Acquisition Directorate

Nationwide Automatic Identification System Project

Statement of Work

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Homeland Security

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NAIS Statement of Work
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1. Introduction.

The Nationwide Automatic Identification System (NAIS) Project was initiated in response to the Maritime Transportation Security Act of 2002 (46 U.S.C. 2101) to implement a system to collect, integrate, and disseminate information concerning vessels operating on, or bound for, waters subject to the jurisdiction of the United States and to help establish effective Maritime Domain Awareness (MDA). The NAIS will utilize Automatic Identification System (AIS) technology and international communication standards as the foundation for its ability to track vessels and exchange safety and security information with AIS-equipped vessels.

AIS technology is already in use by many vessels and the number of AIS users and applications is expected to grow significantly over the coming years. The NAIS will primarily provide a robust and scalable system to receive AIS broadcasts from AIS-equipped ships and other AIS users and convey the message data to other command and control, analytical and case management systems and applications to improve MDA. The NAIS will also provide the ability to leverage other capabilities, inherent to the AIS technology and standards, such as exchanging binary messages with other AIS-equipped stations.

The NAIS will consist of an integrated system of AIS equipment (e.g., AIS Base Stations) and software located at Physical Shore Stations (PSSs), data storage and processing hardware and software located at Logical Shore Stations (LSSs) and the Enterprise Data Center (EDC), system administration and monitoring hardware and software located at the System Operations Center and networking infrastructure. The NAIS will send and receive AIS messages, via the Very High Frequency (VHF) Data Link (VDL), to and from AIS equipped vessels, Aids to Navigation, and Search and Rescue aircraft from various PSS platforms, such as towers, buildings and other structures as necessary to provide NAIS coverage of the U.S. coastline and designated inland waterways. AIS message data will be transported between system components over a Wide-Area Network (WAN) and diverse, PSS connectivity (e.g., leased analog circuits and microwave) to end users such as watchstanders at Sector Command Centers (SCCs). A description of Coast Guard Sectors, including their formal geographic designations per 33 CFR 3, and general information on SCCs is provided in Attachment J.4. The NAIS will provide data management services, including data processing, recording, retrieval and warehousing. Also, the NAIS is intended to primarily be a provider of information and capability that will be accessed, used and controlled via other systems. To this end, the NAIS must be interoperable and interface with a variety of command and control systems, including user interfaces for situation display, analysis and control of the system. In particular, it is intended that display of AIS data, data correlation and fusion, and control of the NAIS functionality will be performed by non-NAIS systems. The NAIS will operate solely within the Sensitive but Unclassified (SBU) domain, but must have the capability to provide data to higher security systems.

The NAIS is being implemented over the following three primary increments:

- **Increment 1** – AIS receive only in designated Critical Ports and Coastal Areas – is currently in production and is scheduled to be fully fielded and operational by the end of Fiscal Year 2007. Specific system design and installation information on Increment 1 (I-1) is provided in the form of a technical data package included in Attachment J.8.

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- **Increment 2** – AIS transmit out to 24 nautical miles (nm) beyond the U.S. baseline and AIS receive out to 50 nm beyond the U.S. baseline nationwide and AIS transmit and receive for designated areas of the Great Lakes and U.S. Inland Rivers – will be accomplished over two phases (under separate contracts) as follows:

    - **Increment 2 Phase I**, which is the subject of this Statement of Work (SOW), involves the work necessary to: design, develop and deliver the core NAIS capability (see SOW Section 3.1.1); optionally, achieve the NAIS Initial Operational Capability (IOC) by developing USCG Sector-based coverage designs, recommending PSS sites and implementing PSSs and LSSs to achieve NAIS receive and transmit coverage for three designated Coast Guard Sectors meeting the requirements outlined in the NAIS Performance Specification (Attachment J.2); and, optionally, to provide systems engineering, physical and logical shore stations hardware and software, initial logistics, and Sector coverage design services to support post-IOC deployment towards achieving Full Operational Capability (FOC) or complete receive and transmit coverage.

    - **Increment 2 Phase II** involves the work to complete Sector coverage designs not performed under Phase I, provide physical and logical shore stations hardware and software not provided under Phase I, and implement physical shore stations and logical shore stations as required beyond the designated IOC Sectors (i.e., provide for NAIS receive and transmit coverage, including PSS build out and equipment installation), to achieve FOC or complete nationwide coverage. This work shall be competed under a separate contract action and may be awarded on a Sector by Sector or Region by Region basis.

    The "NAIS", as used throughout the remainder of this SOW and in the other sections of the contract, refers to Increment 2 (I-2) Phase 1 of the NAIS. A description of the AIS receive and transmit coverage requirements and any allowable exceptions, by USCG Sector, is provided in Attachment J.5.

- **Increment 3** – AIS receive beyond 50 nm and out to 2,000 nm nationwide – will be accomplished through future contract actions.

2. References.

2.1. A list of the documents referenced in this SOW is presented below. Compliance with these documents is required to the degree specified within this SOW. In the event of a conflict between this SOW and the contents of a reference document, this SOW shall take precedence. All referenced documents are available on the Internet.

2.1.1. 5 Code of Federal Regulations (CFR) 731.106(a): Risk Designation <http://www.gpoaccess.gov/cfr/index.html>

2.1.2. 5 United States Code (U.S.C.) 552a: Privacy Act <http://uscode.house.gov/search/criteria.shtml>

2.1.3. 16 U.S.C. 470: National Historic Preservation Act <http://uscode.house.gov/search/criteria.shtml>

2.1.4. 16 U.S.C. 1531: Endangered Species Act <http://uscode.house.gov/search/criteria.shtml>

2.1.5. 17 U.S.C. 401: Notice of Copyright: Visually Perceptible Copies <http://uscode.house.gov/search/criteria.shtml>

2.1.6. 17 U.S.C. 402: Notice of Copyright: Phonorecords of Sound Recordings <http://uscode.house.gov/search/criteria.shtml>

2.1.7. 29 U.S.C. 794d: Rehabilitation Act, Section 508 <http://uscode.house.gov/search/criteria.shtml>

2.1.8. 33 CFR 3: Coast Guard Areas, Districts, Marine Inspection Zones, and Captain of the Port Zones <http://www.gpoaccess.gov/cfr/index.html>

2.1.9. 42 U.S.C. 4321: National Environmental Policy Act (NEPA) <http://www.nepa.gov/nepa/regs/nepa/nepaeqia.htm>

2.1.10. 44 U.S.C. 3541: Federal Information Security Management Act of 2002 <http://uscode.house.gov/search/criteria.shtml>

2.1.11. 46 U.S.C. 2101: Maritime Transportation Security Act of 2002 <http://www.tsa.gov/assets/pdf/MTSA.pdf>

2.1.12. American National Standards Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ANSI/ASHRAE) ANSI/ASHRAE 62.1-2007: Ventilation for Acceptable Indoor Air Quality <http://webstore.ansi.org/RecordDetail.aspx?sku=ANSI%2fASHRAE+62.1-2007>

2.1.13. American National Standards Institute/Electronic Industry Alliance (ANSI/EIA) ANSI/EIA-632-1999: Processes for Engineering a System <http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI%2FEIA%2D632%2D1999>

2.1.14. ANSI/EIA-649-A 2004: National Consensus Standard for Configuration Management <http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI%2FEIA%2D649%2DA+2004>

2.1.15. ANSI/EIA-748-A-1998: Guidelines for Earned Value Management Systems <http://webstore.ansi.org/RecordDetail.aspx?sku=ANSI%2fEIA-748-A-1998>

2.1.16. American National Standards Institute/Telecommunications Industry Association (ANSI/TIA) ANSI/TIA-222-G-2005: Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, August 2005 <http://www.tiaonline.org/>

2.1.17. American Society of Mechanical Engineers International (ASME) ASME Y14.24-1999: Types and Applications of Engineering Drawings <http://members.asme.org/catalog/ItemView.cfm?ItemNumber=N12299>

2.1.18. ASME Y14.34M-1996: Associated Lists <http://members.asme.org/catalog/ItemView.cfm?ItemNumber=N10296>

2.1.19. ASME Y14.35M-1997: Revision of Engineering Drawings and Associated Documents <http://members.asme.org/catalog/ItemView.cfm?ItemNumber=N13097>

2.1.20. ASME Y14.41-2003: Digital Product Definition Data Practices <http://members.asme.org/catalog/ItemView.cfm?ItemNumber=N17103>

2.1.21. ASME Y14.100-2004: Engineering Drawing Practices <http://members.asme.org/catalog/ItemView.cfm?ItemNumber=N13804>

2.1.22. Capability Maturity Model Integration for Software (CMMI-DEV v1.2) <http://www.sei.cmu.edu/cmmi/>

2.1.23. Chief of Naval Operations Instructions (OPNAVINST) OPNAVINST 4410.2A: Joint Regulation Governing the Use and Application of Uniform Source Maintenance and Recoverability Codes, 31 March 2003 <http://www.naisproject.net/NAIS_External/NAISdiscussion/rfp2/sections/Section_J/4410-2A(2003).pdf>

2.1.24. Commandant Instruction (COMDTINST) 4105.7: Equipment/System Integrated Logistics Support Plan (EILSP) and Equipment Support Sheet (ESS) Development and Maintenance Responsibilities, 22 Feb 2002 <http://www.uscg.mil/directives/ci/4000-4999/CI_4105_7.pdf>

2.1.25. COMDTINST 5230.66: Command, Control, Communications, Computers and Information Technology (C4&IT) Systems Development Life-Cycle (SDLC) Policy, 26 October 2004 <http://www.uscg.mil/directives/ci/5000-5999/CI_5230_66.pdf>

2.1.26. COMDTINST 5230.67: Command, Control, Communications, Computers and Information Technology (C4&IT) Information Assurance (IA) Policy, 30 August 2004 <http://www.uscg.mil/directives/ci/5000-5999/CI_5230_67.pdf>

2.1.27. COMDTINST 5520.13: Coast Guard Industrial Security Program, 08 August 1998 <http://www.uscg.mil/directives/ci/5000-5999/CI_5520_13.pdf>

2.1.28. COMDTINST M5260.3: Freedom of Information and Privacy Acts Manual, 14 June 1996 <http://www.uscg.mil/directives/cim/5000-5999/CIM_5260_3.pdf>

2.1.29. COMDTINST M5500.13B: Information Assurance Manual, 29 March 2004 <http://www.naisproject.net/NAIS_External/NAISMain/default_tech.asp>

2.1.30. COMDTINST M10550.25 (series): Electronics Manual, 03 May 2007 <http://www.uscg.mil/directives/cim/10000-10999/CIM_10550_25B.pdf>

2.1.31. Data Item Description DI-MGMT-81650: Integrated Master Schedule, 30 March 2005 <http://www.assistdocs.com/search/document_details.cfm?ident_number=217578&StartRow=1&PaginatorPageNumber=1&doc%5Fid=DI%2DMGMT%2D81650&status%5Fall=ON&search%5Fmethod=BASIC>

2.1.32. Department of Defense (DoD) Handbook 3235.1-H: Department of Defense Test & Evaluation of System Reliability Availability and Maintainability - A Primer, 09 March 1982 <http://www.dtic.mil/whs/directives/corres/html/323501h.htm>

2.1.33. DoD Manual 4100.39-M: Federal Logistics Information System Procedures Manual, July 2007 <http://www.dtic.mil/whs/directives/corres/html/410039m.htm>

2.1.34. Department of Homeland Security (DHS) Management Directive (MD) 4300.1: Information Technology Systems Security, 01 March 2003 <http://www.naisproject.net/NAIS_External/NAISdiscussion/rfp2/sections/Section_J/DHS-MD-4300-1.pdf>

2.1.35. DHS MD 11050.2: Personnel Security and Suitability Program, 05 January 2005 <http://www.naisproject.net/NAIS_External/NAISdiscussion/rfp2/sections/Section_J/DHS-MD-11050-2.pdf>

2.1.36. DHS Sensitive Systems Handbook, 30 Sep 2007 <http://www.naisproject.net/NAIS_External/NAISdiscussion/rfp2/sections/Section_J/DHS-4300A-handbook.pdf>

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2.1.37. DHS Sensitive Systems Policy Directive 4300A, 30 Sep 2007 <http://www.naisproject.net/NAIS_External/NAISdiscussion/rfp2/sections/Section_J/DHS-4300A-policy.pdf>

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3. Requirements.

3.1. General. The Contractor shall provide all project management, supervision, engineering services, personnel, labor, materials, and equipment (except for Government furnished items) required to design, develop, procure, build, integrate, deliver, install, implement, test, and document a Nationwide Automatic Identification System (NAIS), provide initial maintenance, logistics, and ongoing technical support for the NAIS, meeting all the requirements of this SOW and the NAIS Performance Specification, Attachment J.2, (hereafter referred to as PSPEC). The scope of work under these requirements includes all work necessary to: 1) Establish the NAIS Core Capability (SOW Section 3.1.1); 2) Establish Initial Operational Capability (IOC) (SOW Section 3.1.2); and, 3) Support the Government in implementing Full Operational Capability (SOW Section 3.1.3).

3.1.1. NAIS Core Capability. The Contractor shall provide all project management, supervision, engineering services, personnel, labor, materials, and equipment (except for Government furnished items) required to design, develop, procure, build, integrate, deliver, install, implement, test and document the core capability of the NAIS meeting the design and performance requirements of this SOW and the PSPEC. This core system shall provide all of the necessary I-2 functionality for a fully-capable system, albeit with a limited number of PSSs and LSSs. The core capability of the NAIS, which is a subset of the Initial Operational Capability (IOC), is defined as the following system elements or capabilities:

a. Centralized storage and enterprise services for the Enterprise Data Center (EDC), to include data storage, data retrieval, and external data capture services, as well as the interfaces to the External Data Providers and External AIS User Systems as described in the PSPEC;

b. The AIS Service Management at the System Operations Center (SOC), to include the SOC User Human System Interface as described in the PSPEC;

c. Three Physical Shore Stations (PSSs) – one at Government designated site within Sector Delaware Bay and two at the Coast Guard Command and Control Engineering Center (C2CEN);

d. Two Logical Shore Stations (LSSs) – functionality to be provided at the SOC and C2CEN;

e. Both the SCC User and SOC User HSI components;

f. Incorporation of Increment 1 AIS data feeds into the EDC; and

g. All network functions and capabilities associated with connecting these elements into a fully integrated and monitored system that meets the information assurance requirements of this SOW and the PSPEC.

3.1.1.1. Personnel Related Requirements. The Contractor shall adhere to the personnel related requirements in this section in the completion of all work under this contract,

including establishment of the NAIS Core Capability, establishment of IOC and supporting the Government in establishing the NAIS FOC.

3.1.1.1.1. Key Personnel. Before replacing any individual designated as Key by the Government, the Contractor shall provide written notice to the Contracting Officer no less than 15 business days in advance of a Key Personnel change, with justification for replacement, and provide the name and qualifications of any proposed substitute(s). The proposed substitute(s) shall possess qualifications equal to or superior to those of the Key Personnel being replaced.

3.1.1.1.1.1. Designation of Key Personnel. The Contractor shall designate the Project Manager (PM), Lead Systems Engineer, Lead Software Engineer, Lead Logistician and the Environmental Manager (EM) as Key Personnel.

3.1.1.1.1.2. Designation of Additional Key Personnel. As required, the Government will designate additional Contractor personnel as Key.

3.1.1.1.1.3. Replacement Approval of Key Personnel. The Contractor shall not replace Key Personnel without written approval from the Contracting Officer.

3.1.1.1.1.4. Project Manager. The Contractor shall designate one individual as Project Manager (PM) who shall be responsible for all work performed under this contract and be the primary point of contact for the Contracting Officer and designated representatives of the Contracting Officer. The PM shall hold a Bachelors of Science (B.S.) degree or higher in the field of engineering or project management and have at least 5 years experience as a project manager for a major systems development effort and experience using the principles and practices of project management for a Command and Control, Communications, Computers and Information Technology (C4&IT)-related system acquisition project. Additionally, the designated PM must possess a current Project Management Professional (PMP®) certification granted by the Project Management Institute or an equivalent credentialing body.

The PM shall have full authority to act for the Contractor on all matters relating to daily operation and administration of this contract.

3.1.1.1.1.5. Lead Systems Engineer. The Contractor shall designate a Lead Systems Engineer, who shall be the primary technical interface for the Contractor on all technical and systems engineering matters, including design review, testing and configuration management requirements established for the NAIS. The Lead Systems Engineer shall have demonstrated experience in managing similar C4&IT-related system acquisition project development, integration and implementation efforts, including previous experience applying Capability Maturity Model Integration for Software (SW-CMMI) and ISO 9000 process controls to systems development, integration, implementation and testing. The

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Lead Systems Engineer shall hold a B.S. degree or higher in the field of systems engineering or related engineering discipline and have at least 5 years experience managing systems engineering projects of similar size and complexity.

3.1.1.1.1.6. Lead Software Engineer. The Contractor shall designate a Lead Software Engineer who shall be responsible for managing all software-related engineering and testing efforts, to include: validating and verifying user requirements, designing synthesis for system software components, identifying and recommending Commercial off-the-shelf (COTS) components that will meet design criteria, and developing and testing software required to adapt and integrate COTS and non-COTS components to meet the PSPEC. The Lead Software Engineer shall have demonstrated experience in managing similar software development efforts, including previous experience applying SW-CMMI and ISO 9000 process controls to software development. The Lead Software Engineer shall hold a B.S. degree or higher in the field of software engineering, computer engineering, or computer science/applied computer science and have at least 5 years experience managing software development projects of similar size and complexity.

3.1.1.1.1.7. Lead Logistician. The Contractor shall designate a Lead Logistician, who shall be responsible for all analyses, design, life-cycle costing, and initial support efforts related to integrated logistics called for by the NAIS requirements. The Lead Logistician shall have demonstrated experience providing logistics support for major systems and direct program experience in the full life-cycle logistics support for a C4&IT-related system acquisition project. The Lead Logistician shall hold a B.S. degree or higher in the field of logistics, operations planning/management or be Defense Acquisitions Workforce Improvement Act (DAWIA) Logistics Manager Level III certified and have at least 8 years experience managing logistics analysis and support projects of similar size and complexity.

3.1.1.1.1.8. Environmental Manager. The Contractor shall designate an Environmental Manager (EM) to serve as the principal point of interface with the Government for compliance with environmental laws and regulations under this contract. The Contractor's EM shall coordinate with the designated Government EM throughout this contract to ensure that all environmental documents are produced in compliance with all applicable federal and state statutes, regulations, guidelines, and significant judicial decisions. The Contractor's EM shall have demonstrated experience with National Environmental Protection Act (NEPA) compliance studies and environmental impact documentation. The Contractor's EM shall have a degree in the field of environmental sciences (e.g., biology, hydrology, ecology, chemistry) and have at least 5 years experience managing environmental projects of similar size and complexity.

3.1.1.1.2. Qualified Personnel. The Contractor shall provide, directly or through subcontractors, qualified personnel to perform all required tasks to support developing and implementing the NAIS. Personnel must have appropriate experience, license(s), degree(s) and applicable professional certifications relevant to their work assignments, and be United States (U.S.) citizens or properly documented resident legal aliens with U.S. Government documentation.

3.1.1.1.3. Personnel Security Clearances, Screening and Sensitive Information Access. The Contractor shall comply with requirements set forth in COMDTINST 5520.13. Contractor personnel completing work in Government designated Restricted Access Areas (e.g., Sector Command Centers) shall be cleared at least to a level of SECRET. The Contractor shall submit, at least 21 days prior to commencement of any on-site work, a current clearance list to the Contracting Officer. The submitted list shall include the name, social security number, and level of clearance for each employee. The Contractor shall update the clearance list at least 15 days prior to the required access date for the individuals being added. Additional details will be specified in DD Form 254, Attachment J.23.

3.1.1.1.4. Employee Identification and Escort. The Contractor's employees and subcontractor employees visiting Government facilities shall wear an identification badge that, at minimum, displays the Contractor's name, the employee's photo, name, clearance-level and badge expiration date. Visiting Contractor employees shall comply with the local Command's escort rules and requirements. All employees shall identify themselves as Contractors when their status is not readily apparent and display all identification and visitor badges in plain view above the waist at all times.

3.1.1.1.5. Coordination of Field Visits. The Contractor shall coordinate all visits to Government and commercial sites or offices prior to travel. The Contractor shall request access to Government facilities via the COTR at least 7 business days prior to travel and work with the COTR and local Command representative(s) as necessary to ensure that local escort rules and requirements are understood. The Contractor shall confirm the need for and ensure that all necessary security clearances and local office approvals are granted and documented prior to travel.

3.1.1.1.6. Employee Conduct. All employees of the Contractor or subcontractors to the Contractor shall comply with all applicable Government regulations, policies and procedures (e.g., fire, safety, sanitation, environmental protection, security, "off limits" areas, and possession of weapons) when visiting or working at Government facilities. The Contractor shall ensure that Contractor or subcontracted employees present a professional appearance at all times and that their conduct shall not reflect discredit on the United States, Department of Homeland Security (DHS) or USCG.

3.1.1.1.7. Removing Employees for Misconduct or Security Reasons. The Government may, at its sole discretion, direct the Contractor to remove any employee

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from Government facilities for misconduct or security reasons. Upon such Government direction, the Contractor shall immediately remove the employee from the facilities. Such removal does not relieve the Contractor of the responsibility to continue providing service or meeting established scheduled milestones. Within 3 days of the occurrence, the Contracting Officer will provide the Contractor with a written explanation to support any directive to remove an employee.

3.1.1.1.8. Conflict of Interest. The Contractor shall not employ for this contract any person who is an employee of the U.S. Government and in a pay status. The Contractor shall not employ, on a part or full time basis, any employee of the Coast Guard, active duty or reserve uniformed or civilian personnel, unless the Government has determined no actual or potential conflict of interest exists.

3.1.1.2. Project Management Deliverables and Services.

3.1.1.2.1. General. The Contractor shall provide project management for the entire work effort to design, develop, procure, build, integrate, deliver, install, test, document and provide initial maintenance and logistics support for the NAIS meeting all the requirements of this SOW and the PSPEC, for the base period and all exercised option periods.

3.1.1.2.2. Meetings. The Contractor shall participate in meetings, to include: Start-up Workshop (SOW Section 3.1.1.2.2.1), Working Group and Review (SOW Section 3.1.1.2.2.2), Progress (SOW Section 3.1.1.2.2.3), Integrated Product Team (SOW Section 3.1.1.2.3), Risk Management Review (SOW Section 3.1.1.2.9.5), Integrated Baseline Review (SOW Section 3.1.1.2.10.3), Program Management Review (SOW Section 3.1.1.2.11), System Design Review (SOW Section 3.1.1.6.1.2), Preliminary Design Review (SOW Section 3.1.1.6.1.3), Critical Design Review (SOW Section 3.1.1.6.1.4), Test Readiness Review (SOW Section 3.1.1.6.1.5), and System Verification Review (SOW Section 3.1.1.6.1.6) meetings. The Contractor shall participate in additional meetings, as necessary. Except as defined elsewhere in this SOW, for all meetings, the Contractor shall provide a meeting agenda, associated briefing materials, and meeting minutes that reflect all issues addressed, lists attendees, and identifies any pending or other action items to be addressed at subsequent meeting(s).

3.1.1.2.2.1. Post-Award Conference/Start-up Workshop Meeting. Within 21 days after contract award, the Contractor and lead representatives for all major subcontractors shall participate in a combined post-award, kick-off and start-up workshop meeting as required in Section H.9.

3.1.1.2.2.2. Working Group and Review Meeting Deliverables (CDRL 1.2.2.2). The Contractor shall host, facilitate and participate in working group meetings and reviews of various teams, boards, and working groups, as required

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throughout the contract. The Contractor shall ensure standing or formal meetings are reflected in the Contractor's Project Management Plan (CPMP) and Integrated Master Schedule (IMS). Meetings shall occur at the request of either the Contractor or the Government, but not more frequently than weekly for any one team or group, unless otherwise agreed to by the Contracting Officer. For all meetings hosted or facilitated, or as required, the Contractor shall provide a meeting agenda, associated briefing materials, and meeting minutes.

3.1.1.2.2.3. Progress Meeting Deliverables (CDRL 1.2.2.3). The Contractor shall host progress meetings with the NAIS Project Resident Office (PRO) or telephonically with the NAIS Project Office (as required) to review and discuss contract administration issues, to include, but not limited to, outstanding issues, status and schedule to solve the issues, new issues, software development status, design status, and implementation status. Meetings shall occur at the request of either the Contractor or the Government, but not more frequently than weekly, or less frequently than monthly, unless otherwise agreed to by the Contracting Officer. The Contractor shall draft, revise, and provide final meeting minutes for each meeting.

3.1.1.2.3. Integrated Product Teams. The Government expects to establish a collaborative environment with the Contractor using Integrated Product Teams (IPTs) to apply a systematic approach to the integrated, concurrent development of the products and associated processes applicable to the development and delivery of the NAIS in accordance with the requirements of this contract. Charters for the following five (5) IPTs shall be developed and agreed upon by the Government and Contractor during the Post Award Conference/Start-up Workshop Meeting discussed in SOW Section 3.1.1.2.2.1: 1) project and risk management (to include project data management), 2) systems engineering (to include configuration management), 3) test and evaluation, 4) integrated logistics planning and support; and 5) PSS site survey and selection.

3.1.1.2.3.1. Contractor Participation in IPTs. The Contractor shall facilitate and participate in IPTs, under the Government's lead, at a minimum, for the five (5) areas identified in SOW Section 3.1.1.2.3. The Contractor shall describe the structure, processes and utilization of IPTs in the Contractor's Project Management Plan (see SOW Section 3.1.1.2.4). Additional IPTs or sub-IPTs may be formed and shall be supported by the Contractor, when the need emerges from program management or design reviews. The Contractor shall work with the Government to establish a mutually agreeable charter within 15 days of either party identifying the need for a new IPT or sub-IPT. IPT members shall include Government and Contractor representatives with appropriate engineering and business functional expertise, including subcontractors as appropriate.

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3.1.1.2.3.2. IPT Deliverables (CDRL 1.2.3.2). The Contractor shall produce Meeting Agendas and Meeting Minutes for all IPT meetings and workshops facilitated. All decision recommendations shall be documented in the meeting minutes.

3.1.1.2.4. Contractor's Project Management Plan (CDRL 1.2.4).

3.1.1.2.4.1. Preparation and Delivery. The Contractor shall draft, finalize and maintain a Contractor's Project Management Plan (CPMP). The initial draft CPMP shall submitted for Government review no later than 45 days after contract award and shall be built upon the Contractor's proposed approach and related management information accepted by the Government. The Contractor shall prepare and maintain the CPMP detailing the work tasks, critical events with associated exit criteria, and the processes to be used to successfully plan, execute, monitor progress and complete contract requirements of this project. The CPMP shall also fully describe the project management support, processes and procedures to be provided and followed up to and post IOC in support of work efforts, such as data management, scheduling, engineering change requests, technology refreshments and necessary system modifications, to reach FOC. The CPMP shall also cover the selection and management of subcontractors and the management approach to integrated master scheduling, as well as all critical program elements, including trade studies, analyses, design, integration and testing. The CPMP shall also include the Risk Management Plan (SOW 3.1.1.2.9.1) as a distinct section or chapter.

3.1.1.2.4.2. Product and Process Development. The CPMP shall describe the integration of product and process development to incorporate the functional areas of systems engineering, engineering data and specifications, software engineering, configuration management, product assurance, integrated logistics support, real property, compliance with environmental laws and regulations, Government Furnished Equipment (GFE) Management Plan, specialty engineering and risk management into a single Integrated Master Schedule (IMS) and comprehensive management structure and approach.

3.1.1.2.4.3. Project Team Organization. The CPMP shall provide the Contractor's project team organization, including subcontractors, (reflecting staffing and labor categories for all), the qualifications and experience of key personnel and describe the IPT structure/composition and processes to be used in performing the work.

3.1.1.2.4.4. Performance Metrics. The CPMP shall include activity and outcome metrics that the Contractor will use to assess, monitor and report its progress and measure success for project cost, schedule and performance.

3.1.1.2.5. Contract Work Breakdown Structure (CDRL 1.2.5).

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3.1.1.2.5.1. CWBS and CWBS Dictionary. The Contractor shall draft, finalize and maintain a deliverables-based Contract Work Breakdown Structure (CWBS) and associated CWBS Dictionary based on the Contract Line Item Number (CLIN) structure in Section B, providing clear traceability of all work under this contract. The CWBS shall provide visibility to all work efforts and end products. The CWBS shall be sufficiently detailed to identify all major subsystems, components and products to be delivered by the Contractor and each subcontractor using the guidance in MIL-HDBK-881A. The Contractor shall maintain the CWBS as the framework for contract planning, subcontracting, configuration management, budgeting, scheduling and performance reporting. Contract options that are exercised (e.g., to establish IOC, Sector survey and coverage designs, etc.) shall be incorporated into CWBS cost accounts for work package identification, definition and schedule relationships. The initial CWBS shall be submitted for Government review no later than 45 days after contract award. The CWBS shall be revised as necessary, to include incorporation of Government comments, and shall be finalized for approval by the Government as an exit criterion of the Integrated Baseline Review (See SOW Section 3.1.1.2.10.3).

3.1.1.2.5.2. CWBS as Basis of Earned Value Management System. There shall be only one CWBS and it will be utilized and consistent throughout the contract. The CWBS shall be the common link that unifies the planning, scheduling, cost estimating, budgeting, contracting, configuration management, and performance reporting disciplines. The CWBS shall provide a means of consistent communication to permit Government and industry managers to evaluate progress in terms of contract performance. The CWBS shall form the basis for the structure of the Earned Value Management System (EVMS), Systems Engineering Management Plan (SEMP), detailed design, configuration management, drawings, and provisioning.

3.1.1.2.5.3. Changes to the CWBS. During the performance of the contract, the Contractor shall not change the approved CWBS or associated definition, or any of the reporting elements without prior written approval from the Contracting Officer.

3.1.1.2.6. Integrated Master Schedule (CDRL 1.2.6). In accordance with the CPMP, the Contractor shall draft, finalize and maintain an event and deliverables-based Integrated Master Schedule (IMS), which in addition to meeting the requirements identified in DI-MGMT-81650, shall contain all Contract Data Requirements List (CDRL) submissions, including the initial and, where required/expected, subsequent submissions for each CDRL deliverable. The IMS shall contain the contract milestones, accomplishments, and discrete tasks/activities (including planning packages where applicable) from contract award to the completion of the contract. The schedule shall be an integrated, logical network-based schedule that correlates to the CWBS, and is vertically and horizontally traceable to the Contract Performance

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Report (as part of the Monthly Status Report). It shall also contain the flow of subcontractor activity linked into all appropriate schedule levels. The Contractor shall quantify risk in hours, days, or weeks of delay and provide optimistic, pessimistic, and most likely duration for each IMS activity and event. The IMS shall identify a point in time by which a subsequent optional contract task must be exercised to avoid a break in production or missed milestone date. The initial IMS shall be submitted for Government review no later than 45 days after contract award. The IMS shall be revised as necessary to include incorporation of Government comments and shall be finalized for Government approval as an exit criterion of the Integrated Baseline Review (SOW Section 3.1.1.2.10.3). Subsequent submissions of the IMS shall be on a monthly basis, to include schedule status and a schedule analysis report. The IMS shall be submitted with the Monthly Status Report 10 business days following the close of the Contractor's accounting period. The IMS shall be updated for Government approval as necessary to reflect additional work added on contract (e.g., with the Government's exercise of options for Sector survey and coverage designs, etc.).

3.1.1.2.7. Government Furnished Equipment Management.

3.1.1.2.7.1. GFE Database. The Contractor shall employ and maintain a Government Furnished Equipment (GFE) database or log made available through the Integrated Product Data Environment (IPDE) for real-time access by the Government. The database data elements shall, at a minimum, include the following for all GFE: the name of equipment, type of equipment, unit or quantity, date of acceptance, location, manufacturer, model, serial number, inventory number, condition, use restrictions, expected service life remaining and warranty information.

3.1.1.2.7.2. Contractor Management of GFE. For any Government equipment which is employed by the Contractor as part of the NAIS design, the Contractor shall develop GFE Management Procedures for that equipment and identify specific information, equipment, and handling procedures for each GFE item. The procedures shall comply with the provisions of Federal Acquisition Regulations 52.245-1 and Homeland Security Acquisition Regulations 3052.245-70, incorporated by reference in Section I.1. The Contractor shall include the GFE Management Procedures in the CPMP, as identified in SOW Section 3.1.1.2.4.2. The Contractor shall be responsible for the proper receipt, security, storage, and inventory of each item of GFE. The current status of all GFE shall be included as a section of the Monthly Status Reports (see SOW Section 3.1.1.2.10.5).

3.1.1.2.7.3. GFE Proposed Use. The Contractor shall identify proposed GFE, if any, included in the NAIS design, including how the use of GFE is incorporated into the NAIS cost estimates and analyses. All GFE offered for potential use under this contract is listed in Attachment J.7.

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3.1.1.2.8. Environmental Protection, Safety and Health Plan (CDRL 1.2.8).

3.1.1.2.8.1. Definition. Environmental Protection, Safety and Health (EPSH) is a multi-discipline area, which takes into account pollution prevention, compliance, conservation, restoration, munitions response, safety, occupational health, environmental health, explosives safety, fire and emergency services, pest management, environmental technology, and international activities. It is an important factor in sustaining the readiness of the USCG by cost-effectively maintaining all installations and assets through promotion of safety, protection of human health, and protection and restoration of the environment.

3.1.1.2.8.2. EPSH Program. The Contractor shall manage and mitigate EPSH risks using a risk management process and utilizing EPSH risk analysis matrices in accordance with MIL-STD-882. Types of EPSH risks shall include impacts and adverse effects from routine system development, testing, training, operation, sustainment, maintenance, and demilitarization/disposal, mission readiness impacts from system failures or mishaps, including critical software failures, and impacts to program life-cycle cost, schedule, and performance from EPSH compliance requirements.

3.1.1.2.8.3. Environmental Protection, Safety, and Health Plan Requirements. The Contractor shall draft, finalize, maintain and implement an Environmental Protection, Safety and Health (EPSH) Plan for the NAIS project. The EPSH Plan shall document the processes by which the Contractor and its subcontractors will comply with all applicable local, state and federal environmental protection, health, and safety laws and regulations bearing upon the development and deployment of the NAIS. The Contractor shall require its subcontractors to comply with the provisions of the EPSH Plan. The initial submittal of the EPSH Plan shall address those federal, state, and local laws and regulations that will apply to the IOC sectors. Subsequent submittals shall address only those federal, state, and local regulations that will apply in the sectors selected for implementation during that period.

3.1.1.2.8.4. Environmental Laws and Regulations. The Contractor shall comply with all local, state, and federal environmental laws and regulations pertaining to the development, testing and implementation of the NAIS; the environmental constraints imposed by compliance with regulatory requirements; and measures required to comply with these regulations. The Contractor shall provide support to the Government for the preparation of environmental documentation necessary for the NAIS installations, consistent with the EPSH Plan.

3.1.1.2.8.4.1. Programmatic Environmental, Safety, and Occupational Health Evaluation. The Programmatic Environmental, Safety, and Occupational Health Evaluation (PESHE) is a strategy for integrating EPSH considerations into the systems engineering risk management

process using methodologies described in MIL-STD-882. It also contains a schedule for completing the NEPA and Executive Order 12114 documentation, the status of EPSH risk management, and the identification, assessment, mitigation, residual risk acceptance, and on-going evaluations of mitigation effectiveness and on NEPA compliance. The Contractor shall develop a PESHE as part of the EPSH Plan (see SOW Section 3.1.1.2.8).

3.1.1.2.8.4.2. Class 1 Ozone Depleting Substances. The Contractor shall employ no class I ozone-depleting substance in the implementation, operation, or support of the NAIS.

3.1.1.2.8.4.3. Consistency with Programmatic Environmental Impact Statement. The EPSH Plan shall be consistent with the Programmatic Environmental Impact Statement for Implementation of the NAIS and shall, at a minimum, address: pollution prevention, environmental protection compliance, cultural resource protection, and occupational safety and health.

3.1.1.2.8.4.4. System Safety. The Contractor shall implement system safety oversight and procedures that are planned, implemented, and maintained in accordance with MIL-STD-882D. The Contractor's system safety measures shall ensure the efficient and effective achievement of system safety objectives. The Contractor shall review standards, specifications, regulations, design handbooks, safety design checklists, and other sources of design guidance, for pertinent safety design requirements applicable to the system. The Contractor shall identify the safety design criteria derived from all applicable information, and the criteria shall be the basis for developing system specification safety requirements. The Contractor shall expand the criteria and requirements for inclusion with all system design documents.

During the life of the project, the Contractor shall ensure the following:

a. Safety, consistent with mission requirements, is designed into the system in a timely, cost effective manner;

b. Hazards associated with each system are identified, assessed, tracked, monitored, and their associated risks are either eliminated or mitigated. Actions taken to eliminate or minimize risk shall be identified and archived for tracking and lessons learned purposes;

c. Historical safety data, including lessons learned from other systems, are considered and used;

d. Minimal or no risk shall be incurred in accepting and using new technology, materials or designs, and new production, test and operational techniques without approval of the Government. Changes to design, configuration, production or mission requirements, including any resulting system modifications and upgrades, retrofits, insertions of new technologies or materials, or use of new production, test or production techniques, shall be accomplished in a manner that maintains a risk level acceptable to the Government; and

e. Inclusion of the appropriate safety features is accomplished during the applicable phases of the system life cycle.

3.1.1.2.8.4.5. EPSH Risk Information. Documented as part of the risk database (SOW Section 3.1.1.2.9.3), EPSH risk information shall include a description of the risk/hazard, a preliminary risk assessment, necessary mitigation measures to eliminate or reduce risk, a residual risk assessment, a residual risk acceptance level, and mitigation measure effectiveness.

3.1.1.2.9. Risk Management.

3.1.1.2.9.1. Risk Management Plan. As an element of the CPMP (SOW Section 3.1.1.2.4), the Contractor shall draft, finalize and maintain a Risk Management Plan (RMP) that describes risk management actions specific to the NAIS project. The plan shall fully describe the Contractor's systemic process of identifying, analyzing, and managing project risks as an integrated function of sound project management processes.

3.1.1.2.9.2. Implementation of the RMP. The Contractor shall implement risk management procedures, integrated with the NAIS project management activities and consistent with the approved RMP, to identify and evaluate risk events, recommend risk mitigation strategies and plans, and support risk reduction for the processes and systems developed or employed for the NAIS Project. The Contractor's risk management efforts shall encompass the establishment and implementation of processes for identifying, assessing, tracking, and retiring management, development, integration and support risks. Risk events shall be developed from the CWBS and tracked in alignment with the IMS.

3.1.1.2.9.3. Risk Database. The Contractor shall establish and maintain a Risk Database containing all development, integration, implementation and support risks, including human factors and performance. At a minimum, this database shall include the following fields: title of risk event, CWBS element impacted, date identified, risk standing or priority (measured as a function of probability of occurrence times severity of impact), impact area(s) (i.e., cost, schedule, performance), mitigation or disposition strategy(s), mitigation or disposition

task(s), and current status (including how retired, if applicable). The database shall be subdivided into major integration categories (such as by region, infrastructure [network, towers], and / or development phase [design, acquisition, construction]). The database shall capture and record the change in priority of each risk event as a function of time and actions taken and allow the capability for standard queries and reporting. The Contractor shall update the risk database regularly (at least monthly) and provide a report on risk management activities and risk status as part of the MSR (SOW Section 3.1.1.2.10.5). The database shall also be accessible to the Government electronically through the IPDE, described in SOW Section 3.1.1.2.12.2.

3.1.1.2.9.4. Risk Manager. The Contractor shall designate a Risk Manager (RM), who may also be the PM, to oversee the risk management program and to participate in quarterly NAIS Risk Management Board meetings at USCG Headquarters in Washington, D.C and quarterly PMRs (see SOW Section 3.1.1.2.11).

3.1.1.2.9.5. Risk Management Review Deliverables (CDRL 1.2.9.5). The RM shall prepare a meeting agenda and provide a brief on the ten (10) highest risks to the NAIS RMB and status of actions taken to address the highest risk events presented in the previous RMB review. The RM shall draft, revise, and provide final meeting minutes to capture comments and guidance from the RMB and shall document assessments and recommendations from the NAIS RMB in the Risk Database.

3.1.1.2.10. Earned Value Management System.

3.1.1.2.10.1. Implementation of EVMS. The Contractor shall use a single integrated management system to report objective technical performance, cost and schedule data. The integrated management system shall provide management with the necessary information to monitor progress, identify significant problems and implement corrective actions as applicable. The integrated system shall be part of a validated American National Standards Institute/Electronic Industries Alliance Standard 748 (ANSI/EIA-748) Earned Value Management System (EVMS). The EVMS requirements shall be extended to Contractor divisions and all major subcontractors (defined as those performing work associated with meeting this contract with value equal to or exceeding 10% of the Contractor's awarded contract value). The EVMS shall integrate the work requirements specified in this SOW (including the work of subcontractors) and the CWBS and report out on a Contract Performance Report and IMS as part of the Monthly Status Report.

3.1.1.2.10.1.1. Discrete Earned Value Methods. Discrete earned value methods shall be used for all work packages unless the scope is level of effort in nature. The use of the percent complete and level of effort tracking

methods will require an explanation and supporting detail, which will be reviewed during the Integrated Baseline Review (IBR).

3.1.1.2.10.1.2. Liabilities. All project liabilities shall be tracked as they are incurred, and commitments are to be reflected in the earned value data.

3.1.1.2.10.2. EVMS Program Assurance of Conformity Document (CDRL 1.2.10.2). The Contractor shall maintain an earned value management system (EVMS) that has been validated by Defense Contracts Management Agency (DCMA) to manage this contract. The determination of a compliant EVMS is documented in an Advanced Agreement (AA) between DCMA and the Contractor, which specifies that the Contractor will use an effective Earned Value Management System (EVMS) on contracts of this type. The Contractor shall provide a copy of the AA and EVMS Description to the Contracting Officer no later than 60 days after contract award.

3.1.1.2.10.3. Integrated Baseline Review Deliverables (CDRL 1.2.10.3). The Contractor shall host a Government-led Integrated Baseline Review (IBR) to formally review the EVMS and to verify the accuracy, completeness and technical content of the CWBS (SOW Section 3.1.1.2.5) the IMS (SOW Section 3.1.1.2.6) and the EVMS baseline (SOW Section 3.1.1.2.10.4.1).

The Contractor shall conduct an initial IBR not later than 120 days after contract award and may be scheduled in conjunction with other required meetings.

Subsequent IBRs shall be hosted at least annually and within 90 days of significant contractual events, such as the exercise of contract options or contract changes that significantly alter the rate of production and requests to change the current-period EVMS baseline. IBRs may be held in conjunction with other meetings.

Following the IBR, the Contractor shall draft, incorporate Government input and provide final meeting minutes capturing the significant issues, agreements reached and outstanding work items to be addressed. Additionally, the Contractor shall submit the proposed final CWBS and IMS, reflecting Government and Contractor input from the IBR for approval by the Contracting Officer. The Contractor shall allow 14 days for Contracting Officer Approval of the CWBS and IMS.

3.1.1.2.10.4. EVMS Baseline Control.

3.1.1.2.10.4.1. EVMS Baseline. The EVMS Baseline, Budgeted Cost of Work Scheduled (BCWS) (or Planned Value) is established when the Contract Performance Report (CPR – part of the MSR (see SOW Section

3.1.1.2.10.5)) submission following initial IBR has been accepted by the Contracting Officer.

3.1.1.2.10.4.2. Changes to the EVMS Baseline. The Contractor shall not perform any EVMS Baseline changes without prior authorization from the Contracting Officer.

3.1.1.2.10.4.2.1. Contract Option Orders. The award of contract options constitute authorization to change the EVMS Baseline with respect to the increased work associated with the option. No portions of the EVMS Baseline made up of previously authorized work may be changed as a result of an exercised option unless specifically agreed to by the Contracting Officer.

3.1.1.2.10.4.2.2. Contract Modifications. Modifications to the contract (e.g., as a result of an engineering change request) constitute authorization to change the EVMS Baseline with respect to the modifications' scope of work. No portions of the EVMS Baseline made up of previously authorized work may be changed as a result of contract modifications unless specifically agreed to by the Contracting Officer.

3.1.1.2.10.4.2.3. Timeline for Options and Contract Modifications. Changes resulting from exercising options or contract modifications shall be incorporated into the existing baseline within two reporting cycles.

3.1.1.2.10.4.2.4. Requests to Change the EVMS. Requests to change the EVMS baseline shall include detailed supporting documentation, along with current Performance Reports (part of the MSRs – see SOW Section 3.1.1.2.10.5.3) and IMS tasks that will be impacted by the change.

3.1.1.2.10.5. Monthly Status Report (CDRL 1.2.10.5).

3.1.1.2.10.5.1. Monthly Status Report Delivery Requirements. No later than the 10th business day following the close of the Contractor's accounting period each month, the Contractor shall provide a Monthly Status Report (MSR) via the IPDE addressing the following sections and requirements. The report shall clearly distinguish between and be severable by the sections described below. The COTR will certify the completeness and accuracy of the MSR prior to payment of invoices.

3.1.1.2.10.5.2. Progress Report. As part of the MSR, the Contractor shall summarize the work performed in support of this contract during the

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previous month and areas of emphasis for the follow-on month. The Contractor shall provide information, plans, measures and forecasts reflecting the state and status of systems, support and risks. This section of the report shall also include the monthly submittal of the IMS, which is described by CDRL 1.2.6.

3.1.1.2.10.5.3. Contract Performance Report. As part of the MSR, the Contractor shall report on the performance achieved for the previous month and cumulatively to date using EVMS data. The CPR shall accurately reflect how work is being planned, performed and measured and shall be consistent with the actual contract status. The CPR shall be used to report cost and schedule performance information from the Contractor's ANSI/EIA-748 compliance integrated management system. Risks identified in the risk database shall be integrated into the EAC development process and variances in planned performance shall be reported as required in the following section.

3.1.1.2.10.5.3.1. Variance Analysis. The Contractor shall conduct (and include as part of the Contractor Performance Report (CPR) in the MSR) Variance Analysis whenever a regular performance report indicates any thresholds are exceeded.

Variance Analysis shall include Problem Analysis, Task/Project Impact, and a Corrective Action Plan. The Variance Analysis shall be thorough and complete and provide the Government with insight into the Contractor's mitigation strategies. Positive variances associated with Level of Effort work packages must be reflected as a complete cost savings to the Government in the Latest Revised Estimate on CPR Format 1.

3.1.1.2.10.5.4. Contract Funds Status Report. As part of the MSR, the Contractor shall provide the Government a monthly status of Contract funds for all cost type CLINs.

3.1.1.2.10.5.5. GFE Status Report. As part of the MSR, the Contractor shall provide the Government a monthly status of GFE utilized as part of the NAIS.

3.1.1.2.11. Project Management Review.

3.1.1.2.11.1. Conducting Project Management Reviews. The Contractor shall plan and conduct quarterly Project Management Reviews (PMRs) covering the status of action items from the previous PMR and key elements of ongoing or upcoming project efforts, including the cost, schedule, and performance of each contract action. Each review shall provide insight into requirements validation, design and implementation progress, ongoing analyses (e.g., logistics and cost-

performance trade studies), planning, management, staffing, expenditures, and risks against all established performance metrics. At a minimum, the Contractor shall present: 1) An assessment of the effectiveness of procedures as described in planning documents and the need for any changes; 2) Any current or potential problems or risks and recommended alternative approaches, solutions or mitigation activities for these issues; and, 3) How or to what degree recommendations or issues from the RMB and prior PMRs have been addressed. Each PMR shall not exceed three days in duration.

3.1.1.2.11.2. Coordination of PMRs. PMRs shall be coordinated with other design, technical and risk management reviews. The Government reserves the right to schedule additional reviews or working groups if critical issues arise or significant events or changes occur. Unless otherwise approved by the Government, these reviews shall alternate between the Contractor's facility and designated Government facilities.

3.1.1.2.11.3. Office Services at Contractor's Facilities. When the review is at the Contractor's facility, the Contractor shall provide access to an office and telecommunications services at the Contractor's facility for Government's use, when requested by the Government. The Government will provide the Contractor with at least 5 business days notice of the need for this access and service.

3.1.1.2.11.4. PMR Deliverables (CDRL 1.2.11.4). The Contractor shall prepare an agenda and briefing materials for the PMR. The Contractor shall draft, revise, and deliver minutes documenting PMR results of key issues, agreements, action items, and proposed schedule for action item resolution.

3.1.1.2.12. Data Management and Integrated Product Data Environment.

3.1.1.2.12.1. Data Management.

3.1.1.2.12.1.1. IPDE Management Plan (CDRL 1.2.12.1.1). The Contractor shall draft, finalize, maintain and implement an Integrated Product Data Environment (IPDE) Management Plan that establishes the organization, procedures and processes that will be used to develop, check, distribute, update, manage the configuration of, and deliver the technical information necessary to design, construct, deliver and support the NAIS and all other contract products and deliverables. The IPDE Management Plan shall be submitted within 30 days of contract award. The IPDE Management Plan shall include all tasks for documenting and maintaining the IPDE throughout the project life-cycle and transitioning the IPDE to the Government at the end of the contract period.

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3.1.1.2.12.1.2. Information Security. The Contractor shall ensure security of all data and information associated with this contract. At a minimum, the following standards shall be met and procedures used:

a. The IPDE System shall be Federal Information Security Management Act of 2002 (FISMA) compliant.

b. All electronic information shall be archived/backed-up on an incremental and regular basis. At no time will any more than one working day of information be lost.

c. The Contractor shall provide industry standard real-time data redundancy with backup capability. All backup media shall be kept, at a minimum, for the length of the performance period. Backup media shall be indexed to provide straightforward access in case of information requests. In the event of an IPDE failure (including compromise due to hacker or virus attacks), lost information shall be limited to activities that have occurred within the preceding 24 hour period.

d. In the event of failure, loss, or other disaster, the Contractor shall provide full data restoration, with an understanding that some data might be lost, as identified in SOW Section 3.1.1.2.12.1.2(c), either on-site or to the Government, within one working day.

3.1.1.2.12.1.3. Data Format. All data shall be delivered electronically to the Government in its native file format. All data shall have a standard naming convention, detailed file descriptions and the organization, as prescribed by the IPDE Management Plan, to allow for rapid location and version control of files.

3.1.1.2.12.1.4. Coast Guard Standard Workstation Compatibility. Source or native files shall be submitted in formats compatible with the Coast Guard Standard Workstation or as specified in this SOW. Note that the Portable Document Format (PDF) file format is generally unacceptable except for cover letters bearing a signature. Current Coast Guard workstation operating systems and software include:

a. Microsoft® Windows XP® operating system
b. Microsoft® Office 2003 applications
c. Microsoft® Internet Explorer 6.0
d. Telelogic DOORS™
e. Adobe® Acrobat® 7.0
f. Autodesk™ DWG
g. AutoCAD® version 2005
h. Microsoft Project® Professional 2002

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i. Microsoft Office Visio® 2003
j. ESRI ArcView® Version 9.1

3.1.1.2.12.1.5. Delivery Requirements. All electronic data, file structures, associations and datasets, including the Geographic Information System (GIS) interface associated with the IPDE (see SOW Section 3.1.1.2.12.2.3.9) shall be delivered to the Government in a condition and format such that it can be transferred or read into the Government's enterprise logistics, real property, warranty, contract, configuration management and technical publication library systems via CD, DVD, or the internet, without modifications.

3.1.1.2.12.2. Integrated Product Data Environment.

3.1.1.2.12.2.1. General. The Contractor shall provide a software application to fully establish and implement an Integrated Product Data Environment (IPDE) that will allow project stakeholders, those operating both inside and outside the Coast Guard Data Network, to create, store, access, manipulate, and exchange data digitally. The Contractor shall make all project data, unless otherwise noted on the applicable CDRL, available on the IPDE.

3.1.1.2.12.2.2. Timeline Requirement. The Contractor IPDE shall be ready and available for basic online data access by the Government no later than 30 days after award of contract. All capabilities described in this section shall be established no later than 90 days after contract award.

3.1.1.2.12.2.3. IPDE Capabilities. The IPDE shall, at a minimum, provide the following capabilities:

3.1.1.2.12.2.3.1. Availability. The IPDE shall be available 24 hours a day, 7 days a week. A minimum bandwidth of 1.544 megabits per second shall be sustained at least 98% of the time.

3.1.1.2.12.2.3.2. Authorized Users. Access to the IPDE shall be restricted to authorized users through a controlled access web-enabled application (i.e., username and passwords that adhere to current DHS security standards). Access to the IPDE shall be controlled by an initial challenge upon access and connections shall be provided via encrypted Virtual Private Network technology. The IPDE shall provide various levels of access rights and privileges specified at the user level (e.g., administrator, guest, user) and at the data/deliverables level (i.e., ability to allow access to specific data/deliverables to selected users only). The Contracting Officer, or his or her representative, will routinely provide the Contractor with the names of authorized users, which will include contracted support personnel

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for the NAIS Project Office and third party contractor(s) selected for post-IOC PSS site implementation, and the level of access authorized for each user. The Contractor shall maintain and control authorized user access. The Contractor shall provide an online list of valid users and their access level throughout the performance period.

3.1.1.2.12.2.3.3. Access. The IPDE shall be internet accessible hosted on a dedicated server with a dedicated connection to the internet. Authorized personnel shall be able to access the IPDE via the internet using a standard web browser preserving security and integrity of data without the need to install or download additional client software. Existing Government portals and websites will not be made available to host the IPDE.

3.1.1.2.12.2.3.4. Data Exchange. The IPDE shall include a location and process to exchange contract documents between the Contractor and the Government. The process shall be documented in the IPDE Management Plan (see SOW Section 3.1.1.2.12.1.1). The process shall include e-mail notification of data posted for exchange. The Contractor shall submit electronic data deliverables to the Government via this means and provide e-mail notification to the designated Government representative(s) of a waiting submittal. The Government representative(s) will then access the IPDE, download the submittal to a Government system, and acknowledge receipt of the submittal via e-mail notification to the designated Contractor representative(s). A similar process shall be available for the Government to use when providing data to the Contractor. The IPDE shall automatically log all actions and give workflow functionality, to include version control and document approval.

3.1.1.2.12.2.3.5. Search Functionality. The IPDE shall give relevant and robust search functionality (including the ability to search within multiple documents).

3.1.1.2.12.2.3.6. Archive Library. The IPDE shall include an archive library of all submittals made via the data exchange process. The archive library shall be an online electronic repository facilitating the storage, posting, filing, archiving, retrieving, moving, deleting, and locking/unlocking of data and deliverables. Upon notification that the Government has received a submittal via the data exchange process, the Contractor shall remove the submittal from the data exchange location and archive it to the IPDE library. The archive library shall provide the capability to create, modify, delete, restrict, and move electronic folders and electronic folder structures while ensuring media and data security and integrity. File revisions shall be tracked

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and assigned different version numbers for auditing and rollback. The archive shall be indexed and provide the capability to search for information (e.g., data, deliverables, events, tasks, and forums) based on the document name, creation and revision date, document author/owner, including information residing within files.

3.1.1.2.12.2.3.7. Calendar. The IPDE shall provide an electronic calendar that reflects the IMS for events and tasks that are related to the NAIS acquisition. Attributes of events and tasks shall, at a minimum, include: type, title, description, start/end dates, recurrence, assignee, and owner. The IPDE shall provide the capability to view events and tasks in a chronological list or monthly tables, and shall allow for filtering and sorting by any or all of the attributes.

3.1.1.2.12.2.3.8. Desktop Integration. The IPDE shall provide desktop integration with Microsoft® (MS) Office 2003, including e-mail lists and calendars.

3.1.1.2.12.2.3.9. Geographic Information System Interface. The IPDE shall be accessible to a Government provided Geographic Information System (GIS) interface that will allow the NAIS GIS to access all of the data in the IPDE for rapid searching, analyses, and roll-up of data, for key metrics that are typically used for internal USCG briefings, status reports, Congressional inquiries, and other uses (see Attachment J.9 for GIS Information). This will require a separate SQL database to be included in the IPDE and populated with data pulled from the documents that reside in the IPDE. The SQL Data Table Structure for the IPDE will be provided to the contractor at award. These roll-ups and queries shall, at a minimum, be able to be organized by: PSS Site; USCG Sector; USCG District; current congressional district; state and territory; entire project area; and Fiscal Year and Quarter.

3.1.1.2.12.2.3.9.1. Key Metrics. Key metrics typically used include:

a. PSS Site status (selected, surveyed, under construction, operational, accepted);

b. Cost to implement (on a per site basis with the ability to roll up into USCG Sector and District; Congressional District; State and Territory; entire project area; by Fiscal Year and Quarter);

c. Number and type of PSSs per USCG Sector and District; Congressional District; State and Territory; entire project area;

d. Number and types of PSSs implemented per Fiscal Year and Quarter;

e. PSS types based on equipment configuration;

f. PSS site type based on ownership and real estate status (commercial-leased; government-owned, leased; USCG-owned; third-party new build; USCG-Build; PSS site acquired, lease signed, negotiations in progress);

g. Environmental compliance status (at a minimum, to include: permits required, mitigation requirements, mitigation status, NEPA document type required, status of NEPA document, National Historic Preservation Act (16 U.S.C. 470) status, Endangered Species Act (16 U.S.C. 1531) status, Environmental Due Diligence Audit status, type of follow-on studies required, status of follow-on studies);

h. Network connectivity including connectivity type and status of connection (ordered, installed, operational);

i. Predicted coverage for each PSS site;

j. Area covered in percentage and square nautical miles within the 24 nm limit for transmit and the 50 nm limit for receive by USCG, Sector and District; Congressional District; State and Territory; and project overall; and

k. Equipment installed at each site, down to serial number, summaries of site configuration types, trouble-ticket histories, and other similar searches, queries and roll-ups to support sustainment and configuration management.

3.1.1.2.12.2.3.9.2. Queries. The queries required to support these metrics shall be supported by the IPDE and usable by USCG personnel without Contractor assistance. The GIS interface is such that by clicking on a PSS location on a map, active links to all documents and related data for that PSS are displayed. The GIS interface allows the creation of custom graphics for use in presentations, wall charts, and briefings by USCG personnel

without Contractor assistance. The IPDE is scalable with supporting software selected, such as database software, so that all of the NAIS efforts for Increment 2 can be supported without the need to complete significant upgrades, redesign the system or change to or migrate to other supporting software types after IOC is completed. COTS products shall be used to the maximum extent practicable for all of the supporting elements, including the Contractor's IPDE. The goal is to establish a single IPDE that will support the project for the full duration of the NAIS implementation.

3.1.1.2.12.2.3.10. COTS Products. To the maximum extent possible, the IPDE shall use COTS products (e.g., MS Office SharePoint Server and MS SQL Server 2005 [Enterprise or Professional], ESRI ArcInfo or ArcView 9.1).

3.1.1.2.12.2.3.11. Section 508 Compliance. The IPDE shall be compliant with Section 508 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794d) and the provisions provided in Section H.16.

3.1.1.2.12.2.4. Transition Plan. As an element of the IPDE Management Plan (see SOW Section 3.1.1.2.12.1.1), the Contractor shall provide a transition plan for the migration of the IPDE to Government owned and operated infrastructure.

3.1.1.2.12.2.5. IPDE Support. The Contractor shall support and maintain the IPDE in a cost-effective manner to support a Government user population of approximately 250 total users with 50 concurrent users at any given time. The IPDE shall be configured and supported such that users can quickly navigate and access assistance when encountering problems during use. This support may consist of help desk support, online interactive help, Frequently Asked Questions (FAQ), and other similar methods. The mix of support formats should consider turnover of IPDE users, estimated at approximately every two years. .

3.1.1.2.12.2.6. User Interaction. In addition to the GIS interface capability (see SOW Section 3.1.1.2.12.2.3.9), the IPDE shall provide user interaction through an MS Internet Explorer 6.0 (or current version) interface conforming to the Government's current information technology infrastructure and have an access point through the Field Support Desk (FSD) website (see SOW Section 3.1.1.5.2.10.2.1). The standard browser interface shall support industry recognized interface protocols such as Simple Object Access Protocol (SOAP).

3.1.1.2.12.2.7. Trouble Ticket Functionality. The IPDE shall enable the creation, management and notification of trouble tickets which will identify and track the status of issues involving the IPDE requiring actions to achieve resolutions. The trouble ticket system shall provide the capability to add tickets, modify status and particulars, make comments, search and sort tickets according to identifying criteria (e.g. status, creation date, due date, key words), as well as generate and print reports. Tickets shall include identifying information to include: ticket number, priority level, creation date, POC information, problem description, steps taken, and resolution date. The IPDE shall track the date and time of any changes made to tickets and the user who made the changes.

3.1.1.2.12.2.8. Multi-file Downloads. The IPDE shall provide a function to download or upload many files at once with a single command. The command shall be capable of receiving and providing windows explorer directories with sub-folders including their contents, regardless of file format and size. Downloads and uploads shall notify the user of their status, speed and estimated completion time.

3.1.1.2.12.2.9. Delivery of the IPDE. At the end of the contract performance period, or within 30 days of being directed by the Contracting Officer, the Contractor shall deliver the populated IPDE, required documentation, associated software, and the necessary rights and licenses to that data and software, per the transition plan delineated in the IPDE Management Plan, so that the Government may deploy, operate, modify, and maintain it for the duration of the NAIS life-cycle in the same manner and with the same functionality available during deployment.

3.1.1.2.13. Project Resident Office Support and Services.

3.1.1.2.13.1. Establishment of the Project Resident Office. The Government will establish a Project Resident Office (PRO) to conduct contract administration, facilitate the delivery of the NAIS and assess Contractor compliance with the terms of the contract. The PRO offices and/or working spaces shall be equivalent to the working conditions and environment shared by Contractor personnel. Also, the PRO working spaces shall be a separate entity from the shared Contractor's working areas. Presence of the PRO does not relieve the Contractor of the responsibility of complying with the terms of the contract.

3.1.1.2.13.2. Project Resident Office Documentation (CDRL 1.2.13.2). The Contractor shall provide documentation to describe the facilities and services that will be made available to meet the PRO requirements of this SOW. The documentation shall include a plan view drawing, depicting the planned production facility, including the locations of the Contractor offices, the PRO facilities and parking, and the Contractor's laboratory and production area(s).

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The documentation shall also provide the address and exact location of the point of demarcation and associated designated telecommunications closet information to be used for a Government furnished T-1 connection to the Coast Guard Data Network Plus (CGDN+). The Government will use this information to separately arrange for the installation of the CGDN+ circuit.

3.1.1.2.13.3. Contractor Provided PRO Facilities and Parking. Within 30 days of contract award, the Contractor shall provide and maintain facilities and parking at or near the Contractor's production facility to support a Government staff of eight (8) personnel, including military, Government civilian, and contracted support personnel. The facilities shall be within a reasonable walking distance of the Contractor's offices and production area. PRO personnel shall have access to the facilities 24 hours per day, seven days per week. Contractor personnel shall not have access to PRO facilities without Government approval.

3.1.1.2.13.4. General Requirements for the PRO. The Contractor shall provide or meet the following for all spaces for the PRO:

a. Sufficient overhead lighting for the intended use;

b. NFPA 101 requirements specifically regarding fire safety including: smoke detectors, portable fire extinguishers, egress, and emergency lighting;

c. Heating and air conditioning to maintain an environmental range from 68-73 degrees Fahrenheit;

d. Environmental controls shall be in place to ensure acceptable indoor air quality in accordance with ANSI/ASHRAE 62.1-2007;

e. Sufficient 110-120 volt electrical power in accordance with NFPA 70 to support all Contractor-provided equipment and individual outlets for Government provided computer, monitor, and additional office appliances;

f. All Contractor provided telephone lines shall be direct dial, independent and private telephone lines. The Contractor may route direct dial calls through the Contractor's switchboard. All calls to and from the PRO facility shall be accessible twenty-four hours per day, seven days per week. Long distance calls made from the PRO will be billed to and paid for by the Government; and

g. Equipment and amenities shall be new or cleaned and refurbished to like-new condition.

