

Section C - Descriptions and Specifications

STATEMENT OF WORK

FOR ENGINEERING AND MANUFACTURING DEVELOPMENT (EMD)

FOR THE COOPERATIVE ENGAGEMENT CAPABILITY (CEC)

COMMON ARRAY BLOCK (CAB) FAMILY OF ANTENNAS (FoA)

REVISION H

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## **1.0 Scope**

This STATEMENT OF WORK (SOW) defines the effort required for the Contractor to act as designer and fabricator, and provide engineering services to accomplish the design, engineering development, documentation, fabrication, test, and qualification of Engineering Development Model (EDM) Common Array Block (CAB) antennas for the Cooperative Engagement Capability (CEC) Data Distribution System (DDS), and host platform interfaces. It includes the associated program management, human engineering, and logistic support planning requirements. EDMs are to be used by the Contractor for the purposes of testing antenna performance, fully qualifying the design, and integrating the antennas into the CEC DDS network. A close working relationship with the contractor selected as CEC Design Agent (DA) is required.

Two versions of the CAB antenna are required. The Common Array Block-Surface (CAB-S) will be utilized on surface ships; CG/CG Mod, DDG/DDG Mod, CVN, CVN 78, LHD, LHA 6, LPD 17, and DDG 1000. The Common Array Block-Expeditionary (CAB-E) will be utilized for United States Marine Corps (USMC) Composite Tracking Network CTN (ground). Hereafter, the CAB-E and CAB-S versions are also referred to collectively as the CAB Family of Antennas (CAB FoA). To minimize total ownership cost, reduce size and weight, and improve reliability, the CEC program intends to apply a Family of Antennas (FoA) approach using common building blocks for the antenna designs.

### **1.1 Background**

The CAB FoA is intended to replace the antennas currently utilized in the CEC DDS. CAB-S versions are envisioned to replace the AN/USG-2B Shipboard, Planar Array Antenna Assembly (PAAA), Shipboard Active Array (SBAA). CAB-E versions are envisioned to replace the AN/USG-4B Ground Mobile, Compact Solid State Antenna (CSSA). Future activities may include the possibility to utilize the FoA common building blocks in smaller shipboard applications (LCS, etc) AN/USG-3B Airborne Systems, AN/USG-5B US Army JLENS Systems, and AN/USG 6-8B Foreign Military Systems.

A key mechanism to achieve reduced total ownership cost is through the application of common hardware and software/firmware elements in the antenna design. Utilizing a common set of building blocks is necessary in order to reduce the total number of parts in the logistics support chain. Therefore commonality between CAB-E and CAB-S at the highest levels of assembly is considered to be a key design objective.

The United States Navy (USN) has invested in the development of Transmit/Receive (T/R) Monolithic Microwave Integrated Circuits (MMICs) using Gallium Nitride (GaN) semiconductor materials. The Contractor shall utilize the GaN MMIC, provided as Government Furnished Material (GFM), for use in the development of the CAB FoA. The T/R MMIC module specification, testing and mounting white paper is provided as GFI.

The Contractor shall maximize commonality and employ the GFM MMIC to produce air cooled designs.

## **2.0 Applicable Documents**

### **2.1 General**

The Contractor shall utilize the revision effective as of the date of contract award for each of the documents listed in the following subparagraphs and to the extent specified in the requirements of this SOW. Nothing in this document however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

It is the intent of this solicitation and the resulting contract to fully implement the principles of the Department of Defense (DoD) Acquisition Reform initiatives. Specifically, reference is made to the Secretary of Defense policy promulgated by memorandum on 29 June 1994 regarding the use of specifications and standards. When performance specifications are not practical, non-Government (industry developed) standards shall be used.

In the event of conflict between the documents referenced herein and the contents of this SOW, the order of precedence shall be:

- 1) This Statement of Work (SOW);
- 2) The CEC System Specification and other CEC Related Documentation, Section 2.2 of this SOW;
- 3) Specifications, Standards and Other Documents, Section 2.3 to 2.6 of this SOW.

CEC related documentation is located in SOW Section 2.2, Military Standards (MIL-STDs) are located in SOW Section 2.3, Joint Chiefs of Staff, Department of Defense and DoD Services Documents are located in SOW Section 2.4, Military Handbooks (MIL-HDBKs) are located in SOW Section 2.5. All Non-Government and Commercial Standards, Specifications and other applicable publications are located in SOW Section 2.6.

Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available on the internet at the Department of Defense Single Stock Point (DoDSSP) at <http://dodssp.daps.dla.mil>. Joint Chiefs of Staff, DoD Directives (DoDD), Instructions (DoDI) and Publications documents can be found on the Acquisition, Technology, and Logistics (AT&L) Acquisition Knowledge Sharing System (AKSS) at <http://akss.dau.mil/jsp/default.jsp> or at the DoD Directives, Instructions and Publications documents, as well as other services publications at DoD Issuances website at: <http://www.dtic.mil/whs/directives/>. Non-Government documents should be obtained from the commercial sources. Requests for copies of documents not available from sources listed above should be directed to the Contracting Officer's Representative (COR).

The following specifications, standards, and handbooks form a part of this SOW to the extent cited herein. All reference documents may be used for guidance unless otherwise specified within the body of this SOW. Guidance documents may be used as an aid in identifying applicable topics to be addressed consistent with meeting the requirements of the CEC CAB FoA contract. Unless otherwise specified, the issue of Government documents is that listed in the current issue of the Department of Defense Index of Specifications and Standards (DoDISS) on the date of this SOW. Non-Government standards listed are those in effect on the date of this SOW.

## **2.2 CEC Related Documentation**

System Specification for the Cooperative Engagement Capability (CEC) (U), April 2004, plus Specification Change Notices (SCN) from approved ECP-477R2, ECP-438R1, ECP-483R3, ECP-498R1, ECP-499R1C1, ECP-512R1, ECP-513R2 and ECP-523, SECRET

Segment Specification for the Cooperative Engagement Capability Cooperative Engagement Processor (U), August 2004 plus SCNs from approved ECP-477R2, ECP-438R1, ECP-483R3, ECP-498R1, ECP-499R1C1, ECP-513R2 and ECP-522R1, SECRET

Segment Specification for the Cooperative Engagement Capability Data Distribution System (U), August 2004, plus SCNs from approved ECP-477R2, ECP-438R1, ECP-483R3, ECP-498R1, ECP-499R1C1, and ECP-513R2, SECRET

Specification for the Cooperative Engagement Capability Common Array Block – Family of Antennas (CAB-FoA) Antenna System (U), 1 June 2011, SECRET

Interface Control Document the Cooperative Engagement Capability Common Array Block – Expeditionary (CAB-E) Antenna Assembly, 1 June 2011, UNCLASSIFIED

Interface Control Document the Cooperative Engagement Capability Common Array Block – Shipboard (CAB-S) Antenna Assembly, 1 June 2011, UNCLASSIFIED

Cooperative Engagement Capability Transmit/Receive Monolithic Microwave Integrated Circuit (T/R MMIC) Specification (U), 1 June 2011, SECRET

Interface Design Document for the Cooperative Engagement Capability Signal Data Processor to Common Array Block – Family of Antennas (CAB-FoA) System, 1 June 2011, UNCLASSIFIED

**2.3 Military Standards (MIL-STD)**

MIL- STD-31000	05 Nov 2005	Detail Specification, Technical Data Packages
MIL-PRF-32216	17 Oct 2006	Evaluation of Commercial Off-the-Shelf (COTS) Manuals and Preparation of Supplemental Data
MIL- PRF-29612B	08 Jun 2006	Performance Specification, Training Data Products
MIL-PRF-63033C	18 May 2009	Manuals, Technical: Demilitarization of Surplus Military Items, Preparation of
MIL-STD-129P (4)	19 Sept 2007	DoD Standard for Military Marking for Shipment and Storage
MIL-STD-130N	17 Dec 2007	DoD Standard for Identification of U.S. Military Property
MIL-STD-461F	10 Dec 2007	Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment
MIL-STD-464C	01 Dec 2010	Electromagnetic Environmental Effects
MIL-STD-785B	05 Aug 88	Reliability Program for Systems Equipment Development and Production, including notices
MIL-STD-882D	10 Feb 2000	Standard Practice for System Safety
MIL-STD-1472F	05 Dec 2003	Human Engineering, Notice 1
MIL-STD-2073-1E (1)	07 Jan 2011	DoD Standard Practice for Military Packaging
MIL-STD-40051-2A	21 Jul 2010	Preparation of Digital Technical Information for Page-Based. Technical Manuals

**2.4 Joint Chiefs of Staff, Department of Defense and DoD Services Documents**

DFARS 252.234-7001	23 April 2008	Notice of Earned Value Management System
DFARS 252.234-7002	23 April 2008	Earned Value Management System
DoDD5000.01	20 Nov 2007	Defense Acquisition
DoDI 5000.02	8 Dec 2008	Operation of the Defense Acquisition System
DoD Directive 5200.30	21 Mar 1983	Guidelines for Systematic Declassification Review of Classified Information in Permanently Valuable DoD Record
DoD Instruction 5200.39	16 Jul 2008	Mandatory Procedures for Research & Technology Protection with the DoD (Incorporating change 1 28 Dec 2010)
DoD MCTL		DoD Military Critical Technologies List
DoDD 5230-24	18 Mar 1987	Distribution Statements on Technical Documents
DoDD 5220.22M	01 Feb 2006	National Industrial Security Program Operating Manual
DoDD 8500.01E	24 Oct 2002	Information Assurance (IA)

DoDI 8510.01	28 Nov 2007	DoD Information Assurance Certification and Accreditation Process (DIACAP)
DoDI 8500.2	06 Feb 2003	Information Assurance (IA) Implementation
MIL-DTL87268C	27 Jan 2007	Manuals, Interactive Electronic Technical Manuals, General Content, Style, Format, and User Interaction Requirements
MIL-D-23140D	30 Apr 1992	Drawings, Installation Control, for Electronic Equipment
NACSEM 5112		NONSTOP Evaluation Techniques
NAVSEA PIT		DoN CIO Platform IT Guidance
NAVSEA INS 9400.2	7 August 1998	Battle Force Interoperability Guidance and Policy
NESI Part 5 v3.2	22 Dec 2009	Net-Centric Enterprise Solutions for Interoperability - Developers Guidance ( <a href="http://nesipublic.spawar.navy.mil/Part5.jsp">http://nesipublic.spawar.navy.mil/Part5.jsp</a> )
NSTISSAM TEMPEST/1/92		Compromising Emanations Laboratory Test Requirements, Electromagnetics
SECNAVINST 5000.2D	16 Oct 2008	Implementation of Mandatory Procedures for Major and Non- Major Defense Acquisition Programs and Major and Non-Major Information Technology Acquisition Programs

## 2.5 Handbooks

MIL-HDBK-61A	07 Feb 2001	Configuration Management Guidance
MIL-HDBK-470	29 Jun 2007	Design and Develop Maintainable Products and Systems
MIL-HDBK-781	01 Apr 1996	Reliability Test Methods, Plans, and Environments for Engineering Development, Qualification, and Production
MIL-HDBK-881A	30 Jul 2005	Work Breakdown Structure
MIL-HDBK-1785	01 Aug 1995	System Security Program Management requirements
MIL-HDBK-29612-1A	31 Aug 2001	Guidance for Acquisition of Training Data Products and Services (Part 1 of 5 Parts)
SD-22	01 Nov 2006	Diminishing Manufacturing Sources and Material Shortages (DMSMS) Guidebook

## 2.6 Non-Government and Commercial Standards, Specifications and other applicable publications

ANSI/EIA-649-A-2004	01 Apr 2004	National Consensus Standard for Configuration Management
ANSI/EIA-748-B	01 Jun 2007	Earned Value Management Systems
ANSI Z39.18	1987	Scientific and Technical Reports: Organization, Preparation, and Production
AR 700-15	12 Feb 2004	Packaging Of Materiel

ASME Y14.24	1999	Types and Applications of Engineering Drawings
ASME Y14.100	2004	Engineering Drawing Practices
ASTM-D3951 98	2004	Standard Practice for Commercial Packaging
ASTM F1337-10	2006	Standard Practice for Human Engineering Program Requirements for Ships and Marine Systems, Equipment, and Facilities
ASTM F1166-07	2006	Standard Practice for Human Engineering Program Requirements for Ships and Marine Systems, Equipment, and Facilities
CMMI-SE/SW/IPPD/SS	10 Mar 2002	Capability Maturity Model Integration (CMMI <sup>SM</sup> ) for Systems Engineering, Software Engineering, Integrated Product and Process Development, and Supplier Sourcing
EIA-632	01 Jan 1999	Processes for Engineering a System
GEIA-STD-0007	18 Oct 2008	Logistics Products Data
IEEE 1220-2005	09 Sept 2005	IEEE Standard for Application and Management of the Systems Engineering Process
IEEE J-STD-016-1995	01 Sep 1995	Standard for Information Technology, Software Life Cycle Processes, Software Development, Acquirer-Supplier Agreement
IEEE/EIA 12207.0	01 May 1996	Standard for Information Technology-Software Life Cycle Processes
IEEE/EIA 12207.1	01 Apr 1998	Standard for Information Technology-Software Life Cycle Processes-Life Cycle Data
IEEE/EIA 12207.2	01 Apr 1998	Standard for Information Technology-Software Life Cycle Processes-Implementation Considerations
IEEE STD 1016-1998	19 Mar 2009	IEEE Standard for IT Systems Design Software Design Description
IEC 60812 ED.20 B:2008	28 July 2008	Analysis Techniques for Reliability – Procedure for Failure Mode and Effects Analysis (FMEA),
ISO/IEC-15288	01 Nov 2002	Systems Engineering- System Life Cycle Processes
ISO10007		Quality Management-Guidelines for Configuration Management
ISO 9000 & 9001	01 Dec 2000	Quality Management Systems
NAS 411		National Aerospace Standard (NAS) 411, Hazardous Materials Management Program
SAE JA1011	09 Aug 2009	Evaluation Criteria for Reliability-Centered Maintenance (RCM) Processes Referencing Message Specification
SAE JA1012	01 Jan 2002	A Guide to the Reliability-Centered Maintenance (RCM) Standard

## **2.7 Definitions**

The Contractor shall use the following definitions.

