STATEMENT OF WORK

FOR THE

GLOBAL POSITIONING SYSTEM (GPS)-BASED POSITIONING, NAVIGATION, AND TIMING SERVICE (GPNTS)

07 October 2010

Rev. 2

SPAWAR PEO C4I

PMW/A 170

San Diego, CA

Deleted: 21

Deleted: September

Deleted: 1

PROCUREMENT SENSITIVE

TABLE OF CONTENTS

SECTION NO. **PAGE**

1 SCOPE 1
1.1 Concept 1
2 SOW ORGANIZATION 2
2.1 Electronic Exchange of Data 2
3 APPLICABLE DOCUMENTS 3
3.1 Government Documents 3
3.2 Other Government Documents 5
3.3 Non-Government Documents 6
4 REQUIREMENTS 6
4.1 Engineering and Manufacturing Development (EMD) Phase (RDT&E) 7
4.1.1 System Design and Development Requirements (RDT&E) 7
4.1.1.1 Crypto Distribution Development 7
4.1.1.2 Indirect System Access Component Development 7
4.1.1.3 Modular Open Systems Approach/Open System Architecture 7
4.1.1.4 Net-Centric Enterprise Solutions for Interoperability Compliance 8
4.1.2 GPNTS System Documentation (RDT&E) 8
4.1.2.1 GPNTS System Performance Specification 8
4.1.2.2 System/Subsystem and Hardware Configuration Items Specification 8
4.1.2.3 System Requirements Verification Matrix 9
4.1.2.4 Transition Plan 9
4.1.2.5 GPNTS Technical Data Package 9
4.1.2.6 Interface Control Documentation 11
4.1.2.7 DD Form 1494 Compliance 12
4.1.2.8 Software Development Plan 12
4.1.2.9 Software Configuration Management Plan 12
4.1.2.10 Software Requirements Specification 13
4.1.2.11 Software Design Description 13
4.1.2.12 Firmware Reprogramming Procedures 13
4.1.2.13 Software Version Description 13
4.1.3 Systems Engineering (RDT&E) 14
4.1.3.1 System Engineering Management Plan 14
4.1.3.2 Configuration Baseline Reviews 14
4.1.3.3 Technical Reviews 15
4.1.4 Program Management (RDT&E) 17
4.1.4.1 Post-Award Conference 17
4.1.4.2 Program Management Reviews 18
4.1.4.3 Integrated Product Teams 18
4.1.5 Integrated Performance Management (RDT&E) 19
4.1.5.1 Integrated Performance Management System 19
4.1.5.2 Integrated Subcontract Management 19
4.1.5.3 Contract Work Breakdown Structure 19

4.1.5.4 Integrated Master Plan 20
4.1.5.5 Integrated Master Schedule 20
4.1.5.6 Contract Performance Report 20
4.1.5.7 Contract Funds Status Report 20
4.1.6 Configuration Management (RDT&E) 21
4.1.6.1 Configuration Status Accounting 22
4.1.6.2 Nomenclature Assignment and Identification of Plates 22
4.1.7 Risk Management Program (RDT&E) 23
4.1.8 Research and Technology Protection Program (RDT&E) 23
4.1.9 Testing (RDT&E) 23
4.1.9.1 Contractor Test and Evaluation 24
4.1.9.2 Electromagnetic Interference and Electromagnetic Environment Effects Requirements 26
4.1.9.3 Verification, Validation, and Accreditation 26
4.1.9.4 Software Test Plan & Software Test Procedures 27
4.1.9.5 Government Test and Evaluation 27
4.1.10 Reliability and Maintainability (RDT&E) 27
4.1.10.1 Reliability Prediction 27
4.1.10.2 Reliability, Availability, and Maintainability Data 28
4.1.10.3 Failure Reporting and Corrective Action System 28
4.1.11 Environment, Safety and Occupational Health Program (RDT&E) 29
4.1.11.1 System Safety and Occupational Health 30
4.1.11.2 Hazardous Materials Management 30
4.1.11.3 Deactivation, Demilitarization, and Disposal 32
4.1.12 Integrated Logistics (RDT&E) 32
4.1.12.1 Logistics Kick-Off Conference 32
4.1.12.2 Integrated Logistics Program 32
4.1.12.3 Operations & Maintenance Interactive Electronic Technical Manual 34
4.1.12.4 Provisioning Technical Documentation 35
4.1.12.5 Diminishing Manufacturing Sources and Material Shortages 36
4.1.13 Human Systems Integration (RDT&E) 36
4.1.13.1 Human Factors Engineering 36
4.1.14 Manpower, Personnel, and Training (RDT&E) 37
4.1.14.1 Operation and Maintenance Training 37
4.1.14.2 Training Requirements 38
4.1.15 Information Assurance (RDT&E) 38
4.2 Low-Rate Initial Production Phase (OPN and RDT&E) 39
4.2.1 LRIP Units (OPN) 39
4.2.2 Program Management (OPN) 39
4.2.2.1 Program Management Reviews 39
4.2.2.2 Integrated Product Teams 40
4.2.3 LRIP Provisioning Item Ordering (OPN) 40
4.2.4 LRIP Upgrade Kits (OPN) 40
4.2.5 GPNTS Technical Documentation (OPN) 40
4.2.6 Production Tests (OPN) 41

4.2.6.1 Production Qualification Testing 41
4.2.6.2 Hardware Quality Assurance Inspection 41
4.2.6.3 Factory Acceptance Testing 41
4.2.7 Environment, Safety, and Occupational Health Program (OPN) 42
4.2.8 Item Unique Identification (OPN) 42
4.2.9 DD Form 1494 Compliance (RDT&E) 42
4.2.10 Physical Configuration Audit (RDT&E) 42
4.2.11 Maintenance Demonstration (RDT&E) 43
4.2.12 Engineering Support Services (OPN & RDT&E) 43
4.3 Full-Rate Production (FRP) Phase (OPN, SCN, RDT&E, and OCF) 43
4.3.1 FRP Units (OPN, SCN, and OCF) 44
4.3.2 Program Management (OPN) 44
4.3.2.1 Program Management Reviews 44
4.3.2.2 Integrated Product Teams 44
4.3.3 FRP Provisioning Item Ordering (OPN) 45
4.3.4 FRP Upgrade Kits (OPN) 45
4.3.5 GPNTS Technical Documentation (OPN) 45
4.3.6 Production Tests (OPN) 45
4.3.7 Environment, Safety, and Occupational Health Program (OPN) 46
4.3.8 Item Unique Identification (OPN) 46
4.3.9 Engineering Support Services (RDT&E/OPN/SCN) 47
5 GPNTS SECURITY LEVEL 47
6 GOVERNMENT FURNISHED PROPERTY 47
7 ACRONYMS 48

LIST OF TABLES

TABLE NO. **PAGE**

Table 1: Applications for Document Deliverables 2
Table 2: Government Documents 3
Table 3: Other Government Documents 5
Table 4: Non-Government Documents 6
Table 5: Hazardous Materials 31

LIST OF FIGURES

FIGURE NO. **PAGE**

Figure 1 - GPNTS Notional Concept 2

1 SCOPE

This Statement of Work (SOW) defines U.S. Navy technical and acquisition requirements for the design, development, integration, documentation, testing, and production of Global Positioning System (GPS)-based Positioning, Navigation, and Timing Service (GPNTS) Increment I.

The Program Executive Office (PEO) Command, Control, Computers, Communications, and Intelligence (C4I) and PMW/A 170 are responsible for the acquisition, integration, delivery, and support of interoperable communications and information technology systems enabling seamless operations for the Fleet, joint, and coalition warfighters. The GPNTS program was established to meet current and emerging Positioning, Navigation, and Timing (PNT) fleet requirements. GPNTS will provide modernized pervasive, robust, secure, integrated, and shipboard interoperable net-centric PNT capabilities.

GPNTS is a single Program of Record (POR) for U.S. Navy ships and submarines as well as potential U.S. Coast Guard (USCG) and Foreign Military Sales (FMS) platforms. GPNTS will be designed to accommodate back-fit of current legacy PNT systems and forward-fit of new platforms, in accordance with the GPNTS Technical Requirements Document (TRD) and this SOW. The current PMW/A 170 GPS systems in service are the GPS Versa Module Eurocard (VME) Receiver Card (GVRC), AN/WRN-6(V) GPS Navigation System, and the AN/SSN-6(V) Navigation Sensor System Interface (NAVSSI). These systems are installed on over 250 U.S. Navy, USCG, and FMS platforms.

1.1 Concept

GPNTS Increment I will use Non-Developmental Item (NDI) military-grade Selective Availability Anti-Spoofing Module (SAASM) GPS receivers, be developed based on open standards in a Service Oriented Architecture (SOA) environment, and will include anti-jam GPS antenna systems as Government Furnished Property (GFP). GPNTS will take in all applicable PNT related sensor data, including data from its internal GPS receiver, process this data, and provide the best available position, velocity, attitude, and timing data to its users.

GPNTS will support mission critical real-time PNT data services for weapons, combat, navigation, and other C4I systems requiring PNT information. These real-time services include User Datagram Protocol/Internet Protocol (UDP/IP) multicast net-centric messages, legacy point-to-point interface support, and precise time and frequency services.

GPNTS will leverage commercial off-the-shelf (COTS) technology to provide a precise Time and Frequency (T&F) management solution to shipboard users. T&F management will automatically monitor GPS timing integrity and, during GPS outages, will provide a non-GPS time source. The T&F management solution will be modular to support a diverse set of timing, frequency, and time code signals.

GPNTS will provide non-real time PNT data services via publish/subscribe services. GPNTS non-real time services will be hardware independent and may be hosted within the GPNTS system or an enterprise server in a Common Computing Environment (CCE). The modularity and flexibility of the GPNTS Increment I design will accommodate future product improvements planned for GPNTS Increment II (not covered under this contract).

Figure 1 depicts the notional functional block diagram of a GPNTS system with the goal of limiting the number of point-to-point interfaces and target the CCE.

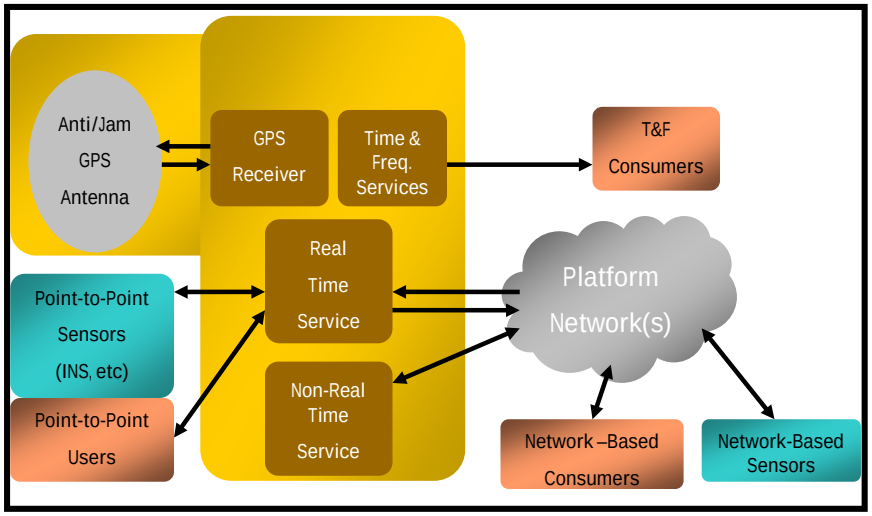

Figure 1 - GPNTS Notional Concept

2 SOW ORGANIZATION

This SOW specifies requirements for the design, development, integration, documentation, testing, and production of the GPNTS system as well as the requirements for GPNTS related engineering services. The SOW is organized into three phases: Engineering *and Manufacturing Development (EMD) Phase*, an optional *Low Rate Initial Production (LRIP) Phase*, and an optional *Full-Rate Production (FRP) Phase*.

2.1 Electronic Exchange of Data

The Contractor shall deliver all contract, technical, and/or engineering information in digital format. The Contractor shall post Contract Data Requirement Lists (CDRLs) to the PMW/A 170 SE2 GPNTS project site at https://nserc.navy.mil/peo_c4i/pmw_170/default.aspx unless otherwise specified on the applicable CDRL. The Contractor shall provide electronic-mail (e-mail) notification to the personnel identified on the CDRL Addressee List within twenty-four (24) hours of CDRL delivery. The Contractor shall reference Table 1, Applications for Document Deliverables, below for the requested applications for each document type. All applications must be compatible with the latest Navy Marine Corps Intranet (NMCI) approved revisions as required by regulatory issuance, or as coordinated with the Government (see http://www.nmciinfo.usmc.mil/nmci3/nmci.nsf/homepage for additional NMCI information).

Table 1: Applications for Document Deliverables

Document Category	Application
Word Processing	Microsoft® Word 2007
Spreadsheets	Microsoft® Excel 2007
Project Planning	Microsoft® Project 2007
Presentations	Microsoft® PowerPoint® 2007
Engineering Drawings	AutoCAD 2008 and PDF format

3 APPLICABLE DOCUMENTS

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

3.1 Government Documents

Table 2: Government Documents

Document	Title	Date
ASN (RD&A)	Center for Earned Value Management (CEVM) Integrated Baseline Review (IBR) Toolkit	March 2008
DoD IMP/IMS	Integrated Master Plan and Integrated Master Schedule Preparation and Use Guide	October 21, 2005
DoD CIO	DoD Net-Centric Data Strategy	9 May 2003
DoD EVMIG	Department of Defense Earned Value Management Implementation Guide (EVMIG)	October 2006
DoDD 5000.1	The Defense Acquisition System	12 May 2003
DoDD 8320.2	Data Sharing in a Net-Centric Department of Defense	23 April 2007
DoDD 8500.01E	Information Assurance (IA)	23 April 2007
DoDI 5200.39	Protection of Critical Program Information (CPI) within the Department of Defense (DoD)	16 July 2008
DoDI 1322.20	Development and Management of Interactive Courseware (ICW) for Military Training	16 November 1994
DoDI 1322.26	Development, Management, and Delivery of Distributed Learning	16 June 2006
DoDI 5000.2	Operation of the Defense Acquisition System	8 December 2008
DoDI 8500.2	Information Assurance (IA) Implementation Guide	6 February 2003
DoDI 8510.01	DoD Information Assurance Certification and Accreditation Process (DIACAP)	28 November 2007
DoDI 5200.40	Defense Information Technology Security Certification and Accreditation Process (DITSCAP)	30 December 1997
MIL-DTL-87268C	Technical Manuals for System-Level hardware/Software, COTS/GOTS, and Newly Developed Equipment	22 January 2007
MIL-HDBK-2036	Preparation of Electronic Equipment Specification	1 November 1999
MIL-HDBK-217F(2)	Reliability Prediction of Electronic Equipment	28 February 1995
MIL-HDBK-454B	General Guidelines for Electronic Equipment	15 April 2007

MIL-HDBK-470A	Designing and Developing Maintainable Products and Systems	20 June 2007
MIL-HDBK-502	DoD Handbook Acquisition Logistics	20 January 2005
MIL-HDBK-61A	Configuration Management Guidance	7 February 2001
MIL-HDBK-881B	Contract Work Breakdown Structure (CWBS) and Contract Work Breakdown Structure Dictionary	30 July 2005
MIL-HDBK-259	Life Cycle Cost in Navy Acquisitions	1 April 1983
MIL-P-15024/5	Military Specification Sheet, Identification	11 June 1971
MIL-P-24534A	Planned Maintenance System: Development of Maintenance Requirement Cards, Maintenance Index Pages, and Associated Documentation	21 March 1991
MIL-PRF-29612B	Training Data Products	08 June 2006
MIL-PRF-49506	Performance Specification Logistics Management Information (LMI)	18 January 2005
MIL-STD-130N	DoD Standard Practice Identification Marking of U.S. Military Property	17 December 2007
MIL-STD-31000	Standard Practice Technical Data Packages	5 November 2009
MIL-STD-882D	DoD (Department of Defense) Standard Practice For System Safety	10 February 2000
MIL-STD-961E(1)	Defense and Program Unique Specifications Format and Content	10 March 2010
MIL-STD-196E and H6	Joint Electronics Type Designation System and Cataloging Handbook – Section A, Federal Item name Directory for Supply Cataloging	17 February 1998
MPT&ECIOSWIT-ILE-HDBK-1C	Navy Integrated Learning Environment (ILE) Content Developer's Handbook	1 May 2009
VARIOUS	All Gov't reference documents identified within the ILE website's "Standards, Specifications, Policy, and Guidance": https://ile-help.nko.navy.mil/ile/content/policy.aspx	VARIOUS
NAS 411	National Aerospace Standard – Hazardous Material Management Program	10 January 1995
NAVEDTRA 43100-1G	Personnel Qualification Standards Unit Coordinator's Guide	November 2003
NAVSOP-6071	Best Practices: The Transition from Development to Production	March 1986
NESI	Net-Centric Enterprise Solutions Interoperability (NESI) http://nesipublic.spawar.navy.mil	19 December 2009
NESI Part 3	NESI Part 3: Migration Guidance http://nesipublic.spawar.navy.mil	17 June 2008

NESI Part 4	NESI Part 4: Node Guidance http://nesipublic.spawar.navy.mil	17 June 2008
NESI Part 5	NESI Part 5: Developer Guidance http://nesipublic.spawar.navy.mil	17 June 2008
OPNAVINST 1500.76B	Navy Training System Requirements, Acquisition, and Management	28 April 2010
OPNAVINST 3500.34F	Personnel Qualification Standards (PQS) Program	13 June 2005
SECNAVINST 5000.2D	Implementation and Operation of the Defense Acquisition System and Join Capabilities Integration and Development System	16 October 2008
SECNAVINST 5200.40	Verification, Validation, and Accreditation (VV&A) of Models and Simulations	19 April 1999
SPAWARINST 4160.3B	Procedures and Responsibilities for Technical Manual Management Operations and Lifecycle Support	7 August 2007
SPAWARINST 3432.1	Operations Security Policy	2 February 2005
DoN CPI Determination Standard Process	DoN CPI Determination Standard Process, Conduce of CPI Assessments within DoN	26 September 2007

