STATEMENT OF WORK

FOR

NETWORK TACTICAL COMMON DATA LINK SYSTEM (NTCDL)

SURFACE TERMINAL

2 November 2015
Amendment 0003

SPAWAR PEO C4I
PMW / A 170
NTCDL Program Office
San Diego, CA

DISTRIBUTION STATEMENT A:
Approved for Public Release. Distribution is unlimited (24 JUNE 2014)

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1 SCOPE

This Network Tactical Common Data Link (NTCDL) Statement of Work (hereinafter referred to as "SOW") and the NTCDL System Performance Specification (hereinafter referred to as "SPS") set forth contractor requirements for the design, development, production, integration, testing and procurement of the NTCDL Surface Terminal. The requirements include hardware and software design and development; hardware and software integration; related test and evaluation; hardware production and related systems engineering activities. The SOW also encompasses the functions needed to provide Integrated Logistics Support (ILS), Configuration Management (CM) and engineering services for tasks and troubleshooting associated with installation and support of NTCDL terminals in the Navy operating environment. Capability and performance requirements are derived from the SPS and the Common Data Link (CDL) Capstone document and Waveform Specifications cited in the Applicable Documents Section.

The NTCDL Surface Terminal developed and produced under this contract is intended for installation aboard U.S. Navy afloat platforms. Based on the required scalability of the NTCDL Surface Terminal, the Variant A system shall be configurable as a Variant B system or a Variant C system. The contractor shall produce two (2) fully populated Engineering Development Models (EDMs).

1.1 Background

The CDL is a Department of Defense (DoD) program designed to achieve data link interoperability. During the 1980s, the proliferation of incompatible intelligence gathering data links motivated the Government to standardize on a single architecture. The CDL standard was formalized in 1988 when Congress mandated the use of the CDL architecture within all Services and Defense Agency imagery and sensory collection systems. The CDL architecture was based on a data link architecture firmly established within the intelligence gathering community at the time of the Congressional mandate. Basing standardization on an existing architecture provided instant interoperability with existing assets and stopped investment in assets not conforming to the standard. This CDL program supports the Information Technology (IT) and information needs necessary to support the Defense Strategy of the Quadrennial Defense Review February 2010, and follows the Office of the Assistant Secretary of Defense Networks and Information Integration CDL Policy Memorandum (30 December 2005) directing requirements for all CDL programs.

NTCDL is the Department of the Navy's (DoN's) way ahead for CDL. NTCDL shall be compatible with legacy shipboard and airborne CDL platforms implementing either Standard CDL (including Rev F Change 1) or Bandwidth Efficient (BE)-CDL waveforms. NTCDL will provide transmit / receive capability of Intelligence, Surveillance, Reconnaissance (ISR) data in support of Tasking, Collection, Processing, Exploitation and Dissemination activities. It will provide the transport mechanism for digital information exchanges between ship-to-air, ship-to-ship, air-to-air and air-to-ground warfighting elements, while enabling connectivity to civil and national authorities (e.g., Humanitarian Assistance / Disaster Relief missions). NTCDL will provide network-centric operations, expanding and enhancing key Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR) capabilities for strategic communications. The data link allows the warfighter to share ISR information, forming a coordinated force. The specific ISR data collected is dependent upon the sensor in an aircraft and may include tactical reconnaissance imagery, radar, full motion video, sonar, electronic intelligence, or signals intelligence.

2 APPLICABLE DOCUMENTS

The following specifications, standards and handbooks form a part of this SOW to the extent specified herein. Unless otherwise specified, the Government documents are those listed in the current issue of the DoD Index of Specifications and Standards on the date of the solicitation. The non-Government standards are those in effect on the date of the solicitation. In the event of a conflict between the documents referenced herein and the contents of this SOW, the text of the SOW takes precedence.

2.1 Government Documents

Copies of the specifications, standards, handbooks, drawings, publications, and other documents required by contractors, in connection with specific acquisition functions, shall be obtained from the Net-Centric Enterprise Solutions for Interoperability (NESI) website or as directed by the Procurement Contracting Officer (PCO). In addition, copies of the specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5095. Application for copies of Occupational Safety and Health Agency (OSHA) references shall be addressed to the Department of Labor, OSHA, Washington, DC 20210. Application for copies of National Security Agency (NSA) references shall be addressed to NSTISOSC Secretariat (V503), NSA, 9800 Savage Road STE 6716, Fort Meade, MD 20755-6716.

Table: 2.1: Government Documents

Document	Title	Date
BE-CDL[1, 2]	Performance Specification for the Bandwidth Efficient-Common Data Link (BE-CDL) Waveform, Specification Number 60038368 Rev [B] Draft	14 July 2015
CAP 60038365 Rev A' Appendix A [1]	Capstone Specification for the Network-Centric Common Data Link (Capstone), Specification Number 60038365 Draft Rev [A], Appendix A,	Mar 2015
CAP 60038365 Rev A' Appendix C [1]	Capstone Specification for the Network-Centric Common Data Link (Capstone), Specification Number 60038365 Draft Rev [A], Appendix C	Mar 2015
CAP 60038365 Rev A[1, 2]	Capstone Specification for the Network-Centric Common Data Link (Capstone), Specification Number 60038365 Draft Rev [A]	Mar 2015
DoDI 5000.02	Operation of the Defense Acquisition System	07 Jan 2015
LCI IDD	Link Control Interface (LCI) Interface Design Description (IDD)	27 Feb 2015 (draft v.0.5)
NESI V3.5.2	Net-Centric Enterprise Solutions for Interoperability (NESI), https://nesix.spawar.navy.mil	17 Apr 2014
NTCDL CM Plan	Network Tactical Common Data Link Configuration Management Plan	20 Aug 2014
NTCDL PESHE	NTCDL Programmatic ESOH Evaluation (PESHE)	9 Sep 2014
NTCDL SEP	NTCDL Systems Engineering Plan (SEP)	25 Nov 2014
NTCDL SPS	NTCDL Surface Terminal System Performance Specification (SPS), Document # NTCDL-SPS-1004M-1.0, Space and Naval Warfare System Command	10 Sep 2015
PEOC4I LCCMIM	Program Executive Office Command, Control, Communications, Computer, Intelligence Lifecycle	6 Feb 2007

Document	Title	Date
	Configuration Management Implementation Manual	
PMW / A 170 CM Plan	PMW / A 170 Configuration Management Plan	16 May 2012
PMW / A 170 IUID Plan	Item Unique Identification (IUID) Implementation Plan For PMW / A 170 Programs	11 Feb 2015
Std-CDL F-1[1, 2]	Waveform Specification for the Standard Common Data Link (Std-CDL) Waveform, Specification Number 7681990 Revision F, Change 1	Feb 2005
Std-CDL H-2[1, 2]	Performance Specification for the Standard Common Data Link (Std-CDL) Waveform, Specification Number 7681990, Revision H-2	Dec 2014

*** Document includes classified annexes.**

All commercial standards which are used by the contractor shall be identified and made available to the procuring activity for informational purposes only.

2.2 Other Government Documents

Table: 2.2: Other Government Documents

Document	Title	Date
ASN RD&A Memorandum	Policy of Digital Product / Technical Data	Oct 2004
COMSPAWAR M-4720. 5A	Installation Requirements Drawing (IRD) Standard Version 2.0	27 Mar 2014
DoD Directive (DoDD) 8570.01	Information Assurance Training, Certification, and Workforce Management	15 Aug 2004
DoD Instruction (DoDI) 4630.09	Communication Waveform Management and Standardization	15 Jul 2015
DoD Instruction 5000.64	Accountability and Management of DoD Equipment and Other Accountable Property	19 May 2011
DoD Instruction 6055.1	DoD Safety and Occupational Health (SOH) Program	19 Aug 1998
DOD UID Guide Version 2.5	Department of Defense Guide to Uniquely Identifying Items Assuring Valuation, Accountability and Control of Government Property Version 2.5	15 Sep 2015
IDEA CAD	IDEA CAD Std. Rev. B	7 Feb 2005
MIL-HDBK-237D, Notice 1	Electromagnetic Environmental Effects and Spectrum Supportability Guidance for the Acquisition Process	4 Apr 2013
MIL-HDBK-454B	General Guidelines for Electronic Equipment	15 Apr 2007
MIL-HDBK-454B, Notice 1 (Validation)	General Guidelines for Electronic Equipment	12 Dec 2012
MIL-HDBK-502A	Product Support Analysis	08 Mar 2013
MIL-HDBK-61A	Configuration Management Guidance	07 Feb 2001

[1] Copies of the above referenced CDL waveform specification are subject to access restrictions and only available upon request from the CDL Program Office within the Secretary of the Air Force / Acquisition, Information Dominance, Airborne Reconnaissance Division (SAF / AQIJ)

[2] Includes classified annexes.

Document	Title	Date
MIL-HDBK-781A	Reliability Test Methods, Plans, and Environments for Engineering Development, Qualification, and Production	01 Apr 1996
MIL-HDBK-781A, Notice 1 (Validation)	Reliability Test Methods, Plans, and Environments for Engineering Development, Qualification, and Production	30 Jan 2015
MIL-PRF-29612B	Training Data Products	20 Jun 2011
MIL-STD-130N w/CHANGE 1	Identification Marking of U.S. Military Property	16 Nov 2012
MIL-STD-1310H	Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility, Electromagnetic Pulse (EMP) Mitigation, and Safety	17 Sep 2009
MIL-STD-1310H, Notice 1 (Validation)	Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility, Electromagnetic Pulse (EMP) Mitigation, and Safety	12 Aug 2014
MIL-STD-1472G	DoD Design Criteria Standard: Human Engineering	11 Jan 2012
MIL-STD-1474D	DoD Design Criteria Standard: Noise Limits	12 Feb 1997
MIL-STD-1474E	DoD Design Criteria Standard: Noise Limits	15 Apr 2015
MIL-STD-1686C	Electrostatic Discharge Control Program For Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)	25 Oct 1995
MIL-HDBK-263B	Electrostatic Discharge Control Handbook for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)	31 July 1994
MIL-HDBK-773A	Electrostatic Discharge Protective Packaging	30 June 2005
MIL-STD-3034A	Reliability-Centered Maintenance (RCM) Process	29 Apr 2014
MIL-STD-31000A	Technical Data Packages	26 Feb 2013
MIL-STD-461F	Requirements for Control of Electromagnetic Interference Characteristics of Subsystems and Equipment	10 Dec 2007
MIL-STD-464C	DoD Interface Standard for Electromagnetic Environmental Effects (E3) Requirements for Systems	01 Dec 2010
MIL-STD-46855A(T)	Human Engineering Requirements for Military Systems, Equipment and Facilities	24 May 11
MIL-STD-882E	DoD Standard Practice: System Safety	11 May 2012
NAVEDTRA-131	Personnel Performance Profile Based Curriculum Development Manual Volume I Developer's Guide	9 Mar 1993
NAVSEA S9040-AA-GTP-00 / SSCR Rev 4, Change 1	Shipboard Systems Certification requirements for Surface Ship Industrial Periods (Non-Nuclear)	1 Jun 1998
OPNAVINST 3000.12A	Operational Availability of Equipment and Weapons Systems	2 Sept 2003
OPNAVINST 5090.1D	Environmental Readiness Program	10 Jan 2014
OPNAVINST 5100.24B	Navy System Safety Program Policy	6 Feb 2007
SPAWARINST 4160.3C	Policy, Procedures and Responsibilities for Technical Manual Management Operations and Product Technical Data Lifecycle Support	13 Feb 2013
SPAWARINST 4440.12	Management of Operating Materials and Supplies (OM&S), Government Furnished Property (GFP), Contractor Acquired Property (CAP), Property, Plant and Equipment (PP&E), and Inventory	8 Feb 2011
SPAWARINST 4720.5A	Policy and Procedures for Development and Life-Cycle Management of Installation Requirements Drawing	16 Apr 2014

Document	Title	Date
SSCPACINST 4650.3A	Foreign Travel Program	24 Oct 2013
TMCR	Technical Manual Contracts Requirements (14001)	Feb 2013
TMQAP	Technical Manual Quality Assurance Plan (TMQAP)	Feb 2013
TOP-1-2-511A	Electromagnetic Environmental Effects System Testing	20 Nov 2013
TSRD	Technical Security Requirements Document – Rev 1.6	Aug 2015

2.3 Non-Governmental Documents

Table: 2.3: Non-Government Documents

Document	Title	Date
AIA / NAS NAS411	Hazardous Materials Management Program - Rev 3	30 Sep 2013
AIA / NAS NAS411-1	Hazardous Materials Target List	30 Sep 2013
ANSI / EIA-748	Earned Value Management Systems	17 Dec 2013
ASQ / ISO Q9000-2005	Quality Management Systems – Fundamentals and Vocabulary	16 May 2006
GEIA-STD-0007B	Logistics Products Data, Version 1.0	1 May 2013
IEEE 12207-2008	Systems and Software engineering — Software life cycle processes - IEEE Computer Society	1 Feb 2008
ISO-9000	Quality Management (Family of standards)	Various

3 GENERAL REQUIREMENTS

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 contractor shall designate a single sell off location to be used for all sell off events (development and production).

3.1 Program Management (RDT&E, OPN, OMN, SCN)

The requirements identified within this Section and the subsequent Subsections are applicable to the management of all development, production, integration, hardware, related engineering services, and data deliverables procured under this contract.

Net-centric Enterprise Solutions for Interoperability (NESI) is a joint effort between the United States Navy's Program Executive Office for C4I & Space and the United States Air Force's Electronic Systems Center. It provides implementation guidance which facilitates the design, development, maintenance, evolution, and use of information systems for the Net-Centric Operations and Warfare (NCOW) environment. All work performed shall adhere to NESI implementation open architecture guidance (see https://nesix.spawar.navy.mil).

The contractor shall appoint a Program Manager (PM) responsible for carrying out the work as set forth in this SOW. The PM shall be the focal point for all program communications between the Government and the contractor. The contractor shall provide the Government a monthly update of the NTCDL contract status via the Contractor's Progress, Status Management Report (CDRL A001). The contractor shall hold quarterly Program Management Reviews (PMRs) per SOW Section 3.1.4.2.

The contractor shall identify in the monthly Contractor's Progress, Status Management Reports (CDRL A001) the task leads responsible for accomplishing tasks and the overall program management structure within the corporation for management and control of this contract. The reports shall address the progress of the contract effort, status of CDRLs and CDRL deliverable schedule, status of any problem resolution, identification of new problems, summary of safety-related actions, significant events, updated contract schedule, and other data required to be included by other paragraphs throughout this SOW where the Contractor's Progress, Status Management Report is identified. An Integrated Master Schedule (IMS), Integrated Baseline Review (IBR), and Contract Funds Status Management Report (CFSR) brief status update shall also be reported as part of the Contractor's Progress, Status Management Report (CDRL A001). Additionally, the contractor shall provide Agenda and Presentation Materials (CDRL A002) and Conference / Meeting Minutes (CDRL A003) as required by the identified CDRL Deliverables.

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status Management Report (DI-MGMT-80227)
- (CDRL A002) Agenda and Presentation Materials (DI-ADMN-81249A)
- (CDRL A003) Conference / Meeting Minutes (DI-ADMN-81250A)

3.1.1 Program Management Plan

The contractor shall develop and maintain a detailed Program Management Plan (PMP) (CDRL A004) for performance of work under this contract. The PMP shall provide the framework for assigning work responsibilities and summarizing planned versus actual accomplishments. The contractor shall establish and define clear lines of authority and responsibility between all organizational elements.

The PMP shall clearly and concisely state the contractor's plans for how efforts will be conducted, and how program tasks will be controlled. It shall identify key system engineering tasks, their interrelationships with program milestones, and the specific criteria that will be used to track and measure successful task completion. The PMP shall provide top-to-bottom traceability from the SOW and SPS to the Contract Work Breakdown Structure (CWBS) and to a mandatory reporting level as provided in the CWBS (CDRL A005).

The contractor shall prepare the PMP in a format clearly and succinctly conveying to the Government the information required by the SOW. The PMP shall describe: key tasks, events, and accomplishments to be met by the contractor; the associated criteria for the events and accomplishments; the processes to be used in performing and reporting the tasks required by the contract; and the organization and conduct of the Integrated Product Teams (IPTs) required in SOW Section 3.2.3.5.

The PMP shall include those items referenced throughout this SOW for inclusion in the PMP. The PMP shall also include: (1) the contractor's Sub-contractor Management Plan; and (2) the contractor's Technical Data Package (TDP) Quality Control Program Plan.

Status against the PMP and the items required of the PMP shall be reported monthly in the Contractor's Progress, Status and Management Report (CDRL A001).

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status Management Report (DI-MGMT-80227)
- (CDRL A004) Program Management Plan (PMP) (DI-MGMT-81797)
- (CDRL A005) Contract Work Breakdown Structure (CWBS) (DI-MGMT-81334D)

3.1.2 Contract Work Breakdown Structure

The contractor shall develop a CWBS and CWBS Dictionary in accordance with (CDRL A005). The contractor's organizational entity responsible for systems engineering shall analyze the system requirements specified in the SOW and the SPS, and translate them into a CWBS representing the products and services, comprising the entire work effort commensurate with the contract requirements. The contractor shall extend the Government program WBS into an extended CWBS as outlined in CDRL A005, down to appropriate levels required to provide adequate internal management, surveillance, and performance measurement. The contractor shall use the CWBS as the primary framework for contract planning, budgeting and reporting of cost, schedule and technical performance status to the Government. Changes to the CWBS and associated CWBS Dictionary definitions at any reporting level require Contracting Officer's Representative (COR) approval.

CDRL Deliverable:

(CDRL A005) Contract Work Breakdown Structure (CWBS) (DI-MGMT-81334D)

3.1.3 Automated Interchange of Technical Information Management

The contractor shall have technical information data exchange procedures which standardize the format, information structure, and transfer methods for exchanging CDRL items electronically. Information provided via electronic mail or compact disc shall provide for a virus check prior to delivery.

The contractor shall deliver unclassified documentation required by this SOW and SPS to PMW/A 170, via SharePoint on the Navy Systems Engineering Resource Center (NSERC) website: https://nserc.nswc.navy.mil/peo_c4i/pmw_170/TACCOMMS/NTCDL_CDRL/default.aspx

The contractor shall deliver classified documentation required by this SOW and SPS to SIPRNET and in accordance with the appropriate CDRL(s). If the contractor cannot provide classified deliverables via SIPRNET, then time of delivery will be determined via USPS certified mail, or signature by NTCDL COR.

The date the CDRL or data deliverable is posted onto SE2 shall serve as the official delivery date. Any restrictions on the use of electronic data shall be as prescribed in the Data Rights Clauses.

3.1.3.1 Data Deliverable Formats

The contractor shall deliver all contract, technical, or engineering information in digital form. The contractor shall reference the table below, *Applications for Document Deliverables*, for the requested applications for each document type. All applications shall be compatible with the latest Navy Marine Corps Intranet (NMCI) approved revisions or as coordinated with the Government (see http://www.nmciinfo.usmc.mil/nmci3/nmci.nsf/homepage for additional NMCI information).

Table: 3.1: Applications for Document Deliverables

Document Category	Application
Word Processing**	Microsoft Word 2010
Spreadsheets	Microsoft Excel 2010
Project Planning Project Schedules	Microsoft Project 2010*
Presentation Software**	Microsoft PowerPoint 2010
Engineering Drawings	AutoCAD 2010 or later (in DWG format) and PDF format

***Project Files shall also be backward compatible to MS Project 2007**.
****Embedded pictures, drawings and figures shall be supplied in native format and delivered in conjunction with the parent document delivery**.

In the circumstance where PDF format documents are required, the editable original source document shall be included with the deliverable (even if the editing program is not listed in the table above). Documents shall not be password protected.

3.1.4 Program Reviews

For each meeting, review and conference, the contractor shall prepare and distribute an agenda, including presentation materials (CDRL A002) and meeting minutes (CDRL A003), in accordance with the applicable DD 1423, for Government approval.

CDRL Deliverables:

- (CDRL A002) Agenda and Presentation Materials (DI-ADMN-81249A)
- (CDRL A003) Conference / Meeting Minutes (DI-ADMN-81250A)

3.1.4.1 Post-Award Conference

Within 30 calendar days after Contract award, the contractor shall host and conduct a Post-Award Conference (PAC) at the contractor's facility. The Government, in conjunction with the contractor, will establish the specific date.

For the meeting, the contractor shall prepare and distribute an agenda, including presentation materials, (CDRL A002) and a draft PMP (CDRL A004). Subsequent to the meeting, the contractor shall provide meeting minutes (CDRL A003) in accordance with the applicable DD 1423, for Government approval.

CDRL Deliverables:

- (CDRL A002) Agenda and Presentation Materials (DI-ADMN-81249A)
- (CDRL A003) Conference / Meeting Minutes (DI-ADMN-81250A)
- (CDRL A004) Program Management Plan (PMP) (DI-MGMT-81797)

3.1.4.2 Program Management Reviews

The contractor shall conduct quarterly PMRs. PMRs shall address the status of all ongoing tasks, including development, hardware and software changes, integration, test and evaluation, and delivery schedules of the material procurement. 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 integrate a Technical Interchange Meeting (TIM) into each review. The technical meetings are conducted so the contractor can show progress toward meeting desired requirements in the form of a design solution. Technical meetings shall also serve as a means to ensure the conditions of the contract are being satisfied. The technical meetings are multi-disciplined product and process assessments consisting of technical, logistics, and Subject Matter Experts from the contractor and Government IPTs. PMRs shall be coordinated with design and technical reviews.

The contractor's Technical Risk Management Plan shall be reported as part of the PMR, per SOW Section 3.1.6.2.

The contractor shall provide selected briefing material to support program office briefing requirements for documenting program activities. For each PMR, the contractor shall prepare and distribute an agenda, including presentation materials (CDRL A002) and minutes (CDRL A003), in accordance with the applicable DD Form 1423, for Government approval. The Government reserves the right to modify the agenda prior to the PMR.

The quarterly PMR shall provide an updated status of action items assigned at previous PMRs, current program task statuses (including 30 / 60 / 90 day outlook), and projected tasks by quarter for the next two (2) fiscal years. As part of the presentation materials (CDRL A002), the contractor shall provide a contract data status, cost and schedule status at each review. In addition, the contractor shall present technical, management, and logistic problem areas and shall address any issues affecting contract deliverables. As part of the initial review, the contractor shall present business and technical management procedures (including technical points of contact assignments, Contractor's Progress, Status Management

Reporting procedures, and designated lines of authority (CDRL A001)) that shall be implemented to accomplish the requirements of the contract. The contractor shall also provide summary status on the CFSR (CDRL A024) at the PMR. The contractor shall also report at PMRs in accordance with CDRL A022, IPMR Report.
The initial review shall include a presentation on key processes including the Configuration Item (CI) identification process, quality and test processes, and software processes (**NOTE: Firmware shall be considered software and shall meet all of the software requirements listed within this SOW)**. The contractor shall specifically address known or anticipated impacts to systems and terminal performance.

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status and Management Report (DI-MGMT-80227)
- (CDRL A002) Agenda and Presentation Materials (DI-ADMN-81249A)
- (CDRL A003) Conference / Meeting Minutes (DI-ADMN-81250A)
- (CDRL A022) Integrated Program Management Report (IPMR) (DI-MGMT-81861)
- (CDRL A024) Contract Funds Status Report (CFSR) (DI-MGMT-81468)

3.1.5 Configuration Management

The contractor shall use a CM process to control all configuration documentation, physical media, and physical parts representing or comprising the NTCDL configuration item. The contractor shall submit to the Government for review the Configuration Management Plan (CMP) (CDRL A006) describing the processes, methods and procedures used to manage the functional and physical characteristics of the NTCDL for the life of the contract. The contractor shall support the Government's requests to audit and verify contractor's CM process requirements documented in a CMP that shall meet the intent of the ANSI / EIA-649B CM standard principles and functions using the MIL-HDBK-61A, NTCDL CM Plan, PEO C4I Lifecycle Configuration Management Implementation Manual (LCCMIM) and the PMW/A 170 CM Plan as a guide to perform CM planning to define the following elements when it implements CM for the NTCDL:

a. Objectives of the CM program and of each applicable CM element.

b. Appropriate level of CM activity for each CM function throughout the product's life cycle.

c. CM organization and organizational relationships.

d. Responsibilities and authority of CM professionals.

e. CM resources to be used (tools, techniques, training, and methodologies).

f. Coordination activities to be used with internal and external agencies (e.g., Government, other contractors, other Government agencies, foreign governments).

g. Identification and labeling structure for CIs.

h. Functions, responsibility, and authority of the Configuration Control process and Configuration Control Boards (CCBs).

i. A release process for product configuration documentation.

j. Configuration Status Accounting activities for creating, editing, reviewing, approving, releasing, publishing, and distributing product configuration documentation and configuration change documentation.

k. Methods to be used to ensure the effectiveness of CM processes.