3.1.1.2.13.5. Private Office. The Contractor shall install or provide two (2) private offices, each a minimum of 100 square feet in size, with one data/phone line drop with four RJ-45 jacks wired to TIA/EIA-568-B standards (two jacks will be

utilized for phone, the other two for the data network), one telephone with speaker function and combined digital answering machine message system, one modular desk, two chairs, one bookcase and one five-drawer, letter size, fire retardant, vertical filing cabinet with compression follower.

3.1.1.2.13.6. Common Offices. The Contractor shall provide common modular offices (a minimum of 600 square feet in size in total) for six (6) PRO personnel using semi-private systems furniture (or equivalent to the Contractor's working environment for personnel). The PRO modular work spaces shall each contain two chairs, one data/phone line drop with two RJ-45 jacks wired to TIA/EIA-568-B standards, and a four drawer filing cabinet.

3.1.1.2.13.7. Work Areas.

3.1.1.2.13.7.1. Work Space. The Contractor shall provide a common work space (of approximately 250 square feet in size) with two (2) bookcases, two five-drawer horizontal lockable file cabinets and a dinette table with eight chairs. The workspace shall have sufficient electrical power outlets and cooling suitable for office equipment, at a minimum to include a copying machine, paper shredder, facsimile machine, a coffee maker, microwave, and a small refrigerator.

3.1.1.2.13.7.2. Copying Machine and Paper Shredder. The Contractor shall provide one (1) plain paper document copier with twenty-sort capability, automatic feed, image sizing, and rated to reproduce approximately fifty pages per minute and approximately 20,000 pages per month. The Contractor shall also provide a paper shredder machine located in a fully enclosed cabinet, with the following characteristics: auto start/stop via photo cell, start/stop/reverse modes, no less than 20 ft/min and with a minimum 20 sheet capacity.

3.1.1.2.13.7.3. Facsimile Machine. The Contractor shall provide one (1) plain paper, laser quality facsimile machine with the following minimum characteristics: 33.6 kbps modem, with a 20 page automatic document feeder, 160 page memory, 3 second per page scan rate, auto-redial, and 150 sheet paper supply.

3.1.1.2.13.8. Conference Room. The Contractor shall provide Government personnel access to one private conference room, approximately 400 square-feet in size, which shall include:

a. One executive conference table and office chairs to seat fourteen persons.

b. One overhead mounting for a Government-provided digital projector.

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c. A desk with space and electric outlets sufficient for a Government-provided computer workstation with a monitor, speakers, and overhead projector. Provide an appropriate conduit for data, phone, and power cables between the computer and the overhead projector mounting.

d. Space and electric outlets in the vicinity of the desk for a Government-provided portable audio/visual equipment cart containing a television, VCR, DVD player, and camcorder and an electric outlet for a Government-provided conference room grade speakerphone to be located in the center of the table.

e. One data/phone line drop, in the vicinity of the desk, with four RJ-45 jacks each, wired in accordance with the TIA/EIA-568-B Standard. One jack shall be utilized to provide telephone service to the analog speakerphone.

3.1.1.2.13.9. Government Provided Materials. The Government will provide and install the following:

a. A T-1 Data Network line to the facility, terminated in a Contractor designated telecommunications closet

b. The phone switch and router and all computer routers, servers, switches, printers, and desktop computers.

c. Office supplies (including dry-erase board(s), easels, projector, audio visual equipment and consumables)

d. Analog speakerphone and audio visual equipment for conference room

e. Any other equipment to support the PRO not requested above.

3.1.1.2.13.10. Services. The Contractor shall provide the following services for the PRO:

3.1.1.2.13.10.1. Security. Physical security of the facility on which the PRO facilities are located, including the presence of a watch attendant 24 hours per day, 7 days per week. Issue security badges for PRO staff and visitors, as necessary. Issue and manage keys to PRO facilities. The Contractor shall provide adequate security that meets the SBU FOUO level requirements for all NAIS networking and computer facilities at the PRO location.

3.1.1.2.13.10.2. Temporary Computer Network. The Contractor shall provide a broadband or equivalent (e.g., DSL, Cable, and ISDN) communication link and service subscription for use by the Government as a temporary computer network until the Government provided T-1 line is installed.

3.1.1.2.13.10.3. Shipping. Shipping/receiving services shall include: receiving, sorting, and storing all Government mail, packages, and shipments until pickup by Government PRO representative. Provide forklift service, as requested, to transport large packages to/from shipping/receiving and USCG PRO Office.

3.1.1.2.13.10.4. Maintenance and Support. The Contractor shall maintain all Contractor-provided spaces and equipment in clean, pest-free, operating condition, including copy machine and facsimile machine maintenance and comparable to standards provided for office employees of the Contractor. PRO spaces shall be cleaned and maintained during normal Government business hours. The Contractor shall provide a program/process for PRO personnel to report and follow up on needed maintenance and service.

3.1.1.2.14. Subcontractor Management Deliverables and Services.

3.1.1.2.14.1. Subcontractor Qualifications. The Contractor shall ensure that subcontractors selected to deliver products or services under this contract are suitably qualified, experienced and capable to meet the NAIS requirements. The Contractor shall actively manage the performance and quality of all work performed under subcontract.

3.1.1.2.14.2. Subcontractor Visits and Reviews. The Contractor shall invite Government contracting and technical representatives to participate in subcontractor visits and reviews. Attendance at these reviews or tests is optional on the part of the Government. Election of the Government representative(s) not to attend shall not constitute an excusable delay on the part of the Contractor.

3.1.1.2.14.3. Subcontractor Cost and Schedule Performance Data. The Contractor shall provide visibility of cost and schedule performance data for major subcontractors (defined as those performing work associated with this contract with value equal to or exceeding 10% of the Contractor's awarded contract value) in accordance with SOW Section 3.1.1.2.10.5 as part of the MSRs.

3.1.1.3. Systems Engineering Deliverables and Services.

3.1.1.3.1. Background. A detailed systems engineering process will be followed during the design, development and implementation of the NAIS. Formal reviews will be used to ensure that the system requirements are traceable and understood, the system design is technically sound, affordable, and supportable, and that the final design is thoroughly tested to meet the NAIS requirements.

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3.1.1.3.2. General. The Contractor shall perform systems engineering tasks, applying systems engineering disciplines and processes, and provide technical support for designing, developing, establishing and maintaining configuration control, integrating and testing the NAIS to comply with the requirements of the PSPEC and this SOW.

3.1.1.3.3. Systems Engineering Management Plan (CDRL 1.3.3). The Contractor shall draft, finalize and maintain a Systems Engineering Management Plan (SEMP) to reflect the technical planning, development and integration effort. The SEMP shall describe and govern the Contractor's integrated approach for transforming the technical systems concepts into reality and address technical program planning, systems engineering processes and specialized integration activities for the complete product realization, and technical evaluation for the NAIS. The SEMP shall also fully describe the systems engineering support, processes and procedures to be provided and followed post IOC in support of engineering change requests, technology refreshments and necessary system modifications to reach FOC.

The SEMP shall identify and tailor systems engineering processes, requirements and tasks from the ANSI/EIA-632-1999 standard to satisfy the NAIS requirements. The SEMP shall:

a. Describe how the various technical inputs are integrated and how multi-disciplinary teamwork will be ensured;

b. Present the methods, practices, and procedures used to manage and integrate the hardware, software, and specialty engineering activities into a structured systems engineering effort;

c. Describe the entire system design process and provide detail on the engineering, technical, support, and programmatic efforts for development and production; and

d. Detail the verification and validation process of technical solutions, how the DT&E and OT&E will be used in this process.

The Contractor shall recommend changes and amend the SEMP and systems engineering processes as necessary, and with the Contracting Officer's approval, to address issues or shortcomings identified through technical and program reviews.

3.1.1.3.4. Trade Studies and Technical Reports (CDRL 1.3.4). The Contractor shall perform trade studies to facilitate specific systems engineering tasks including technical and logistics design, Section 508 compliance, technical reviews, technology refreshment, engineering change proposals and Sector coverage designs. Trade studies shall include analyses such as cost estimation, risk analysis, technical feasibility, and system performance assessments to yield either stand-alone technical reports or as part of products required by the applicable CDRLs.

3.1.1.3.5. Technology Assessment, Insertion and Refreshment Deliverables and Services.

3.1.1.3.5.1. Technology Refreshment Process. The Contractor shall address the process of technology assessment and refreshment in the SEMP, including the Contractor/Government interface in executing these processes to ensure that Contractor-furnished subsystems or components will not become technologically obsolete.

3.1.1.3.5.2. Technology Refreshment Catalog. The Contractor shall maintain a technology refreshment catalog as part of the System Design Plan (SDP – see SOW Section 3.1.1.4.2) that identifies components at risk for technological obsolescence and outlines the Contractor's recommendations for incorporating technologically current components throughout the life of the system to sustain effectiveness and suitability of the system.

3.1.1.3.6. Configuration Management Deliverables and Services. Configuration Management (CM) is an integral part of the system engineering process. The USCG uses a configuration-based, maintenance driven, centralized supply approach to obtain life-cycle supportability.

3.1.1.3.6.1. Configuration Management Program. The Contractor shall establish and maintain a CM program for the NAIS that is integrated with the Contractor's systems engineering process, following the guidance contained in MIL-HDBK-61A and ANSI/EIA-649-A 2004 and in accordance with the NAIS Configuration Management Plan. The Contractor shall include all new and/or modified hardware, firmware, software and documentation, including GFE utilized in the system, resulting from this contract when designing and implementing CM for the NAIS. The Contractor's CM efforts shall include Configuration Identification, Configuration Control, Configuration Status Accounting (CSA), Configuration Verification, Configuration Audits, and Configuration Data Management for the duration of the contract. The Contractor's CM efforts shall address all services and functions of the NAIS and shall be managed at the sub-system or service level as necessary. The NAIS CM and CSA data shall be available to the Government and deployed as a component of the IPDE (see SOW Section 3.1.1.2.12.2).

3.1.1.3.6.2. Configuration Management Plan (CDRL 1.3.6.2). The Contractor shall draft, revise, maintain, and finalize a CMP to document the management and procedures for establishing and maintaining the NAIS hardware and software baseline configurations. The portions of the CMP covering software shall be in accordance with IEEE Standard 828-2005. The CMP shall describe the Contractor's CM organization and shall identify Contractor responsibilities in configuration planning, management, identification, control, status accounting, and verification and audit, to establish and maintain the functional, allocated,

development, and product baselines. The CMP shall describe how the Contractor will ensure subcontractor / vendor compliance with the CM requirements of the contract and the interface between the Government and the Contractor for engineering change proposals and approvals.

3.1.1.3.6.3. Increment 1 Components. The Contractor shall build on or incorporate into its CM processes and activities the Configuration Identification, Configuration Control, CSA, and Configuration Audits information of any components from Increment 1 utilized as part of the NAIS.

3.1.1.3.6.4. Configuration Identification. The Contractor shall establish a configuration identification process, as described in the CMP. During the identification of each Configuration Item (CI), the Contractor shall place the data under internal configuration control and shall maintain configuration status accounting information for each CI. The Contractor shall provide the Government with detailed information on CI identification procedures, processes, and numbering. The Contractor shall submit proposed CI to the Government for review and approval as part of the Allocated Baseline.

3.1.1.3.6.5. Configuration Status Accounting.

3.1.1.3.6.5.1. Conduct CSA. As part of the CM activities, the Contractor shall conduct CSA to capture and maintain the NAIS configuration information and ensure that current and historical configurations of the NAIS and the NAIS configuration information can be accurately determined throughout the performance period. The Contractor shall include the data collected and tracked for Government field generated Engineering Change Requests (ECRs) or System Change Requests into the CSA.

3.1.1.3.6.5.2. Recording CSA Tasks. CSA tasks shall be recorded in accordance with Table 7-3 of MIL-HDBK-61A and reported in Contractor's format.

3.1.1.3.6.5.3. CSA Establishment. The CSA system shall be established prior to the Critical Design Review (CDR), maintained during system implementation, continue through the production contract, and shall provide all necessary information for a complete, accurate and verified "as delivered" configuration baseline for the NAIS.

3.1.1.3.6.5.4. CSA Report (CDRL 1.3.6.5.4). The CSA system shall maintain change status for all Configuration Items and reflect the current system/equipment configuration and Engineering Change Proposal (ECP) approval and implementation status. The CSA database shall be a relational data structure documenting the configuration of the developmental, pre-product and product baselines, the configuration of the EDC, the SOC and each PSS, and approved revised versions of each of

these lists as they mature and change over the contract performance period. The CSA database shall be developed as a hierarchical configuration tree using International Specification S1000D so that it contains all configuration items that are part of the NAIS.

3.1.1.3.6.5.5. CSA On-site Validation. The Contractor shall conduct a 100% physical site validation on all CIs to ensure accuracy of information contained in the CSA database. The Contractor shall use validation aides generated from the CSA database.

3.1.1.3.6.5.6. CSA Accessibility. The CSA system shall be accessible to the Government through the Field Support Desk (FSD) website, described in SOW Section 3.1.1.5.2.10.2.1 and the IPDE.

3.1.1.3.6.6. Configuration Baselines.

3.1.1.3.6.6.1. Functional Baseline. The Functional Baseline (FBL) shall include the PSPEC; specific items or capabilities that the Contractor proposed and that are included in the contract; and, functional requirements derived and validated during the System Design Review. The FBL shall be documented as the System Requirements Specifications (SRS – see SOW Section 3.1.1.4.4) and shall be an exit criterion of the System Design Review (SDR). The FBL shall be established when the SRS deliverable has been approved by the Contracting Officer.

3.1.1.3.6.6.2. Allocated Baseline. The Allocated Baseline (ABL) formally breaks out the functional requirements identified in the FBL into more detailed functional requirements and interface characteristics that are allocated from those of the higher level CI or Computer Software Configuration Item (CSCI) for the system and major subsystems. The ABL shall represent the performance-oriented requirements from the FBL, how the Contractor allocates its design characteristics to these performance-oriented requirements, and the verification required to demonstrate achievement of those specified characteristics.

As a distinct and severable part of the System Design Document (see SOW Section 3.1.1.4.6), the Contractor shall develop an ABL, with a defined performance specification, for each CI. The performance specifications shall include functional characteristics, tests for demonstrating achievement of allocated functional requirements, and interface requirements with each interrelated CI. The development specifications shall include design constraints such as component standardization, use of inventory items, Integrated Logistics Support (ILS) requirements, development and operating environments, and guidance packages that govern system design. The Contractor shall document every

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CI/HWCI/CSCI of the NAIS. If the hardware or software CI is a COTS product, then only reference to the COTS specifications and/or manuals is required. The ABL shall be an exit criterion of the Preliminary Design Review (PDR) and shall be established when the ABL section of the SDD deliverable has been approved by the Contracting Officer.

3.1.1.3.6.6.3. Development Baseline. The Development Baseline (DBL) represents the approved "build to" Technical Data Package (TDP) for the NAIS. The TDP includes all the information that defines the configuration of the NAIS. The DBL may be established in whole or in phases, as a result of a detailed design review of the TDP by USCG personnel. The DBL shall be an exit criterion of Critical Design Review(s). When the Contracting Officer has approved a deliverable, its contents become part of the DBL. The DBL is established when all deliverables associated with the Critical Design Review, SOW Section 3.1.1.6.1.4, have been approved by the Contracting Officer.

3.1.1.3.6.6.4. Product Baseline. Formal approval by the Contracting Officer of the TDP specifications, all applicable TDP products, and satisfactory completion of the Physical Configuration Audits (PCA – see SOW Section 3.1.1.3.6.7.2), including correction of TDP or PCA defects, will result in establishment of the Product Baseline (PBL).

3.1.1.3.6.7. Configuration Audits.

3.1.1.3.6.7.1. Functional and Physical Configuration Audit Plan (CDRL 1.3.6.7.1). The Contractor shall develop, provide, and maintain a plan to conduct Functional Configuration Audit(s) (FCAs) and Physical Configuration Audit(s) (PCAs). The FCA is a formal examination of functional characteristics of the configuration items, or systems, to verify that the items have achieved the requirements specified in their functional and/or allocated configuration documentation. The PCA is a formal examination of the physical characteristics of each HWCI and to verify all the HWCIs and documentation including the drawings are consistent with each hardware installation.

3.1.1.3.6.7.2. Functional and Physical Configuration Audit Report (CDRL 1.3.6.7.2). Upon conclusion of the FCA(s) and each PCA, the Contractor shall develop and provide a report of all findings for all core capability and PSS and SCC equipment. All FCA and PCA discrepancies, if any, must be resolved and the audit repeated for all affected items. All discrepancies resulting from the PCA(s) must be resolved prior to acceptance of the installations by the Government. A PBL for the NAIS will be established upon approval of the core and IOC installation PCAs by the Government.

3.1.1.3.6.8. Configuration Control.

3.1.1.3.6.8.1. General. The Contractor shall control and maintain the NAIS configuration baseline(s) throughout the performance period and ensure they are current and correct. The Government has established an NAIS CCB that will review proposed configuration baseline changes and provide the Contracting Officer with a recommended disposition. The Contractor shall not change an established configuration baseline without an approved Engineering Change, or an approved Request for Deviation (RFD), issued by the Contracting Officer in the form of a contract change.

3.1.1.3.6.8.2. Engineering Change Proposal (CDRL 1.3.6.8.2).

3.1.1.3.6.8.2.1. Submit ECP. The Contractor shall propose changes to the configuration baseline, in response to an Engineering Change Request (ECR) from the Contracting Officer or on the Contractor's own initiative, by submitting an Engineering Change Proposal (ECP) in accordance with the provisions of Section H.10. ECPs are categorized into two classes defined in MIL-HDBK-61A.

3.1.1.3.6.8.2.2. Required ECP Information. For each ECP, the Contractor shall submit the information required by DI-CMAN-80639C.

3.1.1.3.6.8.2.3. Implementation of the Engineering Change. Upon approval from the CCB and at the direction of the Contracting Officer, in the form of a contract change, the Contractor shall implement the Engineering Change.

3.1.1.3.6.8.2.4. Notice of Revision. With each ECP, the Contractor shall submit a Notice of Revision (NOR) or Software Change Notice (SCN), as necessary, that defines the revisions to configuration documentation due to approval of the ECP.

3.1.1.3.6.8.3. Version Description. All changes, after the initial version of each CSCI identified in the system software is baselined, shall be classified as either Class I or Class II changes, consistent with the ECP categorization. These changes shall be listed as such in the version description for every release of the CSCI. The version description shall identify all changes to the software source and object code for all active versions and be provided as an update to the System Product Specification (see SOW Section 3.1.1.4.10.3).

3.1.1.3.6.8.4. Engineering Change Request.

3.1.1.3.6.8.4.1. **ECR Proposals**. The Government may propose changes to the configuration baseline by submitting Engineering Change Requests (ECRs) to the CCB. Upon approval by the CCB, the Contracting Officer will solicit from the Contractor an ECP, based on the ECR, to implement the proposed change. The Contractor shall develop the ECP per SOW Section 3.1.1.3.6.8.2. The CCB will review and consider the Contractor's ECP and upon approval, and at the direction of the Contracting Officer in the form of a contract change, the Contractor shall implement the engineering change.

3.1.1.3.6.8.4.2. **ECR Tracking**. The Contractor shall provide a system for Government Field Personnel to submit and track the status of an ECR. The process shall be provided through the Field Support Desk (FSD) website (SOW Section 3.1.1.5.2.10.2.1), accessible from the IPDE, and allow for the linking of ECR information to the appropriate configuration items contained within the IPDE. The process shall be capable of collecting information similar to that required for an ECP as noted in MIL-HDBK-61A, although, because field personnel may not have all appropriate information or a recommended solution, the process shall collect information the originator can provide to address the concern or idea. The FSD shall forward notice of the submitted ECR by email to the chain of command reviewer specified by the originator, or the CM Manager (as identified by the Contracting Officer) if no reviewer is specified or an undeliverable reviewer e-mail address is specified.

3.1.1.3.6.8.4.3. **ECR Review**. The Contractor shall provide a process for review and endorsement of an ECR by the user. The process shall be capable of capturing information similar to that required for an ECP as noted in MIL-HDBK-61A, although, because review personnel may not have all appropriate information or a recommended solution, the process shall collect information the reviewer provides to address the concern or idea. The process shall forward notice of the submitted ECR by email to the next chain of command reviewer specified, or the CM Manager (as identified by the Contracting Officer) if no reviewer is specified or an undeliverable reviewer e-mail address is specified.

3.1.1.3.6.8.4.4. **Notification**. The ECR input and review processes shall generate a date/time stamped e-mail notifying the next reviewer or the CM Manager of a pending ECR and provide an http link back to the FSD for the reviewer to complete his or her review. The reviewer shall be able to endorse or not endorse the ECR, provide comments, attach files, and provide the e-mail addresses of the next reviewer and any info-copy recipients that the reviewer determines appropriate.

3.1.1.3.6.8.4.5. Comments. Submission of ECRs and their reviewers' comments and attached information shall be recorded and reported in an online status tracking report, so that anyone with appropriate FSD website access can view the status of ECRs submitted.

3.1.1.3.6.8.5. Request for Deviation (CDRL 1.3.6.8.5). The Contractor may propose deviations from a particular requirement of an item's configuration baseline documentation, for a specific PSS or number of PSSs, or for a specific period of time, by submitting a Request for Deviation (RFD). An RFD differs from an engineering change because it does not require a change to the configuration baseline document but merely documents the authority for the specified PSSs, and their configuration documentation, to differ from that baseline document. RFDs submitted by the Contractor without a corresponding request from the Government are not subject to bid and proposal costs. An RFD shall identify the affected item(s), provided a detailed description of the difference between the configuration of the item and the configuration baseline document, provide justification for the deviation, provide a discussion of the consequences of approval, to include technical details explaining the degree of non-compliance and the effects on PSS equipment or system operation constraints, and describe how the deviation will be documented in the PSS configuration documentation. The CCB will review RFDs and provide a recommended disposition to the Contracting Officer. Upon approval from the CCB, and at the direction of the Contracting Officer in the form of a contract change, the Contractor shall implement the RFD.

RFDs are categorized in three classes:

a. **Critical**. Critical RFDs are intended to prevent an unsafe or hazardous condition. Critical RFDs are not authorized for this contract. Proposed changes of this nature shall be submitted as Class 1 ECPs and flagged for emergency review.

b. **Major**. Major RFDs are appropriate for departures from the configuration baseline documents involving: Performance**,** Interchangeability, reliability, survivability, maintainability, or durability of the item or its repair parts; Effective use or operation**;** Size, power load or cooling load; or when the configuration documentation defining the requirements for the item classifies defects in requirements and the deviations consist of a departure from a requirement classified as a major.

c. **Minor**. Minor RFDs are appropriate for departures from the configuration baseline documents involving factors not listed as critical or major.

3.1.1.3.7. Information Assurance Deliverables and Services. The Contractor shall design and implement the NAIS in compliance with the security requirements contained in this SOW and the PSPEC. The Contractor shall develop and implement an information assurance strategy consistent with the Contractor's Information Assurance Plan and produce evidence, as part of the required software products, that the security strategy has been carried out.

3.1.1.3.7.1. Information Assurance Plan (CDRL 1.3.7.1). The Contractor shall draft, maintain, finalize and implement an Information Assurance Plan (IAP). Within the IAP, The Contractor shall identify, as security-critical, those core items (hardware, software, or business process) whose failure could lead to a breach of system security. For each risk identified, the Contractor shall develop an information assurance strategy to ensure that the requirements, design, implementation, and operating procedures for the identified product minimize or eliminate the potential for breaches of system security. The Contractor shall record the strategy and the plan for achieving certification and accreditation of the NAIS in the IAP.

3.1.1.3.7.2. Federal Information Security Management Act Compliance.

3.1.1.3.7.2.1. General. The NAIS is categorized as a Sensitive but Unclassified (SBU) system. The Government has contracted with a third party (Certification and Accreditation (C&A) Agent (CA)) to support the NAIS Project Office in executing NIST SP 800-37 C&A work. The current CGDN+ will be migrating to DHS OneNet but may not be fully integrated until after 2010. The Contractor shall assist and cooperate with the Government CA in obtaining C&A for the NAIS, as specified in the remainder of this section.

3.1.1.3.7.2.2. Security in a Net-Centric Environment. The Contractor shall design and implement the system to operate in a net-centric environment that provides restricted access to the NAIS data sources and applications and supports information exchange across multiple security domains and networks. The Contractor shall design a system that handles all sensitive information in a manner such that it can be certified and accredited in accordance with the guidelines and policy contained in COMDTINST 5230.67, COMDTINST M5500.13B, and DHS 4300A.

3.1.1.3.7.2.3. Certification and Accreditation Support. The Contractor shall provide all supporting documentation necessary for the Government Certification Agent (CA) to successfully execute the NIST SP 800-37

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C&A process; this documentation shall consist of all or a subset of all contract CDRL deliverables, as identified by the CA, which describe the NAIS and its environment. The Contractor shall also correct any materiel or documentation discrepancies identified by the Government CA as necessary to support NAIS C&A efforts, DHS Enterprise Architecture Center of Excellence requirements, and the USCG System Development Life Cycle (SDLC) process defined in COMDTINST 5230.66. Corrections of said discrepancies shall include periodic re-certifications and re-accreditations as required under FISMA, DHS MD 4300.1, and DHS 4300A.

3.1.1.3.7.2.4. Information Assurance Controls. The Contractor shall include security as an integral element in the management of this contract. The Contractor shall implement all network information assurance controls that are required for FISMA compliance, as outlined in the applicable National Institute of Standards and Technology (NIST) Special Publications and Federal Information Processing Standards.

3.1.1.3.7.2.4.1. Conduct Security Reviews. The Contractor shall conduct reviews and report the status of the implementation and enforcement of the security requirements contained in this contract and identified references. The Government may elect to conduct periodic reviews to ensure that the security requirements contained in this contract are being implemented and enforced. The Contractor shall afford DHS, including the Office of Inspector General, USCG ISSM, and other government oversight organizations, access to the Contractor's and subcontractors' facilities, installations, operations, documentation, databases, and personnel used in the performance of this contract. Access shall be provided to the extent necessary for the government to carry out a program of inspection, investigation, and audit to safeguard against threats and hazards to the integrity, availability, and confidentiality of DHS/USCG data or the function of computer systems operated on behalf of DHS/USCG, and to preserve evidence of computer crime.

3.1.1.3.7.2.4.2. Compliance with Security Standards. All services, hardware and software provided under this task order shall be compliant with DHS Information Security Policy, identified in MD4300.1, Information Technology Systems Security Program and 4300A Sensitive Systems Policy and Handbook.

3.1.1.3.7.2.4.3. IT Systems Interconnections. Interconnections between DHS and non-DHS IT systems shall be established through controlled interfaces and via approved service providers. The controlled interfaces shall be accredited at the highest security level of

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information on the network. Connections with other Federal agencies shall be documented based on interagency agreements, memoranda of understanding, service level agreements or interconnect service agreements.

3.1.1.3.8. Increment 1 to Increment 2 Transition Planning.

3.1.1.3.8.1. Background. The NAIS I-1 capability will be fully fielded and operational at the time NAIS I-2 contract award. The full operational I-1 capability has been designed and is being supported and monitored to provide an A_o of 96%. While individual I-1 sites can be off-line for several hours in a month (approximately 12 hours), central elements of I-1, such as the central processing and storage system at USCG Operations Systems Center (OSC) and the Systems Operation Center (SOC), must maintain an A_o of over 99%.

3.1.1.3.8.2. I-1 to I-2 Operational Transition Plan (CDRL 1.3.8.2). The Contractor shall draft, revise, maintain, and finalize an Operational Transition Plan to address the transition from I-1 to I-2 equipment and operational capabilities at the SOC, EDC, SCCs, and field sites. The Contractor shall address how the 96% operational availability requirement for AIS receive capability, as determined by the SOC, will continue to be met as I-2 is implemented. The plan shall include processes and procedures for transitioning between I-1 AIS assets, if they exist, in the I-2 deployment area, to the new I-2 assets, and for establishing the I-2 SOC and EDC functionality for the new assets without detriment to operational availability.

3.1.1.4. Detailed Technical Design.

3.1.1.4.1. Background. The system design serves to document and communicate to the Government the Contractor's decisions regarding how its design will meet the functional, physical, interface, data, logistics, support, workforce and other requirements, and how Government operations may be affected. To meet these objectives, the Contractor will be responsible for 1) developing a plan to design the system, 2) refining and detailing system requirements, 3) conducting periodic reviews during the design process, and 4) developing engineering analyses, models and tests to refine the system design.

3.1.1.4.2. System Design Plan (CDRL 1.4.2). The Contractor shall draft, revise, maintain, and finalize a System Design Plan (SDP) for designing, developing, integrating and testing all NAIS sub-systems, components and services (e.g., Network Service, Communication, Storage, External Services, Management Services, Users/Providers and Operators) as described in the PSPEC. The Contractor shall conduct system component design, development and integration in accordance with the Government-approved SDP. The SDP shall also contain the Software Development and Integration Plan (see SOW Section 3.1.1.4.3) and a Technology

Refreshment Catalog (see SOW Section 3.1.1.3.5.2). The initial SDP shall be reviewed at System Design Review (SDR – see SOW Section 3.1.1.6.1.2). The Contractor shall refine the SDP throughout the project lifecycle and shall present refinements to this plan at each subsequent design review for Government review and approval.

3.1.1.4.3. Software Development and Integration Plan. As an element of the SDP, the Contractor shall draft, revise, maintain and finalize a Software Development and Integration Plan (SDIP), which defines and describes specifics of the Contractor's software development efforts, including development of new software, the incorporation of commercially available software and the reuse of existing software products. The SDIP shall describe how the Contractor plans to develop and integrate highly modular, loosely coupled software components, and shall specify how COTS, GOTS, and developmental items communicate with or serve external users and systems via Service-Oriented Architecture infrastructure. The level of detail in the SDIP shall be sufficient to define all software development processes, activities and tasks to be conducted. Information provided must include, as a minimum, specific standards, methods, tools, actions, strategies and responsibilities associated with development and qualification. The SDIP shall also provide procedures to ensure that software and software revisions are managed under CM control. The Contractor shall conduct system component software development and component integration in accordance with the Government-approved SDIP. The SDP and SDIP shall include or address all software development life-cycle phases, documents, and other work products for the design, development and testing, and implementation SDLC phases specified in COMDTINST 5230.66.

3.1.1.4.4. System Requirements Specification (CDRL 1.4.4). The Contractor shall draft, revise, maintain and finalize the System Requirements Specification (SRS), detailing the system operational, functional, qualification, interface and integration requirements that are derived from the PSPEC and SOW. The SRS shall refine and further detail system requirements, as well as the system architecture, functional, interoperability, interface characteristics, design and expected performance constraints derived from the PSPEC. The Contractor shall implement formal configuration control beginning with the establishment of the approved SRS. The SRS shall include the Requirements Traceability Matrix (see SOW Section 3.1.1.4.5) and Requirements Verification Matrix (see SOW Section 3.1.1.8.2.2) and shall be developed and maintained in Telelogic DOORS™. The SRS shall be considered the functional baseline (FBL) for the NAIS once approved as part of the exit criteria from the System Design Review (SDR). Throughout the system development life cycle, the Contractor shall update the RVM by expanding upon the verification method to reference test plans and procedures for each requirement.

Updates to the SRS shall be reviewed and approved by the Government at each subsequent technical review (SOW Section 3.1.1.6).

3.1.1.4.5. Requirements Traceability Matrix. As an element of the System Requirements Specification (see SOW Section 3.1.1.4.4), the Contractor shall draft, revise and finalize a Requirements Traceability Matrix (RTM) to provide clear traceability from each requirement of the PSPEC and SOW to the functional capability to be provided by the Contractor's design. The Contractor shall develop and maintain the RTM in Telelogic DOORS™ such that the Contractor's traceability data can be merged with the project's requirements repository.

3.1.1.4.6. System Design Document (CDRL 1.4.6). The Contractor shall draft, revise, maintain and finalize a System Design Document (SDD) for the NAIS. The SDD will be a compilation of the design and analysis efforts performed in accordance with Detailed Technical Design section of this SOW. The work descriptions that follow are intended to clarify the level of detail and types of information that must be included in the SDD.

The Contractor shall extend and refine its system solution to encompass the complete system requirements functional baseline defined by the System Requirements Specification (see SOW Section 3.1.1.4.4). The SDD shall further refine the Contractor's design plan by: a) clearly indicating COTS hardware and software utilized in the design, b) including a gap analysis identifying PSPEC requirements not met in their entirety by COTS components, and c) the Contractor's plan for resolving these gaps through the configuration, development and integration of custom system elements. For each system configuration item, the Contractor shall provide an alternatives analysis of potential solutions (Government off-the-shelf (GOTS)/COTS, modified GOTS/COTS, development). Analyses shall document total life-cycle cost, risk, performance, technical feasibility, software size information, re-use estimates (including interoperability with external systems, intra-operability with other NAIS components, upgradeability and re-configurability without large-scale redesign, transportability to other systems, and long-term supportability), and rationale for estimations. The Contractor shall also recommend a solution for each design element and, based on the alternatives analyses, provide justification for each recommendation.

The Contractor shall update the SDD throughout the design phase and shall present the updates at each technical review (SOW Section 3.1.1.6) for Government review and approval. With each successive iteration of the SDD, the Contractor shall maintain traceability of all design elements to the PSPEC. Furthermore, the performance, design and test requirements shall be traceable through each level of specificity. Non-Developmental Item (NDI)/COTS requirements are to be fully developed in these specifications and shall be of sufficient detail to permit design, eventual production and evaluation of each item. All specifications shall be kept current for the duration of the contract and maintained as part of the SDD. The SDD shall specify that unique items (including "glue-code," "middle-ware," or support elements, as well as NAIS-specific adaptor- and wrapper-code) developed during the software development process are Government property. These items shall be delivered to the Government upon completion of the software development process. The Contractor shall use

USCG and DHS SDLC guidance, IEEE 12207, and other "industry best-practices" in developing this documentation; while MIL-STD-961E shall provide guidance as to required content and procedures for different types of specifications and specification-like documents. Once approved, via the technical reviews (see SOW Section 3.1.1.6), the SDD shall be considered the "build-to" blueprint for NAIS and will become the finalized allocated baseline (ABL). The ABL will be maintained and controlled by the Government. The SDD shall contain the type approval certificate for each system component as required by the PSPEC. The SDD schematics and drawings shall be used as the foundation for "as-built" drawings required under SOW Section 3.1.1.5.5.6.

3.1.1.4.7. System Modeling, Simulation and Analysis.

3.1.1.4.7.1. General. The Contractor shall conduct modeling, simulation, and analyses as part of the NAIS design process. The Contractor shall provide results of modeling and analyses efforts during technical reviews, and document the findings as part of the SDD (see SOW Section 3.1.1.4.6). System and software architectural, functional, behavioral and data models shall be developed and maintained in Telelogic System Architect™ v.10.4 (or later).

3.1.1.4.7.2. RF Propagation Analysis. The Contractor shall develop an analysis that clearly demonstrates to the Government that probable environmental conditions have been incorporated into the Contractor's design. RF propagation analysis shall not depend upon any tropospheric or weather conditions to extend the radio horizon, increase coverage or improve propagation in order to meet PSPEC coverage requirements. This analysis shall be included as an appendix to the SDD and shall be utilized in developing the Master Test Plan (see SOW Section 3.1.1.8.2.1).

3.1.1.4.7.3. Privacy Act Compliance Analysis. The Government has assessed, based on the system requirements and current AIS standards, that the NAIS will not collect, store or manipulate personally identifiable information (PII). The Contractor shall design and implement the NAIS in compliance with applicable areas of COMDTINST M5260.3. Should the NAIS requirements or standards evolve to include PII information, the Contractor shall comply with Privacy Act (5 U.S.C. 552a) requirements in system engineering changes to the system design and implementation elements and comply with all applicable guidance provided by DHS and USCG Privacy Offices.

3.1.1.4.7.4. Section 508 Compliance. All Electronic and Information Technology deliverables within this work statement shall comply with the applicable technical and functional performance criteria of Section 508 (29 U.S.C. 794d) of the Rehabilitation Act and the provisions of Section H.16. The Contractor shall be responsible for preparing all Section 508 analyses for all regulated products

proposed as part of the system. Section 508 analyses must be delivered with the SDD (see SOW Section 3.1.1.4.6).

3.1.1.4.8. Modular Open Systems and Services Oriented Approach.

3.1.1.4.8.1. Use of Modular Open Systems and Services Oriented Approach. The Contractor shall use a modular open systems and services oriented approach, documented in the SEMP, and detailed in the SDP, to facilitate the implementation of a modular, services oriented design for the NAIS. A primary consideration in the selection of equipment and software to meet the NAIS required functionality shall be to preserve the overall modular open system services oriented architecture. For example, a COTS system that meets a significant amount of the NAIS performance requirements, but is dependent on a specific user interface module, because it is tightly coupled to (hard coded or embedded within) the other modules of the system to realize the system functionality, is not an acceptable design for the NAIS and shall not be employed by the Contractor. Third party supportability, interoperability, and scalability in a modular, open systems approach shall be major factors in the Contractor's final selection of equipment and integration approach. All the NAIS components shall readily accommodate future upgrades and facilitate the Government's support philosophy for the NAIS (SOW Section 3.1.1.5.1.3), and permit incremental technology insertion to allow for incorporation of additional or higher performance elements with minimal impact on the existing systems. The Contractor shall perform or witness and verify requisite testing to ensure conformance to open system interface standards.

3.1.1.4.8.2. Technology Insertion Methodology. The NAIS design shall provide a viable (e.g., cost effective and minimally disruptive to the overall system) technology insertion methodology and refresh strategy that supports application of a modular open systems architecture and is responsive to changes driven by mission requirements, new technologies and/or new functional requirements. The Contractor shall develop a detailed modular design and integrate that design to allow, at a minimum, for the following: interoperability, intra-operability, upgradeability and re-configurability without large-scale redesign, transportability, long-term supportability without dependence on closed or proprietary interface standards, multiple sources of supply and/or repair.

3.1.1.4.8.3. Proprietary Design Information. For those components of hardware, firmware, or software that include proprietary information, the Contractor shall demonstrate (via analyses or testing) that these components are modular and replaceable. The Contractor shall provide sufficient interface information to completely document the inputs, behavior, transformations, outputs, error conditions and error handling to enable long-term support of the system. As part of the SDD, the Contractor shall clearly identify any system modules, components, subcomponents, hardware and software that have proprietary

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characteristics and note any issues with the interchangeability or interoperability with other systems or components. The Contractor shall provide a planned approach in the SDP (SDIP) to address migration of proprietary characteristics of such system modules, components, subcomponents, hardware and software to non-proprietary forms to be executed through the system design and implementation process.

3.1.1.4.8.4. Data Rights. All system modules, components, subcomponents, hardware and software items, including existing software modifications or integration software, 'glue code,' 'wrappers' and 'adaptors', developed under this contract shall be delivered to the Government with full data and usage rights. The Contractor shall provide the Government all design documentation throughout the design review process. The Contractor shall establish and maintain a process that shall provide disclosure to third party developers and maintainers via non-restrictive and readily available means. As part of the SDP and SDD, the Contractor shall acknowledge and clearly confirm how the core NAIS design can be used by the Government in a separate competed contract to deploy PSSs and SCC capability to achieve fully integrated nationwide coverage post-IOC implementation.

3.1.1.4.9. Additional Component Design Requirements. The Contractor shall design, develop, integrate and test all NAIS components in accordance with the PSPEC. The following subsections amplify the PSPEC design requirements for several of the main components and common services network as described in the PSPEC by identifying Contractor work specific to each of these main components. The specific requirements established in the following sections shall be incorporated in the Contractor's design and presented, evaluated and accepted through the systems engineering technical review process.

3.1.1.4.9.1. Physical Shore Station and Logical Shore Station. The Contractor shall design the NAIS PSS and LSS with multiple configurations so that it may accommodate maximum use of existing and planned government infrastructure and existing AIS capability (e.g., NAIS I-1, Rescue 21, Vessel Traffic Services [VTS], etc.). Necessary adjustments (i.e. configuration versions established) to this 'standard' design or configuration shall be made, documented and tested to accommodate the use of or integration with existing infrastructure facilities as necessary to fully deploy NAIS to achieve Full Operational Capability (FOC) requirements. A listing of existing Coast Guard owned or leased Radio Frequency sites is provided as part of the Technical Library.

3.1.1.4.9.2. Storage. The centralized storage solution for NAIS will be located at the USCG Enterprise Data Center (EDC) at the Operations Systems Center (OSC) in Martinsburg, WV. Included as part of the Technical Library, is a general overview and description of the current functions and capabilities of the OSC for I-1 of the NAIS. Attachment J.9 provides the design constraints related to

hosting the NAIS Increment 2 central storage solution at the OSC EDC. The Contractor shall assist the Government in the preparation and execution of a Memorandum of Understanding between the NAIS Project Office and OSC for the hosting and support of the NAIS central storage solution (and any other system components the Contractor designs for this operational node). The Contractor shall design the NAIS storage to be compatible and compliant with the design constraints and hosting requirements of the OSC. The Contractor shall draft, revise, and finalize the NAIS storage design for Government acceptance and implementation.

3.1.1.4.9.3. Software Development Kit (CDRL 1.4.9.3). To support the SOA implementation of External Services described in the PSPEC, the Contractor shall develop, maintain and deliver a Software Development Kit (SDK) that describes the NAIS SOA and how to develop or configure external systems to access data via the NAIS SOA. The Contractor shall also furnish system engineer developer's instructions that provide a comprehensive overview of the NAIS SOA and provide specific procedures for developing interfaces between the NAIS and C4&IT systems to take advantage of the NAIS external services.

3.1.1.4.9.4. Human System Interface. In addition to providing HSI functionality defined in the PSPEC, the NAIS shall be designed and implemented in a services oriented and modular open system architecture with clearly defined interfaces such that other (both present and future) user interface applications can interface with the NAIS and be capable of utilizing the full functionality of the NAIS.

3.1.1.4.9.4.1. COTS User Interface. If the Contractor proposes to use a COTS product that includes or is dependent on a COTS user interface for system functionality, the Contractor shall design, develop and test the user interface to be de-coupled from the remainder of the system such that any other user interface application in a services oriented architecture construct can successfully utilize the full functionality of the NAIS. This capability shall be demonstrated by the Contractor during the technical reviews and developmental test and evaluation. To this end, the Contractor shall, when requested by the Government, provide the SOA compliant COTS user interface and documentation to the SCCs. The Contractor shall address the HSI design in the NAIS SDP and SDD**.**

3.1.1.4.9.4.2. System Operations Center User Interface. The Contractor shall develop and configure the NAIS HSI for the SOC such that it provides the functionality and capabilities required in the PSPEC. Unless the Contractor can demonstrate technical and Total Ownership Cost benefits to the Government, the Contractor shall integrate the SOC HSI with existing system operation tool suites currently implemented at the Coast Guard. This capability shall be demonstrated by the Contractor during the

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technical reviews and developmental test and evaluation. The Contractor shall address the SOC User Interface design in the NAIS SDP and SDD**.**

3.1.1.4.9.4.3. Sector Command Center User Interface. The Contractor shall develop and configure the NAIS HSI for the SCC such that it provides the functionality and capabilities required in the PSPEC. The SCC HSI shall be implemented at C2Cen in a test environment. Deployment of the SCC HSI to the SCCs will be dictated by the availability of other HSIs to access NAIS LSS and other enterprise services. This capability shall be demonstrated by the Contractor during the technical reviews and developmental test and evaluation. The Contractor shall address the SCC HSI design in the NAIS SDP and SDD**.**

3.1.1.4.9.4.4. Provisioning of Enterprise Services. The Contractor shall provide the SOA infrastructure design for the Government required support of the NAIS. This SOA infrastructure must meet all PSPEC requirements as well as comply with the existing and planned DHS and USCG enterprise architecture. The Contractor shall coordinate the design of the SOA infrastructure with the Government.

3.1.1.4.9.5. AIS System Management.

3.1.1.4.9.5.1. Background. The SOC is expected to be located at NAVCEN in Alexandria, VA. NAVCEN currently serves as the SOC for I-1 of the NAIS. Attachment J.9 provides the design constraints related to the SOC at NAVCEN.

3.1.1.4.9.5.2. I-1 SOC Analysis. The Contractor shall analyze the I-1 SOC requirements, capabilities, facilities and constraints associated with NAVCEN. The Contractor shall assess I-1 SOC capability for its suitability for meeting this SOW and the PSPEC, relative to other COTS solutions. The Contractor shall identify what functionality available through the I-1 SOC is not available with the proposed solution and highlight any gaps that exist between the two. The analysis and the subsequent technical, logistics and data design elements shall be presented, evaluated and finalized through the Systems Engineering technical review process and documented in the SDD (see SOW Section 3.1.1.4.6).

3.1.1.4.9.5.3. AIS System Management Requirements. The Contractor shall design a system management service that provides the capability to manage NAIS operations in accordance with the PSPEC. The Contractor shall incorporate the system administration service capability design in the NAIS SDD**.** If not provided in a COTS solution, the Contractor shall provide a Total life-cycle cost analysis as an appendix to the SDD to justify the use of developmental software. With Government approval of the design and

life-cycle cost analysis, the Contractor shall develop software to provide needed system management functionality.

3.1.1.4.9.6. Network Connectivity Agreements. If a PSS without OneNet or CGDN+ connectivity is recommended to provide AIS coverage for a Sector under the process developed in SOW Section 3.1.2.2.1, the Contractor shall engineer options for network connectivity from PSS to OneNet or CGDN+ network infrastructure ("last-mile" connectivity) that meet all of the NAIS system requirements (see Attachment J.9 for information on CGDN+ and OneNet). The Contractor shall assist in preparation and execution of appropriate connectivity agreements such as Interconnect Systems Agreement, Telecommunication Service Request, OneNet Service Request, Memorandum of Agreement/Understanding, and other documents as necessary for PSS site selection per SOW Section 3.1.2.2.1. The Contractor shall be responsible for designing, implementing, operating, managing, securing, and documenting all of the NAIS Local-Area Network (LAN) infrastructures. The Contractor shall assist and cooperate with Government operated and managed Network Operations Center (NOC) and the DHS SOC to protect the Government network infrastructure and other assets. The boundary for government network infrastructure shall begin and end at the Wide Area Network (WAN) routers within the existing CGDN+ / OneNet networks.

3.1.1.4.9.7. Other Design Elements.

3.1.1.4.9.7.1. Interface for Increment 1 Data. The Contractor shall design an interface to integrate I-1 data into the I-2 core system for the data processing, storage, and retrieval functionality using the EDC.

3.1.1.4.10. Software Engineering.

3.1.1.4.10.1. Software Design. The Contractor shall plan, design, code, test, integrate, support, and deliver the computer applications necessary to meet the requirements of this contract and in compliance with the Government approved SDP. The software development process used for this contract shall adhere to the most recent IEEE/EIA 12207 standard as applied at a minimum Software Engineering Institute CMMI-DEV v1.2, Level 3. Existing COTS or NDI software may be used intact, as long as it is compatible with the architecture and meets the NAIS requirements. Software simulations, code, tools, devices and associated documents developed by the Contractor in support of the NAIS development, integration and testing shall be delivered to the Government on the IPDE (firmware is considered software and should be treated accordingly in development efforts). The Contractor shall provide software source code and full rights to this code on all developed software. Software configuration shall be maintained in accordance with CM requirements of this SOW (with the exception that re-used software from a system fielded after IOC will be placed

under formal configuration management after the Preliminary Design Review (PDR)).

3.1.1.4.10.2. COTS Software.

3.1.1.4.10.2.1. Enterprise Data Center – Primary Facility at OSC. The Contractor shall provide to the Government all necessary COTS based software products for the primary EDC facility at OSC, along with supporting documentation and all required licenses. This software shall include all COTS software incorporated into the baseline(s). The Contractor shall ensure interoperability of such software and shall document any interdependencies. All licensing requirements/restrictions and interdependencies shall be documented in the System Product Specification (SPS – see SOW Section 3.1.1.4.10.3). Supporting documentation shall include delivered software licenses necessary to provide full functionality capabilities and support full nationwide implementation and life-cycle support/maintenance by the Government and/or third party agents.

3.1.1.4.10.2.2. Enterprise Data Center – At Backup Facility TBD. The Contractor shall provide to the Government all necessary COTS based software products for the backup EDC facility at yet unknown location (see Attachment J.9, Enclosure 1), along with supporting documentation and all required licenses. This software shall include all COTS software incorporated into the baseline(s). The Contractor shall ensure interoperability of such software and shall document any interdependencies. All licensing requirements/restrictions and interdependencies shall be documented in the System Product Specification (SPS – see SOW Section 3.1.1.4.10.3). Supporting documentation shall include delivered software licenses necessary to provide full functionality capabilities and support full nationwide implementation and life-cycle support/maintenance by the Government and/or third party agents.

3.1.1.4.10.2.3. Systems Operations Center – Primary Facility at NAVCEN. The Contractor shall provide to the Government all necessary COTS based software products for the primary SOC at NAVCEN, along with supporting documentation and all required licenses. This software shall include all COTS software incorporated into the baseline(s). The Contractor shall ensure interoperability of such software and shall document any interdependencies. All licensing requirements/restrictions and interdependencies shall be documented in the System Product Specification (SPS – see SOW Section 3.1.1.4.10.3). Supporting documentation shall include delivered software licenses necessary to provide full functionality capabilities and support full nationwide

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implementation and life-cycle support/maintenance by the Government and/or third party agents.

3.1.1.4.10.2.4. Systems Operations Center – Backup Facility at C2CEN. The Contractor shall provide to the Government all necessary COTS based software products for the backup SOC location, along with supporting documentation and all required licenses. This software shall include all COTS software incorporated into the baseline(s). The Contractor shall ensure interoperability of such software and shall document any interdependencies. All licensing requirements/restrictions and interdependencies shall be documented in the System Product Specification (SPS – see SOW Section 3.1.1.4.10.3). Supporting documentation shall include delivered software licenses necessary to provide full functionality capabilities and support full nationwide implementation and life-cycle support/maintenance by the Government and/or third party agents.

3.1.1.4.10.2.5. C2CEN – USCG System Support Agent. The Contractor shall provide to the Government all necessary COTS based software products for the core capability defined at C2CEN, along with supporting documentation and all required licenses. This software shall include all COTS software incorporated into the baseline(s). The Contractor shall ensure interoperability of such software and shall document any interdependencies. All licensing requirements/restrictions and interdependencies shall be documented in the System Product Specification (SPS – see SOW Section 3.1.1.4.10.3). Supporting documentation shall include delivered software licenses necessary to provide full functionality capabilities and support full nationwide implementation and life-cycle support/maintenance by the Government and/or third party agents.

3.1.1.4.10.3. System Product Specification (CDRL 1.4.10.3). The Contractor shall maintain and deliver the System Product Specifications (SPS), which fully describes and documents the as-built implementation of the system release or version.

3.1.1.4.10.3.1. Design Information. The SPS shall document the as-built design information for each approved software product baseline.

3.1.1.4.10.3.2. Software Licensing. The SPS shall identify all software licensing requirements and any software usage restrictions. The Contractor shall deliver all required software licenses with the final software product.

3.1.1.4.10.3.3. Source Code. As part of the SPS, the Contractor shall deliver all developmental software source code, developed under this contract, as well as all software tools and utilities to the Government after successful

completion of functional qualifications testing of the developmental software.

3.1.1.5. Logistics Planning and Design.

3.1.1.5.1. General Logistics Requirements.

3.1.1.5.1.1. Contractor's Integrated Logistics Support. The Contractor shall provide, implement, support and maintain an overall integrated logistics design for the NAIS Increment 2 . The Contractor shall also ensure the supportability criteria and ILS elements are integrated into the NAIS design through the Contractor's systems engineering process.

3.1.1.5.1.2. Logistics Requirements. Logistics requirements include the following:

a. Develop a supportable and maintainable NAIS design within existing Coast Guard personnel constraints, minimizing maintenance requirements;

b. Integrate ILS considerations and tasks throughout the design process;

c. Participate in the NAIS Integrated Logistics Support Management Team (ILSMT);

d. Evaluate logistics impacts of engineering changes prior to submission to the Government;

e. Prepare periodic ILS and configuration status reports; and

f. Maintain configuration control of ILS/Configuration documentation.

3.1.1.5.1.3. Baseline Assumptions. The Contractor shall perform all ILS planning and design with consideration of the following baseline assumptions. The Contractor shall not deviate from the following baseline assumptions, unless approved by the Contracting Officer.

a. The NAIS is expected to be supported and maintained in a manner similar to other legacy USCG shore-side AIS and VHF radio systems (e.g., VTS and NAIS I-1) using a combination of Government and commercial support services.

b. The Contractor's NAIS design shall ensure that training requirements are minimized. Systems and equipment shall be capable of being maintained, operated, and repaired in the planned operational environment with minimal training.

c. NAIS shall use common and class standard equipment, such as electronics, and hardware/software. Other common equipment shall be used whenever possible to reduce training costs and time, increase workforce availability and on-the-job training (OJT), increase operational readiness/effectiveness, and reduce parts inventories. Comparison to legacy assets will be used in determining reductions and increases.

d. New Government training, supply and maintenance infrastructure requirements are expected to leverage existing Government infrastructure, processes and systems. New Government training, supply and maintenance infrastructure requirements should only require limited changes to accomplish the additional life-cycle support requirements for the NAIS.

e. The Government will provide personnel (may be Government or 3rd party Contractor support resources) for System Operations Center (SOC) manning and operation.

f. The Government will provide personnel (may be Government or 3rd party Contractor support resources) for Enterprise Data Center (EDC) centralized data storage operation and support.

g. The Government will provide personnel (may be Government or 3rd party Contractor support resources) for System Support Agent (SSA) and System Development Agent operation and support.

h. The system or equipment design shall be consistent with the desired human-system interface functions and compatible with the expected maintenance and operational concepts.

i. System life-cycle maintenance is expected to be provided through a combination of Organizational-Level (O-Level) and Depot-Level (D-Level) maintenance.

j. O-Level maintenance support will consist primarily of support provided through existing or enhanced Government support services. Examples of potential O-Level support services for the NAIS include, but are not limited to: (1) system monitoring and management provided by SOC watchstanders, (2) helpdesk services provided by NAVCEN watchstanders at the SOC or EDC, (3) life-cycle ILS management (i.e., System Support Agent or System Development Agent provided by USCG Command Control Engineering Center (C2CEN), and (4) system PSS maintenance provided by the Maintenance and Logistics Commands (MLCs) and USCG Electronics Support Units (ESUs). Necessary enhancements of O-Level support will be identified and quantified as part of the maintenance planning process.

k. D-Level maintenance support will consist primarily of maintenance support services required to maintain or repair sub-systems or components that are beyond the O-Level maintenance capability to repair. D-Level maintenance support will be provided via commercial services**,** either as an enhancement to existing USCG support services or new contracted support services.

l. The Contractor's NAIS design shall ensure that systems are easy to maintain. Ease of maintenance includes physical access with required tools, ease of removal and replacement of parts, visual access if required. Systems and equipment shall be designed so that they can be maintained in the least amount of time, at the lowest cost, and with a minimum effort and expenditure of support resources assessed during drawing reviews for access and verified during T&E activities. Systems and equipment shall be designed to require only common hand tools for maintenance unless specialized tools provide a significant advantage over common hand tools or where required by security considerations.

3.1.1.5.1.4. ILS Integrated Product Team. The Contractor shall host quarterly ILS IPT meetings in conjunction with the PMRs. Minutes shall be documented in accordance with CDRL 1.2.3.2. The ILS IPT meetings shall, at a minimum, cover the following topics:

a. Configuration Status Accounting;

b. Reliability, Maintainability and Availability;

c. Maintenance Planning;

d. Supply Support;

e. Provisioning Technical Documentation;

f. Outfitting and Spares;

g. Technical Data;

h. Equipment Technical Manuals;

i. System Information Books and Manuals;

j. Drawings;

k. Human Factors Engineering; and

l. Training and Training Support.

3.1.1.5.1.5. Iterative System Engineering. An iterative system engineering approach shall be used that will ensure the logistics data products are continually updated and reflect the configuration of the NAIS as designed and delivered. The Contractor shall ensure the ILS Program closely integrates with the Reliability, Maintainability and Availability (RMA) analysis, human performance factors, and other logistics processes (see SOW Section 3.1.1.5.1.6). In developing the ILS Program, all mission constraints, the availability profile, and the areas of operations shall be fully considered.

3.1.1.5.1.6. Integration with Logistics Processes. At each design review (see SOW Section 3.1.1.6.1), the Contractor shall present the planning factors, ILS design information, analysis and findings appropriate for that level of system design or subsystem to the Government for review and feedback. At the appropriate reviews, the Contractor shall present the Government with proposed, findings and recommendations for alternatives analyses regarding options for achieving ILS requirements. When conducting trade-off analysis, preference shall be given to the following considerations: labor and cost savings due to automated and self-diagnostic equipment; labor and cost savings due to modular replacement equipment (versus piece-part repair); labor and cost savings due to online or self-paced tutorial-style performance interventions.

3.1.1.5.1.7. Initial Support. Between the period of first site installation (as part of core system implementation) and the permanent Coast Guard Support Date (following deployment of the NAIS to achieve FOC coverage), the Government may use Contractor-provided logistics support to provide initial support of the system as defined in the Integrated Support Plan. During the initial support period, the Contractor has overall responsibility for scheduling, monitoring and performing preventative and corrective maintenance and repairs of all system components and support related functions (e.g., managing warranties) to meet the required operational availability. Assistance in coordinating maintenance will be provided, as appropriate, by Coast Guard Sectors, NAVCEN, ESUs, Integrated Support Commands, MLCs, other Government or commercial support organizations, and, at least initially, the NAIS Acquisition Project. During initial system support, the Contractor shall maintain a log of system maintenance records and equipment performance (e.g., A_o and reliability monitoring) of all system sub-systems and components and make this information available to the Government via the Field Support Desk (FSD) website (see SOW Section 3.1.1.5.2.10.2.1).

3.1.1.5.1.8. Integrated Support Plan (CDRL 1.5.1.8). The Contractor shall develop, maintain, and provide an Integrated Support Plan (ISP) reflecting all the elements listed below for design, development, integration, deployment and sustainment of the NAIS. The ISP shall detail for each ILS element how the

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Contractor will provide initial support of the system and shall also describe FSD set up and operations, warranty program administration, the provisioning program, sparing and shipping and handling for the NAIS. The ISP shall include the Provisioning Program Plan (SOW Section 3.1.1.5.4.2.1), Readiness-Based Sparing Recommendations (SOW Section 3.1.1.5.4.2.4), and management of Diminishing Manufacturing Sources/Materials Shortages (SOW Section 3.1.1.5.4.2.5). MIL-HDBK-502 and MIL-PRF-49506 shall be used as guides in the development of the ISP.

a. Maintenance Planning

b. Manpower and Personnel

c. Supply Support (including Diminishing Manufacturing Sources and Material Shortages (DMSMS) management procedures)

d. Technical Data

e. Support and Test Equipment

f. Training and Training Support

g. Computer Resources Support

h. Facilities

i. Packaging, Handling, Storage and Transportation

j. Design Interfaces

3.1.1.5.2. Maintenance Planning.

3.1.1.5.2.1. Maintenance Plan. As a section of the ISP, the Contractor shall develop a maintenance plan that will maintain Coast Guard equipment in the highest state of readiness, consistent with program goals, and ensures maximum effective use of resources. The Contractor's maintenance plan shall be integrated with the NAIS design, reliability and maintainability, failure modes and effects analysis, reliability centered maintenance analysis, (economic) level of repair analysis, corrective maintenance task analysis, manpower optimization, human performance factors, material selection, and other logistics processes. The NAIS shall be designed and constructed to minimize maintenance requirements. During the design phase, the Contractor shall consider and apply the principles of the Modular Open Systems Approach to effect optimized maintenance requirements. These requirements shall not supersede specific performance, design, construction, or warranty requirements.

3.1.1.5.2.2. New Equipment Maintenance Planning. As an element of the maintenance planning section contained in the ISP, the Contractor shall develop maintenance planning for newly developed equipment, for in-service equipment for which the support concept has been significantly changed, and for any commercial equipment for which organic logistics is expected. The Contractor shall document the new equipment maintenance requirements in the LMI for Maintenance Planning & Repair Analysis.

3.1.1.5.2.3. Reliability, Maintainability, and Availability Analysis (CDRL 1.5.2.3). The Contractor shall plan, prepare, conduct and maintain a Reliability, Maintainability and Availability (RMA) Analysis. The RMA analysis shall be performed using an appropriate RMA handbook as a guide, such as IEEE Std 1332-1998, SAE International JA 1000, or SAE International JA 1000/1. Additional guidance on the RMA process may be found in DoD 3235.1-H. The data developed during this RMA analysis shall be used to support the Reliability Centered Maintenance (RCM) analysis process (SOW Section 3.1.1.5.2.4). The RMA analysis development and findings will be reviewed at each design review.

3.1.1.5.2.4. Reliability Centered Maintenance.

3.1.1.5.2.4.1. Maintenance Requirements Package – Reliability Centered Maintenance (CDRL 1.5.2.4.1). The Contractor shall develop, maintain and provide maintenance requirements using Reliability Centered Maintenance (RCM) methodology in accordance with MIL-P-24534A NOT 1. The Contractor shall also document all information and decisions, to be reviewed as being developed at each design review. The Contractor shall, at a minimum, include operational and maintenance functions required for each LRU of the NAIS.

3.1.1.5.2.4.2. Maintenance Task Procedures. For each O-Level maintenance requirement identified, the Contractor shall develop maintenance task procedure deliverables 1-12 as defined by CDRL 1.5.2.4.1.

3.1.1.5.2.4.3. Maintenance Procedure Cards. The Contractor shall develop Maintenance Procedure Cards (MPCs) based on O-Level RCM recommendations and task analysis results in accordance with CDRL 1.5.2.4.1.

3.1.1.5.2.5. Corrective Maintenance. Corrective maintenance responds to failures that have occurred and restores the system to operational condition. Each assembly, subassembly, and component in the top-down breakdown structure

may have multiple tasks. For each maintenance task, the Contractor shall identify the following information:

a. Task frequency in terms of annual occurrences;
b. Task duration and maintenance burden;
c. Support and test equipment required;
d. Spare parts likely to be replaced during a repair task;
e. Performing personnel and level of maintenance;
f. Packaging, handling, storage and transportation (PHS&T) requirements;
g. Environmental impacts, including hazardous materials;
h. Facility requirements, if needed; and
i. Procedural steps.

3.1.1.5.2.6. Maintenance Planning Documentation. The Contractor shall develop maintenance planning documentation for newly developed equipment, for in-service equipment for which the support concept has been significantly changed, and for any commercial equipment for which organic logistics is expected. The Contractor shall document the results of the maintenance planning analysis in a supportability analysis database that conforms to MIL-PRF-49506.

3.1.1.5.2.7. Maintenance Task Analysis. The Contractor shall conduct maintenance task analysis to document both planned and corrective maintenance requirements for O-Level and D-Level maintenance, as defined by CDRL 1.5.2.4.1. The Contractor shall provide a Level of Repair Analysis (LORA) in accordance with DoD OPNAVINST 4410.2A and MIL-PRF-49506 to determine O-Level and D-Level maintenance tasks. Source, Maintenance and Recoverability codes shall be documented in the supportability analysis database, as part of the LORA.

Maintenance task analysis shall include the following:

a. Inspection and test tasks;
b. Remove and replace tasks;
c. Fault locate/fault isolate tasks to include the use of Built-in-Test/Built-in-Test-Equipment and;
d. Disassemble/reassemble tasks for depot-level overhaul.

3.1.1.5.2.8. Supportability Analysis. The NAIS Supportability Analysis review process shall be conducted in conjunction with the SDR, PDR, and CDR. For the SDR, the RCM review shall consist of the review of Failure Modes and Effects Analysis prior to advancing to Phase 5 of the RCM process. For the PDR, the RCM review shall consist of the review of Maintenance Requirements Index prior to advancing to Phase 9 of the RCM process. For the CDR, the

RCM review shall consist of the review and acceptance of MPCs and Supportability Analysis-based sparing recommendations.