3.2 Other Government Documents

Table 3: Other Government Documents

Document	Title	Date
PEO C4I	GPNTS Capability Development Document (CDD) Increment 1 V1.0	25 June 2010
PEO C4I	GPNTS System Engineering Plan (SEP) V 1.08	30 June 2010
PEO C4I	Programmatic Environmental, Safety, and Health Evaluation (PESHE)	April 2009
PEO C4I	GPNTS Human Systems Integration (HSI) Plan	June 2010
PEO C4I	GPNTS Test and Evaluation Master Plan (TEMP)	30 September 2010
PEO C4I	GPNTS Life Cycle Support Plan (LCSP)	TBD
PEO C4I	GPNTS Technical Requirements Document (TRD) v 2.3	5 August 2010
N2N6-TRPPM-E-70-0810	GPNTS Training Resources Planning Process Methodology (TRPPM)	November 2010
PEO C4I	PMW/A 170 Global Positioning System (GPS) Risk Management Plan (RMP) – WRN-6, DAGR, and GPNTS	22 February 2008
PEO C4I	PMW/A 170 Configuration Management Plan	01 July 2007

Document	Title	Date
SSC PAC	NAVSSI Technical Data Package (TDP) - Block 4.2.1 Source Code	13 March 2008
SSC PAC	NAVSSI TDP – Block 4.2 Master Kit List	13 March 2008
SSC PAC	NAVSSI TDP – Block 4.2 Bill of Material (BOM)	13 March 2008
SSC PAC	NAVSSI TDP – Block 4.2 System Interconnect Drawings	13 March 2008
SSC PAC	NAVSSI TDP – Block 4.2 Production Drawings	13 March 2008

3.3 Non-Government Documents

Table 4: Non-Government Documents

Document	Title	Date
ANSI/EIA-748-B	EIA Standard 748-B, Earned Value Management Systems	June 2007
ANSI ISO/IEC 9075-1	Information technology -- Database languages -- SQL -- Part 1: Framework (SQL/Framework)	2008
ANSI ISO/IEC 9075-2	Information technology -- Database languages -- SQL -- Part 2: Foundation (SQL/Foundation)	2008
ANSI ISO/IEC 9075-3	Information technology -- Database languages -- SQL -- Part 3: Call-Level Interface (SQL/CLI)	2008
ANSI ISO/IEC 9075-4	Information technology -- Database languages -- SQL -- Part 4: Persistent Stored Modules (SQL/PSM)	2008
ANSI ISO/IEC 9075-5	Information Technology - Database Languages - SQL - Part 5: Host Language Bindings (SQL/Bindings)	2008
IEEE/EIA Std 12207.0-	Software Development Plan (SDP); Information Technology-Software Life Cycle Processes	31 January 2008
IEEE Std 24765-2010	Standard for Systems and software Engineering--Vocabulary	2 February 2010
ANSI/EIA-649A	National Consensus Standard for Configuration Management	April 2004
ANSI/EIA-836B	Configuration Management Data Exchange and Interoperability	1 May 2010
ISO 10007	Quality Management guidelines for Configuration Management	June 2003

4 REQUIREMENTS

The Contractor shall provide all resources, materials, equipment, and facilities to design, develop, and produce GPNTS systems and related CDRLs in accordance with this SOW and the TRD.

All requirements in the EMD Phase, sections 4.1 – 4.1.15, will be RDT&E funded, all requirements in the LRIP Phase, sections 4.2 – 4.2.12, will be RDT&E and/or OPN funded, and all requirements in the FRP Phase, section 4.3 – 4.3.9, will be RDT&E, OPN, SCN, and/or Other Customer Funds (OCF) (e.g. FMS and Coast Guard) funded.

4.1 Engineering and Manufacturing Development (EMD) Phase (RDT&E)

This section contains the requirements for the EMD phase of the GPNTS system, sections 4.1 – 4.15, which will be RDT&E funded.. The NAVSSI Block 4.2 Technical Data Package (TDP) listed in Table 3 may be reviewed and considered for reuse, at the contractor's discretion, as part of the GPNTS design and development.

4.1.1 System Design and Development Requirements (RDT&E)

The contractor shall design and develop the GPNTS system in accordance with this SOW and the TRD and develop the corresponding TDP as described in section 4.1.2.5 of this SOW. The Contractor shall develop a TDP, which shall include all the data for three GPNTS configurations – Configuration A, Configuration B, and Configuration C.

The Contractor shall produce three (3) Engineering Development Models (EDMs), one (1) Configuration EDM-B system in accordance with section 3.10.7.1 of the TRD and two (2) Configuration EDM-C systems in accordance with section 3.10.7.2 of the TRD.

4.1.1.1 Crypto Distribution Development

The Contractor shall develop the Crypto Distribution capability as specified in Appendix A of the GPNTS TRD. Once developed, PMW/A 170 will submit a request for approval to implement this capability to the National Security Agency (NSA) and the Global Positioning Systems Wing (GPSW). This approval is required prior to activation of this capability in the fleet.

4.1.1.2 Indirect System Access Component Development

The Contractor shall develop and implement the Indirect System Access Component (iSAC) capability as specified in Appendix B of the GPNTS TRD.

4.1.1.3 Modular Open Systems Approach/Open System Architecture

The Contractor shall develop and maintain an open architecture that incorporates appropriate considerations for interoperability, supportability, composeability, technology insertion, vendor independence, reusability, scalability, upgradeability, and long-term supportability as required by the 23 DEC 2005 Office of the Chief of Naval Operations (OPNAV N6/7) requirements letter.

The Contractor shall develop an open architecture that supports a Modular Open System Approach (MOSA), and deliver an Open System Management Plan. The open architecture shall support a layered and modular implementation approach, which maximizes the use of available COTS technology (e.g., hardware, operating systems, software, and middleware) and Government-Off-The Shelf (GOTS), where development is required for building systems. MOSA and analysis of long term supportability, interoperability, and growth for future modifications shall be major factors in the Contractor's final integration approach. All of the system components shall facilitate future upgrades and permit incremental technology insertion to allow for incorporation of additional or higher performance elements with minimal impact on the existing systems.

The architectural approach shall provide a viable technology insertion methodology and refresh strategy that supports application of a MOSA and is responsive to changes driven by mission requirements and new technologies.

The Contractor shall develop a detailed open architecture modular design and integration that takes into consideration system interoperability, intra-operability, upgradeability, reconfigurability, transportability, software standards, interface standards, long-term supportability, sources of supply and/or repair, business strategies, and other entities that affect application of a MOSA.

For those portions of software that are driven to proprietary and/or closed system architectures by mission specific requirements, a software partitioning or other design features to mitigate the system level impacts shall be provided to and approved by the Government.

The Contractor shall provide an orderly, planned approach to address migration of proprietary or closed software components or interfaces to a modular design when technological advances are available.

The Contractors modular design and integration shall preclude long term dependence on closed or proprietary interface standards, technologies, products, or architectures. Secure or classified data systems shall also conform to the modular design approach as much as practicable. The design shall provide sufficient growth and open interface standards to allow future reconfiguration and addition of new capabilities without large-scale redesign of the system.

CDRL Deliverable:

- (A001) Open System Management Plan (DI-MISC-80508B)

4.1.1.4 Net-Centric Enterprise Solutions for Interoperability Compliance

Net-Centric Enterprise Solutions for Interoperability (NESI) compliance shall be presented at all design reviews to ensure system and software design conforms to NESI tenants described in the NESI evaluation checklists. Below is a list of NESI items that the Contractor shall follow:

a. All software shall follow NESI Part 3 located at http://nesipublic.spawar.navy.mil for transitioning software solutions.

b. All software shall follow NESI Part 4 located at http://nesipublic.spawar.navy.mil for building nodes.

c. All software shall follow NESI Part 5 located at http://nesipublic.spawar.navy.mil for developing software solutions.

d. All software development will be required to assess compliance using the NESI evaluation checklists for Parts 4, and 5 located at http://nesipublic.spawar.navy.mil.

The Contractor shall develop a NESI Assessment and Migration Plan, with emphasis on the SOA Migration Plan. The plan shall contain the Contractor's proposed use of guidance and best practices from the NESI Part 3: Migration Guidance. This plan shall also contain the results of the assessment described in item d above.

CDRL Deliverable:

- (A002) NESI Assessment and Migration Plan (DI-MISC-80508B)

4.1.2 GPNTS System Documentation (RDT&E)

4.1.2.1 GPNTS System Performance Specification

The Contractor shall develop a system performance specification in accordance with MIL-STD-961E(1) showing full traceability to the GPNTS TRD and this SOW. The Contractor shall maintain configuration control over the GPNTS system performance specification.

CDRL Deliverable:

- (A003) GPNTS System Performance Specification (DI-SDMP-81465A)

4.1.2.2 System/Subsystem and Hardware Configuration Items Specification

The Contractor shall document the System/Subsystem and Hardware Configuration Items (HWCI) requirements and design, showing full traceability to the GPNTS TRD and this SOW. The Contractor shall trace performance, design, and test requirements through each level of the subsystem specifications. The Contractor shall detail these specifications to permit design, production, and evaluation of the end item. The Contractor shall keep all specifications current for the duration of the contract.

CDRL Deliverable:

- (A004) GPNTS System/Subsystem and HWCI Specification (DI-IPSC-81431A)

4.1.2.3 System Requirements Verification Matrix

The Contractor shall provide a Systems Requirements Verification Matrix (SRVM) for the purpose of test planning and tracking of test results. The Contractor shall provide verification traceability for each requirement of the GPNTS TRD and this SOW and for each requirement contained within the Contractor developed lower level specifications. The Contractor shall provide traceability that includes the verification method, verification approach, verification event, and resulting verification status, to assure compliance with that particular requirement. Verification methods may include inspection, analysis, similarity, demonstration, or test. The Contractor shall support the requirements verified by analysis with appropriate documentation. The purpose of the SRVM is to show compliance with all system functional, performance, environmental, and product quality requirements.

The Contractor shall deliver a preliminary SRVM prior to the System Requirements Review (SRR). Prior to the System Functional Review (SFR), Preliminary Design Review (PDR), Critical Design Review (CDR), and Test Readiness Review (TRR), the Contractor shall deliver an updated SRVM. At the completion of testing, the Contractor shall deliver a final SRVM with verification compliance status clearly conveyed, for Government approval. The SRVM format may be implemented and delivered in database format with standard report forms to allow ease of data search and manipulation.

CDRL Deliverable:

- (A005) System Requirements Verification Matrix (DI-MISC-81283)

4.1.2.4 Transition Plan

The Contractor shall develop and maintain a Transition Plan that details the process of transitioning the EDM into production, consistent with NAVSOP-6071, Best Practices: Transition from Development to Production. This plan shall show how Design for Manufacturing (DFM) is taken into account, to include related trade studies and total anticipated cost savings. The Transition Plan shall also show the Contractor's process for continuous improvement. The Transition Plan is a technical evaluation tool that the Contractor shall use to assess program risks when transitioning from development to production. The Transition Plan will be discussed at the PRR and subsequent Program Management Reviews (PMRs).

CDRL Deliverable:

- (A006) Transition Plan (DI-MISC-80508B)

4.1.2.5 GPNTS Technical Data Package

The Contractor shall develop and maintain the GPNTS TDP in accordance with the requirements of MIL-STD-31000 "Standard Practices Technical Data Packages". The GPNTS TDP shall include applicable technical data including models, drawings, associated lists, specifications, standards, performance requirements, quality assurance requirements, software documentation, and packaging details for all GPNTS configurations. The Contractor shall deliver TDP updates containing data required at each design review prior to each review listed in this SOW section 4.1.3.3. The Contractor shall deliver a final TDP version in accordance with the GPNTS TRD at the conclusion of the development phase. The TDP shall describe the physical configuration and performance characteristics of an item or component in sufficient detail to ensure that an item or component produced in accordance with the TDP will be essentially identical to the original item or component.

The Contractor shall develop and submit a TDP that includes the following:

a. Drawings/models and associated lists shall be in the contractor's format, using Government Cage Code and Document Numbers provided by the Government. The Contractor shall submit a GPNTS Drawing Number Assignment Report for each submission of a TDP.

b. The contractor shall develop and deliver a Master Ordering List. The Contractor shall recommend a kit structure that will define the most efficient way for the Government to order Configuration A, B, and C systems as well as upgrade kits and spare parts. The Master Ordering List shall be delivered as a Microsoft Excel workbook and shall include the Bill of Material (BOM) for each configuration, upgrade kit, and spares For each configuration/kit, the Master Ordering List shall include the Contract Line Item Number

(CLIN) identity number, configuration/kit description, configuration/kit application notes, and reference to configuration/kit production drawing index Each GPNTS upgrade kit or replacement part kit shall consist of the hardware required to acquire a specific GPNTS functional interface (e.g. equipment, interface cards, cables, fasteners, and metal work).

c. Complete production documentation set for each GPNTS Configuration/Kit itemized in the Master Ordering List. This set shall include the following information:

    i. Bill Of Materials (BOM) listing for each part in a kit: part numbers, part descriptions, part quantities, suppliers, reference to production drawing index, Spreadsheet in MS Excel 2007 (.xls)

    ii. Scanned copies of manufacturer's product specification sheets and user manual's (if available), Adobe PDF format

    iii. Kit Production Documentation. These are detailed drawings for each mechanical, electrical, or electronic component used in a kit. Included is a drawing index used to track all drawings and revision levels. 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. As a minimum, the following production documents (using the recommended format/media or newer version approved by the Government) are required for each GPNTS Configuration/Kit:

        1. Hardware Drawing Index, Spreadsheet in MS Excel 2007 (.xls)
        2. Cable Wiring Diagram(s), Size=11x17, AutoCAD 2008 (.dwg)
        3. Cable Assembly Drawing(s), Size=11x17, AutoCAD 2008 (.dwg)
        4. Mechanical Fabrication Drawings, Size=11x17, AutoCAD 2008 (.dwg)
        5. Mechanical Assembly Drawings, Size=11x17, AutoCAD 2008 (.dwg)

d. A Family Tree (top-down breakdown) shall be developed and maintained to the Maintenance Significant Item (MSI) level. The MSI level is that level at which an item can be repaired by removing and replacing sub-items at either the organizational, intermediate, 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 Family Tree to provide a clear and concise top-down breakdown of the TDP. The Contractor shall provide the Family Tree prior to the PDR and an updated drawing tree prior to the CDR. The Contractor shall update the Family Tree as the system design develops.

e. GPNTS System Interconnect Diagrams, which are detailed system-level drawings for each GPNTS core configuration system rack. They illustrate the various electronic components and their required cable connections. Each GPNTS configuration has its own version of interconnect drawings.

f. GPNTS 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 items, 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. The Contractor shall provide all available COTS Vendor Equipment Documentation, including drawings and manuals for all appropriate commercial hardware components.

g. Source control drawing approval requests shall be prepared and submitted to the Government. Each potential source control item shall be approved by the Government prior to inclusion of the source control

drawing in the TDP.

h. Proposed critical manufacturing process descriptions (PCMPD) shall be prepared to describe manufacturing processes, which are critical to meeting the design requirements of the item. The process shall be approved as critical by the Government before it is designated as mandatory in TDP documents.

i. GPNTS Source Code from all software developed, funded, and reduced to practice under this contract.

The following American Society of Mechanical Engineers (ASME) standards and Appendices thereto, are applicable:

(1) Commercial Drawings	ASME Y14.100, Engineering Drawing Practices
(2) DoD Basic Practices	ASME Y14.100 and the following Appendices:
	Appendix B, Non-Commercial Drawing Practices
	Appendix C, Drawing Titles
	Appendix D, Numbering, Coding and Identification
	Appendix E, Markings on Engineering Drawings
(3) Types of Engineering Drawings	ASME Y14.24, Types and Applications of Engineering Drawings
	ASME Y14.35M, Revision of Engineering
	ASME Y14.34M, Associated Lists

CDRL Deliverables:

- (A007) GPNTS Drawing Number Assignment Report (DI-SESS-81011D)
- (A008) GPNTS Master Ordering List (DI-SESS-81000D)
- (A009) GPNTS Production Drawings (DI-SESS-81000D)
- (A010) GPNTS Family Tree (DI-SESS-81000D)
- (A011) GPNTS System Interconnect Drawings (DI-SESS-81000D)
- (A012) GPNTS COTS Documentation (including COTS Drawings and manuals) (DI-TMSS-80527B)
- (A013) GPNTS Source Control Drawings Approval Request (DI-SESS-81010D)
- (A014) GPNTS Proposed Critical Manufacturing Process Descriptions (DI-SESS-81012D)
- (A015) GPNTS Source Code (DI-IPSC-81488)

4.1.2.6 Interface Control Documentation

The Contractor shall develop Interface Control Documents (ICDs) for all external and internal interfaces (that are not provided in the GPNTS TRD, Section 2, Applicable Documents) with sufficient detail to allow the individual design of co-functioning items and to assure that the items, when individually designed and produced, will work together properly to satisfy higher level performance requirements. If any change isolated to a single item needs to be implemented for any reason, its performance, function, or physical attributes, which are related to the interface, constrain the design change. As needed, configuration item (CI) performance specifications and other deliverable documentation may be referenced in the Interface Control Documents. In addition to the need to reduce

development risk, the intent is to eliminate the need to re-engineer an interface for transition from EDM to production. The Contractor shall submit the Preliminary Interface Control Documents prior to the PDR and shall submit the final Interface Control Documents prior to the CDR.

CDRL Deliverable:

- (A016) Interface Control Document (ICD) (DI-CMAN-81248A)

4.1.2.7 DD Form 1494 Compliance

As part of the Spectrum Supportability assessment and determination, the Contractor shall provide the necessary technical data, consisting of a combination of calculated and measured data, to assist PMW/A 170 in filing Stage 3 DD1494 applications for all frequency bands and for all submarine, ship, and shore platforms.

Deleted: The

CDRL Deliverable:

- (A017) Frequency Allocation Data (DI-MISC-81174)

4.1.2.8 Software Development Plan

The Contractor shall generate and deliver a Software Development Plan (SDP) that describes all aspects of the software development (e.g., processes, tools, environment, test phases, verification, anomaly tracking, requirement traceability) in accordance with the Capability Maturity Model Integration (CMMI) capability level 3 (minimum) practices and IEEE/EIA 12207. The Contractor shall follow this SDP for all software to be developed or maintained under this effort.

