TOPIC 1

Ku-Band Propagation Study

Introduction

To ensure that ACP operates as intended in all marine environments the Government has requested certain studies be done on the Propagation of Ku-Band communications in certain areas of the world. It is the hope of the Government that by studying phenomenon that affects Ku-Band quality, a plan can be made to mitigate risk in operating in these environments. The Government requests assistance quantifying the impact of marine and terrestrial-based ducts, as well as evaporation ducts.

Background

A number of ducting issues with line of sight (LOS) Ku-Band transmission are known to exist, especially in marine environments operating somewhat near the equator. Affecting operation in the littorals are three dominant ducting phenomena: marine-based ducts, terrestrial-based ducts, and evaporation-based ducts. Ducts can be composed of suspended silicon, carbon, and water vapor particulate matter. Marine and terrestrial-based ducts form primarily by thermal inversions. Propagation effects of marine and terrestrial-based ducts are relatively independent of frequency. Evaporation ducts form primarily by a decrease in water vapor as a function of height from the ocean surface. Propagation effects of evaporation ducts are frequency dependent. The presence of these ducts can alter the refractivity of the transmission medium such that directional signals can become misaligned.

Engineering Study to be Performed

The intent of this study is to determine what effects will be inherent in the Ku-Band links operating in various marine and terrestrial environments. The offeror shall encompass directional Ku-Band CDL links. The offeror shall involve identifying and classifying specific environmental factors initiating duct formation for all major and minor bodies of water existing between 35 degrees North latitude to 35 degrees South latitude. The specific ducting conditions to study for each body of water in the designated region shall be evaporation ducting, marine and terrestrial-based ducting, and any other the offeror has brainstormed. For each ducting condition, the offeror shall describe the contributing factors, frequency of occurrence, and the severity of the occurrence for each body of water. In addition, the offeror shall quantify elevation of the ducts, diameter of the ducts, dynamic behavior of the ducts, and duration of the ducts for each body of water. As a result of this analysis, the offeror shall model ducting dynamics to determine how each of the ducting condition affects pointing angle of the links. In addition, the offeror shall empirically quantify pointing angle correction as a result of ducting affects. The offeror shall also quantify the effects on both link integrity and data integrity for all ducting conditions at varying levels. The offeror shall propose methods to mitigate the risk of each of the ducting conditions. The offeror shall propose solutions to automate correction for each of the ducting conditions.

The offeror should perform a mixture design of experiment, evaluating possible interaction effects. Deliverables shall include white paper documenting the results of the requested analysis. Furthermore, the optimal performer should include the rules of behavior for the computer model, definition of input variables, and all mathematical and simulation principles governing the behavior of the model. The anticipated period of performance for this effort is not to exceed two months.

Reference Documents

1. ACP Notional Characteristics Description – Attachment 1 to this BAA.

Assumptions

1. For the model, ducts can consist of uniformly distributed particulate mixtures for simplicity of model development.

TOPIC 2

ACP Schedule Feasibility Study

Introduction

To meet the current timelines for deployment in a ship under construction, ACP has streamlined the SDLC effectively decreasing the development schedule by six months. The Government requests assistance analyzing the feasibility of the current program schedule from a technical perspective.

