DRAFT STATEMENT OF WORK
for the
Advanced TDMA Interface Processor (ATIP)
Engineering and Manufacturing Development (EMD) &
Production

Revision 0.61
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Prepared for:
Program Executive Office C4I
PMW/A 170 ATIP Program
4301 Pacific Highway
San Diego 92110-3127

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Statement of Work (SOW) for the Advanced TDMA Interface Processor (ATIP) System Engineering and Manufacturing Development (EMD) & Production

1 INTRODUCTION

The Legacy Time Division Multiple Access (TDMA) Interface Processor (TIP) was developed between 1997 and 2002 to support Internet Protocol (IP) connectivity among Navy ship and shore sites over protected Extremely High Frequency (EHF) Medium Data Rate (MDR) Satellite Communication (SATCOM). The Legacy TIP solution provides a transparent Ethernet bridging capability among participants, requiring no changes to the attached network devices. 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 DoD Teleport sites. TIP is widely used to support surface and submarine fleet operations.

The Advanced TIP (ATIP) system is an updated version of TIP that will provide similar Layer-2 bridging over MDR, together with access to the higher data rates available with the Advanced EHF (AEHF) Extended Data Rate (XDR), or Enhanced Polar XDR SATCOM capability. In addition to supporting higher XDR data rates, ATIP will provide a number of enhancements including (among others) an improved QoS capability, smaller form factor, and easier integration into operational environments, further supporting network user access to protected MILSATCOM connectivity.

The ATIP will be installed on ship, shore, and submarine platforms to support a Layer-2 Ethernet bridging capability among users that are geographically dispersed and connected via Milstar Medium Data Rate (MDR), AEHF MDR/XDR, or Enhanced Polar XDR links. ATIP is a key element of the PMW 170/A Navy Multiband Terminal (NMT) system, which will rely upon it to support a netted, bandwidth-efficient 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 Scope

This Statement of Work (SOW) identifies the tasks required to design, develop, integrate, test, and produce the Advanced Time Division Multiple Access (TDMA) Interface Processor (ATIP) systems for installation at designated ship, shore, and submarine platforms.

1.1.1 Engineering and Manufacturing Development (EMD)

During Engineering and Manufacturing Development (EMD), the Contractor shall design and develop software, develop hardware including COTS procurement, integrate the hardware and software, and perform related Test and Evaluation (T&E).

In addition the Contractor shall deliver ten (10) Engineering Development Models (EDMs) to the Government for technical and operational assessments and provide technical support as required.

The Contractor shall develop and provide logistic support/documentation, depot maintenance, Technical Manuals, factory training, and spares necessary to support design and qualification testing at the contractor's facility and for the EDMs provided to the Government at their test facilities and installed on Fleet platforms/sites.

1.1.2 Production

Production consists of the ATIP production, First Article Inspection (FAI), and Quality Conformance Inspection (QCI)) of the production ATIPs. It also includes fielding support and sustainment with a focus on software sustainment support. The production phase also encompasses the tasks needed to support related areas such as Integrated Logistic Support (ILS), configuration management, and program management tasks associated with the ATIP procurement efforts.

1.1.3 ATIP Enhancements, Fielding, and Sustainment

The Contractor shall perform Cost Plus Fixed Fee (CPFF) activities to support enhancements, fielding, and sustainment of the ATIP in accordance with Technical Direction (TD) received and consistent with the contract. The specific activities will be defined in the individual TD issued. These tasks include engineering studies, analyses, and/or design; engineering development; and/or engineering services.

1.2 Task Description

1.2.1 EMD

During the Engineering and Manufacturing Development Phase the Contractor shall:

a. Design, develop, integrate, and test the EDM ATIPs.

b. Perform Design Verification Testing on the designated ATIP EDMs.

c. Conduct a Functional Configuration Audit and a Physical Configuration Review (FCA/PCR).

d. Perform Quality Conformance Inspection (QCI) on every ATIP EDM units.

e. Deliver 10 ATIP Engineering Development Model (EDM) units.

f. Perform a Quality of Service (QoS)/Forwarding analysis of the ATIP.

g. Perform System Security Analysis of the ATIP.

h. Document the TIP/ATIP Transmission Unit (TU) format.

i. Develop and provide logistic support/documentation, Technical Manuals (TMs), operation and maintenance training, and spares necessary to support Government developmental and operational testing at their test facilities and installed on Fleet platforms/sites.

j. Contractor shall address deficiencies identified through Government testing including resolution of deficiencies identified during Government Developmental Test (DT) and Operational Test (OT).

1.2.2 Production

During the Production Phase the Contractor shall:

a. Fabricate, test (First Article Inspecting Testing and production QCI), and deliver production ATIPs and spares in accordance with the ATIP requirements documents.

b. Update the provision data, TMs, training materials, and design documentation reflecting any changes in the production ATIPs.

c. Conduct a Physical Configuration Audit (PCA).

d. Support production installations.

1.2.3 ATIP Enhancement, Fielding, and Sustainment Tasks

The Contractor shall perform Cost Plus Fixed Fee (CPFF) activities to support enhancements, fielding, and sustainment of the ATIP in accordance with Technical Direction (TD) received and consistent with the contract. The specific activities will be defined in the individual TD issued. These tasks include engineering studies, analyses, and/or design; engineering development; and/or engineering services. A more detailed overview is provided below:

a. Engineering studies, analyses, and design:

- 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 Service's terminals, including different hardware interfaces impacting the 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).
- Training options for operations and maintenance (i.e., protocol and fault emulation) based on state of the art technology.

b. Engineering development:

- 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 sustainment activities including software specification, design, coding, integration, and regression testing to include, but not be limited to, Information Assurance updates and system trouble report fixes for EDM and production ATIP releases.
- EDM and Production system firmware/hardware trouble report resolution.
- Development of special test or support systems equipment and/or software support programs to support development, training, and/or production.

c. Engineering services:

- Installation and field support including problem resolution (EDM and production).
- Provide support during Over-The Air (OTA) testing.
- Test planning, conduct, and data reduction/analysis support during the EMD and production phases.
- Depot maintenance support for EDM equipment.
- Spares inventory control or enhancements to configuration management for EDM and production.
- Failure tracking support for EDM and production.

- Security recertification driven by Information Assurance (IA) design changes and/or security requirements changes.

2 APPLICABLE DOCUMENTS

The Contractor shall adhere to the following documents and shall make appropriate recommendations to resolve potential conflicts for consideration by the Government. Unless otherwise specified herein, the following documents listed are in effect on the date of the Request for Proposal (RFP) and form a part of this SOW to the extent specified herein.

If a conflict exists between the stated and referenced requirements the following order of precedence shall be used:

a. ATIP SOW;
b. ATIP Overall Specification, dated (TBD);
c. ATIP Processor (AP) Specification, dated (TBD);
d. ATIP Terminal Interface Function (TIF) Specification, dated (TBD).

2.1 ATIP Specifications

Title:	Description:
ATIP Overall Specification	Overall System Specification for the ATIP System
ATIP AP Specification	System Specification for the ATIP Processor (AP)
ATIP TIF Specification	System Specification for the ATIP Terminal Interface Function (TIF)
ATIP Method of Verification	ATIP Method of Verification
Technical Manual Contract Requirements (TMCR)-ATIP	TMCR-ATIP

2.2 Standards

Title:	Description:
MIL-D-23140D	Drawings, Installation Control, For Electronic Equipment, 30 April 1992
FED-STD-313D	Material Safety Data
MIL-PRF-29612B	Performance Specification Training Data Products
MIL-STD-196E	Joint Electronics Type Designation System
MIL-STD-882D	Standard Practice for System Safety
MIL-STD-1472F	Human Engineering
MIL-STD-31000	Department of Defense Standard Practice

	Technical Data Packages

2.3 Directives / Instructions

Title:	Description:
DoD Directive 8500.1	Information Assurance (24 October 2002)
DoD Instruction 8500.2	Information Assurance Implementation (6 February 2003)

2.4 Handbooks

Title:	Description:
MIL-HDBK-61A(SE)	Military Handbook, Configuration Management Guidance
MIL-HDBK-217 F Notice I	Military Handbook, Reliability Prediction of Electronic Equipment, Notice I, 10 July 1992
MIL-HDBK-217 F Notice 2	Military Handbook, Reliability Prediction of Electronic Equipment, Notice 2, 28 February 1995
MIL-HDBK-454A	General Guidelines for Electronic Equipment
MIL-HDBK-29612-1A	Guidance for Acquisition of Training Data Products and Services
MIL-HDBK-29612/1A-4A	Guidance for Acquisition of Training Data Products and Services, Glossary for Training

2.5 Other Documentation

Title:	Description:
DISA Access Control STIG	DISA Access Control STIG, Version 2, Release 3, 29 October 2010 (http://iase.disa.mil/stigs/stig/index.html)
DISA Network Management STIG	DISA Network Management – Network Operations Center Security Guidance At-a-Glance, Version 2.2, 14 April 2009
DISA Web Server STIG	DISA Web Server STIG, Version 7, Release 1, 12 October 2010 (http://iase.disa.mil/stigs/stig/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

EIA-649	National Consensus Standard for Configuration Management (August 1998)
MOSA	Modular Open Systems Approach to Acquisition, Version 2.0, September 2004, (http://www.acq.osd.mil/osjtf/mosapart.html)
NFPA 70	National Electric Code, International Electric Code Series
Risk Management Guide for DoD Acquisition	Risk Management Guide for DoD Acquisition, Sixth Edition, Version 1.0, August 2006, (https://acc.dau.mil/CommunityBrowser.aspx?id=108201)

3 REQUIREMENTS

This section identifies the efforts that shall be accomplished by the Contractor during the design, development, and fabrication of the ATIP Engineering Development Models (EDMs) and production units. 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 ATIP Overall Specification, ATIP AP Specification, ATIP TIF Specification, and this SOW. The Contractor shall conduct testing (per section 3.7) 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 requirements identified in ATIP Overall Specification, ATIP AP Specification, and ATIP TIF Specification establish the functional and performance baseline for this program. For future changes that may modify this baseline, the Government will assess the impact of potential inclusion in the scope of this effort.

