

STATEMENT OF WORK

Advanced Time Division Multiple Access Interface Processor Engineering and Manufacturing Development and Production

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Document Change History

Rev	Date	Description of Change
1	12 April 2012	Section 2.6: Added ISO 9001 to “Other Documents” list
1	12 April 2012	Section 3.2.2: Modified language to address delivery requirements for TermSim
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1	12 April 2012	Section 3.8.1.1: Modified language to clarify OTA testing locations
1	12 April 2012	Section 4: Corrected language WRT Section H references for modifying GFP
1	12 April 2012	Added Section 6: Warranty
1	12 April 2012	Appendix A: Added FOT to Acronym List

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1 SCOPE

This Statement of Work (SOW) defines the effort required for the Design, Development, Fabrication, Test, Production and Support of the Advanced Time Division Multiple Access (TDMA) Interface Processor (ATIP) procurement.

The ATIP system is an updated version of the TDMA Interface Processor (Legacy TIP) and will provide similar Layer-2 bridging over Medium Data Rate (MDR) while adding access to higher data rates available with the Advanced Extremely High Frequency (EHF) (AEHF) Extended Data Rate (XDR) or Enhanced Polar XDR satellite communication (SATCOM) capability. In addition to supporting higher XDR data rates, ATIP will provide a number of enhancements including an improved Quality of Service (QoS) capability, smaller form factor, and easier integration into operational environments, further supporting network user access to protected Military SATCOM (MILSATCOM) connectivity.

Additionally, at its discretion, the Government may exercise an option for the Contractor to design and fabricate a Terminal Simulator (TermSim) to support operational testing of the ATIP system and its interoperability with the Legacy TIP units.

The end product of this effort shall be a fully tested and operational ATIP system that meets the requirements of the ATIP Specification, with a design and Technical Data Package (TDP) suitable and qualified for production and operational use. The specific objectives of this effort are to:

- If the Government exercises the option, design and fabricate a TermSim according to the ATIP TermSim Specification.
- Demonstrate system performance that meets or exceeds the values established in the Specification. The Contractor shall use the ATIP Specification for the performance values necessary to accomplish this effort.
- Demonstrate a final system configuration that is backward-compatible with the Legacy TIP.
- Produce a complete and accurate TDP, including elements such as system design, Integrated Logistics Support (ILS), technical manuals, and training curriculum.
- Manufacture, deliver and support ATIP products over the life of this contract.

The ATIP will be installed on ship, shore, and submarine platforms to support a Layer-2 Ethernet bridging capability among geographically-dispersed users connected via Milstar MDR, AEHF MDR/XDR, or Enhanced Polar XDR links. ATIP will replace Legacy TIP equipment as an ancillary system to the Program Manager Warfare/Aviation (PMW/A) 170 Navy Multiband Terminal (NMT) system, to support a netted, bandwidth-efficient Internet Protocol (IP) communications capability over protected EHF/AEHF SATCOM. ATIP will provide backward compatibility with the Legacy TIP to support fleet transition over time.

1.1 PROGRAM HISTORY

The Legacy TIP was developed between 1997 and 2002 to support IP connectivity among Navy ship and shore sites over protected Extremely High Frequency (EHF) MDR SATCOM. The Legacy TIP solution provides a transparent Ethernet bridging capability among participants, requiring no changes to the attached network devices. Legacy TIP has been installed on every ship and submarine platform having EHF MDR capability as well as at a number of shore gateway facilities, including Naval Computer and Telecommunications Area Master Station (NCTAMS) sites, Submarine Broadcast Command Authority

(BCA) sites, and Department of Defense (DoD) Teleport sites. Legacy TIP is widely used to support surface and submarine fleet operations. However, the Legacy TIP system is no longer in production and is experiencing spare parts obsolescence issues that preclude sustainability. The ATIP capability is necessary to meet requirements to support robust connectivity during fleet operations.

2 APPLICABLE DOCUMENTS

The Contractor shall comply with the following specifications, standards, handbooks, and other reference documents as defined herein. If a conflict exists between the stated and referenced requirements the following order of precedence shall be used:

- a. Contract (to be completed at contract award);
- b. Advanced TDMA Interface Processor (ATIP) Requirements Specification, Version 2.0 dated 9 February 2012;
- c. Advanced TDMA Interface Processor Terminal Simulator (ATIP TermSim) Requirements Specification, Version 1.0, 21 February 2012.

2.1 DOCUMENT VERSIONS/ISSUES

Unless otherwise specified herein, the current version of the following documents listed in the Acquisition Streamlining and Standardization Information System (ASSIST) in effect on the date of the Request for Proposal (RFP) form a part of this SOW to the extent specified herein.

2.2 SPECIFICATIONS

Title:	Description:
Advanced TDMA Interface Processor (ATIP) Method of Verification (MoV)	ATIP Method of Verification
Advanced TDMA Interface Processor (ATIP) Requirements Specification	System Specification for the ATIP
Advanced TDMA Interface Processor (ATIP) Terminal Simulator (ATIP TermSim) Requirements Specification	System Specification for the ATIP TermSim
Technical Manual Contract Requirements (TMCR)-ATIP	TMCR-ATIP

2.3 STANDARDS

Document ID	Title
FED-STD-313D(1)	Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities
MIL-D-23140D	Drawings, Installation Control, For Electronic Equipment
MIL-P-15024/5	Plate, Identification
MIL-PRF-29612B	Training Data Products
MIL-STD-196E	Joint Electronics Type Designation System
MIL-STD-882D	System Safety
MIL-STD-1472F(1)	Human Engineering
MIL-STD-31000	Technical Data Packages
MIL-STD-46855A	Human Engineering Requirements for Military Systems, Equipment, and Facilities

2.4 DIRECTIVES / INSTRUCTIONS

Document ID	Title
DoD Directive 8500.1	Information Assurance
DoD Instruction 8500.2	Information Assurance Implementation

2.5 HANDBOOKS

Document ID	Title
MIL-HDBK-61A	Configuration Management Guidance
MIL-HDBK-217 F Notice 1	Reliability Prediction of Electronic Equipment, Notice 1, 10 July 1992
MIL-HDBK-217 F Notice 2	Reliability Prediction of Electronic Equipment, Notice 2, 28 February 1995
MIL-HDBK-454B	General Guidelines for Electronic Equipment
MIL-HDBK-470A	Designing and Developing Maintainable Products and Systems, Volume 1
MIL-HDBK-472 Notice 1	Maintainability Prediction
MIL-HDBK-29612/1A Notice 2	Guidance for Acquisition of Training Data Products and Services (Part 1 of 5 Parts)
MIL-HDBK-29612/2A Notice 2	Instructional Systems Development/Systems Approach to Training and Education (Part 2 of 5 Parts)
MIL-HDBK-29612/3A Notice 2	Development of Interactive Multimedia Instruction (IMI) (Part 3 of 5 Parts)
MIL-HDBK-29612/4A Notice 2	Glossary for Training (Part 4 of 5 Parts)

2.6 OTHER DOCUMENTATION

Title:	Description:
ANSI/EIA-649-B	Configuration Management Standard
ASTM F1166-07	American Society for Testing and Materials (ASTM) F1166-07 “Standard Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities.” (http://www.astm.org)
DISA Access Control STIG	DISA Access Control STIG (http://iase.disa.mil/stigs/index.html)
DISA Network Management STIG	DISA Network Management – Network Operations Center Security Guidance At-a-Glance (http://iase.disa.mil/stigs/index.html)
DISA Web Server STIG	DISA Web Server STIG (http://iase.disa.mil/stigs/index.html)
EE130-B7-OMP-080/176-5	Operations and Maintenance Manual, with Parts List, for the C-12509D/USC-38 “Medium Data Rate (MDR) Time Division Multiple Access Interface Processor (TIP)”
IEEE/EIA 12207.2-2008	Standard for Information Technology – Systems and Software Engineering –software Life Cycle Processes
ISO 9001	Quality Management Systems - Requirements
MOSA	Modular Open Systems Approach to Acquisition (http://www.acq.osd.mil/osjtf/mosapart.html)
Risk Management Guide for DoD Acquisition	Risk Management Guide for DoD Acquisition (https://acc.dau.mil/CommunityBrowser.aspx?id=108201)

2.7 DOCUMENT SOURCES

Most unclassified Defense specifications and standards may be downloaded from the following ASSIST and Navy websites:

- ASSIST (<http://assist.daps.dla.mil/>)
- Quick Search (<http://assist.daps.dla.mil/quicksearch/>)
- ASSIST (<http://assistdocs.com>)
- Submarine Material Control List Website (<https://smcl.dt.navy.mil>)

Documents not available from ASSIST may be ordered from the DoD Single Stock Point (DoDSSP) by:

- Using the ASSIST Shopping Wizard (<http://assist.daps.dla.mil/wizard>);
- Phoning the DoDSSP Customer Service Desk: (215) 697-2197, Mon-Fri, 0730-1600 EST; or
- Ordering from DoDSSP, Building 4, Section D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Telephone (215) 697-2667/2179, Facsimile (215) 697-1462.

Most industrial standards may be downloaded from the following website:

- TECHSTREET (<http://www.techstreet.com/>)

The contract and Specification may be obtained from Program Executive Office (PEO), Command, Control, Communications, Computers and Intelligence (C4I), PMW/A 170, Communications Program Office, 4301 Pacific Highway, San Diego, CA 92110, (619) 524-5930.

3 REQUIREMENTS

This section identifies the efforts that shall be accomplished by the Contractor during the design, development, fabrication, and testing of the ATIP system. The Contractor shall perform the efforts set forth in this SOW and shall comply with all other provisions as called for in the Contract Data Requirements List (CDRL) (DD Form 1423), invoked specifications, and other referenced documents.

The ATIP shall meet the requirements of the ATIP Specification and this SOW. The Contractor shall conduct testing (pursuant to section 3.8 and 3.9.3) to ensure that a fully compliant product is delivered to the Government for evaluation and acceptance. The Contractor shall verify the ATIP meets requirements using verification methods as defined in the ATIP Method of Verification (MoV).

The ATIP Specification establishes the functional requirements and performance baseline for the system. For future changes that may modify this baseline, the Government will assess the impact of any modifications and consider their potential inclusion in the scope of this effort.

3.1 PROGRAM MANAGEMENT

As a general comprehensive requirement of the contract, the Contractor shall provide program management efforts as described below during the performance of this contract commencing the date of contract award. As a result, the Government will not be required to issue a Technical Direction letter or otherwise direct the Contractor to provide such program management efforts after contract award.

The Contractor shall develop a management plan that describes the Contractor's organization, assignment of functions, duties, responsibilities, management procedures and policies, and reporting requirements for the conduct of contractually imposed tasks. Clear lines of authority and responsibility between all organizational elements for the Contractor are to be established and defined.

The Contractor shall establish a formal organization responsible for accomplishing the efforts outlined in this SOW. The Contractor shall maintain an integrated management control system for performance of the efforts associated with this SOW. This system will provide the framework for assigning work responsibility, and summarizing planned vs. actual accomplishments. The Contractor shall appoint a Program Manager (PM) who will be responsible for accomplishing the efforts set forth in this SOW. The PM shall have the authority and responsibility for performing the efforts set forth in the contract. The PM will be the single point of contact for all program communications between the procuring activity and the Contractor. The Contractor shall maintain records of such communications and these records will be made available to the Government if so requested.

The Contractor shall maintain and implement a management program that clearly defines how the ATIP effort will be managed and controlled. The Contractor shall organize, coordinate, and control all internal project activities (including those that are assigned to subcontractors) during all phases of the ATIP program to ensure the correct and timely delivery of all supplies and services specified in this contract.

3.1.1 Integrated Product Teams and Integrated Product and Process Development

The Contractor shall apply a systematic approach to the integrated, concurrent development of the products and processes that apply to the development and production of ATIP units. Integrated Product Teams (IPTs) are a vital part of the DoD acquisition oversight and review process and will therefore be implemented on this contract. The Contractor shall become a member of the ATIP Program Management IPT (PM IPT) chaired by the Government. At a minimum, a System Engineering (SE) IPT, co-chaired by the Contractor and the Government, shall be formed to include topics such as System Engineering, Test and Evaluation (T&E), and Logistics. Additional IPTs or less formal working groups will be formed as required. Any Contractor-led IPTs formed can include Government participants. The Contractor shall provide insight and information to the Government to ensure that the product meets the ATIP Specification, provide external interface information, and coordinate testing issues related to use of Government facilities or equipment. All IPTs will strive for consensus and will keep the number of participants to a minimum. Each IPT will develop an IPT charter and include (at a minimum) objectives, empowered membership, roles and responsibilities, product(s), schedule, and reporting. The Contractor shall not be relieved of the responsibility of meeting contractual requirements due to implementation of any IPT approach. During the IPT process, if issues are identified that the Contractor feels will have significant impact on the terms of the contract, the Contractor is obligated to identify the issue, in writing, to the PM IPT with a copy to the Procuring Contracting Officer (PCO) and Contracting Officers Representative (COR) for resolution. The use of video, web or teleconferencing is encouraged for IPT meetings.

3.1.2 Program Planning and Control

The Contractor shall conduct weekly Program Management telephone conferences with the Government. The Contractor shall present the status of: program planning activities, contract concerns and corrective plans, action items, manage and mitigate risks, near term schedule events (e.g., 90 day look-ahead), critical path network schedule events, upcoming meetings and agendas, and other management concerns for the purpose of coordinating Contractor and Government activities. The Contractor shall prepare and update monthly a program critical path network schedule. The critical path network schedule shall include events leading to program milestones, key program events, and time critical events (e.g., less than 10 days of schedule leaway) and illustrate event relationships on the critical path.

The Contractor shall conduct bi-weekly engineering IPT telephone conferences with the Government, commencing two (2) weeks prior to System Design Review (SDR) (see section 3.1.4.4.1 herein). The Contractor shall address all engineering-oriented concerns (systems, security, software, hardware, human systems integration, and test) with the Government's ATIP Specification document by exchanging informal files (e.g., comments to Government documents, presentation material, e-mail exchanges, and notes) and work these issues to resolution, address closeout of engineering-oriented action items, address risks and mitigation plans, discuss design issues and concerns identified by the Government or Contractor, and discuss testing plans, procedures, and test results and resolve issues.

3.1.2.1 Program Management Plan

The Contractor shall utilize its existing, certified, cost/schedule management control system to provide managerial insight into the status of cost, schedule, and technical performance objectives and shall report to the Government on the progress of work and the status of the program in the form of a Program Management Plan (PMP). This management control system shall be documented in a consolidated and comprehensive PMP aligned to the Contract Work Breakdown Structure (CWBS) and shall include management (and associated organizational chart), cost, engineering, logistics, and hardware development in a single document. As part of the PMP, the Contractor shall also prepare and maintain a master schedule of events keyed to the CWBS (see paragraph 3.1.2.6) and SOW, to include schedules detailing events, tasks, and activities required to achieve milestones in the master schedule. The PMP will identify key milestones necessary to mitigate risks for a timely completion of the ATIP development, and will provide reasoning for why the chosen milestones were selected. The PMP shall provide for planning and control of cost, measurement of performance (value for completed tasks), and generation of timely and reliable information for input into the Contract Funds Status Report (CFSR – see paragraph 3.1.2.3).