Background

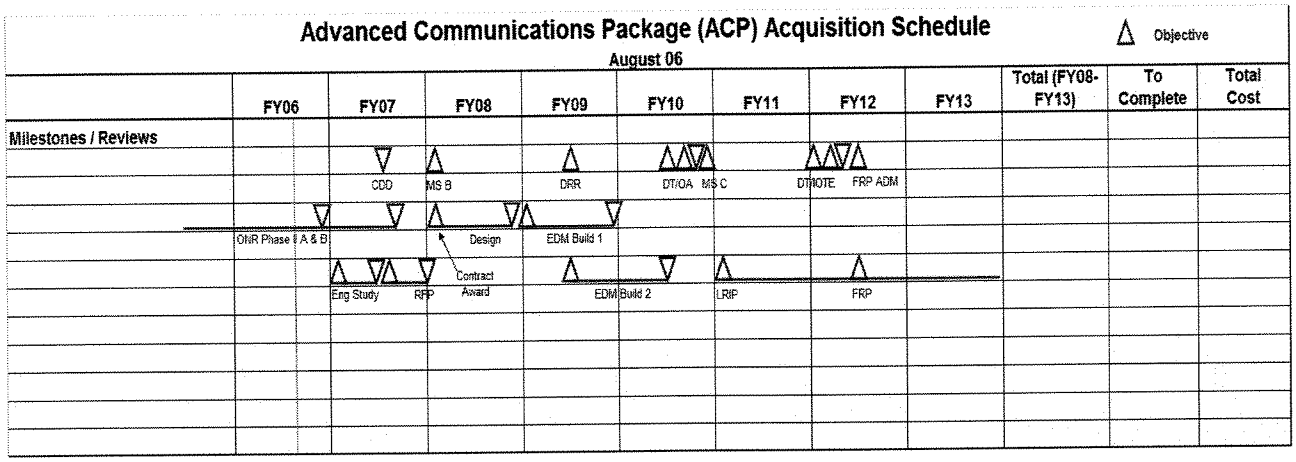
Beginning with contract award in the first quarter of the GFY-08, the original program schedule allocated one year for system design activities, one year for prototype development, and one year for completion of the final design. Each one-year period corresponds to a phase in the design process for an incremental system development approach. From an acquisition perspective, dual competition is possible through each of these phases with potential down selection occurring after each phase. The initial period of system design, the Design Phase, will focus on theoretical analysis of requirements and conceptual design activities. At the end of the Design Phase, the Government will perform a critical design review of all work products. During the second period of design, the EDM Phase 1, the LSI will focus on software and hardware component development, testing, and integration. This phase will culminate in a functional prototype that will be demonstrated in a laboratory environment. In EDM Phase 2, the LSI will incorporate lessons learned from EDM Phase 1 into a production-ready design for the ACP system. The EDM Phase 2 design will undergo rigorous development and operational testing in a field representative environment. After completing all three phases of the design process, the LSI will begin LRIP of the EDM Phase 2 system. To realize a streamlined system development approach, the PMW 760 Program Office elected to overlap EDM Phase 1 & 2 by moving EDM Phase 2 left by six months.

Engineering Study to be Performed

The offeror shall rationalize the execution feasibility of the current program schedule against the desired capabilities of the ACP system. The offeror shall identify potential schedule risks, risk mitigation strategies, as well as cost breakdown and implementation plan for each mitigation strategy. The offeror shall employ multiple analytical perspectives, balancing system complexity against the program schedule. Possible analytical variables include strategies for overlapping system design activities, sequencing of system design activities, and application of functional expertise to system design activities. The offeror shall define quantitative methods to assess LSI's ability to accelerate the design schedule. The anticipated period of performance for this effort is not to exceed two months.

Reference Documents

1. ACP Notional Characteristics Description – Attachment 1 to this BAA.
2. ACP Program Schedule



Assumptions

For the purposes of the engineering study, the offeror shall make the following assumptions:

1. Program schedule is baselined and static.
2. System capability is baselined and static.
3. Program budget is baselined and static.

TOPIC 3

ACP COTS/GOTS Solutions & Market Analysis Study

Introduction

In order to facilitate an expeditious development cycle with reduced risk, the Government would like to search for existing acquisition programs that have similar capabilities to that of ACP, and incorporate them into the ACP system. Furthermore, the Government would like to identify other existing or planned military programs whose capabilities may be enhanced through the addition of ACP technology.

Background

A common method in project management is to reduce risk during conceptualization by determining off-the-shelf technologies and market partners that can eliminate some of the unknowns or provide supplemental resources. Identifying the interfaces between off-the-shelf and developed portions of a project will truncate the overall development timeline and reduce cost. Determining other entities within the marketplace that have similar developmental plans can allow the establishment of a relationship and conjoint research. In addition, identifying parties in future need of a product or service can ensure funding during the later stages of development. These commercial examples can all directly translate to an acquisition strategy that assists the program office in risk mitigation.

