

From installing AIS shore facilities in the VTS areas, the Coast Guard has learned that the two primary drivers of installation cost are port geography and vessel traffic. Specifically, because AIS radio signals transmit in straight lines, installation can be complicated by the amount of water to be covered, as well as by terrain features such as islands, bays, and peninsulas. In addition, secondary features at a site have an impact, including availability of electrical power, previous presence or absence of communications links,<sup>14</sup> availability of antenna towers, and costs to lease

<sup>14</sup>Communications links might include telephone lines, television cabling, or fiber-optic cable.

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or buy land for antenna towers. For example, after completing site surveys of the area, the Coast Guard estimated that installing AIS in Puget Sound—an arm of the Pacific Ocean extending into Washington State that features many bays and islands and is surrounded by mountains—would likely cost \$6.6 million. In contrast, the AIS installation at Berwick Bay, Louisiana, one of the first AIS installations completed by the Coast Guard, generally monitors a roughly 5-mile radius around a short stretch of the Atchafalaya River and surrounding waterways; this installation cost approximately \$1 million. On the basis of its experience installing AIS in the VTS areas, the Coast Guard estimates that installing AIS equipment nationwide could cost between \$62 million and \$165 million—a preliminary estimate that one Coast Guard official responsible for reviewing such programs characterizes as “ballpark.”

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### Long-Range Planning for Nationwide AIS Installation Now Under Way

At the same time the Coast Guard is completing installation of AIS equipment in the 10 VTS areas, it is also planning for nationwide AIS installation, in waters where most of the needed infrastructure is not now available. This planning consists of two primary components:

- The Coast Guard will soon be defining the technical requirements of the system needed to meet both the safety and security missions of AIS, including how elaborate it will be. For example, will the system need to involve satellites to receive AIS signals beyond the range of stations on land,<sup>15</sup> or will an installation that can receive signals only along the shore be adequate? The Coast Guard will also investigate whether AIS can share shore infrastructure, such as antenna towers, with systems in place or under development, such as its search-and-rescue communications system called Rescue 21.<sup>16</sup> As of June 2004, the Coast Guard estimated it will be able to complete this planning sometime between December 2004 and February 2005.
- The Coast Guard is also determining the extent of AIS coverage needed in its overall AIS strategy, including a reexamination of which vessels should carry AIS in U.S. waters outside of VTS areas. This process includes selecting which waterways will be covered (e.g., deciding whether

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<sup>15</sup>The Coast Guard has awarded a contract to test the validity of satellite reception of AIS signals from as far as 2,000 miles of the U.S. coastline.

<sup>16</sup>Rescue 21, now under development, is a system using enhanced VHF and ultrahigh frequency (UHF) radios and direction-finding equipment to speed rescue response to vessels in distress.



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relatively small rivers and lakes will be covered); setting priorities for which waterways will be covered first (e.g., deciding whether large ports will receive coverage before open coastline); and identifying which additional vessels will be required to carry and operate AIS equipment (e.g., whether noncommercial, pleasure craft will still be outside AIS requirements). The Coast Guard has held public meetings and requested public comment on these issues and expects to complete its review of these comments by July 2004.<sup>17</sup>

Even after these planning efforts are completed, the Coast Guard will not be able to install AIS equipment outside VTS areas immediately. The factors that shape the cost of an AIS installation also shape the equipment requirements. For example, the more obstructions, such as mountains or tall buildings, that could block AIS signals, the more antennas will be required. At every location where the Coast Guard decides to install AIS equipment, it will have to evaluate the presence or absence of such design factors. Site surveys that detail local terrain and the volume and variety of vessel traffic will have to be carried out before the Coast Guard can determine a location's precise equipment needs.

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## Challenge and Opportunity Could Affect Nationwide AIS Development

As of June 2004, the continuing dispute between MariTEL and the Coast Guard over various frequency issues was in the hands of FCC, which expected to respond in summer 2004. At issue are competing views over the use of the internationally designated AIS frequencies. The commission's response could involve any number of actions or conditions regarding the internationally designated AIS frequencies, especially on access to frequencies needed to carry AIS information. FCC's specific findings could lead to varied technical, cost, and legal implications for AIS installation and operation, including potential delay. Depending on how FCC responds, and any subsequent actions by the interested parties, one factor that offers an opportunity to lower the federal government's costs is the demonstrated or expressed willingness of certain local port entities to shoulder the expense and responsibility for AIS installation if they, along with the Coast Guard, can use AIS data for their own purposes.