The contractor shall provide the Government a monthly update of CM status via the Contractor's Progress, Status Management Report (CDRL A001).

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status and Management Report (DI-MGMT-80227)
- (CDRL A006) Contractor's Configuration Management Plan (CMP) (DI-CMAN-80858B)

3.1.5.1 Configuration Identification

The contractor shall use a documented process for configuration identification as written in the contractor's CMP (A006). The contractor shall submit potential CI's for Government review, and concurrence. The contractor shall accomplish the following for hardware, software and documentation:

a. The contractor shall uniquely identify as a CI any item satisfying a system end use function and designating it for separate CM because the item meets or impacts any of the following:
    1) An item critical to the functioning of the system.
    2) An item whose failure might result in serious injury, loss of life or loss of primary system capability.
    3) An item whose technology is complex, not well known, and critical to meeting acquisition, operational or supportability aspects of the program.
    4) Is under Government control.
    5) Requires separate designated, versions or nomenclatures.
    6) Is critical or high risk and failure would have significant financial impact.
    7) Requires any one of the following logistics elements:
        a) Supply support Allowance Parts List (APL).
        b) Supply support Allowance Equipage List (AEL).
        c) Supply support Allowance Component List (ACL).
        d) Test equipment (e.g., General Purpose, Special Purpose or Built-in).
        e) Technical manuals.
        f) Planned Maintenance System (PMS) Maintenance Index Pages (MIP) and Maintenance Requirement Cards (MRC).
    8) Danger or Caution Tag Out requirements.
    9) National Stock Number.
b. Establish a CI structure and hierarchy.
c. Select configuration documentation to be used to define configuration baselines for each CI.
d. Identify and control interfaces.
e. Assign identifiers (i.e., enterprise, product, unit, group, and document) to CIs and their component parts and associated configuration documentation, discrete part identifying number (PIN) including prefixes and suffixes, and serial, lot, or batch numbers, with a specific Government type designation (JETDAS approved nomenclature assignments provided by the

Government) by marking in accordance with Military Standard (MIL-STD)-130, MIL-STD-1285, or MIL-STD-13231, as applicable.

f. Change PIN whenever a non-interchangeable condition is created and must not change the original serial number of a unit / item / CI even when a change affecting interchangeability may require rework and re-identification.

g. Include the Commercial Activity / Government Entity (CAGE) Code of the Design Activity for hardware and software and affix those CAGE codes to all CIs, their subordinate parts and assemblies, configuration documentation, software media, and products.

h. Place each item of configuration documentation (e.g., item, material, or process specifications) and software specification, software version description (SVD), etc. under configuration control.

i. Establish and manage the functional, allocated and product baselines (CDRL A014) at the appropriate points in the system / CI life cycle, upon Government approval / contractual implementation of the configuration documentation.

j. Mark or label items and documentation with their applicable identifiers correlating to the item, configuration documentation and other associated data.

k. Assign system product-unique identifiers to elements of the software development environment such as Commercial-Off-the-Shelf (COTS) development products like compilers, linkers, loaders, binary developmental libraries, configuration settings, automation scripts, and other system elements conforming to the format specified in the CMP.

l. Provide a part number representing the device with the embedded code (in cases where both the hardware device and the embedded code are controlled via a single engineering drawing-Altered Item Drawing).

m. Ensure the part number and the software medium is labeled with the contractor's code / name identification and marked separately on the device.

n. Designate computer software as CIs.

The contractor shall generate the configuration documentation required for the configuration baselines being established by the Government, as tailored in the contract. The contractor shall maintain the current approved configuration documentation by creating a new revision to configuration documentation when incorporating approved changes within 90 days. The contractor shall ensure each succeeding baseline described below is traceable to, and a detailed extension of, its predecessor(s).

The contractor shall document the Functional Baseline (CDRL A014) of a CI by:

a. Describing its functional, performance, interoperability and interface requirements.

b. Describing the verifications required to demonstrate achievement of those requirements.

c. Identifying any specialized software and documenting the operating environment used to author the above requirements.

The contractor shall document the Allocated Baseline (CDRL A014) of a CI by:

a. Describing its functional, performance, and interoperability requirements allocated from those of a system or higher level configuration item; and interface requirements with interfacing configuration items.

b. Describing the verifications required to demonstrate achievement of those requirements.

c. Identifying any specialized software and documenting the operating environment used to author the above requirements.

The contractor shall document the Product Baseline (CDRL A014) of a CI by:

a. Describing its detailed design including necessary physical (form, fit, and function) characteristics and selected functional characteristics designated for production, acceptance testing and production test requirements.

b. Identifying the verifications necessary for accepting product deliveries (first article and acceptance instructions).

c. Identifying and documenting the design of any special tooling, software, equipment and facilities required to manufacture, operate, maintain, calibrate, or inspect items contained in the design.

d. Identifying and documenting the design of any special packaging parts required to package the CI.

e. Including any quality assurance provisions required to accept deliveries of the CI (first article or acceptance inspection).

f. Including any unique process specifications required to manufacture, operate, maintain, or calibrate items contained in the design.

g. Identifying any specialized software and documenting the operating environment used to author the detailed design.

h. Include technical data which provides instructions for the installation, operation, maintenance, training, and support of a system or equipment.

Additionally, the contractor shall identify pertinent configuration identification documentation and established baselines to include at a minimum the identification of baseline documentation (specifications or drawings) by title, number, revision, and date according to CDRL A015.

CDRL Deliverables:

- (CDRL A006) Configuration Management Plan (CMP) (DI-CMAN-80858B)
- (CDRL A014) Technical Baseline Description Document (DI-SESS-81121A)
- (CDRL A015) Configuration Status Accounting Information (DI-CMAN-81253A)

3.1.5.1.1 Item Unique Identification

The Item Unique Identification (IUID) Marking Plan (CDRL A008) shall document the scope of meeting MIL-STD-130N (w/CHANGE 1) DoD Standard Practice Identification Marking of U.S. Military Property, with the contractor's marking requirements, marking methodology / strategy, data management, quality assurance, TDP requirements. The IUID Marking Plan shall include strategy to ensure quality, validation, verification, and registration of items being marked; guidance may be gained from two documents: DoD Guide to Uniquely Identifying Items (Assuring valuation, Accountability and Control of Government Property) and DoD Guide to IUID Quality.

The contractor shall identify and mark all end items in accordance with DoD Instruction 5000.64, MIL-STD-130N (w/CHANGE 1), DoD Guide to Uniquely Identifying Items, version 2.5, dated. 15 Sept 2015, and the PMW/A 170 UID Plan.

Additionally, the contractor shall report all IUID marked items in the IUID Registry IAW Defense, Federal Acquisition Regulations Supplement (DFARS) Clause 252.211.7007. The contractor shall mark and register IUID items provided to the Government IAW DFARS clause 252.245-7001 and 252.211-7003. The contractor shall use MIL-STD-130N (w/CHANGE 1) as guidance for item marking.

Timeline for marking and registering all relevant equipment shall be documented in the IUID Marking Plan (CDRL A008).

IUID is a system to distinguish one object from another, allowing DoD to track identical objects separately. The IUID system requires qualifying items to have a data matrix inscribed either directly on the item or on permanent, machine-readable label affixed to the item. The contractor shall develop the IUID Marking Activity, Validation and Verification Report (CDRL A009) in compliance with IUID, DFARS Clause 252.211-7003 and MIL-STD-130N (w/CHANGE 1). For CIs marked with Unique Item Identifier (UII), the contractor shall check DoD IUID Registry to ensure the UII has not been previously assigned to an item.

Status updates regarding IUID shall be reported in the Contractor's Progress, Status Management Report (CDRL A001).

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status Management Report (DI-MGMT-80227)
- (CDRL A008) Item Unique Identification (IUID) Marking Plan (DI-MGMT-81803)
- (CDRL A009) Item Unique Identification (IUID) Marking Activity, Validation and Verification Report (DI-MGMT-81804A)

3.1.5.2 Configuration Control

The contractor shall apply configuration control to each CI, its components and configuration documentation. The contractor shall ensure:

a. Configuration baselines are maintained and controlled.

b. Configuration identification control of all CIs and their associated configuration documentation is maintained.

c. Product configuration changes and variances are documented, coordinated, evaluated, dispositioned, and recorded in a CM/status accounting system and reported to the Government (A003).

d. Requested configuration changes and variances address all areas of impact, to include cost, operational, sustainment, and implementation actions (e.g., ordering material, designing tooling, manufacturing planning, and interface design, support equipment, software code, producing parts, retrofit).

e. Released / approved configuration changes are incorporated into all product configuration information including the CM / status accounting system, and implemented into each product / CI / component impacted.

f. Released / approved configuration changes are verified as being incorporated to maintain product configuration control and product configuration information consistent and prepare release authorization documentation.

g. Released / approved variance corrective actions are implemented and verified.

Hardware ECs shall be documented by red lining a copy of applicable engineering drawings. Software changes shall be documented in accordance with IEEE 12207-2008. Changes shall be identified to the affected assembly / subassembly and module.

The contractor shall update all configuration control documents to include any changes or new capabilities in accordance with Configuration Management Plan (CMP) (CDRL A006). The contractor

changes and / or updates shall include revisions of the Interface Design Descriptions (IDD) (CDRL A007),Installation Requirements Drawings (IRDs) (CDRL A010), and Technical Data Package (TDP) CDRL A018) as required to reflect the changed and / or additional capabilities. The interface documents shall be designed with the flexibility to adapt to changes extending the NTCDL capability. The contractor shall establish a change control board, with Government membership to include logistics representation. The CM database shall include the as-designed, as-built, as-delivered, and as-modified configurations of the product as well as any replaceable component within the product, with traceability requirements from the top-level documentation through all subordinate levels that have been documented. The CM Manager shall record results of all audits, including the status and final disposition of identified discrepancies.

CDRL Deliverables:

- (CDRL A003) Conference / Meeting Minutes (DI-ADMN-81250A)
- (CDRL A006) Configuration Management Plan (CMP) (DI-CMAN-80858B)
- (CDRL A007) Interface Design Description (IDD) (DI-IPSC-81436A)
- (CDRL A010) Installation Requirements Drawing (IRD)
- (CDRL A018) Technical Data Package (DI-SESS-80776A)

3.1.5.2.1 Enterprise Change Request

The contractor shall prepare and submit an Enterprise Change Request (ECR) at the Government's request for the Government's approval (CDRL A011). The contractor shall prepare and implement ECRs to the baseline NTCDL System. CM changes requiring ECR's shall be reported in the Contractor's Progress, Status and Management Report (CDRL A001).

When changes are necessary for the NTCDL form, fit, and function, the contractor shall prepare and submit an ECR for Government approval (CDRL A011). The contractor shall prepare and submit Class I ECRs only with the prior written approval of the Government. The contractor shall implement ECRs to the baseline NTCDL system for ECRs approved by the NTCDL Configuration Control Board when directed by the Government. The contractor shall support CCB review of ECRs when requested by the Government. Authorization requests for ECRs submissions shall be included in the monthly Contractor's Progress, Status and Management report (CDRL A001) and are not to be submitted without the explicit permission of the Government PM and the signature of the PCO or COR.

The contractor shall provide in the Contractor Progress, Status and Management Report (CDRL A001) a list and description of any Lowest Replaceable Unit (LRU) substitutions or modifications associated with specification changes. The Government's intention is to provision these items, utilizing the TDP provided by the contractor.

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status Management Report (DI-MGMT-80227)
- (CDRL A011) Enterprise Change Request (ECR)

3.1.5.2.2 Installation Requirements Drawings

The contractor shall prepare and submit IRDs at the Government's request for the Government's approval (CDRL A010). The contractor shall prepare and complete IRDs to the baseline NTCDL System (or to an approved Enterprise Change if so directed by the Government). The IRD development shall be in accordance with SPAWARINST 4720.5A, Policy and Procedures for Development and Life-Cycle

Management of Installation Requirements Drawing dated 16 April 2014, COMSPAWAR M-4720.5A, Installation Requirements Drawing (IRD) Standard 4720.5 Version 2, dated 27 March 2014, and IDEA CAD Std. Rev. B, 07 Feb. 2005. Any changes made by the contractor to interface information, including drawings, diagrams, tables and textual information, shall be reflected in an update to the IDD and IRDs as applicable.

CDRL Deliverables:

- (CDRL A010) Interface Requirements Drawings (IRD)

3.1.5.2.3 Specification Change Notices

The contractor shall provide Government with all changes to the NTCDL System approved by the COR for incorporation into the end item and that modify, add to, delete, or supersede parts in the end item or its supporting equipment. When an approved engineering design or production change requires new identification, the contractor shall submit Provisioning Technical Data (PTD) revisions via Specification Change Notices (SCNs) (CDRL A012) 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. Supplemental Data for Provisioning (SDFP) is not required for deletion items.
d. Any changes occurring after PTD delivery.
e. Provide drawings so alternate sources may be selected in case of parts obsolescence that inhibit or will inhibit Fleet operational readiness.

When a specification change (e.g., changes in form, fit or function) that impacts the system or equipment configuration is required the PCO will issue a modification. The contractor shall document the specification change as a new end item documented by PTD with associated SDFP.

CDRL Deliverables:

- (CDRL A012) Specification Change Notice (SCN) (DI-CMAN-80643C)

3.1.5.2.4 Request for Variance

Formerly known as a Request for Deviation / Waiver, a Request For Variance (RFV) is an alternate method of achieving the intent of a standard. Variances which propose alternative methods or approaches to meeting a standard may equal or exceed safe practice and will not be considered a negative mark against an accredited facility. Working in conjunction with the program teams, the scheduler shall establish a schedule baseline to monitor and report variances to the baseline to program leadership. The contractor shall not manufacture items for acceptance by the Government that incorporate a known departure from requirements, without prior Government approval of the RFV.

The contractor shall obtain the Government's approval on any product that is found to be defective or nonconforming (i.e., pre-production RFV, post-production RFV) before delivery to the Government.

Note: Pre-production RFVs request permission to produce a product that does not conform to contract requirements / documentation for a limited amount of time and for specified effectivity. Post-production

RFVs request approval of products found out of conformance with contract requirements / documentation after it's produced.

The contractor's RFV shall not include a requirement to change the product configuration documentation.

If the Government determines the variance would be permanently acceptable, then the contractor shall submit an ECR to accomplish the change.

If the RFV is for the benefit of the contractor, the contractor shall provide, as part of the RFV documentation, equitable consideration based on either (or both) the quantity of items affected by the RFV or the extent the affected items do not meet the Government's contractual requirements.

Upon RFV disposition, the contractor shall document in the Configuration Status Accounting (CSA) system: RFV description, how the Non-Conforming Material addressed by the RFV, is impacted including the impact to any additional product / part, the RFV stated corrective action to prevent recurrence, and the corrective action taken / accomplished by the contractor to prevent RFV reoccurrence.

Requests for Variance (CDRL A013) will be submitted by the contractor as needed via DD Form 1694.

Critical and major variances (affecting form, fit, or function) shall require written approval. The Government Contracting Officer will respond with notification of approval/disapproval. If disapproved, the Government Contracting Officer will include instructions for remediation. The PCO or COR is not obligated to accept RFVs.

CDRL Deliverables:

- (CDRL A013) Request for Variance (RFV) (DI-SESS-81883)

3.1.5.3 Configuration Status Accounting

The contractor shall maintain the validity of the CSA by storing valid data in the CSA system. The contractor shall perform CSA analysis to detect and identify trends and report problems. The contractor may utilize any information technology tools or systems desired to meet CSA functional process requirements described herein. The contractor's CSA system shall be closely linked to the data repository used to store and manage the product configuration and product operational information. CSA Information shall be delivered pursuant to CDRL A015.

Note: This close linkage may be accomplished via use of an all-encompassing product data management system (with CM, data repository, requirements management, and traceability functionality all in the same product) or by integration of separate stand-alone IT tools / systems.

The contractor shall use a CSA system to capture, store, and maintain product configuration information about the product that is either provided by the Government or created by the contractor during the duration of the contract. The contractor shall implement a CSA system with the following capabilities:

a. Capture and maintain the currently approved product configuration information by the identification number assigned to each CI.

b. Capture and maintain all historical product configuration information with traceability detailing product configuration from contract award to the present.

c. Store and manage all product configuration information, which includes but not limited to product definition information (information defining the product's requirements, documents the

product attributes, and is the authoritative source for CM of the product) and / or product operational information (information developed from product definition information used to test, operate, maintain and dispose of a product).

d. Identify dependencies among CIs.

e. Report the status of both proposed and approved configuration changes and variances to all CIs.

f. Record, track and report implementation status and engineering release of configuration documentation for approved configuration changes.

g. Record, track and report the status of corrective actions (repairs, use-as-is, scrap) for nonconforming materiel addressed by the RFVs which affects the configuration of any CIs.

h. Record and report the planning and results of configuration audits to include the status and final disposition of identified discrepancies.

i. Provide performance metrics measuring the execution of the contractor's CM process and functions.

j. Record and report all product data inherited from sub-tier Contractors, to include vendor part numbers and serial numbers, and provide clear traceability from these components to their respective next higher assemblies.

k. Document the incorporation of all retrofit changes to those units identified for retrofit.

l. Record and report implementation status of authorized changes.

m. Provide the traceability of all changes from the original baseline configuration documentation of each Hardware Configuration Item (HWCI) and Computer Software Configuration Item (CSCI).

n. Report the baseline (CDRL A014) prior to each technical review listed in section 3.2.6, or upon request by the Government.

o. Provide a status accounting report to the Maintenance Significant Item (MSI) in top-down breakdown, including the Serialized Assembly Record data, detailing the reference number, reference designator, serial number and revision level, and UID for each CI as approved by the COR.

The contractor shall:

a. Make CSA system and product configuration information readily available to the Government or Government's designated representative, via on-site inspection, remote access, or regular submissions of CSA information and updates in accordance with the contract.

b. Be in compliance with DoD Cyber Security requirements for the purpose of interoperating with the Government's system as in an integrated digital environment.

c. Ensure recorded product configuration information is adequately secured, safeguarded and retrievable after extended storage.

d. Provide a digital delivery to the Government upon the completion of the contract, CSA information and configuration baseline documentation created, collected, and managed during the contract. The form, format and delivery date for this data delivery will be in accordance with DID.

The contractor shall identify pertinent configuration information for established baselines to include at a minimum specifications or drawings by title, number, revision, and date according to CDRL A015. The CM database shall include the as-designed, as-built, as-delivered, and as-modified configurations of the

product as well as any replaceable component within the product, with traceability requirements from the top-level documentation through all documented subordinate levels.

CDRL Deliverables:

- (CDRL A014) Technical Baseline Description Document (DI-SESS-81121A)
- (CDRL A015) Configuration Status Accounting Information (DI-CMAN-81253A)

3.1.6 System Effectiveness Engineering

The following subsections represent overarching processes required to manage the program.

3.1.6.1 Requirements Database

The contractor shall establish a Requirements Database for tracking the requirements established by the NTCDL SPS and the derived requirement process. The Requirements Database shall demonstrate traceability back to the SPS, between the system-level and subsystem-level System / Subsystem Design Descriptions (SSDDs), and Functional Configuration Audit / Physical Configuration Audit (FCA / PCA) test cases. The contractor shall create a Microsoft (MS) Excel export from the Requirement Database to use as the standard interchange and review method with the Government (CDRL A016). An updated MS Excel export version of the requirement database shall be provided in conjunction with each EDM Design review (Systems Requirements Review (SRR), Preliminary Design Review (PDR), and Critical Design Review (CDR)), the FCA / PCA, and in conjunction with any engineering change activity which is altering the requirements baseline (CDRL A016).

CDRL Deliverables:

- (CDRL A016) Technical Report, Requirements Database Export (DI-MISC-80508B)

3.1.6.2 Risk Management

The contractor shall establish a Technical Risk Management process and document this plan in the PMP (CDRL A004). Cost, schedule and performance risks shall be reported as part of the Contractor's Progress, Status, and Management Report (CDRL A001).

The risk management process shall address the prototype-to-production implementation process. The risk management process shall, as a minimum, address risk management for critical design areas including, but not limited to:

a. Ship antenna pointing, tracking, and handover at full ship motion.
b. Antenna performance and the ability to produce the antenna.
c. Power amplification performance and reproducibility.
d. Shipboard electromagnetic interference.
e. Baseband interface compatibility (e.g., software, hardware and Operator Interface) including any interface deficiencies.
f. Reliability.
g. Built-In-Test (BIT) / Built-In-Test Equipment detection and isolation.
h. Design envelope of electrical and mechanical requirements for design.
i. Configuration control program for hardware and software.
j. Software performance.
k. Information Assurance and Communications Security (COMSEC) compliance.
l. Interoperability.
m. Link Control Subsystem (LCS) / Link Management System (LMS) Interface.

n. Multiple Independent Levels of Security.

The contractor shall address risk assessment and subsequent management of any risk associated with non-compliance to the Joint Technical Architecture within the NTCDL design. The contractor's risk mitigation plan shall be incorporated into the Performance Measurement Baseline.

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status, and Management Report (DI-MGMT-80227)
- (CDRL A004) Program Management Plan (PMP) (DI-MGMT-81797)

3.1.6.3 Technical Performance Measures

The contractor shall establish and maintain Technical Performance Measures (TPMs) to assess project technical performance, and document the metrics and their collection methods in the PMP. The contractor shall describe their process for collecting processing and monitoring TPMs in the PMP (CDRL A004). The Government reserves the right to incorporate additional TPMs. TPMs shall be reported monthly (CDRL A035). The approval of the PMP shall establish the TPM baseline. Changes greater than 2% to the approved TPM baseline shall be reported (CDRL A001 and CDRL A035).

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status and Management Report (DI-MGMT-80227)
- (CDRL A004) Program Management Plan (PMP) (DI-MGMT-81797)
- (CDRL A035) Progress Report, Technical Performance Measures (DI-ADMN-81313A)

3.1.6.4 Quality Assurance

The contractor shall implement a Quality Assurance Process under the Contract. The contractor shall follow its quality program to ensure the reliability of all hardware delivered under this contract, and it shall meet all inspection and test requirements of the contract, this SOW, and the SPS. Evidence that the best commercial practices are followed in soldering, printed circuit manufacturing, or any other processes applicable to the quality of the equipment, including statistical process control data, shall be made available at the contractor's plant, on a noninterference basis, for review and use by representatives of the procuring activity. The contractor may use any facility suitable for the performance of the inspection and test requirements. The Government reserves the right to observe any of the inspections or tests where such inspections or tests are deemed necessary to assure supplies and services conform to prescribed requirements.

The inspections and tests set forth herein shall become part of the contractor's overall quality program, and shall be documented in the PMP. The absence of individual inspection or test requirements in the NTCDL SPS shall not relieve the contractor of the responsibility for assuring all equipment submitted to the Government complies with all requirements of the contract, this SOW, and the contract specification.

Software quality requirements and validation methods shall be used for all software and firmware developed.

The contractor shall report the results of QA activities on a monthly basis in the Contractor's Progress, Status and Management Report (CDRL A001).

Proposed Critical Manufacturing Process Descriptions shall be identified in the PMP in accordance with CDRL A004 (and DI-SESS-81012E).