The Contractor shall maintain and implement this PMP to ensure the quality, cost, and schedule requirements for all products and services required in this contract are met. The PMP shall outline all phases of the program (System Design, Development, and Production). The PMP shall also include:

- a. Program information (program name, contract number, contract type, contract value, and period of performance)
- b. Organization structure (management, responsibilities, associated organizational chart)
- c. Technical management strategy including overall engineering, software development, system integration, test, and manufacturing approach.
- d. Statement of Work
- e. Resource Management
- f. Risk Management
- g. Configuration Management
- h. Quality Management
- i. Deliverables
- j. Program Review Schedule
- k. Program performance metrics

A Subcontractor Management Plan (SMP) shall be generated and maintained by the Contractor and integrated into the PMP. The Contractor will provide historical background and risk assessment,

including risk to schedule, of the subcontractor regarding production and delivery of subcontractor provided product(s). A Make or Buy Plan shall be required as part of the SMP.

The Contractor will ensure that all subcontractors developing hardware, software, and documentation comply with subcontract requirements. The Contractor will provide the appropriate requirements and guidance to all subcontractors including performance specifications or detailed TDP as needed, manufacturing controls such as reliability, yield, screening, piece part control, defect reporting, and test requirements. The Contractor will conduct technical and project level reviews at the subcontractors' facility, to include:

- a. Part/Product configuration
- b. Manufacturing processes
- c. Test processes
- d. Schedule responsiveness
- e. Yield rates

The Contractor shall provide to the Government visibility into the status of reviews held at the subcontractors' facilities or with the subcontractor at the Contractor's facility. The Contractor shall identify where selloff qualification of the subcontractor product occurs and provide insight to the Government regarding selloff management, progress, risks, and issues.

CDRL deliverables:

- **A001 Program Management Plan (DI-MGMT-81797)**

3.1.2.2 Integrated Master Schedule

The Contractor shall develop, maintain, and deliver a logically networked Integrated Master Schedule (IMS) in accordance with DI-MGMT-81650 and tailoring instructions provided in CDRL A002, Integrated Master Schedule. The IMS shall contain the planned events and milestones, all activities from contract award to contract completion, activity entrance and exit criteria, and risks/risk mitigation activities identified and documented in the Contractor's Risk Management Plan (RMP) (CDRL A007). The IMS shall reflect the tasks, dates (baseline, forecast, and actual), external and internal dependences and relationships necessary to support independent accurate forecasts of contract milestone delivery dates by both the Contractor and the Government. The IMS shall be an integrated, logical network-based schedule that correlates to the CWBS (CDRL A006). The Contractor shall support monthly teleconferences to discuss progress against and issues with the IMS. The Contractor shall conduct Schedule Risk Assessments (SRAs) in accordance with DI-MGMT-81650 and the tailoring instructions provided in CDRL A002, Integrated Master Schedule. SRAs may be performed within the IMS or within a separate risk analysis tool based on the capability of the Contractor's automated scheduling tool. SRAs shall be incorporated into the Contractor's program risk management process. The Government may elect to participate in the SRA process. Any anticipated/ expected Government support will be identified at the post contract award contract meeting, along with the necessary Government participation/response times, in order to avoid SRA disruption/delays.

CDRL deliverables:

- **A002 Integrated Master Schedule (DI-MGMT-81650)**

3.1.2.3 Contract Funds Status Report

The Contractor shall provide to the Government monthly Contractor Funds Status Reports (CFSR) for the purposes of tracking expenditures and expected billings, updating and forecasting contract funds requirements, and planning and decision making on funding changes to contracts.

CDRL deliverables:

- **A003 Contract Funds Status Report (DI-MGMT-81468)**

3.1.2.4 Contractor's Progress, Status and Management Reports

The Contractor shall provide monthly Contractor's Progress, Status and Management Reports (CPSMRs) containing program status, technical issues, and risks (including mitigation) affecting ATIP development and schedule.

The CPSMR shall also address cost information, specifically the Contractor shall report if the cost of products provided during the affected period is commensurate with the available funding and anticipated burn rate. The Contractor shall also report per CLIN/SLIN/ACRN, the following: this period and cumulative labor hours by labor category (segregated by recurring and non-recurring); this period and cumulative labor cost per labor category (segregated by recurring and non-recurring); this period and cumulative material, other direct costs (ODCs) and travel with associated costs; the percentage of work complete under the CLIN/SLIN; and the cost estimate to complete the CLIN/SLIN.

CDRL deliverables:

- **A004 Contractor's Progress, Status and Management Report (DI-MGMT-80227)**

3.1.2.5 Contract Data Requirements List

The Contractor shall provide quarterly CDRL Status Reports to inform the Government on CDRL status of required documents and drawings.

CDRL deliverables:

- **A005 CDRL Status Report (DI-MGMT-80368A)**

3.1.2.6 Contract Work Breakdown Structure

The Contractor shall develop and maintain a CWBS that shall serve as the framework for the Contractor's management control system. This comprehensive CWBS shall demonstrate contract planning, budgeting, and reporting of cost and schedule status throughout all phases of the contract and include all elements of the ATIP procurement effort (design, hardware procurement, integration, software procurement, software design, data, or services).

CDRL deliverables:

- **A006 Contract Work Breakdown Structure (DI-MGMT-81334D)**

3.1.3 Risk Management and Reporting

The Contractor shall develop and maintain a Risk Management Plan (RMP) consistent with the guidance in the *Risk Management Guide for DoD Acquisition* or equivalent internal Contractor processes throughout the life of the contract. The RMP must define and assess program cost, schedule, and

technical performance risks associated with the program. The RMP shall also address critical design areas including:

- a. Legacy TIP compatibility
- b. QoS and timeslot allocation
- c. ATIP Processor (AP) to Terminal Interface Function (TIF) separation distance
- d. ATIP capacity and timing reserve
- e. ATIP security
- f. Human Systems Integration (Manpower, Personnel, Training, Human Factors Engineering, Environment, Safety, Occupational Health, and Personnel Survivability)

CDRL deliverables:

- **A007 Contractor’s Risk Management Plan (DI-MGMT-81808)**

3.1.4 Program Reviews

For each meeting, review or conference, the Contractor shall prepare an agenda which will be subject to the Government’s approval. The Contractor shall submit the agenda to the Government for approval at least five days prior to the scheduled meeting, review, or conference. The Contractor shall have access to videoconferencing, web conferencing, or teleconferencing capabilities for the meetings. The Contractor shall make applicable engineering data, specifications, drawings, schematics, design and test documentation, software development files (including design documentation, screen mock-ups, object oriented design analysis), schedules, working papers and results of studies and analyses available for reference and Government inspection at the reviews. Entrance and exit criteria for reviews will be proposed by the Government with review and comment by the Contractor. The Contractor shall ensure that all entrance criteria are met prior to the review and exit criteria met prior to the closure of the review. Minutes for all meetings, reviews, and conferences shall be submitted to the Government for review and approval prior to execution and distribution.

CDRL deliverables:

- **A008 Presentation Material (DI-ADMN-81373)**
- **A009 Conference Agenda (DI-ADMN-81249A) and Minutes (DI-ADMN-81250A)**

3.1.4.1 Post-Award Conference

The Contractor shall hold a Post-Award Conference (PAC) at the Contractor’s facility within 30 days after contract award. The Government, in conjunction with the Contractor, will establish the specific date. At a minimum, the Contractor shall discuss the following topics at the PAC:

- a. Identify and introduce Contractor management, engineering, and other key personnel to the Government representatives. Each individual shall define his/her area of responsibility and accountability.
- b. Explain the Contractor’s organization, plans, procedures, schedules and program tracking metrics to execute this SOW, including illustrating how the Contractor will minimize schedule, cost, and performance risks.

- c. Present the Contractor's business and technical management procedures (e.g., technical point of contact assignments, status reporting procedures, and designated lines of authority) that shall be implemented to accomplish the requirements of the contract.
- d. Present the Contractor's current staffing plan.
- e. Identify status of subcontracts in effect or anticipated.
- f. Allocate time for the Government to present its organization, plan, procedures, schedules, and concerns.
- g. Allocate time for an open forum to discuss contract-related issues.

3.1.4.2 Program Management Reviews

Commencing with the PAC, the Contractor shall conduct Program Management Reviews (PMRs) on a bi-monthly basis during the Engineering and Manufacturing Development (EMD) phase and on a quarterly basis during the Production phase. To the maximum extent possible, PMRs shall be coordinated to coincide with design and technical reviews. The Contractor shall provide viewgraphs and photographic materials to support Program Office briefing requirements for documenting program activities. The PMR content shall contain all aspects of the contract addressing cost, schedule, and performance (e.g., schedule status, progress against major milestones, subcontract status, program tracking metrics, risk management, action items, close-out of program reviews, configuration management, hardware and software engineering, production, logistics, quality assurance, safety status, and any factors affecting contract deliverables). The Contractor shall present current staffing plan versus original (Post-Award) staffing plan during each PMR. The Contractor's functional leads (e.g., key personnel, software manager, and hardware engineer) shall provide status reports of their respective tasks. During the PMR the Government will evaluate the Contractor's progress and compliance with the ATIP contract, SOW, and Specification. The Government reserves the right to schedule additional reviews or working groups if critical issues arise or significant events or changes have occurred.

3.1.4.3 Technical Interchange Meetings

The Contractor shall conduct Technical Interchange Meetings (TIMs) at the Government's discretion (but not more frequently than monthly) to discuss topics and review documentation including the ATIP's design, requirements, development, integration, testing, security, production, logistic, and analysis. The TIM topics shall include:

- a. ATIP Capacity and Timing design.
- b. Built-In Test (BIT)/Built-In Test Equipment (BITE) design.
- c. Installation design.
- d. QoS/Forwarding design.
- e. Legacy TIP Compatibility design.
- f. AP to TIF distance separation design.
- g. Human Systems Integration (Manpower, Personnel, Training, Human Factors Engineering, Environment, Safety, Occupational Health, and Personnel Survivability).
- h. Configuration Management.

- i. Reliability, Maintainability, and Availability (RMA), including BIT, during the EMD Phase and production.
- j. Logistic support during the EMD Phase and production including an initial guidance meeting to review contract requirements; provisioning conference meeting, and In-Process Review (IPR) meetings to support Technical Manual TM and training development/update.
- k. TIP/ATIP Transmission Unit (TU) compatibility design.

During the TIMs, the Contractor shall allocate time for Government presentations.

3.1.4.4 Design Reviews

3.1.4.4.1 Preliminary Design Review

The Contractor shall conduct a Preliminary Design Review (PDR) at the Contractor's facility to:

- a. Present the selected design approach including its progress, technical adequacy, and risk resolution.
- b. Determine compatibility with performance and engineering requirements for the development specifications.
- c. Establish the existence and compatibility of the physical and functional interfaces among items of equipment, facilities, computer programs, and personnel.
- d. Present preliminary Software Design Description illustrating why the design meets the requirements.
- e. Present preliminary software and firmware design requirements for configuration control identification/tracking and support of field downloading.
- f. Present preliminary Hardware Design Description including commonality design approach and TBD to the MSI level, illustrating why the design meets the requirements.
- g. Present preliminary Interface Control Documents (ICDs) as defined in section 3.3.3.
- h. Present the basis for proceeding into Critical Design Review (CDR).
- i. Present allocated baselines for the ATIP design.
- j. Present the QoS and timeslot allocation trade study results and resulting ATIP design implementation.
- k. Present Capacity and Timing reserve.
- l. Present the Human Systems Integration (Manpower, Personnel, Training, Human Factors Engineering, Environment, Safety, Occupational Health, and Personnel Survivability).
- m. Present the Configuration Files definition.
- n. Present installation design requirements for common/standardized approach.
- o. Present BIT/BITE design including fault detection and isolation performance estimates.
- p. Present the Security design.
- q. Present Legacy TIP compatibility.

- r. Present AP to TIF Separation Distance trade study results and resulting ATIP design implementation.
- s. Present analysis for the definition and performance of the TU Synchronization Preamble.
- t. Present Packaging design.
- u. Present the Operator Orderwire design.
- v. Present reliability and maintainability prediction including identification of all flash memory and programmable elements with usage characteristics and reliability (program-erase cycles) calculation of each memory device's expected lifetime.
- w. Present the software, hardware, system integrate and test, and verification test strategies illustrating all test equipment concepts. Ensure that a requirements regression testing approach is identified for resolution of integration and verification testing trouble reports.
- x. Present logistics support package.
- y. Present obsolescence tracking and forecasting.
- z. Present functional baseline of the ATIP design.

3.1.4.4.2 Critical Design Review

The Contractor shall conduct a CDR at the Contractor's facility. The purpose of the CDR is to determine whether the final design satisfies the ATIP requirements as defined in the ATIP Specification. The Contractor shall establish detailed design compatibility among system components, assess configuration item risk areas, and review preliminary product specifications.

During the CDR, the Contractor shall:

- a. Establish that the detailed software and hardware design solutions, as reflected in the preliminary design documentation, satisfy the requirements established in the Government-provided ATIP Specification.
- b. Demonstrate control of the overall technical program risks associated with technical, cost, and schedule aspects.
- c. Demonstrate the performance and robustness of the QoS/Forwarding and timeslot assignment algorithm.
- d. Present and discuss any potential Legacy TIP compatibility issues.
- e. Present analysis for the definition and performance of the TU Synchronization Preamble.
- f. Demonstrate the establishment of an effective Human Systems Integration (Manpower, Personnel, Training, Human Factors Engineering, Environment, Safety, Occupational Health, and Personnel Survivability).
- g. Demonstrate the detailed DoDI 8500.2 IA controls-compliant design (e.g., illustrate in detail the ATIP requirements flow-down and provide the traceability to IA controls including test scenarios/procedures).
- h. Establish the adequacy of specific software documentation that will be released for coding and testing.
- i. Present the results of breadboarding and testing of critical functions.

- j. Present the status of specifications, ICDs, drawings, final reliability predictions, and acceptance test plans.
- k. Identify electrical and mechanical design to the Line Replaceable Unit (LRU) and provide the following for each LRU: size, weight, thermal design, and vibration and shock analysis. Include the TDBD to the MSI level.
- l. Present reliability and maintainability prediction including identification of all flash memory and programmable elements with usage characteristics and reliability (program-erase cycles) calculation of each memory device's expected lifetime.
- m. Present maintainability design including BIT/BITE approach detailing fault detection and fault isolation predicted performance.
- n. Present ATIP installation design for ship, submarine, and shore installations.
- o. Present software and firmware design for configuration control identification and tracking, and support for field upgrade via software and firmware downloading.
- p. Present logistics support package.

3.1.4.4.3 System Design Review

The Contractor shall conduct an SDR at the Contractor's facility. During the SDR, the Contractor shall:

- a. Demonstrate the total Systems Engineering Management Activity and its output for responsiveness to this SOW and the ATIP Specification ensuring appropriate application of Specification tracking tools from contract award through production sustainment.
- b. Demonstrate knowledge and understanding of the requirements by identifying conflicts, omissions, and risks associated with the Government-provided ATIP Specification, and by recommending alternate designs and solutions to resolve conflicts, minimize omissions, and mitigate risks. Identify all intended trade studies, their scope, and schedules.
- c. Demonstrate knowledge and understanding of DoD Instruction (DoDI) 8500.2 compliance by providing a mapping of Information Assurance (IA) controls to ATIP design concepts.
- d. Identify functional baselines for the ATIP system and initiation of configuration control. Illustrate sufficient requirements allocation analysis through demonstration of trades executed to capture the functional baseline. Illustrate that the functional baseline is intended to support the performance baseline and identify studies to be executed prior to preliminary and critical design to validate the performance baseline. In particular, ensure that interfaces and processing can support the system requirements.
- e. Identify proposed Computer Software Configuration Items (CSCIs) and operating systems.
- f. Identify the proposed Hardware (HW) Configuration Items (HWCIs), computer system(s), and hardware for the ATIP system, including commonality approach and initial Top-Down Breakdown (TDBD) to the Maintenance Significant Item (MSI) level.
- g. Identify Modular Open System Approach (MOSA) compliance. Identify the extent to which the Contractor intends to use open standards for key interfaces (I/Fs) where appropriate and provide modular/common components for similar ATIP functions.
- h. Present a preliminary Software Requirement Specification (SRS).