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<sup>17</sup>The Coast Guard issued a temporary interim rule on July 1, 2003, outlining its MTSA implementation plans and setting forth initial AIS requirements, which apply primarily to commercial vessels on international voyages and traveling in U.S. VTS areas. It also sought public comment on how best to extend and implement AIS requirements on the remaining U.S. navigable waters for vessels not on international voyages. See 68 *Fed. Reg.* 39,353 (2003).

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## Competing Proposals to Be Decided by FCC

Since 2003, there have been a number of petitions, proposals, and other actions put before FCC on who may and should use channels 87B and 88B and for what purposes. In October 2003, for example, MariTEL petitioned FCC seeking a ruling that would prohibit transmission on channels 87B and 88B by entities other than those authorized by MariTEL. In this petition MariTEL asserts, among other things, that the termination of the memorandum of agreement ended the Coast Guard's right to use channels for which MariTEL holds licensing rights. The company further contends that transmissions by entities other than those authorized by MariTEL would interfere with its other maritime frequency licenses and prevent its benefiting from the investment it made at the auction. On behalf of the Coast Guard and the Department of Transportation, NTIA also petitioned FCC in October 2003, opposing MariTEL's petition and proposing instead that FCC allocate channels 87B and 88B exclusively to AIS for government and nongovernment use. The government's position was that navigation safety and homeland security would be compromised if the United States and the maritime industry did not have unrestricted access to the frequencies designated by the International Telecommunication Union for AIS use worldwide.

Then in February 2004, citing a desire to protect its licensed rights and to reach a quick "resolution to the AIS frequency controversy," MariTEL submitted a proposal to FCC, "to share its licensed rights to channels 87B and 88B for use by ship stations and by the USCG at no cost." In this proposal, MariTEL generally agreed with NTIA's proposal to use channels 87B and 88B only for AIS, but unlike NTIA, it sought to limit access to the signals to ships, MariTEL, the Coast Guard, and the St. Lawrence Seaway Development Corporation. In other words, under this proposal, unless authorized by MariTEL, the Coast Guard and the St. Lawrence Seaway Development Corporation would be the only entities allowed to use AIS information received by a shore station. In effect, under this proposal, the transmission and receipt of AIS signals by other entities, such as marine exchanges, port authorities, or state and local government agencies, would require MariTEL's consent.

FCC has been gathering public comment from groups representing vessel pilots, port authorities, ship and barge operators, and others on these competing proposals, and a response is expected in summer 2004. The implications of this response for nationwide AIS development will depend on just how the commission resolves the competing proposals.

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## Challenges Posed by FCC's Decision Will Depend on Its Specifics

If FCC allocates the internationally designated frequencies exclusively to AIS use but limits access to ships, MariTEL, the Coast Guard, and the St. Lawrence Seaway Development Corporation, other organizations will no longer be able to use the signals and would therefore have no incentive to pay for installing AIS infrastructure. Such loss of incentive would likely mean the loss of federal cost-sharing opportunities, potentially closing off a possible long-term cost-reduction strategy in the development of AIS nationwide. For example, an official of the Merchants Exchange of Portland told us that the exchange would not be willing to pay for AIS facilities unless access to AIS data is unrestricted. In addition, according to an AIS consultant, enforcing a ban on parties other than MariTEL and the federal government to receive AIS signals at shore stations, as MariTEL has requested, could prove impossible, because an AIS receiver that is only receiving signals cannot be detected by an enforcement authority.

For its part, MariTEL maintains that it should be able to protect its investors and to profit from the licenses it won and that AIS can be operated as required by FCC's preauction rules. The company also maintains that even if FCC grants MariTEL's proposal for shared access to the internationally designated AIS frequencies, technical issues could still harm the company's ability to use other frequencies for which it holds licenses. In its February 2004 proposal, MariTEL contends that FCC rules now permit an AIS transmission technology that causes interference with maritime communications on channels adjacent to 87B and 88B. The company's proposal asserts that such interference impairs non-AIS shore-to-ship communications, with significant impact to MariTEL's ability to use its licensed spectrum, including its construction of a wide-area radio system for maritime services.

The Coast Guard argues that transmitting AIS signals on frequencies other than those internationally designated could compromise navigation safety and homeland security and complicate nationwide AIS development already under way using channels 87B and 88B. The Coast Guard cites examples such as the following:

- A ship traveling near or in U.S. waters may have to decide between broadcasting and receiving signals on the international frequencies—to “see” foreign vessels operating under international frequency requirements—and United States-specific frequencies—to “see” domestic vessels operating under U.S. frequency requirements. The inability of vessels to broadcast and monitor the U.S. frequencies and the

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internationally designated AIS frequencies simultaneously heightens the risk of collisions.