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status, and Management Report (DI-MGMT-80227)
- (CDRL A004) Program Management Plan (PMP) (DI-MGMT-81797)

3.1.6.5 Manufacturing Quality Data

The contractor shall record and assess manufacturing quality data on the results of inspections (examinations and tests) made. The data shall show the defects found during manufacturing. "Defects" (as defined by ISO-9000 and ASQ / ISO Q9000-2005) shall include all defects, discrepancies, nonconformance, anomalies, failures, etc., occurring or first detected during manufacturing. The contractor shall initiate corrective actions as appropriate to identify and correct the root cause of deficiencies identified. Data shall be recorded and maintained to document the effectiveness of corrective actions implemented.

The contractor shall present defect data summaries and corrective action summaries as part of the PMRs. The manufacturing data shall be reported to address defect history, defect distribution, and defect reduction data (CDRL A001). Printed wiring board assembly data, electro-mechanical assembly data, and environmental stress screening data shall be reported in the defect history and defect distribution charts. Final assembly level data shall be reported in the defect reduction data.

The Contractor's Progress, Status Management Report (CDRL A001), shall identify the source data where information is collected from relative to the processes being tracked by the data, discussion on the methods for collection, and plans on using the manufacturing quality data.

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status Management Report (DI-MGMT-80227)

3.1.6.6 Diminishing Manufacturing Sources and Material Shortages

The contractor shall develop a Diminishing Manufacturing Sources and Material Shortages (DMSMS) plan to supplement the parts control program in accordance with the DMSMS Management Practices Handbook. The DMSMS shall identify potential and existing activities, as required, to effectively control LRU obsolescence in the NTCDL designs, on-going designs, specification changes, existing production, and production additions.

The DMSMS plan shall ensure effective LRU obsolescence management and protect the Government against redundant and incomplete efforts. The DMSMS plan shall determine the best solution for each specific DMS situation.

The DMSMS plan shall allow for continuous monitoring of inputs from appropriate CAGE to improve the early detection of potential DMSMS conditions (e.g., production discontinuance, elimination of an active source, occurrence of a significant quality problem). The DMSMS plan shall easily accept inputs from appropriate CAGE's to enhance the opportunity to quickly resolve DMSMS situations (e.g., when a direct substitute or alternate part is available, when a new LRU supply source is identified). The appropriate CAGE shall document each DMSMS case; identify the recommended resolution, justification and the course of action approved by the Government. The plan shall be primarily directed to production support and shall be updated in conjunction with system transition to NAVSUP support after the NTCDL systems have reached Material Support Date.

The contractor shall provide a detailed DMSMS Plan (utilizing DI-MGMT-81948 for content) and DMSMS/Obsolescence Reports (utilizing DI-MGMT-81941 for content) as part of the Systems Engineering Management Plan (CDRL A017). The contractor shall provide DMSMS/Obsolescence Reports quarterly as part of the Contractor's Progress, Status, and Management Report (CDRL A001).

DMSMS/Obsolescence Report shall include the following minimum information:

a. Original Equipment Manufacturer (OEM).
b. OEM / Actual Vendor CAGE.
c. OEM / Actual Vendor Part Number and piece part numbers.
d. Revision Level.
e. Software Version (NOTE: Firmware shall be considered software and shall meet all of the software requirements listed within this SOW).
f. Reference Designator or Next Higher Assembly.
g. Item Name / Nomenclature.
h. Part Quantity or Piece Part quantity on LRU.
i. Known Alternate Piece-Part Numbers & CAGE.

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status Management Report (DI-MGMT-80227)
- (CDRL A017) Systems Engineering Management Plan (SEMP) (DI-SESS-81785)

3.1.7 Documentation Including Technical Data Package

3.1.7.1 Technical Data Package

The contractor shall create a TDP in accordance with MIL-STD-31000A (CDRL A018) to include COTS items. MIL-STD-31000A prescribes the requirements for preparing the TDP which shall consist of one or more TDP elements and related TDP data management products (See MIL-STD-31000A Section 6.1). The TDP shall describe the physical configuration and performance characteristics of an item or component in sufficient detail to ensure an item or component produced in accordance with the technical data shall be essentially identical to the original item or component. The TDP shall meet the following requirements:

a. A "Top-down breakdown" shall be developed and maintained to the MSI level. MSI level may be below the LRU Level. The MSI level is the level at which an item can be repaired by removing and replacing sub-items at either the organizational, or depot levels of maintenance, but does not include the component level (e.g., piece parts assembled on a circuit card). This shall serve as the baseline for which the product baseline shall be established including item name, part number, CAGE, revision level, and any other configuration identifier necessary for configuration control of an item. The TDP shall be provided in part number order with a cross reference matrix to the "Top-down breakdown" to provide a clear and concise top-down breakdown of the TDP.

b. Product drawings / models and associated lists shall be prepared to provide the design, engineering, manufacturing, and quality assurance requirements information necessary to enable the procurement or manufacture of an item essentially identical to the original item. The product shall be defined to the extent necessary for a competent manufacturer to produce an item, which duplicates the physical, interface, and functional characteristics of the original product, without additional design engineering effort or recourse to the current design activity. Product data shall reflect the approved, tested, and accepted configuration of the defined delivered item.

The TDP content shall include at a minimum:

a. Information required to reproduce all shipboard mountable units (e.g. integrated racks, antenna kits, junction boxes, etc.).
b. Information required to reproduce all components of the system (e.g. modem assembly, antenna assembly, hardening of COTS computing devices for Environmental Qualification Testing (EQT), etc.).
c. Information required to reproduce all subassemblies / subcomponents / parts of the system and include:
    1) Part Design Drawings / Models – Includes internal and external physical dimensions, interconnections, and layouts of each part, including the internal material composition. (e.g., Computer Aided Design (CAD) Drawings, Printed Circuit Board (PCB) Gerber Data / Apertures, Application Specific Integrated Circuit Hardware Description Language / photomasks).
    2) Part Design Drawing Lists – Includes all materials and subcomponents required to fabricate the part. All materials and subparts shall be identified with sufficient detail to support unambiguous procurement from commercial suppliers.
    3) COTS Fabrication Tooling Lists - Includes all commercially available tooling equipment required to fabricate the parts. All tooling equipment shall be identified with sufficient detail to support unambiguous procurement from commercial suppliers. (e.g. machining, PCB milling machine, screwdriver).
    4) COTS Fabrication Tooling Configuration Settings /Files / Instructions - Includes all COTS tooling configuration files / instructions required to achieve all applicable fabrication-ready states. (e.g., PCB NC drill file, 3D printer file, PCB pick-and-place files).
    5) Non Commercial Fabrication Tooling Data Packages - Includes the data package required to reproduce tooling equipment that cannot be purchased off-the-shelf (e.g., Antenna element mold, antenna casing casting, PCB drill fabrication drawing / instructions).
    6) Part Fabrication Instructions - Includes step-by-step procedures for part fabrication using items. Procedures shall demonstrate concordance with design drawing lists, diagrams, and tooling equipment.
    7) COTS Fabrication Test Equipment Lists - Includes the commercially available test equipment required to verify the part was fabricated correctly. All tooling equipment shall be identified with sufficient detail to support unambiguous procurement from commercial suppliers.
    8) COTS Fabrication Test Equipment Configuration Settings / Files / Instructions - Includes all COTS test equipment configuration files / instructions required to achieve all applicable fabrication test-ready states (e.g., PCB check plots).
    9) Non Commercial Fabrication Test Equipment Data Packages - Includes the data package required to reproduce fabrication test equipment that cannot be purchased off-the-shelf.
    10) Part Fabrication Test Instructions - Includes step-by-step procedures for verifying correct part fabrication. Procedures shall demonstrate concordance with test equipment and equipment configurations.
d. All COTS technical manuals shall be delivered to the Government in hard copy and soft copy format.
e. Commercial drawings / models and associated lists provide engineering and technical information in support of end products, or designated portions thereof, which are commercially, developed items, COTS, or items not developed at Government expense. These data and lists shall be in accordance with the commercial design documentation practices of the contractor or supplier of the item.
f. Source control drawing approval requests shall be prepared and submitted to the cognizant Government activity specified in the contract or purchase order as having approval authority.

Each potential source control item shall be approved by the Government activity having source control drawing approval authority prior to inclusion of the source control drawing in the TDP.

g. Proposed critical manufacturing process descriptions shall be prepared to describe manufacturing processes critical to meeting the design requirements of the item. The process shall be approved as critical by the Government activity cited in the contract or purchase order as having approval authority before it is designated as mandatory in TDP documents.

The TDP (CDRL A018) shall be provided to meet the requirements detailed in "TDP Option Selection Worksheet-Product Drawings and Associated List" and "TDP Option Selection Worksheet – Commercial Drawings and Associated Lists" detailed in the associated CDRLs, and in accordance with the SOW (see following Section). The TDP shall be updated to incorporate any implemented engineering changes

The contractor shall be required to deliver the TDP at the end of the four year Development period (i.e., DT/OA), and the TDP Contract Data Requirements List (CDRL A018) shall require the contractor to update the TDP as necessary after DT/OA and throughout the life of the contract for any production changes made. A detailed TDP, updated at completion of DT/OA or as otherwise required by the Government shall facilitate future contracting actions to maintain interoperability, modularity and SWaP. The TDP shall contain sufficient detail to enable its use in a competitive procurement for the full-rate production of NTCDL Systems and Spares by third party vendors. The contractor shall deliver a letter of certification to the Government at time of TDP delivery/FAT.

CDRL Deliverables:

- (CDRL A018) Technical Data Package (DI-SESS-80776A)

3.1.7.1.1 TDP Option Selection Worksheet Data

Figure 3.2: MIL-STD-31000A:

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TDP OPTION SELECTION WORKSHEET

SYSTEM: NTCDL — DATE PREPARED: 21JAN2014

A. CONTRACT NO.	B. EXHIBIT/ATTACHMENT NO.	C. CLIN	D. CDRL DATA ITEM NO(s).
TBD	Enclosure (a)	See Block A of CDRL	TBD

1. TDP LIFECYCLE LEVEL (CHOOSE ONLY ONE PER WORKSHEET) Note: The level selected must coincide with the requirements of the elements selected in Block 5.

A. ☐ CONCEPTUAL LEVEL ☐ DEVELOPMENTAL LEVEL ☑ PRODUCTION LEVEL	B. REMARKS: See Block 9.

2. DELIVERABLE DATA PRODUCTS (X ALL THAT APPLY AND COMPLETE AS APPLICABLE)

TYPE	FORMAT
A. ☑ 2D DRAWINGS	☑ NATIVE CAD ☑ ISO 32000 PDF ☐ HARD COPY ☑ OTHER FORMAT (SPECIFY) See Block 9.
B. 3D MODELS ☐ 3D Digital MODELS ONLY ☑ 3D Digital MODELS W/ ASSOCIATED 2D DRAWINGS	☑ NATIVE CAD (Specify level of annotation) See Block 9. ☐ MODEL ORGANIZATION SCHEMA (Specify Appendix B or other) ☑ NEUTRAL FORMAT (SPECIFY, e.g., ISO 10303 APxxx) See Block 9. ☑ OTHER FORMAT (SPECIFY, E.G., 3D PDF, JT) See Block 9.
C. ☐ METADATA (Specify in Section 9)	☐ ASCII TEXT - PIPE DELIMITED ☐O 10303 (SPECIFY, e.g., APxxx & DEX) ☐ JEDMICS (DLF) ☐THER FORMAT (SPECIFY)
D. ☑ ASSOCIATED LISTS (See Sect 7)	☑ NATIVE FORMAT ☑ ISO 32000 PDF ☐ARD COPY ☑ OTHER FORMAT (SPECIFY) See Block 9.
E. SUPPLEMENTAL ☑ TECHNICAL DATA (Specify in Section 9)	☑ NATIVE See Block 9. ☐ NEUTRAL (SPECIFY e.g., STEP AP238, 240, DEX, Other) ☑ OTHER (SPECIFY,e.g., PDF) ISO 32000 PDF

3. CAGE CODE & DOCUMENT NUMBERS	A. ☑CONTRACTOR CAGE AND DOCUMENT NUMBERS ☐OVERNMENT CAGE (COMPLETE 3B, 3C and 3D)	D.
B. USE CAGE CODE:	C. USE DOCUMENT NUMBERS:	

4. DRAWING FORMATS (X ONE AND COMPLETE AS APPLICABLE)

☐ CONTRACTOR FORMAT ☑ GOVERNMENT FORMAT.
REMARKS: General Format supplied by EDMO (see Block 3.D). Specific formats and compliance requirements identified in Block 8 and Block 9.

5. TDP ELEMENTS AND ASSOCIATED DATA REQUIRED (X ALL THAT APPLY)

☐ CONCEPTUAL DESIGN DRAWINGS/MODELS
☐ DEVELOPMENTAL DESIGN DRAWINGS / MODELS AND ASSOCIATED LISTS
☑ PRODUCT DRAWINGS / MODELS AND ASSOCIATED LISTS
☑ COMMERCIAL DRAWINGS / MODELS AND ASSOCIATED LISTS (See Commercial Drawings/Models/Associated Lists Options Worksheet)
☑ SPECIAL INSPECTION EQUIPMENT (SIE) DRAWINGS, MODELS AND ASSOCIATED LISTS
☑ SPECIAL TOOLING (ST) DRAWINGS, MODELS AND ASSOCIATED LISTS
☑ SPECIAL PACKAGING INSTRUCTIONS (SPI) DRAWINGS, MODELS AND ASSOCIATED LISTS
☐ SPECIFICATIONS AND/OR STANDARDS (SPECIFY) _____
☑ SOFTWARE DOCUMENTATION (SPECIFY) SEE BLOCK 9
☑ QUALITY ASSURANCE PROVISIONS (QAP) (SPECIFY) The contractor shall provide QAPs for assemblies, sub-assembles, and parts.
☐ METADATA (SPECIFY) _____
☑ SUPPLEMENTARY TECHNICAL DATA (SPECIFY) See Block 9

6. TDP DATA MANAGEMENT PRODUCTS

☑ SOURCE CONTROL DRAWING (SOCD) APPROVAL REQUEST
☑ DRAWING NUMBER ASSIGNMENT REPORT
☑ PROPOSED CRITICAL MANUFACTURING PROCESS DESCRIPTION

7. ASSOCIATED LIST (X AND COMPLETE AS APPLICABLE)

☑ A. PARTS LIST (X ONE)	☐ (1) INTEGRAL	☑ (2) SEPARATE	☐ (3) CONTRACTOR SELECT
☑ B. DATA LISTS	☑ REQUIRED (Specify Levels of Assy) See Block 9		
☐ C. INDEX LISTS	☐ REQUIRED (Specify Levels of Assy)		
☑ D. WIRING LISTS	☑ REQUIRED (Specify Levels of Assy) See Block 9		
☐ E. APPLICATION LISTS	☐ (1) INTEGRAL	☐ (2) SEPARATE	☐ (3) CONTRACTOR SELECT
☐ F. OTHER	☐ REQUIRED (Specify)		

8. APPLICABILITY OF STANDARDS.THE FOLLOWING STANDARDS APPLY (X AS APPLICABLE)

☑ ASME Y14.100 ENGINEERING DRAWING PRACTICES WITH APPENDICES: ☑ ☑ ☑ ☑	☑ ASME Y14.24 TYPES AND APPLICATIONS OF ENGINEERING DRAWINGS ☑ ASME Y14.34 ASSOCIATED LIST ☑ ASME Y14.35M REVISION OF ENGINEERING DRAWINGS AND ASSOCIATED LIST ☑ ASME Y14.41 DIGITAL PRODUCT DEFINITION DATA PRACTICES ☑ ASME Y14.5 DIMENSIONING AND TOLERANCING	☑ OTHER STANDARDS APPLY AS DESCRIBED: Use current ASME standards where applicable. COMPANY STANDARDS PERMITTED: ☐S ☑O

9. OTHER TAILORING (ATTACH ADDITIONAL SHEETS AS NECESSARY)

BLOCKS 1 and 2. All drawings, mechanical illustrations and models shall be drawn in 3D vector format. Delivery of 3D models shall be in Native CAD format, ISO 10303 Standard for the Exchange of Product Model (STEP) data in AP214 format, in editable 2D AutoCAD Drawing (.dwg) format and as 2D Adobe Portable Document Format (.pdf) files (exported from the contractor's native 3D CAD system into current NMCI compatible versions). All TDP Elements and Associated Lists will be included in the 3D Native, 3D STEP, 2D Native, 2D Drawings and/or 2D Portable Documents as appropriate. To amplify, all TDP Drawings will be delivered in their Native format, as an AP214 STEP file, as individual AutoCAD 2D Drawings and as individual 2D Adobe PDF files. The Contractor will ensure that all files required to open, read and edit every TDP data item delivered in each format is included.

All TDP drawing elements for end-items (individual Top-Level assemblies) will be developed as mono-detail drawings IAW ASME Y14.24.

Certain drawings will only be developed in 2D format. Format for 2D drawings shall be AutoCAD (current NMCI compatible version), Microsoft (MS) Visio (current NMCI compatible version), MS Word (current NMCI compatible version) or MS Excel (current NMCI compatible version) native formats. Drawing types acceptable in 2D-only formats include Block Wiring Diagrams, Cable Assembly Drawings, Production Assembly Instructions, Data List, Parts List, electronic design drawings and other drawings of that type.

BLOCK 3. The Contractor shall obtain and use Government CAGE Code and Drawing Numbers from the source identified in Block 3. A detailed Drawing Number Assignment Report will be prepared and delivered in accordance with DI-SESS-81011D. Additional information on requesting Government Drawing Numbers is available in SSC Pacific Instruction 3910.1D.

BLOCKS 5 thru 7. The contractor shall deliver a detailed Level 3 Technical Data Package (TDP) for Product Drawings/Models and Associated Lists in accordance with MIL-STD-31000 with additional tailoring requirements as specified herein. Drawings, models, and lists shall be provided at a product structure level of detail and scope that is sufficient to enable a competent third-party manufacturer to produce a NTCDL system which duplicates the physical and performance characteristics of the original design without additional design engineering or recourse to the design activity.

(a) Top Level Production Assembly, Sub-assembly, Altered items, Fabricated Parts, and Cable Assembly Drawings will include detailed information as to the specific procedures and processes required for the complete fabrication, alteration, or manufacture of these items by multiple vendors to sustain the same level of quality of the original design of these items. Production Assembly Instructions and Supplementary Technical Data (STD) can be delivered as a MS Word (current NMCI compatible version) document with annotated callouts to pictures embedded within the document or as a 2D detailed engineering drawing. Commercial and Non-Developmental Items will be documented to the maximum extent possible as allowed by the original Manufacturer and as required for complete system assembly, procurement and configuration management.

(b) Part List (PL) will be developed for assemblies, sub-assemblies, altered items, fabricated parts, and cable assemblies to the level of detail required for procurement and life-cycle management of these items. An overall Separate PL is required and will be provided in MS Excel in the specific template to be provided by the government for ease of import into a government owned database.

(c) Data Lists (DL) and an Indentured Data List. DLs will be developed using MS Excel (current NMCI compatible version) identifying drawing numbers of all assemblies, sub-systems, altered items, source controlled parts (if applicable), fabricated parts, and cable assemblies for each Top-Level assembly. An Indentured Data List will be provided for the overall System (required when System TDP has more than one Top-Level assembly).

(d) Wiring Lists. Wiring Lists will be created as 2D Cable Assembly Fabrication Drawings/Schematics to be included as part of the TDP. Simple point-to-point text-based/table-based wiring lists are not allowed unless they are developed as part of the 2D Cable Assembly Drawing to provide individual conductor functions or to provide other similar technical data.

(e) Component Manuals - Supplemental Technical Data shall also include manuals for all COTS equipment.

TDP OPTION SELECTION WORKSHEET
COMMERCIAL DRAWINGS/MODELS AND ASSOCIATED LISTS

SYSTEM: NTCDL — DATE PREPARED: 21JAN2014

A. CONTRACT NO.	B. EXHIBIT/ATTACHMENT NO.	C. CLIN	D. CDRL DATA ITEM NO(s).
TBD	Enclosure (b)	See Block A of CDRL	TBD

2. DELIVERABLE DATA PRODUCTS (X ALL THAT APPLY AND COMPLETE AS APPLICABLE)

TYPE	FORMAT			
A. ☑ 2D DRAWINGS	☐ NATIVE CAD ☑ OTHER FORMAT (SPECIFY)	☑ ISO 32000 PDF See Block 3.	☐ HARD COPY	
B. 3D DIGITAL MODELS ☐ 3D DIGITAL MODELS ONLY ☑ 3D DIGITAL MODELS W/ ASSOCIATED 2D DRAWINGS	☐ NATIVE CAD (Specify level of annotation) ☐ NEUTRAL FORMAT (SPECIFY e.g. ISO 10303 APxxx) ☑ OTHER FORMAT (SPECIFY) See Block 3.			
C. ☐ METADATA (Specify in Section 2)	☐ ASCII TEXT - PIPE DELIMITED ☐ JEDMICS (DLF)	☐ ISO 1030 (SPECIFY, e.g., Apxxx & DEX) ☐ OTHER FORMAT (SPECIFY)		
D. ☑ ASSOCIATED LISTS	☐ NATIVE FORMAT ☑ OTHER FORMAT (SPECIFY)	☑ ISO 32000 PDF See Block 3.	☐ HARD COPY	

3. OTHER TAILORING (ATTACH ADDITIONAL SHEETS AS NECESSARY)

Commercial drawings/models and associated lists are used to obtain existing information regarding commercial items acquired by the Government and used as end items or as selected subassemblies of Government developed items. They are not to be used for documenting vendor items as part of a production level TDP. The contractor shall provide commercial drawings, models, and/or lists in native formats (in addition to ISO 32000 PDF) in the event that the item was developed at Government expense.

See "TDP Options Worksheet" Block 9.

3.1.7.2 Computer Software

NOTE: Firmware shall be considered software and shall meet all of the software requirements listed within this SOW. The contractor shall provide computer programs, the computer software end item, the executable version of the software, source code, source code listings, object code listings, design details, algorithms, processes, flow charts, formulae and related material to enable the software (including for example, machine generated code) to be reproduced, recreated, or recompiled (CDRL A018). Computer software does not include computer databases or computer software documentation. (DFARS Clause 252.227-7014). If the item provided is commercially available, then the contractor can provide it by providing the part number required to buy the commercial item.

NOTE: Design documentation for software produced and / or modified for this effort shall be documented in accordance with the development requirements specified elsewhere is this SOW, including the SSDDs identified in conjunction with the PDR / CDR milestone events.

CDRL Deliverables:

- (CDRL A018) Technical Data Package (DI-SESS-80776A)

3.1.7.3 Computer Software Documentation

NOTE: Firmware shall be considered software and shall meet all of the software requirements listed within this SOW. The contractor shall provide owner's manuals, user's manuals, installation instructions, operating instructions, and other similar items, regardless of storage medium, explaining the capabilities of the computer software or providing instructions for using the software. (DFARS Clause 252.227-7014) ISO / IEC Standard 12207 uses the term "software life cycle data" to address software documentation. If the item provided is commercially available then the contractor shall provide it by providing the part number required to buy the commercial item, and including the documentation and manuals listed above in the Technical Data Package. The documentation for the software produced and / or modified for this effort shall be documented in the project Technical Data Package (CDRL A018).

CDRL Deliverables:

- (CDRL A018) Technical Data Package (DI-SESS-80776A)

3.1.7.3.1 Software Build Instructions

The contractor shall document the software contents and installation procedures for the software as part of the Software Version Description CDRL (CDRL A020). The contractor shall provide software build instructions for the software as part of the Computer Software End Item CDRL (CDRL A019). The instructions shall include the information needed to build the software, including identification of the commercial software development tools utilized by the contractor. The instructions shall include all information needed to generate an executable version of the software, and produce the executable version, including compiler, software development supports tools such as the applicable Integrated Development Environment, Operating System settings. The computer software (see section3.1.6.2) shall include all files required including all source code, build scripts, any non-commercial compilers, configuration files, binaries, and relevant documentation. The contractor shall document hardware and firmware information not documented in A019 or A020 in the Technical Data Package (CDRL A018).

The contractor shall conduct a Software Maintainability Demonstration as part of NTCDL First Article Testing (FAT) testing to validate the provided Software Build Instructions can be used to build the software for the system.

