



Electronic Aids to Navigation

May 4, 2016

Fiscal Year 2016 Report to Congress



Homeland
Security

United States Coast Guard

Foreword

May 04, 2016

I am pleased to present the following report, “Electronic Aids to Navigation,” which has been prepared by the U.S. Coast Guard.

The Fiscal Year 2016 *Department of Homeland Security Appropriations Act* (P.L. 113-114) requires the submission of a report on the feasibility and advisability of using electronic aids-to-navigation in the Bering Sea and United States areas of the Arctic Ocean, including their use in the Port Access Route Study of the Coast Guard.

Pursuant to congressional requirements, this report is being provided to the following Members of Congress:



The Honorable John Carter
Chairman, House Appropriations Subcommittee on Homeland Security

The Honorable Lucille Roybal-Allard
Ranking Member, House Appropriations Subcommittee on Homeland Security

The Honorable John Hoeven
Chairman, Senate Appropriations Subcommittee on Homeland Security

The Honorable Jeanne Shaheen
Ranking Member, Senate Appropriations Subcommittee on Homeland Security.

I am happy to answer any further questions you may have. Please do not hesitate to contact me at (202) 372-4411 or the Department’s Deputy Under Secretary for Management and Chief Financial Officer, Chip Fulghum, at (202) 447-5751.

Sincerely,

A handwritten signature in blue ink that reads "Paul F. Zukunft". The signature is stylized and cursive.

Paul F. Zukunft
Admiral, U.S. Coast Guard
Commandant



Electronic Aids to Navigation

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I. Legislative Language

This report responds to the language in Senate Report 114-68, which accompanies the Fiscal Year (FY) 2016 *Department of Homeland Security Appropriations Act* (P.L. 114-113).

Senate Report 114-68 states:

AIDS TO NAVIGATION

The Coast Guard shall continue to support Aids to Navigation (ATON) and maintain billets associated with Coast Guard Aids to Navigation Teams. Not later than 270 days after the date of enactment of this act, the Commandant shall submit to Congress a report on the feasibility and advisability of using electronic ATON in the Bering Sea and United States areas of the Arctic Ocean, including their use in the Port Access Route Study of the Coast Guard.

II. Background

In response to the *Maritime Transportation Security Act of 2002*, the Coast Guard began developing a two-way maritime data communication system based on Automatic Identification System (AIS) technology, referred to as the Nationwide Automatic Identification System (NAIS). AIS is a maritime digital broadcast technology that continually transmits and receives voiceless exchange of vessel data. The AIS technology and communication protocol have been adopted by the International Maritime Organization (IMO) as a global standard for ship-to-ship, ship-to-shore, and shore-to-ship communication of navigation information. While the original goal of AIS was to facilitate collision avoidance between vessels, ATON may be enhanced with AIS. AIS ATON, a type of electronic ATON (eATON), can autonomously, and at fixed intervals, broadcast the characteristics, dimensions, name, position, type, and status from or concerning an aid to navigation.

Using the available AIS data, the NAIS system enhances maritime domain awareness (MDA), with a particular focus on improving maritime security, marine and navigational safety, search and rescue, and environmental protection services. NAIS data is combined with other government intelligence and surveillance information to form a holistic, overarching view of maritime traffic within or near U.S. and territorial waters.

The NAIS program was implemented in three increments. Increment 1 provided the shore-based capability to receive AIS messages within the Nation's 58 major ports and 11 most critical waterways by using existing government infrastructure. Increment 1 achieved full operational capability in September 2008. Increment 2, which replaced Increment 1, provided transceiver capability (required to broadcast eATON), transmitting data out to 24 nautical miles and receiving data from out to 50 nautical miles in the same 58 major ports and 11 critical waterways. Increment 3 tested AIS long-range receive capabilities, extending receive coverage out to 2,000 nautical miles using satellite AIS contracted services. It is important to note that with current technology, eATON can be transmitted to AIS users only by shore- or ship-based infrastructure. Long distance coverage, such as the coverage provided by satellites, currently cannot be used to broadcast eATON.