### **2.7.1 Commonality**

A quality that applies to materiel or systems possessing like and interchangeable characteristics enabling each to be utilized or operated and maintained by personnel trained on the others without additional specialized training; and/or having interchangeable repair parts and/or components. Applies to consumable items interchangeable without adjustment. (Glossary of Defense Acquisition Acronyms and Terms, 13th Edition, November 2009)

### **2.7.2 Engineering Development Model (EDM)**

A system acquired during the Engineering and Manufacturing Development (EMD) Phase that is built from approved Critical Design Review (CDR) drawings. EDMs may be used for development and operational testing to demonstrate maturing performance during the latter stages of development and to finalize proposed production specifications and drawings. (Extracted from the Glossary of Defense Acquisition Acronyms and Terms, 13th Edition, November 2009)

### **2.7.3 Firmware**

The combination of a hardware device and computer instructions or computer data that reside as read-only software on the hardware device. The software cannot be readily modified under program control. (Glossary of Defense Acquisition Acronyms and Terms, 13th Edition, November 2009)

For the purposes of this effort, firmware is considered to be software.

### **2.7.4 Gerber Files**

Family of file formats used by printed circuit board (PCB) industry software to describe the images of a printed circuit board (copper layers, solder mask, legend, etc.) as well as the drilling and milling data.

### **2.7.5 Line Replaceable Unit (LRU)**

An essential support item removed and replaced at field level to restore an end item to an operationally ready condition. (Also called Weapon Replacement Assembly (WRA) and Module Replaceable Unit). (Glossary of Defense Acquisition Acronyms and Terms, 13th Edition, November 2009)

### **2.7.6 Long Lead Item (LLI)/Long Lead Time (LLT) Materials**

Those components of a system or piece of equipment for which the times to procure, design and/or fabricate are greater than 12 weeks, and therefore, to which an early commitment of funds may be desirable in order to meet the earliest possible date of system completion. (Glossary of Defense Acquisition Acronyms and Terms, 13th Edition, November 2009)

### **2.7.7 Pre-Production Unit (PPU)**

For the purpose of this contract, a Pre-Production Unit (PPU) is defined as a production representative version of the antenna assemblies (CAB-E and CAB-S) that is suitable for assembly validation, design qualification, and Government testing. The CAB-E PPU is comprised of a CAB-E Assembly and the CAB-S PPU is comprised of a CAB-S Assembly. Some qualification testing is considered destructive and results in rendering a tested unit unsuitable for tactical deployment. Units undergoing destructive testing or units that are damaged during design qualification are no longer considered production representative unless restored to pre-test condition.

### **2.7.8 Production Representative**

For the purpose of this contract, production representative describes a state of assembly design and fabrication such that the item being described has the expectation of meeting all the qualification and fielding requirements.

### **2.7.9 Software**

Computer programs, procedures, and possibly associated documentation and data pertaining to the operation of a computer system. (Glossary of Defense Acquisition Acronyms and Terms, 13th Edition, November 2009)

For the purposes of this effort, firmware is considered to be software.

### **2.7.10 Validation**

(1) The review of documentation by an operational authority other than the user to confirm the operational capability. Validation is the precursor to approval. (2) The process by which the contractor (or as otherwise directed by the DoD Component procuring activity) tests a publication/technical manual for technical accuracy and adequacy. (3) The process of evaluating a system or software/firmware component during, or at the end of, the development process to determine whether it satisfies specified requirements. (Glossary of Defense Acquisition Acronyms and Terms, 13th Edition, November 2009)

### **2.7.11 Verification**

Confirms that a system element meets design-to or build-to specifications. Throughout the system's life cycle, design solutions at all levels of the physical architecture are verified through a cost-effective combination of analysis, examination, demonstration, and testing, all of which can be aided by modeling and simulation. (Glossary of Defense Acquisition Acronyms and Terms, 13th Edition, November 2009)

## **3.0 Requirements**

The Contractor shall develop and deliver to the Government EDMs that are in compliance with the Specification for the CEC CAB – FoA Antenna System. These systems shall be delivered in accordance with the delivery schedule stated in the contract. CEC CAB versions shall be designed to maximize commonality of components, assemblies, and software/firmware. The Contractor shall apply the principles of Naval Open Architecture (NOA) and well defined common standards. Compliance of the EDMs to the performance specification requirements shall be verified through Government witnessed testing and analysis that shall be performed by the Contractor using a Contractor developed, Government approved Master Test Plan (MTP). Government personnel shall have oversight and approval authority for the verification that testing and test documentation satisfy the functional and performance requirements to accept the unit(s). The Contractor shall perform all required technical, engineering, test support services and logistics as delineated in this SOW to support the design, development, integration and testing of the CAB versions. The Contractor shall provide all materials, equipment, tooling and personnel necessary to fabricate, integrate and test support for the types and quantities of deliverables specified by the contract. At the Government's request, the Contractor may be required to produce CAB-E and/or CAB-S Pre-Production Units (PPU).

The Contractor shall address both CAB-S and CAB-E in all CDRLs required under this contract. For some CDRLs, this may require the submission of two (2) separate deliverables for a single CDRL.

## **3.1 Antenna Design**

### **3.1.1 System Engineering**

The Contractor shall use a systems engineering approach to design and build EDMs to meet the CAB-E and CAB-S Performance Specification. The Contractor shall develop a Systems Engineering Management Plan (SEMP) based on the Government Systems Engineering Plan (SEP), provided as GFI. The SEMP shall define the necessary tasks and activities to be performed and shall include requirements analysis, functional analysis and allocation, and synthesis for the design of the system. The Contractor's systems engineering process shall transform the requirements stipulated in the performance specification into a life cycle balanced set of products and process descriptions addressing the systems design, development, fabrication, test and evaluation, operational deployment,

logistical support, personnel training, and final disposal. Where practical, system end-item requirements shall be met through the use of non-developmental items, when such products meet project needs, meet mission operational and environmental requirements, and are cost effective over the entire cycle of the project. The Contractor shall develop and maintain a System Requirements Verification and Validation Matrix (SRVM) to provide an audit trail from requirements of the CAB-E and CAB-S Performance Specifications to design implementation and verification and validation.

**CDRL A001 - System Engineering Management Plan (SEMP), Contractor's Systems Engineering Management Plan (SEMP)  
CDRL A002 - Technical Report – Studies/Services, System Requirements Verification and Validation Matrix (SRVM)**

### **3.1.1.1 Systems Engineering Integrated Product Team (SE IPT)**

The Contractor shall participate in the Government led SE IPT. The SE IPT is a working group of Contractor, Government and Industry subject matter experts, without a formal charter, that will be responsible for the transformation of the system performance specification into a maintainable and supportable detailed system design. The SE IPT will include representatives from the CEC Design Agent, Government Labs and Program Offices. To accomplish this, the SE IPT shall act as the overarching technical authority to allocate system requirements to lower level technical working groups, such as the Modeling and Simulation working group, and sub-IPTs and adjudicate issues and problems across those IPTs. The SE IPT shall determine test objectives for the system, develop and document test strategies that will achieve test objectives, and ensure preparedness for Test Readiness Reviews (TRR).

The SE IPT shall be responsible for the transformation of the software/firmware system performance specifications into a maintainable and supportable detailed software/firmware system design. To accomplish this, the SE IPT shall act as the overarching technical oversight to allocate system software/firmware requirements to lower level technical working groups, such as the Modeling and Simulation working group, and sub-IPTs and adjudicate issues and problems across those groups.

The SE IPT shall also define and integrate supportability requirements into the system design, and enhance the supportability of the design to achieve its objective level of readiness and availability, ensuring that the system can be supported in a cost effective manner and delivered with the necessary support infrastructure.

The meetings shall be held at times and places mutually agreed to by the Government and Contractor, and shall be scheduled in conjunction with Quarterly Program Reviews. The SE IPT shall include both Systems Engineering and Logistics members. The Government anticipates one (1) SE IPT meeting per month. Each meeting is anticipated to be two (2) days long.

### **3.1.1.2 Technical Data Package (TDP)**

The Contractor shall develop, maintain, and deliver a DoD Product Drawing, TDP for all CAB FoA under this contract IAW MIL-STD-31000. For each CAB version, the TDP shall include all components, sub-assemblies, and final-assemblies. The Contractor shall document any test requirements on the components, sub-assemblies, and final-assemblies necessary to ensure the characteristics of performance and include these in the TDP. Material and process specifications, special inspection equipment drawings and special tooling drawings and their associated lists shall be included in the TDP for complete product definition and total design disclosure. The TDP shall define the connectors and the pin-outs for all delivered equipment (antenna, FO converter box, etc.)

The TDP shall contain, but not be limited to, drawings, parts lists, data lists, wiring lists, schematics, interconnect diagrams, special tooling drawings, specifications, special packaging instructions (including storage, shipping container), source control drawings, specification control drawings, cable dressing techniques, software/firmware version description documents, software/firmware, and interface control information for both hardware and software/firmware.

The Contractor shall develop an Installation Control Drawing for both the CAB-E and CAB-S.

The Contractor drawings and associated lists shall be developed and structured IAW ASME Y14.24 and MIL-STD 31000. Classified portions of the TDP shall be handled in accordance with approved security procedures. The Government shall take configuration control of the TDP after successful PCA.

**CDRL A003 - Technical Data Package**  
**CDRL A004 - Computer Software Product, Firmware**  
**CDRL A005 - Installation Control Drawing**

### **3.1.1.3 Human Systems Integration (HSI)**

The contractor shall apply effective HSI principles and design activities during CAB FoA Engineering and Manufacturing Development (EMD). The contractor shall develop and execute an HSI engineering effort that ensures all aspects and requirements have been incorporated into the layout, design, and development of equipment (hardware and software/firmware) having a maintainer interface. The Contractor shall incorporate the "Department of Defense Design Criteria Standard - Human Engineering" from (MIL-STD-1472), into the HSI design of the CAB FoA. The Contractor shall ensure human factors and cognitive engineering are employed for the life of the contract, providing optimal human-machine interfaces.

#### **3.1.1.3.1 Human Systems Integration Program Plan (HSIPP)**

The Contractor shall develop a HSIPP to describe the approach to developing and managing HSI requirements, elements, and functionalities to ensure the attainment of all manning, personnel, training, and human factors engineering objectives. The HSIPP shall include HSI scope and structure, HSI engineering process and controls, HSI schedule and the HSI engineering team composition for all HSI activities. The HSIPP shall identify applicable standards and guidelines to ensure that HSI objectives are met. The HSIPP shall be coordinated with other appropriate Logistics efforts is such that the HSIPP addresses only deltas from other efforts or references in how these efforts are addressed in other logistics areas. Human performance shall be demonstrated and measured through man-in-the loop simulation tests using representative operator and maintainer personnel and representative operational scenarios. The Contractor shall describe the human factors engineering effort in equipment detail design to ensure compliance with the applicable provisions of the human engineering requirements within MIL-STD-1472F, and, for human factor engineering requirements associated with maritime platforms, ASTM F1166-07 shall also be required. The Contractor shall describe human factors engineering test and evaluation as an integrated effort within the Contractor's total test and evaluation program. The Contractor shall conduct a Top-Down Functional Analysis (TDFA) to identify and document critical task for Operators, Maintainers and Support Personnel within the HESAR.