CDRL Deliverables:

- (CDRL A018) Technical Data Package (DI-SESS-80776A)
- (CDRL A019) Computer Software End Items (DI-IPSC-81441A)
- (CDRL A020) Software Version Description (DI-IPSC-81442A)

3.1.8 Government Furnished Property

The Government will furnish the equipment identified in the contract and SOW to enable development and testing of the NTCDL. A list of Government-furnished Property (GFP) is located in Section H of the contract. At the conclusion of the contract or the contractual activity requiring the GFP, the contractor shall return any GFP to the Government per the close out procedures required and in the timelines specified by the Government. The contractor shall not modify the GFP without prior written approval from the Government. The contractor shall return all GFP to the Government in the original condition in which it was furnished to the contractor, unless a letter is sent by the Government to the contractor allowing the return of modified GFP.

The contractor shall provide monthly status updates regarding GFP in accordance with SPAWAR Instruction 4440.12 and populate Form GFP Inventory Listing, and report monthly updates in the Contractor's Progress, Status and Management Report (CDRL A001).

CDRL Deliverable:

- (CDRL A001) Contractor's Progress, Status Management Report (DI-MGMT-80227)

3.1.9 Security

In accordance with the DD254, the contractor shall support this task up to Secret, and shall include access to Secret data, information, and spaces. The contractor shall be required to attend meetings classified up to the Secret level.

3.1.9.1 Foreign Travel

If foreign travel is required, all outgoing Country / Theater clearance message requests shall be submitted to the SSC-PAC foreign travel team, OTC2, Room 1656 for action. A Request for Foreign Travel form shall be submitted for each traveler, in accordance with SSC PACIFIC INSTRUCTION 4650.3A.

3.1.9.2 Distribution Statement

All program documentation and data shall be distributed in accordance with the appropriate distribution statements and classification markings. All contractor documentation and data shall at a minimum, be marked "For Official Use Only (FOUO)."

3.1.9.3 Operations Security

The contractor shall follow the requirements in support of the SPAWAR Headquarters Operations Security (OPSEC) Program. The contractor shall document items of critical information applicable to contractor operations involving information on or related to this SOW. The contractor is responsible to adequately protect Government designated critical information, and to determine and protect critical

information generated by the contractor using guidance and meeting requirements outlined in the DD Form 254. All OPSEC requirements shall be passed down to all Sub-contractors.

3.1.9.4 Cleared Personnel

The contractor shall certify personnel performing functions associated with Fleet and / or military operations are vetted via background checks with National Agency, Local Agency, and Credit (NALAC). The contractor shall ensure all personnel in direct contact with sensitive DoD OPSEC indicators (the unit, location, and time of operations) have personnel security clearances in accordance with the DD Form 254.

3.1.9.5 Access to Secure Communication

The contractor shall have access to secure voice to support anomaly investigation and resolution. COMSEC equipment certified by the NSA to secure critical unclassified in accordance with the DD Form 254 is required at all contractor operations centers.

Additionally, the contractor shall provide their own access to SIPRNET in support of NTCDL requirements.

3.1.10 Information Assurance

The contractor shall follow the guidance for NTCDL Security, Information Assurance (IA), and Cybersecurity to ensure all components meet the Cybersecurity requirements specified in Section 3.4.2, System Security Design Criteria, of the SPS. The contractor shall include facilities located in a physically secure commercial facility with the required level of positive control of access and security and in accordance with the DD Form 254. The contractor may be subject to Government and / or independent verification of compliance.

3.1.10.1 Cybersecurity and Information Assurance Requirements

Cybersecurity and IA are applicable to all information technology (IT) components of NTCDL, and apply to Government and vendor facilities where sensitive information or Government data is hosted or stored. The contractor shall implement controls necessary to meet the IA / Cybersecurity requirements in this SOW and those defined in Section 3.4.2 of the SPS. All controls shall be implemented with supporting comments documenting the procedures, processes or standards used in complying with the control. Any IA / Cybersecurity controls identified as non-compliant shall have documented notes or mitigations for control and be provided to the Government for acceptance. Any notes or requirement-specific risk mitigation measures employed shall be documented for any control. The information shall be sufficiently detailed in order to permit the Government to use this information to assess and assign the residual risk for each control. IA / Cybersecurity status shall be reported in the Contractor's Progress, Status Management Report (CDRL A001).

CDRL Deliverable:

- (CDRL A001) Contractor's Progress, Status Management Report (DI-MGMT-80227)

3.1.10.2 Assess Security Controls

The contractor shall ensure provisioned services meet specified Cybersecurity requirements and Minimum Security Controls listed in the SPS Section 3.4.2.1. The contractor shall assess security control compliance within the IA Compliance Assessment Matrix (CDRL A021).

All non-developmental software and firmware shall be thoroughly tested during the acceptance testing process to ensure it meets the IA requirements noted in the paragraph above. This requirement shall apply to existing reused (whether whole or in part) software and firmware. The contractor shall

demonstrate all non-developmental software and firmware meet current security architecture and design requirements listed in this specification.

A comprehensive vulnerability management process including the systematic identification and mitigation of Software and Hardware vulnerabilities shall be used during the development and maintenance of the NTCDL system. Wherever system capabilities permit, mitigation of Software and Hardware vulnerabilities shall be independently validated through inspection and automated vulnerability assessment or state management tools.

CDRL Deliverable:

- (CDRL A021) Information Assurance Compliance Assessment (DI-MGMT-81845)

3.1.10.3 IA Training, Certification and Work Management

The contractor shall ensure personnel performing IA functions are fully compliant with DoD Directive (DoDD) 8570.01 concerning Information Assurance Training, Certification, and Workforce Management.

3.2 EDM DEVELOPMENT (RDT&E)

The contractor shall develop, test, and deliver two (2) NTCDL EDMs (to include the Link Management Subsystem and External Data User Interface Subsystem Hardware) and three (3) ITSDs, meeting the requirements specified herein and the NTCDL SPS, Section 3 (System Requirements). The EDMs shall establish the functional and physical configuration baselines for each NTCDL Variant and the ITSD (see SOW Section 3.2.10). EDM System #1 will be used for destructive testing (e.g., shock) cited in SOW section 3.2.8.3. EDM system #2 will be installed by the Navy to support Developmental Testing / Operational Assessment (DT / OA) activities.

The contractor shall appoint a Lead System Engineer responsible for technical development of the system design and EDM as set forth in this SOW and the SPS.

3.2.1 EDM Development Overarching Requirements

The NTCDL EDM period is envisioned as a forty-eight (48) month effort. This period shall account for EDM development, test, and delivery. The first thirty (30) months shall include Joint Interoperability Test Center (JITC) Waveform Certification testing for all CDL waveforms, and NSA certification of COMSEC followed by FAT. JITC and NSA certifications are required prior to the initiation of FAT. The following six (6) months shall include shock testing and any corrective actions required to attain shock qualification. Shock testing is performed during months 31-36. The vendor shall retest items failed during shock testing until passed. EDM delivery shall occur after the successful completion of all testing with the exception of shock testing. The Government shall have the right to have one of the systems shipped 30 months after contract award. The final twelve (12) months are to support conduct of (DT / OA) (See SOW Section 3.2.15). At the conclusion of these efforts the formal baseline for the NTCDL system shall be established, and become the production baseline.

The NTCDL System scope shall be organized by major program events. These program events are Design, Hardware / Software Build, Integration, Test, and Logistics Support. Specific tasks to be performed are outlined in each event.

a. Design comprised of:
    1) Requirements work culminating in an SRR.
    2) Preliminary design work culminating in a PDR.
    3) Detailed design work culminating in a CDR.

4) Risk Reduction Demonstration (RRD).

b. Hardware / Software Build / Test comprised of:
   1) Identifying long lead items (parts needing to be ordered pre-CDR in order to maintain schedule).
   2) System development and fabrication culminating in a readiness to begin integration and test activities.
   3) Conduct informal testing and dry runs of formal test procedures to demonstrate readiness to commence formal testing.

c. Integration including:
   1) LRU and subsystem level integration.
   2) Government Furnished Software (GFS) integration.

d. Testing comprised of a series of test events beginning with a successful completion of a Test Readiness Review (TRR):
   1) First Article Test (FAT).
   2) Joint Interoperability Test Center (JITC) CDL Certification Testing.
   3) Production Acceptance Testing (PAT).
   4) Environmental Test.

e. Logistics Support, comprised key activities and products optimizing supportability and maintainability:
   1) Reliability, Maintainability, Availability Analysis.
   2) Maintenance and Repair Analysis.
   3) Provisioning and Spares.
   4) Training and Training Materials.
   5) Provisioning Technical Data.
   6) Technical Manuals.
   7) Depot Repair Services.

3.2.2 Earned Value Management System (Cost Reimbursable CLINs)

Earned Value Management System (EVMS) per Section 3.2.2 and Subsections thereunder shall only be applicable for cost reimbursable efforts collectively over $20M. If the cost reimbursable efforts are less than $20M, then this Section as well as all EVMs clauses shall not be applicable.

The contractor shall establish, maintain, and use in the performance of this portion of the contract, an integrated performance management system. Central to this integrated system shall be an EVMS in accordance with DFARS 252.242-7001 and DFARS 252.242-7002 and the Guidelines for an EVMS contained in ANSI / EIA-748. In regard to DFARS 252.242-7001 and 252.242-7002, the contractor shall have an EVMS complying with ANSI / EIA-748; however, the Government will not formally validate / accept the contractor's management system if the applicable cost reimbursable Contract Line Item Numbers (CLINs) in TY dollars is / are below $50M. While no validation is required below $50M, the Government will observe compliance during the course of the contract through the EVMS surveillance process. For applicable CLINs valued over $50M, DCMA EVMS validation is mandatory.

To establish the integrated performance management system, the EVMS shall be linked to and supported by the contractor's management processes and systems to include the Integrated Master Schedule (IMS), WBS, change management, material management, procurement, cost estimating, and accounting. The correlation and integration of these systems and processes shall provide for early indication of cost and

schedule problems, and their relation to technical achievement. Formal risk management shall also be an integral part of the contractor's integrated performance management system and IPMR deliverables. Outputs of the integrated performance management system shall be used as the single basis for timely, reliable, and auditable reporting of performance information in CDRLs, Quarterly PMRs and reported in the Contractor's Progress, Status Management Report (CDRL A001). Updates against the IMS (including % complete) shall be reported as part of the schedule analysis section in IPMR Format 5 (CDRL A022).

The contractor's EVMS shall be maintained in accordance with EVMS ANSI / EIA-748, current version guidelines and requirements, DFARS Clause 252.234-7002, and the contractor's own documented EVMS Description. If the Government determines EVMS deficiencies exist from IBR results, Joint Surveillance with the Defense Contract Management Agency (DCMA), or quality assessments of cost and schedule data delivered in the IPMR the Government shall perform a Compliance Review of the contractor's EVMS.

CDRL Deliverable:

- (CDRL A001) Contractor's Progress, Status Management Report (DI-MGMT-80227)
- (CDRL A022) Integrated Program Management Report (IPMR) (DI-MGMT-81861)

3.2.2.1 Integrated Program Management Report

The contractor shall provide monthly IPMR detailing the integrated cost and schedule status of work progress on the contract (CDRL A022). Written Government approval shall be required before implementing any formal re-baseline of the Performance Measurement Baseline (PMB). The Government reserves the right to adjust the reporting levels and thresholds throughout the lifecycle of the program. DI-MGMT-81861 contains the detailed content of each of the formats. The required IPMR formats are as follows:

a. Format 1 (Mandatory) (DD Form 2734 / 1), WBS, defines cost and schedule performance data by product oriented Work Breakdown Structure (WBS) comprising the hardware, software, and services the Government is buying.
b. Format 2 (Optional for contract values less than $50M. Mandatory for contract values equal to / greater than $50M in then-year dollars) (DD Form 2734 / 2), OBS, defines organizational cost and schedule performance data rather than by individual CWBS elements. It also identifies each major sub-contractor and material purchases.
c. Format 3 (Mandatory) (DD Form 2734 / 3), Baseline, defines changes to the PMB which performance is measured.
d. Format 4 (Optional for contract values less than $50M. Mandatory for contract values equal to / greater than $50M in then-year dollars), defines staffing forecasts for the Most Likely EAC by the same organizational categories as defined in Format 2.
e. Format 5 (Mandatory) (DD Form 2734 / 5), Explanations and Problem Analyses, is a narrative report used to provide the required analysis of data contained in Formats 1and 3and to explain significant cost and schedule variances and other identified contract problems and topics. The report shall address, at a minimum the cause(s), impact(s), and corrective action(s) of reporting elements exceeding thresholds.
f. Format 6 (Mandatory) (DD Form 2734 / 5), IMS defines and contains the contractor's IMS with the contractor's integrated network, significant external interfaces, Government furnished equipment / information / property and relationship dependencies for the entire contractual effort.
g. Format 7 (Mandatory) (DD Form 2734 / 5), Electronic History and Forecast File, defines the time-phased historical & forecast cost information in the DoD-approved electronic XML format, by WBS.

CDRL Deliverable:

- (CDRL A022) Integrated Program Management Report (IPMR) (DI-MGMT-81861)

3.2.2.1.1 Integrated Baseline Review

The contractor shall engage jointly with the Government's PM and technical staff in conducting IBRs focused on evaluating the realism and inherent risks in the contractor's integrated PMB plan.
The contractor shall present the contents and underlying / supporting assumptions of its initial PMB to Government representatives via an IBR to be held at the contractor's facilities. At the discretion of the Government, subsequent IBRs shall be conducted, as needed. At the contract PAC, the initial IBR event shall be discussed to establish the soonest feasible date (e.g., as soon as the PMB is established and documented) but no later than One Hundred Eighty (180) calendar days after contract award.

Each IBR shall verify the contractor has established and has maintained a reliable PMB that includes the entire contract scope of work; is consistent with contract cost targets and schedule requirements; has adequate resources assigned; and uses effective Earned Value (EV) techniques / methods to accurately reflect technical achievement / progress. Each IBR shall record any indications that effective EVM is not being used. The scope of any subsequent IBRs shall be tailored to the nature of the event, activity or work effort and the IBR shall be conducted within a reasonable time after the occurrence of the program event. The contractor shall flow-down IBR requirements to those sub-contractors who meet the applicable thresholds for EVM reporting. See also SOW Section 3.2.2.1.2, Integrated Sub-contract Management.

During contract performance, the contractor shall provide ongoing access to its records and data underlying and supporting the PMB and cost and schedule data reported. The contractor shall provide IBR planning, documentation, artifacts, and close out activities as specified in the IBR (CDRL A023).
IBR entrance and exit criteria shall include, at a minimum:

Table: 3.3: IBR Entrance & Exit Criteria

Entrance Criteria	Exit Criteria
a. A plan for the integrated baseline has been established. b. The IBR conference location has been determined. c. An agenda has been formulated, accepted, and sent to all participants prior to the review. d. Advance IBR planning documentation and artifacts have been submitted in accordance with the IBR CDRL requirements (CDRL A023). e. The Government APM / PM / COR and the Government EVMS representative have determined the contractor is ready for the IBR based on comprehensive review of IBR artifacts.	a. Concerns have been identified, and closure plans have been developed. b. Action items have been included in the risk management plan and mitigation strategies are in place. c. The PMB reflects the scope of contracted work and determines the PMB is achievable. d. Close-out activities and documentation of action items into the program's tracking tool, and action item closure has been completed.

CDRL Deliverable:

- (CDRL A023) Integrated Baseline Review (IBR) (DI-MGMT-81861)

3.2.2.1.2 Integrated Subcontract Management

The contractor shall flow down the contractual reporting requirements to sub-contractors meeting the applicable thresholds (e.g. exceeding $20 million in then-year dollars). EVMS flow down to sub-contractor cost or incentive contracts of less than $20 million in then-year dollars, or to Firm Fixed Price subcontracts is a risk-based decision to be mutually agreed on between the prime contractor and the COR prior to award. Any Sub-contractor with a contract flow down requirement for EVM shall also be included in the IBR. A separate IBR may be conducted at the Sub-contractor's facility, in which case the prime contractor shall take the lead in conducting the IBR, with Government participation. Alternatively, the sub-contractor may participate as part of the prime contract IBR. On subcontracts where EVM and IMS requirements are not flowed down, subcontracted scope and performance information shall be incorporated / integrated into and reported in cycle with the Prime's reporting via the contractor's integrated performance management system and EVMS. The contractor is responsible for reviewing and assuring the validity of all sub-contractors' EVM reporting through surveillance and other means. It may be necessary to conduct IBRs even with sub-contractors who do not meet the dollar value threshold because of the risk inherent in their work, criticality of their performance to the total program, or percent of the total work share. Exceptions shall be mutually agreed upon by the contractor and the Government.

3.2.2.2 Schedule Risk Assessment

The contractor shall conduct Schedule Risk Assessments (SRAs) (CDRL A022). The results of the contractor's SRA, from the contractor's schedule analysis tool, shall be incorporated into the contractor's program risk management process. The Government may elect to participate in the SRA process. Any anticipated / expected Government support shall be identified at the contract PAC, along with the anticipated Government response times, in order to avoid schedule disruption / delays. The results from the SRA shall be submitted as specified quarterly and / or as stated below:

a. Integrated Baseline Review (IBR artifact package).
b. Over Target Baseline (OTB) / Over Target Schedule (OTS): A SRA shall be submitted along with the request to initiate an OTB or OTS.
c. Re-baseline or Single Point Adjustment. A SRA shall be submitted before implementing a significant cost and schedule reset.
d. Milestone Target(s): The Government will determine the milestone target(s) for the SRA based on contract events.

CDRL Deliverable:

- (CDRL A022) Integrated Program Management Report (IPMR) (as attachment to Format 5 for the reporting months in which it is due (DI-MGMT-81861, paragraph 3.6.11.2)

3.2.2.3 Over Target Baseline / Over Target Schedule Approval

The contractor shall implement an OTB / OTS if the PMB is no longer adequate to provide performance measurement information relative to the remaining work using the principles of EVM and where improved control of the project would result. To prevent unnecessary and uncontrollable changes to the

baseline, the contractor shall not implement an OTB / OTS without formal approval from the PCO. The contractor shall submit a formal request to the PCO requesting permission to implement an OTB and or OTS. The request shall include a detailed plan and schedule for implementing the OTB / OTS, including the ground rules, assumptions, remaining scope impacted, variance adjustment plans and justifications, potential reporting changes / suspensions, documentation recommendations, and planned dates for implementation. The contractor shall also identify EVMS discipline problems contributing to rendering the current work plan unrealistic, and provide plans / corrective actions preventing these problems from reoccurring. Following implementation of any Government approved OTB / OTS, an IBR shall be conducted and IPMR variance thresholds specified in the CDRL may be reevaluated to ensure continued visibility into significant cost and schedule variances.

3.2.2.4 Contract Funds Status Management Report

The contractor shall develop a quarterly CFSR in accordance with DI-MGMT-81468, to include tailoring instructions provided in the identified CDRL (CDRL A024). The CFSR shall be used by the contractor and the Government to update and forecast contract funds requirements; to plan and communicate funding changes; to develop funding requirements for approved efforts; to determine funds in excess of contract needs and available for de-obligation; and to obtain rough estimates of termination liability and open commitment costs. The contractor shall present the data in accordance with Government fiscal year.

CDRL Deliverable:

- (CDRL A024) Contract Funds Status Report (CFSR) (DI-MGMT-81468)

3.2.3 System Engineering Processes

The contractor shall define a systems engineering management approach appropriate for the work to be performed under the NTCDL SPS and SOW. The contractor shall document this approach in a System Engineering Management Plan (SEMP) consistent with the terms of this SOW and CDRL A017. The contractor shall perform all applicable work in accordance with the contractor's Government-approved SEMP. Additionally, the contractor shall complete a Spectrum Dependent Asset Valuation Determination (S-DAVD) in accordance with SECNAVINST 2400.1A (and the Office of Management Budget, Circular A-11 cited therein), wherein contractors shall explain how their system addresses spectrum efficiency. The contractor shall identify, describe, and substantiate Technical Readiness Level (TRL) 6 or greater of the following critical technology elements and equipment integrated into the contractor's solution, in accordance with DoD Technology Readiness Assessment Guidance (April 2011):

a. Antenna(s) capable of meeting the five link requirement.
b. Support for CDL waveforms to include Standard CDL (STD CDL) Revision H-2 and Bandwidth Efficient CDL (BE CDL) Revision B.
c. Simultaneous operation of both Platform Communication Equipment (PCE) and Surface Communications Equipment (SCE) modes (i.e., CDL Communications Link gender swapping).

CDRL Deliverable:

- (CDRL A017) Systems Engineering Management Plan (SEMP) (DI-SESS-81785)

3.2.3.1 Modular Open Systems Approach / Open System Architecture

The contractor shall develop and utilize an open architecture supporting a Modular Open Systems Approach (MOSA) as required by the 23 December 2005 Office of the Chief of Naval Operations (OPNAV N6 / 7) requirements letter. MOSA and analysis of long term supportability, interoperability, and growth for future modifications shall be included in the contractor's final design approach. The contractor shall develop and maintain an open architecture incorporating appropriate considerations for interoperability, composability, technology insertion, vendor independence, reusability, scalability, upgradeability, and long-term supportability. For those portions of software driven to proprietary and / or closed system architectures by mission specific requirements or a lack of appropriate open standards or designs, a software partitioning or other design features to mitigate the system level impacts shall be provided to and approved by the Government prior to implementation. The design shall provide sufficient growth and open interface standards to allow future reconfiguration and addition of new capabilities without redesign of the system.

The contractor shall identify all key interfaces within the system and identify all specific standards to be implemented for the key interfaces, both subject to the Government's approval. The contractor shall identify, with rationale, any interfaces that are not open. Hardware key interfaces will include, but not be limited to, all interfaces associated with system components. The implementation of standards shall be in accordance with the following order of precedence:

a. Standards as specified within the herein.

b. Standards developed by international or national industry standards bodies widely adopted by industry.

c. Standards developed by industry, adopted by industry consensus-based standards bodies and widely adopted in the market place.

d. Standards not adopted by industry consensus-based standards bodies, but widely adopted and supported in the market place.

In the development of the system, the contractor shall maximize the use of COTS (e.g., hardware, operating systems, software, and middleware) and Government-Off-The-Shelf to meet MOSA requirements, where systems engineering, complexity, and cost constraints permit.

The contractor's modular design shall preclude long term dependence on closed or proprietary interface standards, technologies, products, or architectures. In the event the Government approves the use of a non-open standard or design, the contractor must provide the Government with Government Purpose Rights for use of the standard or design.

The Contractor shall document this approach in the project SEMP (CDRL A017). The Contractor shall document MOSA decisions in the design section of the applicable SSDD (CDRL A025).

The Contractor shall deliver the NTCDL System-Level SSDD (CDRL A025) and an NTCDL Subsystem-Level SSDD for each NTCDL subsystem (CDRL A026).

CDRL Deliverables:

- (CDRL A017) Systems Engineering Management Plan (SEMP) (DI-SESS-81785)
- (CDRL A025) NTCDL System-Level SSDD (System / Subsystem Design Description) (DI-IPSC-81432A)
- (CDRL A026) NTCDL Subsystem-Level SSDDs (System / Subsystem Design Description) (DI-IPSC-81432A)

3.2.3.2 HSI Status and Approach

The contractor shall prepare a Human Systems Integration (HSI) Plan (HI-HFAC-81743) for HSI development and integration, and document this approach in the project SEMP (CDRL A017). The SEMP is required to summarize what HSI work has been achieved to date and to describe what is planned for the future, with more detail provided on the next immediate life cycle phase than subsequent phases. The SEMP defines the scope of systems engineering for hardware, software, and human systems integration. The program description section of the SEMP presents the significant hardware, software, and human tasks. It also addresses the relationships of the human tasks in family-of-systems and system-of-systems, and with other systems in which the humans interact.

The contractor shall document HSI decisions in the design section of the applicable SSDD.

CDRL Deliverable:

- (CDRL A017) Systems Engineering Management Plan (SEMP) (DI-SESS-81785)

3.2.3.3 Software Engineering and Development Approach

NOTE: Firmware shall be considered software and shall meet all of the software requirements listed within this SOW.

