N00039-06-X-0002

NOTIONAL CHARACTERISTICS DESCRIPTION FOR THE ADVANCED COMMUNICATION PACKAGE (ACP)

Rev. 1.0

ATTACHMENT 1

1. Notional Capability Discussion.

Advanced Communications Package (ACP) capabilities are described below.

1.1 ACP will consist of two basic elements: the Shipboard Interface Unit (SIU) which is installed in the ship, and the Data Relay Package (DRP) which is a payload of the VTUAV. The Tactical Control System (TCS) will provide the Human Systems Interface (HSI).

1.2 The SIU will receive and disseminate data from the DRP and route command and control signals through ACP. The minimum capability of the ACP is to sustain: 2 full duplex directional Ku band links, one full duplex omni-directional Ku band for node discovery, and one full duplex L band for multiple nodes.

2. Concept of Operations Summary

2.1 ACP transfers data from the battlespace directly to the commander through the use of a relay system. ACP is deployable in that it resides on the ship, and is carried to the front lines by the Vertical Takeoff and Landing Tactical Unmanned Aerial Vehicle (VTUAV).

2.2 ACP will allow for direct communications beyond the line of sight between Operating forces ashore and a command center located on the platform without reliance of satellites

2.3 The ACP will function as a mobile networking system capable of simultaneously routing data streams from multiple geographically disparate operational nodes to one base node.

2.4 Implementation of advanced decision-making logic at the physical, data link and network layers will allow the ACP system to operate as the backbone of the battlespace network by providing:

2.4.1 Network Layer Convergence – ACP will converge at the Internet Protocol (IP) layer to apply criteria, processes, and algorithms to network routing decisions.

2.4.2 Data Persistence – ACP will support a combination of independent and aggregate link management, as well as traffic shaping techniques to facilitate continuous availability of information processing resources and the related output. The ACP shall have the capability to auto-negotiate the highest performance mode of interoperating link and give status of its findings. It shall regulate data flow, maintain connectivity, conduct data flow control, and conduct error detection at rate of 10^{-6} bit error rate (BER).

2.4.3 Communication Control- The ACP shall be able to calculate transmitter performance, synchronize and MUX/DEMUX multiple communication lines simultaneously.

2.4.4 Traffic Management – ACP will enable the application of flow-based routing to support Quality of Service at the point of origin, resulting in increased performance and manageability of critical communications sessions.

2.4.5 Environmental Awareness – ACP will employ granular error control mechanisms as input to the routing process allowing alternate path selection around non-optimal weather conditions.

3. SYSTEM CAPABILITIES REQUIRED FOR THE ACP

This Notional Characteristics Description describes the operational and support-related characteristics of the system that will be verified by testing or analysis. The attributes identified are those which contribute most significantly to the desired operational capability in threshold/objective format. "Threshold" denotes the stated functionality or capability that reflects the minimum acceptable operational combat capability required to meet warfighter requirements. The term "Objective" denotes the stated functionality or capability needed to completely satisfy the warfighter requirement(s). Objectives reflect a direction for levels of operational capability that the ACP program should pursue, based on trade-offs and analyses.

Characteristic	Threshold	Objective
1. Data Links	ACP shall sustain two Ku-band full duplex directional, one Ku-band omni-directional full duplex link for node discovery, one full duplex L-band Omni for multiple nodes,	ACP shall sustain three Ku-band full duplex directional, one Ku-band omni-directional full duplex link for node discovery, one full duplex L-band Omni for multiple nodes,
2. Data Rate	The ACP shall be able to transfer data at a rate up to 44.5 Mbps on each bi-directional TCDL and be able to adapt to changing data rates based on performance of the link. ACP shall have the capability of buffering 45Mbps of data. The ACP shall have the capability to auto negotiate the highest performance mode of interoperability link and give status of its findings. It shall regulate data flow, maintain connectivity, conduct data flow control, and conduct error detection at rate of 10^{-6} bit error rate (BER).	Objective value will be able to transfer data at 90 Mbps.
3. Range	The ACP range shall be up to 110 nautical miles. (Range is defined as distance between ACP and its controller).	220 nm

Characteristic	Threshold	Objective
4. Dimensions	The ACP for the DRP shall be smaller than 16.3"H by 22"W by 15"D . The ACP shall use the existing power available in the UAV at 28Vac power. The ACP shall be less than 250 lbs.	Objective = Threshold
5. Shock and Vibration Ref: Mil STD-810F Sec: 5.2,5.3,8.5	The ACP shall be capable of operating and performing after non-operational, transportation vibration and shock testing as called out in MIL-STD 810F. Shock tolerances shall conform to MIL-STD-810F,	Objective = Threshold
6. Network Performance	ACP shall support the transport of unicast and multicast IP datagrams providing a scalable means of connecting end users in geographically dispersed network.	Objective = Threshold
7. Multicasting	ACP shall comply with the GIG-Wide Multicast Routing Architecture .	
8. Cryptography	The ACP shall operate with COMSEC devices with a threshold value of using bi-directional data links. Traffic will be encrypted before it reaches the ciphertext core of the network.	The objective value will be 1 enclave.