The Contractor shall define the Contractor's proposed life cycle model and the processes used as part of that model in the SDP. In this context, the term 'life cycle model" is as defined in IEEE/EIA Std. 12207.0. The Contractor shall describe the overall life cycle and include primary, supporting, and organizational processes based on the work content of this SOW in the SDP. In accordance with the framework defined in IEEE/EIA Std. 12207.0, the Contractor shall define the processes, the activities to be performed as a part of the processes, the tasks which support the activities, and the techniques and tools to be used to perform the tasks in the SDP.

The SDP shall contain the information defined by IEEE/EIA Std. 12207.1, section 5.2.1 (generic content) and the plans or procedures in Table 1 of IEEE/EIA Std. 12207.1. In all cases, the level of detail shall be sufficient to define all software development processes, activities, and tasks to be conducted. Information provided must include, as a minimum, specific standards, methods, processes, tools, environment, test phases, requirements traceability, actions, strategies, and responsibilities associated with development and qualification.

CDRL Deliverable:

- (A018) Software Development Plan (including CM Plan) (DI-IPSC-81427A)

4.1.2.9 Software Configuration Management Plan

The Contractor shall develop and implement a software configuration management plan. The plan shall describe, at a minimum, the configuration management activities, procedures, and schedule for performing software CM activities; the organization(s) responsible for performing configuration management and activities; and their relationship with other organizations, such as software development or maintenance. The plan shall be documented in the SDP (see Section 4.1.2.8). The Contractor shall designate a Configuration Control Manager to manage the configuration control activities.

The Contractor shall establish a Software Configuration Control Board (SCCB) to discuss and resolve issues interrelated between the computer software configuration items (CSCIs) and the overall software architecture for developed code. A Government representative will participate in the SCCB. At a minimum, the SCCB meetings shall be held monthly via teleconference with the Government. All meeting materials related to SCCB meetings shall be delivered no later than fourteen working days prior to the meeting. Monthly SCCB presentation materials shall include identification of all software related issues and Software Trouble Reports (STRs), prioritization of

STRs, STR resolution plans, and documentation associated with software problems and assessment of sufficiency, and acceptance of STR resolution approaches and final resolution. SCCB tasks and responsibilities shall be documented in a SCCB Charter to be developed by the contractor and included in the first presentation materials deliverable.

CDRL Deliverables:

- (A019) Conference Agenda (DI-ADMN-81249A)
- (A020) Presentation Material (DI-ADMN-81373)
- (A021) Report, Record of Meeting / Minutes (DI-ADMN-81505)

4.1.2.10 Software Requirements Specification

The Contractor shall develop software requirements from allocated system level requirements to ensure they meet both functional and non-functional requirements of the GPNTS TRD and this SOW. Functional requirements include the technical/operational functions the software must be capable of performing. Non-functional requirements include the characteristics of the software, such as, performance, reliability, maintainability, security, safety, and error handling. The Contractor shall develop a Software Interface Requirements Specification (SIRS) within the Software Requirements Specification (SRS) to document the interface with all hardware and software interfaces.

CDRL Deliverable:

- (A022) Software Requirements Specification (including SIRS) (DI-IPSC-81433A, DI-IPSC-81434A)

4.1.2.11 Software Design Description

The Contractor shall develop a Software Design Description (SDD) document for software developed for the GPNTS system. Within the SDD, the Contractor shall describe the design of each Computer Software Configuration Item (CSCI) to include: CSCI-wide design decisions, the CSCI architectural design, and the detailed design needed to implement the software.

CDRL Deliverable:

- (A023) Software Design Description (SDD) (DI-IPSC-81435A)

4.1.2.12 Firmware Reprogramming Procedures

The Contractor shall identify and record information needed to program and reprogram firmware devices installed within GPNTS. If a software tool is required, the Contractor shall provide that tool to the Government.

CDRL Deliverable:

- (A024) Firmware Support Manual (DI-IPSC-81448A)

4.1.2.13 Software Version Description

The Contractor shall employ a software version control / tracking system to facilitate the incremental build stages of the code. For each software configuration item and its versions, the following shall be identified at a minimum:

a. The version references
b. Identification details
c. Description of the contents
d. Changes to each release

CDRL Deliverable:

- (A025) Software Version Description (SVD) (DI-IPSC-81442A)

4.1.3 Systems Engineering (RDT&E)

4.1.3.1 System Engineering Management Plan

The Contractor shall prepare, deliver, update and maintain a Systems Engineering Management Plan (SEMP) in accordance with the GPNTS Systems Engineering Plan (SEP). The Contractor shall conduct analysis to identify support functions and requirements needed to develop, test, operate, and maintain GPNTS, as well as identifying, tracking, and validating critical Technical Performance Measures (TPMs). The Contractor shall describe their System Engineering Process. The SEMP shall provide details about how the Contractor shall organize to accomplish SE activities, the problem-solving process that will be used, documentation that will be used to support this process, approval channels, integration activities, criteria for transitioning critical technologies, technical performance measures/metrics, and additional information as required. The SEMP shall address how the Contractor intends to manage the program by architectural blocks and their interfaces.

CDRL Deliverable:

- (A026) System Engineering Management Plan (DI-SESS-81785)

4.1.3.2 Configuration Baseline Reviews

4.1.3.2.1 Integrated Baseline Review

The Contractor shall engage jointly with the Government's program manager and technical staff in conducting Integrated Baseline Reviews (IBRs) focused on evaluating the realism and inherent risks in the Contractor's integrated Performance Measurement Baseline (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. The initial IBR shall be conducted as soon as feasible after the PMB is fully established and documented but not later than 180 days after contract award without specific authorization of the Contracting Officer. At the discretion of the Government, subsequent IBRs will be conducted, as needed, throughout the life of the contract following initiation of an undefinitized contract action, contract modifications, major milestone events, major changes to the baseline, or replanning. Each IBR will verify that the Contractor has established and is maintaining 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 will also record any indications that effective EVM is not being used. The scope of any subsequent IBRs will be tailored to the nature of the event, activity or work effort. The IBR will be conducted within a reasonable time after the occurrence of the program event. The Contractor shall flow-down IBR requirements to those subcontractors that meet the applicable thresholds for EVM reporting. The prime Contractor shall lead IBRs at subcontractors, with active participation from the Government. During contract performance, the Contractor will provide ongoing access to its records and data that underlie and support the PMB and cost and schedule data reported.

CDRL Deliverable:

- (A027) IBR Conference Agenda/Minutes (DI-ADMN-81249A, DI-ADMN-81250A)

4.1.3.2.2 Functional Configuration Audit

The Functional Configuration Audit (FCA) is performed to verify that the GPNTS system and its configuration items (CIs) are accurate, complete, and compatible, and the CI has achieved the performance and functional characteristics delineated in the Performance Specification. The Government and the Contractor shall conduct the FCA jointly, at a time and place mutually agreed to, with the Government chairing the audit. As part of the configuration management plan, the Contractor shall provide an approach and proposed schedule for conducting the FCA and identification of the CIs/CSCIs to be audited. The Contractor shall participate and assist the Government

in conducting the FCA, using the guidelines contained in MIL-HDBK-61A, section 8. The Contractor shall be responsible for providing the system to be audited, facilities, personnel, documentation (including drawings), and other support as may be required. The Contractor shall develop a configuration audit summary report after each audit. The Contractor shall correct all audit discrepancies as documented in the configuration audit summary reports. The functional baseline will be validated upon completion of the FCA and resolution of audit discrepancies.

CDRL Deliverable:

- (A028) Configuration Audit Summary Report (Functional) (DI-CMAN-81022C)

4.1.3.3 Technical Reviews

The Contract 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. Deliverables shall be in accordance with the applicable CDRL.

All technical reviews listed and described in the upcoming sections shall be in accordance with the GPNTS SEP. The Contractor shall deliver all technical review presentation materials to the Government no later than 30 days prior to the scheduled review. The meeting minutes from each technical review shall be submitted seven (7) calendar days after the conclusion of the meeting. The Contractor shall present the TPM status during each technical review.

4.1.3.3.1 System Requirements Review

SRR is a multi-disciplined technical review to ensure that all system requirements and performance requirements derived from the TRD are defined and are consistent with cost, schedule, risks and other constraints. The SRR shall be considered complete after the adjudication and closure of all critical comments within 45 calendar days of the SRR event.

CDRL Deliverables:

- (A019) Conference Agenda (DI-ADMN-81249A)
- (A020) Presentation Material (DI-ADMN-81373)
- (A021) Report, Record of Meeting / Minutes (DI-ADMN-81505)

4.1.3.3.2 System Functional Review

The SFR is a multi-disciplined technical review to ensure that the GPNTS system can proceed into preliminary design and that all system requirements and functional performance requirements derived from the TRD are defined and is consistent with cost, schedule, risk, and other system constraints. The contractor shall provide a preliminary Allocated Baseline Decision Analysis (ABDA) as part of the Presentation Materials (CDRL A020) for SFR. The SFR shall be considered complete after the adjudication and closure of all critical comments within 45 calendar days of the SRR event.

CDRL Deliverables:

- (A019) Conference Agenda (DI-ADMN-81249A)
- (A020) Presentation Material (DI-ADMN-81373)
- (A021) Report, Record of Meeting / Minutes (DI-ADMN-81505)

4.1.3.3.3 Preliminary Design Review

PDR is used to resolve any issues in the performance specification; however it will not be used as an opportunity to impose additional requirements. The contractor shall provide the final ABDA as part of the Presentation Materials (CDRL A020) for PDR. The contractor shall ensure the ABDA documents the contractor technical and non-

technical rationale and reasoning on how and why they chose to allocate functions to physical CIs. The Contractor shall include each equipment, hardware, and software configuration items and related peculiar support equipment in the PDR presentation. The Contractor shall show and/or demonstrate that evaluations of materials, lead times, tooling, fabrication techniques, assembly methods, test equipment, skills, processes, and inspection techniques have been accomplished for all equipment, hardware, and software configuration items and related support equipment, and the producibility objectives have been achieved. This review will evaluate the progress, technical adequacy, and risk resolution (on a technical, cost, and schedule basis) of the design and will assess the technical risk associated with the selected manufacturing (assembly) methods (processes). The Contractor shall also identify all single source, sole source, and diminishing source(s) in the PDR presentation materials. The PDR shall be considered complete after the adjudication and closure of all critical comments within 45 calendar days of the PDR event.

CDRL Deliverables:

- (A019) Conference Agenda (DI-ADMN-81249A)
- (A020) Presentation Material (DI-ADMN-81373)
- (A021) Report, Record of Meeting / Minutes (DI-ADMN-81505)

4.1.3.3.4 Critical Design Review

At the CDR, the Contractor shall include in the presentation materials a final design that incorporates all deficiencies identified from the PDR. The Contractor shall present a detailed review of the hardware and software design for the GPNTS system and all data items required by the contract at the CDR. The Contractor shall address NESI compliance (SOW section 4.1.1.4) as part of the CDR The Contractor shall provide a requirement trace capable of demonstrating that the design delivered at CDR implements the performance requirements of the GPNTS system, and shall present the methods used to verify and validate the design. The Contractor shall provide an assessment of the results of producibility analyses conducted on system hardware to ensure detailed producibility design solutions satisfy the established requirements. The Contractor shall include at a minimum, the following topics at the CDR:

a. Detailed evaluation of Program Plan indicating Design, Fabrication, Test Phases and Specification/Interface specification/drawings
b. Detailed evaluation of Electrical/Mechanical/Software Design
c. EMI/Thermal/Cooling Design
d. Detailed Reliability/Maintainability Analysis
e. Environment, Safety, and Occupational Health (ESOH) Analysis
f. NBC Survivability
g. Packaging/Handling/Storage/Transportability
h. Testing documents
i. Interoperability

The CDR shall be considered complete after the adjudication and closure of all critical comments within 45 calendar days of the CDR event.

CDRL Deliverables:

- (A019) Conference Agenda (DI-ADMN-81249A)
- (A020) Presentation Material (DI-ADMN-81373)
- (A021) Report, Record of Meeting / Minutes (DI-ADMN-81505)

4.1.3.3.5 Production Readiness Review

The PRR is performed to formally evaluate the Contractor's production readiness, identify existing or projected manufacturing problems, and areas of risk. The Contractor shall demonstrate progress in the following areas: (1) attaining the program's production goals, (2) resolving manufacturing problems (or that a plan for their resolution acceptable to the Government has been developed), and (3) mitigating all production risks. The Contractor shall show that the system design has included those key production factors (e.g., least cost, minimum manufacturing time, manufacturing simplicity/flexibility, resource availability) necessary to assure the system can be acquired on schedule at minimum cost. The Contractor shall conduct the initial production readiness review at the Contractor's facility. At the Government's discretion, follow-on production program reviews may be held quarterly at the Contractor's facility. The Contractor shall propose the review dates and obtain approval by the Government and incorporate into the program schedule. The Contractor shall include in the PRR agenda at least the following considerations, as applicable:

a. A Manufacturing Program Review to include the overall manufacturing process and detailed factors such as: manufacturing organization, responsibilities, facilities and equipment, manufacturing methods, and production flow,

b. A status review of all production efforts for cost and schedule considerations,

c. A status review of manufacturing technology and other previously recommended actions to reduce cost, manufacturing risk, and industrial base concerns,

d. A status review of production engineering efforts, tooling and test equipment demonstrations, and proofing of new materials, processes, methods, special tooling, test equipment,

e. A status of the hazard list from the ESOH analysis,

f. The status of long lead items for production, if any.

The PRR shall be considered complete after the adjudication and closure of all critical comments within 45 calendar days of the PRR event.

CDRL Deliverables:

- (A019) Conference Agenda (DI-ADMN-81249A)
- (A020) Presentation Material (DI-ADMN-81373)
- (A021) Report, Record of Meeting / Minutes (DI-ADMN-81505)

4.1.4 Program Management (RDT&E)

The Contractor shall provide program management to ensure all work conducted during the EMD phase of this contract is planned and executed in a manner that will achieve all management, technical, logistical, cost, and schedule objectives. The Contractor shall ensure coordination and integration of all functional areas within each task. The Contractor shall establish and perform business management functions to ensure contracting related actions meet established need dates of the Government. The Contractor shall use the Contracting Officer Representative (COR) as the primary point of contact for all program activities.

CDRL Deliverable:

- (A029) Contractor's Progress, Status, and Management Report (DI-MGMT-80227)

4.1.4.1 Post-Award Conference

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

a. Identify and introduce Contractor management, engineering, and other key personnel to the Government representatives. Each individual shall define his/her area of responsibility and accountability.

b. Explain the Contractor's organization, plans, procedures, and schedules to execute this SOW, including illustrating how the Contractor will minimize schedule, cost, and performance risks.

c. Present the Contractor's business and technical management procedures (e.g., technical point of contact assignments, status reporting procedures, and designated lines of authority) that shall be implemented to accomplish the requirements of the contract.

d. Present the Contractor's current staffing plan.

e. Identify status of subcontracts in effect or anticipated.

f. Allocate time for the Government to present its organization, plans, procedures, schedules, and concerns.

g. Allocate time for an open forum to discuss contract-related issues.

CDRL Deliverables:

- (A019) Conference Agenda (DI-ADMN-81249A)
- (A020) Presentation Material (DI-ADMN-81373)
- (A021) Report, Record of Meeting / Minutes (DI-ADMN-81505)

4.1.4.2 Program Management Reviews

The Contractor shall conduct periodic PMRs in a presentation to the Government at the Contractor's facility or via video or teleconferences. These reviews will occur at least quarterly and may occur as often as monthly if conditions require. The Contractor shall report on cost, schedule, technical progress, program risks and mitigations, and technical performance measures. The Contractor shall present the Risk Management Database and Risk Management Chart as part of the PMR Presentation Materials.

CDRL Deliverables:

- (A019) Conference Agenda (DI-ADMN-81249A)
- (A020) Presentation Material (DI-ADMN-81373)
- (A021) Report, Record of Meeting / Minutes (DI-ADMN-81505)

4.1.4.3 Integrated Product Teams

The Contractor shall apply a systematic approach to the integrated, concurrent development of the products and processes that apply to the development and production of GPNTS system. Integrated Product Teams (IPTs) are a vital part of the DoD acquisition oversight and review process and will therefore be implemented on this contract.

At a minimum, the Contractor shall support the following Government chaired IPTs: System Engineering (SE), Test and Evaluation (T&E), Contract, and Logistics. Additional IPTs or less formal working groups will be formed, as required. Any Contractor-led IPTs formed can include Government participants. The Contractor shall not be relieved of the responsibility of meeting contractual requirements due to implementation of any IPT approach. During the IPT process, if issues are identified that the Contractor feels will have significant impact on the terms of the contract, the Contractor shall identify the issue, in writing, to the Government COR/Procuring Contracting Officer (PCO) for resolution. The use of video or teleconferencing is encouraged for IPT meetings. The IPTs will be scheduled by the Government and will meet at least monthly to discuss the program's activities.

4.1.5 Integrated Performance Management (RDT&E)

Earned Value Management (EVM) facilitates Integrated Performance Management (IPM). Defense Federal Acquisition Regulation Supplement (DFARS) 252.234-7001 and 252-234-7002 apply. Internal management control systems used by the Contractor to plan and control contract performance shall comply with ANSI/Electronic Industries Alliance (EIA) Standard 748, Earned Value Management Systems (EVMS) (ANSI/EIA-748-B).