**CDRL A006 - Human Systems Integration Program Plan (HSIPP)**

#### **3.1.1.3.2 Human Engineering Systems Analysis Report (HESAR)**

The HESAR shall be coordinated with the Contractor Manpower, Personnel and Training (MPT) team and integrated into MPT products. The HESAR shall include: Mission Analysis to determine mission objectives and high-level tasks the total system must perform; and, System Function Allocation to identify tasks performed by the human, material system, or a combination.

**CDRL A007 - Human Engineering System Analysis Report (HESAR)**

#### **3.1.1.3.3 Human Engineering Design Approach – Maintainer**

The Contractor shall prepare a Human Engineering Design Approach Document – Maintainer.

**CDRL A008 - Human Engineering Design Approach Document – Maintainer (HEDAD-M)**

#### **3.1.1.4 Engineering Support**

The Contractor shall provide technical and engineering support services as Level of Effort labor and material as directed by Government issued Technical Instructions (TIs). In accordance with TIs the Contractor may be required

to provide the necessary personnel, equipment and facilities to execute: troubleshooting of electronic/electrical hardware; repair, maintenance, configuration changes, and refurbishment of hardware and software/firmware; testing of individual system components; testing of electronic modules; procurement of materials; inventory control; generation of test, status, engineering cost and logistics analysis, verification and validation of system operational specifications; sustainment engineering; travel and field support. The Contractor shall detail its Engineering Support Services in a Contractor's Progress, Status and Management Report.

**CDRL A009 - Contractor's Progress, Status and Management Report**

**3.1.1.5 Environmental, Safety, and Health (ESH)**

The Contractor shall establish a System Safety Program Plan (SSPP). The Contractor shall track hazards in a Hazard Tracking Database (HTDB). The Contractor shall identify hazards with the interface of this system with other systems as contractually required. The Contractor shall develop a Safety Assessment Report (SAR). The System Safety Working Group shall meet quarterly to review and resolve safety issues and shall be responsible for the development and revision of the System Safety Hazard Analysis Report (SSHA). The SSHA shall include Operating and Support Hazard Analysis (O&SHA). The Contractor shall document and execute their Hazardous Materials Program IAW their Hazardous Materials Management Program (HMMP) Plan. The Contractor shall develop a Safety Requirements/Criteria Analysis (SR/CA) Report to identify and document the design safety requirements.

**CDRL A010 - System Safety Program Plan (SSPP)**

**CDRL A011 - Safety Assessment Report (SAR)**

**CDRL A012 - System Safety Hazard Analysis Report (SSHA)**

**CDRL A013 - Hazardous Materials Management Program (HMMP) Plan**

**CDRL A014 - Technical Report – Studies/Services, Safety Requirement/Criteria Analysis (SR/CA) Report**

**3.1.1.6 Configuration Management**

The Contractor shall maintain configuration management control of the TDP throughout the period of performance of this contract.

**3.1.1.6.1 Product Baseline and Configuration Audit**

The establishment of the CAB FoA documentation baseline will coincide with delivery of the initial TDP. After the initial TDP a configuration change notice process shall be used to communicate changes to the Government per SOW section 3.1.1.6.3. The Product Baseline shall identify the production configuration. The Government will establish the Product Baseline following successful completion of the Physical Configuration Audit (PCA). A joint Government-Contractor verification PCA between the CAB FoAs undergoing testing and the TDP used to document the CAB FoA configuration shall be conducted. The documentation shall include product, material, and process specifications, technical manuals, technical repair standards, source control documents, and verification to demonstrate required performance. The Contractor shall participate and assist the Government in the development of the PCA in accordance with the PEO IWS 6 CM Plan, provided as GFI, and , using the guidelines contained in MIL-HDBK-61A, Section 8. Support shall include providing technical documentation, equipment, facilities and services, including disassembly and reassembly of CAB FoAs. The Contractor shall respond to audit findings, recommend corrective actions, and resolve all deficiencies identified during these audits prior to Product Baseline establishment. The Contractor shall deliver an Indentured Bill of Materials to support the As Built Configuration List (ABCL) for each CAB version (CAB-E and CAB-S).

**CDRL A015 - Contractor's Configuration Audit Plan, Physical Configuration Audit (PCA)**

**CDRL A016 - Contractor's As Built Configuration List (ABCL), Indentured Bill of Materials**

**3.1.1.6.2 Configuration Management Plan and Control**

The Contractor shall implement configuration control methods and procedures, which maintain the integrity and traceability. The Contractor shall plan, establish and implement a Configuration Management (CM) Plan meeting the requirements of the PEO IWS 6 CM Plan, provided as GFI, and using the following as guidance: ANSI/EIA-649 and MIL-HDBK-61A(SE). The Contractor's CM efforts shall include configuration identification, configuration

change control, hardware and software/firmware Configuration Status Accounting (CSA), configuration verification, validation, and audits, and configuration data management. The Contractor's CM program shall ensure management, control and execution of all CM necessary to control the technical documents used to produce functional and physical characteristics of hardware, software/firmware. The Contractor shall establish a CM program capable of processing required configuration changes that enable identification, evaluation, and implementation of proposed changes. The Contractor shall be responsible for ensuring that any and all Sub-Contractors also adhere to documented CM practices to ensure delivery of a quality product to the Government.

The Contractor shall implement changes to the established product baseline only after Government approval of a Class I change: Engineering Change Proposals (ECP) and Requests for Deviation (RFD). Sufficient supporting data to evaluate the proposed change, such as drawings, supplemental drawings, sketches, specifications, or manufacturer's data sheets, shall be submitted with ECPs and RFDs. Changes shall be identified to the affected assembly serial number, or if not part of an assembly, to the affected equipment serial number. The Contractor's configuration control process shall be available for Government review. All artifacts entered into the Contractor's Configuration Control process shall be available for review by the Government. The Contractor shall submit all configuration control documentation in a digital format specified by the Government.

Any proposed Engineering / specification change(s) to or RFDs from the Government controlled functional, allocated, or product baseline shall be submitted to the Government Configuration Control Board (CCB). The Contractor shall update all relevant documents as changes are approved by the Government and provide them to the Government.

**CDRL A017 - Contractor's Configuration Management Plan**

**3.1.1.6.3 Change Notice**

The Contractor shall develop and provide configuration change notices for any changes to the initial TDP and CEC system and segment level specifications and PIDS.

**CDRL A018 - Engineering Change Proposal (ECP)/Requests for Deviation (RFD), Configuration Change Notice**

**3.1.1.6.4 Configuration Identification**

The Contractor shall update and maintain a configuration identification process that includes:

- Selecting Configuration Items (CI) at appropriate levels of the product structure to facilitate the documentation, control and support of the items and their documentation;
- Determining the types of configuration documentation required for each CI to define its performance, functional and physical attributes, including internal and external interfaces. Configuration documentation shall include the documentation the Contractor uses to develop and procure software/firmware /parts/material, fabricate and assemble parts, inspect and test items, and maintain systems;
- Determining the appropriate configuration control authority for each configuration document consistent with logistic support planning for the associated CI;
- Issuing identifiers for the CIs and document the identifiers within the configuration documentation;
- Maintaining the configuration identification of CIs to facilitate effective logistics support of items in service;
- Releasing configuration documentation;
- Establishing configuration baselines for the configuration control of CIs.

The Contractor shall submit the CI Process as part of the CM Plan.

**3.1.1.7 E3 Systems Engineering**

The Contractor shall develop EMI control plans to address E3 requirements tailored from MIL-STD-461F and MIL-STD-464C as delineated in Section 11 of the CAB FoA Performance Specification.

**CDRL A019 - Electromagnetic Interference Control Procedures (EMICP)**

**CDRL A020 - ELECTROMAGNETIC ENVIRONMENTAL EFFECTS (E3) INTEGRATION AND ANALYSIS REPORT (E3IAR)**

### **3.1.2 Architecture Trades**

The Contractor shall develop a list of recommended trade studies. The Contractor shall conduct Architecture Trade Studies to assist in the design of the CAB FoA. The trade studies shall utilize system requirements to develop a system functional architecture and concludes with a system physical architecture for the CAB FoA. Included in these studies shall be the definition of common components, internal system interfaces, requirements flowdown, and preliminary analysis of: performance of array types, thermal constraints, prime power considerations, component reliability, structural elements, and enclosure/radome characteristics. The contractor shall develop and utilize a Total Ownership Cost (TOC) model for the purpose of selecting the most cost efficient architecture for the CAB FoA. The architecture trade down selection shall be based on Total Ownership Cost (TOC) analysis. The Contractor shall deliver the TOC model and trade studies in an Architecture Trade Report.

**CDRL A021 - Technical Report – Studies/Services, Architecture Trades List**  
**CDRL A022 - Technical Report – Studies/Services, Architecture Trades Report**

### **3.1.3 T/R MMIC**

The Contractor shall analyze the performance of the T/R GaN MMICs and make recommendations for future MMIC design iterations to optimize the MMIC for use in the CAB FoA. The Contractor shall review and evaluate T/R GaN MMICs specifications and test data, provided as GFI, and recommend additional testing and design enhancements. The Contractor shall participate in all future T/R GaN MMIC design iterations, to include technical reviews. Following receipt of future T/R GaN MMICs, the Contractor shall integrate the MMICs into next higher CAB FoA assemblies and conduct testing. The Contractor shall provide a test report for these future T/R MMIC design iterations that shall include all RF and thermal performance parameters tested and compare the test results with specified performance. Contractor tests shall be witnessed by personnel identified by the Government. The Contractor shall provide fourteen (14) calendar days notice prior to any test event.

**CDRL A023 - Test/Inspection Report, MMIC Test Event Data and Detailed Test Results**

### **3.1.4 Software/Firmware Engineering**

The Contractor and any subcontractors performing relevant work are required to maintain and utilize Capability Maturity Model Integration (CMMI) Level III, at a minimum, accreditation throughout the life of the contract. The Contractor shall perform all necessary software/firmware engineering efforts to design, develop, test, evaluate, and produce software/firmware products, services, and artifacts that implement approved CAB FoA capabilities. The details of those efforts, including the required data deliverables and reviews, are described in the subsequent paragraphs of this SOW. To support life cycle sustainment, the Contractor shall provide to the Government unlimited technical data rights for software/firmware, middleware, and modeling artifacts. The Contractor shall minimize the amount of unique non-commercial software/firmware that must be developed in the design of CAB FoA.

#### **3.1.4.1 Software/Firmware Design**

The Contractor is required to define an open modular software/firmware architecture composed of Software Components (SC) that minimizes coupling and inter-dependencies. One or more SCs shall be identified in Computer Software Configuration Items (CSCI) that follows the functional partitioning as depicted in the CAB FoA Reference Architecture. All operational software/firmware shall be identified in one or more CSCI.

The Contractor shall provide a System Requirements Specification (SRS). The SRS shall include all middleware/interfaces and software/firmware with associated details to ensure requirements are met.

The Contractor shall develop a Software Design Description (SDD) that describes the architectural, modularity and detailed design of the software/firmware component. The CAB FoA IDD will be provided as GFI. The Contractor shall work cooperatively with the Government and the CEC Design Agent to define CAB FoA specific messages and fields in the IDD.

**CDRL A024 - Software Requirements Specification (SRS)**

**CDRL A025 - Software Design Description (SDD)****3.1.4.2 Software/Firmware Development**

The Contractor shall be responsible for the development of any CAB FoA software/firmware not available in the open market. The software/firmware must include functions for Built-In Test Functions/ Built-In Test Equipment (BIT/BITE), Calibration Algorithms, and Identification of Status and Control signals. Open Architecture conventions shall be used in this development and must be identified in the Contractor's Software Development Plan (SDP) prior to implementation. The Contractor shall develop and deliver a SDP, based upon guidance found in IEEE/EIA 12207 and in accordance with (IAW) CMMI requirements. The SDP shall specify that unique support items developed during the software/firmware development process are Government property and that any non-unique support items be available for review. The SDP shall discuss software/firmware design integrity, quality and stability addressing CM, defect tracking, peer reviews and other associated processes. The SDP shall detail the software/firmware build environments. The Contractor shall use software/firmware management indicators and metrics to aid in managing the CAB FoA software/firmware development process and communicating its status to the Government. The Contractor shall define goals for each of the software/firmware metrics and present them at the first Program Management Review (PMR) for Government Approval. The Contractor shall define a corrective action process for identifying software/firmware development impacts and resolution when goals are not met. This process shall be documented in the SDP.