3.1 Program Management (RDT&E, OPN)

The Contractor shall maintain and implement a management plan that clearly defines how the ATIP effort will be managed and controlled. The Contractor shall organize, coordinate, and control all internal program activities (including those that are assigned to subcontractors) to ensure the quality and timeliness of all supplies and service specified in this contract. The Contractor shall develop and maintain a Program Management Plan (PMP) and a Contract Work Breakdown Structure (CWBS). The PMP shall outline all phases of the program (System Design, and Full-Rate Production (FRP)). The PMP shall also include:

a. Program information (e.g., program name, contract number, period of performance, contract type, contract value, delivery date, etc).

b. Organization structure (e.g., management, responsibilities, associated organizational chart)

c. Deliverables

d. Statement of Work

e. Program schedule of events keyed to the Contract Work Breakdown Structure (CWBS) and SOW, to include schedules detailing events required to achieve milestones. Identify key milestones necessary to mitigate risks for a timely completion of the ATIP development, and provide reasoning for why the chosen milestones were selected.

f. Technical management strategy including overall engineering, software development, system integration and test, and manufacturing approach.

g. Resource Management

h. Risk Management

i. Configuration Management

j. Quality Management

k. Program reviews

l. Program performance metrics

m. Cost

The PMP shall be made available for Government inspection.

The Contractor shall provide monthly Contractor's Progress, Status and Management Report (CPSMR) containing program status, technical issues, and risks (including mitigation) affecting ATIP development and schedule. The Contractor shall provide quarterly CDRL Status Report to inform the Government on CDRL status of required documents and drawings.

CDRL deliverable:

- **A001 Program Management Plan (PMP) (DI-MGMT-81797)**
- **A002 Contract Work Breakdown Structure (CWBS) (DI-MGMT-81334C)**
- **A003 Contractor's Progress, Status and Management Report (CPSMR) (DI-MGMT-80227)**
- **A004 CDRL Status Report (DI-MGMT-80368A)**

3.1.1 Program Planning and Control (RDT&E)

The Contractor shall conduct weekly Program Management telephone conferences with the Government. The Contractor shall provide insight and information to the Government to ensure that the product meets the ATIP Specifications, program planning activities and schedule events, identify contract concerns and corrective plans, close action items, manage and mitigate risks, plan upcoming meetings and agendas, and address other management concerns for the purpose of coordinating Contractor and Government activities.

The Contractor shall conduct bi-weekly engineering Integrated Product Team (IPT) telephone conferences with the Government. The Contractor shall address all engineering (systems, security, software, hardware, and test) oriented concerns with the Government specification documents by exchanging informal files (e.g., comment to Government documents, presentation material, etc) and work these issues to resolution, address closeout of engineering oriented actions 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 Risk Management and Reporting (RDT&E)

The Contractor shall maintain a risk management program consistent with the guidance in the *Risk Management Guide for DoD Acquisition* or equivalent internal Contractor processes throughout the life of the contract to assess the risks associated with program cost, schedule, and achievement of technical requirements including performance. The Contractor shall develop and maintain Risk Management Plan (RMP). The RMP shall also address the critical design areas including:

a. Legacy TIP Compatibility.
b. Quality of Service (QoS) and timeslot allocation.
c. AP to TIF Separation Distance.
d. ATIP Capacity and Timing reserve.
e. ATIP Security.

CDRL deliverable:

- **A005 Contractor's Risk Management Plan (DI-MGMT-81808)**

3.1.3 Program Reviews (RDT&E, OPN)

For each meeting, review or conference, the Contractor shall prepare an agenda subject to the Governments approval and prepare and distribute minutes. The Contractor should also provide video, web conferencing, or teleconferencing 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. Agendas for all meetings and reviews shall be approved by the Government prior to their execution.

CDRL deliverable:

- **A006 Presentation Material (DI-ADMN-81373)**
- **A007 Meeting Agenda (DI-ADMN-81249A) and Minutes (DI-ADMN-81250A)**

3.1.3.1 Post-Award Conference (RDT&E)

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

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.

3.1.3.2 Program Management Review (PMR) (RDT&E, OPN)

3.1.3.2.1 Development PMR (RDT&E)

Commencing with the Post-Award Conference, the Contractor shall conduct Development Program Management Reviews (PMR) at the Contractor's facility on a bi-monthly basis for the duration of EMD portion of the contract.

To the maximum extent possible, PMRs shall be coordinated with design and technical reviews. The Contractor shall provide viewgraphs and photographic materials to support program office briefing requirements for documenting program activities. The Contractor shall develop agendas and minutes for each PMR. 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, 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 the PMRs.

The Contractor's functional leads (e.g., Key Personnel, Software Manager, and Hardware Engineering) shall report on the status of their respective tasks. During the PMR the Government will evaluate the contractor's progress and compliance with this contract, SOW, ATIP Overall Specification, ATIP AP Specification, and ATIP TIF Specification. The Government reserves the right to schedule additional reviews or working groups if critical issues arise or significant events or changes have occurred. The Contractor shall make information available regarding software design and status, prototype and EDM hardware design and status, task status, test results, drawings and production status as needed to demonstrate contract and specification compliance.

3.1.3.2.2 Production PMR (OPN)

The Contractor shall conduct Production PMRs at the Contractor's facility on a quarterly basis for the duration of the production portion of the contract. The PMR shall focus on production status including production rate information for ATIP components and spares, status of suppliers and associated parts, status of producibility issues, and plans to mitigate any issues, status of production test results, software sustainment status, failure analysis reporting, and other information pertinent to understanding issues or successes associated with the production facility and ATIP delivery progress.

3.1.3.3 Design Reviews (RDT&E)

3.1.3.3.1 System Design Review (SDR) (RDT&E)

The Contractor shall conduct a System Design Review (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 the SOW and the ATIP Specifications 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 specifications, and by specifying 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 DoDI 8500.2 compliance by providing a mapping of IA controls to ATIP design concepts.

d. Identify functional baselines for the ATIP system and initiation of configuration control. Illustrated 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 Computer Software Configuration Items (CSCIs) and operating systems proposed.

f. Identify the Hardware Configuration Items (HWCIs), computer system(s), and hardware proposed 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 interface (I/Fs) where appropriate and provide modular/common components for similar ATIP functions.

h. Pressent prelimary Software Requirement Specification (SRS).

i. Present preliminary software and firmware design requirements for configuration control identification and tracking and to support for field support for downloading.

j. Present preliminary Hardware Requirement Specification (HRS).

k. Present the Quality of Service (QoS) and timeslot allocation trade study approach and results as of the review.

l. Present Capacity and Timing reserve.

m. Provide the Operator Interface approach. The user interface should be designed to emphasize ease of use (e.g., high degree of automation, logical flow, minimal operator tasking).

n. Present the Configuration Files definition.

o. Present the Packaging approach.

p. Present reliability and maintainability allocations.

q. Present Built-In-Test (BIT)/Built-In-Test Equipment (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 Transmission Unit (TU) Synchronization Preamble.

v. Present the Operator Orderwire approach.

w. Present logistics support outline.

x. Present obsolescence tracking approach.

y. Other appropriate topics.

3.1.3.3.2 Preliminary Design Review (PDR) (RDT&E)

The Contractor shall conduct a 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 and tracking and to support for field support for downloading.

f. Present preliminary Hardware Design Description including commonality design approach and TDBD to the MSI level, illustrating why the design meets the requirements.

g. Present preliminary Interface Control Documents (ICDs) as defined in section 3.2.3.

h. Present the basis for proceeding into Critical Design Review (CDR).

i. Present allocated baselines for the ATIP design.

j. Present the Quality of Service (QoS) and timeslot allocation trade study results and resulting ATIP design implementation.

k. Present Capacity and Timing reserve.

l. Present the Operator Interface design.

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 Transmission Unit (TU) Synchronization Preamble.

t. Present Packaging design.

u. Present the Operator Orderwire design.

v. Present reliability and maintainability prediction.

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. Other appropriate topics.

3.1.3.3.3 Critical Design Review (CDR) (RDT&E)

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 ATIP Overall Specification, ATIP AP Specification, and ATIP TIF Specification. The Contractor shall establish detail design compatibility among system components, assess configuration item risk areas, and review preliminary product specifications.

During CDR, the Contractor shall:

a. Establish that the detailed design solutions, as reflected in the preliminary design documentation, satisfy the requirements established in the Government-provided specifications.

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 Transmission Unit (TU) Synchronization Preamble.

f. Demonstrate the establishment of an effective Operator Interface.

g. Demonstrate the detailed DoDI 8500.2 IA controls compliant design (e.g., illustrate in details the ATIP requirements flow-down and provide the traceability to IA controls including test scenarios/procedures).

h. Establish the adequacy of specific software documentation.

i. Present the results of breadboarding and testing of critical functions.

j. Present the status of specifications, Interface Control Documents, 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.

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 Operator Interface design.

p. Present software and firmware design for configuration control identification and tracking, and support for field upgrade via software and firmware downloading.

q. Present logistics support package.

r. Other appropriate topics.

3.1.3.3.4 Test Readiness Review (TRR) (RDT&E, OPN)

The Contractor shall conduct a TRR at the Contractor's facility prior to Design Verification Test (DVT) and Production Test 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.

3.1.3.3.5 Technical Interchange Meetings (TIMs) (RDT&E, OPN)

The Contractor shall meet on a monthly basis if required with the Government during the development phase and quarterly during production phase to discuss topics and review documentation including the ATIP's design, requirements, development, integration, testing, security, production, and analysis. The TIM topics shall include:

a. ATIP Capacity and Timing design.

b. BIT/BITE design.

c. Installation design.

d. QoS/Forwarding design.

e. Present Legacy TIP Compatibility design.

f. AP to TIF Distance Separation design.

g. Operator Interface design.

h. Reliability, Maintainability, and Availability (RMA), including BIT, during EDM and production.

i. Logistic support during EDM and production.

j. TIP/ATIP TU Compatibility design.

k. Other topic as required.