- i. Present preliminary software and firmware design requirements for configuration control identification/tracking and support of field downloading.
- j. Present a preliminary Hardware Requirement Specification (HRS).
- k. Present the QoS and timeslot allocation trade study approach and results as of the review.
- l. Present the Capacity and Timing reserve.
- m. Present the Human Systems Integration (Manpower, Personnel, Training, Human Factors Engineering, Environment, Safety, Occupational Health, and Personnel Survivability).
- n. Present the Configuration Files definition.
- o. Present the Packaging approach.
- p. Present reliability and maintainability allocations including identification of all flash memory and programmable elements with usage characteristics and reliability (program-erase cycles) calculation of each memory device's expected lifetime.
- q. Present BIT/BITE approach including fault detection and isolation allocations.
- r. Present the Security approach.
- s. Present Legacy TIP Compatibility.
- t. Present AP to TIF Separation Distance trade study approach and results of the review.
- u. Present analysis for the definition and performance of the TU Synchronization Preamble.
- v. Present the Operator Orderwire approach.
- w. Present logistics support outline.
- x. Present obsolescence tracking approach.

3.1.4.4.4 Test Readiness Review

The Contractor shall conduct a Test Readiness Review (TRR) at the Contractor's facility prior to Design Verification Test (DVT) and Production Test (PT) to review test conduct, plans, procedures, and expected results. System deficiencies and risks that may have an impact on the test results shall be presented for Government approval. The review shall address what testing the Contractor has already accomplished and the results of those tests, and a proposed approach to resolve outstanding deficiencies.

3.1.4.4.5 Production Readiness Review

The Contractor shall conduct Production Readiness Reviews (PRRs) during the EMD Phase and at the start of the Production Phase, to demonstrate that the design is production ready and adequate production planning has been established to ensure the system can be acquired without incurring unacceptable risks to schedule, performance, cost, or other established criteria, prior to the Government executing a production go-ahead decision. In EMD Phase, the PRR to review the readiness of the manufacturing processes, the Quality Management System, and production planning (e.g., facilities allocation, incorporation of producibility-oriented changes, identification and fabrication of tools/test equipment, long lead item acquisition, personnel development and certification, process documentation, inventory management, and supplier management). The PRR shall also address major subcontractors in the same way as identified above. The final PRR should occur prior to the start of the Production phase and shall

assess the manufacturing and quality risk as the program proceeds into production, while also addressing similarities and difference between the Engineering Development Model (EDM) and Production design. The Contractor shall provide criteria for the production go-ahead decision that should address the following:

- A Manufacturing Program Review to include the overall manufacturing process and detailed factors such as: manufacturing organization, responsibilities, facilities and equipment, manufacturing methods, and production flow,
- A status review of the system product baseline and documentation to enable hardware fabrication and software coding to proceed with proper configuration management,
- A status review of all production efforts for cost and schedule considerations,
- A status review of manufacturing technology and other previously recommended actions to reduce cost, manufacturing risks and mitigation strategies, and industrial base concerns,
- Identify potential impact of critical and long lead items and production equipment, if any,
- A status review of production engineering efforts, tooling and test equipment demonstrations, and proofing of new materials, processes, methods, special tooling, and test equipment.

3.1.5 Automated Interchange of Technical Information

The Contractor shall deliver all unclassified contract, technical, or engineering information required by this SOW as specified in the CDRLs via SharePoint for PMW/A 170 on the Naval Systems Engineering Resource Center (NSERC) website. Classified documents shall include one hard copy and one soft copy on Compact Disk Read Only Memory (CDROM). Any classified deliverables shall be delivered in accordance with the DD 254. Unless otherwise approved by the Government, the Contractor shall use the applications outlined in Table 1 to deliver documents to the Government.

Table 1: Applications for Deliverable Documents

Document Category	Format
Word Processing	Microsoft® Word 2007
Spreadsheets	Microsoft® Excel 2007
Project Planning	Microsoft® Project 2007
Presentation Software	Microsoft® PowerPoint® 2007
Engineering Drawings	Native and PDF format
Requirement Database	IBM DOORS Version 9.x

3.1.6 Environmental, Safety, and Occupational Health

The Contractor shall establish and maintain an effective and comprehensive safety program that complies with the provisions of the Occupational Safety and Health Act (OSHA) and the National Institute of Occupational Safety and Health requirements. All on-site workers (Contractor and subcontractor) performing hazardous operations, including working with hazardous materials, must have completed the

OSHA 1910.120 Hazardous Waste Operations and Emergency Response (HAZWOPER) training and other applicable training, as well as annual refresher courses. The Contractor shall maintain training records and have a written Health and Safety Plan on-site available for workers' and regulatory review. The Contractor shall provide to the Government copies of any OSHA report(s) submitted during the duration of this contract. The Contractor is ultimately responsible for compliance with the OSHA of 1970 and for penalties resulting from violations.

The Contractor shall comply with federal, state, and local environmental laws and regulations. The Contractor shall establish, implement, and maintain a Hazardous Materials Management Program (HMMP) in accordance with National Aerospace Standard (NAS) 411 that addresses compliance with National Environmental Policy Act (NEPA) [42 U.S.C. 4321-4370d]/Executive Order 12114 and Environmental Compliance, System Safety and Health, Hazardous Material, and Pollution Prevention federal policy and regulations as addressed in the System Safety Program Plan (SSPP).

CDRL deliverables:

- **A010 Hazardous Material Management Program Plan (DI-MGMT-81398A)**
- **A011 System Safety Program Plan (DI-SAFT-81626)**

3.2 SYSTEMS ENGINEERING

3.2.1 Engineering and Manufacturing Development Phase (RDT&E)

During the EMD Phase, the Contractor shall design and develop software, develop, procure, and integrate hardware including commercial off-the-shelf (COTS) products, integrate the hardware and software, and perform related Test and Evaluation (T&E) exercises.

In addition, the Contractor shall deliver 10 EDMs to the Government for technical and operational assessments and provide technical support as required. The Contractor shall develop and provide logistic support/documentation, Technical Manuals (TMs), and preliminary training curricula necessary to support design and qualification testing at the Contractor's facility. See section 3.10.4 for required documentation and CDRLs.

During the EMD Phase the Contractor shall:

- a. Design, develop, integrate, and test the ATIP EDM units.
- b. Perform DVT on designated ATIP EDM units.
- c. Conduct a Functional Configuration Audit (FCA) and a Physical Configuration Audit (PCA) (FCA/PCA).
- d. Perform a Quality Conformance Inspection (QCI) on every ATIP EDM unit.
- e. Perform a QoS/Forwarding analysis of the ATIP.
- f. Perform a System Security Analysis (SSA) of the ATIP.
- g. Document the TIP/ATIP TU format.

- h. Address deficiencies identified through Government testing including resolution of deficiencies identified during Government Developmental Test (DT) and Operational Test (OT).

3.2.1.1 Pre-Planned Product Improvements (P3I)

3.2.1.1.1 ATIP External QoS P3I

Future modification to the ATIP will include the ability to exchange QoS and flow control information with an external router, while maintaining the ATIP capability to execute dynamic timeslot assignment as described in Section 3.1.5.1 of the ATIP Specification. The Contractor shall assess the impact of this future enhancement during initial ATIP design, including the impact of interfacing to the router on the Network Interface, QoS Forwarding, TDMA Network Management, and Control/Status Monitoring functions of the ATIP Specification. The Contractor shall attempt to provide the modularity and design flexibility to readily incorporate this P3I modification in a cost effective manner, with minimal impact to the ATIP software architecture and functionality. The Contractor shall present the P3I assessment results at SDR.

3.2.1.1.2 ATIP Adaptive Coding P3I

Future modification to the ATIP will include the ability to provide Adaptive Coding (AC) as described in Section 3.1.5.2 of the ATIP Specification. The Contractor shall assess the impact of this future enhancement during initial ATIP design, including the impact of incorporating encoding and decoding functionality in the ATIP hardware and software. The Contractor shall attempt to provide the modularity and design flexibility to readily incorporate this P3I modification in a cost effective manner, with minimal impact to the ATIP software architecture and functionality. The Contractor shall present the P3I assessment results at SDR.

3.2.1.1.3 ATIP Anti Access Area Denial P3I

Future modification to the ATIP will include the ability to provide support in the Anti-Access Area Denial (A2AD) environment as described in Section 3.1.5.3 of the ATIP Specification. This environment may include operations with an Unmanned Aerial Vehicle (UAV) using a modified XDR waveform due to the absence of MILSATCOM. Adaptive coding will likely be required within the UAV XDR communications architecture to address link margin degradation with extremely low look angles and additional stresses to the link conditions, including variable distance to the UAV and communications link outages not anticipated with MILSATCOM. The ATIP Specification Section 3.1.5.3 identifies conceptual SATCOM and UAV differences in ATIP network architecture, TDMA slot assignment, queuing, and general ATIP operations. The Contractor shall assess the impact of this future enhancement during initial ATIP design. The Contractor shall attempt to provide the modularity and design flexibility to readily incorporate this P3I modification in a cost effective manner, with minimal impact to the ATIP software architecture and functionality. The Contractor shall present the P3I assessment results at SDR.

3.2.2 ATIP Terminal Simulator Development

In the event the Government exercises the option for the Contractor to design and fabricate an ATIP TermSim, a Contract Line Item Number (CLIN) has been established to define quantity and delivery schedules for ATIP TermSim units, indicating the first TermSim shall be completed within six months after exercise of the option.

If the ATIP TermSim development CLIN is exercised, the Contractor shall develop an ATIP TermSim in accordance with the requirements described in the ATIP TermSim Specification for use in testing ATIP operation/interoperability with Legacy TIP units. The proposed ATIP TermSim design shall be presented at PDR. Prior to use in support of development testing, the Contractor shall generate an ATIP TermSim Test Plan which shall be used to verify the requirements as specified in the ATIP TermSim Specification. The Contractor shall develop and deliver to the Government an ATIP TermSim Test Report documenting the requirements verification testing results.

As a part of this effort, the Contractor shall provide an ATIP TermSim operating guide, identifying:

- a. The basic ATIP TermSim form factor (size, weight, power requirements)
- b. Location, and function of switches, indicators, and connectors (including connector pin-outs)
- c. The operator interface display and commands
- d. The format of the ATIP TermSim Configuration File

CDRL deliverables:

- **A012 ATIP TermSim Test Plan (DI-NDTI-80566A)**
- **A013 ATIP TermSim Test Report (DI-80809B)**
- **A014 ATIP TermSim Operating Guide (DI-MISC-80508B)**

3.2.3 Engineering Support Services

The Contractor shall perform Cost Plus Fixed Fee (CPFF) activities during each phase of the contract to support design, fielding, and sustainment of the ATIP in accordance with Technical Direction Letters (TDLs) received and consistent with the contract. The specific activities will be defined in the individual TDL issued by the Government, but will likely include the tasks listed in the following sections.

3.2.3.1 Engineering Support Services – EMD Phase (RDT&E)

- a. Engineering studies, analyses, and design modifications:
 - Modifications to Net Controller and Net Member protocols that enhance ATIP operations.
 - Modifications to support enhancements to the network interface of the ATIP to the local IP User, such as pausing incoming traffic or reporting queue status to the local IP User interface.
 - Modifications to support integration of ATIP with other Services' terminals, including different hardware interfaces impacting the Terminal Interface Function (TIF) design, chassis separability, and/or Size, Weight, and Power (SWaP) enhancements.
 - Addition of new functionality to support waveform enhancements external to the supporting EHF/AEHF terminal.
 - Implementation of similar functionality on different MILSATCOM waveforms.
 - Enhanced software/firmware downloading capability.
 - Improvements in user web-based management interface and fault reporting (detection, isolation, and reporting to the operator).

- Forward compatibility to future systems (e.g., interface and integration with other transceivers).
- Development of special test or support systems, equipment or software support programs to support new development.

3.2.3.2 Engineering Support Services – Production Phase (OPN)

a. Engineering modifications:

- Modification to the ATIP hardware and/or software for advanced Military and commercial communications.
- Modifications to existing capabilities based on system level changes, enhancements, or delayed capabilities.
- Modification to the ATIP hardware and/or software for integration with future or other Services' terminals.
- Software development activities including software specification, design, coding, integration, and regression testing to include IA updates and system trouble report fixes.
- System firmware/hardware trouble report resolution.

3.2.3.3 Engineering Support Services – Fielding and Sustainment Phase (O&M,N)

a. Post-Production Engineering Services:

- Installation and field support including problem resolution
- Technical support during Over-The-Air (OTA) testing.
- Test planning, conduct, and data reduction/analysis support.
- Configuration monitoring and control
- Failure tracking support.
- Security recertification driven by IA design changes and/or security requirements changes.
- Software sustainment support.

3.3 ENGINEERING AND TECHNICAL DOCUMENTATION

3.3.1 Engineering and Source Code Documentation (RDT&E)

The Contractor shall document the system requirements, specifications, and design, showing full traceability to the ATIP Specification. The Contractor shall ensure performance, design, and test requirements are traceable for each HWCI and CSCI including Field Programmable Gate Array (FPGA) design of the ATIP Specification. The Contractor shall ensure these specifications are sufficiently detailed to permit design, production, and verification of the end items. The Contractor shall keep all specifications and design documents current for the duration of the contract.

CDRL deliverables:

- **A015 Software Requirements Specification (DI-IPSC-81433A)**
- **A016 Software Design Description (DI-IPSC-81435A)**
- **A017 Hardware Requirements Specification (DI-SDMP-81465A)**
- **A018 ATIP AP Source Code (DI-IPSC-81441A)**
- **A019 ATIP TIF Source Code (DI-IPSC-81441A)**

3.3.2 Technical Documentation

3.3.2.1 Quality of Service / Forwarding Analysis (RDT&E)

The Contractor shall analyze the functional design and performance of the Internal QoS Functions and Allocate Reservation Timeslot requirements as specified in Sections 3.2.2.1 and 3.2.5.1.3.4, respectively, of the ATIP Specification. The analysis will be conducted early in the development cycle to facilitate design of the ATIP software to provide enhanced QoS performance. The output of the effort shall include identification of the algorithms for QoS/Forwarding for each member and timeslot allocation by the Net Controller using the member queue information and QoS/Forwarding policy. The analysis shall include how effectively the algorithm for timeslot allocation fairly distributes timeslots among Subnet members, while providing each member QoS/Forwarding performance consistent with the QoS policy for the Supernet.