4.1.5.1 Integrated Performance Management System

The Contractor shall establish, maintain, and use in the performance of this contract, an integrated performance management system. Central to this integrated system shall be the use of an EVMS that has been previously validated/accepted by the Defense Contract Management Agency (DCMA) as compliant with ANSI/EIA-748-B requirements. The EVMS shall be linked to and supported by the Contractor's existing internal performance management systems and processes used to plan, schedule, status, direct, budget, monitor, manage, and report cost, schedule, and technical progress applicable to the contract. Formal risk management shall also be an integral part of the Contractor's integrated performance management system including the Integrated Master Schedule (IMS) and Contract Performance Report. The correlation and integration of these internal systems and processes shall provide for early indication of cost and schedule problems, and their relation to technical achievement. 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, PMRs and other status meetings. The Contractor's EVMS shall be maintained in accordance with EVMS ANSI/EIA-748-B guidelines/requirements, DFARS 252.234-7002, and the Contractor's own documented EVMS Description. If the Government determines from Integrated Baseline Review (IBR) results, DCMA surveillance, or quality assessments of Contract Performance Report (CPR) cost and schedule data, that EVMS deficiencies exist, the government will perform a Compliance Review of the Contractor's EVMS.

4.1.5.2 Integrated Subcontract Management

The Contractor shall flow down the requirements of DFARS 252.234-7001 and 252.234-7002, the IMS (CDRL A033), and CPR (CDRL A034), to Subcontractors meeting the applicable thresholds (e.g. exceeding $20 million in then-year dollars). EVMS flow down to Subcontractor 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 Government. Any Subcontractor with a contractual flow down requirement for EVM should also be included in the IBR. A separate IBR may be conducted at the Subcontractor's facility, in which case the prime Contractor shall take the lead in conducting the IBR, with active Government participation. Alternatively, the Subcontractor 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 via the Contractor's integrated performance management system and EVMS. The Contractor is responsible for reviewing and assuring the validity of all Subcontractor EVM reporting through surveillance and other means. It may also be necessary to conduct IBR's with Subcontractors who do not meet the dollar value threshold based on the risk inherent in their work, criticality of their performance to the total program, or percent of the total work share. Exceptions will be mutually agreed upon by the Contractor and the Government.

4.1.5.3 Contract Work Breakdown Structure

Using MIL-HDBK-881B as a guide, the Contractor shall develop a Contract Work Breakdown Structure (CWBS) and CWBS Dictionary. The Contractor's organizational entity responsible for systems engineering shall analyze the system requirements specified in this SOW and TRD, and translate them into a CWBS representing the products and services that comprise the entire work effort commensurate with the contract requirements. The Contractor shall extend the CWBS provided by the Government, RFP Attachment 5, down to at least level 5, 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. The Contractor shall maintain, update, and deliver the CWBS and the CWBS Dictionary during the execution of the contract. Changes to the CWBS and/or associated CWBS Dictionary definitions at any reporting level will require approval of the Government.

CDRL Deliverable:

- (A030) Contract Work Breakdown Structure (including CWBS Dictionary) (DI-MGMT-81334C)

4.1.5.4 Integrated Master Plan

The Contractor shall develop, maintain, and deliver an Integrated Master Plan (IMP). The IMP shall be updated to reflect changes to the ongoing program, in accordance with the IMS at each PMR and at each technical review. The contractor shall use the DoD Integrated Master Plan and Integrated Master Schedule Preparation and Use Guide Version 9 of 21 October 2005 as guidance for schedule, management plan and process development. The Contractor shall develop, update, and maintain an integrated Risk Management process, Configuration Management process, Documentation Management process, Quality Management process, and Requirements Management process documented as an appendix to the IMP.

CDRL Deliverable:

- (A031) Integrated Master Plan (DI-MGMT-80004A)

Moved down [1]: The Contractor shall conduct a quarterly Schedule Risk Assessment (SRA). The government may elect to participate in the SRA process. The SRA will assess the following paths:¶

4.1.5.5 Integrated Master Schedule

The Contractor shall develop, maintain, and deliver a logically networked IMS, in accordance with the IMP/IMS Preparation and Use Guide and the Earned Value Management Implementation Guide (EVMIG). The IMS shall contain the planned events and milestones, all activities from contract award to contract completion, activity entrance and exit criteria, and risk(s) mitigation activities identified and documented in the Contractor's Risk Management Plan (RMP) (CDRL A038). The IMS shall reflect the tasks, dates (baseline, forecast, and actual), external and internal dependencies, and relationships necessary to support accurate forecasts of contract milestone delivery dates by both the Contractor and the Government. The IMS shall be developed, maintained and reported consistently and in conjunction with the CWBS and the CPR. The Contractor shall support monthly teleconferences, as needed, to discuss IMS progress and issues.

The Contractor shall conduct a quarterly Schedule Risk Assessment (SRA). The government may elect to participate in the SRA process. The SRA will assess the following paths:

a. Project Critical Path – longest path through entire project
b. Critical Path to next major milestone(s)
c. Near Critical Paths to next major milestone(s)

Moved (insertion) [1]

CDRL Deliverable:

- (A032) Integrated Master Schedule (DI-MGMT-81650)

4.1.5.6 Contract Performance Report

The Contractor shall submit monthly CPRs, referencing EVMS ANSI/EIA-748-B and the DoD EVMIG. In addition to monthly CPR submittals, the Government may arrange phone conferences at its discretion to discuss CPR performance data, cost/schedule variances, estimates at completion (EACs), and other items of concern or interest.

CDRL Deliverable:

- (A033) Contract Performance Report (DI-MGMT-81466A)

4.1.5.7 Contract Funds Status Report

The Contractor shall submit quarterly Contract Funds Status Reports (CFSRs). The CFSR will 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 CFSR reporting level will provide funding requirements and time phased detail at the CLIN level as well as the total program. The Contractor shall reconcile the reporting elements in the CFSR with the relevant Work Breakdown (WBS) reporting elements in the CPR when the documents are submitted in the same month. The reconciliation will be provided as an addendum to the CPR submittal. All time phased data will be prepared such that it is grouped to provide visibility into the Government fiscal year. If the program is incrementally funded, it may be necessary for the Contractor to provide monthly increments at the beginning of the program or when EAC changes and/or contract modifications are implemented. The Contractor will identify the elements of Termination Liability and Open Commitments in the notes section of the CFSR.

CDRL Deliverable:

- (A034) Contract Funds Status Report (DI-MGMT-81468)

4.1.6 Configuration Management (RDT&E)

The Contractor shall develop and implement a Configuration Management (CM) Plan using MIL-HDBK-61A and the PMW/A 170 Configuration Management Plan as a guide addressing the following:

a. Configuration Management and Planning - Determines which items will be managed, who will be responsible and how the CM function will be performed, and shall include direct performance of tasks or oversight of subordinates.

b. Configuration Identification - Provides the systematic process of selecting the product attributes, organizing associated information about the attributes, and stating the attributes.

c. Configuration Control - Identifies and implements a systematic process to ensure that changes to released configuration documentation are properly identified, documented, evaluated for impact, approved by an appropriate level of authority, incorporated, and verified.

d. Configuration Status Accounting (CSA) - Addresses the configuration management activity concerning the capture, storage of, and access to configuration information needed to manage products and product information effectively.

e. Configuration Audit and Technical Reviews - Provides the formal examination of the “as built” configuration of a configuration item against its technical documentation to establish or verify the configuration item’s product baseline.

f. Information Assurance (IA) boundary requirements in compliance with GPNTS TRD and the GPNTS Information Assurance Plan.

g. Organization, roles, responsibilities, and resources.

h. Definition of terms.

i. Programmatic and organizational interfaces.

j. Deliverables, milestones, and schedules.

k. Subcontract flow down.

The CM plan shall document life cycle CM planning and provides CM program milestones and schedules to monitor program status. The Contractor shall implement an internal configuration management system for the control of all configuration documentation, physical media, and physical parts representing or comprising the GPNTS system. For software, the system shall address the evolving configuration and support environments (engineering, implementation, and test) used to generate and test the product. CM shall be defined consistent with requirements identified in the GPNTS TRD and this SOW. The Contractor shall include a Government representative, to support internal software and hardware configuration control board meetings and reviews.

The Contractor shall recommend a CM tool (i.e. Configuration Management Information System (CMIS), PowerLog-J, Access Database) that will be used by the Contractor and ultimately by the Government to track and manage CIs.

CDRL Deliverable:

- (A035) Contractor's Configuration Management Plan (DI-CMAN-80858B)

4.1.6.1 Configuration Status Accounting

The Contractor shall establish and maintain a Configuration Status Accounting (CSA) database, which represents the configuration of the GPNTS system. All baselines and changes shall be documented in the Contractor's CSA database. The Contractor shall permit acceptance of commercial product information in the CSA database; however, if requirements to report data outside of the CSA database or format exist, the Contractor shall deliver the information as a supplement to prevent disruption to their existing system. The Contractor shall reconcile any differences between the supplier information and Contractor practices in the CSA database to provide the Government with clear accountability of product information. Additionally, the Contractor shall provide a reliable source of configuration information to support GPNTS activities, including program management, systems engineering, logistics support, and modification/maintenance actions in the CSA database. The Contractor shall require the CSA database to allow CSA data in a digital format compatible with the Navy's CSA automated information system, CMIS. The Contractor shall provide CSA reporting in accordance with the guidelines in section 7 "Configuration Status Accounting" in MIL-HDBK-61A to:

a. Identify the current approved configuration documentation for each CI and CSCI including the IA requirements defined in the GPNTS TRD and this SOW.

b. Record and report the status of proposed engineering changes from initiation to final approval/contractual implementation.

c. Record and report the status of all major requests for deviations that affect the configuration of a CI.

d. Record and report implementation status of authorized changes.

e. Provide the traceability of all changes from the original baseline configuration documentation of each CI and CSCI including IAVA.

f. Provide a status accounting report to the MSI level in top-down breakdown, including the Serialized Assembly Record (SAR) data, detailing the reference number, reference designator, serial number and revision level, software version, and Item Unique Identification (IUID) for each CI as approved by the Contracting Officer.

g. Provide a list of any field changes and their status.

CDRL Deliverable:

- (A036) Configuration Status Accounting Report (DI-CMAN-81253A)

4.1.6.2 Nomenclature Assignment and Identification of Plates

GPNTS shall be identified as a new system in accordance with MIL-STD-196E "Joint Electronics Type Designation System" and the DoD Cataloging Handbook - H6 "Cataloging Handbook - Section A, Federal Item Name Directory for Supply Cataloging". All ILS products detailed in this SOW shall use the official nomenclature assignment once approved by the Government. All other documentation detailed in this SOW will track to the official nomenclature assignment to the greatest extent possible.

For identification of the system into the Government inventory, military nomenclatures (e.g., type designator and item names) shall be assigned by the Government based on information provided by the Contractor on the DD Form 61 "Request for Nomenclature" for entry into the Joint Electronics Type Designation Automated System (JETDAS) system (https://tdas6.monmouth.army.mil/jetdas/). The Contractor shall utilize MIL-P-15024/5 "Military Specification Sheet, Identification" Figure 3B "Group" and Figure 3C "Unit" for nameplate assignment requirements. Nameplates shall be provided for nomenclature assignment for all end item equipment. Nameplates may be any size that is compatible with the size of the equipment to which the plate will be attached.

CDRL Deliverables:

- (A037) Request for Nomenclature (DI-CMAN-81254A)
- (A038) Request for Approval of Identification Plate Drawing (DI-MISC-80508B)

4.1.7 Risk Management Program (RDT&E)

The Contractor shall maintain a risk management program and develop a Risk Management Plan (RMP) consistent with the guidance in the Risk Management Guide for DoD Acquisition, 6th Edition, Version 1.0, and the PMW/A 170 Risk Management Plan, dtd. December 2009, throughout the life of the contract. The plan shall be modified, as necessary, to maintain currency with best industry practices and consistency with the Contractor's continuous improvement policies and practices. The RMP shall, as a minimum, address cost, schedule, and technical risk management for critical design areas including:

a. Reliability,
b. Configuration control program for hardware and software,
c. Software performance,
d. GPNTS Security,
e. Interoperability,
f. Supportability,
g. System Availability.

The Contractor shall address risk assessment and subsequent management of any risk associated with non-compliance to the TRD and the GPNTS design.

CDRL Deliverable:

- (A039) Risk Management Plan (DI-MGMT-81808)

4.1.8 Research and Technology Protection Program (RDT&E)

Research and Technology Protection (RTP) is an umbrella term that refers to a collection of security and security related measures and countermeasures taken by Programs of Records and Non-ACAT Projects to systematically protect Critical Program Information (CPI) and critical technologies. All work is to be performed in accordance with the DoD and Department of the Navy (DON) RTP requirements, per the DoDD 5000.01, DoDI 5000.02, DoDI 5200.39, Defense Acquisition Guidebook (DAG), DoN CPI Determination Standard Process, and SPAWARINST 3432.1. The Contractor shall participate in the determination of the GPNTS program's CPI and implementation of RTP and RTP related countermeasures to protect DoD CPI, which shall be included in the Contractor's GPNTS CPI Report. Items designated as CPI are the programs 'crown jewels' and therefore require a higher level of protection from adversarial collection or exploitation than may normally be afforded to similar technical or operational data, or it's associated manufacturing processes, software or hardware. These protections may have an impact to the Contractor's security or operations related to the support or performance of this SOW.

CDRL Deliverable:

- (A040) GPNTS CPI Report (DI-MISC-80508B)

4.1.9 Testing (RDT&E)

The GPNTS Program will implement an Integrated Testing (IT) approach. IT is the collaborative planning and execution of test phases and events to provide data in support of independent analysis, evaluation, and reporting by all stakeholders, particularly the Developmental Test (Contractor and Government) and Operational Testing (OT) communities. IT blends Contractor Testing (CT), Developmental Testing (DT), and OT to form a cohesive testing continuum.

IT does not eliminate the requirement for an independent Initial Operational Test & Evaluation (IOT&E) phase of OT. However, the expectation is that the IOT&E period will be reduced in scope and time due to the early integrated involvement of operational testers throughout the entire continuum of system development. IT entails a significant departure from legacy OT methodology and encompasses some key planning paradigms, including:

a. A requirement for the OT team to provide detailed OT input to the IT planning process, and provide it much earlier in the program schedule than the norm for previous OT planning,

b. The sharing of data throughout development and the associated IT periods. This sharing will support the monitoring and assessment of system capabilities, attributes, Key Performance Parameters (KPP), Measures of Effectiveness (MOE), and Measures of Suitability (MOS) in order to support the resolution of most Critical Operational Issues (COIs), pending completion of the IOT&E.

The benefits of an IT approach are significant; however these benefits cannot be achieved without the cooperation of all parties and a commitment to a team approach between the program office, developmental testers, operational testers, and Contractor personnel. Benefits include:

a. Robust testing minimizes surprises when the product is sent to the warfighter and ensures the specified capabilities are evaluated in the operational environment,

b. Risk is reduced by bringing all testing agents together early in the process to ensure capabilities are tied to missions and tasks, mission-based testing is conducted, system anomalies/deficiencies are identified early in the process, and all data are shared,

c. Cost is reduced by the sharing of resources, elimination of duplicative testing, and the early identification and correction of deficiencies,

d. Schedule compression is achieved by combined versus sequential testing and the sharing of high demand testing assets.

e. Instantiates a collaborative effort between PM/OT/DT/Users/Vendors. This facilitates development of the Mission Based Testing and coordinated test plans, and provides test resources which can be leveraged across all test events.

4.1.9.1 Contractor Test and Evaluation

The Contractor shall establish and conduct a robust, comprehensive, and effective test program that provides the basis for verifying the technical, operational, maintainability, availability, and reliability requirements of GPNTS. The Contractor shall structure the test program to support not only the Contractor's in-plant hardware and software testing, but also support the IT requirements for Government testing, both in-plant and at Government labs and operational sites. All Contractor testing is subject to monitoring by the Government. The Government shall be given access to all Contractor generated T&E data related to the GPNTS Program within 30 calendar day of test event completion. This T&E data shall include, test plans, test procedures, test analysis, and test reports. The Contractor shall maintain all GPNTS related T&E data in a database, and be responsible for storing, maintaining, and validating this data. The Government must be notified a minimum of thirty (30) calendar days prior to any testing event and given the option to witness each test event.

The Contractor shall work with the Government T&E representatives to show compliance with the GPNTS TRD, SOW, SSS, SPS, and SRS. The Contractor shall test every function and performance requirement in accordance with the GPNTS TRD, SRVM, SOW, SSS, SPS, and SRS. The Contractor may tailor the scope of Contractor T&E only with Government approval. For GPNTS EDM development, Contractor T&E shall include industry standard testing (e.g. Development Test and Evaluation (DT&E), Formal Qualification Testing (FQT), System Integration Testing (SIT), Factory Acceptance Testing (FAT)), and environmental testing. Contractor T&E shall include component level, unit level, and sub-subsystem level testing as it pertains to each HWCI/CSCI in the assembly drawings and wiring diagrams. The GPNTS T&E IPT shall convene for a TRR prior to each major test event.

CDRL Deliverables:

- (A019) Conference Agenda (DI-ADMN-81249A)
- (A020) Presentation Material (DI-ADMN-81373)

- (A021) Report, Record of Meeting / Minutes (DI-ADMN-81505)

4.1.9.1.1 Test and Evaluation Program Plan

The Contractor shall develop the Test and Evaluation Program Plan (TEPP) consistent with PMW/A 170 GPNTS Test and Evaluation Master Plan (TEMP). The TEPP shall cover all aspects of Contractor testing described in this SOW. The TEPP shall describe how the Contractor anticipates supporting the DT/IT and OT processes and events. In the TEPP, the Contractor shall describe the complete test program evolution from unit level tests through system and external interface tests, and at a minimum, include an Integrated Master Test Schedule, descriptions of the significant phases of Contractor testing, formats for test plans and test reports, an overview of test methodologies to be used, and data collection and analysis procedures. The Contractor shall also include in the TEPP test capabilities and facilities required to confirm and demonstrate that the developed items and the integrated system comply with the contractual requirements. The Contractor shall list any Modeling & Simulation (M&S) tools planned for use in testing GPNTS in the TEPP. Additionally, the Contractor shall include any Contractor capability gaps for testing the GPNTS system, and how the Contractor plans on addressing them in the TEPP. The Contractor shall deliver the TEPP to the Government within 30 days before PDR for Government approval.