The contractor shall define a software development approach appropriate for effort to be performed under the SOW and SPS. This approach shall be documented in a Software Development Plan (SDP). The contractor shall submit the SDP to the Government for approval prior to the SRR, and shall follow this SDP for all software to be developed or maintained under this effort. The software engineering and development strategy shall be based upon the identified principles of modern software management as identified in IEEE 12207-2008. The software system safety engineering and analysis approach, pursuant to Section 4 and Appendix B of MIL-STD-882E, shall be addressed in the SDP. Status against the SDP shall be reported in the Contractor's Progress, Status Management Report (CDRL A001).

The SDP shall include: A Software Quality Assurance Plan in accordance with IEEE 12207-2008 (status against the plan shall be reported in the Contractor's Progress, Status Management Report); and a Software CM Plan shall in accordance with IEEE 12207-2008 (with the status against the plan shall be reported in the Contractor's Progress, Status Management Report).

If changes are desired by the contractor to the processes documented in the SDP, then the contractor shall submit an updated SDP (CDRL A027) for Government concurrence with the proposed changes.

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status Management Report (DI-MGMT-80227)
- (CDRL A027) Software Development Plan (SDP) (DI-IPSC-81427A)

3.2.3.3.1 Software Version Control / Tracking System

The contractor shall employ a software version control / tracking system and document said system in the SDP (CDRL A027). Software version control status shall be reported in the Contractor's Progress, Status Management Report (CDRL A001).

This tracking system shall facilitate the incremental build stages of the code. The tracking system shall clearly show what modules are active in the program and shall be capable of managing multiple platform

baselines should be required to support the NTCDL variants. For each software CI and its versions, the following shall be identified at a minimum:

a. The documentation establishes the baseline.
b. The version references.
c. Identification details.

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status Management Report (DI-MGMT-80227)
- (CDRL A027) Software Development Plan (SDP) (DI-IPSC-81427A)

3.2.3.4 Human Systems Integration

The contractor shall incorporate Human Factors Engineering throughout the systems engineering process. The following references provide requirements for all Human System Integration domains, including manpower, personnel, training, human factors engineering, personnel survivability, safety, and occupational health: MIL-STD-1472G, MIL-STD-464C and MIL-STD-46855A(T). The contractor shall develop and execute an HSI engineering effort ensuring all HSI domains have been incorporated into the layout, design, and development of all equipment (hardware and software having an operator and maintainer interface. The contractor shall provide a Human Engineering Program Plan (utilizing DI-HFAC-81742A for content) and document this plan in the Systems Engineering Management Plan.

The contractor shall optimize the HSI process areas by analyzing constraints, objectives, thresholds, and risks. Emphasis shall be on those issues that, if unresolved, could degrade system operational performance; result in safety or health hazards; place serious burdens on manpower, personnel, or training resources; or jeopardize the timely development and fielding of the system. Progress on HSI activities and products shall be included as part of the Design Reviews as specified in the SEMP (CDRL A017). Contractor HSI personnel shall provide inputs for the entry and exit criteria for design reviews described and required elsewhere in this SOW:

a. SRR.
b. PDR.
c. CDR.

CDRL Deliverable:

- (CDRL A017) Systems Engineering Management Plan (SEMP) (DI-SESS-81785)

3.2.3.5 Integrated Product Teams

The contractor shall establish IPTs to enable the contractor to focus on specific aspects of the Program and enable discussions regarding program status, issues and accomplishments. The contractor shall establish IPTs internally to provide focus and feedback to the design, build, and test events. These IPTs shall involve the Government, and shall meet at a minimum of once a month, and the Government reserves the right to increase the frequency.

The contractor shall establish the following IPTs at a minimum:

a. Program Management IPT (PM IPT): the PM IPT shall address the scheduling and planning of events and activities, financial risk management, EVMS, status reporting, and all other program management and programmatic aspects of the program.

b. System Engineering IPT (SE IPT): the SE IPT shall address Design, Software (**Firmware shall be considered software and shall meet all of the software requirements listed within this SOW)** BIT and Self-Test, ILS, CM, Spectrum and Environmental, Integration, Hardware / Build and Production, Testing and Qualification and Technical Risk. The SE IPT shall address all technical and coordination issues not specifically assigned to any other IPT. The SEMP shall address the frequency of conduct of the SE IPT meetings and their methods of scheduling and documentation. The SE IPT shall address the manufacturing and production of NTCDL systems, Provision Item Ordering (PIO), and spares. The SE IPT shall address the testing and qualification of NTCDL for both FAT and PAT.
c. Software IPT (SW IPT): Starting at contract award, the contractor shall conduct SW IPTs for the purposes of successful integration of contractor and GFS software. The SW IPT shall serve as a forum for the regular exchange of draft software from the contractor to the Government and from the Government to the contractor. The SW IPT shall be used as a forum for draft software documentation exchange and collaboration, and for resolution of technical issues related to contractor / GFS software development and integration.

With COR concurrence, the contractor may establish additional IPTs.

The contractor shall report status of all IPTs in the Contractor's Progress, Status and Management Report (CDRL A001). The contractor shall provide meeting minutes for the IPT meetings (CDRL A003). If presentation materials are used, they shall be included in the meeting minutes.

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status, and Management Report (DI-MGMT-80227)
- (CDRL A003) Conference / Meeting Minutes (DI-ADMN-81250A)

3.2.3.6 Technical Interchange Meetings

The contractor shall conduct TIMs to discuss status, issues, and accomplishments, and to work on specific issues affecting the NTCDL development efforts. The contractor shall provide meeting minutes according to CDRL A003, Conference / Meeting Minutes.

The topics and frequency for TIMs will be jointly agreed to by the Government and the contractor.

CDRL Deliverable:

- (CDRL A003) Conference / Meeting Minutes (DI-ADMN-81250A)

3.2.4 Engineering Documentation

3.2.4.1 Technical Manuals

The contractor shall prepare a NTCDL Interactive Electronic Technical Manual (IETM) in digital format as prescribed by the Assistant Secretary of the Navy, Research, Acquisition and Development Memorandum of October 23, 2004 titled DON Policy on Digital Product/Technical Data and in accordance with SPAWARINST4160.3C. The resulting technical manual documenting the NTCDL system functionality and maintenance shall be in XML source format, provided to the Government in accordance with the Technical Manual Contract Requirement (TMCR) Number 14001. IETM Manual at a minimum shall contain the following:

a. System overview / system configuration.

b. Detailed system, system / subsystem equipment installation, configuration, and maintenance information.
c. System / subsystem hardware overview.
d. System initialization procedures.
e. System startup / system shutdown procedures.
f. System internal interconnect diagram.
g. Cable wiring diagrams of each internal cable.
h. System external input / output connections.
i. System / subsystem status / fault indications.

The Technical Manual Package (CDRL A028) will consist of multiple deliverables detailed in section 5.1.4 of TMCR 14001.

All COTS technical manuals shall be delivered as part of the TDP.

CDRL Deliverable:

- (CDRL A028) Technical Manual Package (Organizational-Level Maintenance Technical Manual and Source Data)

3.2.5 Environment, Safety, and Occupational Health

The contractor shall incorporate Environment, Safety, and Occupational Health (ESOH) hazard analysis, risk assessment, and integration into the systems engineering process. The ESOH risk assessment approach shall be documented in a System Safety Program Plan (SSPP) as part of the SEMP (CDRL A017). The following references provide requisite guidance for ESOH activities: NTCDL Programmatic ESOH Evaluation (PESHE), NTCDL SEP, DoDI 5000.02 (Interim), DoDI 6055.1, OPNAVINST 5090.1D CH-1, OPNAVINST 5100.24B, MIL-STD-882E, MIL-HDBK-237D, MIL-HDBK-454B, MIL-STD-461F, MIL-STD-1310H, MIL-STD-1472G, MIL-STD-1474D, MIL-STD-1686C, MIL-STD-46855A(T), NAVSEA S9040-AA-GTP-00 / SSCR Rev 4, TOP-1-2-511A. The contractor shall deliver a Hazardous Materials (HAZMAT) Management Program (HMMP) Report in accordance with CDRL A091.

The contractor shall eliminate hazards where possible and manage the ESOH risks when hazards cannot be eliminated using the methodology in MIL-STD-882E. Progress on ESOH activities and products and status of ESOH risks shall be included as part of the technical and program reviews as specified in the SEMP. Contractor ESOH personnel shall provide inputs for the entry and exit criteria for Design Reviews described and required elsewhere in this SOW to include SRR, PDR, CDR, TRR, and Production Readiness Review (PRR).

The contractor shall establish and implement an ESOH compliance / protection program reflecting the contractor's intentions for meeting ESOH regulatory requirements during the NTCDL system's life-cycle stages (i.e. development, testing, operation and maintenance, and disposal). The contractor's ESOH compliance program shall identify the ESOH laws and regulations pertaining to the development effort, the risks these laws may pose, and the measures required to comply with these laws and regulations for the life-cycle of the NTCDL system. The contractor shall implement pollution prevention initiatives where applicable to reduce regulatory compliance burdens of the Government. The contractor shall consider environmentally sound components in the system design (such as energy and water efficiency – reduced consumption, recycled content, and bio-based considerations). The contractor shall provide test data, design data, descriptions and drawings to support NTCDL system compliance with the National Environmental Policy Act, Executive Order 12114, and permitting requirements.

CDRL Deliverables:

- (CDRL A017) Systems Engineering Management Plan (SEMP) (DI-SESS-81785)
- (CDRL A091) HMMP Report including HMUL and LSAR-078 per NAS 411 (DI-MISC-81397B)

3.2.5.1 Safety and Occupational Health Assessment

The contractor shall implement a system safety process in accordance with MIL-STD-882E throughout the development to ensure the NTCDL is safe to operate for the life-cycle of the system. The system safety process shall address the methods to identify and evaluate system safety and health hazards, define risk levels, and manage the probability and severity of all hazards associated with the development, use, and disposal of the NTCDL system. Health hazards shall be identified and include conditions creating significant risks of death, injury, acute chronic illness, disability, or reduced job performance of personnel who produce, test, operate, maintain, or support NTCDL. The contractor shall develop a System Safety Program Plan (SSPP), to include documenting the system safety process, for inclusion in the SEMP (CDRL A017).

The contractor shall conduct analyses to identify and quantify hazards in hardware, software, and human interfaces and submit the results of the analyses in the System Hazard Analysis Report (CDRL A090). Hazards shall be eliminated or controlled to an acceptable level of risk in accordance with the SSPP.

The contractor shall prepare and submit a Safety Assessment Report (SAR) (CDRL A029) that comprehensively evaluates potential safety and occupational health risks prior to test or operation of the NTCDL system (e.g., design, operational use, installation, maintenance, and demilitarization / disposal), based on the previous conducted hazard analysis. The SAR shall identify, evaluate, and include all potential equipment and personnel hazard information, and status on all hazard resolution and / or mitigation actions planned and implemented. The contractor shall maintain a hazard tracking database / Hazard Action Reports. The contractor shall provide the Government full access to the database to allow for assessment of system safety and occupational health efforts and identified risks.

Software safety engineering shall be an integral component of the system safety and occupational health program and analyses. Software system safety analyses shall be conducted pursuant to Appendix B of MIL-STD-882E. The contractor shall provide the necessary data and support the development of technical data packages for Software System Safety Technical Review Panel requirements.

CDRL Deliverables:

- (CDRL A017) Systems Engineering Master Plan (SEMP) (DI-SESS-81785)
- (CDRL A029) Safety Assessment Report (SAR) (DI-MISC-80508B)
- (CDRL A090) System Hazard Analysis Report (DI-MISC-80508B, Task 205 and 206 of MIL-STD-882E**)**

3.2.5.2 Hazardous Materials Management

The contractor (and subcontractors) shall comply with Federal, State, and local environmental laws/regulations and establish / implement a HAZMAT Management Program (HMMP) in accordance with Aerospace Industries Association National Aerospace Standard (NAS) 411 and NAS 411-1 addressing ESOH Compliance, HAZMAT, and Pollution Prevention (P2). HAZMAT management is an integral part of the risk management effort within the program's SE process. The contractor shall address the ESOH compliance, HAZMAT management, and P2 approach (including subcontractors) in the HMMP Plan as part of the SEMP (CDRL A017). The contractor shall define roles, responsibilities, and

procedures needed to accomplish the HMMP Program and tracking of identified HAZMAT. The HMMP shall identify the processes to properly identify, analyze, and control HAZMAT risks to protect human health, safety, and the environment, as well as to support end user needs and the procedures for tracking and reporting HAZMAT.

The contractor shall avoid the use of HAZMAT and generation of hazardous waste wherever practicable by avoiding materials posing ESOH risks. The contractor shall recommend HAZMAT substitutes / changes (alternative materials, processes, or other technologies) to reduce ESOH hazards and disposal problems. The contractor shall use recycled, recovered, or environmentally-friendly preferable materials where possible. The contractor shall evaluate all design changes for ESOH hazards / risks and HAZMAT / waste impacts. The contractor shall avoid or minimize and obtain approval from the Government for uses of HAZMAT that cannot be avoided or eliminated: Class I and Class II ozone depleting substances; Asbestos; Polychlorinated biphenyls; DoD Emerging Contaminants; Hexavalent chromium; Environmental Protection Agency (EPA) industrial toxic chemicals; Chemicals contributing to greenhouse gas effects; EPA and OSHA defined hazardous materials; EPA designated volatile organic compounds; and National Emission Standard for Hazardous Air Pollutants designated hazardous air pollutants. The contractor shall avoid to the maximum extent HAZMAT identified in NAS 411-1. The contractor shall avoid the incorporation into the NTCDL system of material which combines with the atmosphere to form acid or corrosive alkali, or which liberates toxic or corrosive fumes in accordance with MIL-HDBK-454B, Guideline 15.

The contractor shall submit HMMP Reports (CDRL A091). The contractor shall make every attempt to minimize and restrict the use of HAZMAT and toxic or corrosive substances on the system (as delivered) and in operation, and maintenance of the system. If the contractor requires the use of HAZMAT, the contractor shall develop, maintain, and submit a Hazardous Materials Usage List (HMUL) for the system specifically identifying those materials used (1) internally on the system (as delivered) and (2) for operation and maintenance processes (supply and support) – LSAR-078 of GEIA-STD-0007B. Hazardous waste shall be identified to the maximum extent practicable. The HMUL shall be included as part of the HMMP Report (CDRL A091). The contractor shall provide justification to the Government describing the necessity for identified HAZMAT (or material resulting in hazardous waste) recommended for use internally or in association with the supply or support of the NTCDL System, together with a listing of less hazardous potential substitutes considered and the reasons why these substitutes cannot be used. To identify potential ESOH risks including regulatory compliance concerns associated with HAZMAT usage, the contractor shall perform and submit a Health Hazard Analysis (CDRL A030). Potential ESOH regulatory requirements and impacts / risks associated with the use of HAZMAT shall be identified and discussed in the HMMP Report. The contractor shall provide Material Safety Data Sheets (MSDS) as part of the HMMP Report. In the event the contractor identifies any real or potential problems, the contractor shall notify the PCO and technical representative in writing of the specific concerns and recommended course of action.

CDRL Deliverables:

- (CDRL A017) Systems Engineering Master Plan (SEMP) (DI-SESS-81785)(CDRL A030) Health Hazard Analysis (DI-SAFT-80106B, Task 207 of MIL-STD-882E)
- (CDRL A091) HMMP Report including HMUL and LSAR-078 per NAS 411 (DI-MISC-81397B)

3.2.5.3 Deactivation, Demilitarization and Disposal

The contractor shall integrate deactivation, demilitarization and disposal considerations into the SE process so the NTCDL system can be disposed in accordance with all legal and regulatory requirements

relating to safety, security, and the environment. HAZMAT identified in the HMUL must be planned for safe disposal at end-of-life. The contractor shall provide any specific instructions and / or requirements associated with the demilitarization and disposal of HAZMAT as part of submitted HMMP Reports. Contractor shall deliver Logistics Management Information (LMI) Summaries (CDRL A039) and HMMP Report (CDRL A091).

CDRL Deliverables:

- (CDRL A039) Logistics Management Information (LMI) Summaries (Core Logistics Analysis) (DI-ALSS-81530)
- (CDRL A091) HMMP Report including HMUL and LSAR-078 per NAS 411 (DI-MISC-81397B)

3.2.6 EDM Design

The contractor shall design the system, providing the Government insight through established IPTs, Design Reviews, and the CDRLs listed below. The design team shall consider aspects of installation modernization to the fleet and cost trade-offs of the design. These trade-offs shall be shared with the Government at all the reviews, and value Engineering Changes proposed as required. The design shall be compliant with all NTCDL SPS requirements and those objective requirements exercised by the Government. The Design efforts shall include Technical Reviews, SRR, PDR, CDR, and RRD.

NSA approval of the COMSEC subsystem will require milestone events (e.g., PDR, CDR, FAT) earlier than the events for the full system. The contractor may conduct COMSEC events separately. If a COMSEC event is conducted separately, the contractor shall document the event in the Integrated Master Schedule and shall notify the COR in writing no less than 30 calendar days in advance of any COMSEC related event scheduled separately.

3.2.6.1 Technical Reviews

The contractor shall conduct each of the following technical reviews, which shall be hosted at the contractor's facility. The contractor shall prepare an agenda, subject to Government approval, prepare and distribute presentation materials, and prepare and distribute minutes (CDRLs A002 and A003). The contractor shall address any critical comments provided at the contractor's technical review event within 30 calendar days of the event for Government approval. The Government will approve and close each technical review event after the adjudication and closure of all critical comments. Deliverables shall be in accordance with the applicable CDRL, and deliverable comments and closeout will be addressed individually via a COR CDRL disposition letter.

The contractor shall provide configuration documentation to support each Technical Review. All technical reviews listed and described in the upcoming sections shall be in accordance with the SEMP (CDRL A017) and SOW. The contractor shall present the Technical Performance Measures (TPM) status during each technical review. The contractor's TPMs shall be defined in the SEMP in accordance with the requirements of SOW Section 3.1.6.3 Technical Performance Measures and CDRL A035.

In addition to each contractor technical review, the contractor shall support the Government's PM and technical staff in conducting the equivalent Government System Engineering Technical Reviews (SETRs) on a quarterly basis.

Status regarding Technical Reviews shall be reported in the Contractor's Progress, Status Management Report (CDRL A001).

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status Management Report (DI-MGMT-80227)
- (CDRL A002) Agenda and Presentation Materials (DI-ADMN-81249A)
- (CDRL A003) Conference / Meeting Minutes (DI-ADMN-81250A)
- (CDRL A017) Systems Engineering Master Plan (SEMP) (DI-SESS-81785)
- (CDRL A035) Progress Report, Technical Performance Measures (DI-ADMN-81313A)

3.2.6.1.1 SRR Activities

The Systems Requirements Review shall be held to review the total system engineering management activity including the credibility of the development schedule and its output for responsiveness to the SOW and the SPS. Agenda and Presentation Materials (CDRL A002) shall be included as an appendix to the Conference / Meeting Minutes (CDRL A003).

The SRR shall be conducted via a multi-disciplined technical review(s) to ensure all system requirements and performance requirements derived from the technical requirements documents are defined and are consistent with cost, schedule, risks, technology readiness, and other system constraints. The contractor shall demonstrate the total system engineering management activity and its output for responsiveness to this SOW and the technical requirements documents. The contractor shall provide recommendations to resolve conflicts, minimize omissions, and reduce risk. The contractor shall identify all intended trade studies, their scope, and schedules.

The contractor shall perform technical analysis which identifies any conflicts, omissions, and risks associated with the technical requirements. The contractor shall include the results of the technical analysis in the SRR presentation materials. In addition to the above, the contractor shall submit the CDRL documents listed below prior to the SRR. The contractor shall complete the requirements Sections (Sections 1, 2, 3 and 5) of the NTCDL System-Level SSDD for the overall system (i.e., the NTCDL Surface Terminal). The NTCDL System-Level SSDD shall include a definition of the interface requirements (content equivalent to a system level Interface Requirements Specification (DI-IPSC-81434A).

If the contractor conducts sub-contractor SRRs, the contractor shall report those findings to the Government. The contractor shall inform the Government of sub-contractor SRRs at a minimum of 3 business days prior to the event.

The SRR shall be conducted in accordance with the PMP (see Section 3.1.1) and in accordance with the contract requirements, including the performance schedule after a significant portion of the system functional requirements have been established. The SRR shall be conducted after all CDRLs required for SRR have been submitted to the Government in accordance CDRL delivery dates.

Completion criteria shall be the successful completion of the SRR and written Government approval of the SRR. Approval shall be determined based on evaluation against the exit criteria below. The SRR shall be considered complete once all of the exit criteria have been met and after the adjudication and closure of all Government designated non-administrative comments from the SRR event. The contractor shall provide materials for system requirements approval, addressing the following:

a. A system is in place for requirements management. Requirements, to the level of this review, are well understood and can be traced to source documents, and are documented in CDRL A016.

b. Artifacts are under configuration control and a CM process is in place and documented in CDRL A006.
c. A software development process (documented via a SDP (CDRL A027)) has been reviewed and approved by the Government to address software development and maintenance. The SDP addresses software configuration and quality assurance.
d. The program schedule shall reflect the available resources necessary to complete the effort and adequate time is allocated for test and evaluation. The critical path shall be identified and consistent with the preferred system concept. Validate staffing is consistent with skills and level of effort / risk.
e. Preliminary physical and functional interfaces are documented in CDRL A025.
f. A continual risk management process is in place to track critical path, risks (and associated mitigations), capture lessons learned. Risks in systems requirements and future developmental efforts identified.
g. All SRR CDRLs including CDRL A025 and CDRL A031 have been submitted, with comments adjudicated and accepted by the Government.
h. All SRR action items have been closed or if open, a mitigation plan has been approved by the Government.

Note: Firmware shall be considered software and shall meet all of the software requirements listed within this SOW.

CDRL Deliverables:

- (CDRL A002) Agenda and Presentation Materials (DI-ADMN-81249A)
- (CDRL A003) Conference / Meeting Minutes (DI-ADMN-81250A)
- (CDRL A006) Configuration Management Plan (CMP) (DI-CMAN-80858B)
- (CDRL A016) Technical Report, Requirements Data Base Export (DI-MISC-80508B)
- (CDRL A025) NTCDL System-Level SSDD (System / Subsystem Design Description) (DI-IPSC-81432A)
- (CDRL A027) Software Development Plan (SDP) (DI-IPSC-81427A)
- (CDRL A031) Human Engineering Design Approach Document-Maintainer (HEDAD-M) (DI-HFAC-80747B)

3.2.6.1.2 PDR Activities

The PDR shall be conducted at the contractor's facility in accordance the PMP (see Section 3.1.1) and contract requirements. As part of the PDR the contractor shall present their proposed system architecture and its constituent Configuration Items (CIs). The PDR shall address each contractor proposed NTCDL CI or aggregate of CIs, to evaluate the progress, technical adequacy, consistency and risk resolution (on technical, cost, and schedule basis) of the selected design and test approach. Agenda and Presentation Materials (CDRL A002) shall be included as an appendix to the Conference / Meeting Minutes (CDRL A003).

The PDR shall determine hardware and software CI compatibility with performance and engineering specialty requirements of the SSDD including the Design to Cost goals. The PDR shall also assess the technical risk associated with new engineering and manufacturing methods / processes, and establish the existence and compatibility of the physical and functional interfaces among the CIs, the end-user platforms and other items of equipment, facilities, computer software, and personnel.

The contractor shall address the design of the COMSEC component of the system in the design materials. The contractor is permitted to hold this portion of the PDR earlier than the full NTCDL system in order to facilitate NSA approval of the COMSEC device prior to commencement of system level FAT. The contractor shall show a path to obtaining NSA certification for the proposed COMSEC device(s), including addressing the status of each of the individual NSA required documents included in CDRL A034. The contractor shall submit documentation to meet the requirements of the NTCDL COMSEC Security Certification Document CDRL (CDRL A034).