The scope of the study shall also include:

- a. Legacy TIP compatibility including operation with an ATIP network controller with Legacy TIP network members to ensure allocated timeslots are fairly distributed among ATIP members and Legacy TIP members.
- b. QoS policy (e.g., definition, creation, and establishment of QoS policy).
- c. Performance of the queuing and de-queuing algorithm.
- d. Performance of the timeslot allocation algorithm.
- e. Impact of the extern QoS operation on ATIP-specific QoS processing and dynamic timeslot functionality.

The Contractor shall provide an analysis report to the Government. The report shall include:

- a. Evaluation results.
- b. Feasibility assessment.
- c. Contractor-defined QoS and timeslot allocation algorithms.

CDRL deliverables:

- **A020 QoS/Forwarding Analysis Report (DI-MISC-80508B)**

3.3.2.2 System Security Analysis (RDT&E)

The Contractor shall provide an analysis that describes security aspects of the ATIP features (as designed to meet the ATIP requirements) that meet the IA controls specified by DoD Instruction 8500.2 for a

MAC II, Public System, the Defense Information Systems Agency (DISA) Security Technical Implementation Guide (STIG), and ATIP Specification and operational use of the ATIP. Configuration of the ATIP Management-PC, and its integration with the ATIP CSM function, shall be included in this analysis.

The SSA document shall include a compliance matrix for DoDI 8500.2 and DISA STIG IA controls, and for each met requirement, an MoV. The Contractor analysis report shall include identification and justification of all requirements or configuration items deemed not applicable and rationale for claiming compliance to requirements deemed applicable, with the goal of having a minimal number of exceptions. The analysis report shall address both the ATIP and the Management-PC. The intent of the analysis and subsequent documentation thereof is to supplement design information in support of the critical design and IA Certification and Accreditation (C&A).

CDRL deliverables:

- **A021 System Security Analysis (DI-MISC-80508B)**

3.3.2.3 TIP/ATIP TU Compatibility Documentation (RDT&E)

The ATIP must operate in networks containing Legacy TIP members and networks containing only ATIP members using different TU formats. For networks containing Legacy TIP members, informal documentation exists describing the Legacy TIP, but has not been verified against the actual TIP TU structure. The Contractor shall generate and deliver a document describing the following:

- The bit/byte ordering of the Legacy TIP TU and update the document to incorporate the TU format for ATIP-Only networks. In both cases, this document shall define the TU format as it appears on the interface between the TIF and KIV-7M/HSB crypto device.
- Verification that a Legacy TIP harmlessly ignores unknown packet types in the legacy TU Link Data Message "Message Type" field.
- Verification of correct Legacy TIP reception of the legacy portion of a TU sent by an ATIP that contains both legacy and ATIP Message Type Link Packets.

CDRL deliverables:

- **A022 TIP/ATIP TU Compatibility (DI-MISC-80508B)**

3.3.3 Interface Control Documents (RDT&E)

The Contractor shall develop ICDs with sufficient detail to illustrate both external and internal interfaces of the ATIP.

CDRL deliverables:

- **A023 ATIP to External Router ICD (DI-CMAN-81248A)**
- **A024 ATIP AP to TIF ICD (DI-CMAN-81248A)**
- **A025 ATIP Configuration Files ICD (DI-CMAN-81248A)**
- **A026 ATIP Control and Status Monitoring (CSM) ICD (DI-CMAN-81248A)**
- **A027 ATIP TIF to Crypto/Terminal ICD (DI-CMAN-81248A)**

3.3.4 Installation Control Drawings (RDT&E)

The Contractor shall provide a complete set of engineering drawings and associated lists to support installation of the ATIP using MIL-D-23140D as guidance for drawing preparation. ATIP installation and interface requirements shall be in accordance with the ATIP Specification. The Contractor shall provide procedures necessary for installation including the calibration process for AP to TIF separation. Installation hardware for shore sites shall be similar to the shipboard requirement. The Contractor shall support review of the ICDs at TIMs with Government installation and fleet representatives.

CDRL deliverables:

- **A028 Installation Control Drawings (DI-DRPR-81242)**

3.3.5 Provisioning Support (RDT&E)

The Contractor shall develop provisioning data/documentation during the EMD phase to support Spares Acquisition Integrated with Production (SAIP). The SAIP concept provides the necessary provisioning efforts to procure spares concurrently with production equipment for cost savings and to establish the Government’s Material Support Date (MSD) concurrent with the first production ATIP installation. Design Change Notices (DCNs) will be used to maintain the proper configuration identification through the EMD phase.

3.4 SYSTEM EFFECTIVENESS ENGINEERING

3.4.1 System Trouble Reporting (RDT&E)

The Contractor shall employ and maintain a trouble reporting system to track ATIP software and hardware/firmware problems. The problems shall be documented to show root cause, plan to correct, plan to validate, and any possible manifestations of the corrected code on previously tested modules. The Contractor shall assign a priority to each trouble report in accordance with Table 2 below. The Contractor shall provide full-text system trouble reports to the Government.

Table 2: Trouble Report Priority Classification

Priority 1	<ul style="list-style-type: none"> a. Prevent the accomplishment of an operational or mission essential capability b. Jeopardize safety, security, or other requirement designated “critical
Priority 2	<ul style="list-style-type: none"> a. Adversely affect the accomplishment of an operational or mission essential capability and no work-around solution is known b. Adversely affect technical, cost, or schedule risks to the project or to life cycle support of the system, and no work-around solution is known
Priority 3	<ul style="list-style-type: none"> a. Adversely affect the accomplishment of an operational or mission essential capability but a work-around solution is known b. Adversely affect technical, cost, or schedule risks to the project or to life cycle support of the system, but a work-around solution is known
Priority 4	<ul style="list-style-type: none"> a. Result in user/operator inconvenience or annoyance but does not affect a required operational or mission essential capability b. Result in inconvenience or annoyance for development or support personnel, but does not prevent the accomplishment of those responsibilities
Priority 5	Any other effect

CDRL deliverables:

- **A029 System Trouble Report (DI-MGMT-81232)**

3.4.1.1 System Status Reporting (RDT&E)

The Contractor shall provide status updates to the Government regarding software and hardware performance in the CPSMR (CDRL A004) required in section 3.1.2.4 herein, summarizing the following:

- a. Schedule and Progress
 1. Progress against software milestones, highlighting any issues that impact the critical path leading up to system integration and test.
 2. Critical path analysis.
 3. Software build schedule, functionality per build, and status.
 4. Milestone slips if any, and planned recovery.
- b. Growth and Stability
 1. Number of software and hardware trouble reports per thousand lines of source code on a monthly and cumulative basis.
 2. Rate and history of software and hardware trouble report fixes (hours/software and hardware trouble report) based on severity and complexity level.
 3. Status of code stability to indicate variance between planned and expended code development effort.
 4. Stability of software requirements including allocation and design modifications.
- c. Technical Adequacy
 1. Listing of all efforts performed identifying functional areas. Efforts shall be identified within the structure of the program schedule and include identification of progress in functional areas (e.g., software package within a CSCI, functional capability such as Net Controller and Member protocols, functional threads) of an individual CSCI.
 2. Processing capacity utilization updates and issues.
 3. Memory utilization updates and issues.
 4. Timing reserve updates and issues.
- d. Development Performance
 1. List of percentage development progress performed on each CSCI area based on per month and cumulative basis.
 2. Software development productivity.
- e. Product Quality
 1. Software risks and status.

2. Report on action items and outstanding issues from previous month, provide resolution plan and anticipated completion dates.
 - a. A summary of changed software and hardware/firmware trouble reports.

CDRL deliverables:

- **A004 Contractor's Progress, Status and Management Report (DI-MGMT-80227)**

3.4.2 Configuration Management (RDT&E)

The Contractor shall plan, implement, and maintain a Configuration Management (CM) program for the ATIP system that includes Configuration Item (CI) identification, control, status accounting, and audits that ensures configuration control of the ATIP drawings and Specification. The Contractor shall provide a CM Plan (CMP) that describes the Contractor's CM program, how it is organized, how it will be conducted, and the methods, procedures, and controls for effective configuration identification, change control, status accounting, and audits of the total configuration including hardware and software (note: detailed software CM is defined in section 3.5.1.1). The Contractor shall develop a CMP using MIL-HDBK-61A(SE) and American National Standards Institute (ANSI)/Electronic Industries Association (EIA)-649-B for guidance.

CDRL deliverables:

- **A030 Contractor's Configuration Management Plan (DI-CMAN-80858B)**

3.4.2.1 Configuration Identification (RDT&E)

The Contractor shall provide detailed information on Configuration Identification procedures, processes, and numbering. The Contractor shall establish and develop the detailed information in the TDP necessary to accomplish CM of each configuration item. Drawings shall be uniquely numbered, and new drawing numbers shall be assigned when interchangeability is affected by an engineering change.

3.4.2.1.1 Equipment Top-Down Breakdown (RDT&E)

The Contractor shall develop and maintain an ATIP system hardware and software family tree that details CIs in a TDBD format. The family tree shall provide the breakdown for the complete design down to the MSI level (i.e., removal and replacement of an item/component either at the organizational or intermediate level, but not including piece parts). The CI breakdown shall be performed by the Contractor using the information provided herein for completing the analysis.

- a. Unique Identification (UID) - A code (Y=yes or N=no) to identify whether the item will have a UID code provided on the equipment for configuration tracking in accordance with Defense Federal Acquisition Regulation Supplement (DFARS) Clause 252.211-7003 requirements.
- b. Indenture Code - A code which illustrates a lateral and descending "family tree" relationship of each line item to and within the system or end item and its discrete components (units), assemblies and subassemblies.
- c. Reference Designator - Letters or numbers, or a combination of both, used to uniquely identify and locate discrete units, portions thereof, and basic parts of a specific component. The reference designation shall result in the arrangement of provisioning lists for electronic and electronic-related equipment being in alphanumeric reference designation order in accordance with Institute of Electrical and Electronic Engineers (IEEE) 200-75 and top-down order.

- d. Reference Number - Any number, other than a Government activity stock number, used to identify an item of production, or used by itself or in conjunction with other reference numbers, to identify an item of supply. Reference numbers include part or identifying number, drawing, model, type, item designator, or source controlling numbers; manufacturer's trade name; specification or standard numbers; and specification or standard part, drawing, or type numbers (for applicable formats see DoD 4100.39-M).
- e. Commercial and Government Entity Code (CAGE) - A five-character code assigned by the Defense Logistics Information Service (DLIS) to the design control activity or actual manufacturer of an item as contained in the Defense Logistics Agency's (DLA) Cataloging Handbook H4/H8 Series.
- f. Item Name - Is an identifying noun with appropriate adjective modifier, as contained in Federal Item Name Directory for Supply Cataloging, H6-1. Item Names contained in Federal Item Name Directory for Supply Cataloging, H6-1, cannot be abbreviated unless approved by the requiring authority.

CDRL deliverables:

- **A031 Equipment Top-Down Breakdown (DI-MISC-80508B)**

3.4.2.1.2 Nomenclature Assignment and Identification Plates (RDT&E)

The Contractor shall assign nomenclatures to the ATIP in accordance with MIL-STD-196E, "Joint Electronics Type Designation System". All ILS products defined in section 3.10 of this SOW shall use the official nomenclature assignment once approved by the Government. All other documentation detailed in this SOW will track to the official nomenclature assignment to the greatest extent possible.

For identification of the system into the Government inventory, military nomenclatures (e.g., type designator and item names) shall be assigned by the Government based on information provided by the Contractor on the DD Form 61 "Request for Nomenclature" for entry into the Joint Electronics Type Designation Automated System (JETDAS) system (<https://tdas6.monmouth.army.mil/jetdas/>).

The Contractor shall refer to MIL-P-15024/5, "Military Specification Sheet, Identification" for nameplate assignment requirements. Nameplates shall be provided for nomenclature assignment for all "unit" equipment. Nameplates may be any size that is compatible with the size of the equipment to which the plate will be attached.

CDRL deliverables:

- **A032 Nomenclature Information (DI-CMAN-81254A)**
- **A033 Request for Approval of Identification Plate Drawings (DI-SESS-81655)**

3.4.2.1.3 Unique Identification

The Contractor shall comply with DoD UID policy for equipment and spare parts in accordance with DFARS 252.211-7003.

3.4.2.2 Configuration Control

3.4.2.2.1 Engineering Change Proposal (RDT&E)

In cases where changes to form, fit, or function are necessary, the Contractor shall prepare and submit to the Government for approval an Engineering Change Proposal (ECP) using the guidance detailed in MIL-HDBK-61A(SE), section 6.2, “Engineering Change Proposal.”

CDRL deliverables:

- **A034 Engineering Change Proposal (DI-CMAN-80639C)**

3.4.2.2.2 Request for Deviation (RDT&E)

The Contractor shall prepare and submit to the Government for approval a Request for Deviation (RFD) for any deviation to CIs whose design documentation has already been approved by the Government. The Contractor will submit a RFD using the guidelines in MIL-HDBK-61A(SE), section 6.3, “Request for Deviation”.

CDRL deliverables:

- **A035 Request for Deviation (DI-CMAN-80640C)**

3.4.2.2.3 Notice of Revision (RDT&E)

Prior to CDR, the Contractor shall address Government specification issues during bi-weekly engineering IPTs to negotiate possible changes. The Contractor shall, after CDR, prepare and submit to the Government for approval a Notice of Revision (NOR) for any changes to the Government controlled documents (e.g., ATIP Specification, TMs). The Contractor will submit a NOR using the guidelines in MIL-HDBK-61A(SE), section 6.4, “Notice of Revision”.

CDRL deliverables:

- **A036 Notice of Revision (DI-CMAN-80642C)**

3.4.2.3 Configuration Status Accounting (RDT&E)

The Contractor shall provide Configuration Status Accounting (CSA) reporting in accordance with the guidelines in MIL-HDBK-61A(SE), section 7, “Configuration Status Accounting” to:

- a. Identify the current approved configuration documentation for each CI, CSCI, and firmware.
- b. Record and report the status of proposed engineering changes from initiation to final approval/contractual implementation.
- c. Record and report the status of all major RFDs that affect the configuration of a CI.
- d. Provide a status accounting report to the MSI level in TDBD, including the Serialized Assembly Record (SAR) data, detailing the reference number, reference designator, serial number and revision level, software version, and UID for each CI as approved by the PCO.

CDRL deliverables:

- **A037 Configuration Status Accounting Information (DI-CMAN-81253A)**

3.4.2.4 Configuration Verification and Audit (RDT&E)

ATIP EDM unit configuration verifications (consisting of an FCA and PCA) shall be performed after successful DVT. The configuration verification shall be conducted utilizing the guidelines provided in MIL-HDBK-61A(SE), section 8, "Configuration Verification and Audits". PCA shall be conducted on a tested unit used in support of DVT to define the configuration baseline using the equipment's SAR. The EDM configuration verification will serve to define the pre-production baseline for documenting the EDM equipment.

The Contractor shall provide:

- a. A plan detailing the FCA compliance matrix of ATIP Specification performance requirements, test procedures used, test results, and the associated MSI/SAR for the FCA test CIs including software listings for each CSCI. The plan shall also include the PCA requirements for validating/verifying the EDM pre-production product baseline.
- b. A report detailing the actions conducted during the configuration audit including any discrepancies noted with resolution provided and establishment of the product baseline hardware and software record.

CDRL deliverables:

- **A038 EDM Configuration Audit Plan (DI-SESS-81646)**
- **A039 EDM Configuration Audit Summary Report (DI-CMAN-81022C)**

3.4.3 Human Systems Integration (RDT&E)

The Contractor shall implement an HSI process and reporting system using the guidance provided in the MIL-STD-46855A, using MIL-STD-1472F, to evaluate and integrate HSI elements into the ATIP and supporting systems engineering process.