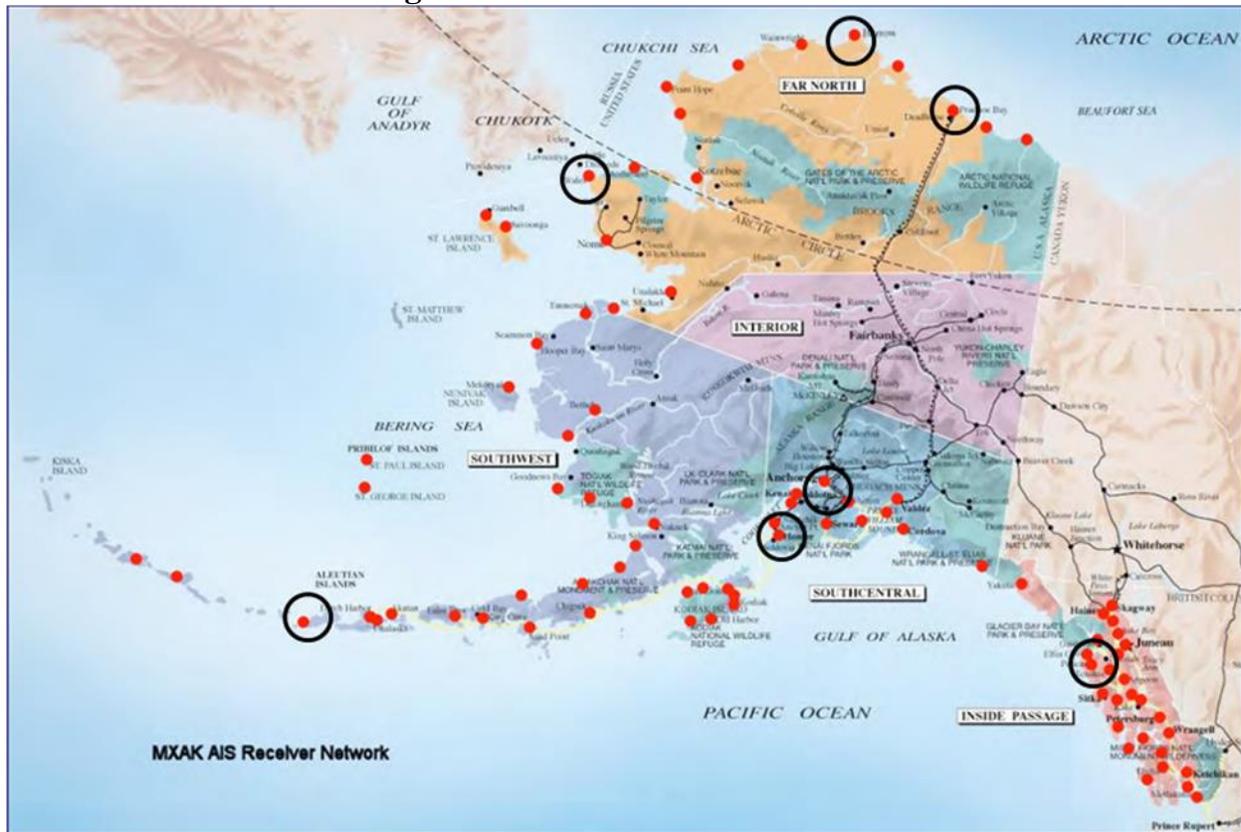
The Coast Guard recently expanded the vessel carriage requirements for AIS. An AIS final rule became effective March 2, 2015, mandating that the following commercially self-propelled vessels operating on U.S. navigable waters must have a properly installed, operational AIS no later than March 1, 2016: vessels of 65 feet or more in length; towing vessels of 26 feet or more in length and more than 600 horsepower; vessels certified to carry more than 150 passengers; dredges that operate near a channel; and vessels engaged in the movement of certain dangerous cargo, flammable, or combustible liquid cargo in

bulk. While this carriage requirement reflects minimum standards, commercial operators often incorporate AIS technology into their operations to provide real-time situational awareness. Due to commercial demand in Alaska, a third-party commercial transmission service provides AIS services for mariners in the Bering Sea and coastal areas of the U.S. Arctic Ocean.

III. Report

The Coast Guard NAIS acquisition project scope excluded coverage for Alaska because of a lack of major ports and minimal maritime traffic. To assess maritime traffic in the Arctic, the Coast Guard works with third-party commercial services in the region both to purchase received AIS data and to broadcast eATON in the Bering Sea and coastal areas of the U.S. Arctic Ocean. Currently, the Coast Guard Research and Development Center has a Cooperative Research and Development Agreement (CRADA) in place with the Marine Exchange of Alaska (MXAK) to explore AIS transmission capability throughout the Alaska regions. In addition to providing the capability to transmit AIS ATON, the CRADA has afforded the Coast Guard the means to transmit reliable marine safety information to enhance mariners' situational awareness and to help mitigate navigational risks throughout the Arctic region. Figure 1 shows MXAK's AIS receivers. The points circled in black¹ indicate the locations where MXAK currently can provide AIS transmit capability necessary to broadcast AIS application-specific messages, in some cases, out to 24 miles from the tower. While the use of MXAK AIS broadcasting stations could improve mariner situational awareness, the limited transmitting range of these receivers paired with the vast expanses of the Arctic may require longer range communications systems.