The Contractor shall define the Software Operating Environment (OE) for both versions (CAB-E and CAB-S) of CAB FoA. The Contractor shall manage this baseline throughout antenna development. The product baseline shall then transition to the control of the Government. Changes to the OE baseline shall be processed IAW the Government approved Contractor's CM Plan. The Contractor shall obtain Government approval of any OE change before proceeding with software/firmware development.

The Contractor shall develop a Software Version Description (SVD). The SVD shall detail all Operating Systems with their associated kernel version, configuration, operational libraries and firmware.

**CDRL A026 - Software Development Plan (SDP)**  
**CDRL A027 - Software Version Description (SVD)****3.1.4.3 Commercial Off-the-Shelf (COTS) Software/Firmware**

The Contractor shall provide to the Government all necessary COTS based software/firmware products, along with supporting documentation and all required runtime licenses. This software/firmware shall include all COTS software/firmware incorporated into the OE baseline(s) as well as software/firmware packages utilized to generate OE baselines but not incorporated into the OE. The Contractor must ensure interoperability of such software/firmware with the OE and shall document any interdependencies (such as minimal revision required) in the appropriate SVD(s). All licensing requirements/restrictions for each COTS product shall be documented in the SVD. This documentation requirement includes all delivered software/firmware licenses necessary to provide the CAB FoA software/firmware capabilities and support full lifecycle implementation.

**3.1.4.4 Software/Firmware Testing**

The Contractor shall plan and conduct unit-level tests for all new and modified Software Units (SUs). The Contractor shall identify and document test cases describing their purpose, the functions being tested, the test environment, and the test cases. The Contractor shall conduct the unit test procedures and record the results in accordance with the SDP and applicable SRS and SDD documents.

The Contractor shall plan and conduct software/firmware integration testing encompassing one or more CSCIs. Iterative software/firmware testing shall include additional CSCI and external interfaces ensuring requirements compliance and sub-system stability. This process is continued until all CSCIs and interfaces are integrated and tested. The Contractor shall conduct this testing in accordance with the Master Test Plan (MTP).

**3.1.4.5 Software/Firmware Products**

The Contractor shall develop Software Product Specifications (SPS) for each approved software/firmware product baseline. The Contractor shall identify all software/firmware licensing requirements and any software/firmware usage restrictions. The Contractor shall deliver all required software/firmware licenses with the final software/firmware product. The SDP shall ensure software/firmware and software/firmware revisions are under CM control. The Contractor shall deliver the Computer Software Products including libraries and software/firmware packages, as well as all software/firmware tools/utilities. The Offeror shall successfully complete qualification testing of the Computer Software Products prior to submission.

**CDRL A028 - Software Product Specification (SPS)**  
**CDRL A029 - Computer Software Product**

### **3.1.4.6 Software/Firmware Delivery and Transition**

The Contractor shall prepare a Software Firmware Support Manual (SFSM). It shall contain detailed technical information addressing the processes and resources required to build CAB FoA software/firmware for each capability. In addition, the SFSM shall include file format and data structures used in downloadable datasets and system logs, and describe processes and associated equipment to load and verify software/firmware on system hardware devices that are not defined in a CSCI.

The Contractor shall prepare, with the Government, the Software Transition Plan (STrP) that shall accompany the final Government accepted software/firmware release products and artifacts. This Plan shall also be accompanied with a current SVD and SFSM.

**CDRL A030 - Firmware Support Manual (FSM), Software Firmware Support Manual (SFSM)**  
**CDRL A031 - Software Transition Plan (STrP)**

### **3.1.5 Analysis**

The Analyses below are the Critical Analyses required to ensure that the antenna meets the requirements set forth in the CAB FoA Specification.

#### **3.1.5.1 Structural Analysis**

The Contractor shall conduct Structural Analysis for each CAB version by Finite Element Analysis (FEA). This analysis shall include weight and balance study, loads, strength (stresses), durability, and damage tolerance. The Contractor shall use analytical tools, such as computational fluid dynamics (CFD) models to predict the changes in behavior/loads related to wind and to determine the severity and location of localized pressure build-ups which could create a situation of adverse fatigue. For installation of the CAB FoA, the Contractor shall use a Finite Element Model (FEM) to calculate the stresses for all ship (for CAB-S) and mast (for CAB-E) structural components and for the CAB hardware. The FEM shall include all required mounting structure for the radomes, antenna pedestals, baseplates, as well as any structural modification to the platforms. Loads to be used in the FEM analysis shall include data determined by the CFD. All critical loads cases shall be analyzed with the FEM to verify the structural integrity of the radome and associated installation components.

**CDRL A032 - Technical Report – Studies/Services, Structural Analysis and Models with Validation Methodology and Supporting Data**

#### **3.1.5.2 Thermal Analysis**

The Contractor shall conduct Thermal Analysis for each CAB version by Finite Element Analysis (FEA) or similar. The thermal Analysis shall include; maximum temperatures, thermal gradients, and thermal distortion of electrical and electronic components. The Contractor shall conduct an analysis for the digital, support, and RF circuitry within the CAB. The analysis shall demonstrate that the heating and cooling requirements are met. The Contractor shall also determine the operating limitations, if any, for both CAB versions under all possible environmental conditions, cooling conditions and sources, as defined in Section 2.

**CDRL A033 - Technical Report –Studies/Services, Thermal Analysis with Validation Methodology and Supporting Data**

### 3.1.5.3 Radar Cross Section Reduction

Only the CAB-S is required to meet Radar Cross Section (RCS) requirements. The Contractor shall conduct Modeling and Simulation (M&S), analysis, and RCS testing of a single array face to ensure that the selected CAB-S design meets RCS specifications.

**CDRL A034 - Technical Report – Studies/Services, Radar Cross Section Reduction Analysis and Models with Validation Methodology and Supporting Data**

### 3.1.6 Testing

The Contractor shall conduct testing per test plans approved by the Government. The Contractor shall implement a test strategy that minimizes the number of assets required to meet the development schedule.

#### 3.1.6.1 Contractor's Master Test Plan (MTP)

The Contractor shall prepare a MTP plan that shall employ an integrated test and evaluation strategy designed to provide continuous insight into the design and performance of CAB FoA EDMs. The MTP shall be the top-level working document that addresses all testing anticipated by the Contractor and its subcontractors, and encompasses all component and antenna level testing. At a minimum, the MPT shall address Asset allocation and sequencing and unique or long lead test support equipment requirements.

The Contractor shall perform all testing in accordance with the MTP and Test Procedures. The Contractor shall develop a Test/Inspection report for any test performed.

**CDRL A035 - Test Plan, Master Test Plan**  
**CDRL A036 - Test Procedure**  
**CDRL A037 - Test/Inspection Report**

#### 3.1.6.2 Contractor Developmental Test and Evaluation (DT&E)

The Contractor shall conduct testing sequentially from component to antenna. These demonstrations may be conducted at a Contractor or Government site. Contractor Developmental Testing (DT) may include some destructive environmental testing. This will allow the Contractor to evaluate the design for deficiencies and also determine compliance with environmental specifications. The primary objectives shall be to determine if critical system mechanical characteristics are achievable, provide data for system refinement and assist in managing technical and design risks. Members of the Government shall be invited and will attend Contractor test events as "Government witnesses". The Contractor shall provide notice no less than fourteen (14) calendar days prior to any test event. The Contractor shall deliver detailed Test Event Test Plans and report detailed Test Event Data and Results based on CDRL A037 Test/Inspection Report.

#### 3.1.6.3 Qualification Tests (QTs)

The Contractor shall develop a QTs Plan and Procedures based on the approved MTP. The Contractor shall conduct QTs following the approved QTs plan and procedures to validate performance of the EDMs. The QT shall be a series of tests that demonstrates to the Government that the hardware functions to specified values, functions through all routines in an accurate and robust manner, and all data packages are mature. Government personnel will witness the QTs to validate system performance, and reliability. Contractor tests will be supported by personnel identified by the Government. The Contractor shall perform CAB-S shock QT using barge testing.

The Contractor shall develop a Failure Analysis and Corrective Action Report (FACAR) for QTs. The FACAR shall detail all hardware/software failures down to the component level.

The Contractor shall develop Electromagnetic Interference Test Procedures (EMITP) for use in QTs and deliver an Electromagnetic Interference Test Report (EMITR) based on QTs. The Contractor shall provide Spectrum Certification Spectral Characteristics Data based on QTs. The Contractor shall develop Electromagnetic

Environmental Effects (E3) Verification Procedures (E3VP) for use in QTs and deliver an Electromagnetic Environmental Effects (E3) Verification Report (E3VR) based on QTs.

**CDRL A038 - First Article Qualification Test Plan and Procedures, Qualification Tests (QTs) Plan and Procedures**  
**CDRL A039 - Failure Analysis and Corrective Action Report**  
**CDRL A040 - Electromagnetic Interference Test Procedures (EMITP)**  
**CDRL A041 - Electromagnetic Interference Test Report (EMITR)**  
**CDRL A042 - SPECTRUM CERTIFICATION SPECTRAL CHARACTERISTICS DATA**  
**CDRL A043 - ELECTROMAGNETIC ENVIRONMENTAL EFFECTS (E3) VERIFICATION PROCEDURES (E3VP)**  
**CDRL A044 - ELECTROMAGNETIC ENVIRONMENTAL EFFECTS (E3) VERIFICATION REPORT (E3VR)**

### **3.1.6.4 System Integration Testing**

System Integration Testing will encompass multiple test sites, both indoor and outdoor at Government and other Contractor facilities. The Contractor shall provide on-site technical support for all portions of System Integration Testing by providing planning support, on-site technical support during testing, and post event analysis/reporting support as directed by TI. The Contractor shall coordinate with the CEC Design Agent (DA) throughout System Integration Testing to ensure that EDMs are successfully integrated into the test environment. The Contractor shall provide EDMs, spares and all ancillary equipment necessary to operate and maintain, and support System Integration Testing. System Integration Testing shall require on-site Contractor test personnel for each test period as directed by TI. Any EDM failures shall be remedied within 24 hours.

### **3.1.6.5 Government Developmental and Operational Test Support**

Government Developmental and Operational Testing will be conducted at Government and commercial facilities to verify System Level Performance requirements are met. The Contractor shall provide test planning, execution, analysis, and reporting support for Government Developmental Testing and shall provide Operational Test support, within the bounds of Federal Law and DoD and Navy regulations, as directed by TI as part of Engineering Support Services.

### **3.1.7 Commonality of Hardware, Software/Firmware and Interfaces**

The Government intends to procure system(s) which have an Open System Architecture and corresponding components. As part of this contract, the contractor shall define, document, and follow an open systems approach across all CAB versions for using modular design, standards-based interfaces, and widely-supported consensus-based standards. The CAB FoA architectural methodology shall support the application of hardware and software/firmware Technology Insertion and Technology Refresh (TI/TR) strategy utilizing an open systems approach responsive to changes driven by mission requirements and new technologies. The Contractor shall deliver a CAB-E and CAB-S Hardware Development Specification (HDS) which shows the commonality between the two versions, and a summary of components used across CAB FoAs. The Contractor shall develop, maintain, and use an Open System Management Plan (OSMP) in conjunction with Open Architecture assessment(s) using the Open Architecture Assessment Tool (OAAT) version 3.0 to support this approach and will be required to demonstrate compliance with that plan during all design reviews. As part of an OSMP, the Contractor will be required to identify to the Government all Commercial-Off-the-Shelf/Non-development Item (COTS/NDI) components, their functionality and proposed use in the system, and provide copies of license agreements related to the use of these components for Government approval prior to use. The proposed OSMP will be incorporated into the contract with any changes, alterations, and/or modifications requiring Government approval.