3.4.3.1 Job Task Analysis (RDT&E)

The Contractor shall perform a Job Task Analysis (JTA) detailing all aspects of the ATIP system/equipment operation and maintenance task performance, identifying the associated Knowledge, Skills, and Attitudes (KSA) needed, and identifying potential training tasks based on Criticality, Difficulty, and Frequency (CDF) detailed in MIL-HDBK-29612/2A, "Instructional Systems Development/Systems Approach to Training and Education" for guidance. The JTA shall describe how the task is performed (performance steps), under what conditions it is performed, and how well the individual must perform it (performance standards). During the task analysis, each task will be examined to determine performance requirements. The products of task analysis are lists of all tasks, the equipment or materials involved with each task, the conditions under which the tasks must be performed, and the standards that must be met. Also during task analysis a determination is made how often the tasks are performed, safety requirements, how critical the task is, its complexity, and the difficulty of learning the task.

The JTA shall be developed in accordance with the JTA Microsoft Excel Template provided as Appendix B to this SOW. It provides three tabs to support the JTA development. The "1 Guidelines" tab provides the data elements with definitions. The "2 Operations" tab provides the format and structure to detail all the ATIP operations tasks needed with examples provided from the NMT system. The "3 Maintenance" tab provides the format and structure to detail all the ATIP organizational level

maintenance tasks needed with examples provided from the NMT system. The Contractor shall complete the JTA for all operations tasks and organizational level maintenance tasks needed to support ATIP.

Finally, the JTA shall be developed to meet all elements required by the Human Analysis Requirements Planning System (HARPS). The final JTA shall be submitted to the HARPS Communications, Information Systems and Networks (CISN) Management & Analysis Training Tool (CMATT) workflow team for upload to the HARPS system.

CDRL deliverables:

- **A040 Job Task Analysis (DI-MISC-80508B)**

3.4.3.2 Human Factor Engineering (RDT&E)

Human factors design requirements shall be established to develop effective human-machine interfaces and preclude system characteristics that require: extensive cognitive, physical, or sensory skills; complex training intensive tasks; or result in frequent or critical errors. The Contractor shall identify and execute Human Factor Engineering (HFE) tasks, according to the Human Engineering Program Plan (HEPP), to ensure that the ATIP system, equipment, and user interfaces are in compliance with the established MIL-STD-46855A standard, using MIL-STD-1472F, and design requirements of the ATIP Specification. The Contractor shall develop and deliver to the Government a HEPP, describing how the human engineering requirements apply to the design and development of the ATIP System.

CDRL deliverables:

- **A041 Human Engineering Program Plan (DI-HFAC-81742)**

3.4.4 System Safety and Occupational Health

The ATIP shall be designed to minimize the use of prohibited materials and hazardous materials, as indicated in the ATIP Specification. Hazardous waste generated during the manufacturing process shall be reported to the Government. Any hazardous material, as defined in FED-STD-313D including Notice 1, which may be used in, supplied with, or required in support of the ATIP shall be approved by the PCO prior to the Contractor incorporating that material into the ATIP. Prior to approval, the Contractor shall provide a Material Safety Data Sheet (OSHA Form 174) and written justification describing the necessity for the type, container size, and quantity of hazardous material (or material that results in hazardous waste) together with a listing of less hazardous alternatives that were considered and the reasons why these substitutes cannot be used. Order of precedence for PCO approval will be:

- a. Non-hazardous material.
- b. Recyclable material.
- c. Material that results in hazardous waste that can be treated to reduce it to a non-hazardous state.

Pertinent data and precautions from the material safety sheets shall be provided in all associated manuals and documentation delivered with the ATIP.

3.4.4.1 Hazardous Materials

The use of any hazardous material (HAZMAT) by the Contractor shall require Government approval prior to use through approval of the HMMP progress reports and HAZMAT material RFD. HMMP

progress reports shall address the entire system life cycle, as well as periodically updating the status for each planned analysis. The analyses shall identify Environmental, Safety, and Occupational Health (ESOH) hazards, support requirements associated with using hazardous materials, and cost-effective pollution prevention programs. HMMP progress reports shall be prepared in accordance with NAS 411. A statement of nonuse of any of the hazardous material listed in Section 3.4.2 “Materials” of the ATIP Specification shall suffice for a report.

CDRL deliverables:

- **A042 Hazardous Material Management Program Progress Report (DI-MISC-81397A)**

3.4.4.1.1 Mercury

Any Contractor RFD for the use of Mercury shall comply with the requirements defined in Naval Sea Systems Command Instruction (NAVSEAINST) 5100.3D “Mercury, Mercury Compounds, and Components Containing Mercury or Mercury Compounds; Control of” and requires Government approval prior to use.

3.4.4.1.2 Beryllium

Based on the current health issues and the uncertainty of a true dose-response relationship from beryllium exposure, contact with items or materials containing beryllium even at low concentrations are an occupational health concern. To prevent and/or control human and environmental exposure, knowledge of items, systems and materials that may contain beryllium in concentrations greater than 0.1 % by weight is required. The 0.1 % limit is taken from the hazardous material reporting requirements of 29 Code of Federal Regulation (CFR) 1910.1200 for materials containing carcinogens defined by any one of the following: The International Agency for Research on Cancer (determined beryllium compounds are carcinogenic to humans); The National Toxicology Program (determined beryllium compounds are known to be a human carcinogen); or listed as a carcinogen in 29 CFR 1910 Subpart Z (beryllium not specifically listed as a carcinogen). Therefore, a complete inventory of items or materials containing beryllium should be conducted for all items or material associated with the ATIP that could be worked, heated, repaired or serviced by Navy personnel.

3.4.4.2 System Safety Analysis and Assessment Report

The Contractor shall conduct system safety analyses addressing system safety requirements detailed in MIL-STD-882D “System Safety,” section 4, “General Requirements” and verify compliance with ATIP Specification safety requirements. The Contractor will use MIL-HDBK-454A, “General Guidelines for Electronic Equipment”, and Office of the Chief of Naval Operations (OPNAV) Instruction (OPNAVINST) 5100.19A, “Occupational Safety and Health”, for guidance. The analyses and results will be formally documented in the assigned reports.

CDRL deliverables:

- **A043 System Safety Hazard Analysis Report (DI-SAFT-80101B)**
- **A044 Safety Assessment Report (DI-SAFT-80102B)**

3.4.5 Reliability and Maintainability Program

3.4.5.1 Reliability Tracking (RDT&E)

The Contractor shall create and maintain a Failure Reporting and Corrective Action System (FRACAS) to document all problems found during EMD phase, covering all EDM units. The FRACAS shall document all problems found with the ATIP and ATIP-connected equipment including the Fiber Optic Isolators and encryption devices during manufacturing, assembly, and testing, the causes of the failures and faults, and the corrective actions taken to resolve the failures and faults. The FRACAS shall include all problems found during Accelerated Life Test (ALT) (per section 3.4.5.6). A FRACAS review will be conducted as part of the PMR (per section 3.1.4.2).

CDRL deliverables:

- **A045 Failure Reporting & Corrective Action System Report (DI-RELI-80255)**

3.4.5.2 Reliability Prediction (RDT&E)

The Contractor shall perform a reliability prediction of all components and associated quantities comprising the ATIP system. The Contractor shall use MIL-HDBK-217 F including Notices 1 and 2 (electronic parts), and may use Network Program Requirements Document (NPRD)-95 and Naval Surface Warfare Center (NSWC) Standard 98/LE1 (mechanical parts) for the reliability prediction methodology for all military and Non-Developmental Item (NDI) components. The Bellcore Reliability Prediction or equivalent methodology shall be used for commercial/plastic components. The Contractor shall deliver a report detailing the reliability allocations (estimated for each contributing source, Commercial and Non-Developmental Item equipment, and Government Off-the-Shelf (GOTS)) in a TDBD from the equipment to the MSI level for the ATIP design.

CDRL deliverables:

- **A046 Reliability Prediction and Documentation of Supporting Data (DI-RELI-81497)**

3.4.5.3 Thermal Survey Analysis (RDT&E)

The Contractor shall perform a thermal survey under worst case thermal environment in accordance with the ATIP Specification. In addition, to support the reliability prediction analysis, a nominal ambient temperature of +25°C shall be used.

CDRL deliverables:

- **A047 Thermal Design Analysis (DI-MISC-80508B)**

3.4.5.4 Maintainability Analysis (RDT&E)

The Contractor shall perform a corrective maintenance analysis using the guidelines of MIL-HDBK-472, paragraph 3.2.1, "Corrective Maintenance Prediction." The prediction analysis shall be performed by the Contractor using "Worksheet A" and "Worksheet B" in MIL-HDBK-472 for content requirements (Contractor determines format). The Contractor shall perform a preventive maintenance analysis using the guidelines of MIL-HDBK-472, paragraph 3.2.2, "Preventive Maintenance Prediction." The prediction analysis shall be performed by the Contractor using "Worksheet C" and "Worksheet D" in MIL-HDBK-472 for content requirements (Contractor determines format). Both analyses shall be documented in the prediction report.

CDRL deliverables:

- **A048 Maintainability Predictions Report (DI-MNTY-81602)**

3.4.5.5 Failure Modes and Effects Analysis (RDT&E)

The Contractor shall perform a Failure Modes and Effects Analysis (FMEA) for the ATIP design to identify potential equipment (e.g., hardware and software) and system (e.g., IP user, crypto, and NMT interfaces) weaknesses and provide an analysis of the test monitoring and diagnostic equipment capabilities. The analysis shall provide a description of each function, with schematic diagram backup material detailing the circuits involved with the function. All LRUs and components involved in that function shall be identified and listed with their failure rate. The analysis shall detail how fault(s) for that function are detected and isolated to the LRU level through on-line BIT/BITE, off-line BIT/BITE, and manually. BIT/BITE message information and manual procedures (if needed) shall also be detailed. This will also serve to verify the BIT/BITE performance as follows:

- Class A (detection) percentage = Total sum of detected fault failure rate / Total failure rate
- Class B (isolation) percentage = Total sum of isolated fault failure rate / Total failure rate

All functions associated with the ATIP design shall have their fail rate computed based on the reliability model and its individual components' failure rates, such that the FMEA functions' fail rate shall be correlated to the reliability prediction fail rate, to ensure that the performance requirements of the ATIP Specification have been addressed. Information from the analysis will serve as source engineering information in the development of maintenance Fault Logic Diagrams (FLDs) and procedures. See Appendix C for a detailed description of the FMEA.

CDRL deliverables:

- **A049 Failure Modes and Effect Analysis Study (DI-MISC-80508B)**

3.4.5.6 Accelerated Life Test (RDT&E)

The Contractor shall utilize an ATIP EDM unit and perform an ALT in accordance with the ATIP Specification, Appendix E, to validate parts performance, provide early detection of design weaknesses, and provide early reliability assessment and corrective action as detailed in the test plan. The Contractor shall develop an ALT test plan and procedure, and provide test results in a test report. The Government shall have the right to inspect, at the Contractor's facility, the data from all failure and corrective action analyses.

The ALT shall be completed in advance of the DVT. The Contractor shall submit a failure summary and analysis report of all analyses during the conduct of the ALT as part of the Reliability Test Report and as integrated into the overall FRACAS system. The Contractor shall provide resolution of the failure within forty-five (45) days of the failure occurrences during the ALT.

CDRL deliverables:

- **A050 Reliability Test Plan (DI-NDTI-81585A)**
- **A051 Reliability Test Procedures (DI-NDTI-80603A)**
- **A052 Reliability Test Reports (DI-TMSS-81586A)**

3.4.5.7 Maintainability – Testability Demonstration Test (RDT&E)

The Contractor shall develop a test plan, including test procedures, in accordance with the guidance provided in MIL-HDBK-470A, paragraph B.4.10, “TEST METHOD 9: Test for Mean Maintenance Time (Corrective, Preventive, Combination of Corrective and Preventive) and MMax”. The Contractor shall provide a sample task allocation of corrective maintenance tasks in accordance with MIL-HDBK-470A, Table B-VI “Stratification Procedure”. The Contractor shall provide 10 corrective maintenance tasks based on the predominant failure mode of the selected task. The Government will select five maintainability demonstration tasks 90 days prior to the demonstration. In addition, the Contractor shall provide a list of all preventive maintenance tasks that shall be conducted during the maintainability demonstration test.

The Contractor shall host the maintainability demonstration using an ATIP EDM asset provided under Section H of the contract and also provide fault insertion for the selected faults via Fault Insertion Device (FID), Pre-Faulted Module (PFM), or other methodology that is transparent to the maintainer for creating the fault/fault condition. The maintainability demonstration shall be performed by Government military personnel at the Contractor’s facilities; verify system maintenance and logistics documentation developed by the Contractor; and demonstrate that the ATIP meets specified maintainability and testability requirements detailed in the ATIP Specification. The Contractor shall be responsible for correcting deficiencies discovered during the demonstration and for incorporating approved changes into the EDM and production baselines accordingly.

CDRL deliverables:

- **A053 Maintainability/Testability Demonstration Test Plan (DI-MNTY-81604)**
- **A054 Maintainability/Testability Demonstration Test Report (DI-MNTY-81603)**

3.4.6 Quality Assurance (RDT&E)

The Contractor shall document and implement the specific quality practices and activities for all processes, including meeting contractual requirements, with emphasis on problem prevention. The Quality Assurance Program Plan shall address contract requirements, including subcontractor/vendor/supplier quality management and processes.

The Contractor shall ensure that Quality Assurance requirements specified in the ATIP Specification and contract documents are flowed down to all their major sub-suppliers of goods and services. The originator of the subcontracts/purchase orders shall clearly state within the Source Control Document (SCD) the extent of inspection surveillance which will actually be undertaken by the Contractor or its representative at the source of the supply.

Material or services provided by a subcontractor/vendor/supplier shall be controlled and verified by the Contractor in order to achieve quality requirements with regard to material, assembly, function and fit. The subcontractor/vendor/supplier shall verify that material used in fabrication is new, unused, and complies with detailed drawings, and that visual inspections of material have been made to confirm that material identification has been properly maintained.

The subcontractor/vendor/supplier shall provide and operate throughout the contract a quality system which meets the requirements of ISO 9001 ‘Quality Management Systems - Requirements’ or a comparable nationally or internationally recognized Standard.

The subcontractor/vendor/supplier quality assurance activities shall include those functions necessary to prove conformity to the ATIP Specification. They shall provide for the detection and removal of all non-conforming materials or faulty or inadequate workmanship, either prior to or at the latest state of process or manufacture, where the required characteristics can be measured and observed.