The contractor shall perform technical analysis which identifies any conflicts, omissions, and risks associated with the technical requirements or the proposed design. The contractor shall include the results of the technical analysis in the PDR presentation materials. Prior to PDR, all exit criteria from the SRR event shall be completed.

In addition to the above, the contractor's shall submit the CDRL documents listed below prior to the PDR. The contractor shall update and complete the NTCDL System-Level SSDD for the overall system (NTCDL Surface Terminal). The contractor shall complete the requirements section (Sections 1, 2, 3 and 5) of the NTCDL Subsystem-Level SSDDs for each subsystem. Each SSDD shall include a definition of the interface requirements (content equivalent to a system level Interface Requirements Specification (DI-IPSC-81434A).

If the contractor conducts sub-contractor PDRs, the contractor shall report those findings to the Government. The contractor shall inform the Government of sub-contractor PDRs at a minimum of 3 business days prior to the event.

The contractor shall provide IDDs for each CSCI incorporated into NTCDL. The contractor shall provide IDDs for each HWCI incorporated into NTCDL.

Completion criteria shall be the successful completion of the PDR and written Government approval of the PDR. Approval will be determined based on evaluation against the exit criteria below. The PDR shall be considered complete once all of the exit criteria have been met and after the adjudication and closure of all critical comments of the PDR event. The contractor shall provide design materials to support preliminary design approval, addressing the following:

a. Requirements, to the level of this review, are well understood and can be traced to design. Parent and child requirements can be traced. All lower level requirements shall be traceable to higher level requirements or the SPS, and are documented in CDRL A016.
b. Schedule reflective of available resources, critical path items identified and mitigated, tasks linked together and understood.
c. Artifacts are under configuration control in accordance with the CM Plan.
d. Baseline changes are well understood and affected components are identified and documented in CDRL A014. Changes in scope require contractual authorization to proceed. WBS appropriately broken down to track technical risks and / or critical path.
e. Mitigation plan is in place for unanticipated design scope increase in software or hardware requirements. Physical and functional interfaces documented, Interface Requirements Drawings (or equivalent) developed.
f. Risk management process agreed to and implemented. Critical path and technical risks are known and can be traced to risk management process.
g. Engineering progress updates include status versus plan, where applicable. Resources are available and staffed appropriately according to complexity and risk.

h. Test methodology determined and metrics understood. The risks for testing are known and manageable. Initial Reliability, Maintainability, Availability (RMA) assessments project the system shall meet the RMA requirements and are documented in CDRL A078.
i. Logistics support methodologies have been identified and shall be implemented.
j. All PDR CDRLs including A025, A026, A033, and A034 have been submitted, comments adjudicated and accepted by the Government.
k. All PDR action items have been closed or if open, a mitigation plan has been approved by the Government.

With respect to CDRL A025 and PDR, The contractor shall at a minimum provide the following values for each system/subsystem/component:

EIRP over all scan angles
G/T over all scan angles
Antenna gains
Antenna polarizations
Antenna axial ratios
Antenna half-power beam-widths
Antenna sidelobes
System noise figures
System minimum power densities
System maximum power densities
System dynamic ranges

CDRL Deliverables:

- (CDRL A002) Agenda and Presentation Materials (DI-ADMN-81249A)
- (CDRL A003) Conference / Meeting Minutes (DI-ADMN-81250A)
- (CDRL A014) Technical Baseline Description Document (DI-SESS-81121A)
- (CDRL A016) Technical Report, Requirements Database Export (DI-MISC-80508B)
- (CDRL A025) NTCDL System-Level SSDD (System / Subsystem Design Description) (DI-IPSC-81432A)
- (CDRL A026) NTCDL Subsystem-Level SSDDs (System / Subsystem Design Description) (DI-IPSC-81432A)
- (CDRL A033) Link Control Subsystem (LCS) Link Control Interface (LCI) Document, Interface Design Description (IDD) (DI-IPSC-81436A)
- (CDRL A034) NTCDL COMSEC Security Certification Document
- (CDRL A078) Reliability Prediction and Documentation of Supporting Data/RAM Analysis (DI-RELI-81497)

3.2.6.1.3 CDR Activities

At the CDR, the designs for the hardware components shall be completed, culminating with a CDR Review with the NTCDL Customer. Agenda and Presentation Materials (CDRL A002) shall be included as an appendix to the Conference / Meeting Minutes (CDRL A003).

The CDR shall be conducted at the contractor's facility in accordance with the contractor's integrated processes and the contract requirements on critical CIs prior to fabrication / production / coding release to ensure the detail design solutions, as reflected in the SSDD, and engineering drawings satisfy the

requirements. The CDR shall evaluate the credibility of the delivery schedule and performance to the Design to Cost goals.

The contractor shall provide IDDs for each CSCI incorporated into NTCDL. The contractor shall provide IDDs for each HWCI incorporated into NTCDL.

The contractor shall address the detailed design and implementation of the COMSEC component of the system in the design materials. The contractor is permitted to hold this portion of the CDR earlier in order to facilitate NSA approval of the COMSEC device prior to commencement of system level FAT. The contractor shall show a path to obtaining NSA certification for the proposed COMSEC device(s), including addressing the status of each of the individual NSA required documents which comprise CDRL A034. The contractor shall submit documentation to meet the requirements of the NTCDL COMSEC Security Certification Document CDRL (CDRL A034).

In addition to the above, the contractor's shall submit the CDRL documents listed below prior to the CDR. The contractor shall update the NTCDL System-Level. The contractor shall update and complete the NTCDL Subsystem-Level SSDD for each subsystem. Prior to CDR, all exit criteria from the PDR event shall be completed.

If the contractor conducts sub-contractor CDRs, the contractor shall report those findings to the Government. The contractor shall inform the Government of sub-contractor CDRs at a minimum of 3 business days prior to the event.

Completion criteria shall be the successful completion of the CDR and written Government approval of the CDR. Approval will be determined based on evaluation against the exit criteria below. The CDR shall be considered complete once all of the exit criteria have been met and after the adjudication and closure of all critical comments of the CDR event. The contractor shall provide design materials to support a detail design approval, addressing the following:

a. Requirements, to the level of this review, are well understood and can be traced to design. Parent and child requirements can be traced. All lower level requirements shall be traceable to higher level requirements or the SPS and documented in CDRL A016.
b. Artifacts are under configuration control in accordance with the CM Plan.
c. Baseline changes are well understood and affected documentation and components are identified and documented in CDRL A014.
d. Design documents and specifications including CDRLs A025 and A026 have been updated and documented in CDRL A014.
e. Risks are known and manageable. Realized issues can be traced to risk management process and root cause is understood. Plan is in place to prevent reoccurrence.
f. Software, hardware, systems development consistent with projections or revised.
g. Engineering progress updates include status versus plan, where applicable. Resources are available and staffed appropriately according to complexity and risk.
h. Test plans and procedures are defined and documented in CDRLs A037 and A065. Deficiency process, documentation system in place. Resources are identified and available. Test procedures are traceable to requirements and can be evaluated by measurable means. Test metrics exist and/or updated.
i. If slips have occurred, root cause is known and traceable to risk management process. Measures are in place to prevent reoccurrence.
j. Critical path items are identified, risks are known with mitigation measures in place. Deviations from schedule or performance are traceable to risk management plan. Impacts to other system efforts are identified.

k. Test methodology determined and plan has been submitted and approved. The risks for testing are known and manageable. The design RMA assessment project the system shall meet the RMA requirements and are documented in CDRL A078.
l. Logistics support methodologies have been identified and shall be implemented.
m. All CDR CDRLs including A007, A010, A014, A025, A026, A033, A034, and, A039 have been submitted, comments adjudicated and accepted by the Government.
n. All CDR action items have been closed or if open, a mitigation plan has been approved by the Government.

With respect to CDRL A025 and CDR, The contractor shall at a minimum provide the following values for each system/subsystem/component:

EIRP over all scan angles
G/T over all scan angles
Antenna gains
Antenna polarizations
Antenna axial ratios
Antenna half-power beam-widths
Antenna sidelobes
System noise figures
System minimum power densities
System maximum power densities
System dynamic ranges

CDRL Deliverables:

- (CDRL A002) Agenda and Presentation Materials (DI-ADMN-81249A)
- (CDRL A003) Conference / Meeting Minutes (DI-ADMN-81250A)
- (CDRL A007) Interface Design Description (IDD) (DI-IPSC-81436A)
- (CDRL A010) Installation Requirements Drawing
- (CDRL A014) Technical Baseline Description Document (DI-SESS-81121A)
- (CDRL A016) Technical Report, Requirements Data Base Export (DI-MISC-80508B)
- (CDRL A025) NTCDL System-Level SSDD (System / Subsystem Design Description) (DI-IPSC-81432A)
- (CDRL A026) NTCDL Subsystem-Level SSDDs (System / Subsystem Design Description) (DI-IPSC-81432A)
- (CDRL A033) Link Control Subsystem (LCS) Link Control Interface (LCI) Document , Interface Design Description (IDD) (DI-IPSC-81436A)
- (CDRL A034) NTCDL COMSEC Security Certification Document
- CDRL A037) First Article Test (FAT) Plan / Production Acceptance Test (PAT) Plan (DI-QCIC-80553A)
- (CDRL A039) Logistics Management Information (LMI) Summaries (Core Logistics Analysis) (DI-ALSS-81530)
- (CDRL A065) Maintenance Demonstration (M-Demo) Plan (DI-MNTY-81604)
- (CDRL A078) Reliability Prediction and Documentation of Supporting Data/RAM Analysis (DI-RELI-81497)

3.2.6.1.4 Risk Reduction Demonstration

A RRD shall be conducted any time prior to CDR. The RRD shall demonstrate the contractor's capability to support a Government production procurement decision. The RRD shall be a run-time performance test of the software and hardware structured to perform system design verification and demonstration of the maximum number of SPS requirements.

The RRD shall include the demonstration of the following system functions:

a. Network Radio Waveform (NRW), if implemented.
b. Common Data Link Waveforms.
c. Critical Antenna Technology (any technology component which is not a Non-Developmental Item (NDI)).
d. COMSEC.
e. Security Architecture including use of Trusted Guard(s) or Cross Domain Solution (Control Data).

The contractor shall submit an RRD Test Plan (CDRL A040) by PDR to obtain Government concurrence with its methods of demonstrating its ability to providing the Critical Technical Elements for the program. The contractor shall submit a RRD Demonstration Test / Inspection Report (CDRL A041) documenting the resulting of the demonstration.

CDRL Deliverables:

- (CDRL A040) Risk Reduction Demonstration Test Plan (DI-NDTI-80566A)
- (CDRL A041) Risk Reduction Demonstration Test / Inspection Report (DI-NDTI-80809B)

3.2.7 Hardware / Software Build Activities

The contractor shall procure material, build, test, and deliver all NTCDL systems and subsystem products and initial spares. The contract price shall include amounts for royalties payable by the contractor or subcontractors or both, which amounts shall be reported to the Contracting Officer. The term "royalties" refers to any costs or charges in the nature of royalties, license fees, patent or license amortization costs, or the like, for the use of or for rights in patents and patent applications in connection with performing this contract or any subcontract hereunder.

The contractor has the prime role for integration.

Upon Government validation of the EDM design, the contractor shall build and deliver two (2) EDM NTCDL systems. Each EDM shall be configurable to represent all NTCDL Surface Terminal Variants (A, B, and C) in accordance with the SPS and the design approved at the CDR.

The contractor shall also build and deliver three (3) ITSDs in accordance with the NTCDL SPS and the design approved at the CDR.

3.2.7.1 Hardware Build / Production

The contractor shall begin the procurement of materials and build of the EDM hardware after successful completion of the CDR and the RRD. The contractor shall use incremental build and test strategy in developing its manufacturing and test plan, to include all subcontract items. The hardware shall be identified as make or buy items, and manufacturing shall establish build instructions for the prototype

units based upon the engineering design. Manufacturing process changes that may affect quality shall be identified to the Government in the Contractor's Progress, Status Management Report (CDRL A001).

The contractor shall produce and submits test plans and procedures for validating build / production compliance with system requirements in CDRL A042. Completion criteria shall be completion of hardware identified in the sub-sections below in accordance with contractor produced and Government accepted test plans and procedures. The contractor shall notify the Government when the hardware is ready for the commencement of formal testing via the conduct of a FAT TRR.

The contractor shall identify long lead items for the EDMs in the Bill of Materials (see SOW Section 3.2.7.4.1) (CDRL A043) which shall be procured by contractor prior to CDR and present this information at the SRR or PDR for Government authorization to initiate procurement of long lead items.

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status, Management Report (DI-MGMT-80227)
- (CDRL A042) First Article Test (FAT) Procedures (DI-NDTI-80603A)
- (CDRL A043) Bill of Materials (BOM)/Parts List (DI-SESS-81359B)

3.2.7.1.1 Production Readiness Review

Production shall not commence until completion and approval of the PRR which serves as the entrance criteria for Production. The contractor shall conduct PRRs to determine the status of completion of the specific actions required to be accomplished prior to the Government authorizing production (i.e., exercising of production options Contract Line Items (CLINs)). Agenda and Presentation Materials (A002) shall be included as an appendix to the Conference / Meeting Minutes (A003).

The PRR shall also address major subcontractors in the same way as identified above. Timing of the incremental PRRs is a function of program posture and is not specifically locked into other reviews. The final PRR shall occur prior to the start of Production and shall assess the manufacturing and quality risk as the program proceeds into Low-Rate Initial Production and Full Rate Production while also addressing similarities and difference between the EDM and Production design.

The entrance criteria for PRR is the contractor's assertion of readiness to begin production. The contractor shall document its readiness to support the production authorization decision with, at a minimum the following:

a. If the system product baseline has been established and documented in CDRL A014 to enable hardware fabrication and software coding to proceed with proper CM.
b. Adequate processes and metrics in place for the program to succeed.
c. Risks known and manageable.
d. The program schedule is executable (technical / cost risks).
e. The detailed design is producible within the budget.
f. Identify required production processes and manufacturing techniques not currently available, and the risks associated with deployment.
g. Characterize manufacturing risks and identify mitigation strategies.
h. Identify potential impact of critical and long lead items and production equipment.
i. Provide cost and production schedule estimates to support reviews and deliveries.
j. Identify potential production bottlenecks and limitations affecting the production schedule.
k. Identify process prove-out methods.
l. Validate work instructions.
m. Identify manpower and equipment requirements.

Exit criteria shall be the successful completion of the PRR and written Government approval of the PRR.

CDRL Deliverables:

- (CDRL A002) Agenda and Presentation Materials (DI-ADMN-81249A)
- (CDRL A003) Conference / Meeting Minutes (DI-ADMN-81250A)
- (CDRL A014) Technical Baseline Description Document (DI-SESS-81121A)

3.2.7.2 Surface Terminal EDMs

The contractor shall implement the Surface Terminal in accordance with the requirements of the NTCDL SPS and the contractor's approved design at the CDR. The contractor shall produce the EDMs in accordance with the approved design as documented in CDRLs A025, A026, and A007. The CDRLs are not required to be delivered again, but are cited in here to specifically identify the applicable requirements.

CDRL Deliverables:

- (CDRL A007) Interface Design Description (IDD) (DI-IPSC-81436A)
- CDRL A025) NTCDL System-Level SSDD (System / Subsystem Design Description) (DI-IPSC-81432A)
- (CDRL A026) NTCDL Subsystem-Level SSDD(System / Subsystem Design Description) (DI-IPSC-81432A)

3.2.7.3 System / Software Integration

The contractor shall perform integration to ensure the subsystems and components comprising a full NTCDL work together when configured as a maximum possible configuration or as any of the System Variants (A, B or C). The contractor shall notify the Government a minimum of 10 business days prior to any integration activities so the Government may have the opportunity to observe the activities on a not-to-interfere basis. This shall include contractor integration with sub-contractor furnished equipment and software.

3.2.7.3.1 Government Furnished Software Integration

The contractor shall support integration of the GFS with the NTCDL system prior to the conduct of FAT. The integration activities shall be planned by the System Engineering IPT, and shall include the review and refinement of the interfaces between the GFS and the contractor developed hardware and software.

The contractor through the System Engineering IPT Process shall support the update of the Link Control Subsystem (LCS) Link Control Interface (LCI) IDD (CDRL A033).

CDRL Deliverable:

- (CDRL A033) Link Control Subsystem (LCS) Link Control Interface (LCI) Document, Interface Design Description (IDD) (DI-IPSC-81436A)

3.2.7.3.2 Built-In Test and Self-Test Strategy

The contractor shall implement a Condition Based Maintenance (CBM) plus program. The CBM plan is a basic tool used to establish and create a CBM program meeting NTCDL program requirements identified in the SPS Section 3.10.2.3. The CBM Plan (CDRL A044) shall identify design and

implementation of the built-in test features. The contractor shall work with the Government's System Engineering IPT to define and develop a BIT strategy which meets the performance requirements of the NTCDL SPS. The contractor shall coordinate the invocation of BIT and the analysis of BIT results with the Government. The contractor shall ensure software documentation delivered accurately reflects the software interfaces for BIT and self-test, including the proper sequences and scenarios for BIT and self-test.

CDRL Deliverable:

- (CDRL A044) Condition Based Maintenance Plus Program Plan (CBM+Plan) (DI-MGMT-81915)

3.2.7.3.3 LMS / EDUI Hosting Hardware

The contractor shall identify items on the Proposed Spares List which shall be used to host GFS. If the part is not commercially available, the contractor shall provide a purchase option (from the PIO / Spares list) resulting in delivery of the hardware to the Government no less than 90 Calendar Days prior to the commencement of GFS Integration.

3.2.7.4 EDM Technical Data Package

All technical data shall be delivered at the conclusion of EDM development in support of FCA / PCA (SOW Section 3.2.8.5) and according to CDRL A018, Technical Data Package. Technical data shall include Level III drawings. The contractor shall be in compliance with the TDP Option Work Sheet at SOW Section 3.1.7.1.1 which specifies the requirements for Level III drawings. Upon implementation of any ECP, the TDP shall be updated.

CDRL Deliverable:

- (CDRL A018) Technical Data Package (DI-SESS-80776A)

3.2.7.4.1 Bill of Materials

The contractor shall provide a Bill of Materials (BOM) and Equipment Top-Down Breakdown Parts List (CDRL A043) at PDR, CDR and TRR for the NTCDL system and subsystems. The BOM shall address the system / subsystem as built, and provide a list of the raw materials, sub-assemblies, intermediate assemblies, sub-components, components, connectors, parts and the quantities of each needed to manufacture the system / subsystem. The BOM shall be updated if any changes in the manufacturing process occur.

The BOM / Equipment Top-Down Breakdown shall be updated if any changes in the equipment are made.

CDRL Deliverables:

- (CDRL A043) Bill of Materials (BOM) / Parts List (DI-SESS-81359B)

3.2.8 EDM Testing Activities

The contractor shall provide an integration, test, evaluation, and acceptance program. The contractor shall create all FAT and PAT Plans and Procedures. The contractor shall perform early integration testing

of contractor produced LRUs using modeling and simulation to reduce risk. Changes required to make the system compliant with test requirements shall be the responsibility of the contractor.

3.2.8.1 Waveform Compliance

The contractor shall subject the NTCDL Surface Terminal to CDL Waveform Compliance testing at the JITC designated and approved facility (e.g. NAS Patuxent River, Surface / Aviation Interoperability Laboratory (SAIL)) and submit the results of the testing to the COR for approval as an entrance criteria to the FAT TRR (See Section 3.2.8.2).

The contractor shall schedule Waveform Compliance testing with JITC and shall inform the COR of proposed test schedule 180 Calendar days prior to the commencement of CDL Waveform Compliance testing.

The contractor shall support the JITC and program office test personnel in the conduct of the CDL waveform compliance tests. Upon completion of CDL Waveform Compliance testing, the contractor shall prepare a Failure Analysis and Corrective Action Report (FACAR) (CDRL A045), and prepare a Trip Report (CDRL A046). The Trip Report shall document the conduct and results of the test, including advising on corrective actions required for successful retest and CDL waveform compliance certification.

Completion criteria shall be JITC Waveform Certifications and / or CDL Executive Agent Waiver Approvals of JITC test results.

CDRL Deliverables:

- (CDRL A045) Failure Analysis and Corrective Action Report (FACAR) (DI-SESS-81315B)
- (CDRL A046) Trip Report (JITC Certification Testing) (DI-ADMN-81250A)
- (CDRL A056) Waveform Certification

3.2.8.1.1 Non-CDL Waveform Compliance

The contractor shall subject the NTCDL Surface Terminal to Waveform Compliance testing for all non-CDL waveforms that the terminal supports. The contractor shall submit the results of this testing in the First Article Test (FAT) / Inspection Report (CDRL A048). The contractor shall submit the waveform certification paper work (CDRL A056) in the event the waveform is not on the approved DoD CIO Waveform List in DODI-4630.09. The waveform certification submission must be approved prior to FAT TRR and submit the results of the testing to the COR for approval prior to the initiation of FAT testing.

CDRL Deliverables:

- (CDRL A048) First Article Test (FAT) / Inspection Report (DI-NDTI-80809B)
- (CDRL A056) Waveform Certification

3.2.8.2 First Article Test Test Readiness Review

The contractor shall conduct a FAT TRR to demonstrate to the Government the NTCDL development activities have progressed to the point where the NTCDL system(s) are ready to be tested in accordance with approved test procedures. The contractor shall provide documentation supporting that the NTCDL System is ready for FAT at the TRR (i.e., the contractor asserts the system will pass all the approved test procedures). All previous component, subsystem, and system test results shall form a basis for

proceeding into planned tests. All test resources shall be properly identified and coordinated to support planned tests.

In addition to the above, the contractor shall submit the CDRL documents listed below prior to the FAT TRR. This shall include an updated version of the requirements database showing full traceability of the requirements to the proposed test cases. Agenda and Presentation Materials (A002) shall be included as an appendix to the Conference / Meeting Minutes (A003).

Exit criteria shall be the successful completion of the FAT TRR and written Government approval of the FAT TRR. It shall include completion of all exit criteria from the CDR event. Approval will be determined based on evaluation against the exit criteria below. The FAT TRR shall be considered complete once all of the exit criteria have been met and after the adjudication and closure of all critical comments of the FAT TRR event. The contractor shall provide presentation materials and test readiness documentation in support of a decision to proceed with FAT. The materials shall address the following:

a. Verification and Validation of the traceability of planned tests to program requirements using the Verification Cross Reference Matrix including CDRL A016.
b. All previous component, subsystem, and system test results form a basis for proceeding into planned tests.
c. Verification of the completeness of test procedures and their compliance with test plans and descriptions.
d. Verification and Validation of system development maturity to proceed to test.
e. Test plans are completed and approved by the Government, and final Test Procedures are provided in CDRL A042.
f. Risks are known and manageable. Realized issues can be traced to risk management process and root cause is understood. Plan is in place to prevent reoccurrence.
g. All TRR CDRLs including CDRL A016, A020 and A042 have been submitted, comments adjudicated and accepted by the Government.
h. All TRR action items have been closed or if open, a mitigation plan has been approved by the Government.

CDRL Deliverables:

- (CDRL A002) Agenda and Presentation Materials (DI-ADMN-81249A)
- (CDRL A003) Conference / Meeting Minutes (DI-ADMN-81250A)
- (CDRL A016) Technical Report, Requirements Database Export (DI-MISC-80508B)
- (CDRL A020) Software Version Description (DI-IPSC-81442A)
- (CDRL A042) First Article Test (FAT) Procedures (DI-NDTI-80603A)

3.2.8.3 First Article Test

The contractor shall perform the First Article Test in accordance with approved verification methods identified in Section 4 of the NTCDL SPS and the procedures documented in CDRL A042. The contractor shall provide the Government with at least 30 calendar days' notice prior to the commencement of FAT. FAT shall not commence until completion and approval of the TRR per section 3.2.8.2, which shall serve as entrance criteria to FAT.

Once the EDM hardware is available, a qualification system shall be assembled, integrated, and subjected to First Article Testing (at the contractor's facilities) in order to accomplish system design verification. If changes to the procedures (CDRL A042) are required during conduct of the FAT, the redlined version of

the test procedures shall be provided to the Government and a final dated version of the test procedures shall be delivered to the Government.