In satisfying the Government's requirements, the following system architecture approach characteristics shall be utilized:

- a. Open Architecture – The Contractor shall develop and maintain an architecture that incorporates appropriate considerations for commonality, reconfigurability, portability, maintainability, Technology Insertion/Technology Refresh (TI/TR), vendor independence, reusability, scalability, interoperability, upgradeability, and long-term supportability as required by the 23 DEC 2005 Office of the Chief of Naval Operations (OPNAV N6/7) requirements letter. (This letter is available at <https://acc.dau.mil/oa.>)

1. Ensure that external information exchange requirements are implemented in a standard and open manner as part of this effort. These actions shall include planning that identifies the contractor's specific approach to ensuring system and interface data is well-defined, available to all programs, and uses a standards-based tool for definition within the context of the Navy and Marine Corps upgrade programs. The contractor shall develop system upgrades that ensure that 1) data will be posted to shared spaces for users to access except when limited by security, policy, or regulations; 2) data shall provide for interoperability with many-to-many exchanges of data, and verified trust and integrity of users and applications; and 3) data shall be transmitted through well and openly defined interfaces.
- b. Modular, Open Design – The contractor shall develop an architecture that is layered and modular and uses standards-based COTS/NDI hardware, operating systems, and middleware that all utilize either non-proprietary or non-vendor unique key Application Programming Interfaces (APIs). The contractor's design approach shall be applied to all subsystems and components. As part of its Open System Management Plan, the contractor shall, at a minimum, describe how the proposed system architecture meets these goals, including the steps taken to use non-proprietary or non-vendor unique COTS or reusable NDI components wherever practicable. An Open Architecture assessment using the Open Architecture Assessment Tool (OAAT) shall be conducted to evaluate the degree of system openness.
    1. Module Coupling – The Contractor's design approach shall result in modules that have minimal dependencies on other modules (loose coupling), as evidenced by simple, well-defined interfaces and by the absence of implicit data sharing. The purpose is to ensure that any changes to one module will not necessitate extensive changes to other modules, and hence facilitate module replacement and system enhancement. The approach used to determine the level of coupling and the design trade-off approach shall be described.
    2. Module Cohesion – The Contractor's design shall result in modules that are characterized by the singular assignment of identifiable and discrete functionality (high cohesion). The purpose is to ensure that any changes to system behavioral requirements can be accomplished by changing a minimum number of modules within the system. The approach used to determine the level of cohesion and the design trade-off approach shall be described.
  - c. System Requirements Accountability – The Contractor shall ensure all CAB FoA requirements are accounted for through a demonstrated ability to trace each requirement to one or more modules that consist of components that are self-contained elements with well-defined, open and published interfaces implemented using open standards.
  - d. Inter-component Dependencies – The Contractor's design approach shall result in a layered system design, maximizing software/firmware independence from the hardware, thereby facilitating TI/TR. The design shall be optimized at the lowest component level to minimize inter-component dependencies. The layered design shall also isolate the application software/firmware layers from the infrastructure software/firmware (such as the operating system) to enhance portability and to facilitate technology refresh. The design shall be able to survive a change to the computing infrastructure with minimal or no changes required to the application logic. The interfaces between the layers shall be built to open standards or available to the Government with at least Government Purpose Rights. The system architecture shall minimize inter-component dependencies to allow components to be decoupled and re-used, where appropriate, across various Naval programs and platforms.
  - e. System Decomposition - The Contractor shall describe its rationale for the modularization choices made to generate the design. The Contractor's design approach shall produce a system that consists of hierarchical collections of software/firmware and hardware configuration items (components). These components shall be of a size that supports competitive acquisition as well as reuse. The Contractor's design approach shall emphasize the selection of components that are available commercially or within the DoD, to avoid the need to redevelop products that already exist and that can be re-used. The

Contractor's rationale must explicitly address any tradeoffs performed, particularly those that compromise the modular and open nature of the system.

- f. Technology Insertion – The Contractor's architectural approach shall support the rapid and affordable insertion and refreshment of technology through modular design, the use of open standards and open interfaces. The Contractor shall define the functional partitioning and the physical modularity of the system to facilitate future replacement of specific subsystems and components without impacting other parts of the system and to encourage third-party vendor's participation.
- g. Interface Design and Management – The Contractor shall:
  - i. Clearly define and describe all component and system interfaces;
  - ii. Define and document all subsystem and Configuration Item (CI) level interfaces to provide full functional, logical, and physical specifications;
  - iii. Identify processes for specifying the lowest level (i.e. subsystem or component) at and below which it intends to control and define interfaces by proprietary or vendor-unique standards and the impact of that upon its proposed logistics approach. Interfaces described shall include, but not be limited to, mechanical, electrical (power and signal wiring), software/firmware, and hardware interfaces;
  - iv. Identify the interface and data exchange standards between the component, module or system and the interconnectivity or underlying information exchange medium;
  - v. Consider using these interfaces to support an overall information assurance strategy that implements Information Assurance (IA) Processes in accordance with DoD Instruction 8500.2 (dated February 6, 2003) .
  - vi. If applicable, select external interfaces from existing open or Government standards with an emphasis on enterprise-level interoperability. The contractor shall describe how its selection of interfaces will maximize the ability of the system to easily accommodate technology insertion (both hardware and software/firmware) and facilitate the insertion of alternative or reusable modular system elements;
  - vii. Describe the extent that the change or configuration management process proposed will use "community of interest" teams in an integrated team approach to effectively identify how individual changes impact the system's internal or external interfaces and information exchange standards.
- h. Treatment of Proprietary or Vendor-Unique Elements – The Contractor shall explain the use of proprietary, vendor-unique or closed components or interfaces. If applicable, the contractor will define its process for identifying and justifying proprietary, vendor-unique or closed interfaces, code modules, hardware, firmware, or software to be used. When interfaces, hardware, firmware, or modules that are proprietary or vendor-unique are required, the Contractor shall demonstrate to the Government that those proprietary elements do not preclude or hinder other component or module developers from interfacing with or otherwise developing, replacing, or upgrading open parts of the system.
- i. Life Cycle Management and Open Systems – The Contractor's architecture shall provide for insertion of COTS into the system and demonstrate that COTS, reusable NDI, and other components are logistically supported throughout the life cycle. The Contractor shall describe and demonstrate the strategy for reducing product or system and associated supportability costs through insertion of COTS and other reusable COTS or NDI products. The Contractor shall establish a process to logistically support COTS or NDI products. The Contractor shall describe the availability of commercial repair parts and repair services, facilities, and manpower required for life cycle support and demonstrate they

are adequate to ensure long term support for COTS or NDI products. The Contractor shall provide the proposed methodology for pass through of COTS warranties to the Government.

The Contractor shall maintain and deliver Commonality Metrics that describe the commonality of components in the CAB FoA.

**CDRL A045 - System/Subsystem Specification (SSS), Hardware Development Specification (HDS)**  
**CDRL A046 - Technical Report – Studies Services, Commonality Metrics**

### **3.2 Program Management (PM)**

The Contractor shall establish and maintain a PM process and methodology that ensures all work associated with this SOW is clearly and concisely demonstrated and meets all technical objectives within the Contractor's established cost and schedule baseline. Program management shall include appropriate metrics and tracking processes to allow clear visibility into the program and to ensure the program remains within cost and schedule. The Contractor shall designate a Program Manager who shall ensure all work conducted within this contract is planned and executed in a manner that will achieve all management, technical, logistics, budget and schedule objectives. The Contractor shall develop and maintain an Integrated Master Schedule (IMS) for program control, status monitoring, and reporting purposes that identifies the program milestones, major tasks, efforts, and activities necessary to successfully execute this contract, including those activities assigned to subcontractors. The IMS should be traceable to and integrated with all elements of the Contract Work Breakdown Structure (CWBS).

#### **3.2.1 Subcontractor Management**

The Contractor is responsible for performance of requirements delineated in this SOW, and shall institute appropriate management actions relative to subcontractor performance. Requirements that are contractually specified shall apply to subcontractor performance; however, the Contractor shall be accountable for subcontractor's compliance and is responsible for ensuring all deliverable products comply with the contract requirements.

#### **3.2.2 Data Management**

The Contractor shall be responsible for the digital generation, reception and electronic delivery of data. The Contractor shall use the Government furnished website, hereafter known as the Integrated Data Environment (IDE) to document all aspects of the program, including the system design, integration and test engineering efforts, the Contractor's system engineering efforts, and the Contractor's program management effort. The purpose of this IDE is to facilitate and streamline the transfer of information between the Contractor and Government, and is intended to replace extensive generation and delivery of costly and time consuming reports and other paper products for the Government. The Contractor shall post all documents to the IDE, updating it with all approved changes on at least a monthly basis, preferably more frequently when warranted by significant changes and additions.

To access the IDE, the Contractor shall register a PKI certificate with the data manager, and complete a Non-Disclosure Agreement (NDA). VeriSign ECA and ORC ECA certificates and CAC certificates will be accepted. Instructions for requesting access and the NDA will be provided as GFI.

#### **3.2.3 Quality Management Plan (QMP)**

The Government requires the Contractor to be in compliance with ANSI/ISO/ASQ 9001:2000 standards or higher; registration though not required is preferable. The Contractor shall develop and continually update (as needed) a QMP to include a Quality Assurance Surveillance Plan (QASP). Once the QMP is approved by the Government, the QMP shall be used as a QA measuring tool for work performed under this contract, and appropriately delineates a plan applicable to all requirements and standards. The QMP shall detail the processes, procedures, and metrics for assuring quality, such as; (1) Identification of roles, responsibilities and process owners, (2) Implementation of an effective root cause analysis and corrective action process, (3) Continuous process improvement to reduce costs and timelines, (4) Incorporating Lessons Learned, After Action Reports and customer satisfaction surveys into process improvement, and (5) Documentation of all outstanding deficiencies related to all phases of design, fielding, and

logistics support. All manufacturing processes and quality systems procedures shall be in accordance with applicable ANSI/ISO Standards. The Contractor shall flow all quality system requirements down to sub-tier suppliers.

**CDRL A047 - Technical Report – Studies/Services, Quality Management Plan**

### **3.2.4 Business and Financial Management**

#### **3.2.4.1 Earned Value Management System (EVMS)**

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 a validated Earned Value Management System (EVMS) in accordance with DFARS 252.234-7001, DFARS 252.234-7002 and the Guidelines for an EVMS contained in ANSI/EIA-748B. To establish the integrated performance management system, the EVMS shall be linked to and supported by the Contractor's management processes and systems to include the Integrated Master Schedule (IMS), Contract Work Breakdown Structure (CWBS), change management, material management, procurement, cost estimating, resource loading and accounting. The correlation and integration of these systems and processes shall provide for early indication of cost and schedule problems, and their relation to technical achievement. Required variance reporting shall be discussed at the Monthly Program Management Reviews (PMR).

##### **3.2.4.1.1 Integrated Baseline Review (IBR)**

The Contractor shall engage jointly with the Government team to conduct an IBR to evaluate the risks inherent in the contract's planned performance measurement baseline. Initially, this shall occur as soon as feasible but not later than ninety (90) days after Contract Award. The IBR shall verify that the Contractor is using a reliable performance measurement baseline, which includes the entire program, is consistent with contract schedule requirements and has adequate resources assigned. IBRs should also be conducted on subcontracts that meet or exceed a \$5 Million EVM threshold. The prime Contractor shall lead the subcontractor IBRs, with active participation by the Government. The Contractor shall establish a Performance Measurement Baseline of the CWBS within one hundred twenty (120) days after Contract Award.

### **3.2.5 Schedule Management**

The Contractor shall develop and maintain an IMS. The IMS shall be extended and expanded as the contract unfolds and when additional insight is needed. The Contractor shall notify the Government in writing within 24 hours of any anticipated or projected work stoppages or delays that will impact schedules. The IMS shall be detailed sufficiently that critical and high-risk efforts are identified and planned realistically to assure executability.

**CDRL A048 - Integrated Master Schedule (IMS), Contractor's Integrated Master Schedule (IMS)**

#### **3.2.5.1 Contract Performance Report (CPR)**

The Contractor shall develop a CPR. The Contractor shall report at the control account level. For planning purposes, assume no more than 25 Variance Analysis Reports (VAR) per month. Details for reporting formats one (1) through (5) will be discussed prior to and presented at the Post-Award Kickoff Meeting.

**CDRL A049 - Contract Performance Report (CPR), Contractors Cost and Schedule Performance**

#### **3.2.5.2 Life Cycle Cost (LCC) Analysis**

The Contractor shall prepare the LCC Analysis and develop cost reduction initiatives. This effort represents the three phases of life cycle cost: System Design and Development (SD&D), production, and operations and support. The LCC analyses and associated methodologies shall be used to support cost reduction initiatives and the Cost as an Independent Variable (CAIV) program. As such, the LCC methodology shall reflect key design, performance, programmatic and logistics parameters that have a significant impact on cost. The Contractor shall include inputs from major suppliers.

**CDRL A050 - Life Cycle Cost (LCC) and Independent Schedule Assessment (ISA) Report, Life Cycle Cost (LCC) Analysis**

##### **3.2.5.2.1 Life Cycle Costs (LCC) and CAIV Implementation**

In support of the CAIV and LCC processes the Systems Engineering Integrated Product Team (SEIPT) shall review all the hardware under LCC consideration and perform an analysis of maintenance and materials to validate Mean Time Between Failure (MTBF) and percent improvement if enhancements are incorporated. The SEIPT shall also help determine Return on Investment (ROI) forecasts. This data shall be input into LCC presentations and submitted in accordance with CDRL A067 CDRL A001 (Life Cycle Cost (LCC) and Independent Schedule Assessment (ISA) Report, Life Cycle Cost (LCC) Analysis).