Engineering Study to be Performed

This engineering study shall consist of two phases. Within the first phase, the offeror shall search for systems within other military acquisition programs which satisfy the capabilities required of ACP, either wholly or in part. The offeror shall investigate similar capabilities provided by RFE (both TCDL, VRC-99, TTNT and Subnet Relay), the routing/switching module, the system controller, the antenna controller, and the antenna. The offeror shall search for capability within existing and developing programs of the US Air Force, Army, Navy, Marines, and Coast Guard. The offeror shall only consider programs that meet the guidelines of TRL 6 or greater. Furthermore, the offeror shall provide information on the maturity level and current life cycle support plan for the capabilities examined. In addition, programs must be less than 1 year from integration to the fighting force.

For the second phase of the study, the offeror shall review and analyze the required capabilities of ACP and determine their applicability to warfighting operations in other US armed service branches. To initiate this phase, the offeror shall research existing concepts of operations for all US armed service branches. The offeror shall derive operational requirements from each CONOPS and align to ACP capability. The offeror shall investigate funding sources and requirements maturity for all derived operational requirements. Programs identified can be either pre-acquisition or in development. The offeror shall document point of contact information for any program of interest. The offeror should research applicable technology forecast based on current force projection needs for a period of 5 years in the future. The deliverable from the technology forecast will be to identify capability required by future programs that ACP can provide. To support future program marketing endeavors, the offeror shall research and compile a list of all conferences, trade shows, etc., that would be useful for the program office to attend and facilitate direct marketing approaches to other Government program offices. The anticipated period of performance for this effort is not to exceed two months.

Reference Documents

1. ACP Notional Characteristics Description – Attachment 1 to this BAA.

2. FORCEnet Target Architecture - Defense Architecture Registry System (DARS) https://dars1.army.mil

Assumptions

1. Assets developed wholly or in part by foreign entities may not be considered for integration with ACP.

TOPIC 4

EMI Between the Avionics and Payload Systems Study

Introduction

The Government requests assistance researching the effects of emanated radiation between the ACP payload and the organic systems of the VTUAV. The study will involve analysis of radiated emissions and susceptibility of the ACP system with respect to the MQ-8B FireScout VTUAV.

Background

EMI can be a significant problem in any electrical system. The VTUAV exercises an array of four (4) tactical data links providing critical command and control and navigation services. When the VTUAV is deployed in concert with the ACP MMP, the VTUAV leverages two ARC-210 radios to provide connectivity to these critical systems. Concurrently, ACP will leverage a maximum of three (3) TCDL and one (1) VRC-99 radios to provide tactical edge connectivity to the ship's off-board sensors and deployed MMP's. To insure operational efficiency of both the VTUAV critical systems and the ACP system, it is essential to investigate the cumulative effect of radiated energy on the electromagnetic spectrum. A comprehensive analysis will focus on isolating the perspective of the VTUAV, as well as the ACP system. Analysis will simulate a fully-loaded operational scenario to quantify EMI in the surrounding area. Continuing from this phase, the analysis will determine performance impact associated with quantified EMI. Performance impact will be defined in context of impact to VTUAV systems and impact to ACP systems.

Engineering Study to be Performed

The offeror shall perform a detailed engineering analysis of all potential EMI issues associated with the following use case:

- VTUAV carrying an ACP payload as defined by the Notional Characteristics Description
- VTUAV is operating up to 100 nautical miles from antenna
- VTUAV is operating in a maritime environment at 10,000 MSL
- Concurrently communicating using three Ku-Band TCDL links and two UHF links (one VRC-99 and one ARC-210)

For the use case described, the offeror shall determine the radiated emissions generated by the VTUAV systems and ACP system. Emanated energy shall be quantified across all relevant portions of the frequency spectrum accounting for design considerations such as side lobes and guard bands. The offeror will create a radio frequency profile at discrete 0.5 meter intervals from 1 to 20 meters from the VTUAV center of gravity along the vertical and horizontal planes. For all identified EMI issues, the offeror shall determine impact to signal attenuation with respect to distance. The offeror shall define the distance limitations based upon link budget assumptions for radiating assets. The offeror shall identify threshold levels of radiated power above which bit error rates exceed acceptable values. The offeror shall also consider potential natural harmonic impacts of electromechanical avionics systems emanations. In addition, the offeror should identify transmittance limits that would interfere with mission stealth objectives. The offeror shall build upon the results of analysis to suggest mitigation strategies to reduce identified EMI areas. Mitigation strategies shall consider cost and complexity of implementation when defining mitigation strategies. To support mitigation strategies, the offeror shall research and report on industry best practices citing examples where applicable. At a minimum, the mitigation strategies shall consider shielding, relative placement and orientation of radiating assets, and emission patterns of radiating assets. The anticipated period of performance for this effort is not to exceed two months.