3.1.1.5.2.9. Validation. The Contractor shall validate the information and procedures contained within the RCM through performance of operations and maintenance tasks. Validation requirements shall be coordinated with other system engineering tests and demonstrations, as applicable.

3.1.1.5.2.10. Field Support Desk Deliverables and Services.

3.1.1.5.2.10.1. Establish Field Support Desk. The Contractor shall establish a Field Support Desk (FSD) to coordinate and deliver assistance to the Government during the acquisition cycle of the NAIS. The FSD will serve as the central reporting point and clearing house for all support issues during the initial Contractor support period. The objective of the FSD is two fold: 1) to facilitate the aggregation and recording of user and support community issues, concerns and recommendations for improvement and/or possible engineering change requests; and 2) to coordinate prompt resolution of questions or problems with the NAIS system after acceptance, utilizing the most expeditious, cost effective means. The FSD services shall be structured to ensure effective communications between the Contractor and Government during the resolution of these questions or problems. At a minimum, the FSD shall consist of a World Wide Web site supplying access to information in the IPDE (see SOW Section 3.1.1.2.12.2) and a staffed telephone/fax response.

3.1.1.5.2.10.2. Field Support Desk Process. The FSD process shall consist of three primary levels of support, and a reporting system. The FSD process begins with the FSD website. The FSD website shall serve as the 'first stop' and primary access point for Government personnel to obtain supply and maintenance support, technical and RMA data, initiate potential warranty claims and log system performance concerns or suggestions for system improvement/changes. The Contractor shall recommend updates and changes to maintenance procedures based upon feedback received from end-users via the FSD. If the required support exceeds the scope of the phone/fax/email support,the request shall be referred to the PRO, along with a recommended plan of action, for review and authorization to continue support**.**

3.1.1.5.2.10.2.1. FSD Website. The Contractor shall provide and maintain a 24-7, 365 days/year accessible website to enable access to the FSD. Government interaction with the website shall be as defined for the IPDE in SOW Section 3.1.1.2.12.2. The website shall, at a minimum, include:

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a. Instructions on how to use the FSD;

b. A FAQ for issues including how to use the FSD, the Preventive Maintenance System procedures, troubleshooting, system operation, system setup, and any other questions frequently received or answered by the FSD;

c. Access to drawings, technical manuals, training manuals, and electronic, electrical & mechanical systems troubleshooting information;

d. Access to supply support information and RMA data (including failure reports and log of system maintenance and performance);

e. A means to submit comments and suggestions about the FSD;

f. Contact information (phone, fax, e-mail) ;

g. A means for NAIS users to submit requests or recommendations for system performance improvements or system changes/enhancements; and

h. A way to submit a request for additional support, including potential warranty claims.

3.1.1.5.2.10.2.2. FSD Phone, E-Mail, & Fax Response. The Contractor shall provide appropriately qualified personnel to respond to e-mail, facsimile, and phone support requests that cannot be resolved via the website. The technical assistance phone requests shall be supported 24 hours a day, seven days a week. The Contractor's representative(s) shall answer routine questions, assist requestors in navigating the FSD website or finding answers in documentation fielded with the NAIS, and record the questions and responses for the FSD Report described below.

3.1.1.5.2.10.2.3. Field Support Desk Report (CDRL 1.5.2.10.2.3). The Contractor shall provide, maintain and utilize a tool to log and track all support requests (warranty and non-warranty repairs, maintenance, supply support, technical advice and support). Upon acceptance of the first NAIS PSS, the Contractor shall provide a weekly FSD Report detailing all FSD actions since the last report, including requests, comments, and suggestions received, details of specific action taken

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and any responses provided, whether the request has been resolved, planned action for any pending or open requests, summary of supply support provided, RMA data, updated minor defects list and any changes made to the FSD.

3.1.1.5.2.11. Warranty Administration Program.

3.1.1.5.2.11.1. Coordination with Warranty Program. The Contractor shall develop the initial logistics support infrastructure such that it can be utilized to coordinate the warranty program, ensuring consistent support between warranty and initial support programs. In order to minimize response times, the Government intends to resolve malfunctions with warranty determination occurring after completion of corrective action and failure analysis.

3.1.1.5.2.11.2. Warranty Administration Process. As part of the FSD services and as described in the ILS Plan, the Contractor shall establish a warranty administration process to receive, investigate, and resolve claims against the warranty purchased and defined in FAR 52.246-19, incorporated at Section I.13 for the full warranty period defined by Section H.17. The Contractor shall be solely responsible for warranty issues related to its work as well as that of the equipment and services supplied by all subcontractors. The Contractor's Warranty Administration Process shall include provisions for analyzing the failure of an item under warranty and to provide a report of that analysis to the Government as part of the FSD Report, required under SOW Section 3.1.1.5.2.10.2.3.

3.1.1.5.2.11.3. Warranty Book (CDRL 1.5.2.11.3). The Contractor shall maintain and submit a Warranty Book that contains the terms and conditions of all component warranties. Warranty claims will normally be submitted by the Government after receipt of the failure analysis report, though obvious claims may be submitted upon initial receipt of support request.

3.1.1.5.2.11.4. Inspection of Defects. Whenever practicable, the Government will, in addition to giving the Contractor notice of any defect or nonconformance, afford the Contractor an opportunity to examine the defective supplies before they are replaced or repaired, provided the inspection does not result in unreasonable delays in returning the NAIS to operational status. Should the Contractor require an inspection of the equipment to assess the correction of a defect, it is the Contractor's responsibility to have, if required, all appropriate representatives of the equipment manufacturer present at that time. Multiple inspections of the equipment for each claim will not normally be permitted due to the effect they would have on operational availability.

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3.1.1.5.2.11.5. Correction of Defects. On the occasions that the Contracting Officer makes a warranty claim upon the initial receipt of a support request, the Contractor shall correct the defects in accordance with contract requirements defined in Section I.14.

3.1.1.5.2.11.6. Minor Defects List. In cases where a defect is categorized as a "minor defect", the Government may make repairs prior to warranty determination and without notification to the Contractor. As part of the weekly FSD Report (see SOW Section 3.1.1.5.2.10.2.3), the Contractor shall provide the Government with a list of all work items considered as "minor defects." Upon correction of the defect the Contracting Officer shall provide written notification to the Contractor detailing the corrective action and the Contractor shall provide replacement parts in accordance with this section. "Minor Defect" means a defect that can be corrected by O-Level personnel without requiring OEM certification, purchase of special tools, or use of unavailable facilities and that will not void any OEM or builders warranty.

3.1.1.5.2.12. Maintenance Transition Plan (CDRL 1.5.2.12). The Contractor shall prepare and maintain a maintenance transition plan for transitioning maintenance from the Contractor to the Government or a third party Contractor. The Contractor shall update the plan in coordination with the Integrated Logistics Support and Planning IPT.

3.1.1.5.3. Manpower and Personnel Analysis. The Contractor shall conduct a manpower and personnel analysis to determine the number and types of personnel required to maintain the NAIS. The Contractor shall consider existing USCG resources and the desire to leverage existing infrastructure and maintenance processes where feasible. The Contractor shall report the results of the manpower and personnel analysis as a Trade Study (SOW Section 3.1.1.3.4).

3.1.1.5.4. Supply Support.

3.1.1.5.4.1. Background. The Government usually conducts supply support for its shore-side electronics systems using three major levels of support. The most immediate level of support consists of a small number of ready-for-issue repair parts stored at the distributed ESUs or contracted field technician response shops. The next level of support consists of an inventory of parts stocked at centralized depot, such as the Coast Guard Engineering Logistics Support Center or contracted support organization's centralized depot. The final level of support consists of obtaining parts from the commercial sector.

3.1.1.5.4.2. Supply Support Plan. The Contractor shall develop a Supply Support Plan, as part of the ISP, that addresses sparing, storage, shipping and handling of

spare and repair parts necessary to fulfill the minimum set of maintenance requirements as defined in the maintenance planning document for the system's lifecycle. The Contractor may be required to hold, stock, and ship supplies to Contractor-provided/contracted repair technicians.

3.1.1.5.4.2.1. Develop Provisioning Program Plan. As a section of the Supply Support Plan in the ISP, the Contractor shall develop, implement and maintain a Provisioning Program Plan (PPP) for the production, deployment and support of the NAIS. Provisioning is the process of determining and acquiring the range and quantity (depth) of support items required to operate and maintain an end item of material for an initial period of service. As a result, the Contractor shall also implement the provisioning efforts for all repairable and replaceable equipment to support O-Level and D-Level maintenance requirements in accordance with the RMA and RCM analyses developed for NAIS.

The PPP shall also describe tasks and activities required to identify, collect, and incorporate the provisioning data needed to source and procure, or, if necessary, produce all equipment identified in the Logistics Management Information (LMI) Summary. The PPP shall address the IOC Sector deployment and post-IOC Sector deployment as the Government may order PSS and SCC equipment for post-IOC implementation under this contract.

3.1.1.5.4.2.2. Conduct Provisioning. The Contractor shall conduct provisioning in accordance with the PPP and ensure that provisioning data accurately reflects the configuration of the NAIS and its supporting components.

3.1.1.5.4.2.3. Provisioning Data. Provisioning Data shall be accurately maintained within the LMI Summary (see SOW Section 3.1.1.5.12.1) on the IPDE. The Contractor shall ensure the provisioning processes and data is adequate to support core implementation of the NAIS to IOC as well as full system deployment nationwide. The Contractor shall develop and provide provisioning data for:

a. Any equipment or component on the LMI Summary obtained from any source of supply;

b. Any equipment or component on the LMI Summary that the Contractor manufactures or modifies;

c. Any unique or Special Purpose Test Equipment;

d. The Contractor shall ensure provisioning data includes information to identify the end item as well as related

components, subcomponents, or assemblies, and related support items;

e. For end items with embedded software or firmware, ensure the provisioning data includes the version or other identifying information of the embedded software or firmware and documents the associated rights necessary for the Government to operate, maintain, diagnose, and repair the NAIS throughout its life-cycle;

f. For end items requiring related support items consisting of software used to update or maintain embedded software or firmware, ensure the provisioning data includes the version or other identifying information of the support software, and documents the software and the associated rights necessary for the Government to operate, maintain, diagnose, and repair the NAIS throughout its life-cycle; and

g. For any provisioned item with an assigned NSN, the Contractor shall include the NSN in the provisioning data. (see DoD 4100.39-M)

3.1.1.5.4.2.4. Readiness-Based Sparing Recommendations. As a section of the Supply Support Plan in the ISP, the Contractor shall provide Readiness-Based Sparing recommendations for support allowances.

3.1.1.5.4.2.5. Diminishing Manufacturing Sources/Material Shortages. The Contractor shall develop and run a complete DMSMS management program that shall address the loss or impending loss of manufacturers or suppliers of items or shortages of raw materials during any phase in the acquisition cycle. This includes the NAIS from design and development through post-production, and the items that have the potential to severely impact asset supportability and life-cycle costs.

As a section of the Supply Support Plan in the ISP, the Contractor shall develop, implement, and deliver a DMSMS Management Plan for managing the loss, or impending loss of manufacturers or suppliers of parts and/or material. This plan shall include a standard case resolution process to manage DMSMS cases, and a description of the tracking and reporting system for DMSMS cost and performance metrics.

As part of the DMSMS management, the Contractor shall develop a technology roadmap that identifies the system's current planned technology (e.g., processor speed, size, capacity, performance, etc.) mapped against industry technology roadmaps and planned market life

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expectancy over the proposed life of the system. This mapping shall identify when significant changes to capacity, reliability and design for the system's technologies are forecasted to occur so that informed decisions on potential upgrades and technology insertion can be made.

The Contractor shall assist in the identification of obsolete items and provide technical and engineering research and analyses of potential obsolete COTS parts replacements. The Contractor shall also assist in identifying asset vendors surveyed, alternate supply sources, and provide recommendations for possible alternative parts if they become impacted by DMSMS.

Lastly, the Contractor shall develop and implement a process for identifying and notifying the Project Office of forecasted and identified DMSMS issues, by requiring the use of predictive tools and methods to proactively forecast and monitor parts for DMSMS. The Contractor shall provide the results to the Project Office in report form in accordance with CDRL 1.3.4. This is a continuous monitoring process that begins at initial design and proceeds throughout the life cycle. The Contractor shall present forecasts at all design reviews and program reviews to show the project's DMSMS status. The Contractor shall conduct engineering technology assessments to predict future obsolescence. The results of these assessments will be an understanding of the current status of the planned or current system, the scope of any immediate non-availability and obsolescence problem, the magnitude of the future problem, and any possibilities for alleviating the impacts.

3.1.1.5.4.2.6. Initial Contractor Supply Support. Prior to Coast Guard's Support Date, and as part of the FSD operations (see SOW Section 3.1.1.5.2.10), the Contractor shall define, establish, and maintain a parts management program (i.e., supply chain) to support the NAIS during the initial support period. The spare parts management is a process to reduce total cost of ownership and increase logistics readiness, promote interoperability, enhance the interchangeability, reliability, and availability of parts, minimize Diminishing Manufacturing Sources and Material Shortages (DMSMS) impacts, assist in meeting end item performance goals, assist with parts selection and qualification procedures, minimize the proliferation of parts and drawings through standardization.

The scope of the parts supply support program shall also be such that the Contractor can manage, order, receive, inspect, stock, package, and deliver NAIS-specific materials, spare and repair parts, consumables and preventive maintenance materials to the NAIS stations nationwide to meet system availability requirements.

The spare parts management program shall be economically planned, integrated and developed in conjunction with other engineering and logistic support planning functions. It shall, at a minimum, consist of a documented parts selection process, a parts selection baseline, a corporate baseline, a parts selection list, or other database, to give visibility to designers and subcontractors of parts preferred for use, a Program Parts Selection List made up of parts selected by the Contractor or subcontractor(s), procedures for incorporating DMSMS management, verification of compliance of subcontractor spare parts management program, a documented process for assessing part suppliers and part quality such as statistical process control data, audits, and past performance, a documented process for the management and documentation of parts, other than those on an as-built or as-designed parts list, and metrics to measure program success. The Government shall have the right to review and approve this data, and have viewing rights into these lists and databases at the Government's discretion.

The Contractor shall minimize cost and response time by maximizing the use of existing commercial supplier networks and direct vendor delivery. The program shall incorporate effective configuration control of parts and other hardware, and provide web-based customer access to inventory, ordering, and other appropriate supply systems.

In general, all parts and materials furnished as part of the NAIS shall be new. However, the Contractor may deliver reworked, reconditioned, or otherwise like-new parts and materials, provided that:

a. Using the item will not cause the A_o of the NAIS to fall below requirements;

b. The COTR has been notified of the intended substitution, been provided the reason (cost savings or improved response time) and a statement that the A_o threshold will not be breached by the use of the item, and has not objected to the substitution;

c. The status/condition of the item is clearly labeled on the packaging material and any reports and invoices associated with the item;

d. To fully realize cost savings from using reconditioned parts, the Contractor may request, as appropriate, that removed or damaged parts be returned by the Government to the Contractor for turn-in credit, repair, or further disposition. Any savings garnered from this program shall be credited to the Government; and

e. The Contractor shall maintain an inventory of long-lead items, items not readily available, or where a direct vendor delivery plan can not be established to meet the support request response times, subject to Government approval. The Contractor shall report Government-owned, Contractor-held ready-for-issue parts in accordance with HSAR 3052.245-70. Any Government-purchased parts held by the Contractor at the end of the contract, or earlier as determined by the Contracting Officer, will be packaged, marked and delivered to the Government in accordance with the Maintenance Transition Plan (see SOW Section 3.1.1.5.2.12).

3.1.1.5.5. Technical Data Deliverables and Services.

3.1.1.5.5.1. Technical Manuals. In accordance with SOW Section 3.1.1.5.5.5, the Contractor shall develop, maintain and provide Interactive Electronic Technical Manuals (IETMs), Operators and Maintenance technical manuals, COTS manuals and any other applicable technical documentation to assist the end users in efficiently and effectively using and maintaining the system. The Contractor shall also provide commercial equipment manuals, primary vendor drawings, service parts lists, and supplemental data for each piece of equipment installed on the NAIS in accordance with MIL-DTL-24784C. All documentation created shall utilize S1000D chapter identification to the greatest extent possible.

3.1.1.5.5.2. Technical Data Resources. The Contractor shall obtain and provide all technical data, including parts lists, drawings, and data rights necessary for the operation, maintenance, service, and repair of the NAIS throughout its lifecycle. As detailed in SOW Section 3.1.1.5.5.5, this technical data shall be stored in and delivered in the form of a Contractor-developed IETM. The IETM shall be delivered in a format that makes use of COTS technical manuals, drawings, and any other technical publications.

3.1.1.5.5.3. Format. Unless otherwise stated, the format of all technical data shall be delivered in electronic format, and Contractor-developed technical data shall be in XML format. All COTS documentation acquired under this contract shall provide the Government extended data rights to reproduce all COTS manuals via any means necessary to support its maintenance/operational objectives. All COTS documentation acquired under this contract shall provide the Government extended data rights to repurpose any portions of COTS material for use within other Government required or authored documents. All COTS documentation acquired under this contract shall be acquired with lifetime revision service for updates and service bulletin support. Where this is cost prohibitive, the Contractor will detail all exceptions and recommend solutions. The intent is to assure the Government maintains the most current documents available during

the entire life cycle of each COTS product. The Contractor is therefore encouraged to purchase and deliver the rights to the electronic source material used to develop the COTS technical manuals, thereby simplifying Contractor efforts in developing the required derivative works.

3.1.1.5.5.4. Data Rights. The Contractor shall obtain and document the Government's data rights to the technical data, and appropriately mark the data so the nature of the rights are clearly identified, particularly when Government rights differ from the rights available to the general public.

3.1.1.5.5.4.1. Restricted Computer Software. For restricted computer software, specifically including software and firmware contained in equipment provided in the NAIS as well as any additional software used to update or maintain that software or firmware, the Contractor shall acquire on the Government's behalf a paid-up nonexclusive, irrevocable worldwide license in such computer software to use, copy, reproduce, modify, adapt, combine with other computer software, and disclose to support service Contractors and their subcontractors in accordance with FAR 52.227-14 (g)(3) (Alternate II) and FAR 52.227-19(c) incorporated at Section I.1.

3.1.1.5.5.4.2. Copyright Claims. For technical data not first developed in the performance of this contract for which a copyright is claimed in accordance with 17 U.S.C. 401 or 402, specifically including COTS manuals, the Contractor shall acquire on the Government's behalf a paid-up, nonexclusive, irrevocable worldwide license in such copyrighted data to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, by or on behalf of the Government. See FAR 52.227-14I(2) incorporated at Section I.1.

3.1.1.5.5.5. Interactive Electronic Technical Manual (CDRL 1.5.5.5).

3.1.1.5.5.5.1. General. The Contractor shall develop, maintain, deliver, and host via the FSD an IETM system, to include a Technical Data Index (see SOW Section 3.1.1.5.5.9), to provide field-level users with access to the technical data described in the sections below. The purpose of deploying an IETM for disseminating information necessary to operate, maintain, repair, and replace equipment and systems is to maximize content reuse, both within the publication and across the Government enterprise. The Contractor shall present the development status of the IETM at the Critical Design Review and at each Integrated Logistics Support and Planning IPT meeting. The Contractor shall be prepared to hand off responsibility for the deployment, operation, and maintenance of the IETM at the direction of the Government.

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3.1.1.5.5.5.2. Source Information. The Contractor shall obtain and provide source information and appropriate rights to that information suitable to develop the IETM. Note: Equipment providers may restrict use of their source information. Notwithstanding these restrictions, the Contractor is responsible for obtaining and documenting the rights for the Government to use the source information (see SOW Section 3.1.1.5.5.4). The Contractor shall provide source information according to the following requirements:

a. For commercial components where the Original Equipment Manufacturer (OEM) provides suitable source data, the Contractor may obtain and provide the OEM data.

b. For commercial components where the OEM does not provide suitable source data, the Contractor shall either obtain and provide suitable 3rd-party equivalents, or itself develop and provide suitable data.

c. For Contractor-developed components, the Contractor shall develop and provide suitable data.

d. For components listed on the LMI Summary that are subcomponents of another item on the LMI Summary, if the source data for the parent component contains suitable detail regarding the subcomponent, no additional source data is required for the subcomponent.

e. The Contractor shall provide a list of all the source information products in the Technical Data Index (TDI – see SOW Section 3.1.1.5.5.9).

3.1.1.5.5.5.3. IETM Content. The Contractor shall provide the following data information to populate the IETM for each Configuration Item Line Replaceable Unit (CILRU) identified on the LMI Summary. Illustrations provided shall be isometric and provide a view as seen by the user. Illustrations shall appear on same or facing page as applicable text; quantity and type of illustration shall allow user to locate items and operate and maintain equipment in an accurate and efficient manner.

3.1.1.5.5.5.3.1. General Information and Safety Precautions. This information shall depict the precautions necessary to safely operate each piece of equipment on the LMI Summary and the systems comprised of that equipment, and allow for the easy and rapid determination of the purpose, physical and functional characteristics, and operational capabilities of the equipment. This information shall

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also be sufficient to describe the interface relationships between systems/equipment.

3.1.1.5.5.5.3.2. Operations. This information shall depict the procedures necessary to enable personnel to locally operate each piece of equipment on the LMI Summary (see SOW Section 3.1.1.5.12.1) and the systems comprised of that equipment, in the normal mode.

3.1.1.5.5.5.3.3. Equipment Descriptions. This information shall depict the equipment physical descriptions such as the cabinets, subassemblies, lowest repairable units, and controls and indicators.

3.1.1.5.5.5.3.4. Functional Description. This information shall depict the theory of operation in a simplified manner with supporting illustrations. The data shall be sufficient to describe major subassemblies and develop illustrations.

3.1.1.5.5.5.3.5. Planned Maintenance. The Contractor shall develop data that are necessary to perform planned maintenance at the O-Level. Maintenance data shall incorporate the RMA analysis (see SOW Section 3.1.1.5.2.3) and RCM derived maintenance procedures.

3.1.1.5.5.5.3.6. Corrective Maintenance. The Contractor shall develop data that are necessary to perform corrective maintenance at the O-Level. Maintenance data shall incorporate the RMA analysis (see SOW Section 3.1.1.5.2.3) and RCM derived maintenance procedures.

3.1.1.5.5.5.3.7. Remove and Replace Procedures. The Contractor shall develop data in sufficient detail to fully document, through the use of the IETM, the performance of all actions required for the removal and replacement of all CILRUs identified on the LMI Summary (see SOW Section 3.1.1.5.12.1). This information shall describe the procedures necessary to enable personnel to remove and replace or reinstall the equipment. The IETM shall be used to display data, including drawings and other information, to facilitate removal and replacement procedures.

3.1.1.5.5.5.3.8. Test and Special Support Equipment. This information shall include a list of test equipment and special tools required to support and maintain the NAIS. For each item on the list, provide technical nomenclature, manufacturer, manufacturer's Contractor and Government Entity (CAGE) code, Original Equipment Manufacturer's (OEM) part number, model number, operating characteristics, depiction of use, and acceptable substitutes as

applicable. Special tools shall include metric tools or calibration devices of other than English standard measurement.

3.1.1.5.5.5.3.9. Configuration Drawings and Parts Breakout Data. The Contractor shall develop data for all equipment on the LMI Summary (see SOW Section 3.1.1.5.12.1) and all Contractor-developed assemblies of that equipment, documenting exploded view drawing(s) containing keyed parts lists, and exploded view assemblies containing keyed parts lists. A parts list shall include:

a. Exploded view key number, seller's part number, source manufacturer, source manufacturer's CAGE code, OEM part number, and quantity required for one complete assembly;

b. Designation and identification of commercial items, such as cabling and connectors to allow for purchase outside the manufacturer's parts system; and

c. Equivalent English standard units when metric system components are provided. The metric system of measurement is the preferred system of weights and measures, except when such use is impracticable or is likely to cause significant inefficiencies or loss of markets to United States firms. When the latter is the case, the Contractor shall follow standard industry practices with respect to the metric system of measurement. Equivalent English standards are not required for fittings that require size-specific tools to install, remove, or adjust.

3.1.1.5.5.5.4. XML Schema. The Contractor shall utilize an XML schema-based type II IETM in accordance with the International Specification for Technical Publications Utilizing a Common Source Database, Spec 1000D.

3.1.1.5.5.5.5. Data Types. The IETM shall be developed for data delivered via the support website, all technical and supply support data in conjunction with the TDP (see SOW Section 3.1.1.3.6.6.3), the LMI Summary (see SOW Section 3.1.1.5.12.1), and the corresponding publications (see SOW Section 3.1.1.5.5). The IETM shall contain sufficient information to operate, maintain, and replace as applicable all equipment and systems.

3.1.1.5.5.6. Product and As-Built Drawings and Associated Lists.

3.1.1.5.5.6.1. Format. The Contractor shall draft, deliver and maintain a system diagram and schematics package, including as-built drawings and one-line diagram and pin-to-pin wiring for each site. These documents shall be compatible with USCG Autocad, MS Visio or an agreed upon format. The documents shall be made available in both hard copy and electronic format available for viewing on the Coast Guard's standard workstation. The Contractor shall provide for automatic derivation of drawings when elements of drawings do not depict the part's or component's actual physical configuration. The Contractor shall provide templates and all other files required to generate Engineering Drawings.

3.1.1.5.5.6.2. Diagrams. Product drawings shall be comprised of printable depictions of all NAIS components in their actual location and schematic diagrams as required to depict functional interconnections between components. All physical components on the NAIS shall be listed on a bill of materials on the drawing where they are defined and shall appear on only one such bill of materials in the entire drawing set. All parts used to develop the NAIS shall be included on the bills of materials. Schematic diagrams need not have a bill of material. However, any component depicted on a schematic shall also be located and depicted on product drawings.

3.1.1.5.5.6.3. Salient Features. All components' salient features shall be identified including the actual manufacturer and their part number for the component, if available. Distributors' part numbers shall not be used. National Stock Numbers shall be used for any components that have them.

3.1.1.5.5.6.4. Engineering Drawings. Engineering drawings shall be prepared in accordance with ASME Y14.100-2004 (including non-mandatory appendices A-E), Y14.24-1999, Y14.34M-1996, Y14.35M-1997, Y14.41-2003 and shall include the following:

a. A unique drawing number;

b. Rack elevations, power and signal cabling and parts list;

c. Antenna mounting configurations and cabling for RF signal with parts list;

d. Back up power generator cabling and foundations and parts list;

e. Title sheet with drawing indexes and revision indexes;

f. Title Blocks will be provided as Government Furnished Information (GFI) in electronic format to the Contractor after contract award; and

g. Government signature authority for drawings will be the PRO.

3.1.1.5.5.7. Technical Data Validation.

3.1.1.5.5.7.1. Conduct Technical Data Validation. The Contractor shall validate the adequacy and accuracy of all technical data provided, to include original technical manuals, revisions to all existing manuals, product drawings and any associated lists. The Contractor shall employ one of the following three methods for accomplishing validation.

3.1.1.5.5.7.1.1. Physical performance method (Type 1). This method consists of physically performing the procedures using the required systems, equipment, and/or software. Physical performance shall include validation of set-up, alignment, operating, troubleshooting and maintenance procedures. Physical performance shall not involve installation, removal, disassembly, and re-assembly of equipment unless these are the only steps by which to validate the technical manual. Physical performance requires that alignment of the systems, equipment, and/or software be in accordance with the NAIS specifications and that support equipment and tools, be those planned for Government use. In the event some support equipment or tools are not available, suitable substitutes may be used. The substitute items shall be reviewed to ensure there is no degradation of validation.

3.1.1.5.5.7.1.2. Walk-through simulation method (Type 2). This method consists of on-site determination that all steps of the procedures are correct and can be physically performed. Hardware configuration must be noted, as well as interfaces between tools and support equipment. The Contractor shall ensure that references to other technical manuals or publications are appropriate and accurate.

3.1.1.5.5.7.1.3. Review/analysis method (Type 3). This method is a desktop review to check the accuracy of all technical data including the following:

a. Removal, replacement, and troubleshooting instructions;

b. Maintenance functions and categories;

c. Parts lists, recommended spares lists, special tools, and test equipment;

d. Equipment modifications or substitutions;

e. Equipment and maintenance procedure illustrations; and

f. References to technical manuals.

3.1.1.5.5.8. IETM Transition to Government. The Contractor shall deliver the IETM system, software, source code, data, data schema, documentation, and related work products, including the data, user interface, source code, supporting software, and related documentation to the Government.

For any IETM data and computer software not first produced in the performance of this contract, the Contractor shall acquire on the Government's behalf the rights to such data or, if commercial, acquire the software (SOW Sections 3.1.1.5.5.4.1 and 3.1.1.5.5.4.2). IETM delivery to the Government shall include the following and similar work products to allow the Government to manage, maintain, edit, and re-author the documents:

a. Database used to store source content of XML files;

b. XML, Hypertext Markup Language (HTML) or Extensible Hypertext Markup Language (XHTML) source file(s);

c. Common source database used to populate content in XML/HTML or XHTML files;

d. Graphic source files;

e. XML Schema;

f. Entity files;

g. XML Data Dictionary;

h. Tagging Conventions Document;

i. Any associated style sheets and filter;

j. IETM software package, specifically including the source code for the application(s) used to manage and display content, and its maintenance tool (see SOW Section 3.1.1.5.5.10.1); and

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k. A written description of the hardware, software, and network operating environment specifications used to operate and maintain the IETM, including:

1. Software and associated licenses required;

2. Hardware requirements currently being used to deploy the IETM;

3. Any recommended changes to software or hardware requirements due to obsolescence or changes in the industry;

4. Specific deployment and access requirements including the current and projected bandwidth;

5. Qualifications of personnel required for maintenance and modification of the IETM.

3.1.1.5.5.9. Technical Data Index. As an element of the IETM, the Contractor shall prepare and maintain a TDI which lists all equipment cross referenced with their respective IETM content types (SOW Section 3.1.1.5.5.5.3), and their respective source information (SOW Section 3.1.1.5.5.5.2).

3.1.1.5.5.10. Technical Data Maintenance.

3.1.1.5.5.10.1. Content Maintenance Tool. The Contractor shall deploy a web-based content maintenance tool to create, update, and maintain IETM content. The tool shall support subject matter experts in drafting changes and allow configuration managers to review and approve changes. Access to the tool for approval of changes shall be restricted to Contractor configuration managers.

3.1.1.5.5.10.2. Timeline. The Contractor shall maintain all of the NAIS technical data during the initial support period.

3.1.1.5.5.10.3. Configuration Change. Configuration changes shall be made in accordance with the Configuration Control process (SOW Section 3.1.1.3.6.8).

3.1.1.5.5.10.4. History of Changes. The Contractor shall retain a history of all technical data changes and provide a means for users to rapidly determine what, how, and when information has changed.

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3.1.1.5.5.10.5. Notification. The Contractor shall post approved technical data change notifications to the IETM.

3.1.1.5.6. Support and Test Equipment.

3.1.1.5.6.1. Identify Support and Test Equipment. As an element of the ISP, the Contractor shall identify all support and test equipment (tools, test equipment, etc.) necessary to fulfill the minimum set of maintenance requirements as defined in the system maintenance planning document. The Contractor shall consider all logistics elements in the analysis and recommendations for support equipment. The data provided shall be traceable to the supportability analysis.

3.1.1.5.6.2. Support Equipment Selection Criteria. The Contractor shall identify all support equipment in accordance with the following order of priority selection criteria:

a. Priority 1. Pre-existing Standard/Preferred USCG support equipment items or modification of such support equipment.

b. Priority 2. Pre-existing Standard/Preferred DoD support equipment items or modification of such support equipment.

c. Priority 3. Commercial support equipment or modification of commercial support equipment.

d. Priority 4. New development support equipment.

e. If a life-cycle cost analysis shows that the order of priority would not yield the most cost effective approach for support of the end item, the Contractor can recommend a piece of support equipment that would yield the most efficient approach. The Contractor shall include a search of FED-LOG if applicable.

3.1.1.5.6.3. Existing Support Equipment List. The Contractor shall research existing USCG support equipment for use during the support equipment identification process. The objective is to have the Contractor use existing USCG support equipment as much as possible, rather than choose new support equipment. The Contractor shall update the ISP Support and Test Equipment List as required.

3.1.1.5.7. Training Deliverables and Services.

3.1.1.5.7.1. Training/Performance Intervention Program. The Contractor shall develop a comprehensive training program, to include training and non-training interventions for the NAIS operations and maintenance personnel. This

program shall follow the Coast Guard training system Standard Operating Procedures Volumes 2, 4, 5, 6, and 8. The training program shall encompass the position types of system operators, system administrators, system maintenance personnel, generic users of (or subscribers to) NAIS services, and system instructors for each course or intervention needed. Training may be integrated with existing operational training such as Sector Personnel "C" schools, Sector-based on the job training, VTS certification training, or other as determined in the Training/Performance Intervention Plan.

3.1.1.5.7.2. Training/Performance Intervention Plan (CDRL 1.5.7.2). The Contractor shall maintain and provide a detailed NAIS Training/Performance Intervention Plan. The Contractor shall conduct an analysis and recommend the most optimal form of training/intervention. The plan shall include the type of training/performance intervention to be provided, content and style of training and/or intervention tool, instructor qualifications as appropriate, and details on training and non-training interventions implementation. In order to determine the appropriate intervention, design and deployment method(s), the Contractor shall conduct a review of the existing Coast Guard training and performance tools in place for related or inter-dependent systems. The plan shall address, at a minimum, five distinct communities for the NAIS: 1) Operators (e.g., SCC Operators); 2) System Administrators (SOC, OSC, and C2CEN); 3) System Maintainers (the MLCs and ESUs for PSS-related and any distributed architecture equipment and the EDC for hosted equipment/software at the EDC); 4) System Trainers (for Coast Guard Training Centers), and 5) generic users of (or subscribers to) NAIS services. As part of this plan, the Contractor shall evaluate and recommend how, where and when training for those functions and personnel, as determined by analysis, should be provided.

3.1.1.5.7.3. Training Program Materials and Tools (CDRL 1.5.7.3). The Contractor shall develop, maintain and provide training materials such as instructor and student guides, job aids and any tools or special fixtures required to train or instruct the NAIS operators, system administrators, maintainers, system trainers and generic users of (or subscribers to) NAIS services in accordance with the approved Training/Performance Intervention Plan.

3.1.1.5.8. Computer Resources Support. As an element of the ISP, the Contractor shall identify all computer resources required to support the system in accordance with the Maintenance Plan. The Contractor shall provide software upgrades as well as software patches to deployed sites in support of the NAIS System Management and Engineering Facility (SMEF) /Software Support Activity (SSA) or Telecommunications and Information Systems Command (TISCOM). Computer resources for the NAIS include use of existing software (NAIS databases, network and security software), self monitoring equipment and user interfaces at a minimum.

3.1.1.5.9. Facilities. As an element of the ISP, the Contractor shall provide permanent, semi-permanent or temporary real property assets required to support the NAIS, which includes studies to define new facilities or facility improvements, locations, space needs, utilities, environmental requirements, real estate requirements and equipment. Human Factors Engineering (HFE) shall be considered, to include compatibility with planned support equipment, and serviceability/accessibility of installed equipment. The primary facility requirements associated with the NAIS are the potential acquisition of towers and equipment shelters for AIS receive and transmit services.

The Contractor shall gather any necessary unique/site specific data/information on the operating environment, proposed sites, and USCG assets in each area to identify NAIS implementation requirements. To obtain this information, the Contractor may perform site surveys. The Contractor will coordinate any site visits to Government facilities through the Contracting Officer's Technical Representative (COTR) to avoid interference with Government operations.

The Contractor shall develop Sector PSS and SCC Site Specific Design (CDRL 2.2.2) showing any construction required and the installation plan for each site. The Sector PSS Site Installation Planning Documentation shall provide a detailed description of how the installation of NAIS will be implemented. This plan shall take into account the requirement that Increment 1 NAIS capability remain fully operational until the Increment 2 installation is fully operational and transitioned, as appropriate.

Upon USCG approval of the Sector PSS and SCC Site Specific Design (CDRL 2.2.2), satisfaction of NEPA requirements, and completion of required real property actions the Contractor will be authorized to commence construction (as required) and installation work. The Contractor shall be responsible for any and all site preparation work necessary to implement NAIS installation in all regions. The Contractor shall coordinate and receive Government approval to conduct any and all site preparation work on Government property. Approval and coordination with TISCOM shall be required for all CGDN+ connections. The Contractor shall facilitate all permits and licenses required to implement the system, including but not limited to coordination with the Federal Communications Commission, Federal Aviation Administration, and any local agencies.

3.1.1.5.10. Packaging, Handling, Storage & Transportation. As part of the ISP, the Contractor shall describe their Packaging, Handling, Storage & Transportation (PHS&T) procedures, compliant with Section D, to ensure successful delivery of all NAIS systems and components to the destinations required under this statement of work and associated contract tasks.

3.1.1.5.11. Equipment Integrated Logistics Support Plan. As an element of the ISP, the Contractor shall develop and deliver an Equipment Integrated Logistics Support Plan (EILSP) in accordance with COMDTINST 4105.7.

3.1.1.5.12. Logistics Management Information.

3.1.1.5.12.1. Logistics Management Information Summary (CDRL 1.5.12.1). The Contractor shall develop, maintain and provide a Logistics Management Information (LMI) Summary, identifying and providing support-related engineering data, using MIL-PRF-49506 as a guide, for the following logistics elements:

a. Maintenance Planning and Repair Analysis;

b. Manpower, Personnel and Training;

c. Support and Test Equipment;

d. Supply Support;

e. Packaging, Handling, Storage and Transportation; and

f. Post Production Support.

The NAIS Project Office will use this information to perform logistics planning and analysis, assess design status, influence program decisions, and verify that Contractor performance meets system supportability requirements.

3.1.1.5.12.2. LMI Structure and Configuration. The Contractor shall develop and maintain the LMI Summary as a hierarchical configuration tree containing all configuration items that are part of the NAIS and be delivered via the IPDE. The Contractor shall present the LMI design and presentation and data capture approach at the SDR for Government review and shall present the status of the LMI development at each Integrated Logistics Planning and Support IPT.

The Government will validate all LMI Summary data generated as a result of the Contractor's support program efforts as specified in MIL-PRF-49506, Secton 4.3, through various methods, including:

a. Using source data identified by the Contractor;

b. Reviewing drawings and Engineering Notebooks;

c. Observing operations and maintenance during system tests;

d. Conducting FCAs/PCAs; and

e. Participating in program activities such as program and design reviews.

3.1.1.5.12.3. LMI Point of Contact. The Contractor shall identify a single point of contact that will be responsible for developing and maintaining the LMI Summary, communicating status, and actively serving as a member of the NAIS Integrated Logistics Planning and Support IPT.

3.1.1.5.13. Transfer Life-Cycle Support to Government Support. At the end of the initial support period, or when notified by the Contracting Officer, the Contractor shall transfer to the Government all life-cycle support including the data, source code, supporting software, software licenses, related documentation, and the rights to use, maintain and modify the system such that the Government may competitively aquire commercial support services or provide organic support of the system as a whole or for individual sub-systems as desired.

3.1.1.6. Core System Design Reviews, Development and Integration.

3.1.1.6.1. Design Reviews.

3.1.1.6.1.1. General. The following technical reviews shall be incorporated into the SEMP, SDP, ISP and Master Test Plan (MTP) and executed as part of the Contractor's systems engineering process.

3.1.1.6.1.2. System Design Review.

3.1.1.6.1.2.1. Conduct System Design Review. The Contractor shall conduct a System Design Review (SDR) within 150 days after contract award.

3.1.1.6.1.2.2. SDR Presentation Requirements. During the SDR the Contractor shall present, at a minimum, the System Design (and Software Development and Integration) Plan, the System Requirements Specification and the System Design Document. In addition, the Contractor shall highlight key aspects and any updates to the systems engineering management, master test, configuration management, information assurance and integrated support plans and also address key cost, schedule and performance risks associated with the technical and logistics design.

3.1.1.6.1.2.3. SDR Meeting Deliverables (CDRL 1.6.1.2.3). The Contractor shall develop and provide Meeting Agendas and Briefing Materials in advance of all SDRs. Additionally, the Contractor shall draft, revise, and deliver Meeting Minutes for all SDRs. All recommendations affecting cost, schedule, or performance shall be documented in the meeting minutes.

3.1.1.6.1.2.4. Government Approval of SDR. The Contractor shall incorporate written Government feedback from the SDR into the design and planning elements.

3.1.1.6.1.3. Preliminary Design Review.

3.1.1.6.1.3.1. Conduct PDR. Upon receiving Government review and approval of the SDR artifacts, the Contractor shall prepare for and conduct a Preliminary Design Review (PDR) to demonstrate the Contractor's preliminary system-level design, the fully allocated baseline (ABL), and the design for the NAIS subsystems, services, components, and interfaces.

3.1.1.6.1.3.2. PDR Configuration Items. A PDR may be held for each NAIS CI, or group of related CIs, prior to a system-level PDR, consistent with the approved SEMP, CMP, SDP and MTP. The Contractor shall, with the approval of the Government, determine what hardware and software elements constitute a CI or group of related CI.

3.1.1.6.1.3.3. PDR Presentation Requirements. During the PDR, the Contractor shall present, at a minimum, any updates to the System Design (and Software Development and Integration) Plan and the System Requirements Specification, and detail the advancements made and developments with the System Design Document, including all relevant analyses, alternatives assessed and basis of recommendations and plans for development, integration and implementation. In addition, the Contractor shall highlight key updates to the systems engineering management, master test, configuration management, information assurance and integrated support plans consistent with current technical design information. The Contractor shall also address current cost, schedule and performance risks associated with the presented design, development and implementation.

3.1.1.6.1.3.4. PDR Meeting Deliverables (CDRL 1.6.1.3.4). The Contractor shall develop and provide Meeting Agendas and Briefing Materials in advance of all PDRs. Additionally, the Contractor shall draft, revise, and deliver Meeting Minutes for all PDRs. All recommendations affecting cost, schedule, or performance shall be documented in the meeting minutes.

3.1.1.6.1.3.5. Government Approval of PDR. The Contractor shall incorporate written Government feedback from the PDR into the design and planning elements.

3.1.1.6.1.4. Critical Design Review.

3.1.1.6.1.4.1. Conduct CDR. Upon receiving Government review and approval of the PDR artifacts, the Contractor shall prepare for and conduct a Critical Design Review (CDR) at the Contractor's facility. The CDR signals the Contractor's readiness to begin development of the core NAIS capability, and shall demonstrate the Contractor's final system-level design (developmental baseline [DBL]), as well as the design for the NAIS subsystems, services, components, and interfaces.

3.1.1.6.1.4.2. CDR Configuration Items. At the Contractor's discretion, and with Government approval, the Contractor may elect to hold a CDR for each CI or group of related CIs, consistent with the approved SEMP, SDP, MTP, CMP and ISP.

3.1.1.6.1.4.3. CDR Presentation Requirements. During the CDR, the Contractor shall present, at a minimum, any updates to the System Design (and Software Development and Integration) Plan and the System Requirements Specification, and detail the draft-final products associated with the System Design Document, including all plans and drawings for development, integration and implementation. The Contractor shall present the software development kits, the system product specification, including the interface control documents and service level agreements and logistics design/planning products, including the RMA analysis, maintenance requirements package, IETM, and training/performance intervention plan. In addition, the Contractor shall highlight key updates to the systems engineering management, master test, configuration management, information assurance and integrated support plans consistent with the critical design review stage. The Contractor shall also address current cost, schedule and performance risks associated with the design, development, integration and implementation.

3.1.1.6.1.4.4. CDR Meeting Deliverables (CDRL 1.6.1.4.4). The Contractor shall develop and provide Meeting Agendas and Briefing Materials in advance of all CDRs. Additionally, the Contractor shall draft, revise, and deliver Meeting Minutes for all CDRs. All recommendations affecting cost, schedule, or performance shall be documented in the meeting minutes.

3.1.1.6.1.4.5. Government Approval of CDR. The Contractor shall incorporate written Government feedback from the CDR into the design and planning elements.

3.1.1.6.1.5. Test Readiness Review.

3.1.1.6.1.5.1. Conduct TRR. Upon receiving Government review and approval of the CDR artifacts and following completion of approved developmental

and integration efforts, the Contractor shall prepare for and conduct a Test Readiness Review (TRR) at the Contractor's facility. The TRR signals the Contractor's completion of development of the NAIS, and readiness to exercise the Contractor's test plans and procedures for the NAIS services, components, and interfaces prior to field implementation.

3.1.1.6.1.5.2. TRR Configuration Items. At the Contractor's discretion, and with Government approval, the Contractor may elect to hold a TRR for each CI or group of related CI, consistent with the approved SEMP, SDP, CMP, MTP, and ISP.

3.1.1.6.1.5.3. TRR Presentation Requirements. During the TRR, the Contractor shall review the System Requirements Specification, System Design Document and present the Test Plans and Procedures and Functional and Physical Configuration Audit Plan. In addition, the Contractor shall highlight any key updates to the systems engineering management, master test, configuration management, information assurance and integrated support plans. The Contractor shall also address key cost, schedule and performance risks associated with the testing and implementation plans.

3.1.1.6.1.5.4. TRR Meeting Deliverables (CDRL 1.6.1.5.4). The Contractor shall develop and provide Meeting Agendas and Briefing Materials in advance of all TRRs. Additionally, the Contractor shall draft, revise, and deliver Meeting Minutes for all TRRs. All recommendations affecting cost, schedule, or performance shall be documented in the meeting minutes.

3.1.1.6.1.5.5. Government Approval of TRR. The Contractor shall incorporate written Government feedback from the TRR into the design and planning elements.

3.1.1.6.1.6. System Verification Review.

3.1.1.6.1.6.1. Conduct SVR. Upon receiving Government review and approval of the TRR artifacts, the Contractor shall prepare for and conduct an SVR at the Contractor's facility. The Contractor shall demonstrate that all system requirements have been verified, all test plans successfully executed and documented, and any required corrective actions initiated.

3.1.1.6.1.6.2. SVR Configuration Items. At the Contractor's discretion, and with Government approval, the Contractor may elect to hold an SVR for each CI or group of related CI, consistent with the approved SEMP, SDP, MTP, CMP and ISP; however, SVR approval must be given by the Government prior to initiating NAIS implementation. Upon approval,

specifications and functional configuration identifiers shall be incorporated into the configuration status accounting system.

3.1.1.6.1.6.3. SVR Presentation Requirements. During the SVR, the Contractor shall review the System Requirements Specification and the Test Plans and Procedures and present the results of the testing performed, including the Functional and Physical Configuration Audit Report. In addition, the Contractor shall review and highlight any key updates to the System Design Document, in particular, plans for implementation. The Contractor shall also address key cost, schedule and performance risks associated with the implementation plans.

3.1.1.6.1.6.4. SVR Meeting Deliverables (CDRL 1.6.1.6.4). The Contractor shall develop and provide Meeting Agendas and Briefing Materials in advance of all SVRs. Additionally, the Contractor shall draft, revise, and deliver Meeting Minutes for all SVRs. Major decision recommendations affecting cost, schedule, or performance shall be documented in the meeting minutes.

3.1.1.6.1.6.5. Government Approval of SVR. Government approval of the SVR will be based upon successful completion by the Contractor of the above, and confirmation that the final system configuration is sufficiently understood by the Contractor to permit the Contractor to initiate NAIS capability implementation. The Contractor shall incorporate written Government feedback from the SVR in finalizing and conducting NAIS capability implementation.

3.1.1.6.2. System Development and Integration.

3.1.1.6.2.1. System/Subsystem Development and Integration. The Contractor shall integrate all NAIS subsystems, components and services, to meet external integration and interoperability requirements in this SOW and the PSPEC. As part of the integration effort, the Contractor shall design the NAIS interfaces to minimize software and hardware integration modifications or changes required to integrate with existing systems. Unless the Contractor receives prior approval from the Government, integration with all external systems must be performed via the USCG ESB or other SOA infrastructure designated by the Government.

3.1.1.6.2.2. System/Subsystem Integration Plan. As an element of the SDP (see SOW Section 3.1.1.4.2), the Contractor shall develop a plan to integrate all the NAIS subsystems, including future pre-planned improvements. This plan shall also address the Contractor's approach for integration and testing to ensure the core system meets the PSPEC. Any unique hardware or software required for external system integration shall be considered part of the NAIS configuration.

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3.1.1.6.2.3. Hardware and Software Interfaces. The Contractor shall analyze all system functional, hardware, physical, and data interfaces to define interface requirements and ensure compatibility before design implementation. All interfaces shall be clearly defined and fully specified in Interface Control Documents (ICDs) and Service Level Agreements (SLAs – see SOW Section 3.1.1.6.2.5) and included as distinct and severable parts of the SDD prior to integration testing. The Contractor shall conduct specific tests to verify that interface requirements have been met and service level thresholds achieved.

3.1.1.6.2.4. Correction of Interface Problems. The Contractor shall be responsible for the analysis and correction of all of the NAIS interface incompatibilities that are discovered during factory integration testing and land-based testing. The Contractor shall also be responsible for the analysis and correction of NAIS interface incompatibilities with designed firmware and software. All such problems shall be reported to the Government and corrected prior to Government led OT&E.

3.1.1.6.2.5. Interface Control Documents and Service Level Agreements.

3.1.1.6.2.5.1. Interface Control Document. As part of the system design and integration effort, the Contractor shall develop and deliver ICDs for all system, sub-system, service and component interfaces, to facilitate and document modularity of the SOA of the NAIS. ICDs shall be delivered in the SDD (see SOW Section 3.1.1.4.6).

3.1.1.6.2.5.2. Service Level Agreement. The Contractor shall develop SLAs for all NAIS external system, service and component interfaces. SLAs shall be delivered in the SDD (see SOW Section 3.1.1.4.6).

3.1.1.6.2.5.3. ICD and SLA Requirements. The ICDs and SLAs shall clearly indicate all inputs, outputs, assumptions, conditions and constraints of each defined sub-system and component to facilitate interoperability, integration with other systems (e.g., enterprise command and control user interface application) and interchange of other like-components for 3rd party nationwide deployment and support of the NAIS. The interface analysis and definition effort shall be conducted throughout the program and reviewed by the Government during each technical review. The Contractor shall deliver as-built documentation for all hardware and software interfaces at TRR. The Contractor shall deliver as-built interface specifications prior to FCA. The Contractor shall maintain and deliver updates to these documents during the operational and maintenance phases of this contract.

3.1.1.7. Core System Implementation.

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3.1.1.7.1. General. The Contractor shall schedule, procure, implement and document the core system in accordance with the Government approved SDD and I-1 to I-2 Operational Transition Plan to meet the requirements of this SOW, the PSPEC and the SRS. Core System Implementation shall include the following:

3.1.1.7.1.1. EDC. The Contractor shall acquire, configure, test, ship and install all equipment, software and network connections at the EDC. The EDC functionality shall include data storage, enterprise services (e.g., data retrieval, and external data capture services), as well as the interfaces to the External Data Providers and External AIS User Systems as described in the PSPEC. The Contractor shall provide, upon USCG request, a list of all hardware and software required to implement the Contractor's NAIS Increment 2 data storage solution, and provide all developmental software to the EDC for establishing the NAIS DR capability.

3.1.1.7.1.2. SOC. The Contractor shall acquire, configure, test, ship and install all equipment, software and network connections to establish ASM functionality at the SOC. The SOC shall include the SOC User HSI functionality as described in the PSPEC.

3.1.1.7.1.3. Single PSS in Sector Delaware Bay. The Contractor shall acquire, configure, test, ship and install all equipment, software and network connections at a single PSS, at a site to be selected by the Government, within the IOC Sector Delaware Bay. The PSS shall include all PSS components as described in the PSPEC.

3.1.1.7.1.4. Two Baseline PSSs at C2CEN. The Contractor shall acquire, configure, test, ship and install all equipment and software and network connections for two functional baseline PSSs, at C2CEN in Portsmouth, VA. This site will also serve as the SMEF for NAIS test and evaluation and system support.

3.1.1.7.1.5. HSI and LSS. The Contractor shall acquire, configure, test, ship and install all equipment, software and network connections for HSI and LSS functionality at the SOC and C2CEN. The SOC User HSI component is to be located at the SOC and C2CEN and the Sector Command Center (SCC) User HSI and LSS component is to be located at the C2CEN in an NAIS SCC system mockup, along with the two PSSs.

3.1.1.7.1.6. Incorporation of I-1. The Contractor shall incorporate I-1 AIS feeds into the EDC.

3.1.1.7.1.7. Network Functionality. The Contractor shall establish all network services functions and capabilities associated with connecting these elements into a fully integrated system that meets the PSPEC and all information assurance requirements.

3.1.1.7.2. Core System As-Built Documentation (CDRL 1.7.2). The Contractor shall develop, maintain and provide as-built documentation for each element of the core system defined above within 30 days of installation in accordance with requirements outlined in SOW Section 3.1.1.5.5.6. Drawings shall be updated by the Contractor to reflect any post installation changes made prior to transfer to the Government for operational support and maintenance. The Contractor shall prepare drawings, photos of installation, equipment inventory of installation, including, at a minimum, serial numbers, antenna height, antenna location (Latitude /Longitude in decimal degrees in North American Datum 1984 format), IP addresses, telephone numbers (if Public-switched Telecommunications Network modem installed), any configuration settings or files from all equipment. Drawings shall include, at a a minimum, rack layouts and system interconnection diagrams identifying cable types, connection locations (port numbers), connection type and pin-out diagrams as appropriate.

3.1.1.8. Quality Assurance, Test and Evaluation.

3.1.1.8.1. Quality Standards and Practices.

3.1.1.8.1.1. ISO 9000 Compliance. The Contractor shall plan, implement, and manage the NAIS project activities following in a quality manner that complies with the ISO 9000 family.

3.1.1.8.1.2. QA Processes and Procedures. The Contractor shall establish QA processes and procedures to verify and validate that the product development process is complete, in compliance with requirements, and meets customer expectations.

3.1.1.8.1.3. ISO 9001-2000 Registration. The Contractor shall have an ISO 9001-2000, "Quality Management Systems – Requirements" registration and CMMI-DEV v1.2, Level 3 (or higher) certification for the division/branch that will perform the NAIS work.

3.1.1.8.1.4. Quality Assurance Plan (CDRL 1.8.1.4). The Contractor shall develop and maintain a Quality Assurance Plan (QAP), which shall, at a minimum, address the critical elements associated with establishing a quality development and product line. Further, the QAP shall address the quality management system, management responsibility, resource management, product realization, and measurement, analysis, and improvement, as they apply to all of the NAIS requirements including: design, construction, testing, delivery, logistics support processes, and associated data. The QAP shall provide traceability to the Contractor's ISO 9001 compliant quality system as documented and described in the Contractor's quality manual. The QAP, once approved by the Government, shall provide the basis for its execution throughout the duration of the contract.

3.1.1.8.2. Contractor-Led Testing & Verification Deliverables and Services.

3.1.1.8.2.1. Master Test Plan (CDRL 1.8.2.1).

3.1.1.8.2.1.1. Preparation and Implementation. The Contractor shall prepare, maintain and implement a Master Test Plan (MTP) that describes and details the Contractor's plan to implement and manage a comprehensive test program for the NAIS that shall provide the basis for verifying the technical, operational, maintenance, human performance and reliability requirements of the NAIS. The plan shall include all test and evaluation activities associated with proper verification of the NAIS requirements. The Contractor shall describe the test program evolution from low-level component tests through complete system and external interface tests, and outline the complete phased sequence of all of the NAIS performance and acceptance tests.

3.1.1.8.2.1.2. Factory Qualification Testing. The MTP shall cover factory qualification testing through final acceptance and contract completion. The Contractor shall include schedule considerations as the design effort evolves; test procedure development; review and approval; potential re-tests; regressive testing; test data collection and distribution; test reporting; and other interrelated tasks to ensure the delivery of a fully qualified system with the program schedule. Summaries of details from other test plans shall be included to show the flow of the test program through development and integration. The Contractor shall also describe its procedures for conducting inspections of incoming items manufactured by an outside vendor or provided as GFE.

3.1.1.8.2.1.3. Built-in Test Equipment. The Contractor's test program shall include demonstration of built-in test and built-in-test equipment, integrated and external diagnostic test sets and equipment incorporated in the design. This shall include the validation of built-in-test equipment through induced failure. The Contractor shall utilize Government approved support equipment in support of performance evaluation activities. Simulation or substitution of support equipment shall be approved by the Government.

3.1.1.8.2.1.4. Operation and Maintenance Procedures. The Contractor shall include demonstration of operation and maintenance procedures for installation, removal, assembly, and fault localization. It is the responsibility of the Contractor to request GFE in order to support its verification and validation effort.

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3.1.1.8.2.2. Requirements Verification Matrix. As an element of the SRS (see SOW Section 3.1.1.4.4), the Contractor shall provide a Requirements Verification Matrix (RVM) describing each specification requirement, all associated design document paragraph references, and the method to be used for verification. The Contractor shall include in the RVM the justification for the use of any non-COTS items in the NAIS for Government review.

3.1.1.8.2.3. Developmental Test and Evaluation Deliverables and Services.

3.1.1.8.2.3.1. Test Plan and Procedures (CDRL 1.8.2.3.1). The Contractor shall develop, maintain and provide test plans and procedures for each formal test to be conducted, to include a description of the test environment, test tools, scenarios, and resource requirements. Test procedures shall identify each discrete event/step to be accomplished in the test activity. Test procedures shall tie directly to the RTM, ensuring that each element of the RTM is covered by specific test and verification procedures. The event sequence shall be specified to ensure verification of requirements. For each discrete event, the procedures shall identify who is responsible for executing the event, exactly what actions/processes are involved, how the event is documented, and the expected test results.

3.1.1.8.2.3.2. Validation and Verification. Validation and verification activities shall be executed in accordance with Government-approved test plans and procedures. Furthermore, the Contractor shall provide the Government with the opportunity to witness each verification test; thus, the Contractor shall provide ten (10) days advance notice of each activity.

3.1.1.8.2.3.3. Test Performance.

3.1.1.8.2.3.3.1. General. The Contractor shall conduct testing to show compliance with the PSPEC. Every function and performance requirement summarized in the PSPEC and listed in the RVM shall be verified with formal test in order to ensure compliance with the NAIS requirements. In the event where performance verification is not possible through formal testing the Contractor shall ensure the provision of compliance with analysis, examination or demonstration. The Contractor may tailor the scope of testing only if mutual concurrence with the Government is obtained. Tests of the NAIS shall include component, sub-subsystem, subsystem qualification, Factory Acceptance Testing, system qualification, environmental testing, and Government Acceptance Testing. Component and sub-subsystem level testing shall be included as it pertains to each HWCI and CSCI in the PSPEC and SDD (see SOW Section 3.1.1.4.6).

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3.1.1.8.2.3.3.2. Conduct DT&E. At a minimum, the Contractor shall plan, coordinate, and conduct DT&E activities in the IOC SCCs and their associated PSSs, LSSs, and NAIS installations. The Contractor shall provide verification and conformance methods of the baseline system in order to demonstrate that the NAIS is capable of performing according to the NAIS specifications including receive and transmit coverage, interoperability, reliability and supportability requirements. To this extent, DT&E shall be conducted on the NAIS and subsystem components including HSI software modules, SOC applications, EDC or data processing and warehousing servers and modules, and any gateways with other supporting systems.

3.1.1.8.2.3.3.3. Test Vessel. The Contractor shall include provisions for outfitting a Government provided test vessel for the execution of transmit and receive coverage, reporting rate, and latency verification. The Contractor shall define the planning, preparations, scheduling information, test methodology and identify/outline the various organizational entities involved in these test and evaluation activities for timely and effective completion of:

a. Vessel's AIS equipment installation and inspection test – The purpose of these activities is to ensure proper AIS equipment (one AIS Class A, one AIS Class B, AIS display, and, if needed, AIS receivers connected to an AIS data collection tool) and document the setting and configuration of the AIS elements onboard of the test vessel. The display is necessary to demonstrate the performance of NAIS transmit capability, such as display of safety related messages, data transmitted using binary applications and telecommands (e.g., change to report rate).

b. Coverage test – The purpose of this test is to verify and demonstrate the coverage requirements using data collection from and to AIS Class A and Class B on a vessel traveling various courses and speeds on an area pre-selected by the Government. In addition, during the execution of this test the AIS Class A and B position reporting time and transmit requirements (i.e., that messages transmitted from a shore-based NAIS transmitter will be successfully received by the onboard AIS elements meeting or exceeding the Packet Error Rates specified in the PSPEC) as well as data transfer latency from the NAIS PSS to the NAIS message server and SCC shall be verified.

3.1.1.8.2.3.3.4. Government Assets. The Government will provide the test vessel for the receive and transmit coverage field testing. The Contractor shall coordinate with and support the Government provided asset to execute the required testing.

3.1.1.8.2.3.3.5. Verification of System Performance. DT&E activities shall verify the NAIS performance status and identify any deviations from the expected system performance. The Contractor shall provide complete information about its technical analysis methods and integration approach and component alternative selections. For radio frequency (RF) equipment, the Contractor shall perform a full range of testing from the lab through to field measurements. Software modules shall be evaluated incrementally to ensure problems are identified early in the integration process. Furthermore, the MTP shall define required software testing and refer to specific software test plans for tests to be conducted. COTS data networking and processing hardware and software shall, at a minimum, be tested to ensure service oriented architecture, interoperability and security compliance.

3.1.1.8.2.3.3.6. Integrated Factory Acceptance Test. The Integrated Factory Acceptance Test (IFAT) shall be conducted at the Contractor's facility in order to ensure that the system meets NAIS requirements before it is shipped to System Pretest (see SOW Section 3.1.1.8.2.3.3.7) and then IOC PSS sites. IFAT shall be performed in the presence of Government personnel. IFAT shall, at a minimum, satisfy the following requirements: verify correct interconnectivity of all system components (showing that hardware and software are fully integrated as a system); meet scalability requirements; satisfy performance requirements; and demonstrate the suitability and workability of the system design. Only upon Government approval of IFAT results shall the Contractor disasssemble and ship the system to the System Pretest locations.

3.1.1.8.2.3.3.7. System Pretest. Prior to deployment or implementation at the IOC sectors, the Contractor shall complete the installation, configuration, and deployment of the NAIS core capability at the SOC, EDC, and three AIS PSSs and two LSSs. Upon completion of the aforementioned activities, the Contractor shall perform DT&E in the presence of the Government to ensure that the Contractor's engineering design meets the PSPEC. Compliance with NAIS requirements at the completion of this DT&E is the precursor to deployment and testing of the IOC sectors.

3.1.1.8.2.3.4. DT&E Test Report (CDRL 1.8.2.3.4). The Contractor shall prepare and deliver a DT&E Test Report demonstrating successful completion of all DT&E conducted on the NAIS. DT&E results shall be reported in accordance with the approved test plans and procedures. In addition, the Contractor shall maintain, and provide for Government inspection when requested, the test logs and data sheets.

3.1.1.8.2.4. IOC System Acceptance Test and Evaluation.

3.1.1.8.2.4.1. Conduct IOC System Acceptance Test and Evaluation. The NAIS IOC system acceptance test and evaluation shall be conducted to ensure that the system meets required technical and operational parameters end-to-end, to include all core capability elements as well as the AIS coverage requirements for the three designated IOC Sectors. This acceptance test and evaluation shall constitute preliminary acceptance as defined in Section E.3, and upon approval by the Contracting Officer, denotes the beginning of the Warranty Period, defined in Section H.17. Acceptance activities shall utilize actual AIS data input and shall include an uninterrupted two-week test to evaluate operational availability. Particular emphasis shall be placed on verifying that the installed PSSs and NAIS installations meet their performance requirements and operate in their installed environment. As a part of system acceptance, the Contractor shall also demonstrate equipment operation, maintenance accessibility, removal and installation. Discrepancies, if any, must be resolved prior to full system acceptance.

3.1.1.8.2.4.2. IOC System Acceptance Test and Evaluation Report (CDRL 1.8.2.4.2). The Contractor shall document the results of all system acceptance tests in the IOC System Acceptance Test and Evaluation Report.