The Quality Assurance Program Plan shall include a section addressing the following elements related to subcontractors, vendors, and suppliers used by the Contractor in support of the ATIP:

- a. Does the supplier have copies of drawings with proper revision level and date?
- b. Does supplier have copies of all applicable Specifications?
- c. Has the supplier identified Non-Destructive Test (NDT) requirements?
- d. Has the supplier identified Qualified Products List (QPL) items and suppliers?
- e. Has the supplier identified all process requirements which require approval?
- f. Does the supplier furnish reasonable facilities and assistance for the safe and convenient performance of Government source inspection to include equipment adequate for the product being produced?
- g. Does the supplier have a system for assuring the quality of purchased material?
- h. Does the supplier assure that sub-suppliers furnish reasonable facilities and assistance for the safe and convenient performance of Government source inspection to include equipment adequate for the product being produced?
- i. Has the supplier passed all applicable technical and quality requirements to sub-suppliers?
- j. Does the supplier have an adequate selection of calibrated inspection equipment necessary for examination of the product being produced or procured?
- k. Does the supplier maintain an acceptable system to assure the accuracy and adequacy of measuring and test equipment which includes records, traceability to National Institute of Science and Technology (NIST), and a recall system?
- l. Does the supplier maintain records of all inspections and tests which indicate the nature and number of observations, the type and number of deficiencies found, the quantities accepted, and the quantities rejected?
- m. Does the supplier understand and use statistically valid sampling plans?
- n. Does the supplier have a system for identifying and segregating nonconforming material?
- o. Does the supplier understand the requirements for presenting nonconforming material for acceptance?
- p. Does the supplier maintain records of corrective action which address correction as to cause to prevent recurrence?

CDRL deliverables:

- **A055 Quality Assurance Program Plan (DI-QCIC-81794)**

3.5 SOFTWARE DEVELOPMENT

The Contractor is responsible for software/firmware development and for measuring progress with schedule, metrics, and reporting to the Government at program reviews. The design and development efforts shall be performed in accordance with Software Engineering Institute (SEI) Capability Maturity Model (CMM) Level 3 (minimum) practices and IEEE/EIA 12207.

3.5.1 Software Development Plan (RDT&E)

The Contractor shall generate and deliver a Software Development Plan (SDP) that describes all aspects of the software development (e.g., processes, tools, environment, test phases, verification, anomaly tracking, requirement traceability) in accordance with SEI CMM Level 3 (minimum) practices and IEEE/EIA 12207. The SDP shall include:

- a. Software architecture design approach.
- b. Code reuse strategies by identifying reused functionality, how it fits into the ATIP architecture, impact to newly developed code, and risk associated with software integration, interfaces, and performance, and software sustainment (e.g., state of existing software design documentation and the ability to sustain code from these documents). The Contractor shall not reuse software without express approval from the Government.
- c. Software development process including the use of software design, development, and generation tools that are used for development of computer software deliverables. The Contractor shall also state whether or not the tool is required for sustainment of the computer software deliverable, and if so, whether or not the development tool is also being delivered.
- d. Software requirements analysis approach.
- e. Software testing approach (e.g., unit testing, unit integration testing).
- f. CSCI/HWCI integration and testing approach.
- g. Executable software/firmware image development approach (e.g., preparing the source files, preparing the executable software)
- h. Software product evaluation approach.
- i. Software risk management approach.
- j. Software metrics.
- k. Software quality assurance.
- l. Software trouble reporting process and tracking tool concept including definition of severity and complexity levels (if used).
- m. Software build (or thread or other) approach, including impact of the approach to system development and integration.

CDRL deliverables:

- **A056 Software Development Plan (SDP) (DI-IPSC-81427A)**

3.5.1.1 Software Configuration Management (RDT&E)

The Contractor shall implement a Software CMP. The plan shall describe, at a minimum, the CM activities, procedures, and schedule for performing software CM activities; the organization(s) responsible for performing CM activities and their relationship with other organizations, such as software development or maintenance. The Contractor shall also disclose the software version/control tracking system including how the code will be marked and tracked during development, unit level test, system level test, and release. The plan shall be documented in the SDP and implemented.

CDRL deliverables:

- **A056 Software Development Plan (SDP) (DI-IPSC-81427A)**

3.5.2 Software Testing and Evaluation (RDT&E)

The Contractor shall implement a test program that supports management of the software units, software components, and software qualification testing process. The Contractor shall integrate the software units and software components and test as the aggregates are developed in accordance with the integration plan. The Contractor shall ensure that each aggregate satisfies the requirements of the software item and that the software item is integrated at the conclusion of the integration activity.

The Contractor shall conduct software qualification testing, to prepare for system integration, in accordance with the qualification requirements of the software item. The Contractor shall ensure that the implementation of each software requirement is tested for compliance.

The Contractor shall document and track all problems discovered as a result of software units, software components, and software quality testing as defined in section 3.4.1 herein.

3.6 HARDWARE DEVELOPMENT (RDT&E)

The Contractor shall perform all hardware engineering activities required to allocate hardware requirements, develop prototype hardware to validate functional capabilities, develop and integrate EDM hardware, test hardware, and ensure hardware production specifications are developed. All hardware must meet system and Contractor (or subcontractor) hardware requirement specifications. The Contractor shall ensure that all Contractor-developed test hardware has appropriate design margin to meet verification and PT stresses. The Contractor shall document and track problems discovered as a result of hardware testing as defined in section 3.4.1 herein.

3.7 SOFTWARE AND HARDWARE INTEGRATION (RDT&E)

The Contractor shall generate and implement a Software and Hardware Integration Test Plan which shall be used to verify that each piece of hardware and its associated software components operate together as specified in the ATIP Specification. The Software and Hardware Integration Test Plan shall also include testing requirements, objectives, environment, integration strategy (e.g., software integration sequence, hardware integration sequence, full hardware and software integration sequence, and subsystem integration sequence), procedures, test cases, and evaluation criteria.

The Contractor shall complete system integration testing prior to the start of DVT. During the system integration effort, the Contractor shall provide weekly integration status updates to the engineering IPT.

The Contractor shall develop and deliver to the Government a system integration test report.

This report shall include:

- a. Requirement traceability to individual software and hardware components.
- b. Test coverage of system requirements.
- c. Conformance to expected results.
- d. Software components and units of each software item that have been completely and correctly integrated with the hardware.
- e. Hardware items, software items, and manual operations of the system that have been completely and correctly integrated into the system.
- f. Integration efforts performed in accordance with the integration plan including the following integration tests:
 1. Software interfaces with hardware component correctly.
 2. Software error recovery options are completely tested.
 3. Software and hardware component interfaces with other hardware components correctly.

The Contractor shall document and track all problems discovered as a result of software and hardware integration testing as defined in section 3.4.1. These integration problems shall be included in the Software and Hardware Integration Test Report.

CDRL deliverables:

- **A057 Software/Hardware Integration Test Plan (DI-NDTI-80566A)**
- **A058 Software/Hardware Integration Test Procedure (DI-NDTI-80603A)**
- **A059 Software/Hardware Integration Test Report (DI-NDTI-80809B)**

3.8 TEST AND EVALUATION (RDT&E)

The ATIP shall be tested in accordance with the ATIP MoV developed by the Government and applicable Security Verification Test Plan (SVTP) developed by the Contractor and approved by the Government. The Contractor shall review the ATIP MoV, recommend updates that reflect the Contractor's current ATIP design and proposed testing methods by PDR, and incorporate changes as approved by the Government.

The Contractor shall generate and present to the Government at a TIM a SVTP which shall be used to verify ATIP system security requirements as specified in the ATIP Specification. The Contractor shall ensure each security requirement is testable and documented in the SVTP. The SVTP shall also include testing requirements, objectives, environment, procedures, methodologies, test cases, and evaluation criteria.

The Contractor shall notify the Government 30 working days prior to all tests to provide the Government the option to witness the testing.

CDRL deliverables:

- **A060 Security Verification Test Plan (DI-NDTI-80566A)**

3.8.1 EDM Testing

3.8.1.1 EDM Design Verification Testing (RDT&E)

The Contractor shall conduct DVT on an EDM unit. The DVT shall consist of all testing necessary to determine compliance with the ATIP requirements at the Contractor's facility and MDR/XDR Over-the-Air (OTA) communications with Follow-On Terminal (FOT)/NMT at the Government's facility in accordance with the ATIP MoV, SVTP, Government-approved test plan and procedure, and this SOW. The Contractor shall ensure that by completion of DVT, the hardware and software under test has been modified, as required, to correct design deficiencies and retested such that the ATIP is production-representative at the end of DVT. Modifications to design after the start of DVT shall require Government-approved plans for regression testing. After successful DVT, an FCA and a PCA shall be conducted on a tested unit to verify the design requirements have been achieved and will serve to define the pre-production baseline for documenting the EDM equipment.

The Contractor shall generate a test plan, test procedure, DVT test report, and security verification test report, which will be coordinated with and approved by the Government. The Contractor shall generate and present to the Government at a TRR meeting a plan that identifies how personnel, the ATIP, test equipment, and site assets are allocated to and scheduled for DVT. Prior to TRR, all Priority 1, 2, and 3 trouble reports shall be resolved with status presented at the TRR. The test plan shall include a system and allocated requirements cross-reference matrix illustrating the relationship between the test and requirements verified per test. The test plan shall identify reliance on test equipment and Government Furnished Equipment (GFE) for each test setup required.

CDRL deliverables:

- **A061 DVT Test Plan (DI-NDTI-80566A)**
- **A062 DVT Test Procedures (DI-NDTI-80603A)**
- **A063 DVT Test Report (DI-NDTI-80809B)**
- **A064 Security Verification Test Report (DI-NDTI-80809B)**

3.8.1.2 EDM Quality Conformance Inspection (RDT&E)

QCI shall be conducted on every ATIP EDM unit offered for delivery. The inspection shall consist of tests to meet workmanship screening requirements identified in Section 3.4.8 of the ATIP Specification and reveal the omissions and errors of the EMD phase, such as functional and performance tests at a limited number of points, tests that detect deviations from design, tests on controls/adjustments, and tests that detect hidden defects in materials. QCI shall include the examinations and tests in accordance with the ATIP MoV.

After each QCI, the Contractor shall submit to the Government a report of all failures and the impact of these failures on ATIP EDM.

CDRL deliverables:

- **A065 EDM QCI Test Plan (DI-NDTI-80566A)**

- **A066 EDM QCI Test Procedures (DI-NDTI-80603A)**
- **A067 EDM QCI Test Report (DI-NDTI-80809B)**

3.9 PRODUCTION (OPN)

Production consists of the ATIP production, First Article Inspection (FAI), and QCI of the production ATIPs. The production phase also encompasses the tasks needed to support related areas such as ILS, CM, and program management tasks associated with the ATIP procurement efforts.

The Contractor shall provide logistic support including updated documentation necessary during the production phase.

During the Production Phase the Contractor shall:

- Fabricate, test (FAI testing and production QCI) and deliver production ATIP units and spares in accordance with the Advanced TDMA Interface Processor Requirements Specification (herein referred to as the ATIP Specification.)
- Update the provision data, TMs, training materials, and design documentation reflecting any changes in the production ATIPs.
- Conduct an FCA/PCA and provide results.

3.9.1 Configuration Verification and Audit (OPN)

ATIP production unit configuration verifications (consisting of an FCA and PCA) shall be performed after successful FAI. The configuration verification shall be conducted utilizing the guidelines provided in MIL-HDBK-61A(SE), section 8, "Configuration Verification and Audits". PCA shall be conducted on a tested unit used in support of FAI to define the configuration baseline using the equipment's SAR. The production configuration verification shall serve as the establishment of the product baseline for final acceptance of production equipment.

The Contractor shall provide:

- A plan detailing the FCA compliance matrix of ATIP Specification performance requirements, test procedures used, test results, and the associated MSI/SAR for the FCA test CIs including software listings for each CSCI. The plan shall also include the PCA requirements for validating/verifying the production product baseline.
- A report detailing the actions conducted during the configuration audit including any discrepancies noted with resolution provided and establishment of the product baseline hardware and software record.

CDRL deliverables:

- **A068 Production Configuration Audit Plan (DI-SESS-81646)**
- **A069 Production Configuration Audit Summary Report (DI-CMAN-81022C)**

3.9.2 Reliability Tracking (OPN)

The Contractor shall update and maintain a FRACAS to document all problems found during production phase, covering all production units. A FRACAS review will be conducted as part of the PMR (per section 3.1.4.2).

CDRL deliverables:

- **A045 Failure Reporting & Corrective Action System Report (DI-RELI-80255)**

3.9.3 Production Test (OPN)

3.9.3.1 First Article Inspection Testing (OPN)

The Contractor shall perform FAI testing on the first production ATIP unit of each production CLIN exercised. FAI testing shall consist of all testing necessary to determine compliance with the ATIP requirements in accordance with the methodology identified in the ATIP MoV. After successful FAI, an FCA and PCA shall be conducted on a tested unit to verify the design requirements have been achieved. The FAI Test Report will serve to define the production baseline for documenting the ATIP equipment design.

CDRL deliverables:

- **A070 FAI Test Plan (DI-NDTI-80566A)**
- **A071 FAI Test Procedures (DI-NDTI-80603A)**
- **A072 FAI Test Report (DI-NDTI-80809B)**

3.9.3.2 Production Quality Conformance Inspection (OPN)

A production QCI shall be performed on every production ATIP unit offered for delivery. The inspection shall consist of tests to meet workmanship screening requirements identified in Section 3.4.8 of the ATIP Specification and reveal the omissions and errors of the production process, such as functional and performance tests at a limited number of points, tests that detect deviations from design, tests on controls/adjustments, and tests that detect hidden defects in materials. Production QCI inspection shall include the examinations and tests in accordance with the ATIP MoV.

After each production QCI inspection, the Contractor shall submit to the Government a report of all failures and the impact of these failures on production.

CDRL deliverables:

- **A073 Production QCI Test Plan (DI-NDTI-80566A)**
- **A074 Production QCI Test Procedure (DI-NDTI-80603A)**
- **A075 Production QCI Test Report (DI-NDTI-80809B)**

3.9.4 ATIP TermSim Production (OPN)

If the ATIP TermSim production CLIN option is exercised, the Contractor shall produce and deliver ATIP TermSims in accordance with the quantities specified upon exercise of the option. The Contractor shall develop a Production QCI Test Procedure and test the production ATIP TermSims to verify proper operation on all ports at all ATIP data rates.

For each ATIP TermSim production CLIN exercised, the Contractor shall notify the Government of all changes to the ATIP TermSim that significantly impact the system or equipment configuration (e.g., changes to form, fit, or function). The report shall including the following data:

- Original configuration.
- New configuration.
- Description of changes, including designation as minor, major or critical and rationale for change.
- Changes in components and part numbers.
- Changes to technical documentation (e.g., ATIP TermSim Operating Guide).
- Changes in performance/operability/interoperability to other ATIP TermSim.
- Changes in cost.
- Effect on delivery schedule.

CDRL deliverables:

- **A076 ATIP TermSim Production QCI Test Procedure (DI-NDTI-80603A)**
- **A077 ATIP TermSim Production QCI Test Report (DI-NDTI-80809B)**
- **A078 ATIP TermSim Design Changes Notification (DI-MISC-80508B)**

3.10 INTEGRATED LOGISTIC SUPPORT

3.10.1 Logistic Support

The Contractor shall provide at design reviews, PMRs, and TIMs ILS planning that clearly defines the life-cycle ILS requirements and tasks in adequate detail to ensure that ATIP installations can be supported in an operational environment.

3.10.2 Repair Analysis (RDT&E)

The Contractor shall perform a Level of Repair Analysis (LORA) of the ATIP to establish the performance level at which an item will be replaced, repaired, or discarded based on economic and non-economic considerations and operational readiness requirements. The Contractor shall provide rationale for how the non-economic analysis was performed and how the results were derived. The Contractor shall use a DoD- or Government-approved industry standard LORA model to conduct the LORA.