At the conclusion of testing, the contractor shall conduct a CCB meeting to adjudicate the test status and results. The exit criteria is the adjudication that all tests within the FAT have been accepted as complete by the CCB. The test results and CCB adjudication of the results shall be documented in FAT / Inspection Report (CDRL A048). The contractor shall document the results in the Software Version Description document (CDRL A020) and submit the SVD in conjunction with a full delivery of the as tested software Computer Software End Items (CDRL A019).

CDRL Deliverables:

- (CDRL A019) Computer Software End Items (DI-IPSC-81441A)
- (CDRL A020) Software Version Description (SVD) (DI-IPSC-81442A)
- (CDRL A042) First Article Test (FAT) Procedures (DI-NDTI-80603A)
- (CDRL A048) First Article Test (FAT) / Inspection Report (DI-NDTI-80809B)

3.2.8.3.1 FAT Functional Testing

The contractor shall perform FAT Functional Testing at contractor's Facility using the Government approved test procedures (CDRL A042). FAT Procedures (CDRL A042) shall be provided to the Government for review 30 days prior to FAT. The contractor shall amend the FAT Procedures (CDRL A042) as directed by the Government prior to FAT. FAT Functional Testing shall ensure full design requirements are met, and the manufacturing processes, equipment and procedures produce a system which meets the applicable quality and durability standards.

The FAT Functional Test shall be performed with the GFS integrated into the system using the LMS as the interface to operate the system. If the GFS available at the time of the FAT is insufficient to support a set of specific test(s), then contractor shall provide software to operate the system in order to successfully complete the set of FAT test(s). Contractor software used to support FAT shall be documented by the contractor for use by the Government and delivered in the FAT Procedures (CDRL A042). See Section 3.2.8.3 for the entrance and exit criteria for FAT Functional Testing.

The contractor shall obtain NSA Certification of the proposed COMSEC device(s). The NSA Approval Letter shall be included with the First Article Test (FAT) / Inspection Report (CDRL A048).

CDRL Deliverables:

- (CDRL A042) First Article Test (FAT) Procedures (DI-NDTI-80603A)
- (CDRL A048) First Article Test (FAT) / Inspection Report (DI-NDTI-80809B)

3.2.8.3.2 Stress Testing

As part of FAT Functional Testing the contractor shall perform stress testing which places maximum loads on the system. Maximum loads shall include operational of all possible links at the highest possible data rates concurrently. Software stress testing shall include operating the system for a minimum of 25 hours under simulated link loaded.

3.2.8.3.3 Operational Testing

As part of FAT Functional Testing the contractor shall conduct operational testing in which CDL operations (i.e. transfer of video, chat, e-mail, file transfer) are performed. Operational testing shall include flight testing with airborne assets (or equivalent) comprising no less than half of the links under test consistent with Section 4.2.6 (Flight Testing) of the NTCDL SPS. The Contractor shall conduct an Operational multi-link flight test (i.e. one airborne link from each of three airborne platforms, utilizing both STD CDL BE CDL waveforms and NRW waveform, if implemented), of at least four (4) continuous hours operating at varying data rates and ranges (the range must exceed 150 Nautical Miles). Contractors shall plan on performing no less than 80 flight hours.

3.2.8.3.4 E3 / SS Compliance Verification

The contractor shall design, develop, integrate, and qualify the system to meet the Electromagnetic Environmental Effects (E3) / Spectrum Supportability (SS) performance requirements of the system specification. The contractor shall perform analyses, studies, and testing to establish E3 / SS controls and features to be implemented in the design of the item. The contractor shall perform inspections, analyses, and tests, as necessary, to verify the system meets its E3 / SS performance requirements, and document the procedures for this in CDRLs A049, A050, and A053. The results of the testing and analysis shall be documented in CDRL A051, A052, and A054. The contractor shall provide the data required to complete a DD Form 1494 (CDRL A055) in accordance with the National Telecommunications and Information Administration Manual (Red Book), meeting the requirements of the Equipment Location-Certification Information Database software, and to update the data throughout the development of the system for spectrum-dependent equipment and shall perform analysis and testing to characterize the equipment, where necessary.

Frequency authorization shall be approved prior to any over-the-air testing or operation.

The contractor shall establish and support an E3 / SS Working-level Integrated Product Team to support the accomplishment these tasks. These tasks shall include support for the conduct and successful completion of E3 MIL-STD-464 testing by NSWC Dahlgren. MIL-HDBK-237 may be used for guidance.

CDRL Deliverables:

- (CDRL A049) Electromagnetic Interference (EMI) Control Procedures (DI-EMCS-80199C)
- (CDRL A050) Electromagnetic Interference (EMI) Test Procedures (DI-EMCS-80201C)
- (CDRL A051) Electromagnetic Interference (EMI) Test Report (DI-EMCS-80200C)
- (CDRL A052) Electromagnetic Environmental Effects (E3) Integration and Analysis Report (E3IAR) (DI-EMCS-81540B)
- (CDRL A053) Electromagnetic Environmental Effects (E3) Verification Procedures (VP) (DI-EMCS-81541B)
- (CDRL A054) Electromagnetic Environmental Effects (E3) Verification Report (VR) (DI-EMCS-81542B)
- (CDRL A055) Spectrum Certification DD-1494 (Stage 3 and 4) (DI-EMCS-81827)

3.2.8.3.5 Environmental Qualification Testing

The contractor shall conduct EQT in accordance with approved test procedures to the meet the testing requirements defined in Section 4 of the SPS. Successful completion of EQT shall represent confirmation the NTCDL System is ready for fielding aboard ships.

The contractor shall prepare and submit EQT Test Plan (CDRL A058) and Test Procedures (CDRL A059), and Shock Test Plan (CDRL A060).

The contractor shall perform EQT as required to complete the necessary testing. In addition, the contractor shall perform vibration testing in support of EQT and document vibration test results in a separate analysis report (CDRL A063). The contractor shall perform shock testing and document the results of shock testing in a separate analysis report, Shock Test Analysis Report (CDRL A061). The balance of the environmental testing results shall be documented in the Test / Inspection Report (CDRL A062).

Completion of these tests is required for testing exit criteria.

Completion criteria for this activity shall be the approval of the submitted Test and Analysis Reports by the Government.

CDRL Deliverables:

- (CDRL A058) Environmental Qualification Test (EQT) Test Plan (DI-NDTI-80566A)
- (CDRL A059) Environmental Qualification Test (EQT) Test Procedures (DI-NDTI-80603A)
- (CDRL A060) Shock Test Plan (DI-ENVR-80709)
- (CDRL A061) Shock Test Analysis Report (DI-ENVR-80708)
- (CDRL A062) Test / Inspection Report (DI-NDTI-80809B)
- (CDRL A063) Vibration Test Analysis Report (DI-HFAC-80274)

3.2.8.3.6 Reliability Test

Reliability Qualification Test shall be conducted on the system to verify compliance with specified performance and reliability requirements of Section 3.10.1 of SPS. Guidelines for the conduct of this test are contained in MIL-HDBK-781A, Section 5.5.1. The Test Plan (CDRL A064) and testing shall meet the requirements of the minimal fixed value test (XXI-D) at a minimum. The Reliability Test shall be terminated after one major or critical failure. The reliability test results shall be documented in a Reliability Test Report (CDRL A036).

Completion criteria for this activity shall be the approval of the submitted Reliability Test Report (CDRL A036) by the Government.

CDRL Deliverables:

- (CDRL A036) Reliability Test Report (DI-TMSS-81586A)
- (CDRL A064) Reliability Test Plan (DI-NDTI-81585A)

3.2.8.3.7 Environmental Testing Damage Retrofit / Repair

Environmental Testing shall be conducted on components of an EDM. The contractor shall be responsible to retrofit / repair the system components used in environmental testing prior to delivery to the Government. Environmental Tests include all those listed in Section 4 of the NTCDL SPS (See, i.e., Environmental Inspection).

3.2.8.3.8 Maintenance Demonstration

The contractor shall prepare, conduct and complete a Maintenance Demonstration (M-Demo) witnessed by the Government as part of First Article Testing. The Government shall utilize an M-Demo Test Plan submitted by the contractor in accordance with CDRL A065, and a complete NTCDL System to conduct an M-Demo. The M-Demo Test Plan shall contain all the information necessary to evaluate the demonstration test procedures to be followed, test selection rationale, test duration, test start date, scenario, and group rules. The contractor shall submit an M-Demo Plan to include a list of thirty (30) LRU faults scenarios for use during the demonstration. The Government will reduce and select it down to fifteen (15) fault scenarios. The contractor shall include the highest probability Organizational-Level (O-Level) failures in the list of LRU faults. The contractor shall be responsible to train and provide operator and maintenance documentation to the Government technicians who will physically diagnose and repair the fault. Test equipment shall be limited to contractor recommended General Purpose Electronic Test Equipment. The contractor shall be responsible to induce the selected fault to the equipment using nondestructive means. During the M-Demo, the contractor shall make available spares, technical support data, support equipment, a Packaging, Handling, Storage and Transportation capability, and necessary facilities. The contractor shall be responsible for correcting deficiencies discovered during the demonstration and for recommending changes to the support requirements of the NTCDL. The contractor shall generate an M-Demo Report (including Fault documentation) and calculate Mean Corrective Maintenance Time for Operational Mission Failures as part of the M-DEMO report. The contractor shall submit an M-Demo Test Report in accordance with CDRL A038 containing a record of demonstration test results, identified deficiencies, conclusions, and recommendations for improvements and corrective actions, as applicable.

For informational purposes, COMOPTEVFOR will conduct an independent M-Demo as part of DT / OA activities.

CDRL Deliverables:

- (CDRL A038) Maintenance Demonstration (M-Demo) Report (including fault documentation) (DI-MNTY-81603)
- (CDRL A065) Maintenance Demonstration (M-Demo) Plan (DI-MNTY-81604)

3.2.8.3.9 Software Maintainability Demonstration

The contractor shall provide software that can be regenerated and maintained using commercially available, Government-owned or contractually deliverable support software and hardware. **(NOTE: Firmware shall be considered software and shall meet all of the software requirements listed within this SOW)**.

The contractor shall conduct a Software Maintainability Demonstration as part of NTCDL FAT testing to validate that the provided Software Build Instructions (see SOW Section 3.1.7.3.1) can be used to build the software for the system. The test shall be performed by using the software build instructions included as part of the Software Version Description (SVD) CDRL (CDRL A020). The contractor shall also provide the Government with a Software Maintenance Demonstration Report according to CDRL A066.

CDRL Deliverables:

- (CDRL A020) Software Version Description (DI-IPSC-81442A)
- (CDRL A066) Software Maintenance Demonstration Report (DI-NDTI-80809B)

3.2.8.4 Production Acceptance Testing

The contractor shall conduct the PAT of the EDM hardware at the contractor's facility to validate the PAT test procedures (CDRL A067) in accordance with the Acceptance Test Plan (CDRL A037), and document the results in a test/inspect report (CDRL A068). The contractor shall conduct the Production Acceptance Testing of all subsequent EDM hardware at the contractor's facility in accordance with approved PAT test procedures with Government witnesses.

The entrance criteria is the contractor's assertion that the hardware is ready for Government PAT through the passing of its documented testing and quality assurance procedures (see Section 3.1.6.4, Quality Assurance). The exit criteria is the Government signed acceptance of the Test and Inspection Report per CDRL A068 and any DD250s in association with the hardware.

CDRL Deliverables:

- (CDRL A037) First Article Test (FAT) Plan / Production Acceptance Test (PAT) Plan (DI-QCIC-80553A)
- (CDRL A067) Production Acceptance Test (PAT) Procedures (DI-NDTI-80603A)
- (CDRL A068) Production Acceptance Test (PAT) Test / Inspection Report (DI-NDTI-80809B)

3.2.8.5 Functional Configuration Audit / Physical Configuration Audit

The contractor shall support a configuration audit at the conclusion of the FAT in accordance with the requirements of SPS and the Functional / Physical Configuration Audit (FCA / PCA) Plan (CDRL A069). The PCA and FCA shall be jointly conducted by the Government and contractor at a time and place mutually agreed to, with the Government chairing the audit.

The entrance criteria for conduct of the configuration audit include:

a. Successful completion of FAT including:
    1) CDL Interoperability Certification.
    2) E3 / SS Compliance Verification.
    3) EQT.
    4) Reliability Test.
b. Verification of PAT Procedures (using the EDM assets).
c. Submission of required documentation including the TDP.

Configuration audits are conducted by the Government to verify the contents of the engineering data provided under the contract. Engineering data includes documentation of HWCIs and CSCIs as well as the FAT test results, the TDP, and other required supporting data. The contractor shall provide copies of the engineering data to be reviewed, engineering support personnel, sample equipment, facilities, tools, and test equipment required to perform a PCA of the engineering data, and a FCA of the system's (or modification kit's) functionality as demonstrated by tests, analysis, and inspections.

The PCA shall be performed to verify the NTCDL system is built in accordance with the drawings, and the TDP and CI documentation are accurate, complete, and compatible; and the NTCDL system has achieved the performance and functional characteristics defined in the functional configuration baseline with a conforming system. The FCA shall be performed to verify the NTCDL system and its CIs are accurate, complete, and compatible, and the CI has achieved the performance and functional characteristics delineated in the Performance Specification.

Government acceptance of the EDM hardware will occur at successful completion of FCA / PCA, which shall be document via reports (CDRLs A070 and A071). However, the Government reserves the right to request and accept delivery of a system for installation after completion of PAT testing. Completion criteria shall be Government Acceptance of hardware in accordance with successful completion of FCA / PCA, which shall be formally conveyed by Government Certification and acceptance of Test Results via a signed DD250.

CDRL Deliverables:

- (CDRL A069) Functional / Physical Configuration Audit (FCA / PCA) Plan (DI-SESS-81646)
- (CDRL A070) Functional Configuration Audit (FCA) Summary Report (DI-CMAN-81022C)
- (CDRL A071) Physical Configuration Audit (PCA) Summary Report (DI-CMAN-81022C)

3.2.8.6 Failure Analysis and Corrective Action Report

The contractors shall provide FACARs in response to failures starting at FAT Test Readiness Review (TRR). Frequency of submittals and definitions of reporting categories are listed in CDRL (A045).

The following definitions are being used:

Critical:

a. Involves a catastrophic or critical hazard related to health or safety of personnel (death or sever injury or occupational illness; Categories I and II per MIL-STD 882E).
b. Involves a catastrophic safety hazard to the item / system under test (unplanned system loss; Category I per MIL-STD 882E).
c. Reports test reports which make test suspension or termination advisable.

Major:

a. Involves a marginal hazard to health or safety of personnel (Category III per MIL-STD 882E).
b. Involves a critical safety hazard to the interim / system under test (unplanned major system damage; Category II per MIL-STD 882E).
c. Reports the inability of the test material (including diagnostics equipment, tool, publications, software, and so forth) to meet a critical or essential functional area, design or inadequate performance.
d. Reports subtest results which reflect inadequate performance.
e. Involves two or more repetitive minor Test Incident Reports (TIR) incidents in which their cumulated affect could result in any of the above for conditions.

Minor:

a. Reflects actual or incipient malfunction, defect, hazard, or negative finding not qualifying as critical or major.
b. Reports subtest results reflecting marginal performance.

Informational:

a. Reports modifications to the test item: current configuration of other tested item, test findings subtest results.

CDRL Deliverable:

- (CDRL A045) Failure Analysis and Corrective Action Report (FACAR) (DI-SESS-81315B)

3.2.9 Logistics Support

The contractor shall establish an ILS program to ensure supportability design criteria and characteristics are considered and incorporated into the system design and the system shall meet the operational availability, maintainability, training, and manning requirements established in the NTCDL SPS. The contractor shall designate an ILS Manager, establish and update a detailed ILS project schedule, and participate in SE IPT meetings with Government representatives. The contractor's ILS program shall further develop and deliver the ILS related products and data detailed in the paragraphs below.

Documentation and the Provisioning Data Package shall be clear, concise, and accurate so as to provide training, operations, and repair providing the highest levels of availability.

The contractor shall provide Logistics Support to include maximization of parts standardization, interchangeability, and commonality; and minimization of the number and types of spares. A maintenance plan shall be developed with preventive maintenance procedures supporting the CDL System maintenance philosophy and level of repair, and establish failure analyses that are summarized and categorized (part type, cause, location, supplier, etc.).

Special support equipment shall be held to a minimum and include documentation of the Support Equipment concept as a result of the level of repair analysis, organic / contractor support and the sparing concept.

The contractor shall provide support to ensure all system, equipment, and support items are preserved, packaged, handled, and transported properly, including environmental considerations, equipment preservation requirements for short and long term storage, and transportability. Packaging will afford protection against corrosion, deterioration, and physical damage when exposed to shock, vibration, temperature, and humidity during domestic shipment. For acquisition purposes, the packaging requirements shall allow the use of all modes of transportation (ground, sea, and air) without special constraints.

The contractor shall package and handle hardware and related parts in accordance with MIL-STD-2073-1E, Change Notice 1 DoD Standard Practice for Military Packaging. When feasible for commercial items, the contractor shall adhere to the American Society for Test and Material (ASTM) D3951-10, Standard Practice for Commercial Packaging. Items sensitive to Electrostatic Discharge (ESD) will be packaged in accordance with MIL-STD-1686C, Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment, MIL-HDBK-263B Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment and MIL-HDBK-773A, Electrostatic Discharge Protective Packaging. The contractor shall mark containers for ESD sensitive items with ESD sensitive electronic symbols IAW MIL-STD-129R, Military Marking for Shipment and Storage. For COMSEC equipment, the Director, COMSEC Material System (DCMS) will determine shipping priorities and destinations. The contractor shall strictly adhere to all required safeguards for the physical movement of COMSEC materials stipulated in Chapter 5 of Electronic Key Management System (EKMS) 1, CMS Policy and Procedures for Navy Electronic Key Management System Tiers 2 and 3. For items identified as containing hazardous materials, Material Safety Data Sheets (MSDSs) shall be provided with each shipment IAW FED-STD-313E.

The contractor shall complete and deliver the following Core Logistics Analysis Summaries in support of NTCDL, and specifically, in CDRL A039 below, Core Logistics Analysis. Additional information regarding each Summary is provided in the list below. MIL-HDBK-502A for Acquisition logistics

defines the make-up of each summary by data element and the Data Element Dictionary is provided in GEIA-STD-0007B.

a. Maintenance Planning Summary.
b. Failure Modes Effects Analysis Summary.
c. Source of Repair Analysis.
d. Supply Support Summary.
e. Support and Test Equipment Summary.
f. Special Packaging, Handling, Storage, and Transportability Summary.
g. Manpower, Personnel and Training Summary.
h. Demilitarization and Disposal Summary.

CDRL Deliverable:

- (CDRL A039) Logistics Management Information (LMI) Summaries (Core Logistics Analysis) (DI-ALSS-81530)

3.2.9.1 Maintenance Planning

The contractor shall identify all preventive maintenance and corrective maintenance tasks in a CBM Plan (CDRL A044). Preventive maintenance tasks are scheduled tasks intended to prevent failure during system operation. Corrective maintenance responds to failures that have occurred and restores the system to operational condition. The contractor shall identify each assembly, subassembly, and component in the top-down breakdown structure of NTCDL. The contractor shall produce a maintenance plan summary containing the data necessary to ensure that conformance with the NTCDL requirements has been met and supporting analysis of personnel and maintenance resource requirements. The contractor shall develop Planned Maintenance System Documentation (Maintenance Index Page) and Maintenance Requirements Cards) (CDRLs A072 and A073) in accordance with MIL-STD-3034A by a NAVSEA Certified, Level 2 PMS Document Developer.

Within the CBM Plan, the contractor shall determine and document the O-level corrective and preventive maintenance requirements and Depot-Level maintenance requirements that support overall system maintainability and availability thresholds. Additionally, the contractor shall include in the CBM a description of the BIT and a BIT execution map

CDRL Deliverables:

- (CDRL A044) Condition Based Maintenance Plus Program Plan (CBM+Plan) (DI-MGMT-81915)
- (CDRL A072) Planned Maintenance System (PMS) Documentation - Maintenance Index Page (MIP) (DI-SESS-80992A)
- (CDRL A073) Planned Maintenance System (PMS) Documentation - Maintenance Requirements Card (DI-SESS-80991A)

3.2.9.2 Training

The contractor shall provide maintenance training in sufficient detail to enable the Government to safely and effectively use, maintain, and support the NTCDL System. The contractor shall develop a detailed NTCDL Training Curriculum, which includes details on operations, maintenance procedures, and technical information of the NTCDL System.

The contractor shall ensure the course covers, the necessary information, skill development, and practical application required by the students to set up, check out, assemble / disassemble, perform preventive / corrective, maintenance, and safety on the NTCDL system / sub-systems / components. All training material shall be developed for skills equivalent to those of Electronic Technician (ET) personnel at the E3 level. The training materials may be in contractor's format, with MIL-PRF-29612B and NAVEDTRA-131 used as guidance in development of curricula and media materials. The contractor shall develop the training materials to be Sharable Content Object Reference Model (current version) compliant. The contractor shall include in the support documentation:

a. Lesson guide with instructional data (including trainee guide answer keys).
b. Trainee guide data requirements.
c. On-the-Job training handbook data.

This documentation shall be part of the required CDRLs (A074, A075, and A076).

The contractor shall provide a Job Duty Task Analysis (CDRL A077) for maintenance personnel and document the results. The Job Duty Task Analysis shall include a description of the analyses performed supporting the JDTA conclusions.

The contractor shall recommend the number of classes, number of students per class, and a schedule of classes that shall provide training to address all system operator and maintenance training requirements in support of M-DEMO, Operational Assessments, Technical Evaluation, Initial Operational Test and Evaluation, and Train-the-Trainer sessions.

The contract shall conduct Train-the-Trainer training 30 calendar days prior to the conduct of the NTCDL FAT TRR. The Train-the-Trainer training shall address both operator and maintainer training. The contractor shall provide all equipment, tools, training materials, and fault insertion instructions in support of this (and all other) training sessions. The contractor shall administer a training test package to evaluate course curricula and presentation effectiveness.

CDRL Deliverables:

- (CDRL A074) Course Conduct Information Package (Training Test Results) (DI-SESS-81522B)
- (CDRL A075) Training Conduct Support Document (DI-SESS-81523B)
- (CDRL A076) Training Test Package (DI-SESS-81525B)
- (CDRL A077) Job Duty Task Analysis (Maintenance Only) (DI-HFAC-81399B)

3.2.9.3 Operational Availability Prediction & Analysis

The contractor shall meet Operational Availability as described in the SPS and in accordance with OPNAVINST 3000.12. The contractor shall analyze the predicted reliability of the NTCDL system (each variant) and document the results in the Predicted System Operational Availability & Reliability document (CDRL A078). The contractor shall analyze the reliability, availability, and maintainability of the system and document the results in the Reliability Prediction and Documentation Supporting Data / RAM Analysis document (CDRL A078).

CDRL Deliverable:

- (CDRL A078) Reliability Prediction and Documentation of Supporting Data / RAM Analysis (DI-RELI-81497)

3.2.9.4 Provisioning and Spares

Sparing analyses shall be developed to include Mean Time Between Failure (MTBF), Mean Time To Repair (MTTR), repair limitations and criticality to the mission, and a provisioning data package providing a technical description of any item at the level required to maintain the system using the contractor as the repair facility.

The contractor shall include item cost for Installation and Checkouts (INCOs), On Board Repair Parts and wholesale level system spares; indicate failure / usage rates, MTBF and MTTR computations, recommended quantities of each item for each NTCDL system, as well as consumable items in the Proposed Spares List (CDRL A079). The contractor shall support the Spares List (CDRL A079) with a Bill of Materials ((BOM) / Parts List (CDRL A043) which identifies all materials and / or parts which comprise the NTCDL system. The contractor shall provide a reliability prediction analysis (CDRL A078) to support the recommended levels of sparing.

The contractor shall produce the PIO / Spares required to support installations, testing and training activities required during the EDM Development, base period and production. The contractor shall include both sub-LRU level and integrated subsystems as available items on the PIO Spares list. For end of life (EOL), end of sale (EOS) scenarios, the contractor shall provide a report to identify a sufficient number of LRUs or piece parts to cover planned production plus planned spares (CDRL A079).