3.1.1.8.2.5. Government Oversight of System Verification and Validation Activities. The Contractor shall permit and assist the Government to oversee all verification and validation activities. In doing so, Contractor shall provide the necessary information, such as test schedule, test execution plan, expected results (where applicable), and test location as well as physical access to proposed test facilities, to allow oversight of verification and validation tasks. Oversight shall include the following:

a. Validation of activities to ensure that practice, methods, and procedures contained in the Quality Assurance Plan are being properly applied;

b. Verification that system elements at each level of the system hierarchy meet their built-to specifications;

c. Government product inspection of the NAIS elements prior to delivery to estimate their quality;

d. Verification of materials employed in the NAIS solution are being used in a safe and environmentally compliant manner;

e. Government product inspection of delivered system elements to ensure compliance with the NAIS requirements;

f. Verification of system performance with intended operational environment and users; and

g. Validation of Contractor support to the NAIS maintenance.

3.1.1.8.2.5.1. Inspection Records. The Contractor shall maintain records of all inspections and tests. The Government has the right to inspect at source, any supplies or services that were not manufactured or performed within the Contractor's facility. Any purchasing documents to a sub supplier shall cite the applicable portions of the contractually invoked quality standards (e.g., calibration, configuration requirements), plus any product requirements that apply to the supplies being purchased.

3.1.1.8.2.6. Independent Verification and Validation. The Government reserves the right to utilize an Independent Verification and Validation (IV&V) agent to verify the system is ready for OT&E. IV&V, when necessary, shall be performed by an organization independent of the development Contractor and the NAIS Project Office. The Government will notify the Contractor of the IV&V agent selected during the system design and review phase of the NAIS.

3.1.1.9. Contractor Support Services for Government-led Testing for IOC. In addition to the quality assurance and testing related efforts described in SOW Section 3.1.1.8, the Contractor shall support the test planning, testing and test reporting of Government led testing of the NAIS, as required by the Government. These tests, which include System Operational and Verification Testing (SOVT) and OT&E, shall be supported in a manner consistent with the efforts and plans described in SOW Section 3.1.1.8.

3.1.1.9.1. Operational Test and Evaluation.

3.1.1.9.1.1. Government OT&E. Operational Test and Evaluation (OT&E) shall be conducted by Government personnel with Contractor assistance, as ordered, to determine operational effectiveness and operational suitability (that include compatibility, interoperability, maintainability, and supportability), to identify risks and the need for modification, if applicable, to meet operational requirements. OT&E shall be conducted by system users (typical operational personnel) to ensure operational effectiveness and suitability are met. Desirable

OT&E results shall provide indication that the system has successfully achieved IOC and is ready for full rate production and deployment. For planning purposes supporting the IOC date, the Contractor may assume that OT&E execution, including reporting, will take approximately four (4) weeks to complete.

3.1.1.9.1.2. OT&E Objectives. The major NAIS OT&E objectives are summarized below:

a. Satisfy continuous receive (out to 50 nm of the baseline as well as navigable inland waterways) and transmit (out to 24 nm of the baseline as well as navigable inland waterways) coverage of the NAIS, regardless of tropospheric or weather conditions;

b. Ensure AIS data collection, storage, retrieval and data sharing via enterprise services;

c. Comply with network response time and latency between various installations;

d. Evaluate the RMA of the system;

e. Test the channel management capabilities of the system;

f. Satisfy system interoperability, network interface (e.g., display system), and the user interface (e.g., access and query the NAIS data);

g. Meet the security requirements of the system;

h. Verify logistics supportability, safety, training, personnel, and network management capabilities of the system; and

i. Verify proper operation of system between adjacent geographic control areas.

3.1.1.9.1.3. Additional OT&E Objectives. During the establishment of the NAIS IOC, additional OT&E activities will be performed to ensure that the SCC can effectively transmit all standard AIS messages, including binary messages, and that the NAIS can provide data to separate systems and organizations, which shall include at a minimum the SBU Common Operational Picture (COP), the Maritime Information for Safety and Law Enforcement (MISLE) application and the Intelligence Community via the Common Intelligence Picture and supporting systems (e.g., MAGNet). The NAIS will also be assessed to ensure real-time and archived data can be shared effectively with authorized external

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entities. Furthermore, access to all AIS functionality where required and the system capabilities of accommodating advances in AIS technology and changes to AIS standards shall be evaluated.

3.1.1.10. Travel. The Contractor shall perform and charge for travel in a manner consistent with Joint Federal Travel Regulations. Any required travel or other direct costs associated with the performance of the Contractor's duties must be authorized by the Contracting Officer in advance.

3.1.2. Establish the NAIS Initial Operational Capability – Implement AIS Coverage for Three (3) Coast Guard Sectors.

3.1.2.1. General. As required by the Government, the Contractor shall deliver the Initial Operational Capability (IOC) of the NAIS. In addition to delivering the core NAIS capability, described in SOW Section 3.1.1, the Contractor shall recommend the location of and implement the PSSs necessary to establish AIS receive and transmit coverage meeting the coverage requirements defined in the PSPEC and Attachment J.5 for the Coast Guard Sectors Delaware Bay, Hampton Roads and Mobile. At IOC, the NAIS shall meet all the requirements in the PSPEC, with the exception of those associated with AIS receive and transmit coverage beyond the designated IOC Sectors. IOC will be achieved upon successful completion and documentation of Government-led OT&E, discussed under SOW Section 3.1.1.9.1.1, which is in addition to Contractor developmental testing. The Contractor shall account for the estimated four weeks that the Government will require to complete and document OT&E as part of the schedule for reaching IOC. Also, prior to the Government's acceptance of IOC, the Contractor shall deliver the data associated with NAIS core capability design, as the Government will use the core design for nationwide deployment/implementation beyond IOC Sectors via separate contract(s). The Government reserves the right to choose alternative Sectors to establish IOC.

3.1.2.2. Sector Delaware Bay. As ordered by the Government to deliver IOC, the Contractor shall meet the requirements listed in this Section and the applicable testing sections of 3.1.1.8 to establish AIS coverage for Sector Delaware Bay, meeting the requirements in the PSPEC and the Sector coverage boundaries defined in Attachment J.5.

3.1.2.2.1. Sector Survey and Coverage Design Deliverables and Services.

3.1.2.2.1.1. Background. The process for identifying and selecting PSS sites for the NAIS must be collaborative between the Contractor and Government Teams. The Contractor and Government must recognize that each has very important role to play and that they are mutually dependent to be successful. Attachment J.10 provides a RF Coverage Design and PSS Site Selection Process that the Government has used successfully in the past. This is a shared process incorporating data and expertise from both the Contractor's and the Government's perspective. The meetings and deliverables required in the

following SOW sections are derived from the process presented in Attachment J.10.

3.1.2.2.1.2. PSS Site Identification and Selection Plan (CDRL 2.2.1.2). The Contractor shall develop, maintain and implement a PSS Site Identification and Selection Plan to detail the process and procedures by which PSS sites are discovered, evaluated, ranked and selected to meet the NAIS performance requirements at the lowest total life-cycle cost. The plan shall include a detailed schedule for completing all aspects of the siting work (for inclusion in the IMS), a list and description of all proposed deliverables, meetings, teleconferences, staffing plan and requirements for what GFI would be required and when in the process it would be required. The Contractor may propose to deviate from the process provided as Attachment J.10 to integrate the Contractor's established facility siting practices or processes, however, the following requirements, at a minimum shall be satisfied:

a. The process shall be in accordance with industry standards for siting communications towers or similar facilities and shall include a detailed technical approach for selecting all of the sites on a Sector basis;

b. The process shall address, at a minimum, all of the technical areas and issues covered by the Government provided process, and meet the deliverables, data and requirements called for in this SOW;

c. The process shall reflect a collaborative effort and understanding of the inherently governmental functions and timeframes associated with completing environmental planning and compliance functions under NEPA (42 U.S.C 4321) and with real property acquisitions (i.e., leases);

d. The process shall allow the Government the same or greater visibility into the Contractor work processes and work products as presented in Attachment J.10, in order to provide the Government with a high level of assurance that the sites selected are those that are the best to meet the cost, schedule, and performance needs of the project; and

e. The process shall minimize the probability of sites falling out late in the process and provide sufficient data on alternative sites so that schedule is not compromised if a site does fall out.

f. If the Contractor chooses to propose an alternative process, the proposed process shall be presented at least to the same level of detail as that provided in Attachment J.10.

3.1.2.2.1.3. PSS Site Selection IPTs. As part of the site identification and selection process, the Contractor shall facilitate and participate in the NAIS PSS Site

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Selection IPT. The Contractor shall develop Meeting Agendas and Meeting Minutes for all PSS Site Selection IPT meetings. The Contractor shall regularly assess the PSS site identification and selection process and incorporate Government input for improvements.

3.1.2.2.1.3.1. Meeting 1 – Sector Planning Kickoff Deliverables (CDRL 2.2.1.3.1). The Contractor shall facilitate a meeting to initiate the PSS site identification and selection process. At this meeting, the Contractor shall present technical and process issues related to the specific Sector(s) for which work is being initiated. The Contractor shall complete the necessary research on the specific Sector and potential PSS sites before the meeting.

3.1.2.2.1.3.2. PSS Site Selection Desktop Analysis Report (CDRL 2.2.1.3.2). The Contractor shall complete an initial PSS site selection desktop analysis of potential candidate sites to determine suitability for use by the NAIS project. The PSS site selection desktop analysis report shall, at a minimum, include the following:

a. A Summary of PSS Sites Reviewed and Description of each (which shall, at a minimum, include: location, tower information summary, site information summary, owner information summary, rationale for consideration and relative merits of use);

b. Coverage Analyses associated with each (each shall include model name and the parameters, calibration factors, and other inputs and assumptions used in model for the site);

c. Sector-specific Issues/Risks Associated with Achieving Coverage and Recommendations for Mitigating Risks;

d. For existing Government facilities where as-built drawings are available, an assessment of shelter space availability based on as-built drawings;

e. Preliminary Candidate List and Supporting Documentation; and

f. Network Connectivity Analysis and Recommendations.

3.1.2.2.1.3.3. Meeting 2 – Desktop Analysis and Pre-Screen Survey Candidate PSS Site Review Deliverables (CDRL 2.2.1.3.3). At the second site identification and selection meeting, the data presented in CDRL 2.2.1.3.2 shall be discussed. The outcome of the meeting shall be a final list of PSS sites that will be visited for a pre-screen survey. These sites shall be documented in the Meeting Minutes.

3.1.2.2.1.3.4. Pre-Screen Survey and Proposed PSS Site Rankings Report (CDRL 2.2.1.3.4). The Contractor shall perform pre-screen surveys of the candidate sites agreed to by the Government in Meeting 2. The Government will accompany the Contractor on the surveys. The focus of the pre-screen surveys shall be to identify and document any and all issues that determine a tower or PSS site to be unacceptable for any reason (e.g., radio frequency interference, environmental concerns, significant structural problems, infrastructure deficiencies such as network connectivity, power, and real estate issues). The Contractor shall develop a Pre-Screen Survey and Proposed PSS Site Rankings Report to document the findings of the pre-screen survey. The documentation for the Proposed PSS Site Rankings Report shall, at a minimum, include:

a. Primary PSS Sites Recommended for Coverage Design, with details on each site that shall, at a minimum, include: location, site information, tower information, facility assessment (e.g., preliminary structural, power, heating, ventilation, and air conditioning (HVAC), access and network connectivity availability), RF environment and revised coverage model (as necessary), environmental and cultural resource issues and real property issues;

b. Alternative PSS Sites Recommended, with details on each site that shall, at a minimum, include: location, site information, tower information, facility assessment (e.g., preliminary structural, power, HVAC, access and network connectivity availability), RF environment and revised coverage model (as necessary), environmental issues (including cultural resource issues) and real property issues. Alternative PSS sites are required for each primary site;

c. PSS Site Evaluation, Scoring and Ranking, which includes:

    1. Adjustments Made because of PSS Site Interdependencies;

    2. Recommended Regional PSS Site Geography;

    3. Other Viable PSS Site Geographies; and

    4. Comparison Table of Viable PSS Site Geographies.

d. Preliminary Work Site Action Plans (WSAPs) for proposed sites

e. Pre-Screen Survey Field Notes.

3.1.2.2.1.3.5. Meeting 3 – Post-Pre-Screen Survey Review Deliverables (CDRL 2.2.1.3.5). Following the pre-screen surveys, the Contractor shall hold a meeting with the Government to review the survey notes, the PSS site rankings developed and preliminary Work Site Action Plans (WSAPs) for the proposed PSS sites. The Contractor shall prepare for and facilitate this meeting with the following outcome goals: 1) A final list of candidate PSS sites shall be developed and approved; 2) The Contractor's proposed WSAPs shall be reviewed for completeness and accuracy, which will determine the special studies, analyses and specific documentation to be developed for items such as network connectivity, inter-modulation, structural, real property and environmental issues; 3) Timeframes for completing necessary follow-on actions shall be reviewed and verified; and 4) Any requirements for new builds and PSS sites that pose schedule risks shall be identified and agreed upon. All outcomes shall be documented in the Meeting Minutes.

3.1.2.2.1.3.6. Post-Meeting 3 Documentation (CDRL 2.2.1.3.6). In accordance with the WSAPs, the Contractor shall prepare preliminary versions of the special studies, analyses and documentation established during Meeting 3 (see SOW Section 3.1.2.2.1.3.5) to be relevant and necessary for the approved candidate sites. Depending on the nature of the PSS sites within the Sector, relevant documentation may include the following: Tower Structural Assessment, Federal Aviation Administration Documentation (Attachment J.11), Inter-Modulation Analysis, and an Environmental and Cultural Resource Risk Assessment. All deliverables shall be PSS site-specific. If the Government and Contractor determine that a new tower build will be required as a result of the discussions and document review completed during Meeting 3, the Contractor shall follow the requirements detailed in SOW Section 3.1.2.2.1.3.11 for new-build requirements and deliverables.

3.1.2.2.1.3.7. Meeting 4 – Pre-Detailed PSS Site Survey Review Deliverables (CDRL 2.2.1.3.7). Following the completion of the PSS site-specific deliverables associated with the WSAPs, the Contractor shall facilitate a meeting to review all deliverables generated and establish the final list of PSS sites. The outcome of the meeting will be a final list of sites to be surveyed in detail for the NAIS equipment installation. The list of PSS sites approved for a detailed survey shall be documented in Meeting Minutes.

3.1.2.2.1.3.8. Detailed PSS Site Survey Report (CDRL 2.2.1.3.8). The Contractor shall conduct detailed surveys of the approved PSS sites to collect data required to complete PSS site assessments. The Government will accompany the Contractor on the surveys. The data collected shall, at a minimum, include the data required to complete Attachments J.13

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(Environmental Site Assessment Checklist), J.14 (Site Identification Information Checklist), J.15 (Frequency Authorization Request), and J.26 (Network Connectivity Agreement Data Collection Form) for each site. Following the detailed PSS site surveys, the Contractor shall prepare and submit a Detailed PSS Site Survey Report, providing the following information:

a. Primary PSS Sites Recommended for Coverage Design, with details on each PSS site that shall, at a minimum, include: location, site information, tower information, facility assessment (e.g., preliminary structural, network connectivity, power, HVAC, access and network connectivity availability and options) environmental and cultural resource issues and real property issues;

b. Alternative PSS Sites Recommended, with details on each site that shall, at a minimum, include: location, site information, tower information, facility assessment (e.g., preliminary structural, network connectivity, power, HVAC, access and network connectivity availability and options) environmental issues (including cultural resource issues) and real property issues. The objective is to have enough information to proceed with an alternative PSS site without requiring significant site re-work or delays for additional data collection and surveys if the primary site falls out or becomes unworkable; and

c. PSS Site Evaluation, Scoring and Ranking, which includes:

    1. Adjustments made because of PSS site interdependencies;

    2. Recommended Regional PSS Site Geography;

    3. Other viable PSS site Geography; and

    4. Comparison table of viable PSS site geographies.

3.1.2.2.1.3.9. Meeting 5 – Post-Detailed PSS Site Survey Review Deliverables (CDRL 2.2.1.3.9). Following the detailed PSS site surveys, the Contractor shall facilitate a meeting with the Government to review the results of the detailed PSS site surveys and the Contractor's recommended PSS sites. The meeting shall establish the pre-final list of PSS sites for the Sector(s) that will be fully documented. The pre-final list of PSS sites and any alternatives shall be identified in the Meeting Minutes.

3.1.2.2.1.3.10. Post-Meeting 5 Documentation (CDRL 2.2.1.3.10). For each PSS site included on the pre-final list, the Contractor shall complete

drawings and revisions for the site, tower or other structure, shelter, utilities and any other modifications that will be required for the Government to acquire or lease the PSS site for equipment installation. The Contractor shall also complete Rough Order of Magnitude pricing (which includes an explanation of methods used, assumptions, and confidence of accuracy) and schedule (which includes Government and Contractor activities and their interdependencies and reflects a true understanding of the timeframes required for each activity) by PSS site for installation of NAIS equipment. The Contractor shall finalize completion of Attachments J.13, J.14, J.15 and J.26. The Contractor shall also complete a Tower Structural Assessment and Wind-Load Analysis, Inter-Modulation Analysis, Phase I Environmental Due Diligence Audit, and Collocation Application (Attachment J.12), as required. The Contractor shall also provide documentation that, at a minimum, addresses the following issues:

a. PSS Site Installation Issues and Risks and Recommended Action for Mitigating Risks; and

b. Network Connectivity, which includes:

1. Current status of network;

2. Network Connectivity Analysis and Requirements;

3. New Circuits Required (if any);

4. Network Configuration including Internet Protocol (IP) Addressing Requirements;

5. Network Security Analysis and Requirements; and

6. Network Implementation Schedule.

3.1.2.2.1.3.11. Information for New Tower Builds.

3.1.2.2.1.3.11.1. Background. The nature of new site development and tower construction, in particular the coordination of environmental compliance requirements, requires a collaborative effort between the Contractor and the Government. The following sections describe the work requirements for ensuring thorough planning and coordination of a wide variety of site development tasks.

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3.1.2.2.1.3.11.2. Third Party Builds. As a part of the PSS site identification and selection recommendation process, the Contractor shall determine what types of PSS sites are available for new tower construction. The Contractor shall explore the availability of 3rd party build options such that the Government would occupy as a tenant, however, the Contractor does not have the authority to obligate the Government to any third party property transactions. When a new tower build is assessed to be necessary, the Contractor shall determine if the Government currently owns/leases property suitable for use. If not, the Contractor shall determine if there is other federally-owned or leased property available for use. If not, the Contractor shall determine if there is private property available for lease or purchase that would be suitable for use. Also, the Contractor shall estimate the costs of a third party build options to ensure compliance with OMB Circular A-11, which prohibits the Government from entering a third party build leases if the costs for a 20-year lease exceed the costs of building a Government-owned site. After review of the initial planning documents, the Government shall determine whether a PSS site will be a third-party built or Government-owned built tower.

3.1.2.2.1.3.11.3. New Tower Documentation (CDRL 2.2.1.3.11.3). The Contractor shall prepare general PSS site location maps for use in determining interest for 3rd party tower builder and PSS site requirements (tower height, type, shelter type, equipment space, utility requirements and other specifications required). If a new tower will be owned by the Government, the Contractor shall complete additional documentation as required to support the new construction. This documentation shall include Attachments J.13, J.14, J.15, J.26, site plans and drawings, Rough Order of Magnitude Pricing and Schedule, Tower Structural Assessment and Wind-Load Assessment, Inter-Modulation Analysis, Phase I Environmental Due Diligence Audit, Geotechnical Survey and Report, New Tower Build Siting and Construction Specifications (by site), and a New Tower Build Siting Report and Recommendation.

3.1.2.2.1.3.12. Meeting 6 – Final PSS Site Selection Review Deliverables (CDRL 2.2.1.3.12). The Contractor shall facilitate a meeting with the Government to review all of the documentation generated following the Post Detailed PSS Site Survey Review and discuss the status of any new tower builds, reviewing any documentation that may be available for those at the time Meeting 6 is conducted. The meeting shall establish the final Government approved list of PSS sites and PSS site geometry for the Sector(s) under consideration, to be documented in the Meeting Minutes. With approval of the PSS site(s), the Government will then execute lease activities as required.

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3.1.2.2.1.3.13. Sector PSS Site Selection Report (CDRL 2.2.1.3.13). The Contractor shall develop and deliver a Sector PSS Site Selection Report. The Sector PSS Site Selection Report shall be used as the basis for all follow-on compliance, lease, design, construction, and installation documents and activities. The Sector PSS Site Selection Report shall consist of all of the final documents prepared for selected PSS sites, including the information required to complete a Telecommunications Service Request. If there are new tower builds and the documentation is not completed in time for inclusion, it shall be provided as soon as it is available (see SOW Section 3.1.2.2.1.3.11). The documentation developed for any unselected PSS sites shall be included as an appendix. The Sector PSS Site Selection Report shall include a full bibliography that contains the following for all references used throughout the siting process for each sector:

a. GFI (Summary, including full bibliographic citations, of the GFI that was used);

b. Other Government Documents (Summary, including full bibliographic citations, of the other Government documents that were used); and

c. Non-Government Documents (Summary, including full bibliographic citations, of the non-Government documents that were used).

3.1.2.2.2. PSS and SCC Site Specific Design (CDRL 2.2.2). Following Government approval of the site selection, the Contractor shall develop, maintain and provide a site specific design for each PSS site and the respective SCC site in conformance with the SDD, establishing AIS coverage for the Sector to meet this SOW and the PSPEC. The PSS and SCC Site Specific Design shall describe how to safely and adequately accommodate the new AIS equipment, which, at a minimum, includes addressing the following issues:

a. Identify special site safety considerations and specify instructions for site installation team to follow regarding any special safety issues;

b. Identify and specify handling/special construction/mitigation instructions and requirements for any special environmental factors (e.g., asbestos and lead-based paint);

c. Complete listing of equipment and materials, to include hardware, software and firmware for the site installation;

d. Develop or verify as necessary the detailed structural analysis for tower or affected structures and develop necessary engineering plans and specifications for structural modifications needed to accommodate the new equipment for the NAIS, incorporating details from the most recent tower inspection and maintenance reports;

e. Perform electrical, cooling and heating load analysis and develop detailed engineering plans and specifications to provide for new or modifications to existing services to support the NAIS equipment;

f. Verify and refine as necessary space and structure requirements for the NAIS site equipment, include installation drawings, foundation and penetration details as necessary, plan views, evaluations, mounting details, and one-line electrical and electronic diagrams;

g. Design and develop drawings and equipment detail to reflect WAN/LAN network connectivity for the site;

h. All single-line, site plan, elevation and configuration drawings shall be prepared in sufficient detail to enable a 3rd party installation Contractor to install the NAIS equipment;

i. Coordinate with Government commands, to include the appropriate USCG MLC, Civil Engineering Unit, ESU and local unit Command to schedule and provide arrangements for installation of the antennas and the NAIS equipment at all designated towers and facilities owned by the Government; and

j. Resolve technical and coordination issues associated with the design and installation of the sites.

3.1.2.2.2.1. Timeline. For each PSS site, the Contractor shall complete and submit a PSS and SCC Site Specific Design no later than 30 days after the site is approved by the Government.

3.1.2.2.2.2. Tower Design. The Contractor shall be responsible for recommending the proper tower design and height to prevent for five years terrain screening, installing equipment, power, and remote interfaces to the sites, and providing physical access, physical security, and maintenance. As an element in the PSS and SCC Site Specific Design (see SOW Section 3.1.2.2.2), the Contractor shall document and submit the design of these towers and other structures to the Government for approval. The Contractor shall perform soil analysis (bore samples) as part of their structural analysis. The Contractor shall complete tower mapping and structural surveys including soil analysis for each PSS site selected for installation of the NAIS equipment. Mapping and structural surveys

shall be completed in accordance with ANSI/TIA-222-G-2005 and follow formats required by the tower/building owner.

3.1.2.2.2.3. Hardware and Software Installation Design Details. As an element in the PSS and SCC Site Specific Design (see SOW Section 3.1.2.2.2), the Contractor shall clearly identify and specify hardware/software to be installed, detail equipment footprints and orientation, any required PSS site preparations, all cable paths and types, power supply and detail all steps to be conducted during installation.

3.1.2.2.3. Site Equipment Acquisition, Configuration, Testing and Shipment.

3.1.2.2.3.1. Equipment for SCCs or Other LSS Locations. The Contractor shall procure, configure and test in accordance with the System Design Document, System Product Specifications, approved configuration baseline and approved test plan(s) all of the NAIS equipment (hardware and software) that will be installed at the SCCs (as required). The Contractor shall handle and ship the equipment in accordance with SOW Section 3.1.1.5.10 and the approved Integrated Support Plan (ISP) (see SOW Section 3.1.1.5.1.8) to the locations required for the Sector being implemented.

3.1.2.2.3.2. Equipment for PSSs at leased or new build sites not located with existing USCG equipment. The Contractor shall procure, configure and test in accordance with the System Design Document, System Product Specifications, the approved configuration baseline and approved test plan(s) all of the NAIS equipment (hardware and software) that will be installed at PSSs located at leased or new build sites not collocated with existing USCG equipment. The Contractor shall handle and ship the equipment in accordance with SOW Section 3.1.1.5.10 and the approved Integrated Support Plan (ISP) (see SOW Section 3.1.1.5.1.8) to the locations required for the Sector being implemented.

3.1.2.2.3.3. Equipment for PSSs at sites located with existing USCG equipment. The Contractor shall procure, configure and test in accordance with the System Design Document, System Product Specifications, the approved configuration baseline and approved test plan(s) all of the NAIS equipment (hardware and software) that will be installed at PSSs collocated with existing USCG equipment. The Contractor shall handle and ship the equipment in accordance with SOW Section 3.1.1.5.10 and the approved Integrated Support Plan (ISP) (see SOW Section 3.1.1.5.1.8) to the locations required for the Sector being implemented.

3.1.2.2.4. PSS Site Construction and Modifications.

3.1.2.2.4.1. Schedule and Execution. The Contractor shall be responsible for scheduling and executing all facility and site construction and modifications in

accordance with the PSS and SCC Site Specific Design to produce a solution that conforms to the SDD and meets the requirements of the PSPEC to establish AIS coverage for the Sector.

3.1.2.2.4.2. Coordination. The Contractor shall work with the Government to coordinate the equipment installations with the receiving units and appropriate stakeholders (which include Government authorities, site owners, installation Contractors and regulatory agencies) to minimize any operational impacts or down time of existing systems.

3.1.2.2.4.3. Supervision. The Contractor shall be responsible for supervising the installation teams to ensure quality control, configuration management, and the required performance is achieved. The Contractor shall take proactive steps to correct any deficiencies noted by its on-site personnel and the Government representative. The Contractor shall inform the Government of any concerns or issues and actions taken.

3.1.2.2.4.4. Safety and Accident Prevention. The Contractor shall comply with all applicable safety and occupational health requirements set forth in the OSHA General Industry Standards and as described in the EPSH Plan (see SOW Section 3.1.1.2.8). If the Contractor fails to comply promptly with safety requirements, the Contracting Officer may issue an order to stop all or part of the work until the Contractor has taken appropriate corrective action.

3.1.2.2.4.5. Building Code Compliance. The Contractor shall construct or modify any facilities or structures required under this contract, including PSSs and operational facilities, to conform to the SDD and Site Specific Designs, meet the PSPEC requirements, and comply with local, state, and national regulations and building codes.

3.1.2.2.4.6. Environmental Compliance. The Contractor shall conform to the EPSH Plan (see SOW Section 3.1.1.2.8), all site-specific restrictions and requirements in all site-specific permits and NEPA documentation, and comply with all other applicable Federal, State and local environmental regulations while implementing the NAIS.

3.1.2.2.4.7. Existing Facility Modifications. The Contractor shall schedule and execute facility modifications, including PSS tower and shelter, SOC, EDC and SCC modifications to accommodate all of the NAIS equipment and services as required to meet this SOW and the PSPEC to achieve IOC. Prior to executing the facility modifications, the Contractor shall evaluate the facility modifications with any collocated USCG equipment to ensure any proposed facility modifications will not adversely affect the services or operations of the collocated USCG equipment.

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3.1.2.2.4.8. New Tower and Shelter Construction. The Contractor shall plan, construct and install new towers and shelters (including foundations, as needed) when necessary to implement approved sites for sector coverage and a suitable tower or shelter do not exist. The towers and shelters shall be implemented in conformance with the SDD and the Site Specific Design and in accordance with the PSPEC and any applicable local regulations to reach IOC. The Contractor shall be responsible for providing all equipment, power, and remote network interfaces to the sites; and providing physical access and physical security during the construction and installation.

3.1.2.2.5. Equipment Installation.

3.1.2.2.5.1. Equipment Installation at SCCs. The Contractor shall provide, integrate, and install all required system components (internal and external), interconnect them as required, and test the system to ensure conformance with the SDD, the PSS and SCC Site Specific Design and system performance in accordance with the test plans and the PSPEC to reach IOC. The Contractor shall be responsible for managing the installation of the equipment, to include the following:

a. Coordinating and conducting follow-on SCC site surveys as necessary to ensure that all deployment and installation issues are resolved and the site is ready for installation;

b. Establishing and maintaining a SCC site installation schedule and notifying the Government if the installation schedule changes;

c. Coordinating the installation of the NAIS equipment to minimize disruption of the operation of existing equipment and providing, at a minimum, two weeks notice to the Government of any expected impact to the operation of existing equipment for the period of NAIS equipment installation.

d. Installation of all of the NAIS equipment in accordance with COMDTINST M10550.25 (the USCG Electronics Manual) and the National Electrical Code; and

e. Ensuring existing facility equipment and structures are protected and that the SCC site is clean and free of debris and trash generated as a course of the AIS equipment installation upon completion. Any damage caused as a result of the work being performed shall be corrected by the Contractor prior to PSS site acceptance.

3.1.2.2.5.2. Equipment Installation for PSSs at leased or new build sites not located with existing USCG equipment. The Contractor shall provide, integrate, and install all required system components (internal and external),

interconnect them as required, and test the system to ensure conformance with the SDD, the PSS and SCC Site Specific Design and system performance in accordance with the test plans and the PSPEC to reach IOC. The Contractor shall be responsible for managing the installation of the equipment, to include the following:

a. Coordinating and conducting follow-on PSS site surveys as necessary to ensure that all deployment and installation issues are resolved and the site is ready for installation;

b. Establishing and maintaining a PSS site installation schedule and notify the Government if the installation schedule changes;

c. Installation of all of the NAIS equipment in accordance with COMDTINST M10550.25 (the USCG Electronics Manual) and the National Electrical Code; and

d. Ensuring existing facility equipment and structures are protected and that the PSS site is clean and free of debris and trash generated as a course of the AIS equipment installation upon completion. Any damage caused as a result of the work being performed shall be corrected by the Contractor prior to PSS site acceptance.

3.1.2.2.5.3. Equipment Installation for PSSs at sites located with existing USCG equipment. The Contractor shall provide, integrate, and install all required system components (internal and external), interconnect them as required, and test the system to ensure conformance with the SDD, the PSS and SCC Site Specific Design and system performance in accordance with the test plans and the PSPEC to reach IOC. The Contractor shall be responsible for managing the installation of the equipment, to include the following:

a. Coordinating and conducting follow-on PSS site surveys as necessary to ensure that all deployment and installation issues are resolved and the site is ready for installation;

b. Establishing and maintaining a PSS site installation schedule and notifying the Government if the installation schedule changes;

c. Coordinating the installation of the NAIS equipment to minimize disruption of the operation of existing equipment and providing, at a minimum, two weeks notice to the Government of any expected impact to the operation of existing equipment for the period of NAIS equipment installation.

d. Installation of all of the NAIS equipment in accordance with COMDTINST M10550.25 (the USCG Electronics Manual) and the National Electrical Code; and

e. Ensuring existing facility equipment and structures are protected and that the PSS site is clean and free of debris and trash generated as a course of the AIS equipment installation upon completion. Any damage caused as a result of the work being performed shall be corrected by the Contractor prior to PSS site acceptance.

3.1.2.2.6. Sector PSS Site Installation As-Built Documentation (CDRL 2.2.6). The Contractor shall develop, maintain and provide as-built documentation for each site within 30 days of installation in accordance with requirements outlined in SOW Section 3.1.1.5.5.6. Drawings shall be updated by the Contractor to reflect any post installation changes made to the PSS site prior to transfer to the Government for operational support and maintenance. The Contractor shall prepare drawings, photos of installation, equipment inventory of installation, including serial numbers, antenna height, antenna location (Latitude /Longitude in decimal degrees in North American Datum 1984 format), IP addresses, telephone numbers (if Public-switched Telecommunications Network modem installed), any configuration settings or files from all equipment. Drawings shall include rack layouts and system interconnection diagrams identifying cable types, connection locations (port numbers), connection type and pin-out diagrams.

3.1.2.2.7. Travel. The Contractor shall perform and charge for travel in a manner consistent with Joint Federal Travel Regulations. Any required travel or other direct costs associated with the performance of the Contractor's duties must be authorized by the Contracting Officer in advance.

3.1.2.3. Sector Hampton Roads. As ordered by the Government to deliver IOC, the Contractor shall meet the requirements listed in SOW Sections 3.1.2.2.1, 3.1.2.2.2, 3.1.2.2.3, 3.1.2.2.4, 3.1.2.2.5, 3.1.2.2.6, and 3.1.2.2.7 to establish NAIS coverage for Sector Hampton Roads meeting the requirements of the PSPEC and the Sector coverage boundaries defined in Attachment J.5.

3.1.2.4. Sector Mobile. As ordered by the Government to deliver IOC, the Contractor shall meet the requirements listed in SOW Sections 3.1.2.2.1, 3.1.2.2.2, 3.1.2.2.3, 3.1.2.2.4, 3.1.2.2.5, 3.1.2.2.6, and 3.1.2.2.7 to establish NAIS coverage for the coastal area (not inclusive of designated Western Rivers Locations) of Sector Mobile meeting the requirements of the PSPEC and the Sector coverage boundaries defined in Attachment J.5.

3.1.3. Initial Logistics Support, Sector Survey, Coverage Design, and Equipment Acquisition for NAIS Full Operational Capability.

3.1.3.1. Support for Establishing NAIS Full Operational Capability.

3.1.3.1.1. General. As required by the Government under the base and option periods of this contract, the Contractor shall provide systems engineering services, Sector coverage design and PSS site selection recommendations, support for Government-led testing, initial logistics support services for installed NAIS equipment and delivery of configured PSS and SCC equipment (hardware and software) to support the Government in establishing NAIS coverage in post-IOC Sectors to achieve Full Operational Capability (FOC) for the NAIS. The Contractor shall work openly and collaboratively with any other Contractor(s) the Government selects under the NAIS Phase II contract, meeting on a monthly basis or as necessary, to help achieve the NAIS FOC. The listing of Post-IOC Sectors under this section does not necessarily represent the order in which the work will be implemented.

3.1.3.1.2. Project Management and Systems Engineering Services in Support of Establishing FOC. Following completion of the NAIS core capability development, integration, testing and delivery to establish IOC, the Contractor shall provide project management (including data management support) and systems engineering services as described by the approved CPMP and SEMP and as required by the Government to support the project in achieving nationwide AIS coverage required for NAIS Full Operational Capability (FOC). These services shall include the full range (see SOW Section 3.1.1) of and project management-related activities to plan, coordinate and complete post-IOC work and systems engineering-related activities for the NAIS core system (e.g., trade studies, modeling and simulation, testing, reviews and implementation) to facilitate design, development, implementation and documentation of core system changes that are required by the Government to accommodate full nationwide deployment. The scope of changes may, at a minimum, include: design modifications and implementation of changes to the core system to facilitate a PSS configuration that integrates with existing vessel traffic service AIS sites, development and implementation of engineering change proposals and requests, technology refreshment, and pre-planned improvements. This support shall include upkeep of system configuration management, design and project data for the NAIS as deployed and transition of data upon order by the Government, in accordance with the Configuration Management (see SOW Section 3.1.1.3.6) and IPDE Management plans and requirements (see SOW Section 3.1.1.2.12.1.1).

3.1.3.1.2.1. Contractor Support Services for Government-led Testing in Support of Establishing FOC. In addition to the quality assurance and testing related efforts described in SOW Section 3.1.1.8, the Contractor shall support the test planning, testing and test reporting of Government led testing of the NAIS, as required by the Government. These tests, include System Operational and Verification Testing (SOVT) and shall be supported in a manner consistent with the efforts and plans described in SOW Section 3.1.1.8.

3.1.3.1.2.2. Travel. The Contractor shall perform and charge for travel in a manner consistent with Joint Federal Travel Regulations. Any required travel or other

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direct costs associated with the performance of the Contractor's duties must be authorized by the Contracting Officer in advance.

3.1.3.2. Initial Logistics Support Deliverables and Services. The Contractor shall provide initial logistics support consistent with the logistics-related provisions of SOW Section 3.1.1.5, including:

3.1.3.2.1. Field Support Desk Operations and Support. Provide FSD operations and support (see SOW Section 3.1.1.5.2.10).

3.1.3.2.2. Initial Preventative Maintenance and Warranty Administration. Provide initial preventative and corrective maintenance support (see SOW Section 3.1.1.5.1.7). Provide warranty administration (see SOW Section 3.1.1.5.2.11).

3.1.3.2.3. Initial Corrective Maintenance. Provide initial preventative and corrective maintenance support (see SOW Section 3.1.1.5.1.7).

3.1.3.2.4. Initial Spares. Provide initial spares and spares management, in accordance with the ISP (see SOW Section 3.1.1.5.1.8).

3.1.3.2.5. Training. Provide training services, in accordance with the Training/Performance Intervention Plan (see SOW Section 3.1.1.5.7.2).

3.1.3.2.6. Technical Data and IETM Maintenance and Transition. Upon delivery of IOC of the NAIS, the Contractor shall, as ordered, maintain the NAIS Technical Data and IETM and transition the data and IETM to the Government (see SOW Section 3.1.1.5.5).

3.1.3.2.7. Travel. The Contractor shall perform and charge for travel in a manner consistent with Joint Federal Travel Regulations. Any required travel or other direct costs associated with the performance of the Contractor's duties must be authorized by the Contracting Officer in advance.

3.1.3.3. Site Equipment Acquisition, Configuration, Testing and Shipment.

3.1.3.3.1. Equipment for SCCs or Other LSS Locations. Upon exercise of the optional task by the Government, the Contractor shall procure, configure and test in accordance with the System Design Document, System Product Specifications, approved configuration baseline and approved test plan(s) the suite of NAIS equipment (hardware and software) that will be installed at an SCC (as required). The Contractor shall conduct a Physical Configuration Audit, (consistent the approved Functional and Physical Configuration Audit Plan, required by SOW Section 3.1.1.3.6.7.2) of each equipment suite prior to shipment and provide that report to Government with the shipment. The Contractor shall handle and ship the

equipment in accordance with SOW Section 3.1.1.5.10 and the approved Integrated Support Plan (ISP) (see SOW Section 3.1.1.5.1.8) to the locations required for the Sector being implemented.

3.1.3.3.2. Equipment for PSSs at leased or new build sites not located with existing USCG equipment. Upon exercise of the optional task by the Government, the Contractor shall procure, configure and test in accordance with the System Design Document, System Product Specifications, the approved configuration baseline and approved test plan(s) the suite of NAIS equipment (hardware and software) that will be installed at a PSS located at leased or new build sites not collocated with existing USCG equipment. The Contractor shall conduct a Physical Configuration Audit, (consistent the approved Functional and Physical Configuration Audit Plan, required by SOW Section 3.1.1.3.6.7.2) of each equipment suite prior to shipment and provide the report to Government with the shipment. The Contractor shall handle and ship the equipment in accordance with SOW Section 3.1.1.5.10 and the approved Integrated Support Plan (ISP) (see SOW Section 3.1.1.5.1.8) to the locations required for the Sector being implemented.

3.1.3.3.3. Equipment for PSSs at sites located with existing USCG equipment. Upon exercise of the optional task by the Government, the Contractor shall procure, configure and test in accordance with the System Design Document, System Product Specifications, the approved configuration baseline and approved test plan(s) the suite of NAIS equipment (hardware and software) that will be installed at a PSS collocated with existing USCG equipment. The Contractor shall conduct a Physical Configuration Audit, (consistent the approved Functional and Physical Configuration Audit Plan, required by SOW Section 3.1.1.3.6.7.2) of each equipment suite prior to shipment and provide the report to Government with the shipment. The Contractor shall handle and ship the equipment in accordance with SOW Section 3.1.1.5.10 and the approved Integrated Support Plan (ISP) (see SOW Section 3.1.1.5.1.8) to the locations required for the Sector being implemented.

3.1.3.4. Sector Baltimore. Upon exercise of the optional task by the Government, the Contractor shall provide the services described by the following Sections to support the Government in establishing NAIS coverage for Sector Baltimore. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.4.1. Sector Survey and Coverage Design Deliverables and Services.

3.1.3.4.1.1. PSS Site Identification and Selection Plan. The Contractor shall adhere to the approved PSS Site Identification and Selection Plan and the approved process and procedures by which PSS sites are discovered, evaluated, ranked and selected to meet the NAIS performance requirements at the lowest total life-cycle cost.

3.1.3.4.1.2. PSS Site Selection IPTs. As part of the site identification and selection process, the Contractor shall facilitate and participate in the NAIS PSS Site Selection IPT. The Contractor shall develop Meeting Agendas and Meeting Minutes for all PSS Site Selection IPT meetings. The Contractor shall regularly assess the PSS site identification and selection process and incorporate Government input for improvements.

3.1.3.4.1.2.1. Meeting 1 – Sector Planning Kickoff Deliverables (CDRL 2.2.1.3.1). The Contractor shall facilitate a meeting to initiate the PSS site identification and selection process. At this meeting, the Contractor shall present technical and process issues related to the specific Sector(s) for which work is being initiated. The Contractor shall complete the necessary research on the specific Sector and potential PSS sites before the meeting.

3.1.3.4.1.2.2. PSS Site Selection Desktop Analysis Report (CDRL 2.2.1.3.2). The Contractor shall complete an initial PSS site selection desktop analysis of potential candidate sites to determine suitability for use by the NAIS project. The PSS site selection desktop analysis report shall, at a minimum, include the following:

a. A Summary of PSS Sites Reviewed and Description of each (which shall, at a minimum, include: location, tower information summary, site information summary, owner information summary, rationale for consideration and relative merits of use);

b. Coverage Analyses associated with each (each shall include model name and the parameters, calibration factors, and other inputs and assumptions used in model for the site);

c. Sector-specific Issues/Risks Associated with Achieving Coverage and Recommendations for Mitigating Risks;

d. For existing Government facilities where as-built drawings are available, an assessment of shelter space availability based on as-built drawings;

e. Preliminary Candidate List and Supporting Documentation; and

f. Network Connectivity Analysis and Recommendations.

3.1.3.4.1.2.3. Meeting 2 – Desktop Analysis and Pre-Screen Survey Candidate PSS Site Review Deliverables (CDRL 2.2.1.3.3). At the second site identification and selection meeting, the data presented in CDRL 2.2.1.3.2 shall be discussed. The outcome of the meeting shall be a

final list of PSS sites that will be visited for a pre-screen survey. These sites shall be documented in the Meeting Minutes.

3.1.3.4.1.2.4. Pre-Screen Survey and Proposed PSS Site Rankings Report (CDRL 2.2.1.3.4). The Contractor shall perform pre-screen surveys of the candidate sites agreed to by the Government in Meeting 2. The Government will accompany the Contractor on the surveys. The focus of the pre-screen surveys shall be to identify and document any and all issues that determine a tower or PSS site to be unacceptable for any reason (e.g., radio frequency interference, environmental concerns, significant structural problems, infrastructure deficiencies such as network connectivity, power, and real estate issues). The Contractor shall develop a Pre-Screen Survey and Proposed PSS Site Rankings Report to document the findings of the pre-screen survey. The documentation for the Proposed PSS Site Rankings Report shall, at a minimum, include:

a. Primary PSS Sites Recommended for Coverage Design, with details on each site that shall, at a minimum, include: location, site information, tower information, facility assessment (e.g., preliminary structural, power, heating, ventilation, and air conditioning (HVAC), access and network connectivity availability), RF environment and revised coverage model (as necessary), environmental and cultural resource issues and real property issues;

b. Alternative PSS Sites Recommended, with details on each site that shall, at a minimum, include: location, site information, tower information, facility assessment (e.g., preliminary structural, power, HVAC, access and network connectivity availability), RF environment and revised coverage model (as necessary), environmental issues (including cultural resource issues) and real property issues. Alternative PSS sites are required for each primary site;

c. PSS Site Evaluation, Scoring and Ranking, which includes:

    1. Adjustments Made because of PSS Site Interdependencies;

    2. Recommended Regional PSS Site Geography;

    3. Other Viable PSS Site Geographies; and

    4. Comparison Table of Viable PSS Site Geographies.

d. Preliminary Work Site Action Plans (WSAPs) for proposed sites

e. Pre-Screen Survey Field Notes.

3.1.3.4.1.2.5. Meeting 3 – Post-Pre-Screen Survey Review Deliverables (CDRL 2.2.1.3.5). Following the pre-screen surveys, the Contractor shall hold a meeting with the Government to review the survey notes, the PSS site rankings developed and preliminary Work Site Action Plans (WSAPs) for the proposed PSS sites. The Contractor shall prepare for and facilitate this meeting with the following outcome goals: 1) A final list of candidate PSS sites shall be developed and approved; 2) The Contractor's proposed WSAPs shall be reviewed for completeness and accuracy, which will determine the special studies, analyses and specific documentation to be developed for items such as network connectivity, inter-modulation, structural, real property and environmental issues; 3) Timeframes for completing necessary follow-on actions shall be reviewed and verified; and 4) Any requirements for new builds and PSS sites that pose schedule risks shall be identified and agreed upon. All outcomes shall be documented in the Meeting Minutes.

3.1.3.4.1.2.6. Post-Meeting 3 Documentation (CDRL 2.2.1.3.6). In accordance with the WSAPs, the Contractor shall prepare preliminary versions of the special studies, analyses and documentation established during Meeting 3 (see SOW Section 3.1.3.4.1.2.5) to be relevant and necessary for the approved candidate sites. Depending on the nature of the PSS sites within the Sector, relevant documentation may include the following: Tower Structural Assessment, Federal Aviation Administration Documentation (Attachment J.11), Inter-Modulation Analysis, and an Environmental and Cultural Resource Risk Assessment. All deliverables shall be PSS site-specific. If the Government and Contractor determine that a new tower build will be required as a result of the discussions and document review completed during Meeting 3, the Contractor shall follow the requirements detailed in SOW Section 3.1.3.4.1.2.11 for new-build requirements and deliverables.

3.1.3.4.1.2.7. Meeting 4 – Pre-Detailed PSS Site Survey Review Deliverables (CDRL 2.2.1.3.7). Following the completion of the PSS site-specific deliverables associated with the WSAPs, the Contractor shall facilitate a meeting to review all deliverables generated and establish the final list of PSS sites. The outcome of the meeting will be a final list of sites to be surveyed in detail for the NAIS equipment installation. The list of PSS sites approved for a detailed survey shall be documented in Meeting Minutes.

3.1.3.4.1.2.8. Detailed PSS Site Survey Report (CDRL 2.2.1.3.8). The Contractor shall conduct detailed surveys of the approved PSS sites to

collect data required to complete PSS site assessments. The Government will accompany the Contractor on the surveys. The data collected shall, at a minimum, include the data required to complete Attachments J.13 (Environmental Site Assessment Checklist), J.14 (Site Identification Information Checklist), and J.15 (Frequency Authorization Request) for each site. Following the detailed PSS site surveys, the Contractor shall prepare and submit a Detailed PSS Site Survey Report, providing the following information:

a. Primary PSS Sites Recommended for Coverage Design, with details on each PSS site that shall, at a minimum, include: location, site information, tower information, facility assessment (e.g., preliminary structural, network connectivity, power, HVAC, access and network connectivity availability and options) environmental and cultural resource issues and real property issues;

b. Alternative PSS Sites Recommended, with details on each site that shall, at a minimum, include: location, site information, tower information, facility assessment (e.g., preliminary structural, network connectivity, power, HVAC, access and network connectivity availability and options) environmental issues (including cultural resource issues) and real property issues. The objective is to have enough information to proceed with an alternative PSS site without requiring significant site re-work or delays for additional data collection and surveys if the primary site falls out or becomes unworkable; and

c. PSS Site Evaluation, Scoring and Ranking, which includes:

1. Adjustments made because of PSS site interdependencies;

2. Recommended Regional PSS Site Geography;

3. Other viable PSS site Geography; and

4. Comparison table of viable PSS site geographies.

3.1.3.4.1.2.9. Meeting 5 – Post-Detailed PSS Site Survey Review Deliverables (CDRL 2.2.1.3.9). Following the detailed PSS site surveys, the Contractor shall facilitate a meeting with the Government to review the results of the detailed PSS site surveys and the Contractor's recommended PSS sites. The meeting shall establish the pre-final list of PSS sites for the Sector(s) that will be fully documented. The pre-final list of PSS sites and any alternatives shall be identified in the Meeting Minutes.

3.1.3.4.1.2.10. Post-Meeting 5 Documentation (CDRL 2.2.1.3.10). For each PSS site included on the pre-final list, the Contractor shall complete drawings and revisions for the site, tower or other structure, shelter, utilities and any other modifications that will be required for the Government to acquire or lease the PSS site for equipment installation. The Contractor shall also complete Rough Order of Magnitude pricing (which includes an explanation of methods used, assumptions, and confidence of accuracy) and schedule (which includes Government and Contractor activities and their interdependencies and reflects a true understanding of the timeframes required for each activity) by PSS site for installation of NAIS equipment. The Contractor shall finalize completion of Attachments J.13, J.14, J.15 and J.26. The Contractor shall also complete a Tower Structural Assessment and Wind-Load Analysis, Inter-Modulation Analysis, Phase I Environmental Due Diligence Audit, and Collocation Application (Attachment J.12), as required. The Contractor shall also provide documentation that, at a minimum, addresses the following issues:

a. PSS Site Installation Issues and Risks and Recommended Action for Mitigating Risks; and

b. Network Connectivity, which includes:

1. Current status of network;

2. Network Connectivity Analysis and Requirements;

3. New Circuits Required (if any);

4. Network Configuration including Internet Protocol (IP) Addressing Requirements;

5. Network Security Analysis and Requirements; and

6. Network Implementation Schedule.

3.1.3.4.1.2.11. Information for New Tower Builds.

3.1.3.4.1.2.11.1. Background. The nature of new site development and tower construction, in particular the coordination of environmental compliance requirements, requires a collaborative effort between the Contractor and the Government. The following sections describe the work requirements for ensuring thorough planning and coordination of a wide variety of site development tasks.

3.1.3.4.1.2.11.2. Third Party Builds. As a part of the PSS site identification and selection recommendation process, the Contractor shall determine what types of PSS sites are available for new tower construction. The Contractor shall explore the availability of 3rd party build options such that the Government would occupy as a tenant, however, the Contractor does not have the authority to obligate the Government to any third party property transactions. When a new tower build is assessed to be necessary, the Contractor shall determine if the Government currently owns/leases property suitable for use. If not, the Contractor shall determine if there is other federally-owned or leased property available for use. If not, the Contractor shall determine if there is private property available for lease or purchase that would be suitable for use. Also, the Contractor shall estimate the costs of a third party build options to ensure compliance with OMB Circular A-11, which prohibits the Government from entering a third party build leases if the costs for a 20-year lease exceed the costs of building a Government-owned site. After review of the initial planning documents, the Government shall determine whether a PSS site will be a third-party built or Government-owned built tower.

3.1.3.4.1.2.11.3. New Tower Documentation (CDRL 2.2.1.3.11.3). The Contractor shall prepare general PSS site location maps for use in determining interest for 3rd party tower builder and PSS site requirements (tower height, type, shelter type, equipment space, utility requirements and other specifications required). If a new tower will be owned by the Government, the Contractor shall complete additional documentation as required to support the new construction. This documentation shall include Attachments J.13, J.14, J.15, J.26, site plans and drawings, Rough Order of Magnitude Pricing and Schedule, Tower Structural Assessment and Wind-Load Assessment, Inter-Modulation Analysis, Phase I Environmental Due Diligence Audit, Geotechnical Survey and Report, New Tower Build Siting and Construction Specifications (by site), and a New Tower Build Siting Report and Recommendation.

3.1.3.4.1.2.12. Meeting 6 – Final PSS Site Selection Review Deliverables (CDRL 2.2.1.3.12). The Contractor shall facilitate a meeting with the Government to review all of the documentation generated following the Post Detailed PSS Site Survey Review and discuss the status of any new tower builds, reviewing any documentation that may be available for those at the time Meeting 6 is conducted. The meeting shall establish the final Government approved list of PSS sites and PSS site geometry for the Sector(s) under consideration, to be documented in the Meeting Minutes. With approval of the PSS site(s), the Government will then execute lease activities as required.

3.1.3.4.1.2.13. Sector PSS Site Selection Report (CDRL 2.2.1.3.13). The Contractor shall develop and deliver a Sector PSS Site Selection Report. The Sector PSS Site Selection Report shall be used as the basis for all follow-on compliance, lease, design, construction, and installation documents and activities. The Sector PSS Site Selection Report shall consist of all of the final documents prepared for selected PSS sites, including the information required to complete a Telecommunications Service Request. If there are new tower builds and the documentation is not completed in time for inclusion, it shall be provided as soon as it is available (see SOW Section 3.1.3.4.1.2.11). The documentation developed for any unselected PSS sites shall be included as an appendix. The Sector PSS Site Selection Report shall include a full bibliography that contains the following for all references used throughout the siting process for each sector:

a. GFI (Summary, including full bibliographic citations, of the GFI that was used);

b. Other Government Documents (Summary, including full bibliographic citations, of the other Government documents that were used); and

c. Non-Government Documents (Summary, including full bibliographic citations, of the non-Government documents that were used).

3.1.3.4.2. Travel. The Contractor shall perform and charge for travel in a manner consistent with Joint Federal Travel Regulations. Any required travel or other direct costs associated with the performance of the Contractor's duties must be authorized by the Contracting Officer in advance.

3.1.3.5. Sector Jacksonville. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Jacksonville. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.6. Sector Long Island. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Long Island. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.7. Sector New York. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and

the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector New York. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.8. Sector St. Petersburg. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector St. Petersburg. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.9. Sector Portland. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Portland. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.10. Sector Seattle. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Seattle. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.11. Sector Miami. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Miami. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.12. Sector Key West. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Key West. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.13. Sector Corpus Christi. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Corpus Christi. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.14. Sector Houston-Galveston. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Houston-Galveston. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.15. Sector New Orleans. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS

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coverage for Sector New Orleans. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.16. Sector Boston. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Boston. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.17. Sector Southeastern New England. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Southeastern New England. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.18. Sector Northern New England. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Northern New England. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.19. Sector San Diego. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector San Diego. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.20. Sector Los Angeles-Long Beach. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Los Angeles-Long Beach. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.21. Sector San Francisco. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector San Francisco. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.22. Sector North Carolina. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector North Carolina. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.23. Sector Charleston. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and

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the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Charleston. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.24. Sector Lake Michigan. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Lake Michigan. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.25. Sector Sault Ste. Marie. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Sault Ste. Marie. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.26. Sector Detroit. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Detroit. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.27. Sector Buffalo. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Buffalo. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.28. Sector Anchorage. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Anchorage. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.29. Sector Juneau. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Juneau. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.30. Sector San Juan. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector San Juan. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.31. Sector Honolulu. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Honolulu. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.32. Sector Guam. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS coverage for Sector Guam. Sector coverage boundaries are defined in Attachment J.5.

3.1.3.33. Sector Upper Mississippi River. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS receive-only coverage for the designated Western Rivers locations within Sector Upper Mississippi River. Western Rivers coverage locations are defined in Attachment J.5.

3.1.3.34. Sector Ohio Valley. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS receive-only coverage for the designated Western Rivers locations within Sector Ohio Valley. Western Rivers coverage locations are defined in Attachment J.5.

3.1.3.35. Sector Lower Mississippi River. Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS receive-only coverage for the designated Western Rivers locations within Sector Lower Mississippi River. Western Rivers coverage locations are defined in Attachment J.5.

3.1.3.36. Sector Mobile (Western Rivers Locations). Upon exercise of the optional task by the Government, the Contractor shall provide the services described in SOW Sections 3.1.3.4.1, 3.1.3.4.2, and the SOW Sections referenced therein to support the Government in establishing NAIS receive-only coverage for the designated Western Rivers locations within Sector Mobile. Western Rivers coverage locations are defined in Attachment J.5.

4 Appendices

4.1 A: List of Acronyms and Abbreviations

AA	Advanced Agreement
ABL	Allocated Baseline
AIS	Automatic Identification System
ANSI/ASHRAE	American National Standards Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ANSI/EIA	American National Standards Institute/Electronic Industry Alliance
ANSI/TIA	American National Standards Institute/Telecommunications Industry Association
A_o	Operational Availability
AOR	Area of Responsibility
ASME	American Society of Mechanical Engineers International
ASTM	American Society for Testing and Materials
BCWP	Budgeted Cost of Work Planned
BCWS	Budgeted Cost of Work Scheduled
B.S.	Bachelor of Science
C&A	Certification and Accreditation
C2	Command and Control
C2CEN	The Command and Control Engineering Center
C4&IT	Command, Control, Communications, Computers and Information Technology
CAGE	Contractor and Government Entity
CCB	Configuration Control Board
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CFR	Code of Federal Regulations
CG-6	Assistant Commandant, C4&IT
CG-939	USCG NAIS Project Office
CGDN+	Coast Guard Data Network Plus
CI	Configuration Item

CILRU	Configuration Item Line Replaceable Unit
CLIN	Contract Line Item Number
CM	Configuration Management
CMP	Configuration Management Plan
COI	Community of Interest
COMDTINST	Commandant Instruction
COP	Common Operational Picture
COTR	Contracting Officer Technical Representative
COTS	Commercial off-the-shelf
CPMP	Contractor's Project Management Plan
CPR	Contract Performance Report
CSA	Configuration Status Accounting
CSCI	Computer Software Configuration Item
CV	Cost Variance
CWBS	Contract Work Breakdown Structure
D-Level	Depot-Level
DAWIA	Defense Acquisitions Workforce Improvement Act
DBL	Development Baseline
DHS	Department of Homeland Security
DHS OneNet	Department of Homeland Security One Network
DI-MGMT	Data Item – Management
DISA	Defense Information Systems Agency
DMSMS	Diminishing Manufacturing Sources and Material Shortages
DoD	Department of Defense
DSC	Digital Selective Calling
DT&E	Developmental Test and Evaluation
EAC	Estimate at Completion
ECP	Engineering Change Proposal
ECR	Engineering Change Request
EDC	Enterprise Data Center
EILSP	Equipment/System Integrated Logistics Support Plan
EM	Environmental Manager
EPSH	Environmental Protection, Safety and Health
ESB	Enterprise Service Bus
ESS	Equipment Support Sheet

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ESU	Electronics Support Unit
EVMS	Earned Value Management System
FAQ	Frequently Asked Questions
FAR	Federal Acquisition Regulation
FBL	Functional Baseline
FCA	Functional Configuration Audit
FED-STD	Federal Standard
FIPS	Federal Information Processing Standard
FISMA	Federal Information Security Management Act
FOB	Freight-On-Board
FOC	Full Operational Capability
FSD	Field Support Desk
GFE	Government Furnished Equipment
GFI	Government Furnished Information
GOTS	Government off-the-shelf
HFE	Human Factors Engineering
HSAR	Homeland Security Acquisition Regulation
HSI	Human System Interface
HSIN	Homeland Security Information Network
HTML	Hypertext Markup Language
HVAC	Heating, Ventilation, and Air Conditioning
HWCI	Hardware Configuration Item
I-1	Increment 1
I-2	Increment 2
IA	Information Assurance
IBR	Integrated Baseline Review
ICD	Interface Control Document
IEEE/EIA	Institute of Electrical and Electronics Engineers/Electronic Industries Alliance
IETM	Interactive Electronic Technical Manual
IFAT	Integrated Factory Acceptance Test
ILS	Integrated Logistics Support
ILSMT	Integrated Logistics Support Management Team
IMO	International Maritime Organization

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IMS	Integrated Master Schedule
IOC	Initial Operational Capability
IP	Internet Protocol
IPDE	Integrated Product Data Environment
IPT	Integrated Product Team
ISO	International Organization for Standardization
ISP	Integrated Support Plan
ITP	Infrastructure Transformation Program
IV&V	Independent Verification and Validation
LAN	Local-Area Network
LMI	Logistics Management Information
LORA	Level of Repair Analysis
LSS	Logical Shore Station
MAGNet	Maritime Awareness Global Network
MD	Management Directive
MDA	Maritime Domain Awareness
MDT	Mean Down Time
MIL-DTL	Military Detail Specification
MIL-HDBK	Military Handbook
MIL-P	Military Specification
MIL-PRF	Military Performance Specification
MIL-STD	Military Standard
MISLE	Marine Information for Safety and Law Enforcement
MLC	Maintenance and Logistics Command
MMSI	Maritime Mobile Service Identity
MPC	Maintenance Procedure Card
MS	Microsoft®
MSR	Monthly Status Report
MTBF	Mean Time Between Failures
MTP	Master Test Plan
NAIS	Nationwide Automatic Identification System
NAVCEN	US Coast Guard Navigation Center
NCES	Net-Centric Enterprise Services
NDI	Non-Developmental Items
NEPA	National Environmental Policy Act of 1969

NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology
nm	Nautical Miles
NOAA	National Oceanic and Atmospheric Administration
NOC	Network Operations Center
NOR	Notice of Revision
NSN	National Stock Numbers
O-Level	Organizational-Level
OEM	Original Equipment Manufacturer
OMB	Office of Management and Budget
OPNAVINST	Chief of Naval Operations Instructions
OSC	Operations Systems Center
OSHA	Occupational Safety and Health Administration
OT&E	Operational Test and Evaluation
P2I	Personally Identifiable Information
PBL	Product Baseline
PCA	Physical Configuration Audit
PDF	Portable Document Format
PDR	Preliminary Design Review
PESHE	Programmatic Environment, Safety, and Occupational Health Evaluation
PHS&T	Packaging, Handling, Storage & Transportation
PIV	Personal Identity Verification
PM	Project Manager
PMR	Program Management Review
PPP	Provisioning Program Plan
PRO	Project Resident Office
PSPEC	NAIS Performance Specification (Attachment J.2)
PSS	Physical Shore Station
QA	Quality Assurance
RCM	Reliability Centered Maintenance
RF	Radio Frequency
RFD	Request for Deviation
RM	Risk Manager
RMA	Reliability, Maintainability and Availability

RMB	Risk Management Board
RMP	Risk Management Plan
RTM	Requirements Traceability Matrix
RVM	Requirements Verification Matrix
SBU	Sensitive but Unclassified
SCC	Sector Command Center
SCN	Software Change Notice
SDD	System Design Document
SDK	Software Development Kit
SDLC	Systems Development Life-Cycle
SDIP	Software Development and Integration Plan
SDP	System Design Plan
SDR	System Design Review
SEMP	Systems Engineering Management Plan
SLA	Service Level Agreement
SMEF	System Management and Engineering Facility
SMP	Security Management Plan
SOA	Service Oriented Architecture
SOAP	Simple Object Access Protocol
SOC	System Operations Center
SOP	Standard Operating Procedures
SOVT	System Operational Verification Testing
SOW	Statement of Work
SP	Special Publication
SQL	Structured Query Language
SPS	System Product Specification
SRS	System Requirements Specification
SSA	System Support Agent
SV	Schedule Variance
SVR	System Verification Review
SW-CMMI	Capability Maturity Model for Software
TDP	Technical Data Package
TDI	Technical Data Index
TDMA	Time Division Multiple Access
TIA/EIA	Telecommunications Industry Association/Electronics

	Industry Alliance
TRR	Test Readiness Review
U.S.	United States
U.S.C.	United States Code
USCG	United States Coast Guard
VDD	Version Description Document
VDL	Very High Frequency Data Link
VHF	Very High Frequency
VTS	Vessel Traffic Services
WAN	Wide-Area Network
WSAP	Work Site Action Plan
XHTML	Extensible Hypertext Markup Language
XML	Extensible Markup Language

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4.2 B: Contract Data Requirements List

4.2.1. CDRL 1.2.2.2	Working Group and Review Meeting Deliverables
4.2.2. CDRL 1.2.2.3	Progress Meeting Deliverables
4.2.3. CDRL 1.2.3.2	IPT Meeting Deliverables
4.2.4. CDRL 1.2.4	Contractor's Project Management Plan
4.2.5. CDRL 1.2.5	Contract Work Breakdown Structure
4.2.6. CDRL 1.2.6	Integrated Master Schedule
4.2.7. CDRL 1.2.8	Environmental Protection, Safety and Health Plan
4.2.8. CDRL 1.2.9.5	Risk Management Review Deliverables
4.2.9. CDRL 1.2.10.2	EVMS Program Assurance of Conformity Document
4.2.10. CDRL 1.2.10.3	IBR Deliverables
4.2.11. CDRL 1.2.10.5	Monthly Status Report
4.2.12. CDRL 1.2.11.4	PMR Deliverables
4.2.13. CDRL 1.2.12.1.1	IPDE Management Plan
4.2.14. CDRL 1.2.13.2	Project Resident Office Documentation
4.2.15. CDRL 1.3.3	Systems Engineering Management Plan
4.2.16. CDRL 1.3.4	Trade Studies and Technical Reports
4.2.17. CDRL 1.3.6.2	Configuration Management Plan
4.2.18. CDRL 1.3.6.5.4	Configuration Status Accounting Report
4.2.19. CDRL 1.3.6.7.1	Functional and Physical Configuration Audit Plan
4.2.20. CDRL 1.3.6.7.2	Functional and Physical Configuration Audit Report
4.2.21. CDRL 1.3.6.8.2	Engineering Change Proposal
4.2.22. CDRL 1.3.6.8.3	Version Description Document
4.2.23. CDRL 1.3.6.8.5	Request for Deviation
4.2.24. CDRL 1.3.7.1	Information Assurance Plan
4.2.25. CDRL 1.3.8.2	I-1 to I-2 Operational Transition Plan
4.2.26. CDRL 1.4.2	System Design Plan
4.2.27. CDRL 1.4.4	System Requirements Specification
4.2.28. CDRL 1.4.6	System Design Document
4.2.29. CDRL 1.4.9.3	Software Development Kit
4.2.30. CDRL 1.4.10.3	System Product Specification
4.2.31. CDRL 1.5.1.8	Integrated Support Plan
4.2.32. CDRL 1.5.2.3	Reliability, Maintainability, and Availability Analysis
4.2.33. CDRL 1.5.2.4.1	Maintenance Requirements Package – Reliability Centered Maintenance
4.2.34. CDRL 1.5.2.10.2.3	Field Support Desk Report
4.2.35. CDRL 1.5.2.11.3	Warranty Book
4.2.36. CDRL 1.5.2.12	Maintenance Transition Plan
4.2.37. CDRL 1.5.5.5	Interactive Electronic Technical Manual
4.2.38. CDRL 1.5.7.2	Training/Performance Intervention Plan
4.2.39. CDRL 1.5.7.3	Training Program Materials and Tools
4.2.40. CDRL 1.5.12.1	Logistics Management Information Summary
4.2.41. CDRL 1.6.1.2.3	SDR Meeting Deliverables

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4.2.42. CDRL 1.6.1.3.4	PDR Meeting Deliverables
4.2.43. CDRL 1.6.1.4.4	CDR Meeting Deliverables
4.2.44. CDRL 1.6.1.5.4	TRR Meeting Deliverables
4.2.45. CDRL 1.6.1.6.4	SVR Meeting Deliverables
4.2.46. CDRL 1.7.2	Core System As-Built Documentation
4.2.47. CDRL 1.8.1.4	Quality Assurance Plan
4.2.48. CDRL 1.8.2.1	Master Test Plan
4.2.49. CDRL 1.8.2.3.1	Test Plan and Procedures
4.2.50. CDRL 1.8.2.3.4	DT&E Test Report
4.2.51. CDRL 1.8.2.4.2	IOC System Acceptance Test and Evaluation Report
4.2.52. CDRL 2.2.1.2	PSS Site Identification and Selection Plan
4.2.53. CDRL 2.2.1.3.1	Meeting 1 – Sector Planning Kickoff Deliverables
4.2.54. CDRL 2.2.1.3.2	PSS Site Selection Desktop Analysis Report
4.2.55. CDRL 2.2.1.3.3	Meeting 2 – Desktop Analysis and Pre-Screen Survey Candidate PSS Site Review Deliverables
4.2.56. CDRL 2.2.1.3.4	Pre-Screen Survey and Proposed PSS Site Rankings Report
4.2.57. CDRL 2.2.1.3.5	Meeting 3 – Post-Pre-Screen Survey Review Deliverables
4.2.58. CDRL 2.2.1.3.6	Post-Meeting 3 Documentation
4.2.59. CDRL 2.2.1.3.7	Meeting 4 – Pre-Detailed PSS Site Survey Review Deliverables
4.2.60. CDRL 2.2.1.3.8	Detailed PSS Site Survey Report
4.2.61. CDRL 2.2.1.3.9	Meeting 5 – Post-Detailed PSS Site Survey Review Deliverables
4.2.62. CDRL 2.2.1.3.10	Post-Meeting 5 Documentation
4.2.63. CDRL 2.2.1.3.11.3	New Tower Documentation
4.2.64. CDRL 2.2.1.3.12	Meeting 6 – Final PSS Site Selection Review Deliverables
4.2.65. CDRL 2.2.1.3.13	Sector PSS Site Selection Report
4.2.66. CDRL 2.2.2	PSS and SCC Site Specific Design
4.2.67. CDRL 2.2.6	Sector PSS Site As-Built Documentation

4.3 C: Glossary

4.3.1. Analysis: Used when testing is not required or is simply not feasible. Analysis includes modeling, simulation, and possibly will constitute or be an element of a formal test.