Reference Documents

1. ACP Notional Characteristics Description – Attachment 1 to this BAA.

Assumptions

1. The offeror will specify antenna configuration for all radiating assets.

TOPIC 5

Common Architecture of Unmanned Vehicles Study

Introduction

Currently several unmanned platforms are being developed with a variety of communications methods. The Government requests assistance in developing a strategy to harmonize discordant communication interfaces ensuring efficient interoperability of future deployed systems.

Background

Review of the ACP Operational View (OV) and Systems View (SV) architecture work products reveals a significant number of operational nodes employed to provide lethality in the littoral region. The many assets communicating within the littoral operational construct leverage various waveforms, protocols, and standards created interface diversity. Interface standardization at the physical, data link, and network layers is critical to resolving interoperability issues. In addition, synchronizing communication interfaces may streamline development for future ACP design spirals. Recognizing the challenges of saturating the radio frequency spectrum, diversity of waveform frequencies is still a desired characteristic of systems deployed at the tactical edge. For unmanned aerial platforms, the Government has mandated procurement of TCDL-compatible radio assets beginning GFY-07. Each of these avenues suggests decoupling the physical layer from the data link layer. Following this approach, it is possible to support physical layer diversity in concert with the goal of interface standardization.

The OV and SV products developed should utilize the existing FORCEnet baseline architecture August 2006. It provides the target or enterprise architecture that systems need to plug into. This architecture consists of approved OVs, SVs, and Technical Views (TVs). This enterprise architecture provides the developer with the systems, via the SVs to support interoperability and the TVs provide the list of net centric technical standards that are needed. The standards used in FORCEnet architecture are consistent with DoD Information Standards Registry (DISR). The FORCEnet architecture products are available in Defense Architecture Registry System (DARS) https://dars1.army.mil.

Engineering Study to be Performed

The offeror shall identify all required communication interfaces supporting the littoral operational construct. The offeror shall define points of commonality and divergence for each identified interface. The offeror shall develop multiple strategies to efficiently standardize communication interfaces. Each strategy shall incorporate conclusions of technical and programmatic analysis addressing areas of development cost, development strategy, policy requirements, authoritative organizations that can create and execute policy, technical complexity of integration, schedule for integration, technical performance in marine RF environments, broadcast behavior, and latency sensitivity. The anticipated period of performance for this effort is not to exceed two months.

Reference Documents

1. ACP Notional Characteristics Description – Attachment 1 to this BAA.
2. UAS Spectrum Policy – http://www.dsi.org.au/Portal/Portals/15/DOD%20UAS%20Freq%20Spectrum%20Policy%20%20Apr06.pdf
3. FORCEnet target architecture - Defense Architecture Registry System (DARS) https://dars1.army.mil

TOPIC 6

NESI Compliance Study

Introduction

"NESI is a body of architectural and engineering knowledge that guides the design, implementation, maintenance, evolution, and use of the Information Technology (IT) portion of net-centric solutions for military application."[1] NESI provides guidance to software development activities associated with the SDLC. As with all compliance requirements, there is a cost to implementation. The Government requests assistance to investigate the development cost impact of NESI compliance.

Background

NCW objective is to promote effective networking within the warfighting community. NESI's purpose is to provide acquisition programs with a method for meeting and exceeding DoD Net-Centric Warfare policy. Detailed information on NESI can be found at http://nesipublic.spawar.navy.mil.