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

3.1.4 Automated Interchange of Technical Information (RDT&E, OPN)

The Contractor shall deliver all unclassified contract, technical, or engineering information required by this SOW as specified in the CDRLs (DD-Form 1423) via SharePoint for PMW/A

170 on the NSERC/SE2 website (TBD). Classified documents shall be delivered in one (1) hard copy and one (1) soft copy on 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 for documents to be delivered to the Government.

Table 1: Applications for Deliverable Documents

Document Category	Format
Word Processing	Microsoft® Word 2003
Spreadsheets	Microsoft® Excel 2003
Project Planning	Microsoft® Project 2003
Presentation Software	Microsoft® PowerPoint® 2003
Engineering Drawings	Native and PDF format
Requirement Database	Telelogic's DOORS

3.2 Engineering and Technical Documentation (RDT&E)

3.2.1 Engineering Documentation (RDT&E)

The Contractor shall document the system requirements, specifications, and design, showing full traceability to the ATIP Specifications. The Contractor shall ensure performance, design, and test requirements are traceable for each Hardware Configuration Items (HWCI) and Computer Software Configuration Items (CSCI) including Field Programmable Gate Array (FGPA) design of the ATIP specifications. 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 deliverable:

- **A022 Software Requirements Specification (DI-IPSC-81433A)**
- **A023 Software Design Description (DI-IPSC-81435A)**
- **A024 Hardware Requirements Specifications (DI-SDMP-81465A)**
- **A025 Software Product Specification (DI-IPSC-81441A)**
- **A026 FPGA Product Specification (DI-IPSC-81441A)**

3.2.2 Technical Documentation (RDT&E)

3.2.2.1 Quality of Service (QoS)/Forwarding Analysis (RDT&E)

The Contractor shall analyze the functional design and performance of the QoS/Forwarding and Allocate Reservation Timeslot requirements as specified in the section 3.2.1 and 3.5.1.3.4 of the ATIP AP Specification. The analysis will be conducted early in the development cycle to facilitate design of the ATIP software to ensure enhanced QoS performance. The output of the effort shall include identification of the algorithms for QoS/Forwarding and timeslot allocation by the Net Controller using the member queue information and QoS/Forwarding policy. The analysis shall include how well 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 between 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.

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 deliverable:

- **A027 QoS/Forwarding Analysis Report (DI-MISC-80508B)**

3.2.2.2 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 Information Assurance (IA) controls specified by DoD Instruction 8500.2 for a MAC II, Public System; the DISA Security Technical Implementation Guide (STIG), and ATIP AP Specification document and operational use of the ATIP. The document shall include a compliance matrix for DoDI 8500.2 and DISA STIG IA controls, and for each met requirement, a method of verification. The Contractor analysis report shall include identification and justification of all requirements deemed not applicable and rationale for claiming compliance to requirements deemed applicable. The intent of the analysis

and subsequent documentation thereof is to supplement design information in support of the critical design and Information Assurance (IA) Certification and Accreditation (C&A).

CDRL deliverable:

- **A028 System Security Analysis (DI-MISC-80508B)**

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

The ATIP is required to 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 describing the Legacy TIP exists, 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 formats 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 and also verify 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 deliverable:

- **A029 TIP/ATIP TU Compatibility (DI-MISC-80508B)**

3.2.3 Interface Control Documents (RDT&E)

The Contractor shall develop Interface Control Documents (ICDs) with sufficient detail to document both external and internal interfaces of the ATIP.

CDRL deliverable:

- **A030 ATIP AP to TIF ICD (DI-CMAN-81248A)**
- **A031 ATIP Configuration files ICD (DI-CMAN-81248A)**
- **A032 ATIP Control and Status Monitoring (CSM) ICD (DI-CMAN-81248A)**
- **A033 ATIP TIF to Crypto/Terminal ICD (DI-CMAN-81248A)**

3.2.4 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 ATIP specifications. 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 installation control drawings at TIMs with Government installation and Fleet representatives.

CDRL deliverable:

- **A034 Installation Control Drawings (DI-DRPR-81242)**

3.3 Software Development (RDT&E)

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.

3.3.1 Software Development Plan (SDP) (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. The plan for code reuse 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. The software development process including the use of software design, development, and generation tools.

d. The software requirements analysis approach.

e. The software testing approach (e.g., unit testing, unit integration testing, etc).

f. The CSCI/HWCI integration and testing approach.

g. The approach for building an executable software/firmware image (e.g., preparing the source files, preparing the executable software, etc).

h. The software product evaluation approach.

i. The software risk management approach.

j. The software metrics.

k. Software trouble reporting process and tracking tool concept including definition of severity and complexity (if used) levels.

l. Software build (or thread or other) approach, including impact of the approach to system development and integration.

CDRL deliverable:

- **A035 Software Development Plan (SDP) (DI-IPSC-81427A)**

3.3.2 Software Configuration Management (RDT&E, OPN)

The Contractor shall implement a Software Configuration Management Plan. The plan shall describe, at a minimum, the configuration management activities, procedures, and schedule for performing software Configuration Management (CM) activities; the organization(s) responsible for performing configuration management and activities; and their relationship with other organizations, such as software development or maintenance. The Contractor shall also disclose the software version/control tracking system and 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.

3.3.3 Software Testing and Evaluation (RDT&E)

The Contractor shall generate and implement a Software Test Plan (STP) which shall be used to verify ATIP requirements for software and system/subsystem-level requirements as specified in the ATIP Specifications. The Contractor shall ensure each software requirement is testable and documented in the STP. The STP shall also include testing requirements, objectives, environment, procedures, methodologies, test cases, and evaluation criteria.

The Contractor shall track software trouble reports as defined in section 3.6.1 herein. The Contractor shall develop and deliver to the Government a Software Test Report that documents the results of testing performed for verification of requirements for software, and system/subsystem-level requirements.

CDRL deliverable:

- **A036 Software Test Plan (STP) (DI-IPSC-81438A)**
- **A037 Software Test Description (STD) (DI-IPSC-81439A)**
- **A038 Software Test Report (STR) (DI-IPSC-81440A)**

3.4 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 production specifications are developed and EDM and production hardware 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 production testing stresses.

The Contractor shall generate and implement a Hardware Test Plan which shall be used to verify ATIP requirements for hardware and system/subsystem-level requirements as specified in the ATIP Specifications. The Contractor shall track hardware/firmware trouble reports as defined in section 3.6.1 herein. The Contractor shall develop and deliver to the Government a Hardware Test Report that documents the results of testing performed for verification of requirements for hardware, and system/subsystem-level requirements.

CDRL deliverable:

- **A039 Hardware Test Plan (DI-NDTI-80566A)**
- **A040 Hardware Test Procedure (DI-NDTI-80603A)**
- **A041 Hardware Test Report (DI-NDTI-80809B)**

3.5 Software and Hardware Integration (OPN)

The Contractor shall generate and implement a Software/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 Specifications. The Software/Hardware Integration Test Plan shall also include testing requirements, objectives, environment, integration strategy (e.g., software integration sequence, hardware integration sequence, full hardware/software integration sequence, and subsystem integration sequence), procedures, test cases, and evaluation criteria.

During the system integration effort, the Contractor shall provide bi-weekly integration status 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) The software components and units of each software item that have been completely and correctly integrated with the hardware.

e) The hardware items, software items, and manual operations of the system that have been completely and correctly integrated into the system.

f) The integration efforts that have been 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 track software/hardware integration trouble reports as defined in section 3.6.1 herein. These integration problems shall be included in the Software/Hardware Integration Test Report.

CDRL deliverable:

- **A042 Software/Hardware Integration Test Plan (DI-NDTI-80566A)**
- **A043 Software/Hardware Integration Test Procedure (DI-NDTI-80603A)**
- **A044 Software/Hardware Integration Test Report (DI-NDTI-80809B)**

3.6 System Effectiveness Engineering (RDT&E)

3.6.1 System Trouble Reporting

The Contractor shall employ and maintain a trouble reporting system to track ATIP software and hardware/firmware problems that includes a description of the problem, version, priority, resolution, and etc. The Contractor shall provide full-text system trouble reports to the Government.

CDRL deliverable:

- **A045 System Trouble Report (DI-MGMT-81232)**

3.6.1.1 Status Reporting

The Contractor shall provide status on software and hardware performance in the CPSMR (CDRL A003) required in section 3.1 herein, to the Government 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 differences 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, etc.) 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.

3.6.2 Configuration Management (RDT&E, OPN)

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 specifications. The Contractor shall provide a CM Plan that describes the Contractor's configuration management 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: detail software CM is defined section 3.3.2). The Contractor shall develop a Configuration Management Plan (CMP) using MIL-HDBK-61A(SE) as a guide.

CDRL deliverable:

- **A049 Contractor's Configuration Management Plan (DI-CMAN-80858B)**

3.6.2.1 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 Technical Data Package (TDP) necessary to accomplish configuration management of each configuration item. Drawings shall be numbered uniquely, and new drawing numbers shall be assigned when interchangeability is affected by an engineering change.

3.6.2.1.1 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 top-down breakdown 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, intermediate, or depot level, but not including piece parts). The CI breakdown shall be performed by the Contractor using the information provided herein for completing the analysis under the design trade study report.

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 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, and subassemblies.

c. Reference Designator - Letters or numbers, or 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 IAW 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 Services Center (DLSC) to the design control activity or actual manufacturer of an item as contained in the 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-l. Item Names contained in

Federal Item Name Directory for Supply Cataloging, H6-l, cannot be abbreviated unless approved by the requiring authority.