4.3.2. A_o: Operational Availability, to be calculated by the following formula:

$A_o = T_o / (T_o + T_m + T_l + T_a)$ where:

Operating time (T_o) is a period of uptime where the network elements, hardware and software, are in operable and committable state.

Maintenance Delay (T_m) is a period of downtime during the physical act of preventing, determining, and correcting equipment or software faults. It includes all actions taken to retain system/equipment/product in a useful serviceable condition or to restore it to usefulness / serviceability. Maintenance includes inspection, testing, servicing, repair, rebuilding, and reclamation.

Logistics Delay Time (T_l) is a period of downtime during which no maintenance takes place due to delays in parts/equipment delivery and transportation.

Administrative Delay Time (T_a) is a period of downtime during which no maintenance takes place due to delays in administrative processing and assignments of maintenance personnel.

4.3.3. Archive Data Store: Is the final repository of the NAIS data. Its goal is to offer efficient storage for data that are no longer needed for day-to-day operations, but which might be required for auditing or research purposes. As archived data ages, it is purged from the storage component.

4.3.4. Automatic Identification System (AIS): 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.

4.3.5. AIS AtoN Station: An Automatic Identification System type-certified to meet the requirements set forth in IEC 62320-2.

4.3.6. AIS Base Station: An Automatic Identification System type-certified to meet the requirements set forth in IEC 62320-1

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4.3.7. AIS Class A: An Automatic Identification System type-certified to meet the requirements set forth in IEC 61993-2.

4.3.8. AIS Class B: An Automatic Identification System type-certified to meet the requirements set forth in IEC 62287-1.

4.3.9. Availability: Availability (A) is the probability that a system or equipment, when used under stated conditions in an actual operational environment, shall operate satisfactorily at a given point in time. It includes ready time, logistics time, and waiting or administrative downtime. A is expressed as:

$$A = MTBF/(MTBF + MDT)$$

where MTBF is mean time between failure (loss of a critical function) and MDT is mean down time. MDT includes diagnosis and repair time, preventative maintenance time, and logistics time (time spent waiting for personnel, spare parts, authorization, and other causes.)

4.3.10. Baseline: From NOAA, National Ocean Service, Office of Coast Survey: The baseline is "the line from which maritime zones are measured. The normal baseline for measuring the territorial seas, contiguous zone, exclusive economic zone and continental shelf is the low-water line along the coast."

4.3.11. Channel Management: Performed when default operating settings for mobile AIS stations are switched to any different operating setting. Channel management can be performed over the VDL using AIS Message 22 or via VHF-FM Ch 70 by using Digital Select Calling (DSC). The use of DSC Channel Management depends on the geographical situation.

4.3.12. Coast Guard Data Network Plus (CGDN+): A state-of-the-art nationwide private, Internet Protocol (IP) Wide-Area Network (WAN) employing FTS2001 and NON-FTS2001 services for inter-city connectivity and data transport. For more information about CGDN+, see Attachment J.9.

4.3.13. Commercial off-the-shelf: Commercial off-the-shelf (COTS) describes systems or components that are widely available through the commercial market at competitive prices. The items are normally commodity-type products developed to commercial standards to satisfy the needs of large groups of users, although this is not always the case.

4.3.14. Configuration Item Line Replaceable Unit: A configuration item is defined as a CILRU that is an essential support item which is removed and replaced at the field level to restore the PSS, installation or system, taken as a whole, to an operationally ready condition. In some cases the CILRU will be an individual item or piece-part and in other cases will be a significant part or component of a system which comprises a higher-level CILRU.

4.3.15. Corrective Maintenance: All actions performed as a result of a failure to restore an item to a specified condition. Corrective maintenance can include any or all of the following steps: localization, isolation, disassembly, interchange, reassembly, alignment, and checkout.

4.3.16. Data Retrieval Services: Used to obtain a more refined view of the AIS messages and associated data (e.g., vessel location, AIS metadata).

4.3.17. Data Storage: The repository of the NAIS data. It consists of three conceptually different data stores: Real-Time Data Store, Near Real-Time Data Store, and Archive Data Store.

4.3.18. Data Subscription Services: The main mechanisms by which the real-time AIS data is delivered to external users.

4.3.19. Demonstration: Similar to formal testing, but more informal in nature. Demonstrations shall be the precursors to formal tests allowing for more expediency in the design, prototyping and production of the system. Demonstration shall be a part of a formal test.

4.3.20. Deviation: A deviation is a specific written authorization to depart from a particular requirement(s) of an item's current approved configuration documentation for a specific number of units or a specified period of time. It differs from an engineering change since a deviation does not effect a change to a configuration document. Deviations are requested by Contractors prior to manufacture, during manufacture, or after an item has been submitted for Government inspection and acceptance. To be tendered for delivery or to be installed in an item to be tendered for delivery, the deviant item must be suitable for use.

4.3.21. DHS OneNetwork (OneNet): DHS has implemented an Infrastructure Transformation Program (ITP) to meet department wide information sharing requirements. The ITP calls for the department to consolidate its SBU networks into one department wide network backbone – OneNet. For more information on OneNet, see Attachment J.9.

4.3.22. Enterprise Data Processing Center (EDC): Facilities designed to host and meet the NAIS data storage, management, retrieval, and disaster recovery requirements.

4.3.23. Enterprise Service Bus (ESB): Facilitates communication between internal NAIS services and external service users and data providers over a standardized platform. Will provide multiple adapters enabling existing, legacy Government applications to consume NAIS services and provide data to the NAIS.

4.3.24. Enterprise Services: Provide agile and adaptive functionality to current and future interoperable systems. Enterprise Services will provide the core of the NAIS functionality exposed to system users, providers and operators, including the following: Data Subscription Services, Raw Feed Services, Processed Feed Services, Transmit Services, Management Services, RF Management Services, System Management Services, and External Data Capture (Import) Services.

4.3.25. External Data Capture (Import) Services: Allow the NAIS to ingest data from other, external (non-NAIS) AIS data sources.

4.3.26. External Interface: An external interface of the system is defined as any interface where at least one item of equipment or services involved in the interface is not under the control of the vendor.

4.3.27. External Services: Services that enable external users to access the NAIS data and functionality. External Services includes Message Transmit Services, External Data Capture Services, Data Subscription Services, Data Retrieval Services, and HSI Services.

4.3.28. Government off-the-Shelf (GOTS): Describes systems or components that are available on existing Government contracts to satisfy agency requirements. GOTS items are typically commodity-type items that have a commercial counterpart and may have been modified or updated to satisfy a specific mission requirement.

4.3.29. Human System Interface (HSI) Services: A collection of services and applications that allow external and internal users to interact with the NAIS.

4.3.30. Increment 1 (I-1): The first phase of the NAIS project, which establishes the capability to receive AIS messages from all vessels equipped with AIS transmitters operating in the Country's most critical port and coastal areas. This increment is intended to meet immediate operational needs and align with anticipated expansion of AIS carriage requirements.

4.3.31. Increment 2 (I-2): The second phase of the NAIS program is the focus of this Statement of Work and the PSPEC. Increment 2 will enhance the functional and operational capabilities of I-1 by: extending the NAIS receive capability - bridging the gaps in I-1 coverage and enabling the NAIS to receive AIS messages to 50 nm from the U.S. baseline; adding the capability to transmit standard AIS messages out to 24 nm from the U.S. baseline; exploiting the full functional capabilities of AIS, including - transmitting messages from shore stations, developing back-end data processing for validation and verification of AIS messages, and online queries to support the analysis of historical data; managing the VDL in order to: monitor VDL traffic, detect spoofing and jamming, and enable authorized SOC users to actively manage VHF channels used for AIS by each transceiver; and providing a service-oriented mechanism for disseminating the NAIS data to all authorized users and external systems.

4.3.32. Increment 3: The third phase of the NAIS program will extend the NAIS capability to receive AIS messages beyond 50 nm and up to 2000 nm from the U.S. baseline. This long range tracking capability will greatly enhance the Government's ability to identify and monitor vessels approaching U.S. waters, and improve the Federal Government's ability to protect the nation's coastlines. Increment 3 will not enhance end-user functionality beyond the capabilities provided with Increments 1 and 2.

4.3.33. Inspection: Physical inspection of items performed on equipment, gear, or other physical items. Inspection shall be performed on designs, documents, and certifications to ensure

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compliance with the requirements. Inspection includes examinations, reviews, and in some cases will constitute a part of a formal test.

4.3.34. Interface: An interconnection between subsystems having the dimensions of form, fit, and function, which are determined by the requirements of the interconnected subsystems.

4.3.35. Logical Shore Station: A software process that transforms the AIS data flow associated with one or more PSS into a different AIS-related data flow.

4.3.36. Maintainability: Maintainability is a characteristic of design which, when achieved, contributes to fast, easy maintenance at the lowest life-cycle cost.

4.3.37. Management Services: Allow the NAIS operators to maintain the system. They offer management tools for the RF components located within the PSS (e.g., VDL monitoring, channel management, operational status), and for the NAIS itself (e.g., database administration, performance monitoring).

4.3.38. Maritime Domain Awareness: The effective understanding of anything associated with the global maritime domain that could impact the security, safety, economy, or environment of the United States.

4.3.39. NAIS Component: Similar to an NAIS service; however, a component consists of modules which are more tightly coupled to perform a very specific function. Components do not expose interfaces to services and components outside their operational environment or domain.

4.3.40. NAIS Service: A grouping of business logic and rules specifically needed to implement an operational requirement. A service exposes an interface that can be discovered and called by other services and components. Services are loosely coupled to other services, components, and applications so that they can be made available to anyone.

4.3.41. NAIS Services Network: Enables communication among internal NAIS services over the EDC LAN.

4.3.42. Near Real-Time Data Store: Is the main repository of the NAIS data. This data can be queried in multiple ways using the Data Retrieval Services. As the near-real-time data ages beyond its use for tactical operations, it is transferred to the Archive data store.

4.3.43. Network Operations Center (NOC): Provides network administration and maintenance, including management of user access and monitoring of network device performance.

4.3.44. Operators: Watchstanders, watch supervisors, and system administrators, trainers and trainees who work the system from within the SOC.

4.3.45. Physical Shore Station (PSS): A physically fixed entity composed of at least: one AIS base station or one AIS repeater station, a power supply, VHF-/RF-domain equipment (at a minimum

simply a cable and VHF antenna), a means to transport data to and from the AIS base station (if the PSS houses an AIS base station), and a means to protect the above components against environmental influence and damage. The PSS will generally have a Universal Time Coordinate source of its own. The PSS may also include additional, optional AIS-related functions.

4.3.46. Preventive Maintenance: All actions performed in an attempt to retain an item in a specified condition by providing systematic inspection, detection, and prevention of incipient failures.

4.3.47. Providers: External AIS user systems, including Maritime COP, MAGNet, MISLE, and others.

4.3.48. Real Time Data Store: Enables the real-time delivery of AIS data to all authorized data consumers through the Data Subscription Services. Data exists in this store for a short amount of time; as soon as it is delivered to all consumers, it is moved to the Near Real-Time Data Store.

4.3.49. Receive and Transmit Component: AIS Physical Shore Stations communicate via Logical Shore Stations for the purpose of sending and receiving AIS messages. This component is a high-throughput, always on, and low latency component.

4.3.50. Reliability: The probability that a system or component will perform its capabilities under given conditions for a specified period of time.

4.3.51. Risk Management Board: Ensures that the risk management program is implemented, risk reduction is accomplished in conformance with the PM's strategy, and the risk management efforts of the Sub-Tier IPTs are integrated; Reports risk events to the risk management coordinator; Evaluates whether Sub-Tier IPTs and PMO functional offices have identified critical risks and proposed risk-handling plans; Ensures that cost, schedule, and performance risks are compatible; and Ensures that cost, schedule, and performance risks are combined in a manner consistent with the plan.

4.3.52. Sector Command Center: The USCG is in the process of reorganizing its operational command and control units into Sector Command Centers (SCC). Each SCC monitors an Area of Responsibility (AOR) and performs a common, standardized set of mission activities and functions (tailored to meet the specific needs of each SCC's AOR).

4.3.53. Segment: The level of configuration immediately below system. There are three system segments: operational, facilities, and support.

4.3.54. Sensitive Information: Any information of which the loss, misuse, or unauthorized access to or modification of could adversely affect the national interest or the conduct of Federal programs, or the privacy to which individuals are entitled under 5 U.S.C 552a (the Privacy Act), but which has not been specifically authorized under criteria established by an Executive Order or an Act of Congress to be kept secret in the interest of national defense or foreign policy.

4.3.55. Service Oriented Architectures (SOA): Provide patterns for design, development, deployment and management of a loosely coupled business application infrastructure. The NAIS system shall be developed using a SOA approach, which is in line with the Department's Enterprise Architecture. Service Oriented Architectures will allow the NAIS to be scaleable, secure and flexible.

4.3.56. SOA Infrastructure Component: These components enable the various internal services and components to communicate with each other and with the outside world. These components include a Services Network enabling internal services and components to communicate, an Enterprise Service Bus that enables external systems to communicate with the NAIS services, a NOC and SOC to monitor and govern service performance, and components for service discovery.

4.3.57. Storage: See Data Storage.

4.3.58. Support and Test Equipment: All equipment, mobile or fixed, required to support system operation and maintenance. This includes associated multi-use end items, maintenance equipment, tools, metrology and calibration equipment, and test equipment.

4.3.59. System Administrative Support: Support for the NAIS, including deployment, optimization, administration, data input, data manipulation, data reporting, security, server management, and the NAIS infrastructure connectivity, accomplished on a sector or regional basis for PSSs.

4.3.60. System Administrator: A person in the SOC who administers system security, monitors and optimizes system performance, performs system backup and restoration, installs system upgrades, performs data and data base management, and performs port system configuration management.

4.3.61. System Operations Center (SOC): Provides system administration and maintenance.

4.3.62. Technical Data Validation: The final quality assurance iteration required of the Contractor or developing activity during which the technical manual is tested for technical adequacy and accuracy and compliance with the provisions of the specifications and other technical contractual requirements. Technical data validation is normally conducted at the developing activity or vendor's facility.

4.3.63. Tracking: Measurement of the position coordinates of a target to provide data to determine the target path versus time.

4.3.64. Transmit Services: Responsible for validating and transmitting outbound AIS messages. They shield external users from the complexity of delivering messages to the PSS.

4.3.65. Users: Mariners equipped with AIS, U.S. Coast Guard personnel, other Government personnel, and others who are authorized to access or exchange information with the system.

4.3.66. Validation: The capability to automatically ascertain the validity of inbound and outbound AIS messages. Inbound message data (e.g., time of arrival, signal strength, or receiver identification number) are examined to validate position, destination, name, and MMSI. Invalid messages must be flagged and stored.

4.3.67. VDL Monitoring: Includes monitoring VDL traffic for interference and managing channels and Fixed Access TDMA so that the integrity of the VDL remains uncompromised. VDL management is required to ensure reliable continuation of AIS communications from all NAIS PSSs, including detection from satellites and aeronautical platforms, and the safe navigation of ships.

4.3.68. Vessel: Every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water. (In this SOW, the term "vessel" is used to denote a vessel or aircraft equipped with a type-certified AIS.)

Acquisition Directorate

Nationwide Automatic Identification System Project

NAIS Performance Specification

December 20, 2007

Version 1.0

Homeland Security

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1 Introduction

This Performance Specification (PSPEC) contains requirements for Increment 2 of the United States Coast Guard (USCG) Nationwide Automatic Identification System (NAIS). Section 1 provides an overview of this document, a system Concept of Operations, and system design constraints within which the Contractor must operate. Section 2 provides the references cited in this document. Section 3 consists of specific requirements that will be used to verify system performance. Section 4 provides the planned methods of verification. Section 5 provides this document's glossary of terms and a list of abbreviations.

The primary objectives of this document are to define system requirements, to provide sufficient context for the requirements such that the Contractor can understand the USCG's vision for NAIS Increment 2 capability, and describe the relationships between NAIS and other systems and USCG Information Technology (IT) infrastructure. Minimizing Total Life-Cycle cost (TLC) while meeting operational requirements is paramount for the NAIS Project. TLC encompasses all costs associated with the design, implementation, operation, and support of this system. To achieve that goal, it is expected that the development of Increment 2 will leverage existing IT infrastructure, capabilities, standards, resources, and the application of lessons learned that have been dedicated to current capabilities. This PSPEC provides requirements to the level of deemed necessary in each area while acknowledging that a range of solution options are available meet these requirements.

1.1 Concept of Operations (CONOPS)

This section provides the CONOPS for the NAIS by presenting an overview of its functionality, its support for USCG missions, and a conceptual implementation of the system. The NAIS will enable the Coast Guard to transmit and receive AIS messages to/from vessels traveling on the navigable waters of the United States and its territories via receivers, transmitters and transceivers located on radio towers and other shoreside facilities, as well as buoys, offshore platforms, aircraft, and spacecraft. Received AIS data will be used for the purpose of identifying and tracking vessel movement, while transmitted messages will be used to provide Aids to Navigation (AtoN) and other marine broadcasts. The system will also support encrypted AIS (EAIS) messaging as well as Blue Force Tracking functionality. The system will monitor and manage the health of the VHF Data Link (VDL), as well as use the VDL to perform AIS channel management. Nationwide AIS data and functionality will be used by USCG, DHS, Department of Defense and other government agencies' communications, surveillance and data processing systems in support of their missions.

1.1.1 Support to the USCG Missions

NAIS will provide functionality to support the five mission areas of the USCG.

1.1.1.1 Maritime Safety

The USCG's Maritime Safety role is to eliminate deaths, injuries, and property damage associated with maritime transportation, fishing, and recreational boating.

1.1.1.1.0-1 Search and Rescue (SAR)

a. Provide near-real-time locations for AIS-equipped vessels in distress.

b. Assist SAR Controllers by providing the location of nearby AIS-equipped "Good Samaritans" capable of assisting in searching and / or rescuing mariners in distress.
c. Allow SAR Controllers to track the progress of CG vessels, aircraft and other resources as they conduct searches along the prescribed search patterns.
d. Enable watchstanders to replay search vessel tracks to evaluate coverage efficiency and enable SAR Controllers to redirect assets as necessary.

1.1.1.1.0-2 Safety Broadcasts

a. Enable Sectors to transmit digital Marine Information Broadcasts (MIBs), weather broadcasts, and other safety-related broadcasts.
b. Enhance voyage planning by providing urgent navigation warnings, AtoN status, and other pertinent navigation information (e.g., waterway closures, critical chart corrections).
c. Allow Sector watchstanders to schedule safety broadcasts to be transmitted by NAIS to AIS-equipped vessels in their Areas of Responsibility (AOR).

1.1.1.1.0-3 Aids to Navigation (AtoN)

a. Permit Sectors to transmit AtoN status messages (e.g., to automatically provide the AtoN operational status).
b. Facilitate the identification of hazards to navigation not marked by physical AtoN, the transmittal of the location and characteristics of those hazards, and support the analysis of waterways and vessel movement.
c. Facilitate the collection of vessel voyage information, especially within ports, to assist in traffic pattern analyses, waterways management, the placement of AtoN, and traffic separation schemes.

1.1.1.1.0-4 Safe Navigation

a. Extend the range of vessel-to-vessel AIS communications through the use of repeater functions at AIS shore stations in areas of poor voice coverage or "radar shadows."

1.1.1.1.0-5 AIS VHF Data Link (VDL) Management

a. Provide the ability to monitor and manage the VDL to ensure AIS viability during periods of high volume and / or radio interference.
b. Provide the ability to shift AIS traffic to alternate frequencies in the event of an emergency or natural disaster.

1.1.1.2 Maritime Security

The Maritime Security mission is to protect America's maritime borders from all intrusions by: (a) halting the flow of illegal drugs, aliens, and contraband into the United States through maritime routes; (b) preventing illegal fishing; and (c) suppressing violations of federal law in the maritime arena.

1.1.1.2.0-1 Maritime Domain Awareness (MDA)

a. Feed near real-time AIS vessel location information to unclassified and classified Coast Guard Command and Control and Intelligence systems, specifically the Common Operating Picture (COP) and MAGNet.

b. Provide real-time AIS data feeds to other CG maritime partners, including the Saint Lawrence Seaway Development Corporation (SLSDC) and joint Coast Guard/Port Authority Cooperative Vessel Traffic Services (CVTS).

1.1.1.2.0-2 Port Security

a. Provide Sector Commanders with means to notify vessels of changes to the Maritime Security Level, and to monitor compliance with security zones.
b. Enable operational commanders to identify, select and target vessels for law enforcement action, security screening inspections, boarding or other measures.
c. Provide near real-time location of the vessels in question to effectively coordinate and deploy boarding and inspection teams.

1.1.1.3 Maritime Mobility

Support of Maritime Mobility involves facilitating maritime commerce and eliminating interruptions and impediments to the efficient and economical movement of goods and people, while maximizing recreational access to and enjoyment of the water.

1.1.1.3.0-1 Maritime Incident Investigation

a. Assist in the investigation of maritime incidents by providing a detailed record of a vessel's movements and AIS message transmissions covering the time before, during and after the event.
b. Provide detailed records of other vessels in the area that may have witnessed or contributed to incidents under investigation.

1.1.1.3.0-2 Navigation Mobility

a. Providing vessel tracking data to Command and Control (C2) and intelligence systems for use in monitoring vessels.
b. Provide an additional means to exchange navigation data and other pertinent marine information (e.g., bridge closures, location of safety/security zones, dangerous currents) to assist in reducing the risk of collisions, allisions and groundings.
c. Facilitate domestic icebreaking resource deployment by providing a universal communication link that provides ships' status (e.g., position, speed, heading, course, and draft).
d. Support the monitoring of compliance with existing vessel traffic management regulations, such as vessel routing schemes, regulated navigation areas, mandatory ship reporting systems, safety and security zones, transits of high value assets, management of marine events and regattas and other such requirements.

1.1.1.4 National Defense

The USCG's National Defense mission is to defend the nation, as one of the five U.S. armed services, and to enhance regional stability in support of the National Security Strategy, utilizing the Coast Guard's unique and relevant maritime capabilities.

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1.1.1.4.0-1 Blue Force Tracking (BFT)/Encrypted Messaging

a. Supporting Encrypted AIS (EAIS) communications for Sensitive But Unclassified (SBU) messaging to/from CG units and other Port Partners.
b. Give vessels a method of sending and receiving text messages, targets of interest, tracks, and other encrypted messages, enhancing CG operations without compromising vessel movements.

1.1.1.4.0-2 Strategic Information

a. Allow other systems (e.g., MAGNet) to access the NAIS data, perform queries, and conduct other intelligence functions on the data (e.g., vessel movement anomaly detection).
b. Enhance transparency in the maritime domain to detect, deter and defeat threats as early and distant from U.S. interests as possible.
c. Provide maritime situational awareness for decision makers at all levels using a host of systems, sensors and processes to enable accurate, dynamic, and confident decision-making.
d. Support the missions of other Federal, State and local agencies, such as customs clearance and local law enforcement.

1.1.1.5 Protection of National Resources

USCG's goal in the Protection of National Resources is to eliminate environmental damage and the degradation of natural resources associated with maritime transportation, fishing, and recreational boating.

1.1.1.5.0-1 Protection of National Resources

a. Permit detection and tracking of vessels in mammal safety zones and other areas where vessel speed or intrusion is restricted.
b. Enable replaying of vessel tracks to identify potential polluters.
c. Permit monitoring of resources involved in pollution mitigation activities.

1.1.2 NAIS User Segments

The NAIS capabilities will be provided to the following three types of end-users:

a. USCG Command Centers: Sector, District, and Headquarters command centers. This group includes Vessel Traffic Service (VTS) operators as well.
b. NAIS System Operations Center: NAVCEN watchstanders and others responsible for NAIS Operations and Maintenance (O&M).
c. Generic Users: These users are not defined specifically but the system will make allowance for new user groups to be added.

1.1.3 CONOPS Depiction

In order to provide a better understanding of how NAIS is expected to operate, the following graphic (Figure 1.1) is provided. This depiction and the accompanying notes are not design requirements, but are intended to provide an explanation of the NAIS CONOPS.

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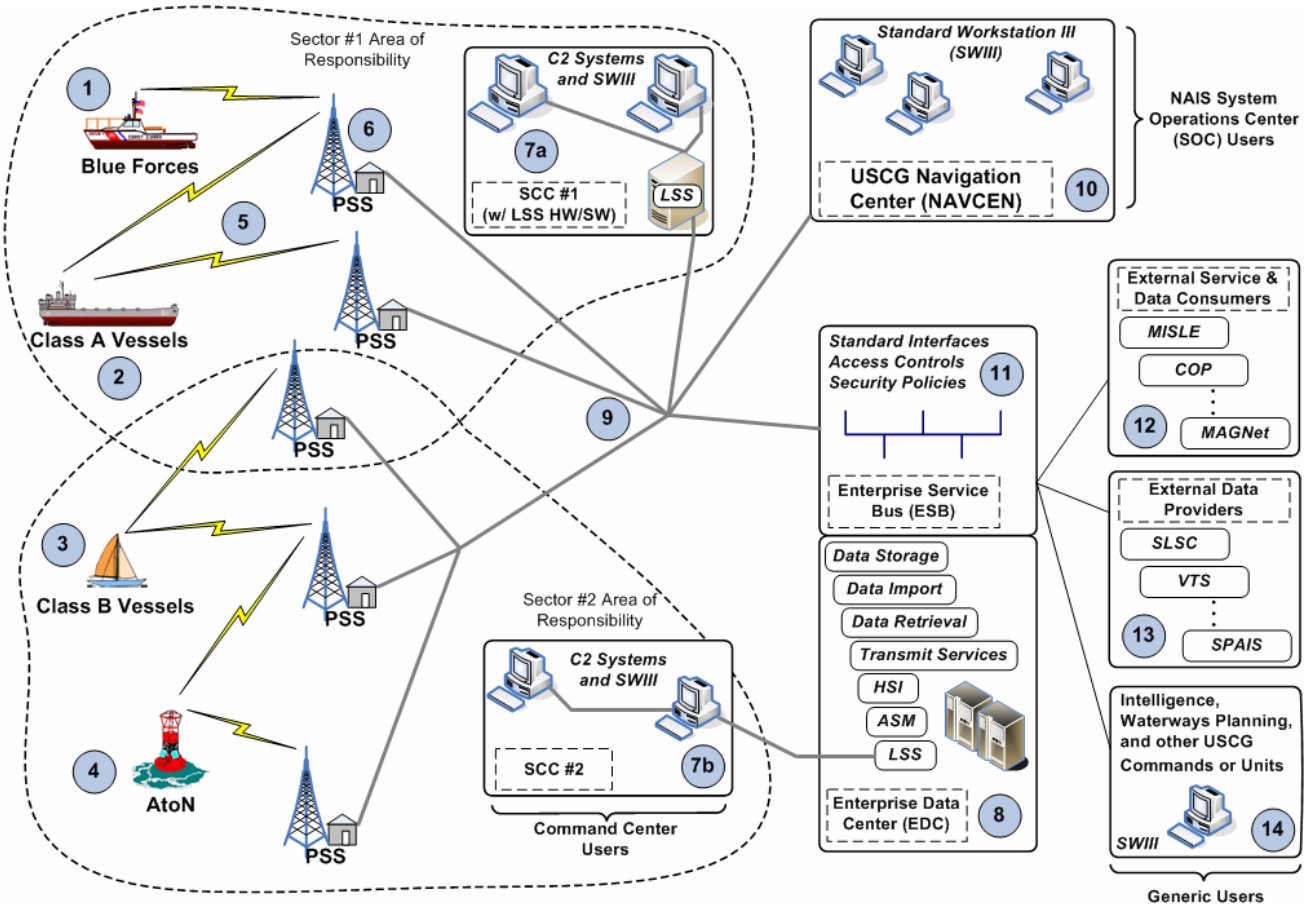

Figure 1.1: Representation of the NAIS CONOPS

Because NAIS will comply with international standards and guidelines governing AIS, it will communicate with all International Telecommunications Union (ITU) compliant AIS equipment. NAIS communications will include encrypted transmit and receive communications with Blue Forces **(1)** for position reports and targets of interest, as well as unencrypted communications with all types of vessels. Class A **(2)** and Class B **(3)** vessels will send position reports and vessel information as required by law, and will receive Aids to Navigation (AtoN) transmissions, marine broadcasts, or any other standard message from the USCG Physical Shore Stations (PSS). AIS-equipped AtoNs (e.g., buoys **(4)**) may transmit their real time position and other information.

These communications will take place over the VHF Data Link (VDL) **(5)**, which operates on AIS 1 & 2 channels, but can be switched to other channels by the SOC. The PSSs **(6)** will serve as the infrastructure by which AIS messages are transmitted to and received from AIS equipped vessels.

Each USCG Sector will have NAIS functionality to support their missions, with each Sector's Sector Command Center (SCC) having responsibility for monitoring AIS activity within its AOR. Every SCC will have access to NAIS functionality integrated into their C2 systems and/or SWIII, and *may* host the hardware and software to run its Logical Shore Station (LSS) software **(7a)**. Conversely, an SCC **(7b)** may access LSS functionality via the LSS hardware and software that is hosted at the Enterprise Data Center (EDC) **(8)**.

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Wide Area Network (WAN) connectivity will be provided by the CGDN+ and DHS OneNet networks **(9)**. These networks connect the PSS/LSS and SCCs with the EDC. The EDC is responsible for NAIS data storage, archiving, retrieval, and disaster recovery, and may host the transmit services, LSS, AIS Service Management (ASM), and server-side Human System Interface (HSI) functionality. The SOC **(10)** provides administrative support and oversight for the entire system. This includes VDL management, remote diagnostics and troubleshooting, technical support functions, and possibly hosting LSS functionality.

NAIS is expected to interoperate with many external systems, providing data and services to multiple users as well as importing data from other AIS data providers via the Enterprise Service Bus (ESB) **(11)**. The ESB will provide the standard interfaces and access controls required to interoperate with these systems (including consumers **(12)** like MAGNet, providers **(13)** such as the St. Lawrence Seaway Development Corporation (SLSDC), and other yet to be defined systems **(14)**). Authorized users within the USCG will be able to access NAIS Enterprise Services via a SWIII for specific mission needs.

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2 Reference Documents

The Contractor shall comply with the following references as per section 3 of this document, and shall use the most current version of the document as of the date of the contract award.

Ref. Number	Reference	Reference Link
United States Coast Guard Documents		
2.1.1	Command and Control Engineering Center (C2CEN) Encrypted Automatic Identification System (EAIS) v 4.0	This document is available in Attachment J.8, Technical Library: http://www.naisproject.net/NAIS_External/NAISMain/default_tech.asp
2.1.2	COMDTINST M2400.1G: Spectrum Management Policy and Procedures	This document is available in Attachment J.8, Technical Library: http://www.naisproject.net/NAIS_External/NAISMain/default_tech.asp
2.1.3	COMDTINST M11000.11 (series), USCG Civil Engineering Manual, Chapter 10	http://www.uscg.mil/directives/cim/11000-11999/CIM_11000_11A.pdf
2.1.4	MDA COI Fact Sheet: Maritime Domain Awareness Data Sharing Community of Interest	http://www.uscg.mil/hq/g-m/nmc/pubs/proceed/newpromagpage2005/fall%2006/FALL%2006/Fall06%20PDFs/MaritDAwDataSharingCom.pdf
2.1.5	MDA COI DSWG: MDA Community of Interest Data Sharing Work Group vocabulary handbook	http://www.naisproject.net/NAIS_External/NAISdiscussion/rfp2/sections/Section_J/MDA-COI-vocab.pdf
2.1.6	MDA COI DSWG Spiral 2 XML schema	http://www.naisproject.net/NAIS_External/NAISdiscussion/rfp2/sections/Section_J/MDA-COI-XML-Schema.ZIP
2.1.7	USCG Information Technology Product Inventory (ITPI)	This document is available in Attachment J.8, Technical Library: http://www.naisproject.net/NAIS_External/NAISMain/default_tech.asp
2.1.8	USCG Inland Rivers Vessel Movement Center (IRVMC) Reporting Points	http://www.uscg.mil/hq/g-m/nmc/pubs/proceed/newpromagpage2005/fall%2006/FALL%2006/Fall06%20PDFs/USCG%20InlandRiverVMC.pdf
Other Government Documents		
2.2.1	29 U.S.C. 655: Occupational Safety and Health Act Of (OSHA) 1970	http://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=OSHACT&p_toc_level=0&p_keyvalue=

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Ref. Number	Reference	Reference Link
2.2.2	29 U.S.C. 794d, Rehabilitation Act, Section 508	http://www.section508.gov/index.cfm?FuseAction=Content&ID=14
2.2.3	Code of Federal Regulations (CFR), Title 33 Navigation and Navigable Waters	http://www.access.gpo.gov/cgi-bin/cfrassemble.cgi?title=200733
2.2.4	Code of Federal Regulations (CFR), Title 33, part 3, Coast Guard Areas, Districts, Marine Inspection Zones, And Captain Of The Port Zones	The Codes of Federal Regulation can be obtained from the following website: http://www.access.gpo.gov/nara/cfr/waisidx_07/33cfr3_07.html
2.2.5	Code of Federal Regulations (CFR), Title 33, part 165, Regulated Navigation Areas And Limited Access Areas	The Codes of Federal Regulation can be obtained from the following website: http://www.access.gpo.gov/nara/cfr/waisidx_07/33cfr165_07.html
2.2.6	Code of Federal Regulations (CFR), Title 33, part 161,Vessel Traffic Management	http://www.access.gpo.gov/nara/cfr/waisidx_07/33cfr161_07.html
2.2.7	Code of Federal Regulations (CFR), Title 47, part 80, Colregs Demarcation Lines	The Codes of Federal Regulation can be obtained from the following website: http://www.access.gpo.gov/nara/cfr/waisidx_07/33cfr80_07.html
2.2.8	DHS Technical Reference Model (TRM) Interoperability Requirements	This document is available in Attachment J.8, Technical Library: http://www.naisproject.net/NAIS_External/NAISMain/default_tech.asp
2.2.9	Department of Defense (DoD) XML Registry and Clearinghouse policy	These collection of documents is available on the DoD Metadata Registry website: https://metadata.dod.mil/mdr/homepage.htm
2.2.10	Federal Communications Commission (FCC) Office of Engineering and Technology (OET) Bulletin 65 (Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields)	http://www.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65.pdf
2.2.11	Federal Information Processing Standards (FIPS) Publication 140-2	http://csrc.nist.gov/publications/fips/fips140-2/fips1402.pdf
2.2.12	Federal Information Processing Standards Publication (FIPS) 197	http://csrc.nist.gov/publications/fips/fips197/fips-197.pdf

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Ref. Number	Reference	Reference Link
2.2.13	FED-STD-795: Uniform Federal Accessibility Standards	http://www.assistdocs.com/search/document_details.cfm?ident_number=53835&StartRow=1&PaginatorPageNumber=1&doc%5Fid=FED%2DSTD%2D795&status%5Fall=ON&search%5Fmethod=BASIC
2.2.14	Department Of Defense Design Criteria Standard - Human Engineering: MIL-STD-1472-F	http://hfetag.dtic.mil/docs-hfs/mil-std-1472f.pdf
2.2.15	National Fire Protection Association (NFPA) NFPA 70: National Electric Code (NEC)	This document is available for purchase on the NFPA website: http://www.nfpa.org/catalog/product.asp?pid=7008SB&order_src=A291
2.2.16	NFPA 75: Standard for the Protection of Electronic Computer/Data Processing Equipment	This document is available for purchase on the NFPA website: http://businesscontinuitybookstore.com/data/dr231a.htm
2.2.17	NFPA 101: Life Safety Code	This document is available for purchase on the NFPA website: http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=101
2.2.18	National Telecommunications and Information Administration (NTIA) Manual of Regulations & Procedures for Federal Radio Frequency Management	The latest version of this document is available for purchase on US Government Printing Office website. The May 2003 Edition can be viewed at: http://www.ntia.doc.gov/osmhome/redbook/Manual.pdf
2.2.19	United States Code, Title 5, Section 552a (the Privacy Act)	http://www.usdoj.gov/oip/privstat.htm
Non-Government Documents		
2.3.1	American National Standards Institute / Telecommunications Industry Association (ANSI/TIA) ANSI/TIA-222-G-2005: Structural Standards for Steel Antenna Towers and Supporting Structures	This document is available for purchase on the TIA website: http://www.tiaonline.org/
2.3.2	American Society for Testing and Materials (ASTM) A 36 (Standard Specification for Carbon Structural Steel)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.3	ASTM A 53 (Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/

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Ref. Number	Reference	Reference Link
2.3.4	ASTM A 123 (Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.5	ASTM A 153 (Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.6	ASTM A 194 (Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.7	ASTM A 325 (Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.8	ASTM A 463 (Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.9	ASTM A 490 (Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.10	ASTM A 563 (Standard Specification for Carbons and Alloy Steel Nuts)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.11	ASTM A 615 (Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.12	ASTM A 780 (Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.13	ASTM F 1166 (Standard Practice for Human Engineering Design for Marine Systems, Equipment and Facilities)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.14	ASTM F 1337 (Standard Practice for Human Engineering Program Requirements for Ships and Marine Systems, Equipment, and Facilities)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.15	eXtensible Markup Language (XML)	http://www.w3.org/XML/
2.3.16	National Marine Electronics Association (NMEA) 0183 V3.01 formats	This document is available for purchase on the NMEA website: http://www.nmea.org/pub/0183

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Ref. Number	Reference	Reference Link
2.3.17	SEI / ASCE 7-02: Minimum Design Loads for Buildings and Other Structures	This document is available for purchase on the SEI website: http://content.seinstitute.org/
2.3.18	Telecommunications Industry Association/Electronics Industry Alliance (TIA/EIA) TIA/EIA-568-B: Commercial Building Telecommunications Wiring Standard	This document is available for purchase on the TIA website: http://www.tiaonline.org/
2.3.19	TIA-569-B: Commercial Building Standard for Telecommunications Pathways and Spaces	This document is available for purchase on the TIA website: http://www.tiaonline.org/
2.3.20	TIA TSB-88-B: Wireless Communications Systems - Performance In Noise And Interference	This document is available for purchase on the TIA website: http://www.tiaonline.org/
International Documents		
2.4.1	Building Code Requirements for Structural Concrete and Commentary ACI 318-05/318R-05	This document is available for purchase on the ICC website: http://www.iccsafe.org/e/prodshow.html?prodid=9021S05&stateInfo=IabfDkcEcjcauokd5489|3
2.4.2	Convention on the Territorial Sea and the Contiguous Zone, 15 U.S.T. 1606	http://untreaty.un.org/ilc/texts/instruments/english/conventions/8_1_1958_territorial_sea.pdf
2.4.3	IALA Recommendation A-124 on AIS Shore Stations and Networking Aspects Related to the AIS Service	http://site.ialathree.org/pages/publications/publicationsessaip2.php?lang=eng&id=59&LeTypePub=1
2.4.4	International Code Council: 2006 International Codes	http://www.iccsafe.org/
2.4.5	International Electrotechnical Commission (IEC) 61162-1: Maritime navigation and radio communication equipment and systems - Digital interfaces - Part 1: Single talker and multiple listeners, Edition 2, July 2000	This document is available for purchase on the ANSI website: http://webstore.ansi.org/ansidocstore/default.asp

Ref. Number	Reference	Reference Link
2.4.6	IEC 61993-2: Maritime navigation and radiocommunication equipment and systems –Automatic identification systems (AIS) – Part 2: Class A shipborne equipment of the universal automatic identification system (AIS) – Operational and performance requirements, methods of test and required test results	http://domino.iec.ch/preview/info_iec61993-2%7Bed1.0%7Den.pdf
2.4.7	IEC 62287-1: Maritime navigation and radiocommunication equipment and systems - Class B shipborne equipment of the automatic dentification system (AIS) - Part 1: Carrier-sense time division multiple access (CSTDMA) techniques	http://webstore.iec.ch/preview/info_iec62287-1%7Bed1.0%7Den.pdf
2.4.8	IEC 62288: Maritime Navigation and Radio communication Equipment and Systems - Presentation of Navigation-related Information on Shipborne Navigational Displays - General Requirements - Methods of Testing	http://www.iec.ch/index.html
2.4.9	IEC 62320-1: Maritime navigation and radio communication equipment and systems - Automatic identification system (AIS) - Part 1: AIS Base Stations - Minimum operational and performance requirements, methods of testing and required test results	http://webstore.iec.ch/webstore/webstore.nsf/artnum/037701
2.4.10	Internet Engineering Task Force (IETF) IPv6 Specification, RFC 2460	http://www.ietf.org/rfc/rfc2460.txt
2.4.11	IMO NAV 53/INF.12: Use of AIS Binary Messages	http://www.naisproject.net/NAIS_External/NAISdiscussion/rfp2/sections/Section_J/53-21-INF-12.pdf
2.4.12	IMO Safety of Navigations Circular 236	http://www.imo.org/includes/blastDataOnly.asp/data_id%3D10741/236.pdf

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Ref. Number	Reference	Reference Link
2.4.13	International Telecommunications Union Sector for Radio communications (ITU-R) M.1371: Technical Characteristics for an Automatic Identification System (AIS) Using Time Division Multiple Access in the Maritime Mobile Band, including IALA Technical Clarifications on the ITU-R M.1371	http://www.itu.int/ITU-R/
2.4.14	ITU-R.P525 : Calculation of Free-Space Attenuation	This document is available with subscription to the ITU website: http://www.itu.int/rec/R-REC-P.525-2-199408-I/en
2.4.15	ITU-R.P526: Propagation by Diffraction	This document is available with subscription to the ITU website: http://www.itu.int/rec/R-REC-P.526-10-200702-I/en
2.4.16	ITU-R.P1546: Method for Point-to-Area Predictions for Terrestrial Services in the Frequency Range 30 MHz to 3000 MHz	This document is available with subscription to the ITU website: http://www.itu.int/rec/R-REC-P.1546-2-200508-I/en
2.4.17	United Nations Convention on the Law of the Sea (UNCLOS), 21 I.L.M. 1261	http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm

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3 Requirements

3.1 Design Constraints

Increment 2 of NAIS is expected to take advantage of several USCG and DHS enterprise IT infrastructure components. This section provides an overview of the constraints and integration requirements for the use of existing assets and infrastructure by NAIS, which are detailed in later attachments as identified below.

3.1.1 USCG Navigation Center (NAVCEN)

The NAIS System Operations Center (SOC) established for Increment 1 is located at the NAVCEN, in Alexandria, VA, and NAVCEN will serve as the SOC for I-2. In addition to the NAIS SOC, NAVCEN operates the Navigation Information Service (NIS), the Nationwide Differential Global Positioning System (NDGPS), and Long-Range Navigation (LORAN) system. NAVCEN also serves as the civilian interface for the Global Positioning System (GPS) and manages other navigation-related projects. NAVCEN houses much of the IT equipment required for the monitoring and management of these systems. Each of these systems includes wide-area network (WAN) connections via routers to the CGDN+ and other networks administered and monitored by TISCOM and DHS One Network (OneNet), Local Area Network (LAN) connections, and end-user computer workstations. Additional information on NAVCEN can be found at http://www.navcen.uscg.gov.

All system support functions (except for network monitoring and administration and field support desk), including, but not limited to, system monitoring (including facility alarms) and administration, help desk, user support, and SOC watchstander training, will continue to be provided by NAVCEN. A description of NAVCEN components and infrastructure to be made available for Increment 2 appears in Attachment J-9 of the NAIS I-2 RFP.

3.1.2 Enterprise Data Centers

Increment 1 data storage was established at the Coast Guard Enterprise Data Center (EDC) at the Operations Systems Center (OSC) in Martinsburg, WV. OSC will continue to host NAIS data storage components for Increments 2 and 3. NAIS Increment 2 will require a centralized repository for all NAIS data (including AIS messages, metadata, and other supporting information) in order to supply NAIS data to external systems and users, provide a warehouse for long-term storage of NAIS data, including AIS Messages from non-NAIS data sources (e.g., the Saint Lawrence Seaway Corporation and NOAA), and to provide a mechanism for analysis of this historical data. This repository will be the official DHS and Coast Guard data store for AIS information.

All enterprise-level databases must be located at the Coast Guard designated EDC primary and disaster recovery (DR) sites. A description of the OSC EDC appears in Attachment J-9 of the NAIS I-2 RFP.

3.1.3 DHS OneNet & CGDN+

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NAIS will utilize DHS OneNet infrastructure to the maximum extent possible. TISCOM, the management authority for CGDN+, began the migration of USCG networks from CGDN+ to OneNet in Q1 CY 2007. After the migration is complete, security and day-to-day management of OneNet will be the responsibility of U.S. Customs and Border Protection (CBP), while TISCOM will support USCG-specific operations of OneNet. In cases where OneNet is not in use in a given sector, CGDN+ shall be used. A brief description of the publicly available information pertinent to OneNet and CGDN+ appears in Attachment J-9.

3.1.4 Sector Command Centers

The USCG has organized its operational command and control (C2) units into Sectors with Sector Command Centers (SCC). Each SCC monitors the sector area of responsibility (AOR) and performs a common, standardized set of mission activities and functions (tailored to meet the specific needs of each area).

In order to streamline and facilitate SCC operations supported by NAIS, it is expected that NAIS platform will integrate and interoperate with the SCC C2 systems to the greatest degree possible. NAIS functionality will be accessed via USCG standard workstations. Ideally, all NAIS end-user functions will be provided through the SCC C2 system, and will not require a separate workstation. Each SCC may support additional IT equipment if necessary for the specific technical solution.

Although several C2 systems, services, and components available at the SCC support classified data, NAIS is an unclassified system, and all AIS messages received and transmitted by the system are unclassified. Integration of NAIS functionality with any existing or planned classified system shall not require a change in the classification level of NAIS. Additional information describing the Sectors and SCCs is provided in Attachment J-9 of the NAIS I-2 RFP.

3.1.5 Geographic Information Systems

The DHS Office of the Chief Information Officer has designated the ESRI ArcGIS™ suite as the enterprise standard for Geographic Information Systems (GIS). DHS has established an enterprise license for ArcGIS products, and the Coast Guard will provide access to these tools as needed by the Contractor. ArcGIS components provided by the Coast Guard shall be reused to the extent possible. GIS data shall comply with the DHS Geospatial Data Model. The Contractor shall develop any applications using GIS components employing a standards-based approach to ensure interoperability.

3.1.6 HLS Enterprise Architecture and Technical Reference Model

The NAIS shall be compliant with the Homeland Security Institute (HLS) Enterprise Architecture (EA). All IT hardware and software shall be compliant with the HLS EA Technical Reference Model (TRM) Standards and Products Profile.

3.1.7 Enterprise Service Bus (ESB) and Service Oriented Architecture (SOA)

The Coast Guard is developing an ESB based on the concept of delivering business events, documents, and data as asynchronous messages. The ESB will use a Java Messaging Service (JMS)-compliant backbone to route messages with eXtensible Markup Language (XML) payloads to topics and queues. NAIS business

services, whether intended for Enterprise or NAIS-only consumption should be architected to leverage this ESB as appropriate. The Coast Guard has not yet solved all the security and access issues surrounding use of the ESB and SOA services. However, the architectural vision is to leverage the Coast Guard's Active Directory for user authentication, along with DoD-compliant Public Key Infrastructure (PKI). Further, the Coast Guard intends to use industry standards such as Security Assertion Markup Language (SAML) v2.0 and Web Services-Security (WS-Security), with others considered as adopted, as key components of their security strategy for SOA. NAIS shall be architected in such a way to utilize these security services and authentication capabilities as they become available.

3.2 General System Requirements

3.2.0.0-1 The system shall be designed for a 15 year life-cycle that will begin at Full Operational Capability (FOC) acceptance. For the purposes of the system design, an FOC date of Q4 FY2013 shall be used.

3.2.0.0-2 The NAIS system shall not degrade the performance or operational availability of other USCG systems.

3.2.1 Application Architecture

3.2.1.0-1 The NAIS shall be designed using Service Oriented Architecture (SOA) approaches in order to:

a. Ensure that NAIS software components are reused throughout their service life;
b. Make it easier to adapt NAIS software to meet new operational requirements;
c. Ease the reuse of existing and planned USCG and DHS IT infrastructure;
d. Improve scalability and modularity of the software components; and
e. Establish standard interoperable external interfaces for all NAIS software components to make it easier to integrate NAIS into existing (e.g., COP, MISLE, MAGNet) and yet to be developed systems.

3.2.1.0-2 The application architecture of NAIS shall align with the structure shown in Figure 3.1, which illustrates the top-level NAIS Application Architecture Components (Component(s)) within NAIS. It corresponds to high-level organization of functional requirements that will be provided by separate software segments. Each Component can be accessed and used independently. The Components illustrated represent the minimal amount of modularity required of the NAIS software. Additional modularity within the Components is allowed. However, the government is not requiring a specific architecture for lower-level modularity. In addition, this application architecture represents only certain requirements for the NAIS software and does not imply requirements for physical hardware.

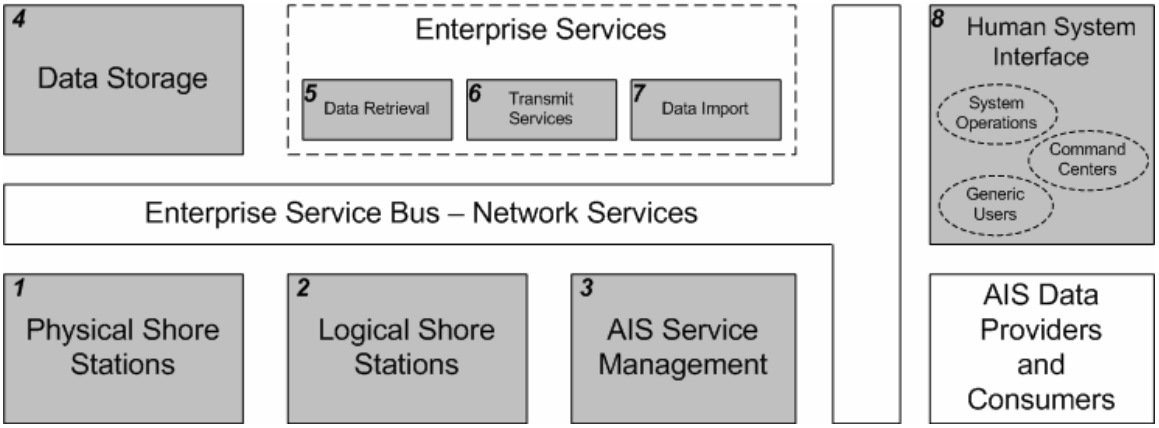

Figure 3.1: NAIS Application Architecture

The following describes the parts of the Application Architecture diagram.

The NAIS application architecture will consist of at least eight Components that communicate via a common ESB and set of Network Services, and can be accessed by other data providers and consumers. Several of the services are consistent with the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) A-124. The requirements for those Components derive from that document, but have additional requirements that are needed by the USCG.

1. *Physical Shore Stations (PSS)* represents the functionality of the transmit and receive infrastructure, predominantly at remote RF sites. This segment of the application draws heavily from the IALA guidelines for AIS Physical Shore Stations.

2. *Logical Shore Stations (LSS)* processes the data received from and transmitted to one or more PSSs and provides the Basic AIS Services[1] to the applications during runtime, as described in the IALA guidance, as well as additional functionality as laid out in this specification document.

3. *AIS Service Management* represents the management and maintenance functionality of the system, as described in the IALA guidance and the AIS Service Management section of this document.

4. The *Data Storage* service is comprised of the functionality and infrastructure required to store and maintains system data. This includes archival, database query, and disaster recovery functionality. As noted in the Design Constraints section of this document and the J-9 Attachment, this functionality will reside at the EDC.

Enterprise Services includes three loosely-coupled Components:
5. *Data Retrieval*, used to obtain a more refined view of the AIS messages and associated data;
6. *Transmit Services*, for validating and transmitting outbound AIS messages, thereby shielding external users from the complexity of delivering AIS messages to the PSS; and
7. *Data Import*, to allow NAIS to accept data from other, external (non-NAIS) AIS data

[1] Basic AIS Services, are the services described in IALA-124 guidance

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sources.
The dotted line indicates that the three Components are grouped as *Enterprise Services*. The solid line for the individual Components shows that they must be modular in design and implementation.

8. *Human System Interface* represents the user interface segment of the system. The three sub-parts of this module represent the three distinct user types that must be served by the interface, which does not necessarily require separate software modules. The dotted lines represent that the needs of these three user segment may be satisfied either by separate user interface modules, or by a unified—but customizable—user interface module.

Figure 3.1 also illustrates two Components that are ancillary to the NAIS system.

The *Enterprise Service Bus* (*ESB)* will be provided by the Government. The telecommunications infrastructure will consist of DHS OneNet and the connected LANs at the various government facilities. Enhancements to the ESB will be made by the USCG to improve the USCG's Service Oriented Architecture. *Network Services* are those methods, media, products, and platforms needed to communicate between NAIS internal Components.

AIS Data Providers and Consumers represents the external systems with which data may be shared. The specific systems that will provide or consume AIS data, or interface with any of the NAIS Components are not defined. Some systems are identified (e.g., MAGNet), but others are not, and others may not yet be developed. Conceptually, the NAIS Components shall be built with open and defined interfaces that allow for interoperability with external systems.

Software implementation decisions will be made during the system engineering process.

3.2.1.0-3 The software processes of the Components shall be portable to run on machines within the Design Constraints and the DHS TRM and the USCG Information Technology Product Inventory (ITPI).

3.2.1.0-4 The system shall expose software application interfaces for the Components illustrated in Figure 3.1 that can be discovered and used by other systems.

3.2.1.0-5 The application interfaces shall be based on international standards or otherwise open (e.g., provision of interface specification documentation) to inspection and reuse by other systems external to NAIS.

3.2.1.0-6 The application interfaces shall remain stable throughout the life of the system.

3.2.2 Facilities

NAIS system facilities are those structures, shelters, or similar assets that are provided, altered, or enhanced by the Contractor, and are the subject of the following requirements:

a. Improved land, towers, equipment shelters, structures, and other real property
b. Electrical power, telephone, telecommunications termination

c. Site access and physical security
d. Heating, cooling, ventilation, and lighting commensurate with the NAIS system and staff located at the site
e. Fire and intrusion detection systems

3.2.2.0-1 Facilities shall be designed for a 30-year service life.

3.2.2.0-2 Facilities construction shall be completed in accordance with all requirements outlined in the environmental documentations that the Contractor will prepare in accordance with the Environmental Compliance section of the SOW, Section 3.1.2.2.4.6.

3.2.2.0-3 The construction or alteration of all facilities (e.g. towers, shelters, buildings, etc.) shall comply with the applicable federal, state, and local laws and regulations.

3.2.2.0-4 New equipment shelters shall be of concrete construction.

3.2.2.0-5 A monolithic design for new construction equipment shelters shall be used where practical.

3.2.2.0-6 Tilt-up shelter construction shall be used in locations where use of a monolithic shelter is impractical or cost prohibitive (e.g. a remote location with limited access).

3.2.2.0-7 The exterior finish of new construction equipment shelters shall be resistant to chips, cracks, spalling, fading, and damage due to interior wall corrosion.

3.2.2.0-8 New facilities or modifications to existing USCG facilities shall conform to USCG Civil Engineering Manual, COMDTINST 11000.11 (series) Chapter 10.

3.2.2.0-9 The design and implementation of the NAIS shall be in compliance with applicable areas of the Spectrum Management Policy and Procedures Manual (COMDTINST M2400.1G) and Manual of Regulations and Procedures for Federal Radio Frequency Management.

3.2.2.0-10 New towers or modifications to existing towers shall conform to the current versions of the following documents:

a. Structural Standards for Steel Antenna Towers and Supporting Structures (ANSI/TIA-222-G-2005).
b. ACI 318-05/318R-05

3.2.2.0-11 New facilities or modifications to existing facilities shall conform to the current versions of the following documents:

a. American Society for Testing and Materials (ASTM)-A-36
b. ASTM-A-53
c. ASTM-A-123
d. ASTM-A-153
e. ASTM-A-194 grade 2H or ASTM-A-563 grade DH

f. ASTM-A-325
g. ASTM-A-463
h. ASTM-A-490
i. ASTM-A-615
j. ASTM-A-780
k. ANSI/TIA-222-G-2005
l. SEI / ASCE 7-02
m. ACI 318-05/318R-05
n. International Code Council (ICC), International Codes
o. Life Safety Code (NFPA 101)
p. National Electric Code (NFPA 70)
q. Uniform Federal Accessibility Standards (UFAS), FED-STD-795 (Note: This standard is not applicable for remote sites)

3.2.2.0-12 Aluminum conductors shall be prohibited for interior power distribution wiring.

3.2.2.0-13 Facilities shall conform to NFPA 75 for construction and fire protection requirements.

3.2.2.0-14 Halon fire suppression systems shall not be used.

3.2.2.0-15 Asbestos shall not be used at NAIS facilities.

3.2.2.0-16 Chlorofluorocarbons shall not be used at NAIS facilities.

3.2.2.0-17 Facilities shall accept commercial power as provided by the local electric power utility.

3.2.2.0-18 Facilities shall supplement utility power as necessary to meet operational availability requirements.

3.2.2.0-19 NAIS facilities shall have an Uninterruptible Power Supply (UPS) to provide power during switchover from commercial power to supplemental power.

3.2.2.0-20 NAIS shall comply with Occupational Safety and Health Administration (OSHA) Act of 1970 regulations.

3.2.2.0-21 NAIS shall comply with Federal Communications Commission (FCC) Office of Engineering and Technology (OET) Bulletin 65 (Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields) regulations.

3.2.2.0-22 NAIS shall comply with all applicable local, state and federal safety and environmental laws, regulations and requirements to ensure personnel and environmental safety.

3.2.2.0-23 The system shall comply with Commercial Building Standard for Telecommunications Pathways and Spaces TIA-569-B.

3.2.2.0-24 The system shall comply with Commercial Building Telecommunications Wiring Standard TIA/EIA-568-B.