Engineering Study to be Performed

[1] http://nesipublic.spawar.navy.mil/

The study will analyze the effect of NESI compliance on all software and hardware development cost centers. The offeror shall analyze the affected cost centers for a proposed acquisition program. At a minimum, the offeror shall consider cost centers aligned to labor cost, procurement costs, overhead, as well as indirect costs incurred due to compliance. The offeror shall also consider potential legal and contractual implications incurred due to compliance. Additionally, for existing contracts, the offeror shall explain in detail the contractual implications. The offeror shall also identify costs incurred if not NESI compliant. For example, all efforts performed under this study shall be NESI compliant; however, in the event that other pre-existing contracts that are non-NESI compliant are utilized, the offeror shall identify the cost associated with bringing the in-place contract(s) into NESI compliance. The offeror shall brainstorm and analyze all affected variable and fixed cost changes. For each identified cost that will change the offeror shall identify the cost driver. The offeror shall consider seed assumptions provided by the Government. Furthermore, all independent assumptions shall be defined according to the specific disclaimer for the engineering study. In addition to the white paper, the offeror shall provide a spreadsheet or other program with the cost model built into it, such that the Government may change cost variables to run other scenarios. The anticipated period of performance for this effort is not to exceed two months.

Reference Documents

1. ACP Notional Characteristics Description – Attachment 1 to this BAA.
2. Net-Centric Implementation Framework - nesipublic.spawar.navy.mil
3. FORCEnet Architecure SVs and Technical View (TV-1 and TV-2) – contain the mandated and emerging net centric standards and is available in **Defense Architecture Registry System (DARS) https://dars1.army.mil** (DARS)

Assumptions

1. The subject of the study was not previously NESI compliant.
2. The subject of the study has no NESI knowledge or expertise within its organization / group.
3. The offeror may decide on the subject organization's size, budget of program to be evaluated, duration of program to be evaluated.
4. The acquisition program to become NESI compliant may not increase in its scheduled time of completion.
5. The subject found out they must become NESI compliant 6 months prior to their period of performance.

6. The FORCEnet Architecture contains the currently mandated net centric standards and emerging standards (2 years plus) per the DoD information Standards Registry (DISR). These are the net-centric standards that Navy uses per CJCSI 6212.2D.

TOPIC 7

ACP Link Queue Architecture Study

Introduction

C4I support of mission prosecution in the littorals presents a plethora of challenges. One of the most significant challenges is the use of radio-frequency assets in a marine-airborne environment, and the impact to link quality at the physical layer. The Government requests assistance in establishing the technical requirements for data buffering/queuing architecture for the ACP system.

Background

Beyond LOS range extension is one of the core capabilities of the ACP system, effectively expanding the reach of the Global Information Grid to the tactical edge of warfighting operations. As the VTUAV navigates through the surrounding operational environment, the data rate for each link is continuously negotiated between communication endpoints. Data rate negotiation proceeds as a function of physical layer errors in the digital waveform caused by various phenomena associated with atmospheric and meteorological dynamics. For instance, as error detection and correction activity increases beyond acceptable thresholds, the system will decrease the data rate to maintain data integrity. During the negotiation process, the system will automatically select the appropriate data rate from a discrete array of values: 200 Kbps, 2 Mbps, 10.71 Mbps, and 44.73 Mbps. The conceptual operations plan for the ACP system assumes a high-bandwidth data link between the ACP and the home platform, allowing the ACP to act as a communication hub relaying information to shipboard enclaves and systems operating in the littorals. Additional communication links will be capable of data rates up to 10.71 Mbps in support of deployed assets such as Remote Mine Hunting Vehicles and Intelligence, Surveillance, and Reconnaissance payloads installed on additional VTUAV platforms. With each link negotiating data rate independently, traffic congestion can become a problem quickly. In terrestrial networked environments, QoS is the solution of choice to manage traffic flows in a deterministic fashion, particularly in a congested environment. While QoS algorithms provide a mechanism to change queue size, they cannot do so dynamically as a function of an independent variable such as error rate. In addition, there may be circumstances where a physical link is unavailable for an extended period of time causing queues to overflow and data loss if the queue cannot respond in real-time. One potential solution is to employ system logic that will write data to a static storage location in the event of queue overflow. However, security requirements create significant challenges to deploying a solution that retains data upon loss of power.