### **3.2.6 Risk Assessment and Management**

The Contractor shall develop, implement, and maintain a risk management plan that includes a process that identifies, evaluates, and mitigates program risks including technical environmental, safety, cost, and schedule components. Risks shall be evaluated as to their impact on reliability, safety, supportability, affordability, schedule, and technical performance objectives. Mitigation plans that will reduce the risks to an acceptable management level, shall be put into place for those risks with the probability to most likely occur. Mitigation plans shall be managed and updated as contract performance proceeds. All risks shall be identified and reported to the Government. The risk management status shall be briefed during each Status Review.

**CDRL A051 - Contractor's Risk Management Plan**

### **3.2.7 Management and Accountability for Government Furnished Material (GFM), Equipment and Information**

The Contractor shall deliver a GFM plan that addresses the management and accountability of all GFM, Government Furnished Equipment (GFE), and Government Furnished Information (GFI). The plan shall be reviewed by the Government to ensure that items furnished by the Government are properly managed and accounted for.

**CDRL A052 - Technical Report – Studies/Services, GFM Management and Accountability Plan**

### **3.2.8 End of Contract Transition Planning**

The Contractor shall develop an End-of-Contract Transition Plan that addresses the long-term support requirements of all equipment produced under this contract, as support agent responsibility transitions from the Contractor. This plan shall describe how the Contractor would transition the follow-on support of the CAB FoAs to a third party.

These plans shall identify all hardware and software/firmware information required for lifetime support of the CAB FoA. Data items necessary are the TDP, interface and installation control drawings, software/firmware items including: testing programs, verification and validation programs, source and object code, program logs, and problem resolutions and pending solutions. These transition plans shall address the turnover of all databases (e.g. ESOH database and CSA database). Additionally, the end of contract transition plan shall address the supply support topics specified in the Specification for the CEC CAB – FoA Antenna System. This information shall be sufficient to enable a third party to procure replacement parts, deliver software/firmware builds and perform all other functions required to provide long-term, post-contract support of the CAB FoA.

**CDRL A053 - Technical Report – Studies/Services, End of Contract Transition Plan**

### **3.2.9 Meetings and Reviews**

The Contractor shall coordinate, schedule, prepare, conduct, facilitate and participate in reviews, meetings and conferences specified herein. The Contractor shall prepare presentation materials for all meetings identified in this SOW. At a minimum, the Contractor shall support meetings and reviews identified within the following paragraphs.

**CDRL A054 - Presentation Material**

#### **3.2.9.1 Post Award Kickoff Meeting**

The Contractor shall deliver a detailed briefing on their management and contract execution strategy at the Post Award Kickoff Meeting to be held within three weeks of contract award. The Government will provide status on the results of the Contractor's evaluation. The Contractor shall also establish Technical Manual (TM) schedules and clarify any questions concerning MIL-STD-40051-2A requirements. The Contractor shall plan for a one day Post Award Kickoff Meeting.

### **3.2.9.2 Program Management Reviews (PMR)**

Monthly PMRs shall be conducted in person or via Government approved meeting solutions with the Contractor providing a summary of their current program status. The reports shall contain the following main sections: Summary, Accomplishments, Current Status, Problem Areas, Risks and Mitigation, Cost and Schedule Data, and Future Plans. The reporting period shall be for the duration of the contract. The Contractor shall deliver a Progress, Status and Management Report for each PMR. The PMR shall address:

- Status of significant/major design, development, testing, qualification, certification, production
- logistics efforts, and/or issue resolution;
- MOSA assessment;
- Key Technical concerns and proposed changes
- Environmental, Safety and Occupational Health (ESOH) hazard status;
- Action item status;
- Risk identification and mitigations strategies (to include Mitigation burn-down plans)
- Business, Financial, Cost and Schedule metrics
- Status of significant program events (e.g. Program Reviews);
- Resolution status of obsolescence issues and their associated risk
- Failure Reporting including analysis, risks and resolutions
- TDP drawing metrics
- Schedules for individual tasks, delivery orders, and equipment production/deliveries;
- Technical Instructions (TI) status updates;
- Integrated logistics support update
- Funding status
- Problem identification and resolutions
- Actual versus expected performance assessment

### **3.2.9.3 Technical Interchange Meetings (TIMs)**

TIMs shall be scheduled as needed (average of weekly) to focus on specific engineering or Program Management discussions (interface designs, MOSA, IA, AT, Supportability Analysis, training materials etc.) during the execution of this contract.

### **3.2.9.4 System Requirements Review/System Functional Review (SRR/SFR)**

The Contractor shall conduct a combined SRR/SFR, including a dry run two weeks prior to the formal meeting. During the SRR, the systems requirements shall be evaluated by the Government to determine the direction and progress of the systems engineering effort and the degree of convergence upon a balanced and complete configuration and whether traceability of systems requirements to the Initial Capabilities Document or draft Capability Development Document is maintained and whether there is reasonable expectation of satisfying the requirements of the specifications for the CEC CAB FoA antenna system within the currently allocated budget and schedule. A successful review is predicated on the Government IPT's determination that the system requirements, preferred system solution, available technology, and program resources (funding, schedule, staffing, and processes) form a satisfactory basis for proceeding into the System Development and Demonstration phase. The SRR/SFR may be repeated after the start of System Development and Demonstration to clarify the Contractor's understanding of redefined or refined system performance constraints, or new user requirements are mandated. The Contractor shall provide a configuration change notice, per SOW Section 3.1.1.6.3, that proposes changes to the CEC system and segment level specifications as necessary to integrate with the CAB FoA.

The entrance criteria for the SRR/SFR are as follows:

- a. An antenna system concept description has been developed.
- b. Customer requirements analyzed and translated into system-specific functional and performance requirements for mission capabilities.
- c. Technology validation and demonstration plans complete and closure plans on technical demonstrations and maturations achieving required progress.
- d. Risks identified and quantified, and risk mitigation actions achieving required progress.
- e. Total system approach to satisfying requirements (including interfaces) for the primary system functions identified.
- f. The antenna architecture has been defined.
- g. Critical technologies for people, product, and process solutions verified for availability, achievability, needed performance, and readiness for use for development within the antenna.

Technical reviews and technical interchange meetings shall be scheduled between the Government technical design agent representatives and the Contractor development team representatives to adjudicate comments and clarify questions on the documents submitted for review and assessment prior to the SRR/SFR.

The exit criteria for the SRR/SFR consists of Government affirmations for the following statements:

- a. The system requirements are traceable to and satisfy the CAB FoA Specification, and are shown to be achievable.
- b. The system requirements are sufficiently detailed and understood to enable system functional definition and functional decomposition.
- c. There is an approved system performance specification.
- d. Adequate processes in place for the program to succeed.
- e. Antenna system option decisions completed.
- f. The risks known and manageable for development.
- g. Plans for the next phase of the program are defined and accepted.
- h. The program schedule is executable within technical and cost parameters.
- i. Software Development Environment defined (with an emphasis of verifying that the environment is appropriate and sufficient for anticipated development) and accepted.
- j. Interface defined/preliminary interface specs accepted.
- k. Technical architecture accepted.

As a precursor to the SRR/SFR, the Contractor shall provide the Government with access to the appropriate draft and preliminary CDRLs (listed below) for review and assessment to ensure entrance and exit criteria are satisfied.

CDRL A001 - System Engineering Management Plan (SEMP), Contractor's Systems Engineering Management Plan (SEMP)

CDRL A002 - Technical Report – Studies/Services, System Requirements Verification and Validation Matrix (SRVM)

CDRL A006 - Human Systems Integration Program Plan (HSIPP)

CDRL A010 - System Safety Program Plan (SSPP)

CDRL A017 - Contractor's Configuration Management Plan

CDRL A021 - Technical Report – Studies/Services, Architecture Trades List

CDRL A022 - Technical Report – Studies/Services, Architecture Trades Report

CDRL A024 - Software Requirements Specification (SRS)

CDRL A026 - Software Development Plan (SDP)

CDRL A045 - System/Subsystem Specification (SSS), Hardware Development Specification (HDS)

CDRL A047 - Technical Report – Studies/Services, Quality Management Plan

CDRL A048 - Integrated Master Schedule (IMS), Contractor's Integrated Master Schedule (IMS)

CDRL A051 - Contractor's Risk Management Plan

CDRL A068 - Technical Report – Studies/Services, Information Assurance (IA) Implementation Strategy

### **3.2.9.5 Preliminary Design Review (PDR)**

The Contractor shall conduct a system PDR, including a dry run two weeks prior to the formal meeting, that confirms the preliminary design that meets the requirements established in the CAB FoA Performance Specifications. The Contractor shall complete a System-Level Trade Study in support of the preliminary design presented at PDR. The trade study shall validate the best approach for meeting the CAB FoA requirements considering risk and schedule. The PDR also shall identify all single source, sole source, and diminishing source(s). Prior to PDR, the Contractor shall also have conducted sub-system design reviews at the IPT level to confirm that preliminary sub-system designs meet the requirements established in the System Performance Specifications.

The entrance criteria for the PDR are the following:

- a. Documentation complete for functional design and test plans.
- b. All action items from previous reviews have been closed.
- c. Plans for the next phase of system development have been established.
- d. Technical review teams have reviewed and assessed appropriate CDRLs to satisfy the entrance and exit criteria

Technical reviews and technical interchange meetings shall be scheduled between the Government technical design agent representatives and the Contractor development team representatives to adjudicate comments and clarify questions on the documents submitted for review and assessment prior to the PDR.

The exit criteria for the PDR are the following:

- a. Analysis definition complete:
  - All subsystems are identified.
  - Each subsystem, its interfaces, allocated functionality, and algorithms needed to implement the functionality are defined and accepted.
  - Error budgets have been established for critical system parameters.
  - Fault Detection/Fault Isolation (FD/FI) concept supports availability requirements.
  - Environmental and system integration impacts are addressed in design.
- b. Test plans concurred in:
  - Requirements for the Hardware and Software/Firmware are mapped to test approaches.
  - Appropriate test strategies for the lower-level testing are fully defined and accepted.
- c. Processes: Development processes are fully defined and accepted.
- d. Tools: All tools required for the next phase are in place and ready for use.
- e. Risks have mitigation plans in place that are compatible with the equipment development schedule.
- f. Plans for the next phase of system development have been accepted.

As a precursor to the PDR, the Contractor shall provide the Government with access to the appropriate draft and preliminary CDRLs (listed below) for review and assessment to ensure entrance and exit criteria are satisfied.

CDRL A001 - System Engineering Management Plan (SEMP), Contractor's Systems Engineering Management Plan (SEMP)

CDRL A002 - Technical Report – Studies/Services, System Requirements Verification and Validation Matrix (SRVM)

CDRL A003 - Technical Data Package

CDRL A006 - Human Systems Integration Program Plan (HSIPP)

CDRL A007 - Human Engineering System Analysis Report (HESAR)

CDRL A008 - Human Engineering Design Approach Document – Maintainer (HEDAD-M)

CDRL A013 - Hazardous Materials Management Program (HMMP) Plan

CDRL A021 - Technical Report – Studies/Services, Architecture Trades List

CDRL A022 - Technical Report – Studies/Services, Architecture Trades Report

CDRL A023 - Test/Inspection Report, MMIC Test Event Data and Detailed Test Results

CDRL A024 - Software Requirements Specification (SRS)

CDRL A025 - Software Design Description (SDD)

CDRL A032 - Technical Report – Studies/Services, Structural Analysis and Models with Validation Methodology and Supporting Data

CDRL A033 - Technical Report – Studies/Services, Thermal Analysis with Validation Methodology and Supporting Data

CDRL A034 - Technical Report – Studies/Services, Radar Cross Section Reduction Analysis and Models with Validation Methodology and Supporting Data  
 CDRL A035 - Test Plan, Master Test Plan (MTP)  
 CDRL A045 - System/Subsystem Specification (SSS), Hardware Development Specification (HDS)  
 CDRL A048 - Integrated Master Schedule (IMS), Contractor's Integrated Master Schedule (IMS)  
 CDRL A055 - Logistics Management Information (LMI) Data Product  
 CDRL A061 - Scientific and Technical Reports, Reliability Growth Curve Report  
 CDRL A062 - Reliability Block Diagrams and Mathematical Models Report  
 CDRL A063 - Reliability Prediction and Documentation of Supporting Data  
 CDRL A068 - Technical Report – Studies/Services, Information Assurance (IA) Implementation Strategy

### 3.2.9.6 Critical Design Review (CDR)

The Contractor shall conduct a CDR, including a dry run two weeks prior to the formal meeting, to demonstrate that the system detailed design is complete, meets requirements, and that the system can proceed into system fabrication, demonstration and test, meets the performance requirements of the CAB FoA Performance Specification, and is ready for fabrication and coding.