3.2.2.0-25 The NAIS system shall monitor, report, and log the physical status of system facilities to the SOC and applicable SCC. At a minimum, facilities that house NAIS system equipment will provide the following monitoring and status reporting capabilities. In cases where NAIS equipment resides at a non-NAIS facility (e.g., a Rescue 21 radio site), facilities monitoring may be done by the site owner, and the necessary alerts passed to NAIS system operations management.

a. The system shall monitor and report changes in the status of physical intrusion and fire detection alarms at NAIS facilities.

b. The system shall monitor and report changes to the status of primary power, the transition to backup power, and the restoration of primary power.

c. The system shall monitor the fuel level for backup generators (where installed) and the charge of backup batteries (where installed), and report when lower than acceptable levels are discovered.

d. The system shall monitor and report the voltage output for batteries that are used for backup power.

e. The system shall monitor the environmental conditions within the facilities, and will report when an out-of-tolerance event is discovered.

f. The system shall monitor the status of tower lighting, and will report tower warning light failures.

g. For new monitoring and alarm capabilities at NAIS facilities, physical intrusion and fire detection alarms shall have a false alarm rate of no greater than 5% when detecting an out-of-tolerance event.

h. For new monitoring and alarm capabilities at NAIS facilities, physical intrusion, physical status and fire detection alarms shall transmit an alarm to the alarm monitoring system within ten (10) seconds of detecting an out-of-tolerance event.

3.2.3 Operational Environment

3.2.3.0-1 All NAIS shelters shall be adequately conditioned so that the ambient temperature is maintained within the published limits for all equipments.

3.2.3.0-2 Environmentally sensitive equipment shall be housed in appropriate climate-controlled facilities.

3.2.3.0-3 The system shall be operable and survivable within the parameters outlined in Table 3.1.

Table 3.1: Environmental Tolerances

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Environmental Parameters	Operational	Survivable
Temperature	-25 to 50 deg. Cº	-82 to 70 deg. Cº
Humidity	20% to 100% condensing	1% to 100% condensing
Wind Speed	65 kts sustained 100 kt gust	65 kts sustained 140 kt gust
Weather	Rain, fog, snow, sleet, freezing rain	Rain, fog, snow, sleet, freezing rain
Other	Salt, spray, sand, dust, static discharge, and vibration	Lightning strikes, salt water immersion, shock.

3.2.4 Information Assurance

3.2.4.0-1 The system shall incorporate data networking components (e.g. routers, switches, gateways) that implement National Institute of Standards and Technology (NIST) Special Publication compliant information assurance (IA) controls.

3.2.4.0-2 The system shall implement Federal Information Processing Standard (FIPS) 140-2 and 197 for data communications encryption.

3.2.4.0-3 The system shall not allow the alteration of AIS messages received by NAIS receivers.

3.2.5 Security Management

3.2.5.0-1 The system shall be able to interoperate and share data with both classified and unclassified systems.

3.2.5.0-2 The system shall share data with classified systems through a Cross Domain Solution (CDS) or Multi-Level Security (MLS) solution.

3.2.5.0-3 The system shall restrict access to system data and functionality to authorized users and operators.

3.2.5.0-4 The system shall incorporate logical separation and access protection (i.e., gateways, firewalls) to protect the system from unauthorized use.

3.2.5.0-5 The system shall incorporate logical separation and access protection controls between various connected organizations and entities.

3.2.5.0-6 The system shall have the capability to monitor network activity, automatically report unauthorized activity, and block unauthorized access to network and system infrastructure.

3.2.5.0-7 All network hardware shall be IPv6 compatible without modification, upgrade, or replacement as specified by the Internet Engineering Task Force (IETF) IPv6 Specification, RFC 2460.

3.2.6 Scalability

3.2.6.0-1 The system and its Components and services shall scale to accommodate the performance thresholds as specified in Table 3.2. The scaling of the Components may be required individually or collectively.

Table 3.2: System Scalability Metrics

System Component	Threshold Performance at IOC	Threshold Performance at FOC
Physical Shore Station (PSS)	30 PSSs	400 PSSs
VDL Throughput	10% capacity saturation for each PSS	100% capacity saturation for each PSS
Human System Interface	20 concurrent users across 3 SCCs, SOC, and generic cases	400 concurrent users across all SCCs, SOC, and generic cases
Logical Shore Station (LSS)	10 LSSs	200 LSSs

3.2.6.0-2 System growth shall not degrade performance of any of the system functions below the threshold requirements of this PSPEC.

3.2.6.0-3 Other system Components shall be able to scale to meet the service needs dependencies of the Components in Table 3.2. These Components are:

a. Storage
b. Enterprise Services
c. AIS Service Management

3.2.7 Operational Availability (A_O)

3.2.7.0-1 The system shall operate 24 hours a day, 7 days a week, in the environmental conditions described in Operational Environment section of this document, Section 3.2.3.

3.2.7.0-2 For each Sector Command Center (SCC), the system shall achieve a monthly operational availability (A_O) of ≥ 0.96 for each of the three critical functions defined in this section.

Receive and Transmit AIS Messages: This function is supported by the system elements that allow the end-user at the SCC to receive and use messages from, and transmit messages to, AIS mobile stations in the sector area of responsibility. For the operational availability calculations of this critical function, the Contractor shall take into account that any unavailable time observed, during normal system operations, over any part of the required coverage area, will

count against the entire SCC sector availability for this critical function. For instance, in the event where one of the physical shore stations (PSSs) becomes inoperable and some part of the required coverage is lost, for the purpose of A_O calculations, this critical function will be considered inoperable.

Data Management: This function is supported by the system elements that are necessary to perform data processing, storage, retrieval and analysis at the SCC level. Although this capability will largely depend upon system Components that are centrally located, the A_O will be measured per sector.

Interoperability: This function is supported by the system elements that provide the means of interfacing the data management function with unclassified and classified external systems.

3.2.7.0-3 For the purposes of system design, the Contractor shall assume an A_O of ≥ 0.999 for the CGDN+ and OneNET networks, as described in their respective Design Constraints attachments.

3.2.7.0-4 The A_O for each critical function of each sector shall be calculated on a monthly basis using the below formula:

$A_O = T_O / (T_O + T_m + T_l + T_a)$ where:

Operating time (T_o) is the period of uptime where all of the elements of the critical function (as described above) are fully operable.

Maintenance Delay (T_m) is a period of downtime during the physical act of preventing, determining, and correcting equipment or software faults. It includes all actions taken to retain system/equipment/product in a useful serviceable condition or to restore it to usefulness / serviceability. Maintenance includes inspection, testing, servicing, repair, rebuilding, and reclamation.

Logistics Delay Time (T_l) is a period of downtime during which no maintenance takes place due to delays in parts/equipment delivery and transportation.

Administrative Delay Time (T_a) is a period of downtime during which no maintenance takes place due to delays in administrative processing and assignments of maintenance personnel.

3.3 Physical Shore Station (PSS)

3.3.1 General PSS Requirements

3.3.1.0-1 Individual PSSs, as well as the aggregate capability provided by all PSSs, shall comply with the NTIA Manual of Regulations & Procedures for Federal Radio Frequency Management for U.S. telecommunications services.

3.3.2 Individual PSS Units

3.3.2.0-1 The PSSs shall provide the capability described in IALA recommendation A-124, Part 6.6.

3.3.2.0-2 PSSs shall have the capability to store AIS messages when network connectivity is lost, and send the stored messages to appropriate LSSs when connectivity is regained.

3.3.2.0-3 PSSs shall be able to store and forward at least two weeks of AIS messages received over a fully utilized VDL.

3.3.2.0-4 The system shall provide, at a minimum, the following corresponding metadata for each AIS message transmitted from the PSS, and shall send the metadata to the NAIS data subsystem for storage and retrieval in conjunction with copies of the transmitted AIS message.

a. UTC Timestamp (at time of transmission from the PSS – based upon GPS clock)
b. Remote site numbers(s) (i.e., base station ID numbers) from which the message was transmitted
c. Operator ID (i.e., the user ID of the Operator)
d. Transmit power level
e. Channel(s) on which the message was transmitted
f. Other administrative data as appropriate to aid in message retrieval, as determined during system design

3.3.2.0-5 The system shall provide and store, at a minimum, the following corresponding metadata for all messages received by the PSS, and shall send the metadata to the NAIS data subsystem for storage and retrieval in conjunction with copies of the received AIS message.

a. UTC Timestamp (received from GPS clock)
b. Remote site numbers(s) (i.e., base station ID numbers) upon which the message was received
c. System source identifier (i.e., the system, NAIS or other, by which the message was received. Example: Saint Lawrence Seaway AIS System)
d. Consolidation tag (i.e., group number, number of messages received)
e. Received signal strength
f. Channel(s) on which the message was received
g. Packet Time of Arrival
h. Other administrative data as appropriate to aid in message retrieval, as determined at system design

3.3.2.0-6 Each base station shall meet the minimum requirements of the base station as described in IEC 62320-1, IEC 61162-1, and National Marine Electronics Association (NMEA) 0183 V3.01.

3.3.2.0-7 The base station shall provide a receiver sensitivity of at least -115dBm.

3.3.2.0-8 Where the PSS is integrated with other RF systems (e.g., Rescue21), the NAIS RF system output power shall be configurable up to at least 100 Watts.[2]

[2] *The Rescue 21 RF subsystem induces approximately 10 dB of insertion loss.*

3.3.2.0-9 Base stations shall be capable of receiving and transmitting AIS messages that contain encrypted information as per Command and Control Engineering Center (C2CEN) Encrypted Automatic Identification System (EAIS) v 4.0.

3.3.3 Coverage

3.3.3.0-1 The system shall provide at least the minimum transmit and receive performance as shown below in Table 3.3. Performance is measured in terms of the maximum acceptable Packet Error Rate (PER).

The specific geographic areas that require coverage are defined below. For coverage verification purposes, the characteristics of the vessel types (i.e., AIS mobile stations) are defined in section 3.3.4.

Table 3.3: Minimum Coverage Requirements, in PER

		Ports & Other Specified Areas (Table 3.4)	Inland Navigable Waterways, Coastal Waterways out to 24nm (Table 3.5)	24 to 50nm from baseline
Receive	**Class A**	25%	50%	90%
	Class B			--[3]
Transmit	**Class A**	27%	42%	--
	Class B	42%	52%	--

3.3.3.0-2 The system shall provide transmit and receive coverage in the *Ports and Other Specified Areas* as defined in Table 3.4. Graphical representations of the coverage requirements in Table 3.4 are provided in Attachment J-5.

Table 3.4: Ports and Other Specified Areas

Port Areas		
Albany, NY	Jacksonville, FL	Port Everglades, FL
Anchorage, AK	Lake Charles, LA	Portland, ME
Baltimore, MD	Long Beach, CA	Portland, OR
Baton Rouge, LA	Los Angeles, CA	Portsmouth, NH
Beaumont, TX	Marcus Hook, NJ	Richmond, CA
Boston, MA	Memphis, TN	San Diego, CA
Camden, NJ	Miami, FL	San Francisco, CA
Charleston, SC	Mobile, AL	San Juan, PR
Chicago, IL	New Orleans, LA	Savannah, GA
Cincinnati, OH	New York/New Jersey	Seattle, WA
Cleveland, OH	Newport News, VA	South Louisiana, LA
Corpus Christi, TX	Norfolk Harbor, VA	St. Louis, MO

[3] This table provides *minimum* coverage performance requirements; even where no minimum requirement is provided, coverage is still considered to be of value to the Government.

Detroit, MI Duluth-Superior, MN/WI Freeport, TX Galveston, TX Honolulu, HI Houston, TX Huntington, WV	Oakland, CA Paulsboro, NJ Philadelphia, PA Pittsburgh, PA Port Arthur, TX Port Canaveral, FL	Tacoma, WA Tampa, FL Texas City, TX Valdez, AK Wilmington, DE Wilmington, NC

Critical Coastal and Non-Port Areas

- US Waters of the Great Lakes:
  - Lake Superior: West End (Two Harbors, MN), Keweenaw Peninsula, MI, Marquette, MI
  - Lake Michigan: Straits of Mackinac (St Ignace, Charlevoix, Mackinaw City, MI), Door Peninsula (Green Bay, Sturgeon Bay, WI); Milwaukee, WI; South End (Gary, Indiana Harbor, Michigan City, IN), Holland/Grand Haven/Muskegon, MI
  - Lake Huron: Alpena, MI, Bay City, MI, Port Huron, MI
  - Lake Erie: Toledo, OH, Lorain, OH, Erie, PA, Buffalo, NY
  - Lake Ontario: Rochester/Sodus/Oswego, NY
- California/Oregon Coast from Mexican Border to Cape Blanco:
  - Oceanside, CA; Santa Barbara Channel (Point Conception, Santa Barbara, Channel Islands, CA); Point Sur, CA; Point Arena, CA; Cape Mendocino, CA ; Lost Coast (Eureka, Crescent City, CA); Cape Blanco, OR
- Delaware Bay Approaches (Cape May, Cape Henlopen)
- Unimak Pass, AK
- Cape Hatteras, NC

Vessel Tracking Service Areas

VTS areas extending beyond (seaward of) the baseline. VTS Areas are described in the *Code of Federal Regulations (CFR), Title 33: Navigation and Navigable Waters, Part 161 – Vessel Traffic Management, Subpart C – Vessel Traffic Service and Vessel Movement Reporting System Areas and Reporting Points.*

IRVMC Reporting Points

IRVMC Reporting Points, as described in CFR, Title 33: Navigation and Navigable Waters, Part 165.830 and Part 165.921.

3.3.3.0-3 The system shall provide transmit and receive coverage in *Inland Navigable Waterways* as defined in Table 3.5. Graphical representations of the coverage requirements in Table 3.5 are provided in Attachment J-5.

Table 3.5: Inland Navigable Waterways (Shoreward Coverage Boundaries)

District / Sector	River / Waterway	Mile Marker / Landmark
D1		
Northern New	Kennebec River	Days Ferry to Gardiner Bridge.

District / Sector	River / Waterway	Mile Marker / Landmark
England	Montsweag Bay	Hockomock Bay to Youngs Point.
	Sheepscot River	Middle Westport Island Wiscasset Bridge.
	New Meadows River	Dingly Island to Woolward Point.
	Damariscotta River	Farmers Island to New Castle.
	Medomak River	Waldoboro to Hungry Island.
	St. George River	Otis Cove to Thomaston.
	Pisqataqua River	I-95 Bridge to Broad Cove to Great Bay.
	Penobscot River	Bangor at the Joshua Chamberlain Bridge.
	Lake Champlain	US/Canada Border to Lock 12 in Whitehall, NY.
	Champlain Canal	MM 26.5 (Lock 12 in Whitehall, NY) to MM 0 (Southern end of Champlain Canal).
Long Island Sound	Connecticut River	Charter Oak Bridge (41-45N/072-39W), Hartford, CT. Approximately 44NM North of the mouth.
	Thames River	Norwich, CT (41-31.5N/072-05W). Approximately 13.5 NM north of the mouth.
New York	Hudson River	MM 184.2 (Southern end of Champlain Canal) to MM 0 (Southern tip of Manhattan/NY Harbor).
D5		
Delaware Bay	Delaware River	Trenton Falls.
	C & D Canal	Mouth to Maryland State line.
Baltimore	Sassafras River	Grove Pt. to Swantown Creek
	Chester River	Love Point to Spry Landing
	Choptank River	Tilghman Island to 331 Bridge in Denton, MD.
	Patapsco River	Bodkin Point to Baltimore Inner Harbor.
	Patuxent River	Drum point to Trueman Point.
	Potomac River	Point Lookout to Woodrow Wilson Bridge, Wash. DC.
	Wicomico River	Long Point to Tonytank Creek, Salisbury, MD.
	Elk River	Turkey Point to 213 Bridge
	C & D Canal	Elk River to Rte. 213 Bridge, Chesapeake City, MD.
	Nanticoke River	Roaring Pt. to the route 24 bridge, DE.
	Broad Creek	Nanticoke River to the route 24 bridge, DE
Hampton Roads	York River	Up to West Point.
	Rappahannock River	Up to the Route 360 Bridge.
	James River	Up to Chickahominy River
North Carolina	Cape Fear River	The US 17 bridge turning basin (5 miles upstream of the Port of Wilmington).
	Neuse River	Day Beacon (DBN) 50 (35-08.5N 077-03.5W)

District / Sector	River / Waterway	Mile Marker / Landmark
	Trent River	DBN 4 (35-04.5N 077-04W)
	Pamlico River	Pamlico River swing bridge at the town of Washington, NC (Route 17 Bridge)
D7		
Charleston	Cooper River	To Lighted Buoy 76, LLNR 3070
	Stono River	Wadamalaw Sound.
	Broad River	Hall Island.
	Savannah River/S. Channel	Little Kiffer Point.
	Ogeechee River	Ossabaw Sound.
Jacksonville	St. Johns River	To the Route 17 Bridge.
	Indian River	MM875 to MM890.
Miami	St. Lucie Canal	The whole canal.
D8		
Galveston	Houston Ship Channel	Manchester Bridge (610 Bridge).
	San Jacinto River	Hwy. 90 Bridge (near Crosby, TX.)
Corpus Christi	Brownsville Ship Channel	Port of Brownsville.
	Victoria Barge Canal	Pickering Basin
	Channel to Port Harlingen	Arroyo Colorado Cutoff to Port of Harlingen.
D9		
Buffalo	St. Lawrence River	Lighted Buoy 1 (LLNR 0005). Canadian border at Massena NY.
Detroit	Saginaw River	M-46 Bridge, approximately 20 miles upstream from the mouth of the river.
Lake Michigan	Grand River	14NM inland.
	Illinois River	MM291.1 to MM333.5. Which include the Chicago Sanitary Ship Canal, the Cal-sag & Calumet Rivers mm304.5-mm333.5, each separate channel is identified as part of the Illinois River system.
D11		
San Francisco	Sacramento River	City of Sacramento Water Intake Light (LLNR 7762) - Port of Sacramento
	Sacramento River Deep Water Ship Canal	Light 86 (LLNR 7615)
	San Joaquin River	Stockton Channel Light 48 (LLNR 7165) - Stockton

District / Sector	River / Waterway	Mile Marker / Landmark
		Note: The navigable waters of the American, Old, Middle, N. & S. Mokelumne Rivers fall w/in a 10 mile radius of San Pablo Bay, Suisun Bay, Sacremento River & San Joaquin River.
	Lake Tahoe	All
D13		
Portland	Umpqua River	MM 0 - MM 12 (Bridge at 43-39N, 123-50W in Scottsburg, OR)
	Siuslaw River	MM 0 - MM 18 (Bridge at 44-02N, 123-52W in Mapleton, OR)
	Columbia River	MM 0 - MM 45 (Eastern end of Puget Island)
	Columbia River	MM 40 - Western end of Puget Island to Richland.
	Willamette River	MM 0 - MM 30 (Columbia River confluence to Oregon City Falls)
Seattle	Hood Canal	The whole canal.
	Lake Washington	The whole Lake.
D17		
Anchorage	Bristol Bay	Tuklung Mt. HLS

3.3.3.0-4 The system shall provide transmit and receive coverage in the coverage exception areas as described in Table 3.6.

Table 3.6: Coverage Exceptions – Alaska and U.S. Territories

Area description	Receive PER		Transmit PER	
	Class A	Class B	Class A	Class B
Alaska Bering Sea coast north of Kotzebue to Canadian border	95%	--[4]	--	--
Cook Inlet North and East of Anchorage (Turnagin and Knik Arms)	90%	--	--	--
Aleutian Islands west of Dutch Harbor, except for Adak and Attu	90%	--	--	--
Alaska Peninsula west of 155° west longitude, except Unimak Pass	90%	--	--	--
Adak, Attu, Dutch Harbor and Unimak Pass	50%	50%	--	--
Gulf of Alaska between 137° and 144° west longitude	90%	--	--	--

[4] This table provides *minimum* coverage performance requirements; even where no minimum requirement is provided, coverage is still considered to be of value to the Government.

Western Rivers covered by IRVMC (covering IRVMC designated reporting points)	90%	--	--	--
U.S. Territories (Island of Guam, Puerto Rico, U.S. Virgin Islands)	50%	50%	42%	52%
U.S. waters exempt from AIS carriage requirements[5]	None		None	

3.3.4 Coverage Verification Constraints

3.3.4.0-1 Contractor-proposed testing methodologies, which will be evaluated and approved by the Government, shall comply with prescribed configuration and testing requirements as stated below.[6]

3.3.4.0-2 Coverage verification tests shall assume the following configurations for mobile AIS stations for the purposes of coverage modeling and testing.

a. Class A and Class B mobile AIS stations shall be equipped with omni-directional antennas.
b. Class A VHF antennas shall be at 10 meters height above sea level.
c. Class B VHF antennas shall be at 1 meter height above sea level.
d. The power output of Class A mobile AIS station units shall be 12.5 watts as measured at the transmit output port.
e. The power output of Class B mobile AIS station units shall be 2 watts as measured at the transmit output port.

3.3.4.0-3 The propagation analysis and coverage plots for proposed NAIS sites shall be conducted using proven methodologies and standards (e.g., CFR, title 47, part 80, Subpart P, ITU-R.P525/526, ITU-R.P1546, TIA TSB-88-B, etc.) applicable to each specific desired location. Antenna heights, effective radiated power, and other characteristics used for the modeling shall be in accordance with the proposed transceiver locations, system design, and applicable international AIS standards.

3.3.4.0-4 The results of coverage verification, which are to be performed in accordance with industry best practices, shall prove the validity of the Contractor's standards and tools used for the propagation analysis and coverage plots.

3.3.4.0-5 Testing methodologies shall account for studies (refer to IMO NAV 53/INF.12, 18 May 2007) which show that when the AIS VDL is significantly populated, the throughput efficiency of the VDL is limited by the behavior of the shipborne AIS in all transmission modes. This requires isolating the coverage verification test from the behavior of the shipborne AIS, such that the coverage verification is indicative of the system design alone; not the behavior of the shipborne AIS. For example, it may be necessary to use FATDMA to exclusively allocate time-slots for

[5] As defined by Title 33 of the Federal Code of Regulations: Navigation and Navigable Waters.
[6] Specific deliverables and work products for which the Contractor will be responsible are described in the Contract Data Requirements Lists: *CDRL 1.8.2.1: Master Test Plan, CDRL 1.8.2.3.1: Test Plan and Procedures, CDRL 1.8.2.3.4: DT&E Test Report*

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both the base station and the shipborne units under test. The testing methodology shall also confirm that the noise level of these FATDMA-allocated time-slots is sufficiently low (that the signal level is near the thermal noise floor) during the test. Message repetition in multiple contiguous time-slots may be necessary to support the test.

3.4 Logical Shore Station (LSS)

3.4.1 General LSS Requirements

3.4.1.0-1 The LSS shall provide the capability described in IALA A-124 Part IV, Edition 1.2.

3.4.1.0-2 The system shall be capable of providing Joint Technical Architecture (JTA)-standard and registered (in compliance with Department of Defense (DoD) XML Registry and Clearinghouse policy) tags for NAIS data intended to be exchanged through the COP to the Global Information Grid (GIG) JTA.

3.4.1.0-3 The system shall be configurable such that it can provide AIS messages from the PSSs to other Components or systems in both the native and parsed format.

3.4.1.0-4 The system shall provide a configurable capability to automatically detect when static ship and voyage information changes, and trigger a user-configurable event or alarm.

3.4.1.0-5 The system shall allow operators to transmit any standard AIS message from any single PSS, predefined group of PSSs, or from a group of selected PSSs (ad hoc).

3.4.1.0-6 The system shall be capable of manually or automatically aggregating data from any PSS or group of PSSs, locally, regionally, or system wide.

3.4.1.0-7 The system shall be configurable to allow received AIS messages to be rebroadcast (repeated) by the PSS that received the AIS message or any other PSS (i.e., any PSS that is needed to achieve the coverage needed for navigation safety), and shall, at a minimum, support the functionality as described in the following use case:

a. Where multiple vessels may approach a common location by routes separated by terrestrial obstructions that prevent AIS communications between the vessels, one or more PSSs providing coverage in that area are configured such that messages received from the vessels are retransmitted so that other vessels receive the obstructed vessel's position reports.

3.4.1.0-8 The system shall be able to filter and pass AIS messages based on any combination of message metadata attributes and values.

3.4.1.0-9 The system shall be able to filter and pass NAIS data to other NAIS services based on any combination of attributes and values within the following messages:

a. Position Report messages (Messages 1, 2, 3, and 18) as defined by ITU-R M 1371-3, Annex 8

b. Static and Voyage Related Data message (Message 5, 19, and 24) as defined by ITU-R M 1371-3, Annex 8
c. Standard SAR Aircraft Position Report message (Message 9) as defined by ITU-R M 1371-3, Annex 8.
d. Aids to Navigation message (Message 21)
e. Binary and safety related messages (messages 6, 8, 12, 14,25, and 26)

3.4.1.0-10 The system shall provide capability to configure the rate at which AIS messages are passed on to other external systems (e.g., the most recent position reports from any vessels every minute, 5 minutes, etc.)

3.5 AIS Service Management (ASM)

3.5.1 General ASM Requirements

3.5.1.0-1 The system shall provide ASM functionality that meets the requirements of IALA A-124, Part V.

3.5.1.0-2 The system shall record which USCG (or other) users acknowledge AIS messages from vessels.

3.5.1.0-3 The system shall support a configurable deconfliction process for transmitting AIS messages from multiple USCG users that make the request at the same time so that they are transmitted automatically by the appropriate PSSs. The deconfliction process shall be based on the priority of the user and/or message type.

3.5.2 VHF Data Link (VDL) Management

3.5.2.1 VDL Monitoring

3.5.2.1.0-1 Operators shall be able to receive and display the contents of the base station output sentences (e.g., Frame Summary Report [FSR]) any selected PSS, group of PSSs, or pre-configured group of PSSs.

3.5.2.1.0-2 Operators shall be able to configure the parameters and thresholds within the AIS Device Status (ADS), FSR, and VDL Signal Information (VSI) messages to create VDL monitoring reports.

3.5.2.1.0-3 Operators shall be able to manually request and view a VDL monitoring report.

3.5.2.1.0-4 Operators shall be able to select the base stations which provide VDL monitoring reports.

3.5.2.1.0-5 The system shall, at a minimum, provide functionality to support the following use cases:

a. The system constantly monitors the FSR from each of the base stations and alerts the operator when one or a combination of preset parameters is exceeded. When the parameters are exceeded, the system notifies the operator. The operator then views the information from the base station exceeding the parameters and uses the information to determine whether or not VDL management or other action (system repair) is needed.

b. The operator requests from the system a graphical display of average noise levels of selected base stations. The operator then selects from those base stations the IDs of the base stations where the average slots with Cyclic Redundancy Check (CRC) failures exceeds a designated threshold. Those base stations are then displayed on a map of the US.
c. The operator receives an alarm indicating that the number of slots with received signal strength for a particular base station has been below a pre-set threshold level for the past five minutes. The operator reviews the AIS messages entering the system from that base station and notes that there are no messages being received by the base station. The operator identifies an adjacent base station and sends a Message 4 from that base station.

3.5.2.2 VDL Management

3.5.2.2.0-1 The operator shall be able to manage the VDL by transmitting management messages (e.g., DSC telecommands, Message 4, Message 16, Message 20, Message 22, and Message 23).

3.5.2.2.0-2 The system shall, at a minimum, provide functionality to support the following use cases:

a. The operator is alerted to a high noise level on AIS1 in a port, selects all the vessels in that port and transmits a Message 22 to shift AIS operations in the port to a different channel for AIS 1.
b. The operator in A. (above) determines through VDL monitoring (see above) that AIS1 is no longer interfered with, and transmits Message 22 to shift AIS operations in the port back to AIS 1.
c. The operator selects all hazardous cargo vessels in a port and decreases their reporting interval to 5 seconds by sending a Message 23 to all selected vessels.
d. The operator configures all base stations in the Sector AOR to pre-announce the fixed allocation schedules for each base station (FATDMA) by transmitting Message 20 as per a configurable schedule.

3.5.3 System Management

3.5.3.0-1 The system shall provide centralized performance management capabilities to include operational status reporting, performance monitoring and optimization, and reporting for critical system elements.

3.5.3.0-2 The system shall be able to provide centralized system administration with the ability to detect and troubleshoot system faults.

3.5.3.0-3 The system shall, upon NAIS operator request, generate user-defined status and performance reports including but are not limited to: service and subsystem availability reports; trouble ticket reports; and site health reports.

3.5.3.0-4 The system shall, from a centralized location, be capable of performing maintenance on system components to include software and firmware updates, diagnostics, and all other component-dependent maintenance.

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3.5.3.0-5 The system shall notify its operators, locally and remotely, to physical threats such as fire and intrusion to NAIS infrastructure and assets.

3.5.3.0-6 The system shall provide centralized administration capabilities to include at a minimum: user administration, system receiver site management, NAIS data source management, NAIS data client management.

3.5.3.0-7 The system shall provide the capability to manage the access privileges of each user with respect to all NAIS functionality.

3.5.3.0-8 The system shall record all system configuration, maintenance, and administration actions taken by users of the system.

3.5.3.0-9 The system shall be able to log the following performance metrics:

a. System component response times
b. System component availability
c. System stability
d. Packet error rate

3.6 Network Services and Enterprise Service Bus

3.6.1 Performance Standards

3.6.1.0-1 The system shall transfer AIS messages from the Physical Shore Station (PSS) to the appropriate Sector Command Center (SCC) within one second. This latency will be measured from reception of the AIS Message by the base station to output of NAIS data from the router located at the associated SCC.

3.6.1.0-2 All AIS messages delivered from the PSS to storage and enterprise services shall have latency from time of receipt at PSS to the time of receipt at storage and enterprise services, not to exceed five seconds.

3.6.2 Network Management

3.6.2.0-1 Access to NAIS and its network resources shall be managed through the USCG's network directory service.

3.6.2.0-2 The system shall alert system administrators of any attempts to gain unauthorized access to, or unauthorized use of, the system through network connections.

3.7 Data Storage

3.7.1 General Data Storage Requirements

3.7.1.0-1 The system shall store all NAIS data received, created, modified, or transmitted by the system for at least 3 years.

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3.7.1.0-2 The system shall respond to data query requests within 10 seconds of receiving requests for NAIS data that is less than 30 days old.

3.7.1.0-3 The system shall respond to data query requests within 60 seconds of receiving requests for NAIS data that is more than 30 days old.

3.7.2 Data Management

3.7.2.0-1 AIS messages and metadata fields shall be parsed into tagged fields as described in the MDA COI Data Sharing Working Group XML schema for AIS.

3.7.2.0-2 The system shall store the most recent 3 year's of NAIS data collected by NAIS Increment 1.

3.7.2.0-3 The system shall identify and consolidate duplicate AIS messages, defined as a single AIS message sent from one vessel at one time but received simultaneously by multiple PSS.

3.7.2.0-4 The system shall record the receipt of, and all metadata associated with, all duplicate messages, and store this information along with the consolidated AIS data.

3.7.3 Data Integrity

3.7.3.0-1 The system shall store the user identity of the sender of AIS messages.

3.7.3.0-2 The system shall detect and report any loss of NAIS data integrity.

3.7.4 Archive Backup Restore

3.7.4.0-1 The system shall provide a redundant storage solution which ensures continuity of operations (COOP).

3.7.4.0-2 The system shall have the ability to archive and recover all NAIS data received, created, modified, or transmitted by the system.

3.7.4.0-3 The system shall automatically and periodically back up all NAIS data at a frequency configurable by system operators.

3.7.4.0-4 The system shall allow system operators to initiate data backup.

3.7.4.0-5 The system shall provide the capability to purge archived NAIS data after 3 years, or retain the NAIS data for a longer period if desired.

3.7.4.0-6 The system shall store AIS messages in both their raw format (as a single record) and as parsed data fields.

3.8 Enterprise Services

3.8.1 Data Retrieval Services

3.8.1.0-1 The system shall provide well defined interfaces to allow for the controlled export of NAIS data into other systems.

3.8.1.0-2 The system shall allow the execution of user-defined data queries of the NAIS storage.

3.8.1.0-3 The system shall allow configurable query parameters based on any combination of the fields used to store NAIS data.

3.8.1.0-4 The system shall provide a common service for distribution of NAIS data to all authorized users using the Maritime Domain Awareness (MDA) Community of Interest (COI) Data Management Working Group (DMWG) data vocabulary, data model, and XML schema.

3.8.2 Transmit Services

3.8.2.0-1 The system shall provide the capability to create and transmit all types of AIS Messages.

3.8.2.0-2 The system shall be able to create weather binary messages using meteorological and hydrological data from the National Weather Service.

3.8.2.0-3 The system shall be able to automatically and periodically broadcast weather binaries to all vessels in a sector, when weather data is available.

3.8.2.0-4 The system shall provide the capability to configure the type of weather information broadcast to each sector.

3.8.2.0-5 The system shall provide the capability to configure the periodicity of weather information broadcasts, on a per sector basis.

3.8.2.0-6 The system shall have the capability to automatically route AIS messages to appropriate PSSs for transmission.

3.8.2.0-7 The system shall be able to repeat AIS message transmission from a given base station for a user-defined duration to ensure that the threshold probability of reception is achieved

3.8.2.0-8 The system shall provide the capability to transmit AIS Messages to a single vessel identified by its Maritime Mobile Service Identity (MMSI).

3.8.2.0-9 The system shall provide the capability to transmit AIS messages to an arbitrary group of vessels (e.g., tankers, large passenger ships) identified by a list of MMSIs.

3.8.2.0-10 The system shall provide the capability to transmit AIS messages to all or selected vessels within a specified (either predefined or ad-hoc) geographic area

3.8.2.0-11 The system shall provide the capability to transmit AIS messages to specific types of vessels (e.g., tankers, large passenger ships).

3.8.2.0-12 The system shall provide the capability to transmit AIS messages to AIS equipped aircraft.

3.8.2.0-13 The system shall provide a method for creating and then sending predefined ("canned") AIS messages.

3.8.2.0-14 The system shall provide a method for configuring thresholds and events to trigger the transmission of predefined messages.

3.8.2.0-15 The system shall provide a method to configure the schedule for sending predefined messages (e.g., one transmission per event, or repeated for a designated number of transmissions or period of time).

3.8.2.0-16 The system shall utilize a routing scheme that maximizes the probability of receipt of a transmitted AIS message by its intended recipient, based on the recipient's last known position and other relevant data.

3.8.2.0-17 Transmitted AIS messages shall be forwarded to the Data Storage Component within the time constraints identified in Performance Standards within the Networking section of this document.

3.8.2.0-18 The system shall, at a minimum, be able to send AIS messages based on one or a combination of the following means:

a. Geographic Location – "Box": An operator, by means of the GIS component of the HSI, designates target vessels by creating a polygon containing the desired vessels
b. Geographic Location – "Bounds: An operator designates target vessels by designating one or more designated boundaries of latitude and/or longitude containing the vessels
c. Geographic Location – "AOR" (e.g., operator selects pre-defined polygon such as a Sector AOR or Captain of the Port **(**COTP) zone containing the desired vessels
d. Vessel Static Data: An operator selects any one or combination of data fields contained in Message 5 to use in filtering out or including target vessels
e. Vessel Position Reports: An operator selects any one or combination of data fields contained in Message 1, 2, and 3 to use in filtering out or including target vessels for sending message
f. Geographical Location – "Range": An operator designates a vessel as "protected", and a range around the protected vessel so that a messages are sent to any vessel entering the designated zone for the protected vessel

3.8.2.0-19 The system shall, at a minimum, provide functionality to support the following use cases:

a. The operator selects all passenger vessels (static) as target vessels to send a message 12, addressed safety related message, warning of rough weather (ad hoc)
b. The operator selects all but anchored vessels (position) as target vessels in the VTS control area (AOR) to send a message 14 (ad hoc) warning about movement of a Liquefied Natural Gas (LNG) tanker and associated security zones.
c. The operator creates a pre-defined message and thresholds (canned) which transmits a message 12 warning about speed restrictions to prevent whale injuries to all vessels greater than 100 ft traveling faster than 12kts within the marine mammal protection zone displayed on a chart of the area (box).

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d. The operator establishes a 1,000 yards security zone (range) displayed around the icon for an LNG tanker shown on a chart as it approaches Boston Harbor and configures a warning message (canned) to be automatically sent to any vessel approaching closer than 1,000 yards.
e. The operator selects all vessels south of 26°S latitude (bounds) displayed on a chart of the area as target vessels to send a hurricane warning to (ad hoc).]
f. USCGC ATTU wants to send an encrypted text message to a Sector Command Center. They enter the message into their "terminal", it is encrypted, and transmitted as a SBU Tactical Information Exchange and Display Systems (STEDS) message over AIS. The message is received at a base station and passed on to the Logical Shore Station, which determines that it is a STEDS message, and sends it to the decryption service. The decryption service decrypts the message and sends it back to the LSS for delivery to the sector.
g. A user at a Sector Command Center wants to send a Target of Interest (TOI) message to USCGC ATTU. The user creates a message for USCGC ATTU, marks it for encryption, and sends the message as usual, at which point it is handled by the LSS. The LSS forwards it to the encryption service, which encrypts it and passes it back to the LSS for further transfer to USCGC ATTU, using the original message MMSI as the recipient address.

3.8.3 Data Import Services

3.8.3.0-1 The system shall provide a standard interface to import AIS messages from other, external (non-NAIS) systems/sources (e.g. Saint Lawrence Seaway, and Army Corps of Engineers) to the Storage Component.

3.8.3.0-2 The system shall provide the capability to manage the NAIS data that is entered into the NAIS storage from external data feeds. In some cases, the USCG may not want all data imported into the database (e.g., filtering functions such as the LSS provides may be appropriate).

3.8.3.0-3 The system shall provide an interface to import AIS messages from the following systems:

a. Saint Lawrence Seaway Corporation (SLSC)
b. NOAA
c. Offshore Platforms (Petrocom)
d. Coast Guard Vessel Traffic Service (VTS)
e. MAGNet
f. Army Corps of Engineers
g. Commercial AIS Providers

3.9 Human-System Interface (HSI)

3.9.1 General HSI Requirements

3.9.1.0-1 All HSI functionality shall be browser compatible.

3.9.1.0-2 HSI functionality shall allow all system management responsibilities to be met with only the three system operators to be staffed at NAVCEN.

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3.9.1.0-3 Human system interface software and functionality shall be loosely coupled with the rest of the system such that: the functionality of the HSI is limited to providing user access to system functionality provided by other high-level system Components; none of the functionality provided by the other Components is contained within, or dependent on, the HSI; only open, standard interfaces are used between the HSI and the rest of the system; and no proprietary technology is used in the HSI.

3.9.1.0-4 The human system interface(s) to be used in the NAIS system shall support three user groups, as described below:

a. A User Interface for operational units (e.g., Sectors, Districts, etc.) to use in accessing the functionality of the LSS and Enterprise Services
b. A User Interface for the System Operations Center (SOC) to access all functionality of the system: LSS, PSS, ASM, Storage, and Enterprise Services
c. A Generic User interface that allows users to view NAIS data using the Data Retrieval Service and LSS functionality[7] via a Standard Workstation III (SWIII)

3.9.1.0-5 All HSI software shall be capable of running on a Standard Workstation III (SWIII).

3.9.1.0-6 The user interface shall uniquely identify messages that have been processed by any encryption or decryption services.

3.9.2 HSI Standards

3.9.2.0-1 The system shall comply with the following standards:

a. MIL-STD-1472-F (Human Engineering)
b. ASTM F 1166 (Standard Practice for Human Engineering Design for Marine Systems, Equipment and Facilities)
c. ASTM F 1337 (Standard Practice for Human Engineering Program Requirements for Ships and Marine Systems, Equipment, and Facilities)
d. IEC 62288 (Maritime navigation and radio communication equipment and systems – Presentation of navigation-related information on shipborne navigation displays)
e. 29 U.S.C. 794d, Rehabilitation Act, Section 508

3.9.2.0-2 NAIS interface modules shall maintain the same GUI standards and look-and-feel of the legacy applications[8] by using similar controls, menus, navigation, and terminology.

3.9.3 Geographic Information System (GIS) Functionality

3.9.3.0-1 The system shall be capable of using and displaying GIS layers provided by third parties

[7] Generic users will not have AIS message transmit capabilities
[8] These are the existing applications and user interfaces on the Standard Workstation III.

3.9.3.0-2 System functionality shall be accessible via a GIS visualization tool for system troubleshooting and monitoring purposes, and shall, at a minimum, support the functionality as described in the following use case:

a. A User's graphical display shows a map with icons representing the location and status of each NAIS PSS site. Changes in a PSS icon's appearance and an audible alarm indicate that that there is a system fault at the site. The user selects that site to view certain system parameters for the selected site. If necessary, the user chooses to display additional information and available remote administration tools to perform corrective action

3.9.3.0-3 System functionality shall be accessible via a graphical interface by which to display, sort, organize, and manipulate received and transmitted AIS messages from any source or origin, and shall, at a minimum, support the functionality as described in the following use cases:

a. A user wishes to review all AIS messages transmitted or received by the system for the past hour. The user opens a query window on his console, enters the parameters for and submits the query. The results are displayed on the console in views similar to that of office suite software, search, sort, display, read, and print functionality.
b. A user wants to see a display of messages sent between two vessels in the past two hours. The user opens a query window on her console, selects the two vessels in the C2 display (automatically entering identifiers for each of the vessels into the query), enters the other parameters, and submits the query. The results are displayed on the console in views similar to that of office suite software with search, sort, display, read and print functionality.

3.9.3.0-4 System functionality shall be accessible via a graphical interface with which to create and manipulate vessel tracks, input Search and Rescue (SAR) patterns from other systems, and other visual representations on the GIS display, and shall, at a minimum, support the functionality as described in the following use cases:

a. A user receives notification from a CG aircraft that a vessel is inbound for a port within the SCCs area of responsibility, but is still too far away for AIS reception by the system. The user wishes to transmit the track of the vessel to two CG assets patrolling the near the port using EAIS. Using the GIS display, the user creates the track provided, chooses CG assets to which to send the track, and sends the NAIS data to the system for transmission to the two CG assets. The system routes the message through the encryption service and then on to the appropriate transmitter(s) for transmission.
b. A user selects an AIS-equipped vessel on the GIS display and marks that vessel as a Target of Interest (TOI). The user then selects a CG asset (also on his GIS display) to which to send the TOI information using EAIS. The user then sends the TOI information to the system for transmission to the selected CG asset. The system routes the message through the encryption service and then on to the appropriate transmitter for transmission.

3.9.3.0-5 The system shall have functionality to generate and send AIS messages based on user-created graphical representations and information (e.g., security zones, virtual AtoN).

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4 Verification

Verification activities will be focused on determining what is required to prove that system design meets the NAIS requirements listed in this document. Validation activities will determine how the means of verification will be proven. These activities will also determine system testability, specialized equipment, facility and other resource requirements. It is important to determine early in the system design activity how the operational, functional, maintenance, and support features of the system will be tested, and to determine if special test equipment is needed. System requirements shall be verified during test and evaluation (T&E) to demonstrate the technical feasibility of system. Table 4.1 provides the minimum level of verification required for each requirement.

4.1 Methods of Verification

Methods used to verify system requirements include inspection, Analysis, Demonstration, and Formal Testing. The methods of verification and the level of assembly for those verifications shall be documented in the Developmental Test and Evaluation (DT&E) Plan and the Operational Test and Evaluation (OT&E) Plan.

4.1.1 Inspection

Physical inspection of items shall be performed on equipment, gear, or other physical items. Inspection shall be performed on designs, documents, and certifications to ensure compliance with the requirements. Inspection includes examinations, reviews, and in some cases, will constitute a part of a formal test.

4.1.2 Analysis

Analysis shall be used when testing is not required or is simply not feasible. Analysis includes modeling, simulation, and may constitute or be an element of a formal test.

4.1.3 Demonstration

Demonstration is similar to formal testing, but more informal in nature. Demonstrations shall be the precursors to formal tests allowing for more expediency in the design, prototyping and production of the system. Demonstration shall be a part of a formal test.

4.1.4 Formal Testing

Formal tests shall encompass experimental and systematic checking of the NAIS system performance during its developmental stage. They shall be performed by applying test experiments to the NAIS system, by making observations during the execution of these tests, and by subsequently assigning a verdict about the correct functioning of the system.

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4.2 Verification Matrix

Table 4.1: Requirements Verification Matrix

Requirement	Method	Notes
3.1 Design Constraints		
3.1.1	Analysis	
3.1.2	Analysis	
3.1.3	Analysis	
3.1.4	Analysis	
3.1.5	Analysis	
3.1.6	Analysis	
3.1.7	Analysis	
3.2 General System Requirement		
3.2.0.0-1	Analysis	
3.2.0.0-2	Analysis	
3.2.1		
3.2.1.0-1	Analysis	
3.2.1.0-2	Inspection	
3.2.1.0-3	Analysis	
3.2.1.0-4	Analysis	
3.2.1.0-5	Inspection	
3.2.1.0-6	Analysis	
3.2.2		
3.2.2.0-1	Inspection	
3.2.2.0-2	Analysis	
3.2.2.0-3	Inspection	
3.2.2.0-4	Inspection	
3.2.2.0-5	Inspection	
3.2.2.0-6	Analysis	
3.2.2.0-7	Inspection	
3.2.2.0-8	Inspection	
3.2.2.0-9	Inspection	
3.2.2.0-10	Inspection	
3.2.2.0-11	Inspection	
3.2.2.0-12	Inspection	
3.2.2.0-13	Inspection	
3.2.2.0-14	Inspection	
3.2.2.0-15	Inspection	
3.2.2.0-16	Inspection	
3.2.2.0-17	Inspection	
3.2.2.0-18	Demonstration	
3.2.2.0-19	Demonstration	

Requirement	Method	Notes
3.2.2.0-20	Demonstration	
3.2.2.0-21	Inspection	
3.2.2.0-22	Inspection	
3.2.2.0-23	Inspection	
3.2.2.0-24	Inspection	
3.2.2.0-25	Formal Test	
3.2.3		
3.2.3.0-1	Analysis	
3.2.3.0-2	Demonstration	
3.2.3.0-3	Analysis	
3.2.4		
3.2.4.0-1	Formal Test	
3.2.4.0-2	Inspection	
3.2.4.0-3	Inspection	
3.2.5		
3.2.5.0-1	Demonstration	
3.2.5.0-2	Demonstration	
3.2.5.0-3	Formal Test	
3.2.5.0-4	Formal Test	
3.2.5.0-5	Inspection	
3.2.5.0-6	Formal Test	
3.2.5.0-7	Demonstration	
3.2.6		
3.2.6.0-1	Analysis	
3.2.6.0-2	Analysis	
3.2.6.0-3	Analysis	
3.2.7		
3.2.7.0-1	Analysis	
3.2.7.0-2	Analysis	
3.2.7.0-3	Inspection	
3.2.7.0-4	Analysis	
3.3 Physical Shore Station		
3.3.1		
3.3.1.0-1	Demonstration	
3.3.2		
3.3.2.0-1	Inspection	
3.3.2.0-2	Demonstration	
3.3.2.0-3	Demonstration	
3.3.2.0-4	Demonstration	
3.3.2.0-5	Demonstration	
3.3.2.0-6	Inspection	The Contractor shall provide a type approval certificate with test data (data

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Requirement	Method	Notes
		must be certified by a recognized independent test laboratory, not self-certified) that states that the AIS base station complies with the latest versions of IEC 62320-1 and IEC 61162-1. This type approval certification shall be recognized and accepted by the appropriate USCG and FCC entities.
3.3.2.0-7	Formal Test	
3.3.2.0-8	Formal Test	
3.3.2.0-9	Formal Test	
3.3.3		
3.3.3.0-1	Analysis / Formal Test	Analysis for all required coverage areas, formal test for IOC coverage
3.3.3.0-2	Analysis / Formal Test	Analysis for all required coverage areas, formal test for IOC coverage
3.3.3.0-3	Analysis / Formal Test	Analysis for all required coverage areas, formal test for IOC coverage
3.3.3.0-4	Analysis / Formal Test	Analysis for all required coverage areas, formal test for IOC coverage
3.3.4		
3.3.4.0-1	N/A	
3.3.4.0-2	Analysis / Demonstration	Analysis for all required coverage areas, demonstration for IOC coverage
3.3.4.0-3	Analysis / Demonstration	Analysis for all required coverage areas, demonstration for IOC coverage
3.3.4.0-4	Analysis / Demonstration	Analysis for all required coverage areas, demonstration for IOC coverage
3.3.4.0-5	Analysis	
3.4 Logical Shore Station		
3.4.1		
3.4.1.0-1	Inspection	
3.4.1.0-2	Demonstration	
3.4.1.0-3	Formal Test	
3.4.1.0-4	Formal Test	
3.4.1.0-5	Formal Test	
3.4.1.0-6	Formal Test	
3.4.1.0-7	Formal Test	
3.4.1.0-8	Formal Test	
3.4.1.0-9	Formal Test	
3.4.1.0-10	Demonstration	
3.5 AIS Service Management		
3.5.1		

Requirement	Method	Notes
3.5.1.0-1	Demonstration	
3.5.1.0-2	Demonstration	
3.5.1.0-3	Demonstration	
3.5.2		
3.5.2.1		
3.5.2.1.0-1	Formal Test	
3.5.2.1.0-2	Formal Test	
3.5.2.1.0-3	Formal Test	
3.5.2.1.0-4	Formal Test	
3.5.2.1.0-5	Formal Test	
3.5.2.2		
3.5.2.2.0-1	Formal Test	
3.5.2.2.0-2	Formal Test	
3.5.3		
3.5.3.0-1	Demonstration	
3.5.3.0-2	Formal Test	
3.5.3.0-3	Demonstration	
3.5.3.0-4	Formal Test	
3.5.3.0-5	Formal Test	
3.5.3.0-6	Demonstration	
3.5.3.0-7	Demonstration	
3.5.3.0-8	Formal Test	
3.5.3.0-9	Demonstration	
3.6 Networking Services and Enterprise Service Bus		
3.6.1		
3.6.1.0-1	Formal Test	
3.6.1.0-2	Formal Test	
3.6.2		
3.6.2.0-1	Demonstration	
3.6.2.0-2	Formal Test	
3.7 Data Storage		
3.7.1		
3.7.1.0-1	Inspection	
3.7.1.0-2	Demonstration	
3.7.1.0-3	Demonstration	
3.7.2		
3.7.2.0-1	Inspection	
3.7.2.0-2	Demonstration	
3.7.2.0-3	Demonstration	
3.7.2.0-4	Demonstration	
3.7.3		
3.7.3.0-1	Formal Test	

Requirement	Method	Notes
3.7.3.0-2	Formal Test	
3.7.4		
3.7.4.0-1	Formal Test	
3.7.4.0-2	Formal Test	
3.7.4.0-3	Formal Test	
3.7.4.0-4	Formal Test	
3.7.4.0-5	Formal Test	
3.7.4.0-6	Formal Test	
3.8 Enterprise Services		
3.8.1		
3.8.1.0-1	Inspection	
3.8.1.0-2	Demonstration	
3.8.1.0-3	Formal Test	
3.8.1.0-4	Formal Test	
3.8.2		
3.8.2.0-1	Formal Test	
3.8.2.0-2	Formal Test	
3.8.2.0-3	Formal Test	
3.8.2.0-4	Formal Test	
3.8.2.0-5	Demonstration	
3.8.2.0-6	Formal Test	
3.8.2.0-7	Demonstration	
3.8.2.0-8	Analysis	
3.8.2.0-9	Demonstration	
3.8.2.0-10	Demonstration	
3.8.2.0-11	Demonstration	
3.8.2.0-12	Demonstration	
3.8.2.0-13	Demonstration	
3.8.2.0-14	Demonstration	
3.8.2.0-15	Analysis	
3.8.2.0-16	Formal Test	
3.8.2.0-17	Formal Test	
3.8.2.0-18	Demonstration	
3.8.2.0-19	Demonstration	
3.8.3		
3.8.3.0-1	Demonstration	
3.8.3.0-2	Demonstration	
3.8.3.0-3	Formal Test	
3.9 Human System Interface		
3.9.1		
3.9.1.0-1	Formal Test	
3.9.1.0-2	Formal Test	

Requirement	Method	Notes
3.9.1.0-3	Formal Test	
3.9.1.0-4	Formal Test	
3.9.1.0-5	Demonstration	The user interfaces shall be demonstrated and tested at the locations in which they will be used (e.g., SCC or SOC).
3.9.1.0-6	Demonstration	
3.9.2		
3.9.2.0-1	Inspection	
3.9.2.0-2	Demonstration	
3.9.3		
3.9.3.0-1	Inspection	
3.9.3.0-2	Inspection	
3.9.3.0-3	Demonstration	
3.9.3.0-4	Demonstration	
3.9.3.0-5	Demonstration	

5 Notes

5.1 Glossary

AIS Messages: Messages that are passed over the VDL.

AIS Message Transmit Services: Services designed to validate and transmit outbound AIS messages.

Analysis: Used when testing is not required or is simply not feasible. Analysis includes modeling, simulation, and possibly will constitute or be an element of a formal test.

Application Architecture Components: Also, referred to as "Components", used to describe system hardware and software at the system level that provides unique capabilities, functionality, and/or services through its unique interfaces. These refer to the eight top-level Components listed in section 3.2.1 Application Architecture.

Archive Data Store: Is the final repository of NAIS data. Its goal is to offer efficient storage for NAIS data that are no longer needed for day-to-day operations, but which might be required for auditing or research purposes. As archived data ages, it is purged from the storage Component.

Captain of the Port (COTP): The Coast Guard officer designated by the Commandant to control a Captain of the Port Zone as described in 33 CFR Part 3. The COTP's duties involve directing & regulating the operation, movement, and anchoring of vessels within a designated area of responsibility, including management of foreign and domestic vessel traffic, regulated navigation areas and safety/security zones, and to enforce ports and waterways safety regulations (including AIS carriage requirements).

Class A Mobile AIS Stations: are stations that comply with IEC 61993-2 , (ITU-R) M.1371.

Class B Mobile AIS Stations: are stations that comply with IEC 62287-1, (ITU-R) M.1371.

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Common Operating Picture (COP): The Coast Guard COP is a tool for achieving situational awareness of what is transpiring in the Maritime Domain. The COP is a display of relevant information shared by more than one command. It provides a shared display of friendly, enemy/suspect, and neutral tracks on a chart, with geographically referenced overlays and data enhancements.

Data Storage: The repository of NAIS data. It consists of three conceptually different data stores: Real-Time Data Store, Near Real-Time Data Store, and Archive Data Store.

Data Subscription Services: The main mechanisms by which the real-time AIS messages is delivered to external users.

Demonstration: Similar to formal testing, but more informal in nature. Demonstrations shall be the precursors to formal tests allowing for more expediency in the design, prototyping and production of the system. Demonstration shall be a part of a formal test.

Enterprise Data Center (EDC): Facilities designed to host and meet NAIS data storage, management, retrieval, and disaster recovery requirements.

Enterprise Service Bus (ESB): Facilitates communication between internal NAIS services and external service users and data providers over a standardized platform. Will provide multiple adapters enabling existing, legacy USCG applications to consume NAIS services and provide data to NAIS.

External Interface: An external interface of the system is defined as any interface where at least one item of equipment or services involved in the interface is not under the control of the vendor.

Formal Testing: Shall encompass experimental and systematic checking of the NAIS system performance during its developmental stage. They shall be performed by applying test experiments to the NAIS system, by making observations during the execution of these tests, and by subsequently assigning a verdict about the correct functioning of the system.

Human System Interface (HSI) Services: A collection of services and applications that allow external and internal users to interact with the NAIS.

Increment 1: NAIS Increment 1 receives, stores, and distributes AIS messages from AIS equipped vessels in selected coastal areas and inland waterways. AIS messages are routed to a centralized enterprise data processing center (EDC) located at the USCG Operations Systems Center (OSC) in Kearneysville, West Virginia. Additional sources, such as the Saint Lawrence Seaway Corporation (SLSC), also supply AIS message via internet links to the EDC. Stored messages are periodically backed-up, and archived in offsite storage.

Upon receiving AIS message at the EDC, each message is parsed, checked for duplication, reformatted (as necessary), stored, and routed to the Maritime Common Operational Picture (COP), Maritime Awareness Global Network (MAGNet), and the Marine Information Safety and Law Enforcement System (MISLE).

NAIS users acquire access to AIS message via the COP, MAGNet and MISLE. Primary users are located in USCG Sector Command Centers (SCC) responsible for performing vessel identification and tracking, managing vessel traffic, ensuring maritime safety and security, and conducting search and rescue (SAR) operations. Additionally, other, non-USCG users may also utilize NAIS data extracted through the COP and MAGNet to perform similar functions. The Maritime COP, MAGNet, and MISLE fuse, merge and correlate NAIS data with other data sources to enhance the value and usefulness of the NAIS data.

A System Operations Center (SOC), located at the USCG Navigation Center (NAVCEN) in Alexandria, VA, provides system administration and end-user support, including managing system access, help desk support, and operator training (on SOC functions). Department of Homeland Security (DHS) / USCG EDC resources provide database administration and maintenance, backup and archive management, as well as support for all incoming and outgoing NAIS data interfaces. Similarly, the USCG Network Operations Center (NOC), currently located at the Telecommunications and Information Systems Command (TISCOM) in Alexandria, Virginia, provides Coast Guard Data Network + (CGDN+) network administration and maintenance, including all preventative and corrective maintenance.

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Increment 2: The second phase of the NAIS program is the focus of this Performance Specification. Increment 2 (I-2) will enhance or replace the functional and operational capabilities of Increment 1 by:

a. extending the NAIS receive capability, enabling NAIS to receive AIS messages to 50 nautical miles (nm) from the U.S. baseline, bridging the gaps and reducing weaknesses in Increment 1 coverage;
b. providing the capability to transmit AIS messages out to 24 nm from the U.S. baseline;
c. exploiting the full functional capabilities of AIS—including transmitting messages from shore stations, developing back-end data processing for validation and verification of AIS messages, and online queries to support the analysis of historical data;
d. managing the Very High Frequency (VHF) Data Link (VDL) in order to: monitor VDL traffic, and enable authorized SOC operators to actively manage VHF channels used for AIS by each transceiver; and
e. providing a service-oriented mechanism for disseminating NAIS data to all authorized users and external systems.

Of the three NAIS increments, Increment 2 is expected to have the greatest impact on, and deliver the greatest benefits to, USCG command centers. The increase in coverage for receiving AIS messages will provide earlier detection, identification, and tracking of vessels transiting U.S. waters, thereby greatly enhancing Maritime Domain Awareness for the USCG and DHS. Transmit functions are expected to both evolve and expand throughout the system life cycle as operational requirements for these functions are refined by the USCG. Transmit functions may be used by SCC and District watchstanders to manage vessel traffic in restricted waterways, create virtual Aids-to-Navigation (AtoN) on vessel navigation systems, send weather alerts, facilitate "Blue Force" communication, coordinate Search and Rescue (SAR) operations, and other operations yet to be identified.

SOC administrators will manage the increased number of new remote sites and system resources located at SCCs and the EDC, and for VDL management operations. SOC operators may also transmit binary messages to mobile (shipboard) AIS stations to alternate channels to receive and transmit AIS messages within a specific coverage area (for guidance on binary messages, see IMO Safety of Navigations Circular 236). Generic users will make use of NAIS data similar to Increment 1.

Increment 3: Increment 3 will extend the NAIS capability to receive AIS messages beyond 50 nm and up to 2000 nm from the U.S. baseline. This long range tracking capability will greatly enhance the USCG's ability to identify and monitor vessels approaching U.S. waters, and improve the Federal government's ability to protect the nation's coastlines. Increment 3 will not enhance end-user functionality as these capabilities will be provided with Increments 1 and 2.

Inspection: Physical inspection of items performed on equipment, gear, or other physical items. Inspection shall be performed on designs, documents, and certifications to ensure compliance with the requirements. Inspection includes examinations, reviews, and in some cases will constitute a part of a formal test.

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Interface: An interconnection between subsystems having the dimensions of form, fit, and function, which are determined by the requirements of the interconnected subsystems.

Logical Shore Station (LSS): A software process that transforms the AIS Message flow associated with one or more PSS into a different AIS-related message flow.

Management Services: Allow NAIS operators to maintain the system. They offer management tools for the RF components located within the PSS (e.g., VDL monitoring, channel management, operational status), and for the NAIS itself (e.g., database administration, performance monitoring).

MDA COI DMWG: The Maritime Domain Awareness Critical Operational Issues Data Management Working Group provides the data vocabulary and data model used for distribution of data to all authorized users.

Monolithic shelter: Is defined as pure monolithic or a two piece structure where the roof and walls are monolithic.

NAIS Data: All data created by NAIS, including: AIS Messages, AIS Message Metadata, Health and Monitoring data, in addition to imported data.

NAIS Service: A grouping of business logic and rules specifically needed to implement an operational requirement. A service exposes an interface that can be discovered and called by other services and components. Services are loosely coupled to other services, components, and applications so that they can be made available to anyone.

Network Operations Center (NOC): Provides network administration and maintenance, including management of user access and monitoring of network device performance.

Operable: Refers to the system state in which all services and capabilities are operating without any degradation from intended system design.

Operators: Watchstanders, watch supervisors, and system administrators, trainers and trainees who operate and monitor the system from within the SOC and OSC.

Physical Shore Station (PSS): A physically fixed entity composed of at least: one AIS base station or one AIS repeater station, a power supply, VHF-/RF-domain equipment (at a minimum simply a cable and VHF antenna), a means to transport data to and from the AIS base station (if the PSS houses an AIS base station), and a means to protect the above components against environmental influence and damage. The PSS will generally have a Universal Time Coordinate (UTC) source of its own. The PSS may also include additional, optional AIS-related functions.

Providers: External AIS user systems, including Maritime COP, MAGNet, MISLE, and others.

Reliability: The probability that a system or component will perform its capabilities under given conditions for a specified period of time.

Sector Command Center: The USCG is in the process of reorganizing its operational command and control units into Sector Command Centers (SCC). Each SCC monitors area of responsibility (AOR) and

administers the missions of the Coast Guard.

Sensitive Information: Any information of which the loss, misuse, or unauthorized access to or modification of could adversely affect the national interest or the conduct of Federal programs, or the privacy to which individuals are entitled under Section 552a of Title 5, United States Code (the Privacy Act), but which has not been specifically authorized under criteria established by an Executive Order or an Act of Congress to be kept secret in the interest of national defense or foreign policy.

Service Oriented Architectures (SOA): provide patterns for design, development, deployment and management of a loosely coupled business application infrastructure. The NAIS system shall be developed using a SOA approach that is in line with the Department's Enterprise Architecture.

Storage: See Data Storage.

Survivable: Refers to the ability of the system to preserve all data and other information through any event that renders the system inoperable; the system may cease to operate when parameters exceed the *operable* thresholds but not the survivable thresholds, however, when conditions return to operable thresholds, the system will return to normal operations with minimal human intervention.

System Operations Center (SOC): Provides system administration and maintenance.

Tracking: Measurement of the position coordinates of a target to provide data to determine the target path versus time.

U.S. Baseline: The line defining the shoreward extent of the territorial sea of the United States drawn according to the principles, as recognized by the United States, of the Convention on the Territorial Sea and the Contiguous Zone, 15 U.S.T. 1606, and the 1982 United Nations Convention on the Law of the Sea (UNCLOS), 21 I.L.M. 1261. Normally, the U.S. baseline is the mean low water line along the coast of the United States.

Vessel: Every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water. (In this specification the term "vessel" is used to denote mandatory participating vessels and selected vessels.)

Watchstander: A military member or civilian employee of the Coast Guard, or an employee or representative of the marine community who monitors vessel movements, updates data within the system based on inputs from sensors and voice communications, and who disseminates information to users.

eXtensible Markup Language (XML): is a flexible way to create common information formats and share both the format and the data on the World Wide Web, intranets, and elsewhere.