Deleted: after

Deleted: contract award

CDRL Deliverable:

- (A041) Test & Evaluation Program Plan (including Integrated Master Test Schedule) (DI-NDTI-81284)

4.1.9.1.1.1 System Integration Testing

The Contractor shall verify that the GPNTS subsystems meet or exceed the requirements as called out in the GPNTS TRD and SOW. Upon successful completion of these tests, the Contractor shall integrate the complete subsystems and perform testing to ensure the integrated system performs according to specifications.

CDRL Deliverable:

- (A042) System Integration Test Plan (DI-NDTI-80566A)
- (A043) System Integration Test Procedures (DI-NDTI-80603A)
- (A044) System Integration Test Report (DI-NDTI-80809B)

4.1.9.1.1.2 Formal Qualification Testing

FQT will be conducted early in the development cycle to identify interface incompatibilities, providing the developing activities the opportunity to resolve issues. FQT will verify that the system is functioning in accordance with the requirements and meets design and performance specifications in accordance with the GPNTS TRD, SRVM, SOW, SSS, SPS, and SRS documents.

CDRL Deliverable:

- (A045) Qualification Detailed Test Plan (DI-NDTI-80566A)
- (A046) Qualification Detailed Test Procedures (DI-NDTI-80603A)
- (A047) Qualification Detailed Test Report (DI-NDTI-80809B)

4.1.9.1.1.3 Factory Acceptance Testing

FAT shall be performed by the Contractor and witnessed by a Government representative on all GPNTS Systems ordered under this contract. GPNTS FAT software and FAT test procedures shall be specifically developed to verify that the performance of each GPNTS system complies with the requirements of this SOW, the GPNTS TRD, and the Contractor generated TDP. FAT shall be scheduled at least 7 calendar days prior to final delivery to the Government. FAT software and test procedures shall be updated as necessary so that they may be used for future production deliveries. The Contractor shall be responsible for documenting and reporting FAT test results.

CDRL Deliverables:

- (A048) Factory Acceptance Test Procedure (DI-NDTI-80603A)
- (A049) Factory Acceptance Test Report (DI-NDTI-80809B)
- (A050) Factory Acceptance Test Software (DI-IPSC-81488)

4.1.9.1.1.4 Environmental Testing

The Contractor shall perform environmental and shock testing on rack #2 of EDM-C using the methods defined in the GPNTS TRD and GPNTS TEMP. This test rack is not part of the two EDM-C systems to be delivered to the Government as required by this SOW. These environmental tests are intended to expose weaknesses in the design of the GPNTS System. During these tests the Contractor shall utilize dummy weight for hosted systems. The Contractor shall verify environmental requirements for EDM-C System Racks 1 and 3, and EDM-B System Racks 1 and 2 by analysis, using the test data from EDM-C System Rack 2 and included the analysis results as part of the below CDRL Test Reports.

CDRL Deliverable:

- (A051) High-Impact Shock Test Procedures (DI-ENVR-80709)
- (A052) Shock Test Report (DI-ENVR-80708)
- (A053) Mechanical Vibration Test Plan and Report (DI-ENVR-81647)
- (A054) Environmental Test Plan and Report (MIL-STD-810)

4.1.9.2 Electromagnetic Interference and Electromagnetic Environment Effects Requirements

The Contractor shall design, develop, and integrate, the system such that it meets Electromagnetic Interference (EMI) and Electromagnetic Environment Effects (E3) control requirements specified in the TRD and this SOW. The contractor shall test and qualify rack #2 of EDM-C to verify that it meets the EMI and E3 control requirements specified in the TRD and this SOW. During these tests the Contractor shall not include the hosted systems. The Contractor shall verify EMI and E3 requirements for EDM-C System Racks 1 and 3, and EDM-B System Racks 1 and 2 by analysis, using the test data from EDM-C System Rack 2 and included the analysis results as part of the below CDRL Test Reports. The Contractor shall perform inspections, analyses, studies, and tests to establish E3 control requirements and features to be implemented in the design of the system and verify that the system meets its E3 control requirements. MIL-HDBK-237D may be used for guidance.

CDRL Deliverables:

- (A055) EMI Control Procedures (DI-EMCS-80199C)
- (A056) EMI Test Report (DI-EMCS-80200C)
- (A057) EMI Test Procedures (DI-EMCS-80201C)
- (A058) E3 Integration and Analysis Report (DI-EMCS-81540A)
- (A059) E3 Verification Procedures (DI-EMCS-81541A)
- (A060) E3 Verification Report (DI-EMCS-81542A)

4.1.9.3 Verification, Validation, and Accreditation

The Contractor shall develop an M&S Verification and Validation (V&V) Plan, which shall describe the V&V process and methodology. The Contractor shall provide the Government with evidence of validation prior to testing.

CDRL Deliverables:

- (A061) DoD M&S Verification and Validation (V&V) Plan (DI-MSSM-81751)
- (A062) DoD M&S V&V Report (DI-MSSM-81752)
- (A063) Reserved

4.1.9.4 Software Test Plan & Software Test Procedures

The Contractor shall develop and execute software test plans and procedures, which shall be used to verify GPNTS requirements for software and subsystem/system-level requirements as specified in the SRS, GPNTS TRD, and this SOW. The Contractor shall ensure that each software requirement is testable and documented in the Software Test Plan (STP). The Contractor shall include testing objectives, priorities, methodologies, test cases, and evaluation criteria for each test in the STP.

For each software-related item in the approved SRVM, designated as requiring test verification, the Contractor shall develop Software Test Procedures. Requirements will be verified at the lowest level practical. The Contractor shall prepare Software Test Reports (STR) that document the results of testing performed for verification of requirements for software and subsystem/system - level requirements.

CDRL Deliverables:

- (A064) Software Test Plan (STP) (DI-IPSC-81438A)
- (A065) Software Test Procedures (DI-IPSC-81439A)
- (A066) Software Test Report (DI-IPSC-81440A)

4.1.9.5 Government Test and Evaluation

The Contractor shall support Government developmental test DT and OT as part of the Integrated Test approach. DT and OT events for the EMD phase may be conducted at the Contractor and/or Government lab facilities. These tests shall validate the Mission Data and GPNTS Subsystems performance at Government approved facilities/ranges within the Continental United States (CONUS). Later phases will include shipboard testing and may include additional test facilities.

4.1.10 Reliability and Maintainability (RDT&E)

The Contractor shall execute a tailored Reliability Program to ensure GPNTS meets supportability and sustainment goals and objectives, as discussed in the following subsections. Changes to the GPNTS design shall be monitored throughout the contract to identify and assess impact to product data, sustainment planning and sustainment execution derived from Reliability Program analyses. The program shall encompass all aspects of reliability with respect to the selection of components, predictions, and testing. The Contractor shall maintain and make available to the Government all reliability data on any vendor or subcontractor supplied item and shall inform the Government of any part or component, which will degrade system reliability requirements. Pre-existing reliability data shall be used to the maximum extent possible. The Contractor is encouraged to apply MIL-HDBK-470A as guidance.

4.1.10.1 Reliability Prediction

The Contractor shall provide reliability predictions based on a defined configuration baseline. Reliability data shall be predicted and/or adjusted to apply to a sheltered marine environment and shall account for end-user environmental conditions. System environmental parameters presented in the GPNTS TRD shall apply. De-rating criteria applied to calculations shall be detailed within the reliability report. Where equipment reliability history data exists, this data shall take precedence over predicted data and be adjusted accordingly to thermal and environmental characteristics. The predictions shall be provided to the lowest indenture level and updated each time design or mission profile changes significantly impact the GPNTS. In the event where the system architecture provides redundant functional/physical capabilities, the reliability report shall separately summarize adjustments to the predictions and identify the Mission Reliability. The Contractor shall prepare and deliver a top-down indentured

reliability report, as part of the RAM Analysis (CDRL A067), to include the identification of the Mean Time Between Failure (MTBF) for each lowest replaceable unit (LRU) in addition to identification of the system MTBF using best commercial practices. Application of MIL-HDBK-217F(2) as guidance is encouraged.

4.1.10.2 Reliability, Availability, and Maintainability Data

The Reliability, Availability, and Maintainability (RAM) requirements are assessed during all Contractor and Government testing. The Contractor shall conduct RAM analysis as an integral part of all required system and subsystem testing to demonstrate that the GPNTS system is capable of achieving the RAM requirements of the TRD. The Contractor shall document the results of all required analysis. Accumulated RAM data shall be available on an ongoing basis. Data from individual analysis shall be available no more than 30 days after each test event.

CDRL Deliverable:

- (A067) RAM Analysis (DI-RELI-81497)

4.1.10.3 Failure Reporting and Corrective Action System

The Contractor shall collect failure data including data from factory trouble failure reports during fabrication/assembly, integration/test, and spares. The Contractor shall accommodate and integrate failure data from Navy field data including Maintenance Action Reports (MARS) and Casualty Reports (CASREPS). The Contractor shall analyze the failure data, addressing: historical operating time and data; determination of the cause of each failure down to the MSI and component level that caused the failure; identification of MSIs and components that have had more than one failure; planned corrective actions; and implementation and results of corrective actions, including resultant reliability. Commencing with integration/test, at the assembly level (integration of subassemblies into an assembly), and including all testing, the Contractor will analyze the root cause for all pattern failures (i.e., more than one failure that occurs to the same piece part) and shall submit for Government approval a failed item analysis report, including subcontractor failed items. The Contractor shall address procedures for "Cannot Duplicate (CND)" and "No Fault Found" failures. The Contractor shall submit a failure summary and analysis report of all analyses within 30 days after notification of the failure and a resolution of the failure within 45 days for the prime Contractor, 60 days for the subcontractor, and 90 days for COTS vendor after notification of the failure. If corrective actions are required, the Contractor shall include the data in the monthly Contractor's management report until the corrective action is completed. The Government will have the right to inspect, at the Contractor's facility, the data from all failure and corrective action analyses. The Failure Reporting and Corrective Action System (FRACAS) shall include the following provisions:

a. Failure reporting - Failures and faults that occur during appropriate inspections and tests shall be reported. The failure report shall include information that permits identification of the failed item, symptoms of failure, test conditions, Built-In-Test (BIT) indications, and item operating time at time of failure. Software problems identified during the inspections and tests shall be reported in accordance with the requirements of the approved SDP. Procedures for initiating failure reports shall include requirements for verifying failures using BIT, when applicable, and for collecting and recording corrective maintenance information and times. All failure reports and software problem reports shall be verified for accuracy and correctness and submitted on standard Contractor forms.

b. Failure analysis - Reported failures shall be evaluated or analyzed as appropriate to determine the root cause of failure. FRACAS procedures shall include requirements for documenting the results and conclusions of failure investigations and analyses. The failure analysis shall be conducted at the lowest level of hardware or software necessary to identify the causes, mechanisms, and potential effects of the failure and to serve as a basis for decisions on the corrective action to be implemented. The investigations and analyses of failures shall consist of any applicable method that may be necessary to determine failure cause.

c. Failure verification - All reported failures shall be verified as actual or an explanation provided for lack of verification. Failure verification is determined either by repeating the failure mode on the reported item or by evidence of failure.

d. Corrective action - When the cause of a failure has been determined a corrective action shall be developed, documented, and implemented to eliminate or reduce the recurrence of the failure. Corrective action implementation shall be approved by responsible Contractor personnel (and acquiring activity as required). Unless otherwise specified, change control procedures shall be in accordance with the approved Configuration Management Plan (CMP).

e. Failure report close-out - Each reported failure shall be analyzed and immediate corrective action taken in order to minimize an unmanageable backlog of open failures from occurring. All open reports, analyses, and corrective action suspense dates shall be reviewed to assure timely failure report close-outs. A failure report shall be considered closed-out upon completion of corrective action implementation and verification or rationale. In those instances where corrective action was not implemented, the rationale to support no corrective action shall be documented and approved by the Government.

f. Identification and control of failed items - All failed items shall be conspicuously marked or tagged and control led to assure disposition per contract requirements. Failed items shall not be opened, distributed, or mishandled to the extent of obliterating facts which might be pertinent to an analysis. Failed items shall be controlled pending authorized disposition after completion of failure analyses.

CDRL Deliverables:

- (A068) Failure Reporting Analysis and Corrective Action (FRACA) Report (DI-SESS-81315A)
- (A069) Failure Analysis Summary Report (DI-SESS-80374A)

4.1.10.3.1 Failure Modes Effects Analysis

The Contractor shall prepare a Failure Modes Effects Analysis (FMEA) to identify all system failure modes. Failure modes resolved by inherent BIT capabilities shall be identified in the analysis. For all failure modes not resolved by BIT, this analysis shall identify the Single Point of Failure (SPOF) or fault group of maintenance-worthy items applicable to the mode based upon the system architecture. The failure effects to the system shall be identified in addition to the criticality level of each failure (inoperable or degraded). In the event of a degraded effect, the Contractor shall identify the operational/inoperable functional capabilities. Failure indications/symptoms to the operator/maintainer shall be detailed within the report. FMEA findings shall be applied to the Maintainability Task Analysis.

CDRL Deliverable:

- (A070) Failure Modes and Effects Analysis (FMEA) Report (DI-MNTY-80980)

4.1.11 Environment, Safety and Occupational Health Program (RDT&E)

The Contractor shall establish and implement an ESOH compliance/protection program that reflects the Contractor's intentions for meeting ESOH regulatory requirements during the GPNTS 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 GPNTS. 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, bio-based considerations, and energy efficient standby power devices). The Contractor shall provide to the Government their ESOH compliance and pollution prevention requirements, standards, and initiatives for inclusion into the GPNTS PESHE.

The Contractor shall provide test data, design data, descriptions and drawings to support GPNTS compliance with the National Environmental Policy Act (NEPA), Executive Order 12114 and permitting requirements.

The Contractor shall avoid the use of hazardous materials and generation of hazardous waste wherever practicable by avoiding materials that pose ESOH risks. The Contractor shall avoid or minimize and obtain approval of the Technical Authority for uses 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 that contribute 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.

CDRL Deliverable:

- (A071) Inputs to Government PESHE (DI-ADMN-80925)

4.1.11.1 System Safety and Occupational Health

The Contractor shall establish and implement a safety and occupational health program that identifies and evaluates system safety and health hazards, defines risk levels, and establishes a system to manage the probability and severity of all hazards associated with the development, use, and disposal of the GPNTS system. Health hazards include conditions that create significant risks of death, injury, acute chronic illness, disability, or reduced job performance of personnel who produce, test, operate, maintain, or support GPNTS. The Contractor shall develop and submit a System Safety Program Plan (SSPP) to meet the requirements in MIL-STD-882D as well as address software safety as part of the overall SSPP. The Contractor shall prepare and submit a Preliminary Hazard Analysis (PHA) to provide an initial risk assessment of the identified ESOH hazards. 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 (SHA) Report and Operating and Support Hazard Analysis (O&SHA) report submit the O&SHA report, respectively. 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) that comprehensively evaluates potential safety and occupational health risks prior to test or operation of the GPNTS. The Contractor shall develop and maintain a Hazard Action Report database. 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. The Contractor shall provide the necessary data and support the development of technical data packages for Software System Safety Technical Review Panel (SSSTRP) requirements.

The Contractor shall avoid the incorporation into the GPNTS 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 avoid the incorporation of radioactive materials into the GPNTS wherever practicable and obtain approval from the Government for uses that cannot be avoided or eliminated.

CDRL Deliverables:

- (A072) Preliminary Hazard Analysis (PHA) (DI-SAFT-80101B)
- (A073) Safety Assessment Report (SAR) (DI-SAFT-80102B)
- (A074) System Safety Program Plan (SSPP) (DI-SAFT-81626)
- (A075) Operating and Support Hazard Analysis (O&SHA) Report (DI-MISC-80508B)
- (A106) System Hazard Analysis (SHA) Report (DI-SAFT-80101B)

4.1.11.2 Hazardous Materials Management

The Contractor shall be responsible for full compliance with Hazard Communication Standard, Title 29- Code of Federal Regulations 19-10.1200, MIL-HDBK-2036, and National Aerospace Standard (NAS) 411, Hazardous Material Management Program. The Contractor shall ensure that all Contractor personnel and facilities used in performance of this SOW (including those of Subcontractors) satisfy federal, state, and local ESOH regulations and statutes.

The Contractor (and their Subcontractors) shall develop and implement a Hazardous Materials Management Program (HMMP). The Contractor shall develop a HMMP Plan and HMMP Report based on NAS 411. The

Contractor shall prepare and submit HMMP Reports. The Contractor shall make every attempt to minimize and restrict the use of hazardous materials 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 hazardous materials, the Contractor shall develop and maintain a Hazardous Materials Usage List (HMUL) for the system specifically identifying those materials that are used (1) on the system (as delivered) and (2) for operation and maintenance processes. To identify potential ESOH risks including regulatory compliance concerns associated with hazardous materials usage, the Contractor shall perform a Health Hazard Assessment. Potential ESOH regulatory requirements and impacts/risks associated with the use of hazardous materials shall be identified and discussed in the HMMP Report. The Contractor shall ensure all materials and their use fall within prescribed federal, state, and local limits and procedures for usage and disposal. The Contractor shall recommend hazardous material 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 hazardous material/waste impacts. The Contractor shall avoid to the maximum extent possible the following materials:

Table 5: Hazardous Materials

Asbestos	Arsenic & Arsenic Compounds	Benzene
Beryllium & Beryllium Compounds	Cadmium & Cadmium Compounds	Carcinogens
Chloroform	Chromium (except when used in a metal alloy) & Chromium Compounds, especially Hexavalent Chromium	Cyanide Compounds
Ethylene Glycol	Formaldehyde	Glass Fibers (exposed, e.g. outside surface or covering)
Glycol Ethers	Heavy Metals	Hydrazine
Hydrofluoric Acid	Isocyanates	Lead (except when used as a solder) & Lead Compounds
Lithium & Lithium Compounds (except for batteries approved for intended service conditions)	Magnesium & Magnesium Compounds	Mercury & Mercury Compounds
Methyl Ethyl Ketone	Methyl Isobutyl Ketone	Methylene Chloride
Methylene Dianiline	Naphthalene	Nickel (except when used in a metal alloy) & Nickel Compounds
Ozone Depleting Substances Class I & II	Perchlorates	Perchloroethylene
Perfluorooctanoic Acid	Phenol	Polybrominated Dephenyl Ethers
Polychlorinated Biphenyls	Polyvinyl Chloride (except for when used for part leads)	Radioactive Materials
Toluene	Toluene Diisocyanate	Trichloroethylene
Xylene & Xylene Isomers	Zinc & Zinc Alloys	

The Contractor shall provide Material Safety Data Sheets (MSDS) and support the update of the GPNTS PESHE. In the event the Contractor identifies any real or potential problem, the Contractor shall notify the PCO and technical representative in writing of the specific concerns and recommended course of action.