If a form, fit, function alternative is available, the contractor shall be responsible for costs of investigating part availability, interchangeability and substitutability, locating part replacement, vendor interface, engineering efforts, testing requirements, internal drawing changes and notify the Government of these changes via CDRL A012.

The proposed spares list shall also include the ITSD and items required to conduct the M-Demo.

Provisioned Item Orders will be ordered by the Government from the contractor in accordance with the PIO clause in the Contract.

CDRL Deliverables:

- (CDRL A012) Specification Change Notice (SCN) (DI-CMAN-80643C)
- (CDRL A043) Bill of Materials (BOM) / Parts List (DI-SESS-81359B)
- (CDRL A078) Reliability Prediction and Documentation of Supporting Data / RAM Analysis (DI-RELI-81497)
- (CDRL A079) Proposed Spares List (DI-ILSS-80134A)

3.2.9.4.1 Provisioning Technical Documentation

The contractor shall provide Logistics Management Information (CDRL A080) and the ICAPS Inventory Data Base (CDRL A081) to support the Government's procurement of spares and conduct of the Provisioning Conference. The contractor shall develop and deliver provisioning technical data in an Interactive Computer Aided Provisioning System (ICAPS) compatible format. The contractor shall provide provisioning data necessary to allow the Government inventory control point to perform inventory management support for designated lowest replaceable assemblies. A Provisioning Conference shall be held at the contractor's facility 90 calendar days after CDR. The contractor shall provide Agenda and Presentation Materials (CDRL A002) and Conference / Meeting Minutes (CDRL A003) as required by the identified CDRL Deliverables.

CDRL Deliverables:

- (CDRL A002) Agenda and Presentation Materials (DI-ADMN-81249A)
- (CDRL A003) Conference / Meeting Minutes (DI-ADMN-81250A)
- (CDRL A080) Logistics Management Information (LMI) Data Product (Provisioning Technical Documentation) (DI-ALSS-81529)
- (CDRL A081) Interactive Computer Aided Provisioning System (ICAPS) Compatible Inventory Database (DI-ALSS-81545)

3.2.10 Installation Test Support Device

3.2.10.1 ITSD Design

The contractor shall provide an ITSD to meet the requirements of NTCDL SPS Section 3.12. The ITSD design shall wherever possible leverage the NTCDL EDM efforts, with the goal of reusing NTCDL components at the LRU level.

The contractor shall document the design in the ITSD System-Level SSDD (CDRL A082), and the test plan in the ITSD First Article Test (FAT) Plan (CDRL A083). The ITSD SRR, PDR, CDR and TRR shall be held in conjunction with the corresponding events for the NTCDL Surface Terminal.

The contractor shall provide Agenda and Presentation Materials (CDRL A002) and Conference/Meeting Minutes (CDRL A003) as required by the identified CDRL Deliverables.

CDRL Deliverables:

- (CDRL A002) Agenda and Presentation Materials (DI-ADMN-81249A)
- (CDRL A003) Conference / Meeting Minutes (DI-ADMN-81250A)
- (CDRL A082) ITSD System-Level SSDD (System / Subsystem Design Description) (DI-IPSC-81432A)
- (CDRL A083) ITSD First Article Test (FAT) Plan / Production Acceptance Test (PAT) Plan (DI-QCIC-80553A)

3.2.10.1.1 ITSD Software

The ITSD shall be controlled by software operating on a ruggedized x86 processor architecture Microsoft Windows laptop (the laptop shall be equivalent to a semi rugged windows-based laptop computer (spill resistant and capable of withstanding a 3 foot drop)). The laptop shall be provided by the contractor to support testing, but provided by the Government when used for Government purposes.

The software installation materials, executables, source code, and Software User's Manual shall be delivered with the ITSD. The COTS / NDI portion of the materials shall be delivered with the NTCDL TDP (CDRL A018) and the ITSD Computer Software End Item (CDRL A019). The balance of the materials shall be delivered in the applicable SSDD or IDD documents. The ITSD software will also be documented with a Software Version Description (SVD) document (CDRL A020), and a Software User's Manual (SUM) (CDRL A084).

CDRL Deliverables:

- (CDRL A018) Technical Data Package (DI-SESS-80776A)
- (CDRL A019) Computer Software End Items (DI-IPSC-81441A)

- (CDRL A020) Software Version Description (DI-IPSC-81442A)
- (CDRL A084) Software User's Manual (DI-IPSC-81443A)

3.2.10.2 ITSD First Article Test

The contractor shall conduct a FAT testing of the ITSD in accordance with the ITSD FAT Plan (CDRL A083) and the ITSD FAT Procedures (CDRL A085), in conjunction with the FAT testing of the NTCDL system as a whole. The ITSD FAT testing shall address the functional and system characteristic requirements of the ITSD as specified in the SPS. The ITSD FAT test procedures shall documented as part of (or an annex to) the NTCDL FAT Test Procedures. The results shall be documented as part of the system verification process.

Completion criteria for this activity shall be the approval of the submitted ITSD FAT / Inspection Report (CDRL A086) by the Government.

CDRL Deliverables:

- (CDRL A083) ITSD First Article Test (FAT) Plan / Production Acceptance Test (PAT) Plan (DI-QCIC-80553A)
- (CDRL A085) ITSD First Article Test (FAT) Procedures (DI-NDTI-80603A)
- (CDRL A086) ITSD First Article Test (FAT) / Inspection Report (DI-NDTI-80809B)

3.2.10.2.1 ITSD FAT TRR

The contractor shall conduct an ITSD FAT TRR to demonstrate to the Government the ITSD development activities have progressed to the point where the ITSD system(s) are ready to be tested in accordance with approved test procedures. The contractor shall provide documentation supporting that the ITSD is ready for FAT at the TRR. All previous component, subsystem, and system test results shall form a basis for proceeding into planned tests. All test resources shall be properly identified and coordinated to support planned tests. In addition to the above, the contractor shall submit the CDRL documents listed below prior to the TRR.

Exit criteria shall be defined as the successful completion of the TRR and written Government approval of the TRR. Approval will be determined based on evaluation against the exit criteria below. The TRR shall be considered complete once all of the exit criteria have been met and after the adjudication and closure of all critical comments of the TRR event. The contractor shall provide materials in support of the decision to proceed with FAT. The materials shall address the following:

a. Verification and Validation of the traceability of planned tests to program requirements using the Verification Cross-reference Matrix.
b. All previous component, subsystem, and system test results form a basis for proceeding into planned tests, and documented in the Software Version Description (SVD) document (CDRL A020).
c. Verification of the completeness of test procedures (CDRL A085) and their compliance with test plans and descriptions.
d. Verification and Validation of system development maturity to proceed to test.
e. Test plans are completed and approved by the Government.
f. All TRR CDRLs have been submitted, comments adjudicated and accepted by the Government.
g. All TRR action items have been closed or if open, a mitigation plan has been approved by the Government.

The contractor shall provide Agenda and Presentation Materials (CDRL A002) and Conference / Meeting Minutes (CDRL A003) as required by the identified CDRL Deliverables.

CDRL Deliverables:

- (CDRL A002) Agenda and Presentation Materials (DI-ADMN-81249A)
- (CDRL A003) Conference / Meeting Minutes (DI-ADMN-81250A)
- (CDRL A020) Software Version Description (DI-IPSC-81442A)
- (CDRL A085) ITSD First Article Test (FAT) Procedures (DI-NDTI-80603A)

3.2.10.3 ITSD Production Acceptance Testing

The contractor shall conduct the PAT of the ITSD EDM hardware at the contractor's facility to validate the ITSD PAT test procedures (CDRL A087) in accordance with the Acceptance Test Plan (CDRL A037), and document the results in a test / inspect report (CDRL A088).

CDRL Deliverables:

- (CDRL A037) First Article Test (FAT) Plan / Production Acceptance Test (PAT) Plan (DI-QCIC-80553A)
- (CDRL A087) ITSD Production Acceptance Test (PAT) Procedures (DI-NDTI-80603A)
- (CDRL A088) ITSD Production Acceptance Test (PAT) Test / Inspection Report (DI-NDTI-80809B)

3.2.10.4 ITSD Technical Data Package and Software Documentation

The contractor shall provide technical data and software documentation for the ITSD to meet the requirements of 3.1.6, and according to CDRL A018, Technical Data Package. The contractor shall document the ITSD in the Software Version Description document (CDRL A020) and submit the SVD in conjunction with a full delivery of the as tested software Computer Software End Items (CDRL A019). To the extent the necessary documentation is provided by the delivery associated with the baseline NTCDL system, no additional documentation is required.

CDRL Deliverables:

- (CDRL A018) Technical Data Package (DI-SESS-80776A)
- (CDRL A019) Computer Software End Items (DI-IPSC-81441A)
- (CDRL A020) Software Version Description (DI-IPSC-81442A)

3.2.11 Reserved

3.2.12 Engineering and Study Services

The contractor shall provide engineering services to support engineering study services pertaining to the NTCDL System. A Technical Direction Letter (TDL) shall be issued for identified efforts. Engineering and Study Services may be required for the following types of items: When necessary and approved by the Government, the contractor shall implement fixes to address issues found during DT / OA, conduct appropriate regression testing, and retrofit the fixes to the EDM system(s).

a. Engineering Change Services (to include updating TDP) (CDRL A018).

b. Interoperability & Test Support Services.
c. Studies and Analyses.
d. DoD Information Assurance Certification and Accreditation Process / IA support.
e. Updating the DD-1494.

Studies and analysis performed shall be documented in a Technical Report (CDRL A089). Should requirements changes be necessary, the contractor shall provide an updated requirements database export (CDRL A016).

Status of all Engineering and Study Services shall be reported in the Contractor's Progress, Status Management Report (CDRL A001). The contractor shall submit a Trip Report (CDRL A046) for all travel in association with engineering and study services.

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status Management Report (DI-MGMT-80227)
- (CDRL A016) Technical Report, Requirements Database Export (DI-MISC-80508B)
- (CDRL A018) Technical Data Package (DI-SESS-80776A)
- (CDRL A046) Trip Report (DI-MGMT-80227) (DI-ADMN-81250A)
- (CDRL A089) Technical Report, Studies Analysis and Design Results (DI-MISC-80508B)

3.2.13 Additional EDM System (Option)

If the Government chooses to exercise the applicable option, the contractor shall produce additional EDM systems in accordance the requirements specified in the SPS (see SPS Section 3). The EDM system(s) shall meet the requirements for the NTCDL surface terminal, Variant A. This system shall be subjected to Production Acceptance Test for acceptance (see SOW Section 3.3.1.1).

3.2.14 EDM INCO and EDM OBRP

Each EDM system will be delivered with one each INCO kit and OBRP kit (CDRL A079) as identified under Section 3.2.9.4 for provisioning as part of the basic system delivery. This will apply to all EDM systems, including the additional EDM system identified in 3.2.13. The contractor shall mark the EDM in accordance with the IUID Plan and also deliver the associated Item Unique Identification (IUID) Marking Activity, Validation, Verification Report (CDRL A009).

The contractor shall perform PAT on all INCO and OBRP kits at the contractor's facility in accordance with approved test procedures. Government acceptance of the production parts will occur at successful completion of PAT (in accordance with PAT Procedures CDRL A067) for all parts within a specific order. The contractor shall update the PAT Procedures (CDRL A067) if required prior to commencement of testing.

Completion criteria shall be Government Acceptance of hardware in accordance with successful completion of PAT and acceptance of PAT Test / Inspection Report (CDRL A068) via a signed DD250 by the COR.

CDRL Deliverables:

- (CDRL A009) Item Unique Identification (IUID) Marking Activity, Validation, Verification Report (DI-MGMT-81804A)
- (CDRL A067) Production Acceptance Test (PAT) Procedures (DI-NDTI-80603A)

- (CDRL A068) Production Acceptance Test (PAT) Test / Inspection Report (DI-NDTI-80809B)
- (CDRL A079) Proposed Spares List (DI-ILSS-80134A)

3.2.15 DT / OA Support

The contractor shall provide engineering, installation, integration, logistics, repair, test and training services for NTCDL and the EDM System #2 used to support DT / OA activities. Services shall be provided for the following items:

a. Installation Support for EDM System #2.
b. Integration Support to establish the full operational capabilities of the system including connections to other shipboard systems.
c. Logistics support for EDM System #2 including maintenance of the Configuration Status Accounting information.
d. Repair and / or refurbishment of parts which failed during shipping, testing and / or installation.
e. Support for conduct of the COTF required Maintenance Demonstration test (this shall include the utilization of pre-failed parts which were used to induce the selected fault to the equipment using nondestructive means as part of the Section 3.2.8.3.8 Maintenance Demonstration).
f. Test Preparation support for DT / OA and JITC Interoperability.
g. Training of Navy and support contractor personnel on the operation and maintenance of the system (at the contractor's facility).

When problems are found during the performance of these services, the contractor shall study, analyze and document the problems found in a Technical Report (CDRL A089).

When necessary and approved by the Government, the contractor shall implement fixes to address issues found during DT / OA, conduct appropriate regression testing, and retrofit the fixes to the EDM system(s).

Status of all Services shall be reported in the Contractor's Progress, Status Management Report (CDRL A001). The contractor shall submit a Trip Report (CDRL A046) for all travel in association with these services.

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status Management Report (DI-MGMT-80227)
- (CDRL A046) Trip Report (DI-MGMT-80227) (DI-ADMN-81250A)
- (CDRL A089) Technical Report, Studies Analysis and Design Results (DI-MISC-80508B)

3.3 PRODUCTION (OPN, OMN, SCN)

Each variant (e.g., Variant A) shall be produced as a stand-alone requirement.

Any changes shall be in accordance with approved ECR procedures and shall require a contract modification, and incorporated into subsequent production orders placed by the Government.

3.3.1 NTCDL Surface Terminal - Variant A

The contractor shall build and deliver the NTCDL Surface Terminal - Variant A in accordance with the SPS, the accepted baseline established at the FCA / PCA, and any authorized and executed ECRs.

3.3.1.1 Variant A Production Acceptance Testing

The contractor shall provide a NTCDL system in accordance with the NTCDL SPS. The contractor shall perform PAT of the NTCDL System at the contractor's facility in accordance with approved test procedures. Government acceptance of the NTCDL System will occur at successful completion of PAT. The contractor shall update the PAT Test Procedures (CDRL A067) if required prior to commencement of testing.

The contractor shall conduct PAT in accordance with the approved plan and procedures. A SPAWAR Representative shall be present to witness each test. Upon completion of the PAT testing, the contractor shall prepare and submit the PAT Test / Inspection Report (CDRL A068). Upon completion of the PAT testing, the contractor shall prepare and submit an updated Item Unique Identification Marking Activity, Validation, Verification Report (CDRL A009).

Completion criteria shall be Government Acceptance of hardware in accordance with successful completion of PAT and acceptance of Test Results via a signed DD250 by the NTCDL COR.

CDRL Deliverables:

- (CDRL A009) Item Unique Identification (IUID) Marking Activity, Validation, Verification Report (DI-MGMT-81804A)
- (CDRL A067) Production Acceptance Test (PAT) Procedures (DI-NDTI-80603A)
- (CDRL A068) Production Acceptance Test (PAT) Test / Inspection Report (DI-NDTI-80809B)

3.3.2 [RESERVED]

3.3.3 [RESERVED]

3.3.4 NTCDL Installation Test Support Device

The contractor shall build and deliver the NTCDL ITSD in accordance with the NTCDL SPS, the accepted baseline established at the FCA / PCA, and any authorized and executed ECRs.

Completion criteria shall be Government Acceptance of hardware in accordance with successful completion of PAT (in accordance with ITSD Production Acceptance Test (PAT) Procedures CDRL A087) and acceptance of ITSD Production Acceptance Test (PAT) Test / Inspection Report (CDRL A088) via a signed DD250 by the NTCDL COR.

CDRL Deliverables:

- (CDRL A087) ITSD Production Acceptance Test (PAT) Procedures (DI-NDTI-80603A)
- (CDRL A088) ITSD Production Acceptance Test (PAT) Test / Inspection Report (DI-NDTI-80809B)

3.3.5 Spares Production

The contractor shall produce spares from the Proposed Spares List consistent with the established baseline. The contractor shall deliver the spares no more than 180 calendar days after exercise of the spares production CLIN. The contractor shall mark the spares in accordance with the IUID Plan and also deliver the associated Item Unique Identification (IUID) Marking Activity, Validation, Verification Report (CDRL A009).

The contractor shall perform PAT on all Spares and INCO parts at the contractor's facility in accordance with approved test procedures. Government acceptance of the production parts will occur at successful

completion of PAT (in accordance with Production Acceptance Test (PAT) Procedures CDRL A067) for all parts within a specific order. The contractor shall update the PAT Test Procedures (CDRL A067) if required prior to commencement of testing.

Completion criteria shall be Government Acceptance of hardware in accordance with successful completion of PAT and acceptance of Production Acceptance Test (PAT) Test / Inspection Report (CDRL A068) via a signed DD250 by the NTCDL COR.

CDRL Deliverables:

- (CDRL A009) Item Unique Identification (IUID) Marking Activity, Validation, Verification Report (DI-MGMT-81804A)
- (CDRL A067) Production Acceptance Test (PAT) Procedures (DI-NDTI-80603A)
- (CDRL A068) Production Acceptance Test (PAT) Test / Inspection Report (DI-NDTI-80809B)

3.3.6 Field Engineering and Depot Repair Services

The contractor shall provide depot repair services for systems and spares delivered under this contract. Depot repair services shall consist of fault isolation, repair and / or refurbishment, testing (to verify the items acceptability for use) of end items, units, modules, or assemblies. Repair and / or refurbishment completion shall be based upon successful performance testing using approved test procedures. Repair and / or refurbishment shall be completed within thirty (30) calendar days exclusive of waiting parts time (i.e., date part ordered to the date the part is received). The contractor shall provide updates in the Contractor's Progress, Status Management Report in accordance with CDRL A001.

Completion criteria shall be Government Acceptance of repaired part(s) in accordance with successful completion of PAT and acceptance of Test Results via a signed DD250 by the NTCDL COR.

The contractor shall perform engineering services to support fielding, maintenance and sustainment of the NTCDL System, associated equipment, and those being procured under this contract. For those efforts identified as Engineering Services, a TDL shall be issued. The specific activities will be defined in the individual TDL. These tasks may require travel. Examples of these types of tasks include:

a. Field Support / Fleet Support Services.
b. Interoperability & Test Support Services.
c. Maintenance and Support Services for deployed systems.
d. Updating the Application for Equipment Frequency Allocation (DD-1494).

The contractor shall as required provide a Technical Report, Studies Analysis and Design Results (CDRL A089) and prepare a Trip Report (CDRL A046). The Trip Report shall document the conduct and results of the Technical Report Studies Analysis and Design Results. Should requirements changes be necessary, the contractor shall provide an updated requirements database export (CDRL A016).

CDRL Deliverables:

- (CDRL A001) Contractor's Progress, Status Management Report (DI-MGMT-80227)
- (CDRL A016) Technical Report, Requirements Database Export (DI-MISC-80508B)
- (CDRL A046) Trip Report (DI-MGMT-80227) (DI-ADMN-81250A)
- (CDRL A089) Technical Report, Studies Analysis and Design Results (DI-MISC-80508B)

3.3.6.1 Task Definition

When tasked and authorized in writing via a TDL by the Navy PCO, the contractor shall provide engineering services with qualified engineering and technical personnel and materials in the accomplishment of the specified task(s). The scope and period of performance for each task shall be defined within each tasking letter. Support services shall be provided as follows:

a. The contractor shall provide direct fleet support and field engineering services to support the Installation, checkout, and problem resolution for the End Items.
b. The contractor shall provide technical advisory and consulting services to Navy and design agent shipyard and Navy installation personnel.
c. The contractor shall provide engineering analysis and evaluation and in-house problem resolution and corrective action to Government agencies and shipyards for the End Item problem areas.

4 LIST OF ACRONYMS AND ABBREVIATIONS

BIT	Built In Test
BOM	Bill of Material
CAD	Computer Aided Design
CAGE	Commercial Activity / Government Entity
CBM	Condition Based Maintenance
CCB	Configuration Control Board
CDL	Common Data Link
CDRL	Contract Data Requirements List
CDR	Critical Design Review
CFSR	Contract Funds Status Report
CI	Configuration Items
CLIN	Contract Line Item Number
CM	Configuration Management
CMP	Configuration Management Plan
COMSEC	Communication Security
COR	Contracting Officer's Representative
COTS	Commercial-Off-The-Shelf
CSCI	Computer Software Configuration Item
CWBS	Contractor Work Breakdown Structure
DFAR	Defense, Federal Acquisition Regulations Supplement
DMSMS	Diminishing Manufacturing Sources and Material Shortages
DT / OA	Developmental Test / Operational Assessment
E3	Electromagnetic Environmental Effects
ECR	Enterprise Change Request
EDM	Engineering Development Model
EMI	Electromagnetic Interference
EQT	Environmental Qualification Test
ESOH	Environment, Safety, and Occupational Health
EVMS	Earned Value Management System
FACAR	Failure Analysis and Corrective Action Report
FAT	First Article Test
FCA	Functional Configuration Item
GFP	Government Furnished Property
GFS	Government Furnished Software
HAZMAT	Hazardous Materials
HMMP	HAZMAT Management Program
HMUL	Hazardous Materials Usage List
HSI	Human Systems Integration
HWCI	Hardware Configuration Item
IA	Information Assurance
IBR	Integrated Baseline Review
ICAPS	Interactive Computer Aided Provisioning System
IDD	Interface Design Description
IETM	Interactive Electronic Technical Manual
ILS	Integrated Logistics Support

IRD	Installation Requirements Drawing
INCO	Installation and Checkout
IPMR	Integrated Program Management Report
IPT	Integrated Product Team
ISR	Intelligence Surveillance and Reconnaissance
ITSD	Installation Test Support Device
IUID	Item Unique Identification
JITC	Joint Interoperability Test Command
LCS	Link Control System
LMS	Link Management System
LRU	Lowest Replaceable Unit
MIL-STD	Military Standard
M-Demo	Maintenance Demonstration
MOSA	Modular Open Systems Approach
MS	Microsoft
MSDS	Material Safety Data Sheets
MSI	Maintenance Significant Item
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
NDI	Non-Developmental Item
NMCI	Navy Marine Corps Intranet
NRW	Network Radio Waveform
NTCDL	Network Tactical Common Data Link
OMN	Operations and Maintenance
OPNAV	Office of the Chief of Naval Operations
OPSEC	Operations Security
OSHA	Occupational Safety and Health Administration
OPN	Operations Procurement, Navy
OTB	Over Target Baseline
OTS	Over Target Schedule
P2	Pollution Prevention
PAC	Post-Award Conference
PAT	Production Acceptance Testing
PCA	Physical Configuration Audit
PCB	Printed Circuit Board
PCO	Procuring Contracting Officer
PDR	Preliminary Design Review
PIO	Provision Item Ordering
PM	Program Manager
PMP	Program Management Plan
PMR	Program Management Review
PMS	Planned Maintenance System
PRR	Production Readiness Review
PTD	Provisioning Technical Data
QA	Quality Assurance
RDT&E	Research Development Test & Evaluation
RFV	Request for Variance
RMA	Reliability, Maintainability, Availability

RRD	Risk Reduction Demonstration
SAR	Safety Assessment Report
SCN	Ship Construction Navy
SCN	Specification Change Notice
SDFP	Supplemental Data for Provisioning
SDP	Software Development Plan
SEMP	Systems Engineering Management Plan
SOW	Statement of Work
SPS	System Performance Specification
SRA	Schedule Risk Assessment
SRR	System Requirements Review
SS	Spectrum Supportability
SSDD	System / Subsystem Design Description
SW IPT	Software Integrated Product Team
TDL	Technical Direction Letter
TPM	Technical Performance Measures
TDP	Technical Data Package
TIM	Technical Interchange Meeting
TM	Technical Manual
TMCR	Technical Manual Contract Requirements
TRR	Test Readiness Review