5.2 Abbreviations and Acronyms

AIS	Automatic Identification System
ANSI	American National Standards Institute
ANSI/TIA	American National Standards Institute/Telecommunications Industry Association
AOR	Area of Responsibility
A_O	Operational Availability
AtoN	Aids to Navigation
C&A	Certification and Accreditation
C2	Command and Control
CBP	Customs and Border Protection Agency
CGDN+	Coast Guard Data Network +
COI	Critical Operational Issues
COMDTINST	Commandant Instruction
CONOPS	Concept of Operations
COP	Common Operational Picture
COTP	Captain of the Port
DHS	Department of Homeland Security
DMWG	Data Management Working Group
DoD	Department of Defense
DSC	Digital Select Calling
DT&E	Developmental Test and Evaluation
EDC	Enterprise Data Processing Center
ESB	Enterprise Service Bus
ESRI	Environmental Systems Research Institute, Inc.
FATDMA	Fixed Access Time Division Multiple Access
FCC	Federal Communications Commission
FIPS	Federal Information Processing Standard
FISMA	Federal Information Security Management Act of 2002
FOC	Full Operational Capability
FY	Fiscal Year
GIG	Global Information Grid
GIS	Geographic Information System
GPS	Global Positioning System
GUI	Graphical User Interface
HSI	Human System Interface
IA	Information Assurance
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IEC	International Electrotechnical Commission
IETF	Internet Engineering Task Force
IMO	International Maritime Organization
IOC	Initial Operational Capability
IP	Internet Protocol
IPv6	Internet Protocol Version 6

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IRVMC	Inland Rivers Vessel Movement Center
ITPI	Information Technology Product Inventory
ITU-R	International Telecommunications Union Sector for Radio Communications
JTA	Joint Technical Architecture
LAN	Local Area Network
LORAN	Long-Range Aid to Navigation
LSS	Logical Shore Stations
MAGNet	Maritime Awareness Global Network
MDA	Maritime Domain Awareness
MISLE	Marine Information for Safety and Law Enforcement
MMSI	Maritime Mobile Service Identity
MSC	Maritime Safety Committee
NAIS	Nationwide Automatic Identification System
NAVCEN	Navigation System Center
NDGPS	Nationwide Differential Global Positioning System
NEC	National Electric Code
NFPA	National Fire Protection Association
NIS	Navigation Information Service
NIST	National Institute of Standards and Technology
NIST SP	National Institute of Standards and Technology Special Publication
nm	Nautical Miles
NOC	Network Operations Center
NTIA	National Telecommunications and Information Administration
OET	Office of Engineering and Technology
OneNet	DHS Enterprise Network
ORD	Operational Requirements Document
OSC	Operations Systems Center
OSHA	Occupational Safety and Health Administration
OT&E	Operational Test and Evaluation
PKI	Public Key Infrastructure
PSS	Physical Shore Stations
RF	Radio Frequency
SAML	Security Assertion Markup Language
SAR	Search and Rescue
SBU	Sensitive But Unclassified
SCC	Sector Command Centers
SLSC	Saint Lawrence Seaway Corporation
SOA	Service Oriented Architectures
SOAP	Simple Object Access Protocol
SOC	System Operations Center
SOP	Standard Operating Procedures
SOTDMA	Self-Organized Time Division Multiple Access
STEDS	SBU Tactical Information Exchange and Display Systems
SWIII	Standard Workstation III

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USCG	US Coast Guard
T&E	Test and Evaluation
TCP/IP	Transmission Control Protocol/Internet Protocol
TIA	Telecommunications Industry Association
TIA/EIA	Telecommunications Industry Association/Electronics Industry Alliance
TISCOM	Telecommunication and Information Systems Command
TRM	Technical Reference Model
UI	User Interface
UNCLOS	United Nations Convention on the Law of the Sea
UTC	Universal Time Coordinate
VDL	VHF Data Link
VHF	Very High Frequency
VTS	Vessel Traffic Service
WAN	Wide Area Network
WS-Security	Web Services-Security
XML	eXtensible Markup Language

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U.S. Department of Homeland Security

United States Coast Guard

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4200
June 25, 2010

Northrop Grumman Space & Missions Systems Corp.
Command and Control Systems Division
Attn: Mr. Richard Keller
1800 Glenn Curtiss St.
Carson, CA 90746

Ref: NGC Letter, 15 Jun 2010, Subj: NAIS PSPEC Requirements and Methods - Contract HSCG23-09-C-ADP001

Dear Mr. Keller:

The U.S. Coast Guard reviewed subject letter, and concurs with the alternate methods of verification, with the following four exceptions:

1. PSPEC 3.3.2.0-7: Verifying actual receiver sensitivity will be needed if coverage requirements are not met. For example: if the base station receiver sensitivity requirement of negative 115dBm is validated, and the system cannot attain minimum coverage requirements, then there may be a flaw in the design. Having confidence in this specification eliminates one of the likely variables in follow-on trouble-shooting. Therefore, test-receiver sensitivity shall be formally tested.
2. PSPEC 3.9.2.0-1 (e): Identify the components/functions of the system that do not meet 508 compliance so there is a clear understanding of the consequences should relief from this requirement be granted.
3. PSPEC 3.9.2.0-2: This requirement specifically deals with a subjective standard, "look-and-feel of the legacy applications." Compliance verification cannot be made without a visual comparison between GUI of the NAIS design and representative GUI of applicable legacy applications.
4. PSPEC 3.5.1.0-3: It is agreed the "AIS standard provides a sufficient deconfliction process." However, NAIS software should be performing message prioritization based on the user, who is assigned a specific role and responsibility. It is this element of the system design that is to be demonstrated.

If you have any technical questions regarding this letter, please contact CDR Jeff Westling at (757) 269-2371. Direct all contractual questions to me at (757) 269-2372.

Sincerely,

Anthony S. Kram
Contracting Officer

NORTHROP GRUMMAN

Northrop Grumman Systems Corporation
Information Systems

2340 Dulles Corner Blvd.
Herndon, VA 20171

15 Jun 2010
R1-1K358.361-10

Contracting Officer (ACO)
NAIS Program Resident Office
12350 Jefferson Ave., Suite 400
Newport News, VA 23602

Attention: Mr. Anthony S. Kram

Subject: NAIS PSPEC Requirements and Methods

Reference: Contract Number HSCG23-09-C-ADP001

Northrop Grumman requests US Coast Guard concurrence with the alternate methods of verification used during IFAT and also relief of the requirements listed within the enclosure for DT&E.

Also enclosed is a list of Nationwide AIS PSPEC Requirements verified during IFAT with an alternate method of verification as listed in Section 4.2 of the PSPEC.

Should you have any questions or require additional information, please contact me at (310) 764-3103 or e-mail at richard.keller@ngc.com.

NORTHROP GRUMMAN SYSTEMS CORPORATION

Richard Keller
Contracts Manager

Enclosure

IFAT

3.2.1.0-6 The application interfaces shall be based on international standards or otherwise open (e.g., provision of interface specification documentation) to inspection and reuse by other systems external to NAIS.

PSPEC Method: Inspection
IFAT Method: Analysis

Rationale: Analysis pointing to the IDD shows the public interfaces for the NAIS system, which consists of SOAP and XML messages. The analysis performed during IFAT should fulfill this requirement.

3.2.5.0-8 All network hardware shall be IPv6 compatible without modification, upgrade, or replacement as specified by the Internet Engineering Task Force (IETF) IPv6 Specification, RFC 2460.

PSPEC Method: Demonstration
IFAT Method: Analysis

Rationale: Demonstration was not planned for IFAT. Demonstration will be performed for this requirement during DT&E.

3.3.2.0-7 The base station shall provide a receiver sensitivity of at least -115dBm.

PSPEC Method: Formal Test
IFAT Method: Analysis

Rationale: Analysis pointing to the AIS Base Station Statement of Conformity shows the base stations were verified to be -115 dBm during certification. NG does not change or alter the base station in any manner.

3.8.2.0-9 The system shall provide the capability to transmit AIS Messages to a single vessel identified by its Maritime Mobile Service Identity (MMSI).

PSPEC Method: Analysis
IFAT Method: Demonstration

Rationale: NG was able to demonstrate the system was capable of sending AIS messages to a single vessel identified by its MMSI. Demonstration of the system capabilities for witnesses to observe sufficiently verifies the system meets this requirement.

3.8.2.0-16 The system shall provide a method to configure the schedule for sending predefined messages (e.g., one transmission per event, or repeated for a designated number of transmissions or period of time).

PSPEC Method: Analysis
IFAT Method: Demonstration

Rationale: NG was able to demonstrate the system was capable of configuring the schedule for sending predefined messages (canned messages). Demonstration of the system capabilities for witnesses to observe sufficiently verifies the system meets this requirement.

3.9.2.0-1 The system shall comply with the following standards:
a. MIL-STD-1472-F (Human Engineering)
b. ASTM F 1166 (Standard Practice for Human Engineering Design for Marine Systems, Equipment and Facilities)
c. ASTM F 1337 (Standard Practice for Human Engineering Program Requirements for Ships and Marine Systems, Equipment, and Facilities)
d. IEC 62288 (Maritime navigation and radio communication equipment and systems – Presentation of navigation-related information on shipborne navigation displays)
e. 29 U.S.C. 794d, Rehabilitation Act, Section 508

PSPEC Method: Inspection
IFAT Method (a.): Inspection
IFAT Method (b.– e.) Analysis

Rationale: Inspection was performed for a. of this requirement. Analysis was performed on the Human System Interface Design Standards b. through e. of this requirement and deemed not applicable to the NAIS system.

3.9.2.0-2 NAIS interface modules shall maintain the same GUI standards and look-and-feel of the legacy applications by using similar controls, menus, navigation, and terminology.

PSPEC Method: Demonstration
IFAT Method: Analysis

Rationale: Analysis provides a comparison of the NAIS system to both Hawkeye and CGVTS systems. Analysis comparing the controls, menus, navigation, and terminology of both systems to the NAIS system verifies the system is similar in look-and-feel to legacy applications.

3.9.3.0-1 The system shall be capable of using and displaying GIS layers provided by third parties

PSPEC Method: Inspection
IFAT Method: Analysis

Rationale: Third party GIS layers were not available during IFAT. Inspection will be performed for this requirement during DT&E.

DT&E

3.2.4.0-3 The system shall be designed such that encryption and decryption of AIS messages is done externally to the system. The system shall not provide an encryption/decryption cryptographic function, nor the associated key management of such a function.

Requirement removed via ECP (Encrypt/Decrypt)

Rationale: Encryption and decryption of AIS messages is not done externally to the system. The Encrypt/Decrypt ECP changed the process that this would be done internally by the NAIS system.

3.2.5.0-2 The system shall share data with classified systems through a Cross Domain Solution (CDS) or Multi-Level Security (MLS) solution.

Northrop Grumman requests relief for this requirement.

Rationale: MLS solution is not provided to Northrop Grumman to fulfill this requirement.

3.2.5.0-3 The system shall deliver data in a manner than can be accepted by the Government-provided CDS or MLS solution.

Northrop Grumman requests relief for this requirement.

Rationale: MLS solution is not provided to Northrop Grumman to fulfill this requirement.

3.5.1.0-3 The system shall support a configurable deconfliction process for transmitting AIS messages from multiple USCG users that make the request at the same time so that they are transmitted automatically by the appropriate PSSs. The deconfliction process shall be based on the priority of the user and/or message type.

Northrop Grumman requests relief for this requirement.

Rationale: This requirement has been discussed during design review and during SE IPT meetings. This requirement is not necessary because the AIS standard provides a sufficient deconfliction process.

3.5.1.0-4 ASM services shall be discoverable via the ESB while adhering to the access privilege restrictions outlined in PSPEC sections 3.2.5 and 3.5.3.

Northrop Grumman requests relief for this requirement.

Rationale: This requirement has been discussed during design review and during SE IPT meetings. ASM services are not part of the four agreed upon services discoverable via the ESB.

3.7.2.0-1 AIS messages and metadata fields shall be parsed into tagged fields as described in the MDA COI Data Sharing Working Group XML schema for AIS.

Northrop Grumman requests the requirement is changed to the following:

"AIS messages and metadata fields shall be parsed into tagged fields as described in the OSC agreed to XML schema."

Rationale: Changing the requirement text would align the requirement with the OSC agreed to XML schema.

3.8.1.0-5 The system shall provide a common service for distribution of NAIS data to all authorized users using the Maritime Domain Awareness (MDA) Community of Interest (COI) Data Management Working Group (DMWG) data vocabulary, data model, and XML schema.

Northrop Grumman requests the requirement is changed to the following:

"The system shall provide a common service for distribution of NAIS data to all authorized users using the OSC agreed to XML schema format."

Rationale: Changing the requirement text would align the requirement with the OSC agreed to XML schema format.

Acquisition Directorate

Nationwide Automatic Identification System Project

NAIS Performance Specification

July 15, 2008

Version 1.2

Homeland Security

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1 Introduction

This Performance Specification (PSPEC) contains requirements for Increment 2 of the United States Coast Guard (USCG) Nationwide Automatic Identification System (NAIS). Section 1 provides an overview of this document, a system Concept of Operations, and system design constraints within which the Contractor must operate. Section 2 provides the references cited in this document. Section 3 consists of specific requirements that will be used to verify system performance. Section 4 provides the planned methods of verification. Section 5 provides this document's glossary of terms and a list of abbreviations.

The primary objectives of this document are to define system requirements, to provide sufficient context for the requirements such that the Contractor can understand the USCG's vision for NAIS Increment 2 capability, and describe the relationships between NAIS and other systems and USCG Information Technology (IT) infrastructure. Minimizing Total Life-Cycle cost (TLC) while meeting operational requirements is paramount for the NAIS Project. TLC encompasses all costs associated with the design, implementation, operation, and support of this system. To achieve that goal, it is expected that the development of Increment 2 will leverage existing IT infrastructure, capabilities, standards, resources, and the application of lessons learned that have been dedicated to current capabilities. This PSPEC provides requirements to the level of deemed necessary in each area while acknowledging that a range of solution options are available meet these requirements.

1.1 Concept of Operations (CONOPS)

This section provides the CONOPS for the NAIS by presenting an overview of its functionality, its support for USCG missions, and a conceptual implementation of the system. The NAIS will enable the Coast Guard to transmit and receive AIS messages to/from vessels traveling on the navigable waters of the United States and its territories via receivers, transmitters and transceivers located on radio towers and other shoreside facilities, as well as buoys, offshore platforms, aircraft, and spacecraft. Received AIS data will be used for the purpose of identifying and tracking vessel movement, while transmitted messages will be used to provide Aids to Navigation (AtoN) and other marine broadcasts. The system will also support encrypted AIS (EAIS) messaging as well as Blue Force Tracking functionality. The system will monitor and manage the health of the VHF Data Link (VDL), as well as use the VDL to perform AIS channel management. Nationwide AIS data and functionality will be used by USCG, DHS, Department of Defense and other government agencies' communications, surveillance and data processing systems in support of their missions.

1.1.1 Support to the USCG Missions

NAIS will provide functionality to support the five mission areas of the USCG.

1.1.1.1 Maritime Safety

The USCG's Maritime Safety role is to eliminate deaths, injuries, and property damage associated with maritime transportation, fishing, and recreational boating.

1.1.1.1.0-1 Search and Rescue (SAR)

a. Provide near-real-time locations for AIS-equipped vessels in distress.

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b. Assist SAR Controllers by providing the location of nearby AIS-equipped "Good Samaritans" capable of assisting in searching and / or rescuing mariners in distress.
c. Allow SAR Controllers to track the progress of CG vessels, aircraft and other resources as they conduct searches along the prescribed search patterns.
d. Enable watchstanders to replay search vessel tracks to evaluate coverage efficiency and enable SAR Controllers to redirect assets as necessary.

1.1.1.1.0-2 Safety Broadcasts

a. Enable Sectors to transmit digital Marine Information Broadcasts (MIBs), weather broadcasts, and other safety-related broadcasts.
b. Enhance voyage planning by providing urgent navigation warnings, AtoN status, and other pertinent navigation information (e.g., waterway closures, critical chart corrections).
c. Allow Sector watchstanders to schedule safety broadcasts to be transmitted by NAIS to AIS-equipped vessels in their Areas of Responsibility (AOR).

1.1.1.1.0-3 Aids to Navigation (AtoN)

a. Permit Sectors to transmit AtoN status messages (e.g., to automatically provide the AtoN operational status).
b. Facilitate the identification of hazards to navigation not marked by physical AtoN, the transmittal of the location and characteristics of those hazards, and support the analysis of waterways and vessel movement.
c. Facilitate the collection of vessel voyage information, especially within ports, to assist in traffic pattern analyses, waterways management, the placement of AtoN, and traffic separation schemes.

1.1.1.1.0-4 Safe Navigation

a. Extend the range of vessel-to-vessel AIS communications through the use of repeater functions at AIS shore stations in areas of poor voice coverage or "radar shadows."

1.1.1.1.0-5 AIS VHF Data Link (VDL) Management

a. Provide the ability to monitor and manage the VDL to ensure AIS viability during periods of high volume and / or radio interference.
b. Provide the ability to shift AIS traffic to alternate frequencies in the event of an emergency or natural disaster.

1.1.1.2 Maritime Security

The Maritime Security mission is to protect America's maritime borders from all intrusions by: (a) halting the flow of illegal drugs, aliens, and contraband into the United States through maritime routes; (b) preventing illegal fishing; and (c) suppressing violations of federal law in the maritime arena.

1.1.1.2.0-1 Maritime Domain Awareness (MDA)

a. Feed near real-time AIS vessel location information to unclassified and classified Coast Guard Command and Control and Intelligence systems, specifically the Common Operating Picture (COP) and MAGNet.

b. Provide real-time AIS data feeds to other CG maritime partners, including the Saint Lawrence Seaway Development Corporation (SLSDC) and joint Coast Guard/Port Authority Cooperative Vessel Traffic Services (CVTS).

1.1.1.2.0-2 Port Security

a. Provide Sector Commanders with means to notify vessels of changes to the Maritime Security Level, and to monitor compliance with security zones.
b. Enable operational commanders to identify, select and target vessels for law enforcement action, security screening inspections, boarding or other measures.
c. Provide near real-time location of the vessels in question to effectively coordinate and deploy boarding and inspection teams.

1.1.1.3 Maritime Mobility

Support of Maritime Mobility involves facilitating maritime commerce and eliminating interruptions and impediments to the efficient and economical movement of goods and people, while maximizing recreational access to and enjoyment of the water.

1.1.1.3.0-1 Maritime Incident Investigation

a. Assist in the investigation of maritime incidents by providing a detailed record of a vessel's movements and AIS message transmissions covering the time before, during and after the event.
b. Provide detailed records of other vessels in the area that may have witnessed or contributed to incidents under investigation.

1.1.1.3.0-2 Navigation Mobility

a. Providing vessel tracking data to Command and Control (C2) and intelligence systems for use in monitoring vessels.
b. Provide an additional means to exchange navigation data and other pertinent marine information (e.g., bridge closures, location of safety/security zones, dangerous currents) to assist in reducing the risk of collisions, allisions and groundings.
c. Facilitate domestic icebreaking resource deployment by providing a universal communication link that provides ships' status (e.g., position, speed, heading, course, and draft).
d. Support the monitoring of compliance with existing vessel traffic management regulations, such as vessel routing schemes, regulated navigation areas, mandatory ship reporting systems, safety and security zones, transits of high value assets, management of marine events and regattas and other such requirements.

1.1.1.4 National Defense

The USCG's National Defense mission is to defend the nation, as one of the five U.S. armed services, and to enhance regional stability in support of the National Security Strategy, utilizing the Coast Guard's unique and relevant maritime capabilities.

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1.1.1.4.0-1 Blue Force Tracking (BFT)/Encrypted Messaging

a. Supporting Encrypted AIS (EAIS) communications for Sensitive But Unclassified (SBU) messaging to/from CG units and other Port Partners.
b. Give vessels a method of sending and receiving text messages, targets of interest, tracks, and other encrypted messages, enhancing CG operations without compromising vessel movements.

1.1.1.4.0-2 Strategic Information

a. Allow other systems (e.g., MAGNet) to access the NAIS data, perform queries, and conduct other intelligence functions on the data (e.g., vessel movement anomaly detection).
b. Enhance transparency in the maritime domain to detect, deter and defeat threats as early and distant from U.S. interests as possible.
c. Provide maritime situational awareness for decision makers at all levels using a host of systems, sensors and processes to enable accurate, dynamic, and confident decision-making.
d. Support the missions of other Federal, State and local agencies, such as customs clearance and local law enforcement.

1.1.1.5 Protection of National Resources

USCG's goal in the Protection of National Resources is to eliminate environmental damage and the degradation of natural resources associated with maritime transportation, fishing, and recreational boating.

1.1.1.5.0-1 Protection of National Resources

a. Permit detection and tracking of vessels in mammal safety zones and other areas where vessel speed or intrusion is restricted.
b. Enable replaying of vessel tracks to identify potential polluters.
c. Permit monitoring of resources involved in pollution mitigation activities.

1.1.2 NAIS User Segments

The NAIS capabilities will be provided to the following three types of end-users:

a. USCG Command Centers: Sector, District, and Headquarters command centers. This group includes Vessel Traffic Service (VTS) operators as well.
b. NAIS System Operations Center: NAVCEN watchstanders and others responsible for NAIS Operations and Maintenance (O&M).
c. Generic Users: These users are not defined specifically but the system will make allowance for new user groups to be added.

1.1.3 CONOPS Depiction

In order to provide a better understanding of how NAIS is expected to operate, the following graphic (Figure 1.1) is provided. This depiction and the accompanying notes are not design requirements, but are intended to provide an explanation of the NAIS CONOPS.

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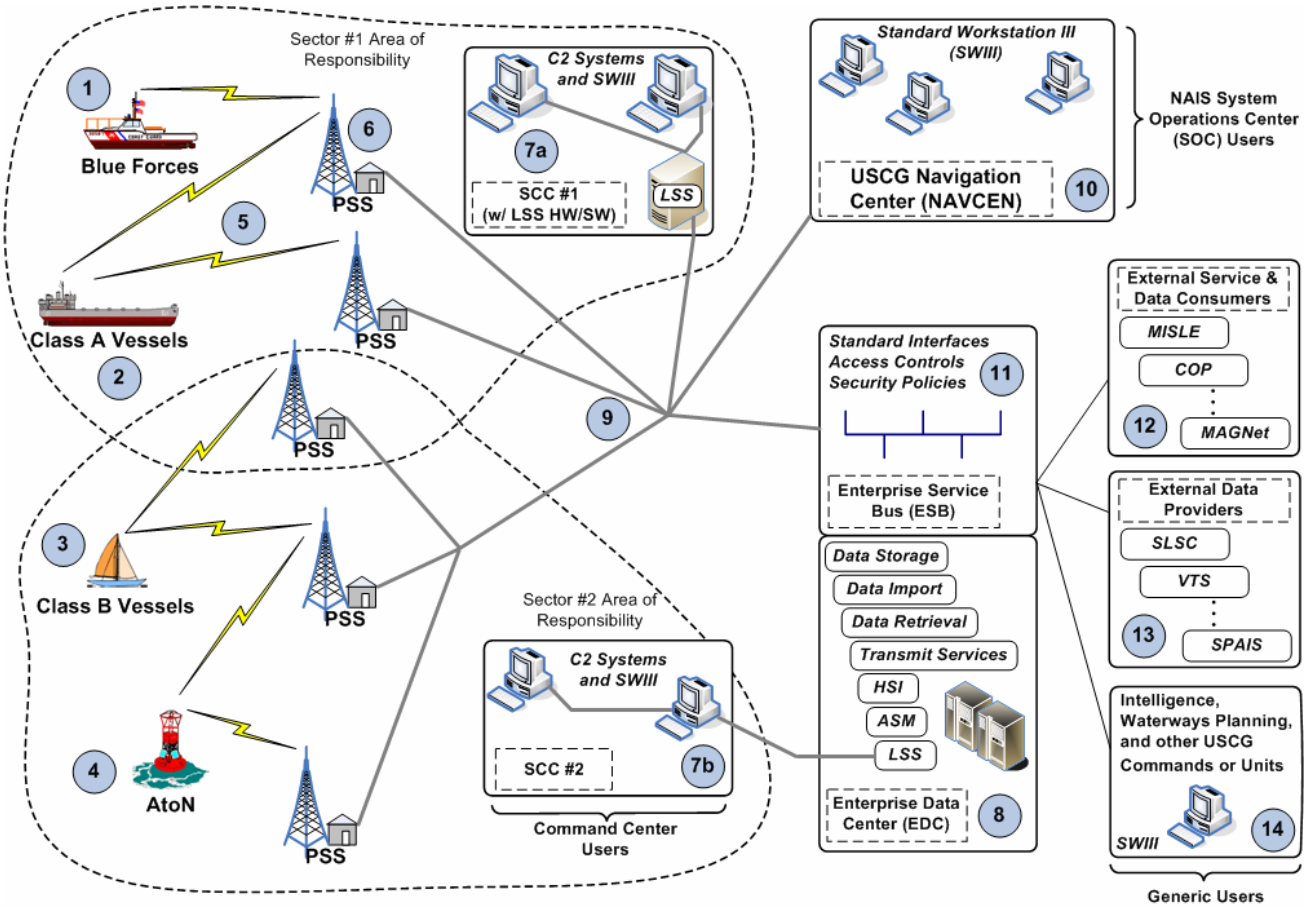

Figure 1.1: Representation of the NAIS CONOPS

Because NAIS will comply with international standards and guidelines governing AIS, it will communicate with all International Telecommunications Union (ITU) compliant AIS equipment. NAIS communications will include encrypted transmit and receive communications with Blue Forces **(1)** for position reports and targets of interest, as well as unencrypted communications with all types of vessels. Class A **(2)** and Class B **(3)** vessels will send position reports and vessel information as required by law, and will receive Aids to Navigation (AtoN) transmissions, marine broadcasts, or any other standard message from the USCG Physical Shore Stations (PSS). AIS-equipped AtoNs (e.g., buoys **(4)**) may transmit their real time position and other information.

These communications will take place over the VHF Data Link (VDL) **(5)**, which operates on AIS 1 & 2 channels, but can be switched to other channels by the SOC. The PSSs **(6)** will serve as the infrastructure by which AIS messages are transmitted to and received from AIS equipped vessels.

Each USCG Sector will have NAIS functionality to support their missions, with each Sector's Sector Command Center (SCC) having responsibility for monitoring AIS activity within its AOR. Every SCC will have access to NAIS functionality integrated into their C2 systems and/or SWIII, and *may* host the hardware and software to run its Logical Shore Station (LSS) software **(7a)**. Conversely, an SCC **(7b)** may access LSS functionality via the LSS hardware and software that is hosted at the Enterprise Data Center (EDC) **(8)**.

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Wide Area Network (WAN) connectivity will be provided by the CGDN+ and DHS OneNet networks **(9)**. These networks connect the PSS/LSS and SCCs with the EDC. The EDC is responsible for NAIS data storage, archiving, retrieval, and disaster recovery, and may host the transmit services, LSS, AIS Service Management (ASM), and server-side Human System Interface (HSI) functionality. The SOC **(10)** provides administrative support and oversight for the entire system. This includes VDL management, remote diagnostics and troubleshooting, technical support functions, and possibly hosting LSS functionality.

NAIS is expected to interoperate with many external systems, providing data and services to multiple users as well as importing data from other AIS data providers via the Enterprise Service Bus (ESB) **(11)**. The ESB will provide the standard interfaces and access controls required to interoperate with these systems (including consumers **(12)** like MAGNet, providers **(13)** such as the St. Lawrence Seaway Development Corporation (SLSDC), and other yet to be defined systems **(14)**). Authorized users within the USCG will be able to access NAIS Enterprise Services via a SWIII for specific mission needs.

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2 Reference Documents

The Contractor shall comply with the following references as per section 3 of this document, and shall use the most current version of the document as of the date of the contract award.

Ref. Number	Reference	Reference Link
United States Coast Guard Documents		
2.1.1	Command and Control Engineering Center (C2CEN) Encrypted Automatic Identification System (EAIS) v 4.0	This document is available in Attachment J.8, Technical Library: http://www.naisproject.net/NAIS_External/NAISMain/default_tech.asp
2.1.2	COMDTINST M2400.1G: Spectrum Management Policy and Procedures	This document is available in Attachment J.8, Technical Library: http://www.naisproject.net/NAIS_External/NAISMain/default_tech.asp
2.1.3	COMDTINST M11000.11 (series), USCG Civil Engineering Manual, Chapter 10	http://www.uscg.mil/directives/cim/11000-11999/CIM_11000_11A.pdf
2.1.4	MDA COI Fact Sheet: Maritime Domain Awareness Data Sharing Community of Interest	http://www.naisproject.net/NAIS_External/NAISdiscussion/rfp2/sections/Section_J/MDA-COI-Data.pdf
2.1.5	MDA COI DSWG: MDA Community of Interest Data Sharing Work Group vocabulary handbook	http://www.naisproject.net/NAIS_External/NAISdiscussion/rfp2/sections/Section_J/MDA-COI-vocab.pdf
2.1.6	MDA COI DSWG Spiral 2 XML schema	http://www.naisproject.net/NAIS_External/NAISdiscussion/rfp2/sections/Section_J/MDA-COI-XML-Schema.ZIP
2.1.7	USCG Information Technology Product Inventory (ITPI)	This document is available in Attachment J.8, Technical Library: http://www.naisproject.net/NAIS_External/NAISMain/default_tech.asp
2.1.8	USCG Inland Rivers Vessel Movement Center (IRVMC) Reporting Points	http://www.naisproject.net/NAIS_External/NAISdiscussion/rfp2/sections/Section_J/USCG-IRVMC-ReportingPoints.pdf
Other Government Documents		
2.2.1	29 U.S.C. 655: Occupational Safety and Health Act Of (OSHA) 1970	http://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=OSHACT&p_toc_level=0&p_keyvalue=
2.2.2	29 U.S.C. 794d, Rehabilitation Act, Section 508	http://www.section508.gov/index.cfm?FuseAction=Content&ID=14

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Ref. Number	Reference	Reference Link
2.2.3	Code of Federal Regulations (CFR), Title 33 Navigation and Navigable Waters	http://www.access.gpo.gov/cgi-bin/cfrassemble.cgi?title=200733
2.2.4	Code of Federal Regulations (CFR), Title 33, part 3, Coast Guard Areas, Districts, Marine Inspection Zones, And Captain Of The Port Zones	The Codes of Federal Regulation can be obtained from the following website: http://www.access.gpo.gov/nara/cfr/waisidx_07/33cfr3_07.html
2.2.5	Code of Federal Regulations (CFR), Title 33, part 165, Regulated Navigation Areas And Limited Access Areas	The Codes of Federal Regulation can be obtained from the following website: http://www.access.gpo.gov/nara/cfr/waisidx_07/33cfr165_07.html
2.2.6	Code of Federal Regulations (CFR), Title 33, part 161,Vessel Traffic Management	http://www.access.gpo.gov/nara/cfr/waisidx_07/33cfr161_07.html
2.2.7	Code of Federal Regulations (CFR), Title 47, part 80, Colregs Demarcation Lines	The Codes of Federal Regulation can be obtained from the following website: http://www.access.gpo.gov/nara/cfr/waisidx_07/33cfr80_07.html
2.2.8	DHS Technical Reference Model (TRM) Interoperability Requirements	This document is available in Attachment J.8, Technical Library: http://www.naisproject.net/NAIS_External/NAISMain/default_tech.asp
2.2.9	Department of Defense (DoD) XML Registry and Clearinghouse policy	These collection of documents is available on the DoD Metadata Registry website: https://metadata.dod.mil/mdr/homepage.htm
2.2.10	Federal Communications Commission (FCC) Office of Engineering and Technology (OET) Bulletin 65 (Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields)	http://www.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65.pdf
2.2.11	Federal Information Processing Standards (FIPS) Publication 140-2	http://csrc.nist.gov/publications/fips/fips140-2/fips1402.pdf
2.2.12	Federal Information Processing Standards Publication (FIPS) 197	http://csrc.nist.gov/publications/fips/fips197/fips-197.pdf
2.2.13	FED-STD-795: Uniform Federal Accessibility Standards	http://www.assistdocs.com/search/document_details.cfm?ident_number=53835&StartRow=1&PaginatorPageNumber=1&doc%5Fid=FED%2DSTD%2D795&status%5Fall=ON&search%5Fmethod=BASIC

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Ref. Number	Reference	Reference Link
2.2.14	Department Of Defense Design Criteria Standard - Human Engineering: MIL-STD-1472-F	http://hfetag.dtic.mil/docs-hfs/mil-std-1472f.pdf
2.2.15	National Fire Protection Association (NFPA) NFPA 70: National Electric Code (NEC)	This document is available for purchase on the NFPA website: http://www.nfpa.org/catalog/product.asp?pid=7008SB&order_src=A291
2.2.16	NFPA 75: Standard for the Protection of Electronic Computer/Data Processing Equipment	This document is available for purchase on the NFPA website: http://businesscontinuitybookstore.com/data/dr231a.htm
2.2.17	NFPA 101: Life Safety Code	This document is available for purchase on the NFPA website: http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=101
2.2.18	National Telecommunications and Information Administration (NTIA) Manual of Regulations & Procedures for Federal Radio Frequency Management	The latest version of this document is available for purchase on US Government Printing Office website. The May 2003 Edition can be viewed at: http://www.ntia.doc.gov/osmhome/redbook/Manual.pdf
2.2.19	United States Code, Title 5, Section 552a (the Privacy Act)	http://www.usdoj.gov/oip/privstat.htm
Non-Government Documents		
2.3.1	American National Standards Institute / Telecommunications Industry Association (ANSI/TIA) ANSI/TIA-222-G-2005: Structural Standards for Steel Antenna Towers and Supporting Structures	This document is available for purchase on the TIA website: http://www.tiaonline.org/
2.3.2	American Society for Testing and Materials (ASTM) A 36 (Standard Specification for Carbon Structural Steel)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.3	ASTM A 53 (Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.4	ASTM A 123 (Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/

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Ref. Number	Reference	Reference Link
2.3.5	ASTM A 153 (Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.6	ASTM A 194 (Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.7	ASTM A 325 (Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.8	ASTM A 463 (Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.9	ASTM A 490 (Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.10	ASTM A 563 (Standard Specification for Carbons and Alloy Steel Nuts)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.11	ASTM A 615 (Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.12	ASTM A 780 (Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.13	ASTM F 1166 (Standard Practice for Human Engineering Design for Marine Systems, Equipment and Facilities)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.14	ASTM F 1337 (Standard Practice for Human Engineering Program Requirements for Ships and Marine Systems, Equipment, and Facilities)	This document is available for purchase on the ASTM website: http://www.astm.org/standards/
2.3.15	eXtensible Markup Language (XML)	http://www.w3.org/XML/
2.3.16	National Marine Electronics Association (NMEA) 0183 V3.01 formats	This document is available for purchase on the NMEA website: http://www.nmea.org/pub/0183
2.3.17	SEI / ASCE 7-02: Minimum Design Loads for Buildings and Other Structures	This document is available for purchase on the SEI website: http://content.seinstitute.org/

Ref. Number	Reference	Reference Link
2.3.18	Telecommunications Industry Association/Electronics Industry Alliance (TIA/EIA) TIA/EIA-568-B: Commercial Building Telecommunications Wiring Standard	This document is available for purchase on the TIA website: http://www.tiaonline.org/
2.3.19	TIA-569-B: Commercial Building Standard for Telecommunications Pathways and Spaces	This document is available for purchase on the TIA website: http://www.tiaonline.org/
2.3.20	TIA TSB-88-B: Wireless Communications Systems - Performance In Noise And Interference	This document is available for purchase on the TIA website: http://www.tiaonline.org/
International Documents		
2.4.1	Building Code Requirements for Structural Concrete and Commentary ACI 318-05/318R-05	This document is available for purchase on the ICC website: http://www.iccsafe.org/e/prodshow.html?prodid=9021S05&stateInfo=IabfDkcEcjcauokd5489|3
2.4.2	Convention on the Territorial Sea and the Contiguous Zone, 15 U.S.T. 1606	http://untreaty.un.org/ilc/texts/instruments/english/conventions/8_1_1958_territorial_sea.pdf
2.4.3	IALA Recommendation A-124 on AIS Shore Stations and Networking Aspects Related to the AIS Service	http://site.ialathree.org/pages/publications/publicationsessaip2.php?lang=eng&id=59&LeTypePub=1
2.4.4	International Code Council: 2006 International Codes	http://www.iccsafe.org/
2.4.5	International Electrotechnical Commission (IEC) 61162-1: Maritime navigation and radio communication equipment and systems - Digital interfaces - Part 1: Single talker and multiple listeners, Edition 2, July 2000	This document is available for purchase on the ANSI website: http://webstore.ansi.org/ansidocstore/default.asp
2.4.6	IEC 61993-2: Maritime navigation and radiocommunication equipment and systems –Automatic identification systems (AIS) – Part 2: Class A shipborne equipment of the universal automatic identification system (AIS) – Operational and performance requirements, methods of test and required test results	http://www.iec.ch/index.html

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Ref. Number	Reference	Reference Link
2.4.7	IEC 62287-1: Maritime navigation and radiocommunication equipment and systems - Class B shipborne equipment of the automatic dentification system (AIS) - Part 1: Carrier-sense time division multiple access (CSTDMA) techniques	http://webstore.iec.ch/preview/info_iec62287-1%7Bed1.0%7Den.pdf
2.4.8	IEC 62288: Maritime Navigation and Radio communication Equipment and Systems - Presentation of Navigation-related Information on Shipborne Navigational Displays - General Requirements - Methods of Testing	http://www.iec.ch/index.html
2.4.9	IEC 62320-1: Maritime navigation and radio communication equipment and systems - Automatic identification system (AIS) - Part 1: AIS Base Stations - Minimum operational and performance requirements, methods of testing and required test results	http://webstore.iec.ch/webstore/webstore.nsf/artnum/037701
2.4.10	Internet Engineering Task Force (IETF) IPv6 Specification, RFC 2460	http://www.ietf.org/rfc/rfc2460.txt
2.4.11	IMO NAV 53/INF.12: Use of AIS Binary Messages	http://www.naisproject.net/NAIS_External/NAISdiscussion/rfp2/sections/Section_J/53-21-INF-12.pdf
2.4.12	IMO Safety of Navigations Circular 236	http://www.imo.org/includes/blastDataOnly.asp/data_id%3D10741/236.pdf
2.4.13	International Telecommunications Union Sector for Radio communications (ITU-R) M.1371: Technical Characteristics for an Automatic Identification System (AIS) Using Time Division Multiple Access in the Maritime Mobile Band, including IALA Technical Clarifications on the ITU-R M.1371	http://www.itu.int/ITU-R/
2.4.14	ITU-R.P525 : Calculation of Free-Space Attenuation	This document is available with subscription to the ITU website: http://www.itu.int/rec/R-REC-P.525-2-199408-I/en
2.4.15	ITU-R.P526: Propagation by Diffraction	This document is available with subscription to the ITU website: http://www.itu.int/rec/R-REC-P.526-10-200702-I/en

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Ref. Number	Reference	Reference Link
2.4.16	ITU-R.P1546: Method for Point-to-Area Predictions for Terrestrial Services in the Frequency Range 30 MHz to 3000 MHz	This document is available with subscription to the ITU website: http://www.itu.int/rec/R-REC-P.1546-2-200508-I/en
2.4.17	United Nations Convention on the Law of the Sea (UNCLOS), 21 I.L.M. 1261	http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm

3 Requirements

3.1 Design Constraints

Increment 2 of NAIS is expected to take advantage of several USCG and DHS enterprise IT infrastructure components. This section provides an overview of the constraints and integration requirements for the use of existing assets and infrastructure by NAIS, which are detailed in later attachments as identified below.

3.1.1 USCG Navigation Center (NAVCEN)

The NAIS System Operations Center (SOC) established for Increment 1 is located at the NAVCEN, in Alexandria, VA, and NAVCEN will serve as the SOC for I-2. In addition to the NAIS SOC, NAVCEN operates the Navigation Information Service (NIS), the Nationwide Differential Global Positioning System (NDGPS), and Long-Range Navigation (LORAN) system. NAVCEN also serves as the civilian interface for the Global Positioning System (GPS) and manages other navigation-related projects. NAVCEN houses much of the IT equipment required for the monitoring and management of these systems. Each of these systems includes wide-area network (WAN) connections via routers to the CGDN+ and other networks administered and monitored by TISCOM and DHS One Network (OneNet), Local Area Network (LAN) connections, and end-user computer workstations. Additional information on NAVCEN can be found at http://www.navcen.uscg.gov.

All system support functions (except for network monitoring and administration and field support desk), including, but not limited to, system monitoring (including facility alarms) and administration, help desk, user support, and SOC watchstander training, will continue to be provided by NAVCEN. A description of NAVCEN components and infrastructure to be made available for Increment 2 appears in Attachment J-9 of the NAIS I-2 RFP.

3.1.2 Enterprise Data Centers

Increment 1 data storage was established at the Coast Guard Enterprise Data Center (EDC) at the Operations Systems Center (OSC) in Martinsburg, WV. OSC will continue to host NAIS data storage components for Increments 2 and 3. NAIS Increment 2 will require a centralized repository for all NAIS data (including AIS messages, metadata, and other supporting information) in order to supply NAIS data to external systems and users, provide a warehouse for long-term storage of NAIS data, including AIS Messages from non-NAIS data sources (e.g., the Saint Lawrence Seaway Corporation and NOAA), and to provide a mechanism for analysis of this historical data. This repository will be the official DHS and Coast Guard data store for AIS information.

All enterprise-level databases must be located at the Coast Guard designated EDC primary and disaster recovery (DR) sites. A description of the OSC EDC appears in Attachment J-9 of the NAIS I-2 RFP.

3.1.3 DHS OneNet & CGDN+

NAIS will utilize DHS OneNet infrastructure to the maximum extent possible. TISCOM, the management authority for CGDN+, began the migration of USCG networks from CGDN+ to OneNet in Q1 CY 2007.

After the migration is complete, security and day-to-day management of OneNet will be the responsibility of U.S. Customs and Border Protection (CBP), while TISCOM will support USCG-specific operations of OneNet. In cases where OneNet is not in use in a given sector, CGDN+ shall be used. A brief description of the publicly available information pertinent to OneNet and CGDN+ appears in Attachment J-9.

The Government expects that there will continue to be Internet connectivity to the NAIS through existing Increment 1 sites currently accessible via the Internet, or future Increment 3 data feeds. In order to minimize Total Life-Cycle cost (TLC) while meeting operational requirements, it is expected that the development of NAIS Increment 2 will leverage existing USCG and DHS IT infrastructure and capabilities (including CGDN+ and OneNet). If a PSS without OneNet or CGDN+ connectivity is recommended, the contractor shall follow the procedure identified in attachment J.1 – SOW, Section 3.1.1.4.9.6.

3.1.4 Sector Command Centers

The USCG has organized its operational command and control (C2) units into Sectors with Sector Command Centers (SCC). Each SCC monitors the sector area of responsibility (AOR) and performs a common, standardized set of mission activities and functions (tailored to meet the specific needs of each area).

In order to streamline and facilitate SCC operations supported by NAIS, it is expected that NAIS platform will integrate and interoperate with the SCC C2 systems to the greatest degree possible. NAIS functionality will be accessed via USCG standard workstations. Ideally, all NAIS end-user functions will be provided through the SCC C2 system, and will not require a separate workstation. Each SCC may support additional IT equipment if necessary for the specific technical solution.

Although several C2 systems, services, and components available at the SCC support classified data, NAIS is an unclassified system, and all AIS messages received and transmitted by the system are unclassified. Integration of NAIS functionality with any existing or planned classified system shall not require a change in the classification level of NAIS. Additional information describing the Sectors and SCCs is provided in Attachment J-9 of the NAIS I-2 RFP.

3.1.5 Geographic Information Systems

The DHS Office of the Chief Information Officer has designated the ESRI ArcGIS™ suite as the enterprise standard for Geographic Information Systems (GIS). DHS has established an enterprise license for ArcGIS products, and the Coast Guard will provide access to these tools as needed by the Contractor. ArcGIS components provided by the Coast Guard shall be reused to the extent possible. GIS data shall comply with the DHS Geospatial Data Model. The Contractor shall develop any applications using GIS components employing a standards-based approach to ensure interoperability.

3.1.6 HLS Enterprise Architecture and Technical Reference Model

The NAIS shall be compliant with the Homeland Security Institute (HLS) Enterprise Architecture (EA). All IT hardware and software shall be compliant with the HLS EA Technical Reference Model (TRM) Standards and Products Profile and/or the USCG IT Products Inventory (ITPI). There is no requirement for proposed products and standards to be listed in both the current TRM and the USCG ITPI. This

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requirement may be met if the items are currently listed in either or both of these documents. However, any new technologies or new products under existing technologies will be required to meet the standard for "technology insertion" into the DHS TRM, which is the current governing document. New products may be proposed, but the Contractor must provide assistance to support the Government's justification for technology insertion.

3.1.7 Enterprise Service Bus (ESB) and Service Oriented Architecture (SOA)

The Coast Guard is developing an ESB based on the concept of delivering business events, documents, and data as asynchronous messages. The ESB will use a Java Messaging Service (JMS)-compliant backbone to route messages with eXtensible Markup Language (XML) payloads to topics and queues. NAIS business services, whether intended for Enterprise or NAIS-only consumption should be architected to leverage this ESB as appropriate. The Coast Guard has not yet solved all the security and access issues surrounding use of the ESB and SOA services. However, the architectural vision is to leverage the Coast Guard's Active Directory for user authentication, along with DoD-compliant Public Key Infrastructure (PKI). Further, the Coast Guard intends to use industry standards such as Security Assertion Markup Language (SAML) v2.0 and Web Services-Security (WS-Security), with others considered as adopted, as key components of their security strategy for SOA. NAIS shall be architected in such a way to utilize these security services and authentication capabilities as they become available.

3.2 General System Requirements

3.2.0.0-1 The system shall be designed for a 15 year life-cycle that will begin at Full Operational Capability (FOC) acceptance. For the purposes of the system design, an FOC date of Q4 FY2013 shall be used.

3.2.0.0-2 The NAIS system shall not degrade the performance or operational availability of other USCG systems.

3.2.1 Application Architecture

3.2.1.0-1 The NAIS shall be designed using Service Oriented Architecture (SOA) approaches in order to:

a. Ensure that NAIS software components are reused throughout their service life;
b. Make it easier to adapt NAIS software to meet new operational requirements;
c. Ease the reuse of existing and planned USCG and DHS IT infrastructure;
d. Improve scalability and modularity of the software components; and
e. Establish standard interoperable external interfaces for all NAIS software components to make it easier to integrate NAIS into existing (e.g., COP, MISLE, MAGNet) and yet to be developed systems.

3.2.1.0-2 The application architecture of NAIS shall align with the structure shown in Figure 3.1, which illustrates the top-level NAIS Application Architecture Components (Component(s)) within NAIS. It corresponds to high-level organization of functional requirements that will be provided by separate software segments. Each Component can be accessed and used independently. The Components illustrated represent the minimal amount of modularity required of the NAIS software. Additional modularity within the Components is allowed. However, the government

is not requiring a specific architecture for lower-level modularity. In addition, this application architecture represents only certain requirements for the NAIS software and does not imply requirements for physical hardware.

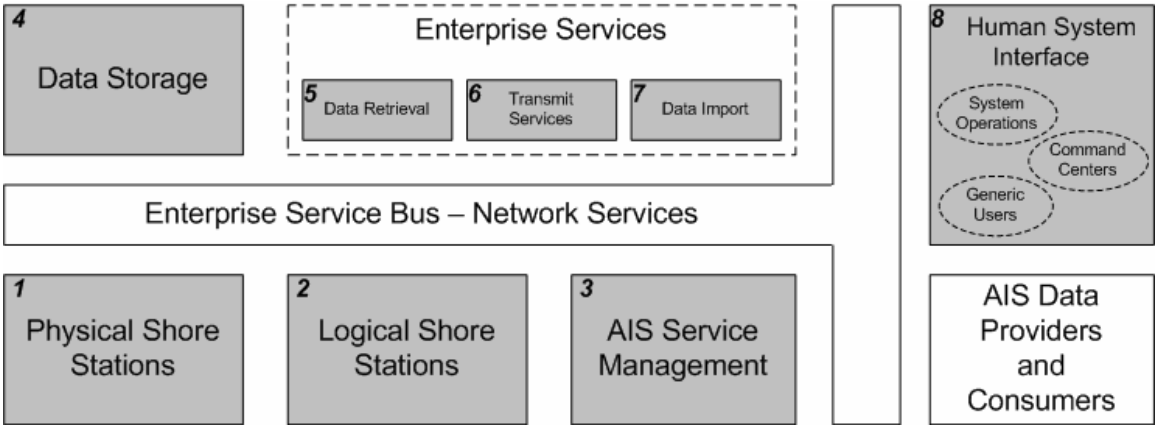

Figure 3.1: NAIS Application Architecture

The following describes the parts of the Application Architecture diagram.

The NAIS application architecture will consist of at least eight Components that communicate via a common ESB and set of Network Services, and can be accessed by other data providers and consumers. Several of the services are consistent with the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) A-124. The requirements for those Components derive from that document, but have additional requirements that are needed by the USCG.

1. *Physical Shore Stations (PSS)* represents the functionality of the transmit and receive infrastructure, predominantly at remote RF sites. This segment of the application draws heavily from the IALA guidelines for AIS Physical Shore Stations.

2. *Logical Shore Stations (LSS)* processes the data received from and transmitted to one or more PSSs and provides the Basic AIS Services[1] to the applications during runtime, as described in the IALA guidance, as well as additional functionality as laid out in this specification document.

3. *AIS Service Management* represents the management and maintenance functionality of the system, as described in the IALA guidance and the AIS Service Management section of this document.

4. The *Data Storage* service is comprised of the functionality and infrastructure required to store and maintains system data. This includes archival, database query, and disaster recovery functionality. As noted in the Design Constraints section of this document and the J-9 Attachment, this functionality will reside at the EDC.

[1] Basic AIS Services, are the services described in IALA-124 guidance

Enterprise Services includes three loosely-coupled Components:
5. *Data Retrieval*, used to obtain a more refined view of the AIS messages and associated data;
6. *Transmit Services*, for validating and transmitting outbound AIS messages, thereby shielding external users from the complexity of delivering AIS messages to the PSS; and
7. *Data Import*, to allow NAIS to accept data from other, external (non-NAIS) AIS data sources.

The dotted line indicates that the three Components are grouped as *Enterprise Services*. The solid line for the individual Components shows that they must be modular in design and implementation.

8. *Human System Interface* represents the user interface segment of the system. The three sub-parts of this module represent the three distinct user types that must be served by the interface, which does not necessarily require separate software modules. The dotted lines represent that the needs of these three user segment may be satisfied either by separate user interface modules, or by a unified—but customizable—user interface module.

Figure 3.1 also illustrates two Components that are ancillary to the NAIS system.

The *Enterprise Service Bus* (*ESB)* will be provided by the Government. The telecommunications infrastructure will consist of DHS OneNet and the connected LANs at the various government facilities. Enhancements to the ESB will be made by the USCG to improve the USCG's Service Oriented Architecture. *Network Services* are those methods, media, products, and platforms needed to communicate between NAIS internal Components.

AIS Data Providers and Consumers represents the external systems with which data may be shared. The specific systems that will provide or consume AIS data, or interface with any of the NAIS Components are not defined. Some systems are identified (e.g., MAGNet), but others are not, and others may not yet be developed. Conceptually, the NAIS Components shall be built with open and defined interfaces that allow for interoperability with external systems.

Software implementation decisions will be made during the system engineering process.

3.2.1.0-3 The software processes of the Components shall be portable to run on machines within the Design Constraints and the DHS TRM and the USCG Information Technology Product Inventory (ITPI).

3.2.1.0-4 All Components identified in Figure 3.1 shall be exposed and discoverable while adhering to system access privilege restrictions described in Sections 3.2.5 and 3.5.3 of this PSPEC.

3.2.1.0-5 The system design shall assume that a service registry will be made available by the Government, but service components shall be defined in such a way that they can be accessed without a registry (e.g., direct calls, hard-coded interfaces).

3.2.1.0-6 The application interfaces shall be based on international standards or otherwise open (e.g., provision of interface specification documentation) to inspection and reuse by other systems external to NAIS.

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3.2.1.0-7 The application interfaces shall remain stable throughout the life of the system.

3.2.2 Facilities

NAIS system facilities are those structures, shelters, or similar assets that are provided, altered, or enhanced by the Contractor, and are the subject of the following requirements:

a. Improved land, towers, equipment shelters, structures, and other real property
b. Electrical power, telephone, telecommunications termination
c. Site access and physical security
d. Heating, cooling, ventilation, and lighting commensurate with the NAIS system and staff located at the site
e. Fire and intrusion detection systems

3.2.2.0-1 Facilities shall be designed for a 30-year service life.

3.2.2.0-2 Facilities construction shall be completed in accordance with all requirements outlined in the environmental documentations that the Contractor will prepare in accordance with the Environmental Compliance section of the SOW, Section 3.1.2.2.4.6.

3.2.2.0-3 The construction or alteration of all facilities (e.g. towers, shelters, buildings, etc.) shall comply with the applicable federal, state, and local laws and regulations.

3.2.2.0-4 New equipment shelters shall be of concrete construction.

3.2.2.0-5 A monolithic design for new construction equipment shelters shall be used where practical.

3.2.2.0-6 Tilt-up shelter construction shall be used in locations where use of a monolithic shelter is impractical or cost prohibitive (e.g. a remote location with limited access).

3.2.2.0-7 The exterior finish of new construction equipment shelters shall be resistant to chips, cracks, spalling, fading, and damage due to interior wall corrosion.

3.2.2.0-8 New facilities or modifications to existing USCG facilities shall conform to USCG Civil Engineering Manual, COMDTINST 11000.11 (series) Chapter 10.

3.2.2.0-9 The design and implementation of the NAIS shall be in compliance with applicable areas of the Spectrum Management Policy and Procedures Manual (COMDTINST M2400.1G) and Manual of Regulations and Procedures for Federal Radio Frequency Management.

3.2.2.0-10 New towers or modifications to existing towers shall conform to the current versions of the following documents:

a. Structural Standards for Steel Antenna Towers and Supporting Structures (ANSI/TIA-222-G-2005).
b. ACI 318-05/318R-05

3.2.2.0-11 New facilities or modifications to existing facilities shall conform to the current versions of the following documents:

a. American Society for Testing and Materials (ASTM)-A-36
b. ASTM-A-53
c. ASTM-A-123
d. ASTM-A-153
e. ASTM-A-194 grade 2H or ASTM-A-563 grade DH
f. ASTM-A-325
g. ASTM-A-463
h. ASTM-A-490
i. ASTM-A-615
j. ASTM-A-780
k. ANSI/TIA-222-G-2005
l. SEI / ASCE 7-02
m. ACI 318-05/318R-05
n. International Code Council (ICC), International Codes
o. Life Safety Code (NFPA 101)
p. National Electric Code (NFPA 70)
q. Uniform Federal Accessibility Standards (UFAS), FED-STD-795 (Note: This standard is not applicable for remote sites)

3.2.2.0-12 Aluminum conductors shall be prohibited for interior power distribution wiring.

3.2.2.0-13 Facilities shall conform to NFPA 75 for construction and fire protection requirements.

3.2.2.0-14 Halon fire suppression systems shall not be used.

3.2.2.0-15 Asbestos shall not be used at NAIS facilities.

3.2.2.0-16 Chlorofluorocarbons shall not be used at NAIS facilities.

3.2.2.0-17 Facilities shall accept commercial power as provided by the local electric power utility.

3.2.2.0-18 Facilities shall supplement utility power as necessary to meet operational availability requirements.

3.2.2.0-19 NAIS facilities shall have an Uninterruptible Power Supply (UPS) to provide power during switchover from commercial power to supplemental power.

3.2.2.0-20 NAIS shall comply with Occupational Safety and Health Administration (OSHA) Act of 1970 regulations.

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3.2.2.0-21 NAIS shall comply with Federal Communications Commission (FCC) Office of Engineering and Technology (OET) Bulletin 65 (Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields) regulations.

3.2.2.0-22 NAIS shall comply with all applicable local, state and federal safety and environmental laws, regulations and requirements to ensure personnel and environmental safety.

3.2.2.0-23 The system shall comply with Commercial Building Standard for Telecommunications Pathways and Spaces TIA-569-B.

3.2.2.0-24 The system shall comply with Commercial Building Telecommunications Wiring Standard TIA/EIA-568-B.

3.2.2.0-25 The NAIS system shall monitor, report, and log the physical status of system facilities to the SOC and applicable SCC. At a minimum, facilities that house NAIS system equipment will provide the following monitoring and status reporting capabilities. In cases where NAIS equipment resides at a non-NAIS facility (e.g., a Rescue 21 radio site), facilities monitoring may be done by the site owner, and the necessary alerts passed to NAIS system operations management.

a. The system shall monitor and report changes in the status of physical intrusion and fire detection alarms at NAIS facilities.

b. The system shall monitor and report changes to the status of primary power, the transition to backup power, and the restoration of primary power.

c. The system shall monitor the fuel level for backup generators (where installed) and the charge of backup batteries (where installed), and report when lower than acceptable levels are discovered.

d. The system shall monitor and report the voltage output for batteries that are used for backup power.

e. The system shall monitor the environmental conditions within the facilities, and will report when an out-of-tolerance event is discovered.

f. The system shall monitor the status of tower lighting, and will report tower warning light failures.

g. For new monitoring and alarm capabilities at NAIS facilities, physical intrusion and fire detection alarms shall have a false alarm rate of no greater than 5% when detecting an out-of-tolerance event.

h. For new monitoring and alarm capabilities at NAIS facilities, physical intrusion, physical status and fire detection alarms shall transmit an alarm to the alarm monitoring system within ten (10) seconds of detecting an out-of-tolerance event.

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3.2.3 Operational Environment

3.2.3.0-1 All NAIS shelters shall be adequately conditioned so that the ambient temperature is maintained within the published limits for all equipments.

3.2.3.0-2 Environmentally sensitive equipment shall be housed in appropriate climate-controlled facilities.

3.2.3.0-3 The system shall be operable and survivable within the parameters outlined in Table 3.1, except where other requirements provide more stringent standards.[2]

Table 3.1: Environmental Tolerances[3]

Environmental Parameters	Operational	Survivable
Temperature	-25 to 50 deg. Cº	-82 to 70 deg. Cº
Humidity	20% to 100% condensing	1% to 100% condensing
Wind Speed	65 kts sustained 100 kt gust	65 kts sustained 140 kt gust
Weather	Rain, fog, snow, sleet, freezing rain	Rain, fog, snow, sleet, freezing rain
Other	Salt, spray, sand, dust, static discharge, and vibration	Lightning strikes, salt water immersion, shock.

3.2.4 Information Assurance

3.2.4.0-1 The system shall incorporate data networking components (e.g. routers, switches, gateways) that implement National Institute of Standards and Technology (NIST) Special Publication compliant information assurance (IA) controls.

3.2.4.0-2 The system shall implement Federal Information Processing Standard (FIPS) 140-2 and 197 for data communications encryption.

3.2.4.0-3 The system shall be designed such that encryption and decryption of AIS messages is done externally to the system. The system shall not provide an encryption/decryption cryptographic function, nor the associated key management of such a function.

3.2.4.0-4 The system shall not allow the alteration of AIS messages received by NAIS receivers.

3.2.5 Security Management

3.2.5.0-1 The system shall be able to interoperate and share data with both classified and unclassified systems.

[2] The survivability of equipment can be addressed using protective facilities.
[3] Rescue 21 antennas used by NAIS are exempt from these requirements.

3.2.5.0-2 The system shall share data with classified systems through a Cross Domain Solution (CDS) or Multi-Level Security (MLS) solution.

3.2.5.0-3 The system shall deliver data in a manner than can be accepted by the Government-provided CDS or MLS solution.

3.2.5.0-4 The system shall allow the Government to restrict access to system data and AIS functionality at each user level.

3.2.5.0-5 The system shall incorporate logical separation and access protection (i.e., gateways, firewalls) to protect the system from unauthorized use.

3.2.5.0-6 The system shall incorporate logical separation and access protection controls between various connected organizations and entities.

3.2.5.0-7 The system shall have the capability to monitor network activity, automatically report unauthorized activity, and block unauthorized access to network and system infrastructure.

3.2.5.0-8 All network hardware shall be IPv6 compatible without modification, upgrade, or replacement as specified by the Internet Engineering Task Force (IETF) IPv6 Specification, RFC 2460.

3.2.6 Scalability

3.2.6.0-1 The system and its Components and services shall scale to accommodate the performance thresholds as specified in Table 3.2. The scaling of the Components may be required individually or collectively.

Table 3.2: System Scalability Metrics

System Component	Threshold Performance at IOC	Threshold Performance at FOC
Physical Shore Station (PSS)	30 PSSs	400 PSSs
VDL Throughput	10% capacity saturation for each PSS	100% capacity saturation for each PSS
Human System Interface	20 concurrent users across 3 SCCs, SOC, and generic cases	400 concurrent users across all SCCs, SOC, and generic cases
Logical Shore Station (LSS)	10 LSSs	200 LSSs

3.2.6.0-2 System growth shall not degrade performance of any of the system functions below the threshold requirements of this PSPEC.

3.2.6.0-3 Other system Components shall be able to scale to meet the service needs dependencies of the Components in Table 3.2. These Components are:

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a. Storage
b. Enterprise Services
c. AIS Service Management

3.2.6.0-4 The system shall, at a minimum, meet the operational requirements as set forth in the following use cases.

a. As part of an incident investigation, a user at a Sector Command Center needs to know all of the vessels that traveled through a specific geographic area during a specific time period. Using the GIS functionality in the NAIS interface on the SWIII, the user bounds the geographic area, and uses that boundary in conjunction with the desired time period to query the database for the MMSI, vessel type, maximum speed, and size of all vessels that match the query parameters.
b. A user at a Sector Command Center needs to see the vessel track for a vessel inbound for that SCCs area of responsibility. The user queries the database for all messages and associated metadata received from that vessel from the time the vessel debarked to the present time.
c. A user needs to know all of the messages that were sent to or received from a particular vessel during a specific period of time. The user queries the database with the MMSI of the vessel and the period of time. The system returns all messages intended specifically for and received from that vessel, and also associates the vessel's track (i.e., location) during that period of time and determines which general broadcast messages should have been received by that vessel given the vessel's characteristics.
d. A user at the System Operations Center wishes to know the reporting rate for all vessels within range of a specific Physical Shore Station over a period of time. The user queries the database with the PSS and period of time, and receives a response that shows the MMSI, vessel characteristics, and timestamp and message type for each message received by that PSS over the period of time.
e. The MISLE system needs access to general NAIS data, and so runs a periodic automated query to determine how many vessels of a specific type are within each SCCs area of responsibility. The NAIS system responds with the number of vessels that match the criteria of the query for each SCC.
f. As part of navigation planning for a specific waterway or port, a USCG user wants to use historical vessel movement data to evaluate options for reducing risk of collisions. Using the system, the analyst queries the database to collect and plot vessel position reports to do statistical analysis to identify risks or plan new traffic patterns.

3.2.7 Operational Availability (A_O)

3.2.7.0-1 The system shall operate 24 hours a day, 7 days a week, in the environmental conditions described in Operational Environment section of this document, Section 3.2.3.

3.2.7.0-2 For each Sector Command Center (SCC), the system shall achieve a monthly operational availability (A_O) of ≥ 0.96 for each of the three critical functions defined in this section.

Receive and Transmit AIS Messages: This function is supported by the system elements that allow the end-user at the SCC to receive and use messages from, and transmit messages to, AIS

mobile stations in the sector area of responsibility. For the operational availability calculations of this critical function, the Contractor shall take into account that any unavailable time observed, during normal system operations, over any part of the required coverage area, will count against the entire SCC sector availability for this critical function. For instance, in the event where one of the physical shore stations (PSSs) becomes inoperable and some part of the required coverage is lost, for the purpose of A_O calculations, this critical function will be considered inoperable. In the case that the loss of a PSS does not result in a reduction of coverage or performance below the thresholds established in this specification, it is not considered to be a loss of operational availability.

Data Management: This function is supported by the system elements that are necessary to perform data processing, storage, retrieval and analysis at the SCC level. Although this capability will largely depend upon system Components that are centrally located, the A_O will be measured per sector.

Interoperability: This function is supported by the system elements that provide the means of interfacing the data management function with unclassified and classified external systems.