CDRL Deliverables:

- (A076) Hazardous Material Usage List (HMUL) with Material Safety Data Sheets (DI-MISC-80508B)
- (A077) Hazardous Materials Management Program (HMMP) Plan (DI-MGMT-81398A)
- (A078) Hazardous Materials Management Program (HMMP) Report (DI-MISC-81397A)
- (A079) Health Hazard Assessment Report (HHAR) (DI-SAFT-80106B)

4.1.11.3 Deactivation, Demilitarization, and Disposal

The Contractor shall integrate deactivation, demilitarization and disposal considerations into the systems engineering process so that the GPNTS system can be disposed in a way that is in accordance with all legal and regulatory requirements relating to safety, security, and the environment. Hazardous materials contained in the GPNTS system must be identified in the HMUL and 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.

4.1.12 Integrated Logistics (RDT&E)

4.1.12.1 Logistics Kick-Off Conference

The Contractor shall hold a Logistics Kick-Off Conference within 30 calendar days after the post-award conference. The Government, in conjunction with the Contractor, will establish the specific date.

CDRL Deliverables:

- (A019) Conference Agenda (DI-ADMN-81249A)
- (A020) Presentation Material (DI-ADMN-81373)
- (A021) Report, Record of Meeting / Minutes (DI-ADMN-81505)

4.1.12.2 Integrated Logistics Program

The Contractor shall establish an Integrated Logistics Support (ILS) program as specified by MIL-HDBK-502, MIL-PRF-49506, and the PMW/A 170 GPNTS Life Cycle Support Plan (LCSP) to ensure that supportability design criteria and characteristics are considered and incorporated into the system design and that the system will meet the operational availability, maintainability, training, and manning requirements established in the GPNTS TRD and this SOW. The Contractor shall designate an ILS Manager, establish and update a detailed ILS project schedule, and participate in Logistics 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.

The Contractor shall complete the following Logistics Management Information (LMI) in support of GPNTS. MIL-HDBK-502 for Acquisition Logistics defines the make-up of each summary by data element. A Data Element Dictionary is provided in MIL-PRF-49506.

a. Maintenance Planning Summary
b. Failure Modes Effects Analysis Summary
c. Repair Analysis Summary
d. Supply Support Summary
e. Supportabilities Summaries
f. Special Packaging, Handling, Storage, and Transportability (PHS&T) Summary
g. Manpower, Personnel and Training Summary

h. Demilitarization and Disposal Summary

CDRL Deliverable:

- (A080) Logistics Management Information (LMI) Summaries (Core Logistics Analysis) (DI-ALSS-81530)

4.1.12.2.1 Maintenance Planning

The Contractor shall identify all preventive maintenance and corrective maintenance tasks in a Maintenance Support Plan (MSP). 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 GPNTS. The Contractor shall produce a maintenance plan summary that contains the data necessary to ensure that conformance with the GPNTS TRD requirements has been met and to support analysis of personnel and maintenance resource requirements. The Contractor shall develop Preventive Maintenance System (PMS) Documentation (Maintenance Index Page and Maintenance Requirements Cards) in accordance with MIL-P-24534A (Navy) by a NAVSEA Certified, Level 2 PMS Document Developer.

Within the MSP, the Contractor shall determine and document the Organizational-level (O-level) corrective and preventive maintenance requirements and Depot-Level (D-Level) maintenance requirements that support overall system maintainability and availability thresholds. Additionally, the Contract shall include in the MSP a description of the Built-In Test (BIT) and a BIT map. The Contractor shall conduct D-level maintenance at the Contractor's facility during the interim support period prior to Government Joint Depot Maintenance Activation Group (JDMAG) decision.

CDRL Deliverables:

- (A081) Maintenance Support Plan (MSP) (DI-ILSS-81225)
- (A082) Preventative Maintenance System (PMS) Documentation - Maintenance Index Page (MIP) and Maintenance Requirements Card (MRC) (DI-MNTY-80991, DI-MNTY-80992)

4.1.12.2.2 Item Unique Identification

The Contractor shall identify and mark all end items in accordance with DoD Instruction 5000.64, MIL-STD-130N, DoD Guide to Uniquely Identifying Items, version 2.0, dtd. 1 Oct 2008, and the PMW/A 170 UID Plan, dated 05 November 2008. In addition, removable/repairable items over $5000 are to be marked. The Contractor shall submit an IUID Report, which lists each end item and corresponding IUID.

CDRL Deliverable:

- (A083) IUID Report (DI-MISC-80508B)

4.1.12.2.3 Depot Support

The Contractor shall develop a depot maintenance support study that identifies the requirements to establish a depot system to meet the planned depot repair requirements of GPNTS. The support study shall address shipment, transportation, handling, repair, and checkout of the repairables (e.g. assemblies, subassemblies, and components) as performed by trained service technician/engineering personnel. The depot maintenance support study must be approved by the Government and shall be implemented by the Contractor prior to the performance of any depot repairs.

CDRL Deliverable:

- (A084) Depot Maintenance Support Study (DI-ILSS-80739)

4.1.12.2.3.1 Life Cycle Cost Analysis

The Contractor shall perform a Life Cycle Cost analysis for the option of establishing a commercial depot capability. This analysis will be an input to the Government's Performance Based Logistics (PBL) analysis. The Contractor shall use a DoD or industry standard LCC model approved by the Government to conduct the LCC analysis. The Government will provide LCC input data as required to assist the Contractor in performing the analysis. MIL-HDBK-259 "Life Cycle Cost in Navy Acquisitions" provides guidance to support the analysis.

CDRL Deliverable:

- (A085) Life Cycle Cost Analysis (DI-FNCL-80449)

4.1.12.2.4 Job Task Analysis

The Contractor shall review the GPNTS Job Task Analysis (JTA) developed by the Government and provide comments itemizing specific GPNTS design JTA data. The final training concept shall utilize the integrated JTA as the foundation for manning and training products as well as the Interactive Electronic Technical Manual (IETM). The Contractor shall detail job tasks, maintenance, and operation and associated skill sets required for the GPNTS system in the JTA. The Contractor shall complete the JTA prior to developing learning content and shall be done against jobs and positions for Navy Officer/Enlisted billets. The Contractor shall reference the Navy Integrated Learning Environment (ILE) Content Developer's Handbook (MPT&ECIOSWIT-ILE-HDBK-1C) for general format and content when developing the JTA. The Contractor shall produce a Personnel Qualification Standards (PQS), consistent with OPNAVINST 3500.34F and NAVEDTRA 43100-1G, for navigation, maintenance and operations of GPNTS systems in the JTA. The Contractor shall include all appropriate information from the JTA in the comments to the GPNTS TRPPM, N2N6-TRPPM-E-70-0810.

CDRL Deliverables:

- (A086) Inputs to GPNTS JTA (DI-ADMN-80925)
- (A087) Personnel Qualifications Standards (PQS) Document (DI-MISC-80508B)

4.1.12.3 Operations & Maintenance Interactive Electronic Technical Manual

The Contractor shall provide an IETM book plan, which shall include an outline and description of proposed IETM for all GPNTS configurations. The IETM book plan shall also include both validation and verification certification plan and corresponding forms (see TMCR, Section 4.2.3.5.3 *Combined Validation and Verification*). The Contractor shall submit an IETM Validation/Verification Report in accordance with the IETM Book Plan, Validation/Verification Plan.

For each GPNTS configuration (A,B, and C), the Contractor shall develop and document in the IETM the appropriate consolidated operations information that fully supports software load procedures, system configuration/initialization, equipment operation and maintenance, and non-tactical operations of GPNTS. For each GPNTS configuration (A, B, and C), the IETM shall include, but not be limited to, Contractor-generated information on the following:

a. System overview / system configuration
b. Detailed system/ system/subsystem equipment installation, configuration, and operation information
c. System/subsystem software overview and software configuration
d. System software load procedures
e. System initialization procedures
f. System startup/ system shutdown procedures
g. System internal interconnect diagram,
h. Cable wiring diagrams of each internal cable

i. System external I/O connections

j. System//subsystem status/fault indications

k. System/subsystem operator-machine control interface

l. System/ subsystem maintenance and troubleshooting

The Contractor shall develop and deliver at a minimum; a Class 2 O&M IETM developed using eXtensible Markup Language (XML) formatting standards. The Contractor shall reflect in the IETM all major system configurations and shall self-tailor to those configurations at the start of the IETM so that only the selected configuration suite of hardware and software is presented. The requirement for XML formatting applies to newly developed manuals. The Contractor shall deliver COTS/GOTS manuals in a searchable PDF or MS Word format at a minimum. The Contractor shall provide all COTS/GOTS manuals referenced including any updates as necessary. These COTS/GOTS manuals shall be provided as appendices to the IETM detailing any changes required to existing manuals. In addition to the IETM, the Contractor shall deliver the XML source file(s), graphic source files, associated document type definitions (DTD), entity files, DTD data dictionary, tagging convention documents, associated style sheets and filters. The Contractor shall produce illustration source data in acceptable vector format and renditions in acceptable raster format as digital files separate from TM delivery. The Contractor shall develop the IETM in accordance with the Digital Data Policy SPAWARINST 4160.3B and the GPNTS Technical Manual Contract Requirement (TMCR) NO. NDMS-090002-000 dtd 9 October 2008, found at https://nsdsa2.phdnswc.navy.mil/tmhtml/h090002000.htm. The Contractor shall structure any TM developed at government expense according to the JTA. The Contractor shall incorporate PQS information (CDRL A087) into the TM/IETM. The IETM shall be developed to be compatible with National Information Assurance Partnership (NIAP), IT2 and Advanced Technical Information Support (ATIS).

The IETM shall be updated as necessary, prior to EDM, LRIP, and FRP deliveries.

CDRL Deliverables:

- (A088) IETM Book Plan, Validation/Verification Plan (DI-MISC-80508B)
- (A089) Interactive Electronic Technical Manuals (Technical Manuals for System-Level Hardware/Software, COTS/GOTS, and Newly Developed Equipment) (MIL-DTL-87268C)
- (A090) IETM - Associated Data and Documentation (DI-SESS-81697)
- (A091) IETM Validation/Verification Report (DI-MISC-80508B)

4.1.12.3.1 Interactive Electronic Technical Manual In-Process Reviews and Verification

The Contractor shall formulate and chair a Technical Manual Working Group (TMWG) and convene IETM In-Process Reviews (IPRs) as part of PDR (30% completion point), CDR (60% completion point) and PRR (90% completion point). The Contractor shall perform joint validation/verification on the 100% IETM, which will be scheduled 30 days after the Contractor receives Government comments from the 90% review.

4.1.12.4 Provisioning Technical Documentation

The Contractor shall deliver Provisioning Technical Documentation (PTD) developed in an Interactive Computer Aided Provisioning System (ICAPS) format. Mandatory fields to be populated in PTD include Provisioning Line Item Sequence Number (PLISN), Item Name, Part Number, CAGE Code, Next Higher Assembly (NHA), Unit Price, Production Lead-Time (PLT), Technical Replacement Factor (TRF), Unit of Issue, Reference Number Category Code (RNCC), Reference Number Variation Code (RNVC) and Source, Maintenance & Recoverability (SMR) Code. The Contractor shall provide provisioning data necessary to allow the Government inventory control point to perform inventory management support for designated LRUs, to include long lead-time items list and non-standard parts list.

The Contractor shall hold a provisioning conference at the Contractor's facility prior to the development of the PTD.

CDRL Deliverable:

- (A019) Conference Agenda (DI-ADMN-81249A)
- (A020) Presentation Material (DI-ADMN-81373)
- (A021) Report, Record of Meeting / Minutes (DI-ADMN-81505)
- (A092) Provisioning Technical Documentation (PTD) (DI-ALSS-81529)

4.1.12.5 Diminishing Manufacturing Sources and Material Shortages

The Contractor shall submit a Diminishing Manufacturing Sources and Material Shortages (DMSMS) Plan that addresses requirements identified in ASN (RD&A) memorandum, "DMSMS Management Guidance," of 27 January 2005 and details the Contractor's strategy for mitigating DMSMS risk associated with the use of commercial items in the end-item configuration.

The Contractor shall submit a semiannual evaluation of all GPNTS LRUs and provide a projected end of production and end of support date for each LRU. The Contractor shall notify the Government of alerts that parts/components/subsystems that are included in the design of the GPNTS system may no longer be produced. The Contractor shall provide a recommended course of action if DMSMS are determined to be sufficient to cause redesign of LRUs because of form, fit, and function change.

CDRL Deliverable:

- (A093) DMSMS Plan (DI-SESS-81656)

4.1.13 Human Systems Integration (RDT&E)

The Contractor shall develop a Human Systems Integration (HSI) Program Plan (HSIPP) in accordance with the Government's GPNTS HSI Plan (HSIP). The HSIPP shall address all HSI domains including, but not limited to, total system operator and maintainer manpower skill requirements, team and staff level skill requirements and all required training to support them, and the identification of human performance risks, constraints, metrics, and mitigation strategies. The HSIPP shall describe how the Contractor's HSI program will integrate the HSI domains with other program elements.

CDRL Deliverable:

- (A094) Contractor HSI Program Plan (HSIPP) (DI-HFAC-81743)

4.1.13.1 Human Factors Engineering

The Contractor shall establish and conduct a Human Factors Engineering (HFE) effort that conforms to the GPNTS HSI Plan, American Society for Testing and Materials (ASTM) F-1337-91, MIL STD 1472F, MIL-HDBK-46855A, ISO 9241-210, and ISO TR 16982. The Contractor shall develop and apply HFE to all areas of human-machine integration, information flows, operator tasks, maintenance tasks, and installation tasks. The Contractor shall perform the HFE effort concurrently with the design of all elements of the system, both hardware and software, having an interface with the system administrator/maintainer.

The Contractor shall develop a Human Engineering Program Plan (HEPP), which describes the Contractor's entire Human Engineering (HE) program, identifies its elements, and explains how the elements will be managed. The HEPP shall include a test plan and address how the HFE test plan will integrate with the GPNTS master test plan.

The Contractor shall develop a Human Engineering Design Approach Document, Maintainer (HEDAD-M) that describes the design/interface requirements of equipment that must be maintained. The HEDAD-M shall include both system administrator and maintainer tasks. This document provides a source of data to evaluate the extent to which equipment having an interface with maintainers meets human performance requirements and HE criteria.

Deleted: (

Deleted:)

The Contractor shall complete a Human Engineering Test Report (HETR) that documents the compatibility of the human performance requirements, personnel selection criteria, training program, and design of the personnel

equipment/software interfaces. The HETR confirms that human performance requirements have been met and defines the degree to which problems may exist. In addition to serving these purposes of acceptance and oversight, HE test data are also used to provide feedback to the system design or input into Engineering Change Requests or newer designs. To avoid duplication with other test reports, the Contractor can reference other applicable test reports containing these data.

CDRL Deliverables:

- (A095) Human Engineering Program Plan (HEPP) (DI-HFAC-81742)
- (A096) Human Engineering Design Approach Document-Maintainer (HEDAD-M) (DI-HFAC-80747B)
- (A097) Human Engineering Test Report (HETR) (DI-HFAC-80744B)

4.1.14 Manpower, Personnel, and Training (RDT&E)

4.1.14.1 Operation and Maintenance Training

The Contractor shall include in the Instructor Led Training (ILT) or Interactive Computer-Based Training life-like simulation training as necessary to meet course training objectives.

The Contractor shall provide either ILT materials, SCORM-compliant ILE courseware, simulation, or a blended solution of multiple training methods.

The Contractor shall provide systems administration, operation, and organizational/depot level maintenance training in sufficient detail to enable the Government to safely and effectively use, maintain, and support the GPNTS System. The Contractor shall develop a detailed GPNTS Training Curriculum, which includes details on operator, system administration, maintenance procedures, and technical information of the GPNTS System. The Contractor shall ensure the course covers, at a minimum, the necessary information, skill development, and practical application required by the students to set up, check out, assemble/disassemble, perform preventive /corrective, maintenance, and perform safely on the GPNTS system / subsystems / components.

The Contractor shall develop the GPNTS training curriculum using all Navy ILE Technical Specifications and Guidelines listed within the ILE website's "Standards, Specifications, Policy, and Guidance" (https://ile-help.nko.navy.mil/ile/content/policy.aspx), OPNAVINST 1500.76B, DoDI 1322.26, and DoDI 1322.20. The MIL-PRF-29612B may be used as guidance. The Contractor shall recommend a training approach utilizing all referenced instructions in a manner that will best represent the system being designed. The Contractor shall develop the training materials to be Sharable Content Object Reference Model (SCORM) (current version) compliant. The Contractor shall include in the support documentation: (1) a lesson guide with administrative and instructional data (including trainee guide answer keys); (2) trainee guide data requirements including information, diagram, job assignment problem and outline sheets; and (3) On-the-Job training handbook data.

If Interactive Courseware (ICW) is selected as a training methodology (whole or in part), a Logistic support package and comprehensive documentation for operation and maintenance of the ICW shall be developed or acquired for all ICW programs. All requirements analysis and training effectiveness evaluation reports for all non-intelligence-related ICW programs – up to and including the "SECRET" classification level – shall be submitted through Command channels to the Defense Technical Information Center, Defense Logistics Agency, within 30 days of report completion. If distributed learning / ICW is selected in whole or part of the training delivery methodology, the Government shall not agree to pay royalties, recurring license or run-time fees, use tax, or similar additional payments for courseware, associated presentation programs necessary to interpret and execute the courseware, documentation, or associated training materials for distributed learning / ICW programs developed for or by the Department of Defense. If ICW is recommended and approved, the Contractor shall successfully post developed content to the Navy Knowledge On-line (NKO) prior to delivery of the Operations & Maintenance training materials. The Integrated Digital Data Environment (IDDE) shall be used in the management of source data, presentation formats, and other product data." The Contractor shall develop the training materials to meet Naval Education and Training ILE standards and include digital copies of all training documentation, lesson plans, and test materials standards.