The CDR shall be conducted on each functional segment prior to fabrication/coding release to ensure that the CI drawings, SDD, and engineering drawings satisfy requirements established by the Functional and Product Specification, and SRS. The overall technical program risks associated with each CI shall also be reviewed on a technical, manufacturing, cost and schedule basis. For software/firmware, a technical understanding shall be reached on the validity and the degree of completeness of the SDD and STDs. The technical details as disclosed by the CI drawings, drawings, and schematics shall be viewed against the Function and Product Specification performance requirements. A detailed review of all logistics, maintenance, and training items shall also be disclosed. The Contractor shall identify critical components that are sole sourced, production End-of-Life (EOL) notices, software/firmware impacts and products experiencing “family” updates/revisions. High risk components shall have resolution identified (form/fit replacement, sunset manufacturing/repair, tech refresh, etc.) Elements with software/firmware the Contractor shall identify impact severity and recommend resolutions in accordance to the SDP.

The entrance criteria for the CDR are the following:

- a. All PDR action items closed.
- b. Documentation complete for detailed design and test plans.
- c. Metrics collected and ready for presentation.
- d. Plans for the next phase of system development have been established.
- e. Technical review teams have reviewed and assessed the appropriate CDRLs to ensure entrance and exit criteria have been satisfied.

Technical reviews and technical interchange meetings shall be scheduled between the Government technical design agent representatives and the Contractor development team representatives to adjudicate comments and clarify questions on the documents submitted for review and assessment prior to the CDR.

The exit criteria for the CDR are the following:

- a. Design maturity and completeness:
  - All subsystems, modules and components are identified.
  - For each subsystem, its design supports all interfaces, allocated functionality, reliability, maintainability, availability, and survivability.
  - For each subsystem, the design is producible based on an assessment of manufacturing processes and components availability.
  - Each subsystem meets allocated performance requirements.
  - Hardware electrical, mechanical and thermal designs support environmental requirements.
  - Algorithms to be implemented by any associated Software/firmware are well defined and accepted.
  - Physical interfaces have been identified.
  - Other changes made since PDR are thoroughly explained. This is where metrics such as requirements stability are addressed.

- Fault detection (FD)/fault isolation (FI) design is complete.
- b. Test plans:
  - All requirements are mapped to test procedures.
  - For lower level testing, test procedures are fully defined and appropriate.
  - For lower level testing, test strategies are fully defined and appropriate (to include structural coverage goals for unit test).
- c. Processes: Development processes are fully defined in the SDP or equivalent document.
- d. Tools: All tools required for fabrication are in place and ready for use.
- e. Risks have mitigation plans in place that are compatible with the equipment development schedule.
- f. Plans for the next phase of system development have been accepted

As a precursor to the CDR, the Contractor shall provide the Government with access to the appropriate draft and preliminary CDRLs (listed below) for review and assessment to ensure entrance and exit criteria are satisfied.

CDRL A002 - Technical Report – Studies/Services, System Requirements Verification and Validation Matrix (SRVM)  
 CDRL A003 - Technical Data Package  
 CDRL A007 - Human Engineering System Analysis Report (HESAR)  
 CDRL A008 - Human Engineering Design Approach Document – Maintainer (HEDAD-M)  
 CDRL A011 - Safety Assessment Report (SAR)  
 CDRL A013 - Hazardous Materials Management Program (HMMP) Plan  
 CDRL A021 - Technical Report – Studies/Services, Architecture Trades List  
 CDRL A022 - Technical Report – Studies/Services, Architecture Trades Report  
 CDRL A023 - Test/Inspection Report, MMIC Test Event Data and Detailed Test Results  
 CDRL A024 - Software Requirements Specification (SRS)  
 CDRL A025 - Software Design Description (SDD)  
 CDRL A032 - Technical Report – Studies/Services, Structural Analysis and Models with Validation Methodology and Supporting Data  
 CDRL A033 - Technical Report – Studies/Services, Thermal Analysis with Validation Methodology and Supporting Data  
 CDRL A034 - Technical Report – Studies/Services, Radar Cross Section Reduction Analysis and Models with Validation Methodology and Supporting Data  
 CDRL A035 - Test Plan, Master Test Plan (MTP)  
 CDRL A045 - System/Subsystem Specification (SSS), Hardware Development Specification (HDS)  
 CDRL A048 - Integrated Master Schedule (IMS), Contractor’s Integrated Master Schedule (IMS)  
 CDRL A053 - Technical Report – Studies/Services, End of Contract Transition Plan  
 CDRL A055 - Logistics Management Information (LMI) Data Product  
 CDRL A061 - Scientific and Technical Reports, Reliability Growth Curve Report  
 CDRL A062 - Reliability Block Diagrams and Mathematical Models Report  
 CDRL A063 - Reliability Prediction and Documentation of Supporting Data  
 CDRL A066 - Failure Modes, Effects and Criticality Analysis (FMECA) Report  
 CDRL A068 - Technical Report – Studies/Services, Information Assurance (IA) Implementation Strategy

### 3.2.9.7 Test Readiness Review (TRR)

The Contractor shall conduct a TRR to demonstrate to the Government the readiness to begin qualification and integration test and technical evaluation. The review shall take place at completion of the CAB-E and CAB-S fabrications and prior to initiation of qualification and integration tests. The Contractor shall provide an As-Built Configuration List (ABCL) of each CAB EDM being tested.

The entrance criteria for the TRR shall consist of the following:

- a. System is under configuration control
- b. All test plans and procedures have been approved
- c. Test assets and resources have been identified
- d. Test assets are available

- e. Safety releases and ESOH risk acceptances are completed and their status duly reported
- f. Results of previous lower-level tests (e.g., component, subsystem, and system) provided

Exit criteria for the TRR shall consist of:

- a. Verification of the traceability of planned tests to program requirements and user needs
- b. Systems are under configuration control and ready for test
- c. Test assets and resources are available
- d. Results of previous lower-level tests (e.g., component, subsystem, and system) form a satisfactory basis for proceeding
- e. Identified risks are adequately managed
- f. Test configuration is accepted
- g. System and test limitations documented and accepted

As a precursor to the TRR, the Contractor shall provide the Government with access to the appropriate CDRLs (listed below) for review and assessment to ensure entrance and exit criteria are satisfied.

CDRL A002 - Technical Report – Studies/Services, System Requirements Verification and Validation Matrix (SRVM)

CDRL A023 - Test/Inspection Report, MMIC Test Event Data and Detailed Test Results

CDRL A027 - Software Version Description (SVD)

CDRL A028 - Software Product Specification (SPS)

CDRL A029 - Computer Software Product

CDRL A035 - Test Plan, Master Test Plan (MTP)

CDRL A036 - Test Procedure

CDRL A038 - First Article Qualification Test Plan and Procedures, Qualification Tests (QTs) Plan and Procedures

CDRL A039 - Failure Analysis and Corrective Action Report

CDRL A048 - Integrated Master Schedule (IMS), Contractor's Integrated Master Schedule (IMS)

### **3.2.9.8 Production Readiness Assessment (PRA)**

The Contractor shall demonstrate that the design is producible. A successful review is predicated on the Government's determination that the CAB FoA design is ready to move into Low-Rate Initial Production. Production Readiness Assessments shall be conducted in an iterative fashion, concurrently with other technical reviews during the System Development and Demonstration phase. The final PRR shall occur at the conclusion of the System Development and Demonstration phase, and shall verify that requirements are fully met in the final production configuration, and that the system is producible.

### **3.3 Integrated Logistics Support (ILS)**

The Contractor shall plan, develop and conduct an ILS program, which shall govern the management of the ILS effort, to ensure supportability, sustainment, and compliance of the CAB FoA with the requirements in the Performance Specifications. The ILS effort shall be conducted as an integral part of the development and integration process to define the range and depth of the required support, and address all applicable and related elements of logistics. Status of the Contractor's ILS program shall be briefed at each program or technical review.

#### **3.3.1 ILS Working Group (ILSWG) Meetings**

The Contractor shall participate in CEC ILSWG meetings, nominally scheduled semi-annually. At this meeting, the Contractor shall present status on their ILS product development for each product baseline.

#### **3.3.2 Logistics Management Information (LMI)/Supportability Analyses (SA) Program**

The Contractor shall develop, implement, and maintain an LMI database used to document the results of all LMI tasks using MIL-PRF-49506. The Contractor shall maintain the LMI database by adding data obtained from analysis and testing conducted under this contract. The Contractor shall maintain currency of the Logistics Control Number

(LCN) structure by assigning a hardware breakdown for each new LMI candidate. The Contractor's LCN structure shall agree with the breakout structure used in engineering drawings.

The Contractor shall prepare a Maintenance Planning and Repair Analysis Summary that provides maintenance planning information to support the CAB FOA maintenance concept and support structure including the proposed operational and support environment for the CAB FOA. The Contractor shall present CAB FOA end items in a top-down breakdown structure which will identify all maintenance actions both preventive and corrective, for the system, subsystems, LRU, and WRA through the depot level of maintenance. Included in the summary shall be the Organizational Level of Maintenance necessary for the CAB FOA equipment. The Maintenance Planning and Repair Analysis Summary shall include the following data:

- Commercial and Government Entity (CAGE) Code
- Essentiality Code
- Estimated Price
- Functional Group Code
- Item name
- Line Replaceable Unit (LRU)
- Mean Time Between Failures (MTBF)
- Mean Time to Repair (MTTR)
- National Stock Number and Related Data
- Operator's Manual
- Quantity Per End Item
- Source, Maintainability and Recoverability (SMR) Code
- Work Unit Code

The Contractor shall prepare a Manpower, Personnel and Training summary that provides the data necessary to evaluate qualitative and quantitative manpower requirements for the CAB FoA equipment. The summary shall include requirements for O-level operator and maintenance personnel and depot maintenance personnel. The Contractor shall identify any new or modified skills and training requirements. The Manpower, Personnel and Training summary shall include the following data:

- Operator Function
- Maintenance Function
- Maintenance Level
- Required Man-hours
- Skill Specialty Code
- New or Modified Skill Requirement
- Education Qualifications
- Additional Training Requirements
- Recommended Rank/Rate/Grade

The Contractor shall prepare a Support and Test Equipment summary that provides the data necessary to evaluate the requirements for support and test equipment for the CAB FoA equipment. Support equipment shall include common and special tools, built-in-test or built-in-test equipment, routine measuring devices, Test Measurement and Diagnostic Equipment, monitoring and diagnostic devices, and equipment checkout and handling devices. The summary shall be developed to support the CAB for operations and maintenance tasks from Organizational level through Depot level of maintenance. The summary shall provide the identification of each proposed item of support and test equipment, and its intended use in CAB equipment. The summary shall provide the cost, calibration procedures and/or requirements, technical parameters and any other information that will aid in the evaluation of the proposed support and test equipment newly developed to support the CAB FOA. The proposed selection of support and test equipment shall conform to the following criteria:

- Existing support and test equipment in the Government inventory.
- Support and test equipment not in the Government inventory.
- Support and test equipment, newly developed, to support the end item.

The Support and Test Equipment summary shall include the following data:

- Calibration Interval
- Calibration item
- Calibration Procedure
- Calibration Required
- Calibration Time
- Commercial and Government Entity (CAGE) Code
- Description/Function and Characteristics of Support Equipment
- Estimated Price
- Item name
- National Stock Number and Related Data
- Operator's Manual
- Parameters
- Quantity per Test
- Support Equipment Dimensions
- Support Equipment Weight
- Usable on Code (UOC)

The Contractor shall prepare a Supply Support Summary that reflects the proposed supply support concept for the CAB FOA. The summary shall also identify all proposed spares and repair parts for organizational and depot level of maintenance. It shall also identify all long lead items, bulk items, critical spares, bench stock spares and proposed initial on-site spares delivery. The Supply Support Summary shall contain the following data:

- Commercial and Government Entity (CAGE) Code
- Essentiality Code
- Estimated Price
- Hazardous Code
- Item Name
- Material Lead Time
- National Stock Number and Related Data
- Quantity Per End Item
- Recommended Minimum System Stock Level
- Shelf Life
- Supplemental Packaging Data

The Contractor shall prepare a Packaging, Handling, Storage and Transportation Summary. The Contractor shall provide information on the shelf life of components and identify any hazardous materials contained in the CAB FoA equipment. The Packaging, Handling, Storage and Transportation Summary shall contain the following:

- Contractor and Government Entity (CAGE) Code
- Cushioning and Dunnage Material Code
- Cushioning Thickness
- Degree of Protection Code
- Hazardous Code
- Item Name
- National Stock Number and Related Data
- Packaging Category Code
- Preservation Material Code
- Quantity per Unit Pack
- Reference Number
- Shelf Life
- Special Marking Code
- Unit of Issue (UI)
- Unit of Measure (UM)
- Unit Size
- Unit Weight

- Wrapping Material

CDRL A055 - Logistics Management Information (LMI) Data Product  
CDRL A056 - Logistics Management Information (LMI) Summaries, Maintenance Planning & Repair Analysis LMI Summary  
CDRL A057 - Logistics Management Information (LMI) Summaries, Manpower, Personnel, and Training LMI Summaries  
CDRL A058 - Logistics Management Information (LMI) Summaries, Support & Test Equipment LMI Summary  
CDRL A059 - Logistics Management Information (LMI) Summaries, Supply Support LMI Summary  
CDRL A060 - Logistics Management Information (LMI) Summaries, Packaging, Handling, Storage, & Transportation LMI Summary

### 3.3.2.1 Indentured Product Codes (IPC)

The Contractor shall develop and utilize IPC, IAW with MIL-PRF-49506, to provide traceability for CAB FoA, and its systems, subsystems, assemblies, subassemblies, components, parts, and any Support Equipment (SE) existing and new, if applicable. The Government shall approve the re-sequencing of IPCs after initial assignment.