CDRL deliverables:

- **A079 LORA (DI-MISC-80508B)**

3.10.3 Supply Support

3.10.3.1 Provisioning Support (OPN)

As provided in Section 3.3.5 herein, the SAIP concept provides the necessary provisioning efforts to procure spares concurrently with production equipment for cost savings and to establish the Government's MSD concurrent with the first production ATIP installation. DCNs will be used to maintain the proper configuration identification throughout the production phase.

3.10.3.1.1 Provisioning Technical Documentation (OPN)

The Contractor shall prepare/update Provisioning Screening Data (PSD) through Defense Logistics Support Center (DLSC) for first-appearance items (first to be produced). The provisioning screening results shall be input by the Contractor into the Contractor's Supply Support Supportability Analysis Summaries (SAS) worksheet. The Contractor is authorized to use Parts Master or other commercial-type provisioning screening process as approved by Naval Inventory Control Point (NAVICP). The Contractor shall provide Provisioning Technical Documentation (PTD) in accordance with requirements herein, the Supply Support Logistic Management Information (LMI) SAS worksheet, and the associated deliverables.

During the provisioning conference review of the PTD the Contractor shall have available the LORA and FMEA CDRLs, as well as ATIP equipment to aid in technical coding and cataloging. The PTD shall be provided in individual Provisioning List Item Sequence Number (PLISN) order as sequenced by reference designation and indenture code. The efforts shall provide a complete provisioning package in reference-designator and indenture-level order for the ATIP equipment. A separate provisioning file shall be developed for each ATIP nomenclature. The Provisioning Guidance Conference will be used to review Interactive Computer-Aided Provisioning System (ICAPS), Development Plan Document (DPD) elements, Standard Procurement System (SPS), and other provisioning requirements. The PTD baseline shall be updated to provide the provisioning efforts for DCNs during the EMD phase. The Contractor shall continue to submit DCNs for the life of the production contract.

CDRL deliverables:

- **A080 Interactive Computer Aided Provisioning System Data File Exchange (DI-ALSS-81545)**

3.10.3.1.2 Supplemental Data for Provisioning (OPN)

Approved Supplemental Data for Provisioning (SDFP) is required for all systems or equipment procured for Government use and for which PTD is being acquired. It is the technical data that provides definitive identification of dimensional, material, mechanical, electrical, or other characteristics adequate for provisioning of the support items of the end article(s) on contract. SDFP consists of data such as specifications, standards, drawings, photographs, sketches and descriptions, and the necessary assembly and general arrangement drawings, schematics, drawings, schematic diagrams, wiring and cable diagrams, or what is sometimes referred to as form, fit, and function. This data is necessary for the assignment of Source, Maintenance, and Recoverability (SMR) codes, for assignment of Item Management Codes, prevention of proliferation of identical items in the Government inventory, maintenance decisions, and item identification necessary in the assignment of a National Stock Number (NSN). SDFP format and content must be prepared in accordance with the latest industry standards and must be reproducible, as outlined below. Approved SDFP shall contain all appropriate annotations (e.g., proper Distribution Statements). For items without an NSN, recognized industry standard, or Government specification or standard, the following order of precedence is required for SDFP:

- a. Technical data equivalent to approved Product Engineering Drawings as defined in MIL-STD-31000
- b. Commercial drawings
- c. Commercial manuals, catalogs, or catalog descriptions; and

- d. Sketches or photographs with a brief description of dimensional, material, mechanical, electrical, or other characteristics.

SDFP shall include the following:

- a. Technical identification of items requiring maintenance support considerations.
- b. Preparation of item identification for the purpose of assigning NSNs.
- c. Review for item entry control.
- d. Standardization.
- e. Review for potential interchangeability and substitutability.
- f. Item management coding.
- g. Preparation of allowance/issue lists.
- h. SMR coding.

SDFP shall not be provided when the item is: (1) Identified by a Government specification or standard that completely describes the item including its material, dimensional, mechanical, and electrical characteristics; (2) Identified in Defense Logistics Information as having an NSN with salient characteristics identical to the item; and/or (3) Listed as a reference item (subsequent appearance of an item) on a parts list.

CDRL deliverables:

- **A081 Supplemental Data for Provisioning (DI-ALSS-81557)**

3.10.3.1.3 Design Change Notices (OPN)

The Contractor shall maintain the Supply Support SAS worksheet (see section 3.10.3.1.1 above) during the life of the contract. Updates/changes shall occur by providing DCNs. The Contractor shall notify PMW/A 170 and NAVICP/Naval Sea Logistics Center (NSLC) of all changes approved for incorporation into the end item and which modify, add to, delete, or supersede parts in the end item or its supporting equipment. A complete ICAPS record shall be provided for each change to completely detail the date element changes. When an approved change requires new identification as specified in American Society of Mechanical Engineers (ASME) Y14.100, the Contractor shall submit PTD revisions via DCNs in accordance with the following:

- a. When the approved change affects interchangeable repairable assemblies so as to introduce non-interchangeable parts, identify the part number before the change as a deletion and the part number after the change as an addition.
- b. Change and document the part number of the next higher assembly, and those of all progressively higher assemblies, up to the assembly where interchangeability is reestablished. PTD shall identify the interchangeable assembly.
- c. SDFP is not required for deleted items.
- d. Changes that occur after PTD delivery.
- e. Provide drawings so that alternate sources may be selected in case of parts obsolescence.

When the design change significantly impacts the system or equipment configuration (e.g., changes form, fit, or function), or when directed by the PCO, a change to the system or equipment shall be provisioned as a new end item and documented by PTD with associated SDFP.

CDRL deliverables:

- **A082 Interactive Computer Aided Provisioning System Data File Exchange - Design Change Notice (DI-ALSS-81545)**
- **A083 Supplemental Data for Provisioning - Design Change Notice (DI-ALSS-81557)**

3.10.3.1.4 Supply Chain Reliability (OPN)

The Contractor shall perform a criticality analysis to identify the mission-critical functions as related to the associated hardware item that may result in Level I and II protection failures due to operational, system information, or component integrity aspects using the family tree detailed in paragraph 3.4.2.1.1 Equipment Top-Down Breakdown. The following criteria shall be added to CDRL A031 Equipment Top-Down Breakdown:

- a. Criticality to mission criticality using the following criticality levels:
 - 1) Level I (Catastrophic) protection failure is a failure that results in total compromise of mission capability.
 - 2) Level II (Critical) protection failure is a failure that results in unacceptable compromise of mission capability or significant mission degradation.
 - 3) Level III (Marginal) protection failure is a failure that results in partial compromise of mission capability or partial mission degradation.
 - 4) Level IV (Negligible) protection failure is a failure that results in little or no compromise of mission capability.
- b. For each Level I and II mission-critical function identified detail the associated logic-bearing system components that implement, or introduce vulnerability to these functions (hereafter referred to collectively as the “critical components”).
- c. For each Level I and II mission critical function detail how visibility is provided into the supply chain for critical components, identifying risks to that supply chain, and risk mitigation to counter those risks.
- d. For each Level I and II mission critical function detail the countermeasures to mitigate foreign intelligence, technology exploitation, supply chain and battlefield threats and system vulnerabilities that result in the catastrophic and critical protection failures, including:
 - 1) The enumeration of *potential* suppliers of critical components, as they are identified, including cost, schedule and performance information relevant for choice among alternates and planned selection for the purpose of engaging with the government to develop mutually-agreeable risk management plans for the suppliers to be solicited.
 - 2) The processes to control access by foreign nationals to program information, including, but not limited to, system design information, DoD-unique technology, and software or hardware used to integrate commercial technology.

- 3) The processes and practices employed to ensure that genuine information and communications technology (ICT) will be employed in the solution and that processes and requirements for genuine ICT are levied upon subcontractors.
- 4) The process used to protect unclassified DoD information in the development environment.

CDRL deliverables:

- **A031 Equipment Top-Down Breakdown (DI-MISC-80508B)**

3.10.3.2 Spares (OPN)

The Contractor shall provide two complete ATIP units to support system stock and four complete ATIP LRUs.

3.10.4 Training Services

3.10.4.1 Train the Trainer Curriculum (OPN)

The Contractor shall develop a training curriculum package (“Train the Trainer”) for the purpose of training users of the ATIP. The Contractor shall provide all published training materials and guides associated with all COTS software and hardware, including all updated training materials after release of new commercially available versions of COTS products as part of CDRL A085 as described in section 3.10.4.3 herein. The Contractor shall provide the training curriculum in an editable version, and provide the Government with the rights to tailor the materials in accordance with Federal Acquisition Regulation (FAR) 52.227-17.

3.10.4.2 Instructional Performance Requirements Document (OPN)

The Contractor shall prepare an Instructional Performance Requirements Document (IPRD) detailing specific personnel performance requirements data necessary to support the design of a training program. The IPRD shall define mission; collective and individual task information; lists of knowledge, skills, attitudes; and learning objectives for the tasks that have been selected for training. The IPRD will be reviewed and evaluated by the Government for accuracy and completeness based on MIL-PRF-29612B, paragraph 4.3.2.2, “Instructional Performance Requirements Document–Type B” using 100% pass/fail criteria.

CDRL deliverables:

- **A084 Instructional Performance Requirements Document (DI-SESS-81518B)**

3.10.4.3 Course Conduct Information Package (OPN)

The Course Conduct Information Package (CCIP) provides data required to support training activities. The CCIP shall provide sufficient information for an accurate evaluation of a student’s capabilities to meet all learning objectives of a course and shall identify prerequisite knowledge and skills of students entering the course. The CCIP shall inform students of the training syllabus, organization, operation, scheduling, and other pertinent information, as well as provide information on trainee’s performance evaluation, the trainee’s evaluation of the provided course, and shall provide the trainee a certificate of completion of the training. The CCIP shall include the following elements:

- a. Trainee orientation guidance.
- b. Training course standards.

- c. Trainee materials.
- d. Training course completion information including trainee completion certificate.

The CCIP will be reviewed and evaluated by the Government for accuracy and completeness based on MIL-PRF-29612B paragraph 4.3.6.2. "Course Conduct Information Package–Type B" using 100% pass/fail criteria.

CDRL deliverables:

- **A085 Course Conduct Information Package (DI-SESS-81522B)**

3.10.4.4 Test Package (OPN)

The test package shall provide specific data necessary for the examination of an individual or unit's knowledge, skills, attitudes, and achievement of learning objectives or performance standards. The test package shall include the following elements:

- a. Test items.
- b. Tests.
- c. Test administration materials.
- d. Testing plan.
- e. Test administrator's guide.

The Test Package will be reviewed and evaluated by the Government for accuracy and completeness based on MIL-PRF-29612B paragraph 4.3.9.2. "Test Package–Type B" using 100% pass/fail criteria.

CDRL deliverables:

- **A086 Course Test Package (DI-SESS-81525B)**

3.10.5 Technical Data Package (OPN)

The Contractor shall deliver complete Level III Production Drawings and associated parts lists for the complete ATIP system. The TDP shall be sufficient to fully reproduce the parts, items, or assembly in accordance with, paragraphs 5.7.1.3 (Production Level), 5.7.2.2 (Type 3D), and 5.7.3.3 (Product drawings/models and associated lists). The TDP shall not include MIL-STD-31000, paragraph 5.7.3.6 (Tooling, Test Fixtures or Test Cables). Product drawings/models and associated parts lists shall be prepared to provide the design, engineering, manufacturing, fabrication, drilling, assembly and quality assurance requirements information necessary to enable the procurement or manufacture of an item essentially identical to the original item. The TDP shall reflect the approved, tested, and accepted configuration of the defined delivered item. Drawings shall provide design, engineering, fabrication, drilling, and manufacturing details; list materials; alternate materials; and provide source control information and specifications as applicable.

CDRL deliverables:

- **A087 Product Drawings/Models and Associated Lists (DI-SESS-81000D)**
- **A088 Commercial Drawings/Models and Associated Lists (DI-SESS-81000D)**

3.10.5.1 Technical Manuals (RDT&E)

The Contractor shall establish, develop, and maintain an Operations and Maintenance (O&M) TM quality assurance program and conduct TM quality assurance program planning, validation planning, and validation certification for the complete ATIP system. All TM data/deliverables shall be developed in accordance with the requirements defined in ATIP TMCR and associated CDRLs.

The TM development shall support an Initial Guidance Conference (IGC) prior to starting the TM tasks and IPRs at the 50%, 75%, 100%, and Validation & Verification (V&V) completion points. The TM shall be established as stand-alone data/deliverables independent of any other TM or Interactive Electronic TM (IETM).

Upon completion of the 100% IPR, the Contractor shall host a V&V review at their facility and also support the Government V&V at the designated land based test facility and onboard Navy platform(s) to ensure technical correctness and fleet usability of the TMs. The conduct of the V&V shall be coordinated by the Government with the Contractor to support Navy test events.

CDRL deliverables:

- **A089 System Component Functional Breakdown Analysis (DI-MISC-80508B)**
- **A090 SLDD and CPDD XML Source Files (DI-MISC-80508B)**
- **A091 Media Source Files (DI-MISC-80508B)**
- **A092 Evidence of Content Review and Validation (DI-MISC-80508B)**
- **A093 PDF Assembly of a Single Technical Manual (DI-MISC-80508B)**
- **A094 Verification Discrepancy/Disposition Record (DI-MISC-80508B)**
- **A095 Technical Manual Verification Incorporation Certificate (DI-MISC-80508B)**
- **A096 TMPOD Manual (DI-MISC-80508B)**
- **A097 ATIS-Compatible CD-ROM (DI-MISC-80508B)**
- **A098 Technical Manual Quality Assurance Plan (DIMISC-80508B)**

3.10.6 Packaging, Handling, Storage, and Transportation (OPN)

The ATIP shall be packaged, handled, stored, and transported in accordance with ASTM D 3951-95 and ASTM D 4169-94. The shipping containers shall be capable of withstanding repeated openings and closures, repeated handling, and the hazards of shipment, storage, and stowage consistent with the non-operating sheltered environment specified in ATIP Specification. The shipping container and content shall not exceed 18.18 kilograms (40 pounds) for one-man lifting requirements. If the shipping container and content exceed 18.18 kilograms (40 pounds), the container shall have lifting features and center of gravity markings to support safe handling procedures. Electrostatic Discharge (ESD) and safety warnings as needed shall be marked accordingly. The Contractor will mark each shipping container and piece with UID in accordance with section 3.4.2.1.3 "Unique Identification".

3.10.7 Diminishing Manufacturing Sources/Material Shortage (OPN)

The Contractor shall be responsible for managing obsolescence over the entire period of the contract, and notwithstanding any obsolescence issues or problems, the Contractor remains responsible for meeting all

performance and other requirements of this contract. This obsolescence management responsibility includes an ongoing review and identification of actual and potential obsolescence issues, including obsolescence of components, assemblies, sub-assemblies, piece parts, and material (hereafter referred to for purposes of this section only as "parts and/or material"). The Contractor is responsible for all costs associated with obtaining a replacement if and when any part and/or material become obsolete. The costs for which the Contractor is responsible include the costs of investigating part availability, interchangeability and substitutability, locating part replacement, vendor interface, engineering efforts, testing requirements, internal drawing changes. The Contractor shall prevent any additional costs from being incurred by the Government due to obsolescence. Any configuration changes due to obsolescence shall be approved in accordance with the CM requirements (section 3.4.2) of this SOW. The Contractor shall provide the Government with obsolescence status briefs as part of the periodic program reviews provided for under the contract.