CDRL Deliverable:

- (A098) Training ILE Documentation (DI-SESS-81523B)

4.1.14.2 Training Requirements

The Contractor shall recommend the number of classes, number of students per class, and a schedule of classes that will provide training to address all system administration, operator and maintenance training requirements in support of Maintenance Demonstration (M-DEMO), Operational Assessments (OAs), Technical Evaluation (TECHEVAL), IOT&E, and Train-the-Trainer sessions. The Contractor shall provide all equipment, tools, training materials, and fault insertion instructions in support of these training sessions. The Contractor shall administer a training test package to evaluate course curricula and presentation effectiveness.

CDRL Deliverables:

- (A099) Training Test Package (DI-SESS-81525B)
- (A100) Training Course Conduct Information Package (Training Test Results) (DI-SESS-81522B)

4.1.15 Information Assurance (RDT&E)

The Contractor shall ensure compliance with Information Assurance (IA) requirements as outlined in DoDD 5000.1, DoDI 5000.2, SECNAVINST 5000.2D, and the GPNTS IA Strategy. The Contractor shall develop each component according to the standards outlined in DoDI 8510.01, DoD Information Assurance Certification and Accreditation Process (DIACAP), SECNAVINST 5239.3A, DoDD 8500.1, and in accordance with the IA Controls outlined in DoDI 8500.2. The applicable IA Controls will be determined based on the applicable Mission Assurance Category (MAC) and Confidentiality levels of each component as defined in the DoDI 8500.2.

The Real Time Component (RTC) and Time Frequency Component (TFC) are designated as Platform Information Technology (PIT) and will be required to be Certified and Accredited under the requirements outlined in the DoN CIO Memo 01-09, DoN IA Policy for PIT. The System Access Component (SAC) is required to fulfill the requirements of DoDI 8510.01, DoD Information Assurance Certification and Accreditation Process (DIACAP), as a PIT Interconnection (PITI) system. The PIT components are required to apply the IA Controls outlined in DoDI 8500.2, IA Implementation, for MAC II Sensitive systems to the greatest extent possible. The SAC has been designated as MAC III Sensitive and will be required to apply the 8500.2 IA Controls associated with that designation.

The Contractor shall conduct independent validation testing of the DoDI 8500.2 IA controls on each component prior to final acceptance of each component. The Contractor shall provide the results of the independent validation testing to the Government, which will include any findings that need to be fixed or mitigated to ensure the DoDI 8500.2 IA controls are satisfactorily addressed.

In accordance with DoDI 8510.01 and the DoN DIACAP Implementation Guide, the Contractor shall develop all of the required IA and Certification and Accreditation (C&A) documentation necessary for adequate independent validation of the IA posture of each component. The Contractor shall provide comments to the GPNTS System Identification Plan, a DIACAP Implementation Plan (DIP), and a Scorecard outlining the status of each applicable IA control, and a Plan of Actions and Milestones (POA&M) to address the status of any non-applicable, inherited, or non-compliant IA Controls in the DIACAP documentation. The Contractor shall provide explanations for non-applicable IA Controls, details regarding the source of inheritance for any inherited controls, and the mitigation strategy and/or measures being taken to correct any non-compliant IA controls in the POA&M. GPNTS shall use an EAL-4 or higher certified operating system and any IA service products, in compliance with the GPNTS TRD.

CDRL Deliverables:

- (A101) Security Plan (DI-MISC-80508B)
- (A102) System Identification Plan (DI-ADMN-80925)
- (A103) DIACAP Implementation Plan (DI-MISC-81064)
- (A104) IA Controls Scorecard (DI-MISC-80508B)

- (A105) IA Controls POA&M (DI-MISC-80508B)

4.2 Low-Rate Initial Production Phase (OPN and RDT&E)

This section contains the requirements for the LRIP phase of the GPNTS system, sections 4.2 – 4.2.12.2, which will be RDT&E and/or OPN funded.

The following tasks will be RDT&E funded: procurement of one LRIP unit for environmental testing , DD Form 1494 compliance data, Physical Configuration Audit support, Maintenance Demonstration support, and related engineering support services.

The following tasks will be OPN funded: procurement of LRIP units, program management support, procurement of LRIP provisioning item ordering (PIO) and upgrade kits, updated GPNTS technical documentation, LRIP production testing, ESOH Program compliance, Item Unique Identification, and related engineering support services.

Deleted: This SOW specifies requirements for system production and integration of complete GPNTS systems and replacement hardware. It also specifies GPNTS related production engineering services.¶

4.2.1 LRIP Units (RDT&E and OPN)

If the Government chooses to exercise these options, the Contractor shall build and deliver up to twelve (12) LRIP units comprised of a mix of configurations A, B, and C, in accordance with sections 3.10.4 – 3.10.6 of the GPNTS TRD.

All Contractor CLIN deliveries shall meet the requirements of this SOW, TRD, GPNTS System Performance Specification, and the GPNTS TDP. Whenever the Contractor's production build does not match the existing drawing package, whether due to Contractor production updates or due to required Government modifications, the Contractor shall document these changes through an Engineering Change Proposal (ECP), and provide approved the modified page(s) to the drawing package.

The Contractor shall update the Contractor's Configuration Management Plan, as needed.

CDRL Deliverable:

- (B001) Contractor's Configuration Management Plan (DI-CMAN-80858B)

4.2.2 Program Management (OPN)

The Contractor shall perform program management activities required to ensure all work conducted during LRIP phase of this contract is planned and executed in a manner that will achieve all management, technical, logistical, cost, and schedule objectives. The Contractor shall ensure coordination and integration of all functional areas within each task. The Contractor shall establish and perform business management functions to ensure contracting related actions meet established need dates of the Government. The Contractor shall use the Contracting Officer Representative (COR) as the primary point of contact for all program activities.

CDRL Deliverable:

- (B002) Contractor's Progress, Status, and Management Report (DI-MGMT-80227)

4.2.2.1 Program Management Reviews

The Contractor shall conduct periodic PMRs in a presentation to the Government at the Contractor's facility or via video or teleconferences. These reviews will occur at least quarterly and may occur as often as monthly if conditions require. The Contractor shall report on cost, schedule, technical progress, program risks and mitigations, and technical performance measures. The Contractor shall present the Risk Management Database and Risk Management Chart as part of the PMR Presentation Materials.

CDRL Deliverables:

- (B003) Conference Agenda (DI-ADMN-81249A)

- (B004) Presentation Material (DI-ADMN-81373)
- (B005) Report, Record of Meeting / Minutes (DI-ADMN-81505)

4.2.2.2 Integrated Product Teams

The Contractor shall apply a systematic approach to the integrated, concurrent development of the products and processes that apply to the development and production of GPNTS system. Integrated Product Teams (IPTs) are a vital part of the DoD acquisition oversight and review process and will therefore be implemented on this contract.

At a minimum, the Contractor shall support the following Government chaired IPTs: System Engineering (SE), Test and Evaluation (T&E), Contract, and Logistics. Additional IPTs or less formal working groups will be formed, as required. Any Contractor-led IPTs formed can include Government participants. The Contractor shall not be relieved of the responsibility of meeting contractual requirements due to implementation of any IPT approach. During the IPT process, if issues are identified that the Contractor feels will have significant impact on the terms of the contract, the Contractor shall identify the issue, in writing, to the Government COR/PCO for resolution. The use of video or teleconferencing is encouraged for IPT meetings. The IPTs will be scheduled by the Government and will meet at least monthly to discuss the program's activities.

4.2.3 LRIP Provisioning Item Ordering (OPN)

The Contractor shall manufacture and deliver provisioning items in accordance with the provisioning item ordering clause. The Contractor shall produce these spares in accordance with the GPNTS TRD and TDP. The Contractor shall include item cost for OBRPs and wholesale level system spares; indicate failure/usage rates, recommended quantities of each item for each GPNTS system, as well as consumable items in the Recommended Spares List. The Contractor shall update the recommended spares list each year or as needed.

CDRL Deliverable:

- (B006) Recommended Spares List (DI-MISC-80508B)

4.2.4 LRIP Upgrade Kits (OPN)

The Contractor shall deliver a list of recommended upgrade kits for GPNTS Configurations A, B, and C. The Contractor shall update the list each year or as needed. The contractor shall produce these kits in accordance with the GPNTS TRD and TDP.

CDRL Deliverable:

- (B007) Upgrade Kits List (DI-MISC-80508B)

4.2.5 GPNTS Technical Documentation (OPN)

The contractor shall deliver an updated TDP, if required, to include any changes resulting from the production and testing of LRIP units.

CDRL Deliverables:

- (B008) GPNTS Drawing Number Assignment Report (DI-SESS-81011D)
- (B009) GPNTS Master Ordering List (DI-SESS-81000D)
- (B010) GPNTS Production Drawings (DI-SESS-81000D)
- (B011) GPNTS Family Tree (DI-SESS-81000D)
- (B012) GPNTS System Interconnect Drawings (DI-SESS-81000D)
- (B013) GPNTS COTS Documentation (including COTS Drawings and manuals) (DI-TMSS-80527B)

- (B014) GPNTS Source Control Drawings Approval Request (DI-SESS-81010D)
- (B015) GPNTS Proposed Critical Manufacturing Process Descriptions (DI-SESS-81012D)
- (B016) GPNTS Source Code (DI-IPSC-81488)

4.2.6 Production Tests (OPN)

The contractor shall submit a Production Test Plan, which shall address LRIP and FRP test events.

CDRL Deliverable:

- (B017) Production Test Plan (DI-NDTI-80556A)

4.2.6.1 Production Qualification Testing

Production Qualification Testing shall be conducted on the first LRIP unit for each subsystem at the Contractor's or Government-approved facility to ensure that the production system meets TRD, SOW, and TDP requirements.

CDRL Deliverables:

- (B018) Production Qualification Test Procedure (DI-NDTI-80603A)
- (B019) Production Qualification Test Report (DI-NDTI-80809B)

4.2.6.2 Hardware Quality Assurance Inspection

A Hardware Quality Assurance (QA) Inspection shall be performed by the Contractor and witnessed by a Government representative on all GPNTS Systems, kits, and spares ordered under this contract. The Contractor shall generate Hardware QA Test Procedures that verify that the production processes and procedures used by the Contractor deliver GPNTS systems and kits which are compliant with the requirements of this SOW, the GPNTS TRD, and the Contractor generated TDP. Each Hardware QA Inspection event shall be scheduled at least 12 calendar days prior to final delivery to the Government. Hardware QA Inspection procedures shall be updated as necessary so that they may be used for future production deliveries. The Contractor shall be responsible for documenting and reporting Hardware QA Inspection results.

CDRL Deliverables:

- (B020) Hardware Quality Assurance (QA) Inspection Procedure (DI-NDTI-80603A)
- (B021) Hardware Quality Assurance (QA) Inspection Test Report (DI-NDTI-80809B)

4.2.6.3 Factory Acceptance Testing

FAT shall be performed by the Contractor and witnessed by a Government representative on all GPNTS systems. GPNTS FAT software and FAT test procedures shall be specifically developed to verify that the performance of each GPNTS system complies with the requirements of this SOW, the GPNTS TRD, and the Contractor generated TDP. FAT shall be scheduled at least 7 calendar days prior to final delivery to the Government. FAT software and test procedures shall be updated as necessary so that they may be used for future production deliveries. The Contractor shall be responsible for documenting and reporting FAT test results.

CDRL Deliverables:

- (B022) Factory Acceptance Test Procedure (DI-NDTI-80603A)
- (B023) Factory Acceptance Test Software (DI-IPSC-81488)
- (B024) Factory Acceptance Test Report (DI-NDTI-80809B)

4.2.7 Environment, Safety, and Occupational Health Program (OPN)

The Contractor shall continue to assure ESOH compliance that reflects the Contractor's intentions for meeting ESOH regulatory requirements for the life-cycle of the GPNTS. The Contractor (and their Subcontractors) shall continue to maintain a HMMP, and submit HMMP Reports based on any design/material usage changes to include an updated HMUL. The Contractor shall make every attempt to minimize and restrict the use of hazardous materials and toxic or corrosive substances on the system (as delivered) and in operation, and maintenance of the system. The Contractor shall continue to assess potential ESOH hazards and their risks to include necessary mitigations to eliminate/reduce the risk. 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 hazardous material/waste impacts. All ESOH risks, recommendations, mitigations, alternatives, and other compliance considerations will be documented in the HMMP Report.

CDRL Deliverables:

- (B025) HMUL with Material Safety Data Sheets (DI-MISC-80508B)
- (B026) HMMP Report (DI-MISC-81397A)

4.2.8 Item Unique Identification (OPN)

The Contractor shall identify and mark all end items in accordance with DoD Instruction 5000.64, MIL-STD-130N, DoD Guide to Uniquely Identifying Items, version 2.0, dtd. 1 Oct 2008, and the PMW 170 UID Plan, dated 05 November 2008. In addition, removable/repairable items over $5000 are to be marked. The Contractor shall submit an IUID Report for the LRIP units.

CDRL Deliverable:

- (B027) IUID Report (DI-MISC-80508B)

4.2.9 DD Form 1494 Compliance (RDT&E)

As part of the Spectrum Supportability assessment and determination, the Contractor shall provide the necessary technical data, consisting of measured test data from LRIP terminals, to assist PMW/A 170 in filing Stage 4 DD1494 applications for all frequency bands and for all submarine, ship, and shore platforms.

Deleted: The

CDRL Deliverable:

- (B028) Frequency Allocation Data (DI-MISC-81174)

4.2.10 Physical Configuration Audit (RDT&E)

The Physical Configuration Audit (PCA) is performed on a production representative LRIP unit, to verify that the GPNTS system and its CIs are accurate, complete, compatible, and that the CI has achieved the performance and functional characteristics defined in the functional configuration baseline. The Government and the Contractor shall conduct the PCA jointly, at a time and place mutually agreed to, with the Government chairing the audit. During the PCA, the Contractor shall verify that the drawings reflect the "as-built" configuration of all newly developed or modified portions of the system; accurate form, fit, function information is provided on control drawings for non-developmental/ commercial off-the-shelf items; and confirm the drawings accurately represent the "as-built" production configuration. Whenever possible, the PCA is conducted incrementally, concurrent with hardware fabrication and assembly of the first production unit of each configuration (A, B, and C). The Contractor shall provide an approach and proposed schedule for conducting the PCA and identification of the CIs/CSCIs to be audited. The Contractor shall participate and assist the Government in the development of the PCA, using the guidelines contained in MIL-HDBK-61A, section 8. The Contractor shall document the results of the PCA after each audit and shall correct all audit discrepancies documented in the configuration audit summary reports. In the event the Government finds evidence the drawings and/or documents do not adequately represent the equipment, production shall cease until all discrepancies are corrected and the Government approves the configuration audit

summary report. The Contractor shall establish the product baseline upon completion of the PCA and resolution of audit discrepancies.

CDRL Deliverable:

- (B029) Configuration Audit Summary Report (Physical) (DI-CMAN-81022C)

4.2.11 Maintenance Demonstration (RDT&E)

The Contractor shall successfully complete an O-Level maintenance demonstration to be witnessed by the Government. The Contractor shall use an LRIP GPNTS system and a draft IETM in the demonstration. The Contractor shall submit a Maintenance Demonstration Plan to include a list of thirty (30) LRU faults for use during the demonstration. The Contractor shall include the highest probability O-Level failures in the list of LRU faults. The Government will down select to fifteen (15) for use during the demonstration.

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 will be limited to Contractor recommended general purpose electronic test equipment (GPETE). The Contractor shall be responsible to induce the selected fault to the equipment using nondestructive means. The Contractor shall submit to the Government the documentation on the means of inducing the nondestructive faults for use in Maintenance training. The Contractor shall generate a Maintenance Demonstration Report (including Fault documentation) and calculate Mean Corrective Maintenance Time for Operational Mission Failures (MCMTOMF) as part of the M-DEMO report.

CDRL Deliverables:

- (B030) Maintenance Demonstration Plan (DI-MNTY-81604)
- (B031) Maintenance Demonstration Report (including fault documentation) (DI-MNTY-81603)

4.2.12 Engineering Support Services (OPN & RDT&E)

The Contractor shall provide engineering support services as described in the following sub-sections.

Deleted: The Contractor shall provide engineering support services to provide technical support during LRIP installations, Government test readiness reviews, and Government test events. Additionally, the Contractor shall provide interim depot support to include testing, engineering investigation, casualty report (CASREP) support, system troubleshooting, and failure analysis/identification and replacement parts.

4.2.12.1 Engineering Support Services (OPN)

The Contractor shall provide engineering support services, as needed, to support the OPN funded tasks in sections 4.2.1 – 4.2.8, including technical support during LRIP installations, interim depot support to include testing, engineering investigation, casualty report (CASREP) support, system troubleshooting, and failure analysis/identification and replacement parts.

4.2.12.2 Engineering Support Services (RDT&E)

The Contractor shall provide engineering support services, as needed, to the RDT&E funded tasks in sections 4.2.1, 4.2.9, 4.2.10, and 4.2.11, including Government test readiness reviews and Government test events.

4.3 Full-Rate Production (FRP) Phase (OPN, SCN, RDT&E, and OCF)

This section contains the requirements for the FRP Phase of the GPNTS program, sections 4.3 – 4.3.9, which will be funded with RDT&E, OPN, SCN, or Other Customer Funds (OCF) (e.g. FMS and Coast Guard).

The following tasks will be OPN funded: procurement of FRP units, program management support, procurement of FRP PIO and upgrade kits, updated GPNTS technical documentation, FRP production testing, ESOH Program compliance, Item Unique Identification, and related engineering support services.

The following tasks will be SCN funded: procurement of FRP units for SCN funded platforms and related engineering support services.

The following tasks will be RDT&E funded: engineering support services related to supporting Government testing and/or engineering changes that are funded with RDT&E.