3.2.7.0-3 For the purposes of system design, the Contractor shall assume an A_O of ≥ 0.999 for the CGDN+ and OneNET networks, as described in their respective Design Constraints attachments.

3.2.7.0-4 For the purposes of system design, the Contractor shall assume an A_O of 99.5% for R21 equipment (including the transmit or receive port) that supports the NAIS at a PSS. This figure applies to the entire R21 site.[4]

3.2.7.0-5 The A_O for each critical function of each sector shall be calculated on a monthly basis using the below formula:

$A_O = T_O / (T_O + T_m + T_l + T_a)$ where:

Operating time (T_o) is the period of uptime where all of the elements of the critical function (as described above) are fully operable.

Maintenance Delay (T_m) is a period of downtime during the physical act of preventing, determining, and correcting equipment or software faults. It includes all actions taken to retain system/equipment/product in a useful serviceable condition or to restore it to usefulness / serviceability. Maintenance includes inspection, testing, servicing, repair, rebuilding, and reclamation.

Logistics Delay Time (T_l) is a period of downtime during which no maintenance takes place due to delays in parts/equipment delivery and transportation.

[4] The MTBF for the Co-Site Interference Mitigation System (CIMS) equipment is 134,000 hours, including all of the CIMS components. The MTBF for the VHF RX and TX antenna is estimated at 170,823 hours each.

Administrative Delay Time (T_a) is a period of downtime during which no maintenance takes place due to delays in administrative processing and assignments of maintenance personnel.

3.3 Physical Shore Station (PSS)

3.3.1 General PSS Requirements

3.3.1.0-1 Individual PSSs, as well as the aggregate capability provided by all PSSs, shall comply with the NTIA Manual of Regulations & Procedures for Federal Radio Frequency Management for U.S. telecommunications services.

3.3.2 Individual PSS Units

3.3.2.0-1 The PSSs shall provide the capability described in IALA recommendation A-124, Part 6.6.

3.3.2.0-2 PSSs shall have the capability to store AIS messages when network connectivity is lost, and send the stored messages to appropriate LSSs when connectivity is regained.

3.3.2.0-3 PSSs shall be able to store and forward at least two weeks of AIS messages received over a fully utilized VDL.

3.3.2.0-4 The system shall provide, at a minimum, the following corresponding metadata for each AIS message transmitted from the PSS, and shall send the metadata to the NAIS data subsystem for storage and retrieval in conjunction with copies of the transmitted AIS message.

a. UTC Timestamp (at time of transmission from the PSS – based upon GPS clock)
b. Remote site numbers(s) (i.e., base station ID numbers) from which the message was transmitted
c. Operator ID (i.e., the user ID of the Operator)
d. Power level control setting as defined in IEC-62320-1 annex A
e. Channel(s) on which the message was transmitted
f. Other administrative data as appropriate to aid in message retrieval, as determined during system design

3.3.2.0-5 The system shall provide and store, at a minimum, the following corresponding metadata for all messages received by the PSS, and shall send the metadata to the NAIS data subsystem for storage and retrieval in conjunction with copies of the received AIS message.

a. UTC Timestamp (received from GPS clock)
b. Remote site numbers(s) (i.e., base station ID numbers) upon which the message was received
c. System source identifier (i.e., the system, NAIS or other, by which the message was received. Example: Saint Lawrence Seaway AIS System)
d. Consolidation tag (i.e., group number, number of messages received)
e. Received signal strength
f. Channel(s) on which the message was received
g. Packet Time of Arrival

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h. Other administrative data as appropriate to aid in message retrieval, as determined at system design

3.3.2.0-6 Each base station shall meet the minimum requirements of the base station as described in IEC 62320-1, IEC 61162-1, and National Marine Electronics Association (NMEA) 0183 V3.01.

3.3.2.0-7 The base station shall provide a receiver sensitivity of at least -115dBm.

3.3.2.0-8 Where the PSS is integrated with other RF systems (e.g., Rescue21), the NAIS RF system output power shall be configurable up to at least 100 Watts.[5]

3.3.2.0-9 Base stations shall be capable of receiving and transmitting AIS messages that contain encrypted information as per Command and Control Engineering Center (C2CEN) Encrypted Automatic Identification System (EAIS) v 4.0.

3.3.3 Coverage

3.3.3.0-1 The system shall provide at least the minimum transmit and receive performance as shown below in Table 3.3. Performance is measured in terms of the maximum acceptable Packet Error Rate (PER).

The geographic areas listed in Table 3.3 are defined below. Table 3.4 defines the Ports & Other Specified Areas. Table 3.5 describes the Inland Navigable Waterways. For coverage verification purposes, the characteristics of the vessel types (i.e., AIS mobile stations) are defined in section 3.3.4.

Table 3.3: Minimum Coverage Requirements, in PER

		Ports & Other Specified Areas (Table 3.4)	Inland Navigable Waterways (Table 3.5)	Coastal Waterways out to 24nm from baseline	Waters 24 to 50nm from baseline[6]
Receive	**Class A**	25%	50%	50%	90%
	Class B				--[7]
Transmit	**Class A**	27%	42%	42%	--
	Class B	42%	52%	52%	--

3.3.3.0-2 The system shall provide transmit and receive coverage in the *Ports and Other Specified Areas* as defined in Table 3.4. Graphical representations of the coverage requirements in Table 3.4 are provided in Attachment J-5.

Table 3.4: Ports and Other Specified Areas

Port Areas		
Albany, NY	Jacksonville, FL	Port Everglades, FL

[5] *The Rescue 21 RF subsystem induces approximately 10 dB of insertion loss.*
[6] See Glossary for definition of the baseline
[7] This table provides *minimum* coverage performance requirements; even where no minimum requirement is provided, coverage is still considered to be of value to the Government.

Port Areas		
Anchorage, AK	Lake Charles, LA	Portland, ME
Baltimore, MD	Long Beach, CA	Portland, OR
Baton Rouge, LA	Los Angeles, CA	Portsmouth, NH
Beaumont, TX	Marcus Hook, NJ	Richmond, CA
Boston, MA	Memphis, TN	San Diego, CA
Camden, NJ	Miami, FL	San Francisco, CA
Charleston, SC	Mobile, AL	San Juan, PR
Chicago, IL	New Orleans, LA	Savannah, GA
Cincinnati, OH	New York/New Jersey	Seattle, WA
Cleveland, OH	Newport News, VA	South Louisiana, LA
Corpus Christi, TX	Norfolk Harbor, VA	St. Louis, MO
Detroit, MI	Oakland, CA	Tacoma, WA
Duluth-Superior, MN/WI	Paulsboro, NJ	Tampa, FL
Freeport, TX	Philadelphia, PA	Texas City, TX
Galveston, TX	Pittsburgh, PA	Valdez, AK
Honolulu, HI	Port Arthur, TX	Wilmington, DE
Houston, TX	Port Canaveral, FL	Wilmington, NC
Huntington, WV		

Critical Coastal and Non-Port Areas

- US Waters of the Great Lakes:
  - Lake Superior: West End (Two Harbors, MN), Keweenaw Peninsula, MI, Marquette, MI
  - Lake Michigan: Straits of Mackinac (St Ignace, Charlevoix, Mackinaw City, MI), Door Peninsula (Green Bay, Sturgeon Bay, WI); Milwaukee, WI; South End (Gary, Indiana Harbor, Michigan City, IN), Holland/Grand Haven/Muskegon, MI
  - Lake Huron: Alpena, MI, Bay City, MI, Port Huron, MI
  - Lake Erie: Toledo, OH, Lorain, OH, Erie, PA, Buffalo, NY
  - Lake Ontario: Rochester/Sodus/Oswego, NY
- California/Oregon Coast from Mexican Border to Cape Blanco:
  - Oceanside, CA; Santa Barbara Channel (Point Conception, Santa Barbara, Channel Islands, CA); Point Sur, CA; Point Arena, CA; Cape Mendocino, CA ; Lost Coast (Eureka, Crescent City, CA); Cape Blanco, OR
- Delaware Bay Approaches (Cape May, Cape Henlopen)
- Unimak Pass, AK
- Cape Hatteras, NC

Vessel Tracking Service Areas

VTS areas extending beyond (seaward of) the baseline. VTS Areas are described in the *Code of Federal Regulations (CFR), Title 33: Navigation and Navigable Waters, Part 161 – Vessel Traffic Management, Subpart C – Vessel Traffic Service and Vessel Movement Reporting System Areas and Reporting Points.*

IRVMC Reporting Points

IRVMC Reporting Points, as described in CFR, Title 33: Navigation and Navigable Waters, Part 165.830 and Part 165.921.

3.3.3.0-3 The system shall provide transmit and receive coverage in *Inland Navigable Waterways* as defined in Table 3.5. Graphical representations of the coverage requirements in Table 3.5 are provided in Attachment J-5.

Table 3.5: Inland Navigable Waterways (Shoreward Coverage Boundaries)

District / Sector	River / Waterway	Mile Marker / Landmark
D1		
Northern New England	Kennebec River	Days Ferry to Gardiner Bridge.
	Montsweag Bay	Hockomock Bay to Youngs Point.
	Sheepscot River	Middle Westport Island Wiscasset Bridge.
	New Meadows River	Dingly Island to Woolward Point.
	Damariscotta River	Farmers Island to New Castle.
	Medomak River	Waldoboro to Hungry Island.
	St. George River	Otis Cove to Thomaston.
	Pisqataqua River	I-95 Bridge to Broad Cove to Great Bay.
	Penobscot River	Bangor at the Joshua Chamberlain Bridge.
	Lake Champlain	US/Canada Border to Lock 12 in Whitehall, NY.
	Champlain Canal	MM 26.5 (Lock 12 in Whitehall, NY) to MM 0 (Southern end of Champlain Canal).
Long Island Sound	Connecticut River	Charter Oak Bridge (41-45N/072-39W), Hartford, CT. Approximately 44NM North of the mouth.
	Thames River	Norwich, CT (41-31.5N/072-05W). Approximately 13.5 NM north of the mouth.
New York	Hudson River	MM 184.2 (Southern end of Champlain Canal) to MM 0 (Southern tip of Manhattan/NY Harbor).
D5		
Delaware Bay	Delaware River	Trenton Falls.
	C & D Canal	Mouth to Maryland State line.
Baltimore	Sassafras River	Grove Pt. to Swantown Creek
	Chester River	Love Point to Spry Landing
	Choptank River	Tilghman Island to 331 Bridge in Denton, MD.
	Patapsco River	Bodkin Point to Baltimore Inner Harbor.
	Patuxent River	Drum point to Trueman Point.
	Potomac River	Point Lookout to Francis Scott Key Bridge, Wash. DC.
	Wicomico River	Long Point to Tonytank Creek, Salisbury, MD.
	Elk River	Turkey Point to 213 Bridge

District / Sector	River / Waterway	Mile Marker / Landmark
	C & D Canal	Elk River to Rte. 213 Bridge, Chesapeake City, MD.
	Nanticoke River	Roaring Pt. to the route 24 bridge, DE.
	Broad Creek	Nanticoke River to the route 24 bridge, DE
Hampton Roads	York River	Up to West Point.
	Rappahannock River	Up to the Route 360 Bridge.
	James River	Up to Chickahominy River
North Carolina	Cape Fear River	The US 17 bridge turning basin (5 miles upstream of the Port of Wilmington).
	Neuse River	Day Beacon (DBN) 50 (35-08.5N 077-03.5W)
	Trent River	DBN 4 (35-04.5N 077-04W)
	Pamlico River	Pamlico River swing bridge at the town of Washington, NC (Route 17 Bridge)
D7		
Charleston	Cooper River	To Lighted Buoy 76, LLNR 3070
	Stono River	Wadamalaw Sound.
	Broad River	Hall Island.
	Savannah River/S. Channel	Little Kiffer Point.
	Ogeechee River	Ossabaw Sound.
Jacksonville	St. Johns River	To the Route 17 Bridge.
	Indian River	MM875 to MM890.
Miami	St. Lucie Canal	The whole canal.
D8		
Galveston	Houston Ship Channel	Manchester Bridge (610 Bridge).
	San Jacinto River	Hwy. 90 Bridge (near Crosby, TX.)
Corpus Christi	Brownsville Ship Channel	Port of Brownsville.
	Victoria Barge Canal	Pickering Basin
	Channel to Port Harlingen	Arroyo Colorado Cutoff to Port of Harlingen.
D9		
Buffalo	St. Lawrence River	Lighted Buoy 1 (LLNR 0005). Canadian border at Massena NY.
Detroit	Saginaw River	M-46 Bridge, approximately 20 miles upstream from the mouth of the river.
Lake	Grand River	14NM inland.

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District / Sector	River / Waterway	Mile Marker / Landmark
Michigan	Illinois River	MM291.1 to MM333.5. Which include the Chicago Sanitary Ship Canal, the Cal-sag & Calumet Rivers mm304.5-mm333.5, each separate channel is identified as part of the Illinois River system.
D11		
San Francisco	Sacramento River	City of Sacramento Water Intake Light (LLNR 7762) - Port of Sacramento
	Sacramento River Deep Water Ship Canal	Light 86 (LLNR 7615)
	San Joaquin River	Stockton Channel Light 48 (LLNR 7165) - Stockton
		Note: The navigable waters of the American, Old, Middle, N. & S. Mokelumne Rivers fall w/in a 10 mile radius of San Pablo Bay, Suisun Bay, Sacramento River & San Joaquin River.
	Lake Tahoe	All
D13		
Portland	Umpqua River	MM 0 - MM 12 (Bridge at 43-39N, 123-50W in Scottsburg, OR)
	Siuslaw River	MM 0 - MM 18 (Bridge at 44-02N, 123-52W in Mapleton, OR)
	Columbia River	MM 0 - MM 45 (Eastern end of Puget Island)
	Columbia River	MM 40 - Western end of Puget Island to Richland.
	Willamette River	MM 0 - MM 30 (Columbia River confluence to Oregon City Falls)
Seattle	Hood Canal	The whole canal.
	Lake Washington	The whole Lake.
D17		
Anchorage	Bristol Bay	Tuklung Mt. HLS

3.3.3.0-4 The system shall provide transmit and receive coverage in the coverage exception areas as described in Table 3.6.

Table 3.6: Coverage Exceptions – Alaska and U.S. Territories

Area description	Receive PER		Transmit PER	
	Class A	Class B	Class A	Class B
Alaska Bering Sea coast north of Kotzebue to Canadian border	95%	--[8]	--	--
Cook Inlet North and East of Anchorage (Turnagin and Knik Arms)	90%	--	--	--
Aleutian Islands west of Dutch Harbor, except for Adak and Attu	90%	--	--	--
Alaska Peninsula west of 155° west longitude, except Unimak Pass	90%	--	--	--
Adak, Attu, Dutch Harbor and Unimak Pass	50%	50%	--	--
Gulf of Alaska between 137° and 144° west longitude	90%	--	--	--
Western Rivers covered by IRVMC (covering IRVMC designated reporting points)	90%	--	--	--
U.S. Territories (Island of Guam, Puerto Rico, U.S. Virgin Islands)	50%	50%	42%	52%
U.S. waters exempt from AIS carriage requirements[9]	None		None	

3.3.4 Coverage Verification Constraints

3.3.4.0-1 Contractor-proposed testing methodologies, which will be evaluated and approved by the Government, shall comply with prescribed configuration and testing requirements as stated below.[10]

3.3.4.0-2 Coverage verification tests shall assume the following configurations for mobile AIS stations for the purposes of coverage modeling and testing.

a. Class A and Class B mobile AIS stations shall be equipped with omni-directional antennas.
b. Class A VHF antennas shall be at 10 meters height above sea level.
c. Class B VHF antennas shall be at 1 meter height above sea level.
d. The power output of Class A mobile AIS station units shall be 12.5 watts as measured at the transmit output port.
e. The power output of Class B mobile AIS station units shall be 2 watts as measured at the transmit output port.

[8] This table provides *minimum* coverage performance requirements; even where no minimum requirement is provided, coverage is still considered to be of value to the Government.
[9] As defined by Title 33 of the Federal Code of Regulations: Navigation and Navigable Waters.
[10] Specific deliverables and work products for which the Contractor will be responsible are described in the Contract Data Requirements Lists: *CDRL 1.8.2.1: Master Test Plan, CDRL 1.8.2.3.1: Test Plan and Procedures, CDRL 1.8.2.3.4: DT&E Test Report*

3.3.4.0-3 Coverage verification tests shall assume watercraft-based mobile AIS stations; verification of coverage and performance is not required for AIS equipped aircraft.

3.3.4.0-4 The propagation analysis and coverage plots for proposed NAIS sites shall be conducted using proven methodologies and standards (e.g., CFR, title 47, part 80, Subpart P, ITU-R.P525/526, ITU-R.P1546, TIA TSB-88-B, etc.) applicable to each specific desired location. Antenna heights, effective radiated power, and other characteristics used for the modeling shall be in accordance with the proposed transceiver locations, system design, and applicable international AIS standards.

3.3.4.0-5 The results of coverage verification, which are to be performed in accordance with industry best practices, shall prove the validity of the Contractor's standards and tools used for the propagation analysis and coverage plots.

3.3.4.0-6 Testing methodologies shall account for studies (refer to IMO NAV 53/INF.12, 18 May 2007) which show that when the AIS VDL is significantly populated, the throughput efficiency of the VDL is limited by the behavior of the shipborne AIS in all transmission modes. This requires isolating the coverage verification test from the behavior of the shipborne AIS, such that the coverage verification is indicative of the system design alone; not the behavior of the shipborne AIS. For example, it may be necessary to use FATDMA to exclusively allocate time-slots for both the base station and the shipborne units under test. The testing methodology shall also confirm that the noise level of these FATDMA-allocated time-slots is sufficiently low (that the signal level is near the thermal noise floor) during the test. Message repetition in multiple contiguous time-slots may be necessary to support the test.

3.4 Logical Shore Station (LSS)

3.4.1 General LSS Requirements

3.4.1.0-1 The LSS shall provide the capability described in IALA A-124 Part IV, Edition 1.2.

3.4.1.0-2 The system shall be capable of providing Joint Technical Architecture (JTA)-standard and registered (in compliance with Department of Defense (DoD) XML Registry and Clearinghouse policy) tags for NAIS data intended to be exchanged through the COP to the Global Information Grid (GIG) JTA.

3.4.1.0-3 The system shall be configurable such that it can provide AIS messages from the PSSs to other Components or systems in both the native and parsed format.

3.4.1.0-4 The system shall provide a configurable capability to automatically detect when static ship and voyage information changes, and trigger a user-configurable event or alarm.

3.4.1.0-5 The system shall allow operators to transmit any standard AIS message from any single PSS, predefined group of PSSs, or from a group of selected PSSs (ad hoc).

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3.4.1.0-6 The system shall be capable of manually or automatically aggregating data from any PSS or group of PSSs, locally, regionally, or system wide.

3.4.1.0-7 The system shall be configurable to allow received AIS messages to be rebroadcast (repeated) by the PSS that received the AIS message or any other PSS (i.e., any PSS that is needed to achieve the coverage needed for navigation safety), and shall, at a minimum, support the functionality as described in the following use case:

a. Where multiple vessels may approach a common location by routes separated by terrestrial obstructions that prevent AIS communications between the vessels, one or more PSSs providing coverage in that area are configured such that messages received from the vessels are retransmitted so that other vessels receive the obstructed vessel's position reports.

3.4.1.0-8 The system shall be able to filter and pass AIS messages based on any combination of message metadata attributes and values, including metadata as described in requirements 3.3.2.0-4 and 3.3.2.0-5.

3.4.1.0-9 The system shall be able to filter and pass NAIS data to other NAIS services based on any combination of attributes and values within the following messages:

a. Position Report messages (Messages 1, 2, 3, and 18) as defined by ITU-R M 1371-3, Annex 8
b. Static and Voyage Related Data message (Message 5, 19, and 24) as defined by ITU-R M 1371-3, Annex 8
c. Standard SAR Aircraft Position Report message (Message 9) as defined by ITU-R M 1371-3, Annex 8.
d. Aids to Navigation message (Message 21)
e. Binary and safety related messages (messages 6, 8, 12, 14,25, and 26)

3.4.1.0-10 The system shall provide capability to configure the rate at which AIS messages are passed on to other external systems (e.g., the most recent position reports from any vessels every minute, 5 minutes, etc.)

3.5 AIS Service Management (ASM)

3.5.1 General ASM Requirements

3.5.1.0-1 The system shall provide ASM functionality that meets the requirements of IALA A-124, Part V.

3.5.1.0-2 The system shall record which USCG (or other) users acknowledge AIS messages from vessels.

3.5.1.0-3 The system shall support a configurable deconfliction process for transmitting AIS messages from multiple USCG users that make the request at the same time so that they are transmitted automatically by the appropriate PSSs. The deconfliction process shall be based on the priority of the user and/or message type.

3.5.1.0-4 ASM services shall be discoverable via the ESB while adhering to the access privilege restrictions outlined in PSPEC sections 3.2.5 and 3.5.3.

3.5.2 VHF Data Link (VDL) Management

3.5.2.1 VDL Monitoring

3.5.2.1.0-1 Operators shall be able to receive and display the contents of the base station output sentences (e.g., Frame Summary Report [FSR]) any selected PSS, group of PSSs, or pre-configured group of PSSs.

3.5.2.1.0-2 Operators shall be able to configure the parameters and thresholds within the AIS Device Status (ADS), FSR, and VDL Signal Information (VSI) messages to create VDL monitoring reports.

3.5.2.1.0-3 Operators shall be able to manually request and view a VDL monitoring report.

3.5.2.1.0-4 Operators shall be able to select the base stations which provide VDL monitoring reports.

3.5.2.1.0-5 The system shall, at a minimum, provide functionality to support the following use cases:

a. The system constantly monitors the FSR from each of the base stations and alerts the operator when one or a combination of preset parameters is exceeded. When the parameters are exceeded, the system notifies the operator. The operator then views the information from the base station exceeding the parameters and uses the information to determine whether or not VDL management or other action (system repair) is needed.
b. The operator requests from the system a graphical display of average noise levels of selected base stations. The operator then selects from those base stations the IDs of the base stations where the average slots with Cyclic Redundancy Check (CRC) failures exceeds a designated threshold. Those base stations are then displayed on a map of the US.
c. The operator receives an alarm indicating that the number of slots with received signal strength for a particular base station has been below a pre-set threshold level for the past five minutes. The operator reviews the AIS messages entering the system from that base station and notes that there are no messages being received by the base station. The operator identifies an adjacent base station and sends a Message 4 from that base station.

3.5.2.2 VDL Management

3.5.2.2.0-1 The operator shall be able to manage the VDL by transmitting management messages (e.g., DSC telecommands, Message 4, Message 16, Message 20, Message 22, and Message 23).

3.5.2.2.0-2 The system shall, at a minimum, provide functionality to support the following use cases:

a. The operator is alerted to a high noise level on AIS1 in a port, selects all the vessels in that port and transmits a Message 22 to shift AIS operations in the port to a different channel for AIS 1.

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b. The operator in A. (above) determines through VDL monitoring (see above) that AIS1 is no longer interfered with, and transmits Message 22 to shift AIS operations in the port back to AIS 1.
c. The operator selects all hazardous cargo vessels in a port and decreases their reporting interval to 5 seconds by sending a Message 23 to all selected vessels.
d. The operator configures all base stations in the Sector AOR to pre-announce the fixed allocation schedules for each base station (FATDMA) by transmitting Message 20 as per a configurable schedule.

3.5.3 System Management

3.5.3.0-1 The system shall provide centralized performance management capabilities to include operational status reporting, performance monitoring and optimization, and reporting for critical system elements.

3.5.3.0-2 The system shall be able to provide centralized system administration with the ability to detect and troubleshoot system faults.

3.5.3.0-3 The system shall, upon NAIS operator request, generate user-defined status and performance reports including but are not limited to: service and subsystem availability reports; trouble ticket reports; and site health reports.

3.5.3.0-4 The system shall, from a centralized location, be capable of performing maintenance on system components to include software and firmware updates, diagnostics, and all other component-dependent maintenance.

3.5.3.0-5 The system shall notify its operators, locally and remotely, to physical threats such as fire and intrusion to NAIS infrastructure and assets.

3.5.3.0-6 The system shall provide centralized administration capabilities to include at a minimum: user administration, system receiver site management, NAIS data source management, NAIS data client management.

3.5.3.0-7 The system shall provide the capability to manage the access privileges of each user with respect to all NAIS functionality.

3.5.3.0-8 The system shall record all system configuration, maintenance, and administration actions taken by users of the system.

3.5.3.0-9 The system shall be able to log the following performance metrics:

a. System component response times
b. System component availability
c. System stability
d. Packet error rate

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3.6 Network Services and Enterprise Service Bus

3.6.1 Performance Standards

3.6.1.0-1 The system shall transfer AIS messages (encrypted and unencrypted) from the Physical Shore Station (PSS) to the appropriate Sector Command Center (SCC) within one second. This latency will be measured from reception of the AIS Message by the base station to output of NAIS data from the router located at the associated SCC.

3.6.1.0-2 All AIS messages (encrypted and unencrypted) delivered from the PSS to storage and enterprise services shall have latency from time of receipt at PSS to the time of receipt at storage and enterprise services, not to exceed five seconds.

3.6.2 Network Management

3.6.2.0-1 Access to NAIS and its network resources shall be managed through the USCG's network directory service.

3.6.2.0-2 The system shall alert system administrators of any attempts to gain unauthorized access to, or unauthorized use of, the system through network connections.

3.7 Data Storage

3.7.1 General Data Storage Requirements

3.7.1.0-1 The system shall store all NAIS data received, created, modified, or transmitted by the system for at least 3 years.

3.7.1.0-2 The system shall respond to data query requests within 10 seconds of receiving requests for NAIS data that is less than 30 days old.

3.7.1.0-3 The system shall respond to data query requests within 60 seconds of receiving requests for NAIS data that is more than 30 days old.

3.7.2 Data Management

3.7.2.0-1 AIS messages and metadata fields shall be parsed into tagged fields as described in the MDA COI Data Sharing Working Group XML schema for AIS.

3.7.2.0-2 The system shall store the most recent 3 year's of NAIS data collected by NAIS Increment 1.

3.7.2.0-3 The system shall identify and consolidate duplicate AIS messages, defined as a single AIS message sent from one vessel at one time but received simultaneously by multiple PSS.

3.7.2.0-4 The system shall record the receipt of, and all metadata associated with, all duplicate messages, and store this information along with the consolidated AIS data.

3.7.3 Data Integrity

3.7.3.0-1 The system shall store the user identity of the sender of AIS messages.

3.7.3.0-2 The system shall detect and report any loss of NAIS data integrity.

3.7.4 Archive Backup Restore

3.7.4.0-1 The system shall provide a redundant storage solution which ensures continuity of operations (COOP).

3.7.4.0-2 The system shall have the ability to archive and recover all NAIS data received, created, modified, or transmitted by the system.

3.7.4.0-3 The system shall automatically and periodically back up all NAIS data at a frequency configurable by system operators.

3.7.4.0-4 The system shall allow system operators to initiate data backup.

3.7.4.0-5 The system shall provide the capability to purge archived NAIS data after 3 years, or retain the NAIS data for a longer period if desired.

3.7.4.0-6 The system shall store AIS messages in both their raw format (as a single record) and as parsed data fields.

3.8 Enterprise Services

3.8.1 Data Retrieval Services

3.8.1.0-1 The system shall provide well defined interfaces to allow for the controlled export of NAIS data into other systems.

3.8.1.0-2 The system shall be capable of exporting NAIS data at a rate that reflects the maximum limits of the scalability requirements described in Table 3.2 (i.e., exporting all messages that are being received from 400 PSSs, each at 100% VDL loading).

3.8.1.0-3 The system shall allow the execution of user-defined data queries of the NAIS storage.

3.8.1.0-4 The system shall allow configurable query parameters based on any combination of the fields used to store NAIS data.

3.8.1.0-5 The system shall provide a common service for distribution of NAIS data to all authorized users using the Maritime Domain Awareness (MDA) Community of Interest (COI) Data Management Working Group (DMWG) data vocabulary, data model, and XML schema.

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3.8.2 Transmit Services

3.8.2.0-1 The system shall provide the capability to create and transmit all types of AIS Messages.

3.8.2.0-2 The system shall be able to create weather binary messages using meteorological and hydrological data from the National Weather Service (NWS); the NWS utilizes the following two interfaces: National Digital Forecast Database (NDFD) and Physical Oceanographic Real-Time System Uniform Flat File Format (PUFFF).

3.8.2.0-3 The system shall be able to receive and process a continuous external weather data feed (e.g., RSS) from the NWS in XML format.

3.8.2.0-4 The system shall be able to automatically and periodically broadcast weather binaries to all vessels in a sector, when weather data is available.

3.8.2.0-5 The system shall provide the capability to configure the type of weather information broadcast to each sector.

3.8.2.0-6 The system shall provide the capability to configure the periodicity of weather information broadcasts, on a per sector basis.

3.8.2.0-7 The system shall have the capability to automatically route AIS messages to appropriate PSSs for transmission.

3.8.2.0-8 The system shall be able to repeat AIS message transmission from a given base station for a user-defined duration to ensure that the threshold probability of reception is achieved

3.8.2.0-9 The system shall provide the capability to transmit AIS Messages to a single vessel identified by its Maritime Mobile Service Identity (MMSI).

3.8.2.0-10 The system shall provide the capability to transmit AIS messages to an arbitrary group of vessels (e.g., tankers, large passenger ships) identified by a list of MMSIs.

3.8.2.0-11 The system shall provide the capability to transmit AIS messages to all or selected vessels within a specified (either predefined or ad-hoc) geographic area

3.8.2.0-12 The system shall provide the capability to transmit AIS messages to specific types of vessels (e.g., tankers, large passenger ships).

3.8.2.0-13 The system shall provide the capability to transmit AIS messages to AIS equipped aircraft.

3.8.2.0-14 The system shall provide a method for creating and then sending predefined (“canned”) AIS messages.

3.8.2.0-15 The system shall provide a method for configuring thresholds and events to trigger the transmission of predefined messages.

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3.8.2.0-16 The system shall provide a method to configure the schedule for sending predefined messages (e.g., one transmission per event, or repeated for a designated number of transmissions or period of time).

3.8.2.0-17 The system shall utilize a routing scheme that maximizes the probability of receipt of a transmitted AIS message by its intended recipient, based on the recipient's last known position and other relevant data.

3.8.2.0-18 Transmitted AIS messages shall be forwarded to the Data Storage Component within the time constraints identified in Performance Standards within the Networking section of this document.

3.8.2.0-19 The system shall, at a minimum, be able to send AIS messages based on one or a combination of the following means:

a. Geographic Location – "Box": An operator, by means of the GIS component of the HSI, designates target vessels by creating a polygon containing the desired vessels
b. Geographic Location – "Bounds: An operator designates target vessels by designating one or more designated boundaries of latitude and/or longitude containing the vessels
c. Geographic Location – "AOR" (e.g., operator selects pre-defined polygon such as a Sector AOR or Captain of the Port **(**COTP) zone containing the desired vessels
d. Vessel Static Data: An operator selects any one or combination of data fields contained in Message 5 to use in filtering out or including target vessels
e. Vessel Position Reports: An operator selects any one or combination of data fields contained in Message 1, 2, and 3 to use in filtering out or including target vessels for sending message
f. Geographical Location – "Range": An operator designates a vessel as "protected", and a range around the protected vessel so that a messages are sent to any vessel entering the designated zone for the protected vessel

3.8.2.0-20 The system shall, at a minimum, provide functionality to support the following use cases:

a. The operator selects all passenger vessels (static) as target vessels to send a message 12, addressed safety related message, warning of rough weather (ad hoc)
b. The operator selects all but anchored vessels (position) as target vessels in the VTS control area (AOR) to send a message 14 (ad hoc) warning about movement of a Liquefied Natural Gas (LNG) tanker and associated security zones.
c. The operator creates a pre-defined message and thresholds (canned) which transmits a message 12 warning about speed restrictions to prevent whale injuries to all vessels greater than 100 ft traveling faster than 12kts within the marine mammal protection zone displayed on a chart of the area (box).
d. The operator establishes a 1,000 yards security zone (range) displayed around the icon for an LNG tanker shown on a chart as it approaches Boston Harbor and configures a warning message (canned) to be automatically sent to any vessel approaching closer than 1,000 yards.
e. The operator selects all vessels south of 26°S latitude (bounds) displayed on a chart of the area as target vessels to send a hurricane warning to (ad hoc).]

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f. USCGC ATTU wants to send an encrypted text message to a Sector Command Center. They enter the message into their "terminal", it is encrypted, and transmitted as a SBU Tactical Information Exchange and Display Systems (STEDS) message over AIS. The message is received at a base station and passed on to the Logical Shore Station, which determines that it is a STEDS message, and sends it to the decryption service. The decryption service decrypts the message and sends it back to the LSS for delivery to the sector.
g. A user at a Sector Command Center wants to send a Target of Interest (TOI) message to USCGC ATTU. The user creates a message for USCGC ATTU, marks it for encryption, and sends the message as usual, at which point it is handled by the LSS. The LSS forwards it to the encryption service, which encrypts it and passes it back to the LSS for further transfer to USCGC ATTU, using the original message MMSI as the recipient address.

3.8.3 Data Import Services

3.8.3.0-1 The system shall provide a standard interface to import AIS messages from other, external (non-NAIS) systems/sources (e.g. Saint Lawrence Seaway, and Army Corps of Engineers) to the Storage Component.

3.8.3.0-2 The system shall be capable of importing data from a minimum of five external data providers using 20 PSSs, each at 100% VDL loading.

3.8.3.0-3 The system shall provide the capability to manage the NAIS data that is entered into the NAIS storage from external data feeds. In some cases, the USCG may not want all data imported into the database (e.g., filtering functions such as the LSS provides may be appropriate).

3.8.3.0-4 The system shall provide an interface to import AIS messages from the following systems:

a. Saint Lawrence Seaway Corporation (SLSC)
b. NOAA
c. Offshore Platforms (Petrocom)
d. Coast Guard Vessel Traffic Service (VTS)
e. MAGNet
f. Army Corps of Engineers
g. Commercial AIS Providers

3.9 Human-System Interface (HSI)

3.9.1 General HSI Requirements

3.9.1.0-1 All HSI functionality shall be browser compatible.[11]

3.9.1.0-2 HSI functionality shall allow all system management responsibilities to be met with only the three system operators to be staffed at NAVCEN.

[11] This requirement does not imply a requirement for "web-based" applications. The application software can be implemented to run locally or at the EDC.

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3.9.1.0-3 Human system interface software and functionality shall be loosely coupled with the rest of the system such that: the functionality of the HSI is limited to providing user access to system functionality provided by other high-level system Components; none of the functionality provided by the other Components is contained within, or dependent on, the HSI; only open, standard interfaces are used between the HSI and the rest of the system; and no proprietary technology is used in the HSI.

3.9.1.0-4 The human system interface(s) to be used in the NAIS system shall support three user groups, as described below:

a. A User Interface for operational units (e.g., Sectors, Districts, etc.) to use in accessing the functionality of the LSS and Enterprise Services
b. A User Interface for the System Operations Center (SOC) to access all functionality of the system: LSS, PSS, ASM, Storage, and Enterprise Services
c. A Generic User interface that allows users to view NAIS data using the Data Retrieval Service and LSS functionality[12] via a Standard Workstation III (SWIII)

3.9.1.0-5 All HSI software shall be capable of running on a Standard Workstation III (SWIII).

3.9.1.0-6 The user interface shall uniquely identify messages that have been processed by any encryption or decryption services.

3.9.2 HSI Standards

3.9.2.0-1 The system shall comply with the following standards:

a. MIL-STD-1472-F (Human Engineering)
b. ASTM F 1166 (Standard Practice for Human Engineering Design for Marine Systems, Equipment and Facilities)
c. ASTM F 1337 (Standard Practice for Human Engineering Program Requirements for Ships and Marine Systems, Equipment, and Facilities)
d. IEC 62288 (Maritime navigation and radio communication equipment and systems – Presentation of navigation-related information on shipborne navigation displays)
e. 29 U.S.C. 794d, Rehabilitation Act, Section 508

3.9.2.0-2 NAIS interface modules shall maintain the same GUI standards and look-and-feel of the legacy applications[13] by using similar controls, menus, navigation, and terminology.

3.9.3 Geographic Information System (GIS) Functionality

3.9.3.0-1 The system shall be capable of using and displaying GIS layers provided by third parties

3.9.3.0-2 The system shall be capable of importing NMEA 0183 Waypoint Files (.wpl) from Coast Guard applications for use in creating and transmitting SAR patterns via AIS.

[12] Generic users will not have AIS message transmit capabilities
[13] These are the existing applications and user interfaces on the Standard Workstation III, which are a part of the Tech Library.

3.9.3.0-3 System functionality shall be accessible via a GIS visualization tool for system troubleshooting and monitoring purposes, and shall, at a minimum, support the functionality as described in the following use case:

a. A User's graphical display shows a map with icons representing the location and status of each NAIS PSS site. Changes in a PSS icon's appearance and an audible alarm indicate that that there is a system fault at the site. The user selects that site to view certain system parameters for the selected site. If necessary, the user chooses to display additional information and available remote administration tools to perform corrective action

3.9.3.0-4 System functionality shall be accessible via a graphical interface by which to display, sort, organize, and manipulate received and transmitted AIS messages from any source or origin, and shall, at a minimum, support the functionality as described in the following use cases:

a. A user wishes to review all AIS messages transmitted or received by the system for the past hour. The user opens a query window on his console, enters the parameters for and submits the query. The results are displayed on the console in views similar to that of office suite software, search, sort, display, read, and print functionality.
b. A user wants to see a display of any message (addressed or otherwise) sent between two vessels in the past two hours. The user opens a query window on her console, selects the two vessels in the C2 display (automatically entering identifiers for each of the vessels into the query), enters the other parameters, and submits the query. The results are displayed on the console in views similar to that of office suite software with search, sort, display, read and print functionality.

3.9.3.0-5 System functionality shall be accessible via a graphical interface with which to create and manipulate vessel tracks, input Search and Rescue (SAR) patterns from other systems, and other visual representations on the GIS display, and shall, at a minimum, support the functionality as described in the following use cases:

a. A user receives notification from a CG aircraft that a vessel is inbound for a port within the SCCs area of responsibility, but is still too far away for AIS reception by the system. The user wishes to transmit the track of the vessel to two CG assets patrolling the near the port using EAIS. Using the GIS display, the user creates the track provided, chooses CG assets to which to send the track, and sends the NAIS data to the system for transmission to the two CG assets. The system routes the message through the encryption service and then on to the appropriate transmitter(s) for transmission.
b. A user selects an AIS-equipped vessel on the GIS display and marks that vessel as a Target of Interest (TOI). The user then selects a CG asset (also on his GIS display) to which to send the TOI information using EAIS. The user then sends the TOI information to the system for transmission to the selected CG asset. The system routes the message through the encryption service and then on to the appropriate transmitter for transmission.

3.9.3.0-6 The system shall have functionality to generate and send AIS messages based on user-created graphical representations and information (e.g., security zones, virtual AtoN).

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4 Verification

Verification activities will be focused on determining what is required to prove that system design meets the NAIS requirements listed in this document. Validation activities will determine how the means of verification will be proven. These activities will also determine system testability, specialized equipment, facility and other resource requirements. It is important to determine early in the system design activity how the operational, functional, maintenance, and support features of the system will be tested, and to determine if special test equipment is needed. System requirements shall be verified during test and evaluation (T&E) to demonstrate the technical feasibility of system. Table 4.1 provides the minimum level of verification required for each requirement.

4.1 Methods of Verification

Methods used to verify system requirements include inspection, Analysis, Demonstration, and Formal Testing. The methods of verification and the level of assembly for those verifications shall be documented in the Developmental Test and Evaluation (DT&E) Plan and the Operational Test and Evaluation (OT&E) Plan.

4.1.1 Inspection

Physical inspection of items shall be performed on equipment, gear, or other physical items. Inspection shall be performed on designs, documents, and certifications to ensure compliance with the requirements. Inspection includes examinations, reviews, and in some cases, will constitute a part of a formal test.

4.1.2 Analysis

Analysis shall be used when testing is not required or is simply not feasible. Analysis includes modeling, simulation, and may constitute or be an element of a formal test.

4.1.3 Demonstration

Demonstration is similar to formal testing, but more informal in nature. Demonstrations shall be the precursors to formal tests allowing for more expediency in the design, prototyping and production of the system. Demonstration shall be a part of a formal test.

4.1.4 Formal Testing

Formal tests shall encompass experimental and systematic checking of the NAIS system performance during its developmental stage. They shall be performed by applying test experiments to the NAIS system, by making observations during the execution of these tests, and by subsequently assigning a verdict about the correct functioning of the system.

4.2 Verification Matrix

Table 4.1: Requirements Verification Matrix

Requirement	Method	Notes
3.1 Design Constraints		
3.1.1	Analysis	
3.1.2	Analysis	
3.1.3	Analysis	
3.1.4	Analysis	
3.1.5	Analysis	
3.1.6	Analysis	
3.1.7	Analysis	
3.2 General System Requirement		
3.2.0.0-1	Analysis	
3.2.0.0-2	Analysis	
3.2.1		
3.2.1.0-1	Analysis	
3.2.1.0-2	Inspection	
3.2.1.0-3	Analysis	
3.2.1.0-4	Analysis	
3.2.1.0-5	Analysis	
3.2.1.0-6	Inspection	
3.2.1.0-7	Analysis	
3.2.2		
3.2.2.0-1	Inspection	
3.2.2.0-2	Analysis	
3.2.2.0-3	Inspection	
3.2.2.0-4	Inspection	
3.2.2.0-5	Inspection	
3.2.2.0-6	Analysis	
3.2.2.0-7	Inspection	
3.2.2.0-8	Inspection	
3.2.2.0-9	Inspection	
3.2.2.0-10	Inspection	
3.2.2.0-11	Inspection	
3.2.2.0-12	Inspection	
3.2.2.0-13	Inspection	
3.2.2.0-14	Inspection	
3.2.2.0-15	Inspection	
3.2.2.0-16	Inspection	
3.2.2.0-17	Inspection	
3.2.2.0-18	Demonstration	

Requirement	Method	Notes
3.2.2.0-19	Demonstration	
3.2.2.0-20	Demonstration	
3.2.2.0-21	Inspection	
3.2.2.0-22	Inspection	
3.2.2.0-23	Inspection	
3.2.2.0-24	Inspection	
3.2.2.0-25	Formal Test	
3.2.3		
3.2.3.0-1	Analysis	
3.2.3.0-2	Demonstration	
3.2.3.0-3	Analysis	
3.2.4		
3.2.4.0-1	Formal Test	
3.2.4.0-2	Inspection	
3.2.4.0-3	Inspection	
3.2.4.0-4	Inspection	
3.2.5		
3.2.5.0-1	Demonstration	
3.2.5.0-2	Demonstration	
3.2.5.0-3	Demonstration	
3.2.5.0-4	Formal Test	
3.2.5.0-5	Formal Test	
3.2.5.0-6	Inspection	
3.2.5.0-7	Formal Test	
3.2.5.0-8	Demonstration	
3.2.6		
3.2.6.0-1	Analysis	
3.2.6.0-2	Analysis	
3.2.6.0-3	Analysis	
3.2.6.0-4	Demonstration	
3.2.7		
3.2.7.0-1	Analysis	
3.2.7.0-2	Analysis	
3.2.7.0-3	Inspection	
3.2.7.0-4	Inspection	
3.2.7.0-5	Analysis	
3.3 Physical Shore Station		
3.3.1		
3.3.1.0-1	Demonstration	
3.3.2		
3.3.2.0-1	Inspection	
3.3.2.0-2	Demonstration	

Requirement	Method	Notes
3.3.2.0-3	Demonstration	
3.3.2.0-4	Demonstration	
3.3.2.0-5	Demonstration	
3.3.2.0-6	Inspection	The Contractor shall provide a type approval certificate with test data (data must be certified by a recognized independent test laboratory, not self-certified) that states that the AIS base station complies with the latest versions of IEC 62320-1 and IEC 61162-1. This type approval certification shall be recognized and accepted by the appropriate USCG and FCC entities.
3.3.2.0-7	Formal Test	
3.3.2.0-8	Formal Test	
3.3.2.0-9	Formal Test	
3.3.3		
3.3.3.0-1	Analysis / Formal Test	Analysis for all required coverage areas, formal test for IOC coverage
3.3.3.0-2	Analysis / Formal Test	Analysis for all required coverage areas, formal test for IOC coverage
3.3.3.0-3	Analysis / Formal Test	Analysis for all required coverage areas, formal test for IOC coverage
3.3.3.0-4	Analysis / Formal Test	Analysis for all required coverage areas, formal test for IOC coverage
3.3.4		
3.3.4.0-1	N/A	
3.3.4.0-2	Analysis / Demonstration	Analysis for all required coverage areas, demonstration for IOC coverage
3.3.4.0-3	Inspection	
3.3.4.0-4	Analysis / Demonstration	Analysis for all required coverage areas, demonstration for IOC coverage
3.3.4.0-5	Analysis / Demonstration	Analysis for all required coverage areas, demonstration for IOC coverage
3.3.4.0-6	Analysis	
3.4 Logical Shore Station		
3.4.1		
3.4.1.0-1	Inspection	
3.4.1.0-2	Demonstration	
3.4.1.0-3	Formal Test	
3.4.1.0-4	Formal Test	
3.4.1.0-5	Formal Test	
3.4.1.0-6	Formal Test	

Requirement	Method	Notes
3.4.1.0-7	Formal Test	
3.4.1.0-8	Formal Test	
3.4.1.0-9	Formal Test	
3.4.1.0-10	Demonstration	
3.5 AIS Service Management		
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3.5.1.0-1	Demonstration	
3.5.1.0-2	Demonstration	
3.5.1.0-3	Demonstration	
3.5.1.0-4	Demonstration	
3.5.2		
3.5.2.1		
3.5.2.1.0-1	Formal Test	
3.5.2.1.0-2	Formal Test	
3.5.2.1.0-3	Formal Test	
3.5.2.1.0-4	Formal Test	
3.5.2.1.0-5	Formal Test	
3.5.2.2		
3.5.2.2.0-1	Formal Test	
3.5.2.2.0-2	Formal Test	
3.5.3		
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3.5.3.0-2	Formal Test	
3.5.3.0-3	Demonstration	
3.5.3.0-4	Formal Test	
3.5.3.0-5	Formal Test	
3.5.3.0-6	Demonstration	
3.5.3.0-7	Demonstration	
3.5.3.0-8	Formal Test	
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3.6 Networking Services and Enterprise Service Bus		
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3.6.1.0-1	Formal Test	
3.6.1.0-2	Formal Test	
3.6.2		
3.6.2.0-1	Demonstration	
3.6.2.0-2	Formal Test	
3.7 Data Storage		
3.7.1		
3.7.1.0-1	Inspection	
3.7.1.0-2	Demonstration	
3.7.1.0-3	Demonstration	

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Requirement	Method	Notes
3.7.2		
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3.7.2.0-3	Demonstration	
3.7.2.0-4	Demonstration	
3.7.3		
3.7.3.0-1	Formal Test	
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3.7.4.0-2	Formal Test	
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3.7.4.0-4	Formal Test	
3.7.4.0-5	Formal Test	
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3.8.1.0-1	Inspection	
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3.8.2.0-8	Demonstration	
3.8.2.0-9	Analysis	
3.8.2.0-10	Demonstration	
3.8.2.0-11	Demonstration	
3.8.2.0-12	Demonstration	
3.8.2.0-13	Demonstration	
3.8.2.0-14	Demonstration	
3.8.2.0-15	Demonstration	
3.8.2.0-16	Analysis	
3.8.2.0-17	Formal Test	
3.8.2.0-18	Formal Test	
3.8.2.0-19	Demonstration	

Requirement	Method	Notes
3.8.2.0-20	Demonstration	
3.8.3		
3.8.3.0-1	Demonstration	
3.8.3.0-2	Analysis	
3.8.3.0-3	Demonstration	
3.8.3.0-4	Formal Test	
3.9 Human System Interface		
3.9.1		
3.9.1.0-1	Formal Test	
3.9.1.0-2	Formal Test	
3.9.1.0-3	Formal Test	
3.9.1.0-4	Formal Test	
3.9.1.0-5	Demonstration	The user interfaces shall be demonstrated and tested at the locations in which they will be used (e.g., SCC or SOC).
3.9.1.0-6	Demonstration	
3.9.2		
3.9.2.0-1	Inspection	
3.9.2.0-2	Demonstration	
3.9.3		
3.9.3.0-1	Inspection	
3.9.3.0-2	Inspection	
3.9.3.0-3	Inspection	
3.9.3.0-4	Demonstration	
3.9.3.0-5	Demonstration	
3.9.3.0-6	Demonstration	

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5 Notes

5.1 Glossary

AIS Messages: Messages that are passed over the VDL.

AIS Message Transmit Services: Services designed to validate and transmit outbound AIS messages.

Analysis: Used when testing is not required or is simply not feasible. Analysis includes modeling, simulation, and possibly will constitute or be an element of a formal test.

Application Architecture Components: Also, referred to as "Components", used to describe system hardware and software at the system level that provides unique capabilities, functionality, and/or services through its unique interfaces. These refer to the eight top-level Components listed in section 3.2.1 Application Architecture.

Archive Data Store: Is the final repository of NAIS data. Its goal is to offer efficient storage for NAIS data that are no longer needed for day-to-day operations, but which might be required for auditing or research purposes. As archived data ages, it is purged from the storage Component.

Baseline: The line defining the shoreward extent of the territorial sea of the United States drawn according to the principles, as recognized by the United States, of the Convention on the Territorial Sea and the Contiguous Zone, 15 U.S.T. 1606, and the 1982 United Nations Convention on the Law of the Sea (UNCLOS), 21 I.L.M. 1261. Normally, the U.S. baseline is the mean low water line along the coast of the United States.

Captain of the Port (COTP): The Coast Guard officer designated by the Commandant to control a Captain of the Port Zone as described in 33 CFR Part 3. The COTP's duties involve directing & regulating the operation, movement, and anchoring of vessels within a designated area of responsibility, including management of foreign and domestic vessel traffic, regulated navigation areas and safety/security zones, and to enforce ports and waterways safety regulations (including AIS carriage requirements).

Class A Mobile AIS Stations: are stations that comply with IEC 61993-2 , (ITU-R) M.1371.

Class B Mobile AIS Stations: are stations that comply with IEC 62287-1, (ITU-R) M.1371.

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Common Operating Picture (COP): The Coast Guard COP is a tool for achieving situational awareness of what is transpiring in the Maritime Domain. The COP is a display of relevant information shared by more than one command. It provides a shared display of friendly, enemy/suspect, and neutral tracks on a chart, with geographically referenced overlays and data enhancements.

Data Client: A consumer (receiver) of AIS and other NAIS data.

Data Source: A provider of AIS (and other) data to the NAIS.

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Data Storage: The repository of NAIS data. It consists of three conceptually different data stores: Real-Time Data Store, Near Real-Time Data Store, and Archive Data Store.

Data Subscription Services: The main mechanisms by which the real-time AIS messages is delivered to external users.

Demonstration: Similar to formal testing, but more informal in nature. Demonstrations shall be the precursors to formal tests allowing for more expediency in the design, prototyping and production of the system. Demonstration shall be a part of a formal test.

DHS Enterprise Architecture: Defines the missions of the Department, the information and technologies needed by the Department to perform these missions, and the transformational processes for implementing new technologies in response to changing mission needs. (also called *HLS Enterprise Architecture*)

Enterprise Data Center (EDC): Facilities designed to host and meet NAIS data storage, management, retrieval, and disaster recovery requirements.

Enterprise Service Bus (ESB): Facilitates communication between internal NAIS services and external service users and data providers over a standardized platform. Will provide multiple adapters enabling existing, legacy USCG applications to consume NAIS services and provide data to NAIS.

External Interface: An external interface of the system is defined as any interface where at least one item of equipment or services involved in the interface is not under the control of the vendor.

Formal Testing: Shall encompass experimental and systematic checking of the NAIS system performance during its developmental stage. They shall be performed by applying test experiments to the NAIS system, by making observations during the execution of these tests, and by subsequently assigning a verdict about the correct functioning of the system.

Human System Interface (HSI) Services: A collection of services and applications that allow external and internal users to interact with the NAIS.

Increment 1: NAIS Increment 1 receives, stores, and distributes AIS messages from AIS equipped vessels in selected coastal areas and inland waterways. AIS messages are routed to a centralized enterprise data processing center (EDC) located at the USCG Operations Systems Center (OSC) in Kearneysville, West Virginia. Additional sources, such as the Saint Lawrence Seaway Corporation (SLSC), also supply AIS message via internet links to the EDC. Stored messages are periodically backed-up, and archived in offsite storage.

Upon receiving AIS message at the EDC, each message is parsed, checked for duplication, reformatted (as necessary), stored, and routed to the Maritime Common Operational Picture (COP), Maritime Awareness Global Network (MAGNet), and the Marine Information Safety and Law Enforcement System (MISLE).

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NAIS users acquire access to AIS message via the COP, MAGNet and MISLE. Primary users are located in USCG Sector Command Centers (SCC) responsible for performing vessel identification and tracking, managing vessel traffic, ensuring maritime safety and security, and conducting search and rescue (SAR) operations. Additionally, other, non-USCG users may also utilize NAIS data extracted through the COP and MAGNet to perform similar functions. The Maritime COP, MAGNet, and MISLE fuse, merge and correlate NAIS data with other data sources to enhance the value and usefulness of the NAIS data.

A System Operations Center (SOC), located at the USCG Navigation Center (NAVCEN) in Alexandria, VA, provides system administration and end-user support, including managing system access, help desk support, and operator training (on SOC functions). Department of Homeland Security (DHS) / USCG EDC resources provide database administration and maintenance, backup and archive management, as well as support for all incoming and outgoing NAIS data interfaces. Similarly, the USCG Network Operations Center (NOC), currently located at the Telecommunications and Information Systems Command (TISCOM) in Alexandria, Virginia, provides Coast Guard Data Network + (CGDN+) network administration and maintenance, including all preventative and corrective maintenance.

Increment 2: The second phase of the NAIS program is the focus of this Performance Specification. Increment 2 (I-2) will enhance or replace the functional and operational capabilities of Increment 1 by:

a. extending the NAIS receive capability, enabling NAIS to receive AIS messages to 50 nautical miles (nm) from the U.S. baseline, bridging the gaps and reducing weaknesses in Increment 1 coverage;
b. providing the capability to transmit AIS messages out to 24 nm from the U.S. baseline;
c. exploiting the full functional capabilities of AIS—including transmitting messages from shore stations, developing back-end data processing for validation and verification of AIS messages, and online queries to support the analysis of historical data;
d. managing the Very High Frequency (VHF) Data Link (VDL) in order to: monitor VDL traffic, and enable authorized SOC operators to actively manage VHF channels used for AIS by each transceiver; and
e. providing a service-oriented mechanism for disseminating NAIS data to all authorized users and external systems.

Of the three NAIS increments, Increment 2 is expected to have the greatest impact on, and deliver the greatest benefits to, USCG command centers. The increase in coverage for receiving AIS messages will provide earlier detection, identification, and tracking of vessels transiting U.S. waters, thereby greatly enhancing Maritime Domain Awareness for the USCG and DHS. Transmit functions are expected to both evolve and expand throughout the system life cycle as operational requirements for these functions are refined by the USCG. Transmit functions may be used by SCC and District watchstanders to manage vessel traffic in restricted waterways, create virtual Aids-to-Navigation (AtoN) on vessel navigation systems, send weather alerts, facilitate “Blue Force” communication, coordinate Search and Rescue (SAR) operations, and other operations yet to be identified.

SOC administrators will manage the increased number of new remote sites and system resources located at SCCs and the EDC, and for VDL management operations. SOC operators may also transmit binary

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messages to mobile (shipboard) AIS stations to alternate channels to receive and transmit AIS messages within a specific coverage area (for guidance on binary messages, see IMO Safety of Navigations Circular 236). Generic users will make use of NAIS data similar to Increment 1.

Increment 3: Increment 3 will extend the NAIS capability to receive AIS messages beyond 50 nm and up to 2000 nm from the U.S. baseline. This long range tracking capability will greatly enhance the USCG's ability to identify and monitor vessels approaching U.S. waters, and improve the Federal government's ability to protect the nation's coastlines. Increment 3 will not enhance end-user functionality as these capabilities will be provided with Increments 1 and 2.

Inspection: Physical inspection of items performed on equipment, gear, or other physical items. Inspection shall be performed on designs, documents, and certifications to ensure compliance with the requirements. Inspection includes examinations, reviews, and in some cases will constitute a part of a formal test.

Interface: An interconnection between subsystems having the dimensions of form, fit, and function, which are determined by the requirements of the interconnected subsystems.

Logical Shore Station (LSS): A software process that transforms the AIS Message flow associated with one or more PSS into a different AIS-related message flow.

Management Services: Allow NAIS operators to maintain the system. They offer management tools for the RF components located within the PSS (e.g., VDL monitoring, channel management, operational status), and for the NAIS itself (e.g., database administration, performance monitoring).

MDA COI DMWG: The Maritime Domain Awareness Critical Operational Issues Data Management Working Group provides the data vocabulary and data model used for distribution of data to all authorized users.

Monolithic shelter: Is defined as pure monolithic or a two piece structure where the roof and walls are monolithic.

NAIS Data: All data created by NAIS, including: AIS Messages, AIS Message Metadata, Health and Monitoring data, in addition to imported data.

NAIS Service: A grouping of business logic and rules specifically needed to implement an operational requirement. A service exposes an interface that can be discovered and called by other services and components. Services are loosely coupled to other services, components, and applications so that they can be made available to anyone.

Network Operations Center (NOC): Provides network administration and maintenance, including management of user access and monitoring of network device performance.

Operable: Refers to the system state in which all services and capabilities are operating without any degradation from intended system design.

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Operators: Watchstanders, watch supervisors, and system administrators, trainers and trainees who operate and monitor the system from within the SOC and OSC.

Physical Shore Station (PSS): A physically fixed entity composed of at least: one AIS base station or one AIS repeater station, a power supply, VHF-/RF-domain equipment (at a minimum simply a cable and VHF antenna), a means to transport data to and from the AIS base station (if the PSS houses an AIS base station), and a means to protect the above components against environmental influence and damage. The PSS will generally have a Universal Time Coordinate (UTC) source of its own. The PSS may also include additional, optional AIS-related functions.

Providers: External AIS user systems, including Maritime COP, MAGNet, MISLE, and others.

Reliability: The probability that a system or component will perform its capabilities under given conditions for a specified period of time.

Sector Command Center: The USCG is in the process of reorganizing its operational command and control units into Sector Command Centers (SCC). Each SCC monitors area of responsibility (AOR) and administers the missions of the Coast Guard.

Sensitive Information: Any information of which the loss, misuse, or unauthorized access to or modification of could adversely affect the national interest or the conduct of Federal programs, or the privacy to which individuals are entitled under Section 552a of Title 5, United States Code (the Privacy Act), but which has not been specifically authorized under criteria established by an Executive Order or an Act of Congress to be kept secret in the interest of national defense or foreign policy.

Service Oriented Architectures (SOA): provide patterns for design, development, deployment and management of a loosely coupled business application infrastructure. The NAIS system shall be developed using a SOA approach that is in line with the Department's Enterprise Architecture.

Storage: See Data Storage.

Survivable: Refers to the ability of the system to preserve all data and other information through any event that renders the system inoperable; the system may cease to operate when parameters exceed the *operable* thresholds but not the survivable thresholds, however, when conditions return to operable thresholds, the system will return to normal operations with minimal human intervention.

System Operations Center (SOC): Provides system administration and maintenance.

Tracking: Measurement of the position coordinates of a target to provide data to determine the target path versus time.

U.S. Baseline: See *Baseline*

Vessel: Every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water. (In this specification the term "vessel" is used to denote mandatory participating vessels and selected vessels.)

Watchstander: A military member or civilian employee of the Coast Guard, or an employee or representative of the marine community who monitors vessel movements, updates data within the system based on inputs from sensors and voice communications, and who disseminates information to users.

eXtensible Markup Language (XML): is a flexible way to create common information formats and share both the format and the data on the World Wide Web, intranets, and elsewhere.

5.2 Abbreviations and Acronyms

AIS	Automatic Identification System
ANSI	American National Standards Institute
ANSI/TIA	American National Standards Institute/Telecommunications Industry Association
AOR	Area of Responsibility
A_O	Operational Availability
AtoN	Aids to Navigation
C&A	Certification and Accreditation
C2	Command and Control
CBP	Customs and Border Protection Agency
CGDN+	Coast Guard Data Network +
COI	Critical Operational Issues
COMDTINST	Commandant Instruction
CONOPS	Concept of Operations
COP	Common Operational Picture
COTP	Captain of the Port
DHS	Department of Homeland Security
DMWG	Data Management Working Group
DoD	Department of Defense
DSC	Digital Select Calling
DT&E	Developmental Test and Evaluation
EDC	Enterprise Data Processing Center
ESB	Enterprise Service Bus
ESRI	Environmental Systems Research Institute, Inc.
FATDMA	Fixed Access Time Division Multiple Access
FCC	Federal Communications Commission
FIPS	Federal Information Processing Standard
FISMA	Federal Information Security Management Act of 2002
FOC	Full Operational Capability
FY	Fiscal Year
GIG	Global Information Grid
GIS	Geographic Information System
GPS	Global Positioning System

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GUI	Graphical User Interface
HSI	Human System Interface
IA	Information Assurance
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IEC	International Electrotechnical Commission
IETF	Internet Engineering Task Force
IMO	International Maritime Organization
IOC	Initial Operational Capability
IP	Internet Protocol
IPv6	Internet Protocol Version 6
IRVMC	Inland Rivers Vessel Movement Center
ITPI	Information Technology Product Inventory
ITU-R	International Telecommunications Union Sector for Radio Communications
JTA	Joint Technical Architecture
LAN	Local Area Network
LORAN	Long-Range Aid to Navigation
LSS	Logical Shore Stations
MAGNet	Maritime Awareness Global Network
MDA	Maritime Domain Awareness
MISLE	Marine Information for Safety and Law Enforcement
MMSI	Maritime Mobile Service Identity
MSC	Maritime Safety Committee
NAIS	Nationwide Automatic Identification System
NAVCEN	Navigation System Center
NDGPS	Nationwide Differential Global Positioning System
NEC	National Electric Code
NFPA	National Fire Protection Association
NIS	Navigation Information Service
NIST	National Institute of Standards and Technology
NIST SP	National Institute of Standards and Technology Special Publication
nm	Nautical Miles
NOC	Network Operations Center
NTIA	National Telecommunications and Information Administration
OET	Office of Engineering and Technology
OneNet	DHS Enterprise Network
ORD	Operational Requirements Document
OSC	Operations Systems Center
OSHA	Occupational Safety and Health Administration
OT&E	Operational Test and Evaluation
PKI	Public Key Infrastructure
PSS	Physical Shore Stations
RF	Radio Frequency
SAML	Security Assertion Markup Language

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SAR	Search and Rescue
SBU	Sensitive But Unclassified
SCC	Sector Command Centers
SLSC	Saint Lawrence Seaway Corporation
SOA	Service Oriented Architectures
SOAP	Simple Object Access Protocol
SOC	System Operations Center
SOP	Standard Operating Procedures
SOTDMA	Self-Organized Time Division Multiple Access
STEDS	SBU Tactical Information Exchange and Display Systems
SWIII	Standard Workstation III
USCG	US Coast Guard
T&E	Test and Evaluation
TCP/IP	Transmission Control Protocol/Internet Protocol
TIA	Telecommunications Industry Association
TIA/EIA	Telecommunications Industry Association/Electronics Industry Alliance
TISCOM	Telecommunication and Information Systems Command
TRM	Technical Reference Model
UI	User Interface
UNCLOS	United Nations Convention on the Law of the Sea
UTC	Universal Time Coordinate
VDL	VHF Data Link
VHF	Very High Frequency
VTS	Vessel Traffic Service
WAN	Wide Area Network
WS-Security	Web Services-Security
XML	eXtensible Markup Language

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