CDRL deliverable:

- **A050 Equipment Top-Down Breakdown (DI-MISC-80508B)**

3.6.2.1.2 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 Integrated Logistics Support (ILS) products defined in section 3.8 of the 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 utilize 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:

- **A051 Nomenclature Information (DI-CMAN-81254A)**
- **A052 Request for Approval of Identification Plate Drawings (DI-SESS-81655)**

3.6.2.1.3 Unique Identification (UID) (RDT&E, OPN)

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

3.6.2.2 Configuration Control (RDT&E, OPN)

3.6.2.2.1 Engineering Change Proposal (ECP) (RDT&E, OPN)

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

CDRL deliverable:

- **A053 Engineering Change Proposal (ECP) (DI-CMAN-80639C)**

3.6.2.2.2 Request for Deviation (RFD) (RDT&E, OPN)

The Contractor shall prepare and submit a RFD to the Government for approval for any deviation (e.g., depart from a particular performance or design requirement) to CIs whose design documentation has already been approved by the Government. The Contractor will submit a RFD using the guidelines in section 6.3 "Request for Deviation" in MIL-HDBK-61A(SE).

CDRL deliverable:

- **A054 Request for Deviation (RFD) (DI-CMAN-80640C)**

3.6.2.2.3 Notice of Revision (NOR) (RDT&E, OPN)

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 a NOR to the Government for approval for any changes to the Government controlled documents (e.g., ATIP Overall Specification, ATIP AP Specification, ATIP TIF Specification, technical manuals, etc.). The Contractor will submit a NOR using the guidelines in section 6.4 "Notice of Revision" in MIL-HDBK-61A(SE).

CDRL deliverable:

- **A055 Notice of Revision (NOR) (DI-CMAN-80642C)**

3.6.2.3 Configuration Status Accounting (CSA) (RDT&E, OPN)

The Contractor shall provide CSA reporting in accordance with the guidelines in section 7 "Configuration Status accounting" in MIL-HDBK-61A(SE) 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 requests for deviations that affect the configuration of a CI.

d. Provide a status accounting report to the MSI level in top-down breakdown, 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 Contracting Officer.

CDRL deliverable:

- **A056 Configuration Status Accounting Information (DI-CMAN-81253A)**

3.6.2.4 Configuration Verification and Audit (RDT&E, OPN)

ATIP EDM and production unit configuration verifications (consisting of a Functional Configuration Audit (FCA) and Physical Configuration Review (PCR)) shall be performed after successful Design Verification Test and Production Testing. The configuration verification shall be conducted utilizing the guidelines provided in section 8 "Configuration Verification and Audits" in MIL-HDBK-61A(SE). PCR shall be conducted on the test assets used in support of DVT and Production Testing to define the configuration baseline using the equipment's Serialized Assembly Record (SAR). The EDM configuration verification will serve to define the preproduction baseline for documenting the EDM equipment. The production configuration verification shall serve as the establishment of the product baseline for final acceptance of production 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 PCR requirements for validating/verifying the EDM pre-production and production product baselines.

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 deliverable:

- **A057 Configuration Audit Plan (DI-SESS-81646)**
- **A058 Configuration Audit Summary Report (DI-CMAN-81022C)**

3.6.3 Human Systems Integration (HSI) (RDT&E)

The Contractor shall implement an HSI process and reporting system using the guidance provided in the Navy "Human Systems Integration Program Manager's Guide" to evaluate and integrate HSI elements into the ATIP and supporting systems engineering process.

3.6.3.1 Job Task Analysis (JTA) (RDT&E)

The Contractor shall perform a job and task analysis 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 job/task analysis 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 Microsoft Excel for the following criteria:

a. PERFORMANCE ROLE: TAB – Operator; TAB - System Administrator; TAB – Maintainer [organizational level]

b. TASK:

c. SUBTASK:

d. SYSTEM/HARDWARE VARIANT:

e. PLATFORM: 1 – Submarine; 2 – Ship/Shore

f. TASK DURATION (TD): nnn – minutes

g. TASK FREQUENCY (TF): n - times performed

h. TASK PERIODICITY (TP): [1] As Required or Rarely; [2] Annually; [3] Semi-Annually; [4] Quarterly; [5] Monthly; [6] Weekly; [7] Daily

i. KNOWLEDGE LEVEL (KL): [1] Facts [something you already know without having to consult materials]; [2] Facts and Procedures; [3] Procedures [knowledge that requires the use of documented procedures for performing a task]; [4] Procedures and Operating Principles; [5] Operating Principles [knowledge for grouping procedures together to complete a task or function]; [6] Operating Principles and Complete Theory; [7] Complete Theory [knowledge necessary for understanding all the functional elements associated with the task]

j. SKILL LEVEL (SL): [1] Extremely Limited [85% or > of people can perform]; [2] Extremely Limited to Partially Limited [70% to 85% of people can perform]; [3] Partially Limited [55% to 70% of people can perform]; [4] Partially Limited to Competent [40% to 55% of people can perform]; [5] Competent [25% to 40% of people can perform]; [6] Competent to Highly Proficient [10% to 25% of people can perform]; [7] Highly Proficient [10% or < of people can perform

k. SAFETY HAZARD SEVERITY (SHS): [1] Minor [failure not serious enough to cause injury, property damage, or system damage but will result in unscheduled maintenance or repair]; [2] Minor to Marginal; [3] Marginal [failure that may cause minor injury, minor property damage, or minor system damage will result in delay or loss of availability or mission degradation]; [4] Marginal to Critical; [5] Critical [failure that may cause severe injury, major property damage, or major system damage will result in mission loss]; [6] Critical to Catastrophic; [7] Catastrophic [failure that may cause death or system loss (e.g., loss of communications, etc.]

l. DIFFICULTY OF PERFORMANCE (DoP): [1] Easy [99% or > of the time without error]; [2] Easy to Average [85% to 99% of the time without error]; [3] Average [70% to 85% of the time without error]; [4] Average to Hard [55% to 70%of the time without

error]; [5] Hard [40% to 55% of the time without error]; [6] Hard to Demanding [25% to 40% of the time without error]; [7] Demanding [25% or < of the time without error]

m. CRITICALITY OF PERFORMANCE (CoP): [1] Minor [consequence of inadequate task performance results in no injury to personnel or damage to equipment]; [2] Minor to Marginal; [3] Marginal [consequence of inadequate task performance results in non-serious personnel injury or damage to equipment]; [4] Marginal to Critical; [5] Critical [consequence of inadequate task performance results in serious or life threatening injury to personnel, or impedes the ability to perform a mission]; [6] Critical to Catastrophic; [7] Catastrophic [consequence of inadequate task performance results in death or being unable to carry out a mission]

n. PROBABILITY OF INADEQUATE PERFORMANCE (PoIP): [1] Less Often Than Other Tasks; [2] Less Often Than Other Tasks to About as Often as Other Tasks; [3] About as Often as Other Tasks; [4] About as Often as Other Tasks to More Often Than Other Tasks; [5] More Often Than Other Tasks; [6] More Often Than Other Tasks to Never Performed Correctly; [7] Never Performed Correctly

o. TASK LEARNING DIFFICULTY: [1] No Training Required; [2] < 15 Minutes Training is Required; [3] > 15 Minutes, but < 30 Minutes Training is Required; [4] > 30 Minutes, but < 45 Minutes Training is Required; [5] > 45 Minutes, but < 60 Minutes Training is Required; [6] > 60 Minutes, but < 120 Minutes Training is Required; [7] > 120 Minutes Training is Required

p. TRAINING EMPHASIS RATING: [1] Little/No Training Required; [2] Little/No Training Required to Some Training Required; [3] Some Training Required; [4] Some Training Required to Thorough Training Required; [5] Thorough Training Required; [6] Thorough Training Required to Extensive Training Required; [7] Extensive Training Required

q. TOTAL TRAINING SCORE (TTS): TP + KL + SL + SHS + DoP + CoP + PoIP + TLD + TER

r. RANK: Numeric score form 1 (highest score) to nn (lowest score)

s. PROCESSING: [U] Unique; [S] Standard; [N] Not Applicable

t. EMBEDDED TRAINING EQUIPMENT (ETE): [Y] Yes; [N] No

u. TYPE OF TRAINING: [IMI] Interactive Media Instruction; [TTE] Tactical Training Equipment

CDRL deliverable:

- **A059 Job Task Analysis (DI-MISC-80508B)**

3.6.4 Human Factors Engineering (HFE) (RDT&E)

The Contractor shall apply and document the human factor engineering principles to the ATIP design that complies with the following criteria:

a. General guideline requirements for human factor considerations detailed in sections 4.2 through 4.13 of MIL-STD-1472F "Human Engineering Design Criteria."

b. Design requirements of ATIP Overall Specification, ATIP AP Specification, and ATIP TIF Specification.

The analyses and results will formally be documented in the assigned document as related to the ATIP operator and maintainer.

CDRL deliverable:

- **A060 Human Factors Engineering (DI-MISC-80508B)**

3.6.5 Environmental, Safety, and Occupational Health (ESOH) (RDT&E)

The Contractor shall establish and maintain an effective and comprehensive safety program that complies with the provisions of the 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, plus annual refresher courses. The Contractor shall maintain documentation supporting training records and have a written Health and Safety Plan on-site available for workers and regulatory review. The Contractor shall provide 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/regulations and establish/implement 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. A HMMP plan shall be prepared in accordance with NAS 411, if no plan has been provided on previous contracts or if significant changes occur.

The ATIP shall be designed to minimize the use of prohibited materials and hazardous materials, as specified in the ATIP Overall 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 Contracting Officer prior to the Contractor incorporating that material into the ATIP. Prior to approval, the Contractor shall provide a Material Safety Data Sheet (Occupational Safety and Health Act (OSHA) Form 174) and written

justification that shows 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 potential substitutes that were considered and the reasons why these substitutes cannot be used. Order of precedence for Contracting Officer approval will be:

a. Non-hazardous material.

b. Material that is recyclable.