3.10.8 Software Sustainment Support (O&M,N)

The Contractor shall provide software sustainment support of the fielded ATIP systems. The software sustainment support activities shall include:

- a. Maintain software trouble reports provided by the Government. Identify any required modifications necessary to address issues, problems, and software failures as identified by the fleet users or the Government.
- b. The Contractor shall provide annual software releases Addressing software updates and software trouble report resolution. The Contractor shall coordinate the content of these releases with the Government.
- c. Design and test software changes and modifications along with system regression testing to ensure changes are ready for release. The Contractor shall provide a test report for each software release.

The Contractor shall maintain and implement a Software Transition Plan (STrP) that clearly defines hardware, software, and other resources needed for life cycle support of the ATIP software. The Contractor shall update and maintain a FRACAS to document all problems found during sustainment.

CDRL deliverables:

- **A045 Failure Reporting & Corrective Action System Report (DI-RELI-80255)**
- **A099 Software Transition Plan (DI-IPSC-81429A)**

4 GOVERNMENT FURNISHED PROPERTY

The Government will furnish communications equipment to enable development and testing of the ATIP. A list of Government-furnished Property (GFP) is located in Section H of the contract. If for any reason an option is not exercised, the Contractor shall return any GFP to the Government within 45 days after an option-exercise period ends. The Contractor shall not modify the GFP without prior written approval from the Government. See Section H clause H-2 Government Furnished Property, and Section I clause 52.245-1 Government Property, for requirements when modifying GFP. The Contractor shall return all GFP to the Government in the original condition in which it was furnished to the Contractor, unless a letter is sent by the Government to the Contractor allowing the return of modified GFP.

The Contractor shall provide monthly status updates regarding GFP in accordance with CDRL A100.

CDRL deliverables:

- **A100 Government Furnished Property (GFP), Status and Management Report (DI-MGMT-80227)**

5 TECHNICAL DATA / SOFTWARE RIGHTS

5.1 EMD SOFTWARE LICENSE AND TECHNICAL DATA RIGHTS (RDT&E)

The Government requests that the Contractor provide a minimum of Government Purpose Rights (GPR) as defined in DFARS Subsection 252.227-7013 to the maximum extent practicable for all noncommercial technical data delivered under this contract.

The Government requests that the Contractor provide a minimum of GPR as defined in DFARS Subsection DFARS 252.227-7014 to the maximum extent practicable for noncommercial computer software and noncommercial computer software documentation delivered under this contract.

For Commercial Technical Data and Commercial Computer Software and Commercial Computer Software Documentation, the Government desires the Contractor provide commercial license rights to the maximum extent practicable, which are equivalent to GPR.

5.2 PRODUCTION SOFTWARE LICENSE AND TECHNICAL DATA RIGHTS (OPN)

The Government requests that the Contractor provide a minimum of GPR as defined in DFARS Subsection 252.227-7013 to the maximum extent practicable for all noncommercial technical data delivered under this contract.

The Government requests that the Contractor provide a minimum of GPR as defined in DFARS Subsection DFARS 252.227-7014 to the maximum extent practicable for noncommercial computer software and noncommercial computer software documentation delivered under the performance of this contract.

For Commercial Technical Data and Commercial Computer Software and Commercial Computer Software Documentation, the Government desires the Contractor provide commercial license rights to the maximum extent practicable, which are equivalent to GPR.

6 WARRANTY

The Contractor shall deliver the ATIP production units to the Government with a one-year warranty in accordance with FAR Clause 52.246-19 -- Warranty of Systems and Equipment under Performance Specifications or Design Criteria.

7 PLACE OF PERFORMANCE

Place of Performance shall be at the Contractor's site.

8 NAVY MARINE CORPS INTRANET

The Contractor is not required to procure Navy Marine Corps Intranet (NMCI) seats for personnel working at the Contractor site.

9 SECURITY

The work performed by the Contractor under this contract will include access to Secret data, information, and spaces. The Contractor will be required to attend meetings classified at the Secret level.

All work is to be performed in accordance with DoD and Navy Operations Security (OPSEC) requirements and in accordance with the OPSEC attachment to the DD254.

Note: If foreign travel is required, all outgoing Country/Theater clearance message requests shall be submitted to the Space and Naval Warfare Systems Command (SPAWAR) Systems Center (SSC) San Diego foreign travel team, Old Town Campus Building 2, Room 1656 for action. A Request for Foreign Travel form shall be submitted for each traveler at least 35 days of departure to initiate the release of a clearance message. Each Traveler must also submit a Personal Protection Plan and have a Level 1 Antiterrorism/Force Protection briefing within one year prior to departure and a country-specific briefing within 90 days prior to departure.

APPENDIX A DEFINITIONS AND ACRONYMS

DEFINITIONS

- a. **Built-In-Test (BIT):** BIT is an essential capability of the ATIP that provides an integrated automated test capability to detect, diagnose, and isolate system failures both on-line and off-line.
- b. **Commercial Item:** (1) has been sold, leased, or licensed to the general public; or (2) has been offered for sale, lease, or license to the general public; or any item that evolved through advances in technology or performance and that is not yet available in the commercial marketplace, but will be available in the commercial marketplace in time to satisfy the delivery requirements under a Government solicitation. Also included in the definition are services in support of a commercial item, or a type offered and sold competitively in substantial quantities in the commercial marketplace based on established catalog or market prices for specific tasks performed under standard commercial terms and conditions; this does not include services that are sold based on hourly rates without an established catalog or market price for a specific service performed (FAR 2.101).
- c. **Day:** Calendar day unless otherwise specified.
- d. **Depot Level Maintenance:** Maintenance done on material requiring major rework or a complete rebuild of parts, assemblies, subassemblies, and end-items, including manufacture, modification, testing, and reclamation of parts as required. Depot Level maintenance serves to support lower levels of maintenance by providing technical assistance and performing maintenance beyond the responsibility of Organizational Level and Intermediate Level maintenance. Depot Level maintenance provides stocks of serviceable equipment by using more extensive facilities for repair than are available in lower level maintenance activities.
- e. **Government:** Government is PEO C4I, PMW/A 170 unless otherwise specified.
- f. **Intermediate Level Maintenance:** Maintenance that is the responsibility of, and performed by, designated maintenance activities for direct support of using organizations. Its phases normally consist of calibration, repair or replacement of damaged or unserviceable parts, components, or assemblies; the emergency manufacture of nonavailable parts; and the provision of technical assistance to using organizations.
- g. **Lowest Replaceable Unit (LRU):** An item that will be replaced at the organizational level of maintenance for both sheltered and unsheltered equipment. The item is defined as a subassembly (e.g., circuit card assembly, network I/F card, low voltage power supply, high voltage power supply), which is part of an assembly (e.g., equipment drawer) or unit (e.g., ATIP Processor).
- h. **Maintenance Significant Item (MSI) level:** The MSI level is defined as the configuration identification top-down breakdown to the removal and replacement level of an item/component either at the organizational, intermediate, or depot level maintenance, but not including piece parts.

- i. **Modular:** Designed with standardized units or dimensions, as for easy assembly and repair or flexible arrangement and use (Plug and Play).
- j. **Naval sheltered environment:** This term refers to the location of equipment, components, or subsystems. Naval sheltered means inside the skin of the ship or inside the hull on decks 2 and lower and includes the deck house on decks 1 and above (e.g., 1, 01, 02). For shore installations, the location is inside interior walls/buildings that are within a ground controlled environment.
- k. **Naval unsheltered environment:** This term refers to the location of equipment, components, or subsystems. Naval unsheltered means outside the skin of the ship or outside the hull on decks 2 and below, and outside the deckhouse on decks 1 and above (e.g. 1, 01, 02). For shore installations, the location is outside the walls/buildings that are within a ground-fixed environment.
- l. **Non-Developmental Item:** For Hardware, (1) any previously developed item of supply used exclusively for governmental purposes by a Federal Agency, a State or local government, or a foreign government with which the United States has a mutual defense cooperation agreement; (2) any item described in (1) that requires only minor modification or modifications of the type customarily available in the commercial marketplace in order to meet the requirements of the procuring department or agency; or (3) any item described in (1) or (2) solely because the item is not yet in use (Federal Acquisition Regulation (FAR) 2.101).
- m. **Organizational Level Maintenance:** Maintenance at the LRU level, which is the responsibility of, and performed by, a using organization on its assigned equipment. Its phases normally consist of inspecting, servicing, lubricating, adjusting, and replacing parts, minor assemblies, and subassemblies.
- n. **Quarterly:** Three months.
- o. **Team:** Team is comprised of Contractor and Government personnel.
- p. **Week:** One week is comprised of 40 work hours.

ACRONYMS

AEHF	Advanced Extremely High Frequency
ALT	Accelerated Life Test
ANSI	American National Standards Institute
AP	ATIP Processor
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATIP	Advanced TDMA Interface Processor
BCA	Broadcast Command Authority
BIT	Built-In Test
BITE	Built-In Test Equipment
C&A	Certification and Accreditation
C4I	Command, Control, Communications, Computers and Intelligence
CAGE	Commercial and Government Entity Code
CCIP	Course Conduct Information Package
CDF	Criticality, Difficulty, and Frequency
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CDROM	Compact Disk Read Only Memory
CFR	Code of Federal Regulation
CI	Configuration Item
CISN	Communications, Information Systems and Networks
CLIN	Contract Line Item Number
CM	Configuration Management
CMATT	CISN Management & Analysis Training Tool
CMM	Capability Maturity Model
CMP	Configuration Management Plan
COR	Contracting Officer's Representative
COTS	Commercial Off-The-Shelf
CPFF	Cost Plus Fixed Fee
CPSMR	Contractor's Progress, Status and Management Report
CSA	Configuration Status Accounting
CSCI	Computer Software Configuration Item
CWBS	Contract Work Breakdown Structure
DCN	Design Change Notice
DFARS	Defense Federal Acquisition Regulation Supplement
DISA	Defense Information Systems Agency
DLA	Defense Logistics Agency
DLIS	Defense Logistics Information Service
DLSC	Defense Logistics Support Center
DoD	Department of Defense
DoDI	Department of Defense Instruction
DPD	Development Plan Document
DVT	Design Verification Test
ECP	Engineering Change Proposal
EDM	Engineering Development Model
EHF	Extremely High Frequency

EIA	Electronics Industries Association
EMD	Engineering and Manufacturing Development
ESD	Electrostatic Discharge
ESOH	Environmental, Safety, and Occupational Health
FAI	First Article Inspection
FCA	Functional Configuration Audit
FID	Fault Insertion Device
FLD	Fault Logic Diagram
FMEA	Failure Modes and Effects Analysis
FOT	Follow-On Terminal
FPGA	Field Programmable Gate Array
FRACAS	Failure Reporting and Corrective Action System
GFE	Government Furnished Equipment
GFP	Government Furnished Property
GOTS	Government Off-the-Shelf
GPR	Government Purpose Rights
HARPS	Human Analysis Requirements Planning System
HAZMAT	Hazardous Material
HAZWOPER	Hazardous Waste Operations and Emergency Response
HFE	Human Factor Engineering
HMMP	Hazardous Materials Management Program
HRS	Hardware Requirement Specification
HSI	Human Systems Integration
HW	Hardware
HWCI	Hardware Configuration Item
IA	Information Assurance
ICAPS	Interactive Computer-Aided Provisioning System
ICD	Interface Control Document
ICD	Installation Control Drawing
IEEE	Institute of Electrical and Electronics Engineers
IETM	Interactive Electronic Technical Manual
I/F	Interface
IGC	Initial Guidance Conference
ILS	Integrated Logistic Support
IP	Internet Protocol
IPR	In-Process Review
IPRD	Instructional Performance Requirements Document
IPT	Integrated Product Team
JETDAS	Joint Electronics Type Designation Automated System
JTA	Job Task Analysis
KSA	Knowledge, Skills, and Attitudes
LMI	Logistic Management Information
LORA	Level of Repair Analysis
LRU	Line Replaceable Unit
MDR	Medium Data Rate
MILSATCOM	Military Satellite Communications
MOSA	Modular Open Systems Architecture
MoV	Method of Verification

MSD	Material Support Date
MSI	Maintenance Significant Item
NAS	National Aerospace Standard
NAVICP	Naval Inventory Control Point
NAVSEAINST	Naval Sea Systems Command Instruction
NCTAMS	Naval Computer & Telecommunications Area Master Station
NDI	Non-Developmental Item
NDT	Non-Destructive Test(ing)
NEPA	National Environmental Policy Act
NIST	National Institute of Science and Technology
NMCI	Navy Marine Corps Intranet
NMT	Navy Multiband Terminal
NOR	Notice of Revision
NPRD	Network Program Requirements Document
NSERC	Naval Systems Engineering Resource Center
NSLC	Naval Sea Logistics Center
NSN	National Stock Number
NSWC	Naval Surface Warfare Center
O&M,N	Operations and Maintenance, Navy
OPN	Other Procurement, Navy
OPNAV	Office of the Chief of Naval Operations
OPNAVINST	OPNAV Instruction
OPSEC	Operations Security
OSHA	Occupational Safety and Health Act
OT	Operational Test
OTA	Over-The-Air
QCI	Quality Conformance Inspection
QoS	Quality of Service
PAC	Post-Award Conference
PCA	Physical Configuration Audit
PCO	Procuring Contracting Officer
PC	Personal Computer
PDR	Preliminary Design Review
PEO	Program Executive Office
PFM	Pre-Faulted Module
PLISN	Provisioning List Item Sequence Number
PMP	Program Management Plan
PMR	Program Management Review
PMW	Program Manager Warfare
PSD	Provisioning Screening Data
PT	Production Test(ing)
PTD	Provisioning Technical Documentation
QCI	Quality Conformance Inspection
QoS	Quality of Service
QPL	Qualified Products List
RDT&E	Research, Development, Test & Evaluation
RFD	Request for Deviation
RFP	Request for Proposal

RMA	Reliability, Maintainability, and Availability
RMP	Risk Management Plan
SAIP	Spares Acquisition Integrated with Production
SAR	Serialized Assembly Record
SAS	Supportability Analysis Summary
SATCOM	Satellite Communication
SDFP	Supplemental Data for Provisioning
SDP	Software Development Plan
SDR	System Design Review
SEI	Software Engineering Institute
SMP	Subcontractor Management Plan
SMR	Source, Maintenance, and Recoverability
SOW	Statement of Work
SPAWAR	Space & Naval Warfare Systems Command
SPS	Standard Procurement System
SRS	Software Requirement Specification
SSA	System Security Analysis
SSC	SPAWAR Systems Center
SSP	Single Stock Point
SSPP	System Safety Program Plan
STIG	Security Technical Implementation Guide
STP	Software Test Plan
STR	Software Test Report
STrP	Software Transition Plan
SVTP	Security Verification Test Plan
SWaP	Size, Weight, and Power
TDL	Technical Direction Letter
TDBD	Top-Down Breakdown
TDMA	Time Division Multiple Access
TDP	Technical Data Package
T&E	Test and Evaluation
TermSim	Terminal Simulator
TIF	Terminal Interface Function
TIM	Technical Interchange Meeting
TIP	TDMA Interface Processor
TM	Technical Manual
TMCR	Technical Manual Contract Requirements
TRR	Test Readiness Review
TU	Transmission Unit
UAV	Unmanned Aerial Vehicle
UID	Unique Identification
V&V	Validation & Verification
XDR	Extended Data Rate