Characteristic	Threshold	Objective
9. Net-Centric Ref: CJCSI 6212.01D	ACP shall support execution of joint critical operational activities identified in the system's integrated architecture products and satisfy the technical requirements for transition to Net-Centric military operations to include: 1) DISR mandated GIG IT standards identified in the TV-1, 2) DISR mandated GIG identified in the KIP declaration table, 3) NCOW RM Services 4) Information assurance requirements including availability, integrity, authentication, confidentiality, and non-repudiation, and issuance of an Interim Approval to Operate (IATO) by the Designated Approval Authority (DAA), and 5) Operationally effective information exchanges; and mission critical performance and information assurance attributes.	The system shall support execution of all joint operational activities identified in the system's integrated architecture products and satisfy the technical requirements for Net-Centric military operations to include: 1) DISR mandated GIG IT standards identified in the TV-1, 2) DISR mandated GIG KIPs identified in the KIP declaration table, 3) NCOW RM Services 4) Information assurance requirements including availability, integrity, authentication, confidentiality, and non-repudiation, and issuance of an Interim Approval to Operate (IATO) by the Designated Approval Authority (DAA), and 5) Operationally effective information exchanges; and mission critical performance and information assurance attributes identified in the SV-6.
10. System Configuration	The ACP shall have a GUI for local and remote capabilities to be controlled and managed via relay/route design. It should be able to disseminate commands/status to and from the ACP. ACP shall be able to interface with the ADNS.	ACP shall be able to interface with Local/Wide Area Networks

Characteristic	Threshold	Objective
11. Monitoring	ACP shall be continuously monitored. The types of information that shall be available are: -Status of all live links -Overload/underload of the links -Additional node available. In case of linkage failure with the primary ship, the ACP shall establish stable TCDL connectivity and crypto synchronization to the nearest ship within 4 minutes or send a distress signal. The ACP shall be able to detect hardware/software failure and inform the ship of its condition within .5 seconds. Priority shall be given to the critical problems.	Objective: -Amount of data in each link and throughput -Configuration of each link Objective=.25 seconds
12. Quality of Service	ACP shall provide dynamic QoS capabilities that ensure information is delivered based on established traffic management policies and in accordance with the commanders' dissemination policies. The system will support applications with JTRS, latency, throughput, packet loss and other traffic requirements, in conjunction with the commanders policy, user assigned priority and quantitative DISA standard QoS/Precedence requirements. ACP QoS methods will be interoperable with any established GIG QoS boundaries. QoS shall be equal to 95%.	Objective = 98%

Appendix of Acronyms

Acronym	Meaning
aADNS	Airborne Automated Digital Network System
ACP	Advanced Communications Package
C4I	Command, Control, Communications, Computers & Intelligence
CDL	Common Data Link
COBRA	Coastal Battlefield Reconnaissance and Analysis
COMSEC	Communications Security
CONOPS	Concept of Operations
CPI	Critical Protected Items
CRU	Central Routing Unit
DISR	DoD Information Technology Standards and Profile Registry
EDM	Engineering Development Model
EMI	Electro-Magnetic Interference
EO/IR	Electro-Optic/Infra Red
GFY	Government Fiscal Year
GIG	Global Information Grid
GUI	Graphical User Interface
ISP	Information Support Plan
JTRS	Joint Tactical Radio System
KIP	Key Interface Profile
LOS	Line of Sight
LRIP	Low Rate Initial Production
LSI	Large System Integrator
MMP	Modular Mission Package
MSL	Mean Sea Level
NBN	Naval Battleforce Network
NCOW RM	Net-Centric Operations and Warfare Reference Model
NCW	Network Centric Warfare
NESI	Net-Centric Enterprise Solutions for Interoperability
OSD	Office of the Secretary of Defense
OSI	Open System Interconnect
PMW	Program Manager, Warfare
QoS	Quality of Service
RFE	Radio Frequency Equipment
SDLC	System Development Life Cycle
SSC	SPAWAR Systems Center
TCDL	Tactical Common Data Link
TRL	Technological Readiness Level
UAS	Unmanned Aircraft Systems
UAV	Unmanned Aerial Vehicle
UV	Unmanned Vehicle
VTUAV	Vertical Take-off Unmanned Aerial Vehicle