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. The use of any HAZMAT by the Contractor shall require Government approval prior to use through approval of the HMMP progress reports and HAZMAT material Request for Deviation (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 ESH hazards, support requirements associated with using hazardous materials, and cost-effective pollution prevention programs. National environmental impact requirements associated with countries involved in FMS contracts. HMMP progress reports shall be prepared in accordance with NAS 411. A statement of nonuse of any of the above listed chemicals shall suffice for a report. Any Contractor RFD for the use of Mercury shall comply with the requirements defined in NAVSEAINST 5100.3D "Mercury, Mercury Compounds, and Components Containing Mercury or Mercury Compounds; Control of" and requires Government approval prior to use.

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 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.

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

CDRL deliverable:

- **A061 System Safety Program Plan (SSPP) (DI-SAFT-81626)**
- **A062 Hazardous Material Management Program (HMMP) Plan (DI-MGMT-81398A)**
- **A063 Hazardous Material Management Program (HMMP) Report (DI-MISC-81397A)**
- **A064 System Safety Hazardous Analysis (SSHA) (DI-SAFT-80101B)**
- **A065 Safety Assessment Report (SAR) (DI-SAFT-80102B)**

3.6.6 Reliability and Maintainability Program

3.6.6.1 Reliability Tracking (RDT&E, OPN)

The Contractor shall create and maintain a Failure Reporting and Corrective Action System (FRACAS) covering all EDM and production units. The FRACAS shall document all problems found with the ATIP and ATIP-connected equipment including the Fiber Optic Isolators (FOIs) 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 be updated during EDM development, production, and sustainment. A FRACAS review will be conducted as part of the Program Management Review (per section 3.1.3.2).

CDRL deliverables:

- **A066 Failure Analysis & Corrective Action Item Report (DI-RELI-80255)**

3.6.6.2 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 Notice 1 and 2 (electronic parts), and may use NPRD-95 and NSWC Standard 98/LE1 (mechanical parts) for the reliability prediction methodology for all military and non-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, Government off-the Shelf (GOTS)) in a top-down breakdown from the equipment to the Maintenance Significant Item (MSI) level for the ATIP designs.

CDRL deliverables:

- **A067 Reliability Prediction and Documentation of Supporting Data (DI-RELI-81497)**

3.6.6.3 Thermal Survey Analysis (RDT&E)

The Contractor shall perform a thermal survey under the worst case conditions (Non-operating temperature range of -40°C (-40°F) to 71°C (159.8°F)) and operating temperature range of 0°C (32°F) to 50°C (122°F). The Contractor shall also perform the thermal survey for the "nominal case" conditions for high temperature only (+25^{o}C). The nominal case analysis high temperature results shall be used to support the reliability prediction.

CDRL deliverable:

- **A068 Thermal Design Analysis (DI-MISC-80508B)**

3.6.6.4 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 as the 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 as the content requirements (contractor determines format). Both analyses shall be documented in the prediction report.

CDRL deliverable:

- **A069 Maintainability Predictions Report (DI-MNTY-81602)**

3.6.6.5 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 . Information from the analysis will serve as source engineering information in the development of maintenance Fault Logic Diagrams (FLDs) and procedures. The FMEA shall be performed by the Contractor using the following information as a minimum:

a. Identification number - A serial number or other reference designation identification number is assigned for traceability purposes on the worksheet. A uniform identification code shall be used to provide consistent identification of system/equipment/MSI functions and provide complete visibility of each failure mode and its relationship to the system/equipment/MSI functions identified in the applicable block diagrams.

b. Item/functional identification - The name or nomenclature of the item or system function being analyzed for failure mode and effects is listed. Schematic diagram symbols or drawing numbers shall be used to properly identify the item or function.

c. Function - A concise statement of the function performed by the hardware item shall be listed. This shall include both the inherent function of the part and its relationship to interfacing items.

d. Failure modes and causes - All predictable failure modes for each indenture level analyzed shall be identified and described. Potential failure modes shall be determined by examination of the item outputs and functional outputs in applicable block diagrams and schematics. Failure modes of the individual item function shall be postulated on the basis of the stated requirements in the system definition narrative and the failure definitions included in the ground rules. The most probable causes associated with the postulated failure mode shall be identified and described. Since a failure mode may have more than one cause, all probable independent causes for each failure mode shall be identified and described.

e. Mission phase/operational mode - A concise statement of the mission phase and operational mode in which the failure occurs. Where sub phase, event, or time can be defined from the system definition and mission profiles, the most definitive timing information should also be entered for the assumed time of failure occurrence.

f. Failure effect - The consequences of each assumed failure mode on item operation, function, or status shall be identified, evaluated, and recorded. Failure effects shall focus on the specific block diagram element which is affected by the failure under consideration. The failure under consideration may impact several indenture levels in addition to the indenture level under analysis; therefore, “local,” “next higher level,” and ‘“end’ effects shall be evaluated. Failure effects shall also consider the mission objectives, maintenance requirements and personnel and system safety. The indenture level detail shall be as follows:

    1. Local effects - Local effects concentrate specifically on the impact an assumed failure mode has on the operation and function of the item in the indenture level under consideration. The consequences of each postulated failure affecting the item shall be described along with any second-order effects which result. The purpose of defining local effects is to provide a basis for evaluating compensating provisions and for

recommending corrective action. It is possible for the local effect to be the failure mode itself.

2. Next higher level - Next higher level effects concentrate on the impact an assumed failure has on the operation and function of the items in the next higher indenture level above the indenture level under consideration. The consequences of each postulated failure affecting the next higher indenture level shall be described.
3. End effects - End effects evaluate and define the total effect an assumed failure has on the operation, function, or status of the uppermost system and any safety and IA considerations and operational impacts.

g. Fault detection - A description of the methods by which occurrence of the failure mode is detected by the operator shall be recorded. The failure detection means shall show a breakdown of BIT/BITE coverage by type and shall address the following:

1. Visual - Display (e.g., fault message, status screens, etc.), indicator (e.g., drawer front panel, etc.), audible warning (i.e., major fault or minor fault), other unique indications, or none shall be identified.
2. Audio - Audible warning (i.e., major fault or minor fault), other unique indications, or none shall be identified.
3. HW BIT - Detail the sensing component, module, or device that detected the fault and under what condition (e.g., thermal sensor detected over temp condition).
4. SW BIT - Detail the BIT status word used to flag the fault, the reporting scheme within the overall BIT architecture, and the methodology used for the central BIT engine to report the fault.
5. BIT Performance - Detail the reliability lambda that was covered by the fault detection BIT.

h. Fault Isolation - A description of the methods by which occurrence of the failure mode is isolated by the operator/maintainer shall be recorded. The failure isolation means shall address the following:

1. Action - Describe the most direct procedure that allows an operator/maintainer to isolate the malfunction or failure. An operator/maintainer will know only the initial symptom until further specific action is taken such as performing a more detailed Built-In-Test (BIT), test equipment reading, etc. Note that fault isolation shall be done without the use of spare assets (i.e., no spares used for subassembly isolation).
2. Visual - Display (e.g., fault message, etc.), indicator (e.g., drawer front panel, etc.), audible warning (i.e., major fault or minor fault), other unique indications, or none shall be identified.
3. Audio - Audible warning (i.e., major fault or minor fault), other unique indications, or none shall be identified.

4. HW BIT - Detail the sensing component, module, or device that detected the fault and under what condition (e.g., thermal sensor detected over temp condition).
5. SW BIT - Detail the BIT status word used to flag the fault, the reporting scheme within the overall BIT architecture, and the methodology used for the central BIT engine to report the fault.
6. BIT Performance - Detail the reliability lambda that was covered by the fault detection BIT.

i. Severity classification - A severity classification category shall be assigned to each failure mode and item according to the failure effect using the following categories:

1. Category I - Catastrophic - A failure which may cause death or weapon system loss.
2. Category II - Critical - A failure which may cause severe injury, major property damage, or major system damage which will result in mission loss.
3. Category III - Marginal - A failure which may cause minor injury, minor property damage, or minor system damage which will result in delay or loss of availability or mission degradation.
4. Category IV - Minor - A failure not serious enough to cause injury, property damage, or system damage, but which will result in unscheduled maintenance or repair.

j. The effect on the functional condition of the item under analysis caused by the loss or degradation of output shall be identified so the failure mode effect will be properly categorized. For lower levels of indenture where effects on higher levels are unknown, a failure's effect on the indenture level under analysis shall be described by the severity classification categories. Basic maintenance actions - Describe the basic actions which must be taken by the maintenance technician to correct the failure. Identify the special design provisions for modular replacement and any adjustments and calibration requirements following repair.

k. Compensating provisions - The compensating provisions, either design provisions or operator actions, which circumvent or mitigate the effect of the failure shall be identified and evaluated. This step is required to record the true behavior of the item in the presence of an internal malfunction or failure.

1. Design provisions - Compensating provisions which are features of the design at any indenture level that will nullify the effects of a malfunction or failure, control, or deactivate system items to halt generation or propagation of failure effects, or activate backup or standby items or systems shall be described. Design compensating provisions include:

    a. Redundant items that allow continued and safe operation,
    b. Safety or relief devices such as monitoring or alarm, provisions which permit effective operation or limits damage, and
    c. Alternative modes of operation such as backup or standby items or systems.

2. Operator actions - Compensating provisions which require operator action to circumvent or mitigate the effect of the postulated failure shall be described. The compensating provision that best satisfies the indication(s) observed by an operator when the failure occurs shall be determined. This may require the investigation of an interface system to determine the most correct operator action(s). The consequences of any probable incorrect action(s) by the operator in response to an abnormal indication should be considered in the effects recorded.
3. Remarks - Any pertinent remarks pertaining to and clarifying any other column in the worksheet line shall be noted. Notes regarding recommendations for design improvements shall be recorded and further amplified in the FMEA report.