### 3.3.2.2 Indentured Product List (IPL)

The CAB FoA LMI IPL shall be developed and maintained in Top-Down Breakdown format, IAW the system drawings per the Technical Data Package (See SOW Section 3.1.1.2). IPL data, based on engineering and logistics data shall be developed and maintained within the LMI database for CAB FoA. The IPL shall be directly traceable to all authorized configurations up to and including the latest hardware configuration drawings/baselines.

### 3.3.2.3 Sustainment Level Logistics Management Information (LMI) / Supportability Analyses (SA)

The Contractor shall design the CAB FoA to be maintained by Organizational Level (O-Level) and Depot Level (D-Level) maintenance activities; no Intermediate Level (I-Level) maintenance shall be required. O-Level maintenance shall be limited to preventive maintenance and LRU remove and replace corrective maintenance actions. The Contractor shall conduct maintenance planning activities during development and qualification to support equipment baselines. The Contractor shall perform Maintenance and Supportability Task Analysis down to the LRU, Replaceable Module and Circuit Card indenture level. A detailed analysis of all operations and maintenance tasks completed to the depth necessary for identification of all procedural steps required for task accomplishment shall be conducted, documented and maintained by the Contractor in the LMI database. This analysis shall be accomplished by the Contractor at a level commensurate with LMI/SA guidelines, defined in this SOW. Associated with this effort shall be the identification of the logistics resources needed to support task accomplishment. All tasks, procedural steps including maintenance task times, and support resources shall be documented in the LMI database. Emphasis shall be placed on completion of: (1) the Operator and Organizational level LMI data, (2) Built-in-Test (BIT) fault location and isolation, (3) verification and validation of repair at all maintenance levels, (4) results of reliability data analyses, (5) Training source data in required formats, and (6) identification of Support and Test Equipment (S&TE)

### 3.3.3 Supply Support

The Contractor shall develop initial Provisioning Technical Documentation (PTD) for all equipment developed under this contract. Provisioning data shall be documented in the LMI database. The formal provisioning process shall be completed after each Physical Configuration Audit (PCA) as identified in this SOW.

### 3.3.4 Item Identification and Valuation

The Contractor shall apply DoD Item Unique Identification (IUID) marking to the Unit level assemblies, and their associated Line Replaceable Units (LRUs) or Weapons Replaceable Assemblies (WRAs) procured under this contract as required by DFAR 252.211-7003. IUID pedigree data for LRUs embedded in Unit level assemblies shall be entered into the IUID Registry as children to the parent Unit. LRUs procured as spares shall not have a parent-child relationship. The Contractor shall utilize MIL-STD-130N for Item Unique Identification marking.

## 3.4 Reliability, Maintainability, and Availability (RM&A) Program

The Contractor shall conduct the RM&A tasks specified herein to ensure the CAB FoA design complies with RM&A requirements defined in the Performance Specification. The Contractor shall plan, implement, and manage a RM&A engineering effort that assures the satisfaction of system objectives and personnel safety.

### **3.4.1 Reliability Predictions/Growth Curve**

The Contractor shall deliver detailed design reliability predictions based on a defined configuration and associated models. The predictions shall be allocated down to the lowest indenture level and updated each time significant design or mission profile changes significantly. The reliability modeling method shall mathematically relate the reliability block diagrams to time-event relationships. The Contractor shall also develop and maintain a Reliability Growth Curve Report. The growth curve shall be developed using the guidance of MIL HDBK 781. The growth curve shall track all system level testing, and using a Test, Analyze, and Fix philosophy, shall indicate demonstrated reliability growth towards the stated requirements over time.

**CDRL A061 - Scientific and Technical Reports, Reliability Growth Curve Report**  
**CDRL A062 - Reliability Block Diagrams and Mathematical Models Report**  
**CDRL A063 - Reliability Prediction and Documentation of Supporting Data**

### **3.4.2 Highly Accelerated Lifecycle Test (HALT)**

The Contractor shall conduct a HALT IAW CDRL A035. The Government has identified High Power Amplifiers (HPAs), Transmit/Receive (T/R) Modules/Assemblies, Thermal Management, and DC Sources (Power Supplies) for HPAs as technology risk areas critical to the development of CAB FoA. The Contractor shall develop a HALT process, IAW CDRL A036, to verify that the CAB components listed above meet the reliability requirements under the given environmental conditions. The HALT Plan shall detail the subset of system hardware to be tested, the nature (i.e., process and duration) of HALT, test environment, facilities, instrumentation, post test analysis and reporting. Upon approval of the HALT Plan, the contractor shall execute the HALT under Government witness. The Contractor shall provide notification no less than 10 working days prior to HALT. The Contractor shall provide a test report IAW CDRL A037. If the HALT does not verify the desired levels of CAB reliability, re-design efforts must commence by the Systems Engineering Team that address the reliability performance shortfall and the HALT shall be performed again. MIL-STD-785B may be used for guidance.

### **3.4.3 Failure Reporting, Analysis and Corrective Action System (FRACAS)**

The Contractor shall develop a closed loop failure reporting system, procedures for analysis of failures to determine cause, and documentation for recording corrective actions taken. The FRACAS shall include uniform failure reporting, failure analysis reports and corrective actions. The Contractor shall provide a monthly Failure Summary and Analysis Report. The Government reserves the right to conduct a Failure Review Board (FRB) throughout the contract period of performance. Failure and corrective action summaries shall be reported at each program or technical review. The Contractor shall maintain and provide the Government with a copy of the FRACAS database. The FRACAS database shall contain all FRACAS information created during the life of the contract, including all FRACAS information listed in this SOW.

**CDRL A064 - Failure Summary and Analysis Report**  
**CDRL A065 - Technical Report – Studies/Services, Failure Reporting, Analysis, and Corrective Action System (FRACAS) Database**

### **3.4.4 Failure Modes, Effects, and Criticality Analysis (FMECA)**

The Contractor shall develop a FMECA using MIL-STD 1629A as guidance to:

- a. Identify all failure modes, determine intermediate level effects, and determine top level effects.
- b. Evaluate each failure mode in terms of the worst potential consequences which may result and assign a severity classification category
- c. Identify fault detection methods (BIT and BITE).

- d. Quantify fault detection rates and identify corrective actions.

The FMECA will serve as source data for design influence for supportability, maintenance, engineering, testability analysis, development of logistics support concept and products, training, and safety analysis.

**CDRL A066 - Failure Modes, Effects, and Criticality Analysis (FMECA) Report**

### **3.4.5 Part Obsolescence**

The Contractor shall be responsible for minimizing obsolescence by selecting products that will avoid or resolve hardware and software/firmware obsolescence issues. The Contractor shall adhere to the PEO IWS 6.0 Diminishing Manufacturing Sources and Material Shortages (DMSMS) Management Plan, provided as GFI. The Contractor shall document and deliver an Obsolescence Assessment that details emergent obsolescence issues and emergent vendor implemented changes relevant to the approved baseline or current configuration if no baseline exists. The Obsolescence Assessment shall include the use of forecasting tools and engineering technology assessments to predict and forecast obsolescence and shall deliver an overall obsolescence health assessment of the equipment to indicate the overall availability risk of items going obsolete. The assessment shall consist of the existing obsolescence status of each configuration item and include the estimated obsolescence timeframe of configuration items not currently obsolete.

**CDRL A067 - Technical Report – Studies/Services, Obsolescence Assessment**

### **3.5 Program Security**

Contractor shall handle and store classified material up to the SECRET Level.

#### **3.5.1 International Traffic in Arms Regulations (ITAR)**

The Contractor shall be solely responsible for obtaining any State Department approvals, licenses, Technical Assistance Agreements (TAA), etc. required by the ITAR.

#### **3.5.2 Information Assurance (IA)**

The Contractor shall support Government Independent Verification and Validation for IA per DoDD 8500.01E, DoDI 8510.01, DoDI 8500.2, NAVSEA PIT, and NAVSEA INS 9400.2. The verification and validation process shall require access to each version of CAB FoA hardware and software/firmware after passing formal qualification testing. The verification and validation process shall not exceed 16 hours per capability and shall require technical and administrative support from the Contractor. The Contractor shall deliver to the Government an Implementation Strategy for implementation of the above IA requirements.

**CDRL A068 - Technical Report – Studies/Services, Information Assurance (IA) Implementation Strategy**

#### **3.5.3 Contractor Security**

The Contractor shall implement security procedures in concert with Defense Security Service (DSS) National Industrial Security Program Operating Manual (NISPOM) per DoD 5220.22M and shall have the appropriate facility security clearance.

#### **3.5.4 Security Clearance Levels**

Personnel requiring access to classified information in support of this effort shall maintain, at a minimum, a SECRET security clearance.

#### **3.5.5 Public Release of Information**

All public releases of information concerning this project must receive written approval of PEO IWS 6.0 thirty (30) calendar days prior to release.

### **3.5.5.1 Website Security**

The Contractor shall ensure that their publicly-assessable web-sites are free of FOUO, and/or indicators that could tip-off adversaries about impeding program activity. The Government will provide additional Operational Security (OPSEC) guidance as necessary.

### **3.5.5.2 Contractor's Internal Network and Data Security**

The Contractor shall ensure that their internal networks and data have sufficient protection to prevent intrusion from sources outside its facilities. The Contractor shall also allow the Government oversight of the Contractor's network security and access to perform Critical Network Reviews when requested by the Government.

## **3.6 Refurbishment**

If ordered by Government issued TIs, EDMs or PPU shall be shipped back to the Contractor's facility at the completion of testing. The Contractor shall perform a system groom such as, clean, repair, replace any components, test, and calibrate to restore all systems to the same condition and specifications they were in when delivered for the test cycle within 30 days of receipt of the systems. The Contractor shall provide material and labor for Refurbishment. Efforts to refurbish the test systems shall be included in the Period of Performance (PoP) of the Contract.

## **3.7 Operation and Maintenance Support**

The Contractor shall provide engineering support services after delivery of the EDMs and PPUs and throughout the remainder of the contract period of performance to correct system problems encountered during laboratory and field use of the EDMs and PPUs as directed by Government issued TIs. The Contractor shall provide the products and services indicated for Operations and Maintenance support of EDMs and PPUs as stated in all sub-paragraphs of Section 3.7.

### **3.7.1 Technical Support**

The Contractor shall provide support services on an as needed basis for technical support, consultation and testing. Technical support, consultation and testing shall be provided as directed by Government issued TIs. Support may be required on short notice via site visit, telephone, email or other form of communication. The Contractor shall provide contact information of a responsible person to coordinate support services. Contact information to be provided, at a minimum, shall include, name, cell phone number and email address. The Contractor shall have a means for Government and military personnel to readily notify the Contractor of EDM or PPU related issues, via all of the following methods at a minimum: telephone number, a voice mailbox, a FAX number, an e-mail address. Contact information is to be provided to the Contracting Officer's Representative (COR) at the same time the EDMs or PPUs are delivered. Any associated special tools, support or test equipment (repair kits, etc) shall be the responsibility of the Contractor to provide if an on-site repair is required.

#### **3.7.1.1 Management and Repair**

The Contractor shall store, manage and repair (at the Government's expense) or replace (at the Government's expense) as necessary all Depot Level Repair Part (DLRPs) purchased by the Government

#### **3.7.1.2 Item Disposition**

For items declared as Beyond Economical Repair, or salvage for parts, the Contractor shall perform demilitarization in accordance with the Government's demilitarization plan.

##### **3.7.1.2.1 Demilitarization and Disposal**

The Contractor shall participate in developing the demilitarizing and disposition procedures based on MIL-PRF-63033C by providing technical expertise, source data, drawings, sketches, illustrations, Material Safety Data Sheets (MSDS), manufacturing procedures, instructions, service bulletins, assembling procedures, special shipping and/or handling instructions.

**4.0 Government Technical Points of Contact: TBD**

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