Figure 1: MXAK's AIS Receivers

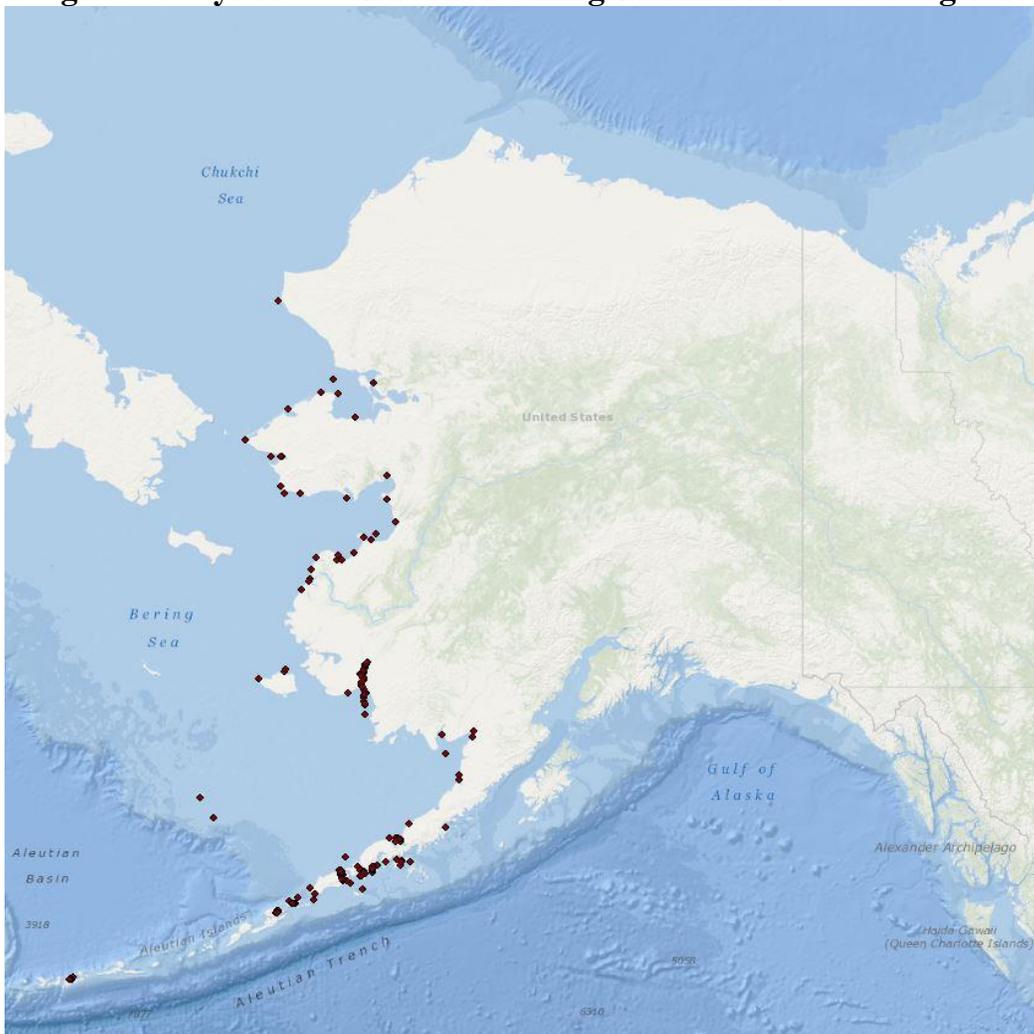


¹ The circles shown are for identification purposes only and are not drawn to scale.

The majority of the federal, physical ATON in the Bering Sea and U.S. Arctic regions is in the Aleutian chain and Kuskokwim Bay. North of the Bering Strait, seacoast aids are in place to mark the approaches to Kotzebue Sound, which serves as a regional maritime transportation hub. Figure 2 shows the aids in this region. The majority of aids in more regularly ice-laden waters are shoreside beacons. Current maritime traffic and marine hazards do not require the establishment of more aids in the Arctic waters of the United States. Several waterway analysis and management studies of the Bering Straits and Arctic Area of Alaska have been conducted to determine if additional ATONs are required in this region. These studies have not identified additional ATON requirements.

Most of the coastal waters on the U.S. Arctic coast are very shallow. The utility of terrestrial ATON for commercial traffic on the U.S. Arctic Coast is extremely limited due to the fact that visual ATON must be seen to assist in navigation. Adequate water depths to support commercial traffic are often only available at a distance offshore that is too far away for shore-based ATON to be useful.

Figure 2: Physical ATON in the Bering Sea and U.S. Arctic regions



The Arctic Waterways Safety Committee was established in October of 2014, with the help of the Coast Guard, as a self-governing group focused on creating or documenting best practices to ensure a safe, efficient, and predictable operating environment for all users of the arctic waterways. The Committee is modeled after the Harbor Safety Committee construct, and is comprised of a wide array of arctic maritime users and stakeholders that fall under three categories: subsistence users, industry, and regional officials. Through engagement with committees like the Arctic Waterways Safety Committee, the Coast Guard will ensure that user needs for ATON and marine safety information are met.

The Bering Strait Port Access Route Study currently is being conducted by the Coast Guard's Seventeenth District. Once final recommendations are determined from the Bering Strait Port Access Route Study, the requirement for additional ATON and Marine Safety Information could be revisited.