CDRL deliverable:

- **A070 Failure Modes and Effect Analysis Study (DI-MISC-80508B)**

3.6.6.6 Accelerated Life Test (ALT) (RDT&E)

The Contractor shall utilize an ATIP EDM unit and perform an Accelerated Life Test (ALT) 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. The ALT shall be performed for 360 hours; all corrective action design changes shall be incorporated followed by three (3) consecutive failure free test cycles; and the test setup shall be provided under the following conditions:

a. Initial test conditions.
   1. Equipment set up in a temperature-controlled chamber at 25°C + 5°C and relative humidity of 45 to 55 percent.
   2. Equipment energized under the following conditions:
      a. Nominal line voltage and frequency specified (120 Vac, 60 Hz).
      b. Cooling system in normal operation.
      c. Fully operational for 2 hours (as detailed in the test procedures).
   3. When equipment internal temperature has stabilized, performance parameters shall be measured and recorded as reference test data for comparison with subsequent tests.

b. Temperature conditions.
   1. Reduce chamber temperature, at a uniform rate in not less than 4 hours, to the lowest operating temperature (0^{o}C).
   2. Maintain chamber temperature at the lowest operating temperature of the range for 10 hours.
   3. Near the end of the 10-hour period, measure and record the performance parameters.

4. Increase chamber temperature, at a uniform rate in not less than 6 hours, to the highest operating temperature (50°C) and maintains humidity at 45 to 55 percent.
5. Maintain chamber temperature at the highest operating temperature of the range specified for 5 hours.
6. Near the end of the 5-hour period, measure and record the performance parameters.
7. Reduce chamber temperature, at a uniform rate in not less than 6 hours, to the lowest operating temperature of the range specified.
8. Maintain chamber temperature at the lowest operating temperature of the range specified for 3 hours.

c. Voltage and frequency cycling conditions.

1. After completion of the 3-hour low temperature conditioning period specified in b.8), decrease the input voltage to the lower limit of the equipment voltage tolerance band (114 Vac).
2. Operate for 1 hour and record performance parameters.
3. Return input voltage to nominal value. Decrease input frequency to the lower limit of the equipment frequency tolerance band (58.2 Hz).
4. Operate for 1 hour and record performance parameters.
5. Return input frequency to nominal value.
6. Increase chamber temperature at a uniform rate in not less than 2 hours to the initial test conditions temperature of 25°C +5°C and maintain relative humidity at 45 to 55 percent. Maintain this condition for 2 hours.
7. With equipment operating at 25°C +5°C and relative humidity at 45 to 55 percent, decrease input voltage and frequency to the lower limits of the equipment voltage and frequency tolerance bands (114 Vac, 58.2 Hz). Maintain this condition for 1 hour and record performance parameter.
8. Repeat c.(7) with input voltage at the upper limit of the equipment voltage tolerance band and input frequency at the lower limit of the equipment frequency tolerance band (126 Vac, 58.2 Hz).
9. Repeat c.(7) with input voltage and frequency at the upper limits of the equipment voltage and frequency tolerance hands (126 Vac, 61.8 Hz).
10. Repeat c.(7) with input voltage at the lower limit of the equipment voltage tolerance band and input frequency at the upper limit of the equipment frequency tolerance band (114 Vac, 61.8 Hz).
11. Increase chamber temperature at a uniform rate in not less than 4 hours to the highest operating temperature.
12. Near the end of the 4 hour period measure and record performance parameters.

13. With equipment operating at the highest operating temperature and relative humidity at 45 to 55 percent, increase input voltage the upper limit of the equipment voltage tolerance band, maintaining input frequency at the upper limit of the equipment frequency tolerance band (126 Vac, 61.8 Hz).
14. Operate for 8 hours and record performance parameters.
15. Maintain voltage, and frequency conditions of c.(13) and increase relative humidity to between 90 to 100 percent.
16. Operate for 2 hours and record performance parameters.
17. Maintain input frequency at the upper limit of the equipment frequency tolerance band and relative humidity at 90 to 100 percent, but decrease input voltage to the lower limit of the equipment voltage tolerance band (114 Vac, 61.8 Hz).
18. Operate for 1 hour and record performance parameters.
19. Maintain high temperature and humidity conditions but return input voltage and frequency to nominal values.
20. Operate for 1 hour and record performance parameters.

d. Repeat conditions.

1. After completion of the voltage and frequency cycling conditions specified in c.20) repeat the test conditions in d.2) through d.10) fifteen (15) times.
2. Increase chamber temperature at a uniform rate in not less than 2 hours to the initial test conditions temperature of 25°C +5°C and maintain relative humidity at 45 to 55 percent. Maintain this condition for 2 hours.
3. With equipment operating at 25°C +5°C and relative humidity at 45 to 55 percent, decrease input voltage and frequency to the lower limits of the equipment voltage and frequency tolerance bands (114 Vac, 58.2 Hz). Maintain this condition for 1 hour and record performance parameter.
4. Repeat c.(7) with input voltage at the upper limit of the equipment voltage tolerance band and input frequency at the lower limit of the equipment frequency tolerance band (126 Vac, 58.2 Hz).
5. Repeat c.(7) with input voltage and frequency at the upper limits of the equipment voltage and frequency tolerance hands (126 Vac, 61.8 Hz).
6. Repeat c.(7) with input voltage at the lower limit of the equipment voltage tolerance band and input frequency at the upper limit of the equipment frequency tolerance band (114 Vac, 61.8 Hz).
7. Increase chamber temperature at a uniform rate in not less than 4 hours to the highest operating temperature.
8. Near the end of the 4 hour period measure and record performance parameters.
9. With equipment operating at the highest operating temperature and relative humidity at 45 to 55 percent, increase input voltage the upper limit of the equipment voltage

tolerance band, maintaining input frequency at the upper limit of the equipment frequency tolerance band (126 Vac, 61.8 Hz).

10. Operate for 8 hours and record performance parameters.

The unit under test shall be energized and monitored to ensure proper functionality is maintained during the operating test cycles. When performance measurements are called for, operating tests shall be performed to ensure that proper functionality is maintained. 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. The Government shall have the right to inspect, at the Contractor's facility, the data from all failure and corrective action analyses.

CDRL deliverable:

- **A071 Reliability Test Plan (DI-NDTI-81585A)**
- **A072 Reliability Test Procedures (DI-NDTI-80603A)**
- **A073 Reliability Test Reports (DI-TMSS-81586A)**

3.6.6.7 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 under 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 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 8 maintainability demonstration tasks 90 day 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 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 deliverable:

- **A074 Maintainability/Testability Demonstration Test Plan (DI-MNTY-81604)**

- **A075 Maintainability/Testability Demonstration Test Report (DI-MNTY-81603)**

3.6.7 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 subcontractor/vendor/supplier shall provide and operate throughout the contract a quality system which meets the requirements of ISO 9001 'Quality Systems – Model for Quality Assurance in Design/Development, Production, Installation and Servicing' or a comparable nationally or internationally recognized Standard.

The subcontractor/vendor/supplier quality assurance activities shall include, but not be limited to, those functions to prove conformity to the 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 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 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 the 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. 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.

A section shall be added to the Quality Assurance Program Plan that addresses the following related subcontractors, vendors, and suppliers requirements used 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 NDT requirements?
d. Has the supplier identified QPL items and suppliers?
e. Has the supplier identified all process requirements which need procedures 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 suppliers?

j. Does the supplier have an adequate selection of calibrated inspection equipment necessary for examination of this item?

k. Does the supplier maintain an acceptable system to assure the accuracy and adequacy of measuring and test equipment which includes records, traceability to 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:

- **A082 Quality Assurance Program Plan (DI-QCIC-81794)**

3.7 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 a TIM meeting a Security Verification Test Plan (SVTP) which shall be used to verify ATIP system security requirements as specified in the ATIP Specifications. 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 deliverable:

- **A046 Security Verification Test Plan (DI-NDTI-80566A)**

3.7.1 EDM Testing

3.7.1.1 EDM Design Verification Testing (DVT) (RDT&E)

The Contractor shall conduct Design Verification Testing (DVT), including security testing on the EDM in accordance with the ATIP MoV, SVTP, 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, a Functional Configuration Audit (FCA) and a Physical Configuration Review (PCR) shall be conducted on a tested unit to verify the requirements have been achieved in the design and will serve to define the pre-production baseline for documenting the EDM equipment.

The Contractor shall generate test plans, test procedures, and test reports, 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, ATIP, test equipment, and site assets are allocated to and scheduled for DVT. 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 deliverable:

- **A076 DVT Test Plan (DI-NDTI-80566A)**
- **A077 DVT Test Procedures (DI-NDTI-80603A)**
- **A078 DVT Test Report (DI-NDTI-80809B)**

3.7.1.2 EDM Quality Conformance Inspection (QCI)

Quality Conformance Inspection (QCI) shall be made on every ATIP EDM offered for delivery. The inspection shall consist of such tests that will prove the workmanship and reveal the omissions and errors of the EMD phase, such as functional and performance test 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 inspection, the Contractor shall submit a report of all failures and the impact of these failures on ATIP EDM.

CDRL deliverable:

- **A096 EDM QCI Test Plan (DI-NDTI-80566A)**
- **A097 EDM QCI Test Procedures (DI-NDTI-80603A)**
- **A098 EDM QCI Report (DI-NDTI-80809B)**

3.7.2 Production Test (OPN)

3.7.2.1 First Article Inspection Testing (OPN)

The Contractor shall perform First Article Inspection (FAI) testing on a production ATIP. 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, a Physical Configuration Audit (PCA) shall be performed to ensure all required documentation matches the design.

a. The Contractor shall submit the first article test report to the Government no later than 30 calendar days after completion of the test. Within 30 calendar days after the Government received the test report, the Contracting Officer will notify the Contractor, in writing, of the conditional approval, approval, or disapproved of the first article.

b. If the first article is disapproved, the Contractor, upon Government request, shall repeat any or all first article tests. After each request for additional tests, the Contractor shall make any necessary changes, modifications, or repairs to the first article or select another first article for testing. All costs related to these tests are to be borne by the Contractor, including any and all costs for additional tests following a disapproval. The Contractor shall then conduct the tests and deliver another report to the Government under the terms and conditions and within the time specified by the Government. The Government shall take action on this report within the time specified in paragraph (a) of this subsection.

c. Final acceptance and payment will be made at the successful conclusion of FAI and incorporation of outstanding test items/resolution. If after successful FAI, a make or buy decision is changed or a new source is identified for a critical component, then the Government must be notified and a revalidation of that component will be required.