The following tasks will be OCF funded: procurement of FRP units for customers other than U.S. Navy and related engineering support services.

4.3.1 FRP Units (OPN, SCN, and OCF)

If the Government chooses to exercise these options, the Contractor shall build and deliver up to 100 FRP units comprised of a mix of configurations A, B, and C, in accordance with sections 3.10.4 – 3.10.6 of the GPNTS TRD, and in accordance with the GPNTS TDP.

All Contractor CLIN deliveries shall meet the requirements of this SOW, TRD, GPNTS System Performance Specification, and the GPNTS TDP. Whenever the Contractor's production build does not match the existing drawing package, whether due to Contractor production updates or due to required Government modifications, the Contractor shall document these changes through an ECP, and provide approved the modified page(s) to the drawing package.

The Contractor shall update the Contractor's Configuration Management Plan, as needed.

CDRL Deliverable:

- (C001) Contractor's Configuration Management Plan (DI-CMAN-80858B)

4.3.2 Program Management (OPN)

The Contractor shall perform program management activities required to ensure all work conducted during the LRIP phase of this contract is planned and executed in a manner that will achieve all management, technical, logistical, cost, and schedule objectives. The Contractor shall ensure coordination and integration of all functional areas within each task. The Contractor shall establish and perform business management functions to ensure contracting related actions meet established need dates of the Government. The Contractor shall use the COR as the primary point of contact for all program activities.

CDRL Deliverable:

- (C002) Contractor's Progress, Status, and Management Report (DI-MGMT-80227)

4.3.2.1 Program Management Reviews

The Contractor shall conduct periodic PMRs in a presentation to the Government at the Contractor's facility or via video or teleconferences. These reviews will occur at least quarterly and may occur as often as monthly if conditions require. The Contractor shall report on cost, schedule, technical progress, program risks and mitigations, and technical performance measures. The Contractor shall present the Risk Management Database and Risk Management Chart as part of the PMR Presentation Materials.

CDRL Deliverables:

- (C003) Conference Agenda (DI-ADMN-81249A)
- (C004) Presentation Material (DI-ADMN-81373)
- (C005) Report, Record of Meeting / Minutes (DI-ADMN-81505)

4.3.2.2 Integrated Product Teams

The Contractor shall apply a systematic approach to the integrated, concurrent development of the products and processes that apply to the development and production of GPNTS system. IPTs are a vital part of the DoD acquisition oversight and review process and will therefore be implemented on this contract.

At a minimum, the Contractor shall support the following Government chaired IPTs: SE, T&E, Contract, and Logistics. Additional IPTs or less formal working groups will be formed, as required. Any Contractor-led IPTs formed can include Government participants. The Contractor shall not be relieved of the responsibility of meeting contractual requirements due to implementation of any IPT approach. During the IPT process, if issues are identified that the Contractor feels will have significant impact on the terms of the contract, the Contractor shall identify the issue, in writing, to the Government COR/PCO for resolution. The use of video or teleconferencing is encouraged

for IPT meetings. The IPTs will be scheduled by the Government and will meet at least monthly to discuss the program's activities.

4.3.3 FRP Provisioning Item Ordering (OPN)

The Contractor shall manufacture and deliver provisioning items in accordance with the provisioning item ordering clause. The Contractor shall produce these spares in accordance with the GPNTS TRD and TDP. The Contractor shall include item cost for OBRPs and wholesale level system spares; indicate failure/usage rates, recommended quantities of each item for each GPNTS system, as well as consumable items in the Recommended Spares List. The Contractor shall update the recommended spares list each year or as needed.

CDRL Deliverable:

- (C006) Recommended Spares List (DI-MISC-80508B)

4.3.4 FRP Upgrade Kits (OPN)

The Contractor shall manufacture and deliver upgrade kits in accordance with the GPNTS TRD and TDP. The Contractor shall update the upgrade kits list each year or as needed.

CDRL Deliverable:

- (C007) Upgrade Kits List (DI-MISC-80508B)

4.3.5 GPNTS Technical Documentation (OPN)

The contractor shall deliver an updated TDP, if required, to include any changes resulting from the production of FRP units.

CDRL Deliverables:

- (C008) GPNTS Drawing Number Assignment Report (DI-SESS-81011D)
- (C009) GPNTS Master Ordering List (DI-SESS-81000D)
- (C010) GPNTS Production Drawings (DI-SESS-81000D)
- (C011) GPNTS Family Tree (DI-SESS-81000D)
- (C012) GPNTS System Interconnect Drawings (DI-SESS-81000D)
- (C013) GPNTS COTS Documentation (including COTS Drawings and manuals) (DI-TMSS-80527B)
- (C014) GPNTS Source Control Drawings Approval Request (DI-SESS-81010D)
- (C015) GPNTS Proposed Critical Manufacturing Process Descriptions (DI-SESS-81012D)
- (C016) GPNTS Source Code (DI-IPSC-81488)

4.3.6 Production Tests (OPN)

The contractor shall submit an updated Production Test Plan, as needed.

CDRL Deliverable:

- (C017) Production Test Plan (DI-NDTI-80566A)

4.3.6.1 Hardware Quality Assurance Inspection

A Hardware QA Inspection shall be performed by the Contractor and witnessed by a Government representative on all GPNTS Systems, kits, and spares ordered under this contract. The Contractor shall generate Hardware QA Test Procedures that verify that the production processes and procedures used by the Contractor to deliver GPNTS systems and kits, which are compliant with the requirements of this SOW, the GPNTS TRD, and the GPNTS TDP. Each Hardware QA Inspection event shall be scheduled at least 12 calendar days prior to final delivery to the Government. Hardware QA Inspection procedures shall be updated as necessary so that they may be used for future production deliveries. The Contractor shall be responsible for documenting and reporting Hardware QA Inspection results.

CDRL Deliverables:

- (C018) Hardware QA Inspection Procedure (DI-NDTI-80603A)
- (C019) Hardware QA Inspection Test Report (DI-NDTI-80809B)

4.3.6.2 Factory Acceptance Testing

FAT shall be performed by the Contractor and witnessed by a Government representative on all GPNTS Systems ordered under this contract. GPNTS FAT software and FAT test procedures shall be specifically developed to verify that the performance of each GPNTS system complies with the requirements of this SOW, the GPNTS TRD, and the GPNTS TDP. FAT shall be scheduled at least 7 calendar days prior to final delivery to the Government. FAT software and test procedures shall be updated as necessary so that they may be used for future production deliveries. The Contractor shall be responsible for documenting and reporting FAT test results.

CDRL Deliverables:

- (C020) Factory Acceptance Test Procedure (DI-NDTI-80603A)
- (C021) Factory Acceptance Test Software (DI-IPSC-81488)
- (C022) Factory Acceptance Test Report (DI-NDTI-80809B)

4.3.7 Environment, Safety, and Occupational Health Program (OPN)

The Contractor shall continue to assure ESOH compliance that reflects the Contractor's intentions for meeting ESOH regulatory requirements for the life-cycle of the GPNTS. The Contractor (and their Subcontractors) shall continue to maintain a HMMP, and submit HMMP Reports based on any design/material usage changes to include an updated HMAUL. The Contractor shall make every attempt to minimize and restrict the use of hazardous materials and toxic or corrosive substances on the system (as delivered) and in operation, and maintenance of the system. The Contractor shall continue to assess potential ESOH hazards and their risks to include necessary mitigations to eliminate/reduce the risk. 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 hazardous material/waste impacts. All ESOH risks, recommendations, mitigations, alternatives, and other compliance considerations will be documented in the HMMP Report.

- (C023) HMUL with Material Safety Data Sheets (DI-MISC-80508B)
- (C024) HMMP Report (DI-MISC-81397A)

4.3.8 Item Unique Identification (OPN)

The Contractor shall identify and mark all end items in accordance with DoD Instruction 5000.64, MIL-STD-130N, DoD Guide to Uniquely Identifying Items, version 2.0, dtd. 1 Oct 2008, and the PMW 170 UID Plan, dated 05 November 2008. In addition, removable/repairable items over $5000 are to be marked. The Contractor shall submit an IUID Report for the FRP units.

CDRL Deliverable:

- (C025) IUID Report (DI-MISC-80508B)

4.3.9 Engineering Support Services (RDT&E/OPN/SCN)

The Contractor shall provide engineering support services as described in the following sub-sections.

Deleted: The Contractor shall provide engineering support services to provide technical support during FRP installations and Government test events. Additionally, the Contractor shall provide depot support to include testing, engineering investigation, casualty report (CASREP) support, system troubleshooting, and failure analysis/identification and replacement parts.

4.3.9.1 Engineering Support Services (RDT&E)

The Contractor shall provide engineering support services, as needed, including technical support to Government test readiness reviews and Government test events.

4.3.9.2 Engineering Support Services (OPN)

The Contractor shall provide engineering support services, as needed, to the OPN funded tasks in sections 4.3.1 – 4.3.8, including technical support during FRP installations, interim depot support to include testing, engineering investigation, casualty report (CASREP) support, system troubleshooting, and failure analysis/identification and replacement parts.

4.3.9.3 Engineering Support Services (SCN)

The Contractor shall provide engineering support services, as needed, to the SCN funded tasks in section 4.3.1, including technical support during FRP installations for SCN ships.

5 GPNTS SECURITY LEVEL

The nature of this task requires access up to SECRET information. The work performed by the Contractor will include access up to SECRET data, information and spaces. The Contractor will be required to attend meetings classified up to the SECRET level.

Some Engineering Support Services will require Contractor access to SECRET data, information, and spaces at Government facilities. Some installation tasks will require Contractor access to SECRET data, information, and spaces at the installation site.

If foreign travel is required, all outgoing Country/Theater clearance message requests shall be submitted to the SSC Pacific Foreign Travel Team, OTC2, Room 1656, for action. A Request for Foreign Travel form shall be submitted for each traveler, in advance of the travel to initiate the release of a clearance message at least 30 days in advance of departure. Each traveler must also submit a Personal Protection Plan and have a Level 1 Antiterrorism/Force Protection briefing within one year of departure and a country specific briefing within 90 days of departure. The Contractor shall receive Government authorization in advance of any foreign travel in accordance with clause H-22 “Reimbursement of Travel Costs” (SPAWAR H-350) (JAN 2006).

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

The Contractor will be required to access restricted data, formerly restricted data, SIPRnet, and COMSEC material/equipment.

6 GOVERNMENT FURNISHED PROPERTY

GPS Antenna systems will be provided as Government Furnished Property (GFP), no later than 30 days after contract award. The GFP GPS Antenna Systems shall be compatible with the GPNTS configurations and the requirements specified in Section 3.7 of the GPNTS TRD. The antenna systems will be provided to the Contractor for GPNTS development and testing only:

The following GFP will be provided to the Contractor:

1. Two (2) GAS-1 antennas
2. Two (2) ADAP Fiber Optic Antenna Link (FOAL) Antenna Systems

7 ACRONYMS

API	Application Programming Interfaces
ANSI	American National Standards Institute
ASD(NII)	Assistant Secretary of Defense for Networks and Information Integration
ASN	Assistant Secretary of the Navy
ASTM	American Society for Testing and Materials
BIT	Built-In Test
BOM	Bill of Materials
C&A	Certification and Accreditation
C4I	Command, Control, Computers, Communications, and Intelligence (C4I)
CASREP	Casualty Report
CCE	Common Computing Environment
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CFSR	Contract Funds Status Reports
CI	Configuration Item
CLIN	Contract Line Item Number
CM	Configuration Management
CMMI	Capability Maturity Model Integration
CMP	Configuration Management Plan
CND	Cannot Duplicate
CONUS	Continental United States
COTS	Commercial off the Shelf
COI	Critical Operational Issue
CPI	Cost Performance Indices
CPR	Contract Performance Report
CSA	Configuration Status Accounting
CSCI	Computer Software Configuration Item
CT	Contractor Testing
CWBS	Contract Work Breakdown Structure
DCMA	Defense Contract Management Agency
DFARS	Department of Defense Federal Acquisition Regulation Supplement
DIACAP	DoD Information Assurance Certification and Accreditation Process
DIP	DIACAP Implementation Plan
D-Level	Depot Level
DMSMS	Diminishing Manufacturing Sources and Material Shortages
DoD	Department of Defense

DoDISS	Department of Defense Index of Specifications and Standards
DoN	Department of Navy
DT&E	Development Test and Evaluation
DTD	Document Type Definition
DVT	Design Verification Test
E3	Electromagnetic Environmental Effects
EAC	Estimate at Completion
EDM	Engineering Development Model
EIA	Electronic Industries Association
EMI/EMC	Electromagnetic Interference/Electromagnetic Compatibility
EPA	Environmental Protection Agency
ESOH	Environment, Safety, and Occupational Health
EVMIG	Earned Value Management Implementation Guide
EVMS	Earned Value Management Systems
FAT	Factory Acceptance Testing
FCA	Functional Configuration Audit
FMEA	Failure Modes, Effects, and Analysis
FOAL	Fiber Optic Antenna Link
FRACAS	Failure Reporting, Analysis, and Corrective Action System
FRP	Full-Rate Production
GFI	Government-Furnished Information
GFP	Government-Furnished Property
GPETE	General Purpose Electronic Test Equipment
GPNTS	Global Positioning System (GPS)-Based Positioning, Navigation, and Timing Service
GPS	Global Positioning System
GPSW	U.S. Air Force GPS Wing
HAE	Host Application Equipment
HAZMAT	Hazardous Material
HE	Human Engineering
HEDAD-M	Human Engineering Design Approach Document, Maintainer
HEPP	Human Engineering Program Plan
HETR	Human Engineering Test Report
HFE	Human Factors Engineering

HHAR	Health Hazard Assessment Report
HMMP	Hazardous Materials Management Program
HMUL	Hazardous Materials Usage List
HSI	Human Systems Integration
HSIP	Human Systems Integration Plan
HSIPP	Human Systems Integration Program Plan
HTML	Hypertext Markup Language
HWCI	Hardware Configuration Items
IA	Information Assurance
IBR	Integrated Baseline Review
ICAPS	Interactive Computer Aided Provisioning System
ICD	Installation Control Drawing
IEEE	Institute of Electrical & Electronics Engineers
IETM	Interactive Electronics Technical Manual
ILS	Integrated Logistics Support
IMS	Integrated Master Schedule
IPT	Integrated Product Teams
iSAC	Indirect System Access Component
IT	Integration Testing
IT&E	Integration Testing and Evaluation
JTA	Job Task Analysis
JETDAS	Joint Electronics Type Designation Automated System
LCC	Life Cycle Cost
LCSP	Lifecycle Support Plan
LMI	Logistics Management Information
LRIP	Low-Rate Initial Production
LRU	Lowest Replaceable Unit
M&S	Modeling and Simulation
MAC	Mission Assurance Category
MARS	Maintenance Action Reports
MCMTOMF	Mean Corrective Maintenance Time for Operational Mission Failures

MIP	Maintenance Index Page
MOS	Military Occupational Specialty
MOSA	Modular Open Systems Approach
MSI	Maintenance Significant Item
MSDS	Material Safety Data Sheet
MTBF	Mean Time Between Failure
NAS	National Aerospace Standard
NAVSSI	Navigation Sensor System Interface
NDI	Non-Developmental Item
NEPA	National Environmental Policy Act
NESI	Net-Centric Enterprise Solutions Interoperability
NHA	Next Higher Assembly
NKO	Navy Knowledge Online
NMCI	Navy Marine Corps Intranet
NSA	National Security Agency
O&M	Operation and Maintenance
OCF	Other Customer Funds
OPNAV	Office of the Chief of Naval Operations
OPSEC	Operations Security
OSA	Open Systems Architecture
OT&E	Operational Test and Evaluation
OTA	Operational Test Authority
OTRR	Operational Test Readiness Review
PCA	Physical Configuration Audit
PDR	Preliminary Design Review
PESHE	Programmatic Environmental, Safety, and Health Evaluation
PHS&T	Packaging, Handling, Storage, and Transportability
PIT	Platform Information Technology
PLISN	Provisioning Line Item Sequence Number
PLT	Production Lead-Time
PM	Program Management

POA&M	Plan of Actions and Milestones
PQT	Production Qualification Testing
PRR	Production Readiness Review
PTD	Provisioning Technical Documentation
QA	Quality Assurance
RAM	Reliability, Availability, and Maintainability
RNCC	Reference Number Category Code
RNVC	Reference Number Variation Code
RMP	Risk Management Plan
RTC	Real Time Component
SAASM	Selective Availability Anti-Spoofing Module (SAASM)
SAC	System Access Component
SCCB	Software Configuration Control Board
SCORM	Shared Courseware Object Reference Model
SDD	Software Design Description
SDP	Software Development Plan
SE	System Engineering
SECNAVINST	Secretary of the Navy Instruction
SEP	System Engineering Plan
SFR	System Functional Review
SIRS	Software Interface Requirements Specification
SIT	System Integration Tests
SMR	Source, Maintenance & Recoverability
SOA	Service-Oriented Architecture
SOW	Statement of Work
SPAWAR	Space and Naval Warfare Systems Command
SPOF	Single Point of Failure
SQL	Structured Query Language
SQT	System Qualification Testing
SRR	System Requirements Review
SRS	Software Requirements Specification

SRVM	System Requirements Verification Matrix
SSC Pacific	SPAWAR Systems Center Pacific
SSPP	System Safety Program Plan
SSSTRP	Software System Safety Technical Review Panel
STP	Software Test Plan
STR	Software Test Report
SVD	Software Version Description
T&E	Test and Evaluation
T&F	Time and Frequency
TDP	Technical Data Package
TECHEVAL	Technical Evaluation
TEMP	Test and Evaluation Master Plan
TEPP	Test and Evaluation Program Plan
TFC	Time & Frequency Component
TMCR	Technical Manual Contract Requirement
TPM	Technical Performance Measures
TRD	Technical Requirements Document
TRF	Technical Replacement Factor
TRPPM	Training Resources Planning Process Methodology
TRR	Test Readiness Review
UDP/IP	User Datagram Protocol/Internet Protocol
UID	Unique Identifier
V&V	Verification and Validation
VME	Versa Module Eurocard
XML	eXtensible Markup Language