- Until a fully automated frequency management system has been established nationwide, the use of frequencies other than channels 87B and 88B would require transmitting foreign ships to manually change frequencies when approaching U.S. shores. According to the Coast Guard, such so-called manual channel switching is cumbersome and vulnerable to human errors and, if a ship's crew fails to change to the U.S. channel when necessary, could leave the ship "invisible" to ships in the same waters broadcasting on the U.S. frequency.
- Any U.S. channel management plans that become necessary would, the Coast Guard believes, impair existing operations in the border regions with Canada and Mexico, as well as AIS communications with international vessels operating within or near U.S. waters. For example, the St. Lawrence Seaway AIS system, jointly operated by the United States and Canada, is viewed by the Coast Guard as a complement to its nationwide AIS. The Seaway system, however, operates on channels 87B and 88B, and any U.S.-specific frequencies would reduce the efficiency of this international shipping thoroughfare.
- Transmissions on channels 87B and 88B from vessels operating outside U.S. jurisdiction would interfere with the effective use of channels 87B and 88B within the United States. According to the Coast Guard, such interference would encumber four frequencies in U.S. coastal areas instead of just the two internationally designated frequencies.

Finally, any additional actions by the interested parties stemming from specifics of FCC's response could slow or otherwise affect nationwide AIS development.

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### Depending on FCC's Response, Local Needs for AIS Data Create a Possible Cost-Sharing Opportunity

An opportunity that may help the Coast Guard speed AIS installation at lower cost to the federal government is potential partnerships between the Coast Guard and local port entities. For projects like AIS whose costs and benefits extend 3 or more years, the Office of Management and Budget instructs federal agencies, including the Coast Guard, to consider alternative means of achieving program objectives, such as different methods of providing services and different degrees of federal

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involvement.<sup>18</sup> Similarly, in 1996 a congressional conference committee report directed the Coast Guard to review user fee options and public-private partnerships for its VTS program.<sup>19</sup> In carrying out these directives, the Coast Guard learned of potential partnership opportunities.

The initiative for the actual partnerships has come mainly from the local port entities following their interactions with the Coast Guard on navigation safety issues. As a part of the VTS program, the Coast Guard has been performing a series of safety assessments at U.S. ports to help determine if additional VTS areas are warranted. In a number of cases, when the Coast Guard determined that a federal VTS was not warranted, local entities approached the Coast Guard for assistance in setting up their own vessel-monitoring system. Coast Guard assistance has ranged from full partnerships on vessel traffic management systems, to memorandums of understanding regarding uses of local vessel-monitoring systems, to advice and counsel on possible local efforts.

The offers from port entities have come at a number of locations and reflect a realization that vessel monitoring can provide a range of benefits. Entities have explored partnership with the Coast Guard at ports including Baltimore, Maryland; Charleston, South Carolina; Corpus Christi, Texas; Delaware Bay, Delaware, Pennsylvania, and New Jersey; Hampton Roads, Virginia; Los Angeles–Long Beach, California; Portland, Oregon; San Diego, California; and Tampa, Florida. Given the level of interest, these partnerships offer an alternative to exclusive federal involvement in nationwide AIS development. Entities at some of the listed locations have used, or want to use, AIS data about incoming vessels to improve port efficiency, for example, by helping schedule tugs or dock workers; to improve safety by mitigating risks uncovered during the Coast Guard’s safety assessments; and to increase their own security by monitoring vessels as they approach the port. Some of these entities have installed AIS or similar systems and have offered to share their information with the Coast Guard. Such work relieves the Coast Guard from having to carry out its own installation of AIS shore stations in certain locations, thus accelerating and facilitating nationwide AIS implementation.

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<sup>18</sup>Office of Management and Budget, *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*, Circular A-94, revised October 29, 1992.

<sup>19</sup>H.R. Conf. Rep. No. 104-785 at 29 (1996).

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As of June 2004, some of the port entities that either used AIS or planned to do so included the following:

- The Marine Exchange of Southern California, which provides vessel information at the ports of Los Angeles and Long Beach, California, to support port safety and the efficient movement of commerce. As a part of that support, the marine exchange financed, with port pilots, and built the VTS system at Los Angeles–Long Beach and purchased and installed AIS equipment to that system. The Marine Exchange and the Coast Guard share information received on the AIS equipment. The Coast Guard estimated that the cost of installation at Los Angeles–Long Beach was comparable to the Coast Guard’s installation at San Francisco, which the Coast Guard estimates at \$2.2 million.
- The Tampa (Florida) Port Authority, which currently operates a vessel traffic advisory service. In 1997 the authority installed an earlier version of AIS that did not meet current international or Coast Guard standards but was designed to help the harbor pilots and vessel masters as they navigated in the Tampa Bay channels. The port authority recently requested a grant from the state of Florida to upgrade its AIS equipment to international and Coast Guard standards so as to improve security at the port of Tampa. The port authority has expressed willingness to share AIS information with the Coast Guard when its system becomes operational.
- Merchants Exchange of Portland, Oregon, which has expressed a desire to build an AIS system around Portland and the Columbia River as a means of supplying information on vessel movements to interested port entities. The goal is again to improve the efficiency of port operations. According to an exchange official, Merchant Exchange would be willing to share AIS information with the Coast Guard but would not build the facility until the conflict over AIS transmission frequencies is settled.

In all three cases, the local port entity has already paid, or is willing to pay, for AIS installation, but the port entities’ ability to use AIS information depends on the coming FCC response. Although the local entities are building systems for their own purposes, all are sharing, or are planning to share, AIS information with the Coast Guard when the systems are complete. For example, the initiative taken by the Marine Exchange of Southern California alone likely saved the federal government \$2.2 million for AIS installation. The more local port organizations that are willing to pay for the purchase and installation of AIS facilities, the more the Coast Guard can save on nationwide AIS installation. If the FCC response does not allow these entities to make unrestricted use of AIS information, they are likely to be less willing to invest in such facilities.

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## Conclusions

The development of AIS nationwide is an important step in the overall effort to increase port safety and security. The Coast Guard has made an expeditious start with its installations at VTS areas and its continued planning for additional coverage, but before the system can be fully implemented, the Coast Guard faces a number of challenges. It must make some key decisions to determine AIS's technical requirements, waterway coverage, and vessels to be equipped with AIS. The dispute with MariTEL must be resolved, and the Coast Guard must obtain financing for installation nationwide. Pending the outcome of FCC's response, financing is one area where the Coast Guard may find help in meeting its challenges. Although the Coast Guard did not actively pursue cost-sharing options under the VTS program, by actively doing so now, it could potentially accomplish its nationwide AIS installation goals more quickly and reduce installation costs to the federal government.

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## Recommendation for Executive Action

To help reduce federal costs and speed development of AIS nationwide, we recommend that, depending on the outcome of the expected FCC response, the Secretary of Homeland Security direct the Commandant of the Coast Guard to seek and take advantage of opportunities to partner with organizations willing to develop AIS systems at their own expense.

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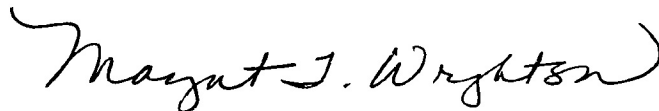
## Agency Comments

We provided a draft of this report to the Department of Homeland Security, the Coast Guard, and FCC for their review and comment. The Coast Guard and FCC generally agreed with the facts presented in the report and offered technical comments that were incorporated into the report where applicable. While agreeing with our recommendation, the Coast Guard also said that developing partnerships would face challenges such as ensuring that locally built systems meet all Coast Guard requirements, dealing with reluctant partners, or developing partnerships that maximize savings to the federal government. Given our assumption that the Coast Guard would not sacrifice AIS capability or standards in developing partnerships, we agree that developing partnerships will not necessarily be easy. We continue to believe, however, that doing so with willing local entities is in the public interest, and we continue to be encouraged in this regard by the level of interest in partnering with the Coast Guard that we found in the VTS program.

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As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 15 days after its issue date. At that time, we will send copies of this report to the Department of Homeland Security and the Federal Communications Commission. We will also make copies available to others upon request. In addition, this report will also be available at no charge at GAO's Web site at <http://www.gao.gov>.

If you or your staffs have any questions about this report, please contact me at (415) 904-2200 or at [wrightsonm@gao.gov](mailto:wrightsonm@gao.gov) or Steve Calvo, Assistant Director, (206) 287-4800 or at [calvos@gao.gov](mailto:calvos@gao.gov). Key contributors to this report are listed in appendix I.

A handwritten signature in black ink that reads "Margaret J. Wrightson". The signature is written in a cursive style with a large initial 'M' and a closing flourish.

Margaret T. Wrightson  
Director, Homeland Security  
and Justice Issues



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# Appendix I: GAO Contacts and Staff Acknowledgments

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## GAO Contacts

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## Staff Acknowledgments

In addition to those named above, Jonathan Bachman, Chuck Bausell, Ellen W. Chu, Mathew Coco, Geoffrey Hamilton, Anne Laffoon, and Jeffrey Larson made key contributions to this report.

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