CDRL deliverables:

- **A079 FAI Test Plan (DI-NDTI-80566A)**
- **A080 FAI Test Procedures (DI-NDTI-80603A)**
- **A081 FAI Test Report (DI-NDTI-80809B)**

3.7.2.2 Production QCI

A production Quality Conformance Inspection (QCI) shall be performed on every production ATIP offered for delivery. The inspection shall consist of such tests that will prove the workmanship and reveal the omissions and errors of the production process, such as functional and performance test 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 a report of all failures and the impact of these failures on production.

CDRL deliverable:

- **A099 Production QCI Test Plan (DI-NDTI-80566A)**
- **A100 Production QCI Test Procedure (DI-NDTI-80603A)**
- **A101 Production QCI Report (DI-NDTI-80809B)**

3.8 Integrated Logistics Support (ILS)

3.8.1 Logistic Support (RDT&E, OPN)

The Contractor shall provide at design reviews, PMRs, and TIMs Integrated Logistic Support (ILS) planning that clearly defines the life-cycle ILS requirements and tasks in adequate detail to assure that ATIP being installed in an operational environment can be supported.

3.8.2 Repair Analysis (RDT&E)

The Contractor shall perform a Level of Repair Analysis (LORA) of the ATIP to establish the maintenance 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 deliverable:

- **A083 LORA (DI-MISC-80508B)**

3.8.3 Supply Support

3.8.3.1 Provisioning Support (RDT&E, OPN)

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 Navy'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 and production phases.

3.8.3.1.1 Provisioning Technical Documentation (PTD) (RDT&E)

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 SAS worksheet. The Contractor is authorized to use Parts Master or other commercial type provisioning screening process as approved by NAVICP. The Contractor shall provide PTD in accordance with requirements herein, the Supply Support 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 cataloguing. 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 ICAPS, DPD elements, SPS, and other provisioning requirements. The PTD baseline shall be updated to provide the provisioning efforts for Design Change Notices (DCNs) during the EMD phase. The Contractor shall continue to submit DCNs for the life of the production contract.

CDRL deliverable:

- **A084 Interactive Computer Aided Provisioning System (ICAPS) Data File Exchange (DI-ALSS-81545)**

3.8.3.1.2 Supplemental Data for Provisioning (SDFP) (RDT&E)

Approved Supplemental Data for Provisioning (SDFP) is required for all systems or equipment that is acquired for Navy 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, but is not limited to, 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: (1) Technical data equivalent to approved Product Engineering Drawings as defined in MIL-DTL-31000; (2) Commercial Drawings; (3) Commercial manuals, catalogs, or catalog descriptions; and (4) 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 of 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. Source, Maintenance, and Recoverability 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 item; and/or (3) Item is listed as a reference item (subsequent appearance of an item) on a parts list.

CDRL deliverable:

- **A085 Supplemental Data for Provisioning (SDFP) (DI-ALSS-81557)**

3.8.3.1.3 Design Change Notices (DCNs) (RDT&E, OPN)

The Contractor shall continue maintaining the Supply Support SAS worksheet during the life of the contract (i.e., EMD and production phases). Updates/changes shall be performed by providing DCNs. The Contractor shall notify PMW/A170 & NAVICP/NSLC of all changes, production or modification type, which are 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 engineering design or production 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 Procuring Contracting Officer (PCO), a change to the system or equipment shall be provisioned as a new end item and documented by PTD with associated SDFP.

CDRL deliverable:

- **A086 Interactive Computer Aided Provisioning System (ICAPS) Data File Exchange; Design Change Notice (DI-ALSS-81545)**
- **A087 Supplemental Data for Provisioning (SDFP); Design Change Notice (DI-ALSS-81557)**

3.8.4 Spares (RDT&E)

The Contractor shall provide 2 complete ATIP units to support system stock and 4 complete ATIP LRUs.

3.8.5 Operation and Maintenance Training (RDT&E)

3.8.5.1 Operation Training

The Contractor shall develop and provide operation and maintenance training in sufficient detail to enable the Government to safety and effectively use and maintain the ATIP. The Contractor shall develop training packages for the complete ATIP system to support "lecture/hands-on training" utilizing a Course Conduct Information Package, multimedia aids, and designated GFP equipment to support operations, maintenance, and installation training in accordance with MIL-HDBK-29612-1A "Guidance for Acquisition of Training Data Products and Services". The training package shall be developed to include the following task based objectives:

a. Operations

1. System start-up tasks such as power-up, software/firmware load, management interface (I/F) setup, user account setup, etc.

2. Pre-operations tasks such as system configuration setup, loading configuration files, configuration file export/save, etc.
3. Baseband (e.g., Local User IP, etc.) and cryptographic equipment setup tasks to support communications.
4. Operations tasks to establish and maintain TDMA Supernet/Subnet services.
5. TDMA Subnet management tasks (e.g., TDMA Subnet establishment, member join/exit, Subnet management handover, etc.).
6. Monitoring equipment and Supernet/Subnet status tasks including low level counters
7. Post-operations tasks to end communication services, power down equipment, etc.
8. System administration tasks such as user account management, log files management, etc.
9. System security tasks.

b. Maintenance

1. System troubleshooting (including fault detection and isolation, loopback test, etc), corrective maintenance, and preventive maintenance tasks.
2. Updating ATIP Software/firmware.

The lecture portion shall be provided in an electronic format to support electronic presentation (e.g., computer) as aided by trainer instruction. The training shall be conducted at the Contractor's facility and be used to support training for Government installation personnel, laboratory and field activity personnel, Test and Evaluation (T&E) personnel, and for On-the-Job instructors.

The training shall be conducted for the duration of 40 hours (1 week). Course conduct shall be provided for up to ten (10) personnel for operations and six (6) personnel for maintenance with two (2) additional slots for personnel on a not-to-interfere basis. The course(s) will be conducted between the hours of 8:00 am and 6:00 pm. For planning purposes, to the extent the training CLIN is exercised six (6) courses are forecast (e.g., two (2) courses to support initial equipment deliveries and then four (4) courses to support platform installations).

Contract designated ATIP and GFP assets shall be used to support the training courses as coordinated by the Contractor to meet Government schedule requirements. The lecture (instructor oriented) to laboratory (hands-on oriented) ratio shall be 40% (maximum) to 60% (minimum) with a goal of 25% to 75%. For the laboratory training the student to training equipment/device ratio shall be no more than two (2) trainees to one (1) training equipment/device.

The Contractor shall provide an Initial Guidance Conference (IGC) prior to commencing the training tasks herein and shall provide 50%, 75%, and 100% IPRs during the development

process with the Government. The following MIL-PRF-29612B "Performance Specification Training Data Products" shall be developed by the Contractor as follows:

a. Instructional Performance Requirements Document (IPRD) - This product shall provide specific personnel performance requirements data necessary to support the design of a training program and data necessary to support the design of a training program. The document shall provide mission; collective and individual task information; lists of knowledge, skills, attitudes; and learning objectives for the tasks that have been selected for training. The types of analysis which shall be conducted to determine instructional performance requirements include mission, procedures (operator, maintenance, and installation tasks), and content and structure (academic discipline). The following is a list of efforts that shall be performed in accomplishing the analysis.

   1. Identify individual and collective training tasks.
   2. Analyze individual and collective training tasks.
   3. Develop performance measures and performance levels, and identify affected occupational skill areas.
   4. Determine prerequisite knowledge, skills, and attitudes of trainees entering the training program.
   5. Identify learning objectives, learning types and levels, and instructional methodology of each learning objective.
   6. Identify required sensory stimuli to support each learning objective.
   7. Determine instructional setting, course mission, length, and class size.
   8. Develop Individual Training Standards (ITS).

   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.

b. Course Conduct Information Package (CCIP) - This package provides data required to support the conduct of training. This product 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. This product shall inform students of the training syllabus, organization, operation, scheduling, and other pertinent information. This product shall also provide information on an evaluation of a trainee's performance, the trainee evaluation of training, and shall provide the trainee with a certificate of training. The following is a list of efforts that shall be performed in accomplishing the task:

   1. Development of trainee orientation guidance.
   2. Development of training course standards.

3. Development of trainee materials.
4. Development of trainee and training course completion information.

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.

c. Test Package. This training data product 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 following is a list of efforts that shall be performed in accomplishing test package development:

1. Develop test items.
2. Develop tests.
3. Develop test administration materials.
4. Develop a testing plan.
5. Develop a 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. "Course Conduct Information Package–Type B" using 100% pass/fail criteria.

CDRL deliverable:

- **A088 Instructional Performance Requirements Document (DI-SESS-81518B)**
- **A089 Course Conduct Information Package (DI-SESS-81522B)**
- **A090 Course Test Package (DI-SESS-81525B)**

3.8.5.2 Long Term Training Approach Study (RDT&E)

The Contractor shall conduct an analysis of how to provide long term, Navy schoolhouse ATIP training to support operations and, if feasible, maintenance training. The study shall provide a list of options including, but not limited to: (1) using the ATIP as a natural product (e.g., developing emulation equipment for IP packet input and crypto/terminal/satellite TU output), (2) enhancing ATIP with embedded capabilities for standalone operations, or (3) non-ATIP training approaches (e.g., Computer Based Training). The study shall include identification of benefits to ATIP development and production (e.g., test equipment applicability) and initial fielding as well as training specific capabilities. The study will provide the pros and cons of the training option addressing, as a minimum, the following:

a. ATIP configuration, ATIP operations, and ATIP maintenance training capabilities.

b. ATIP operations with interfacing systems and their impact on ATIP behavior.

c. ATIP operations with other ATIPs in the Supernet/Subnet architecture.

d. Training effectiveness and the realism of the training environment (e.g., completeness of ATIP functionality, representative nature to the real ATIP, and ability to assess student performance).

e. Development cost of the training option (NRE).

f. Production cost of the training option (RE).

g. Sustainment cost (over a 15 year period) at four (4) designated Navy School houses.

CDRL deliverable:

- **A091 Navy School House Training Environment Study (DI-MISC-80508B)**

3.8.6 Technical Data (RDT&E)

3.8.6.1 Technical Manual (RDT&E)

The Contractor shall develop an Operations and Maintenance (O&M) technical manual for the complete ATIP system addressing the system, functions, interfaces, and configuration requirements/capabilities. The technical manual content requirements shall be developed IAW 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)," using the Table of Contents as the outline format. The technical manual shall also be developed IAW the ATIP Technical Manual Contract Requirements (TMCR) and associated CDRLs.

The technical manual development shall support an Initial Guidance Conference (IGC) prior to starting the technical manual takes and In-Process Reviews (IPRs) at the 50%, 75%, 100%, and V&V completion points. The technical manual shall be established as stand-alone data/deliverables not dependent on any other technical manual or Interactive Electronic Technical Manual (IETM).

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

CDRL deliverable:

- **A092 System Operation and Maintenance Manual (DI-MISC-80508B)**

3.8.6.2 Technical Data Package (TDP) (RDT&E, OPN)

The Contractor shall deliver a complete Level III Production Drawings and associated parts lists for the complete ATIP system. The Technical data Package (TDP) shall be sufficient to fully reproduce the parts, items, or assembly, in accordance with MIL-STD-31000, 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 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 technical data package 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 deliverable:

- **A093 Product Drawings/Models and Associated Lists (DI-SESS-81000D)**
- **A094 Commercial Drawings/Models and Associated Lists (DI-SESS-81000D)**

3.8.7 Packaging, Handling, Storage, and Transportation (RDT&E)

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 Overall 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 kilogram (40 pounds), the container shall have lifting features and center of gravity markings to support 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 paragraph 3.6.2.1.3 "Unique Identification".

3.8.8 Diminishing Manufacturing Sources/Material Shortage (RDT&E, 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 parts 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, etc. 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 Configuration Management (section 3.6.2) requirements 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.

3.9 Software Sustainment Engineering Support (OMN)

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

a) Identify any required modifications necessary to address issues, problems, and software failures as identified by the Fleet users or the Government.

b) Provide software engineering and design solutions in the appropriate form (e.g., ECPs, RFD, NOR) for the Government approval.

c) Design and test software changes and modifications along with system regression testing to ensure changes are ready for release.

d) Deliver software changes and modifications.

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.

CDRL deliverable:

- **A095 Software Transition Plan (STrP) (DI-IPSC-81429A)**

4 GOVERNMENT FURNISHED PROPERTY (GFP)

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 this contract. If for any reason, an option is not exercised, the Contractor shall return any GFP to the Government within 45 days after option exercise period ends. The Contractor shall not modify the GFP without prior written approval from the Government, see Section H clause (NAPS 5252.245-9201) Government Furnished Property and Section I clause 52.245-19 Government Property Furnished "As Is" 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 status on GFP to include, a list with serial numbers and status of the GFP in the CPSMR (CDRL A003) required in section 3.1 herein.

5 TECHNICAL DATA/ SOFTWARE RIGHTS (RDT&E, OPN)

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 for noncommercial technical data produced in the performance of this contract.

The Government requests that the Contractor provide a minimum of Government Purpose Rights (GPR) as defined in DFARS Subsection DFARS 252.227-7014 for noncommercial computer software and noncommercial computer software documentation produced in the performance of this contract.

For Commercial Computer Software and Commercial Computer Software Documentation, the Government requires the Contractor to provide suitable and sufficient license(s) to accommodate all ATIP EDMs acquired under this contract. For commercial technical data, the Contractor must comply with DFARS 252.227-7015.

Production Software License and Technical Data Rights (OPN)

For Commercial Computer Software and Commercial Computer Software Documentation, the Government requires the Contractor to provide suitable and sufficient license(s) to accommodate all production ATIPs acquired under this contract. For commercial technical data, the Contractor must comply with DFARS 252.227-7015.

6 PLACE OF PERFORMANCE

Place of Performance shall be primarily at Contractor site.

7 NAVY MARINE CORPS INTRANET (NMCI)

The Contractor is not required to procure NMCI seats for personnel working at the Contractor site.

8 SECURITY

This contract will require access to Secret Information. The work performed by the Contractor 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 SSC SD foreign travel team, OTC2, Rm. 1656 for action. A Request for

Foreign Travel form shall be submitted for each traveler, in advance of the travel to initiate the release of a clearance message at least 35 days in advance of departure. Each Traveler must also submit a Personal Protection Plan and have a Level 1 Antiterrorism/Force Protection briefing within one year of departure and a country specific briefing within 90 days of departure.

APPENDIX 1: DEFINITIONS / ACRONYMS

DEFINITIONS

a. Built-In-Test (BIT): BIT is an integral 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 and Space, PMW 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, etc.). 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, etc.). 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 (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 (3) 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
AP	ATIP Processor
ATIP	Advanced Time Division Multiple Access (TDMA) Interface Processor (ATIP)
BCA	Broadcast Command Authority
BIT	Built-In Test
BITE	Built-In Test Equipment
BOM	Bills of Material
C&A	Certification and Accreditation
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
CI	Configuration Item
CLIN	Contract Line Item Number
CM	Configuration Management
CMM	Capability Maturity Model
CMP	Configuration Management Plan
CONOPS	Concept of Operations
CoP	Criticality of Performance
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 Notices
DISA	Defense Information Systems Agency
DLSC	Defense Logistics Support Center
DMS/MS	Diminishing Manufacturing Source/Material Shortage
DoD	Department of Defense
DoDI	Department of Defense Instruction
DoDISS	Department of Defense (DoD) Index of Specifications and Standards
DoP	Difficulty of Performance
DVT	Design Verification Test
ECP	Engineering Change Proposal
EDM	Engineering Development Models
EHF	Extremely High Frequency
EIA	Electronics Industries Association

EMD	Engineering and Manufacturing Development
ESOH	Environmental, Safety, and Occupational Health
ETE	Embedded Training Equipment
FAI	First Article Inspection
FCA	Functional Configuration Audit
FID	Fault Insertion Device
FMEA	Failure Modes and Effects Analysis
FPGA	Field Programmable Gate Array
FRP	Full-Rate Production
GFE	Government Furnished Equipment
GFP	Government Furnished Property
GOTS	Government off-the Shelf
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
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
IUID	Item Unique Identification
JETDAS	Joint Electronics Type Designation Automated System
JTA	Job Task Analysis
KL	Knowledge Level
KPP	Key Performance Parameters
KSA	Knowledge, Skills, and Attitudes
LAN	Local Area Network
LORA	Level of Repair Analysis
LRU	Line Replaceable Unit
MDR	Milstar Medium Data Rate
MILSATCOM	Military Satellite Communications
MOE	Measure of Effectiveness

MOS	Measure of Suitability
MOSA	Modular Open Systems Architecture
MoV	Method of Verification
MS	Material Storages
MSD	Material Support Date
MSI	Maintenance Significant Item
MTBF	Mean Time Between Failure
MTTR	Mean Time To Repair
NC	Network Controller
NDI	Non-Developmental Item
NEPA	National Environmental Policy Act
NCTAMS	Naval Computer and Telecommunications Area Master Station
NMT	Navy Multiband Terminal
NOR	Notice of Revision
NRE	Non-Recurring Engineering
NSERC	Naval Systems Engineering Resource Center
NSN	National Stock Number
OPN	Other Procurement, Navy
OS	Operating System
OSHA	Occupational Safety and Health Act
OTA	Over-The Air
QCI	Quality Conformance Inspection
QoS	Quality of Service
PAC	Post Award Conference
PBOM	Priced Bill of Material
PCA	Physical Configuration Audit
PCR	Physical Configuration Review
PCO	Procuring Contracting Officer
PDR	Preliminary Design Review
PFM	Pre-Faulted Module
PMP	Program Management Plan
PMR	Program Management Review
PMW	Program Manager Warfare
PoIP	Probability of Inadequate Performance
PRR	Production Readiness Review
PSD	Provisioning Screening Data
PT	Production Test
PTD	Provisioning Technical Documentation
QoS	Quality of Service
RDT&E	Research, Development, Test & Evaluation
RE	Recurring Engineering
RFD	Request for Deviation
RFP	Request for Proposal
RMP	Risk Management Plan

SAIP	Spares Acquisition Integrated with Production
SAR	Safety Assessment Report
SAR	Serialized Assembly Record
SATCOM	Satellite Communication
SCCB	Software Configuration Control Board
SDFP	Supplemental Data for Provisioning
SDP	Software Development Plan
SDR	System Design Review
SEI	Software Engineering Institute
SHS	Safety Hazard Severity
SL	Skill Level
SMR	Source, Maintenance, and Recoverability
SRS	Software Requirement Specification
SOW	Statement of Work
SPAWAR	Space & Naval Warfare Systems Command
SRB	Software Review Board
SSHA	System Safety Hazardous Analysis
SSPP	System Safety Program Plan
STD	Software Test Description
STIG	Security Technical Implementation Guide
STP	Software Test Plan
STR	Software Test Report
SVTP	Security Verification Test Plan
SWaP	Size, Weight, and Power
TBD	To be determined
TBR	To be resolved
TD	Technical Direction
TD	Task Duration
TDBD	Top-Down Breakdown
TDMA	Time Division Multiple Access
TDP	Technical Data Package
T&E	Test and Evaluation
TEMP	Test and Evaluation Master Plan
TF	Task Frequency
TIF	Terminal Interface Function
TIM	Technical Interchange Meeting
TIP	TDMA Interface Processor
TM	Technical Manual
TMCR	Technical Manual Contract Requirements
TP	Task Periodicity
TRR	Test Readiness Review
TSM	TDMA Subnet Management
TTS	Total Training Score
TU	Transmission Unit

UID	Unique Identification
V&V	Validation & Verification
XDR	Extended Data Rate