Engineering Study to be Performed

The offeror shall perform an engineering study to identify and analyze queue management techniques for environments characterized by dynamic data rates. The offeror shall consider comparison of software-controlled vs. hardware-controlled queuing with respect to performance, flexibility, and implementation complexity. The offeror shall also address the impact of connection-oriented vs. connectionless transport layer protocols on queue strategies. The offeror shall simulate traffic flows to observe system behavior and establish technical recommendations for queue sizes, as well as specific guidance on implementation of technical recommendations. The offeror shall capture analysis and conclusions in a white paper complete with graphical representations of comparative analysis, references for source documentation, and model input & output parameters. The anticipated period of performance for this effort is not to exceed two months.

Reference Documents

1. ACP Notional Characteristics Description – Attachment 1 to the BAA.

TOPIC 8

ISR-Relay Payload Consolidation

Introduction

To support mission areas of Mine Interdiction, Under Sea, and Surface Warfare, in the littoral environment, a ship might be required to operate organically controlled assets, each with unique mission prosecution capabilities. These organically-developed systems share common elements at their foundations. The Government requests assistance to define a strategy for capability consolidation across specifically defined MMPs deployed by the ship.

Background

Within the littoral operational construct, VTUAVs could be utilized as transport vehicles for various mission payloads such as, for example, the ACP, the COBRA, and the Britestar EO/IR MMP's. Each payload package supports a distinct role in each of the Mine Interdiction, Under Sea and Surface warfare operational scenarios. Significant portions of the overall requirements are common between payload packages even though specific mission requirements are often unique. For instance, the marine operational environments that dictate the physical requirements of the system will be common in most cases. The electrical, mechanical, and data interfaces are standard across VTUAV MMP's. Form factor and weight distribution will also be similar, if not identical, across MMP development cycles.

Furthermore, the distinction in mission support role ultimately evolves into design and integration of unique system components to meet the system functional requirements derived from the operational scenarios. During the process of derivation, alignment between the MMP development cycles would likely show areas of overlap in data encryption, data storage, data modulation, data encoding, data multiplexing, antenna control, carrier-frequency generation, and data-channel up conversion. These functional areas of overlap yield potential opportunities to realize substantial cost savings and consolidate development efforts. While the feasibility of merging design processes is not in doubt, a critical analysis is required to ensure that the corresponding consolidation can still meet the specific constraints of the VTUAV platform without influencing the established baseline for operational efficiency.

Engineering Study to be Performed

The offeror shall perform an engineering study, which defines a comprehensive strategy to consolidate capability provided by MMP systems.
As a part of the analysis, the offeror shall perform a functional decomposition, creating a functional block diagram for each system. During the analysis, the functional block diagrams shall align to identify areas of overlap. This offeror shall develop a single visual representation for each consolidation strategy. With a consolidation strategy defined, the offeror shall determine the overall power, cooling, and electromagnetic isolation requirements for the system. The Government will provide space and weight constraints for this portion of the analysis. The offeror shall also provide recommendations on methods to consolidate unique system functions. The offeror shall define common system development and manufacturing processes, and the resultant estimated cost impact to the system. The offeror should analyze the production cycle time for suggested consolidation areas ensuring acquisition delivery requirements do not

fall short from lack of production capacity. The offeror shall capture analysis and conclusions in a white paper complete with analysis, conclusions, references for source documentation, functional block diagrams, and all relevant visual representations. The anticipated period of performance for this effort is not to exceed two months.

Reference Documents

1. ACP Notional Characteristics Description – Attachment 1 to the BAA.

Assumptions

1. ACP is intended to become one (1) shipboard unit and one (1) airborne unit. Inventory objectives are 58 shipboard units and 95 airborne units.

TOPIC 9
System Controller-Layer 2 Functionality

Introduction

The use of unmanned vehicles for kinetic warfighting operations represents a paradigm shift that leverages deployed systems to perform defined tasks previously executed by human beings. There are several notable advantages to operating unmanned vehicles: removal of anomalous or unexpected behavior, and a decreased risk of collateral damage. System behavior now becomes defined in terms of inputs, decision logic and outputs. The extent of automation is often referred to as the "intelligence" of a system. In some cases, military demand for intelligence has outpaced the natural evolution within the technology marketplace, yielding a discrepancy between required operational capability and feasible system functionality.

After detailed analysis of operational requirements in the areas of Mine Interdiction Warfare, Surface Warfare, and Under Sea Warfare, it is evident that the ACP system requires a high degree of intelligence. The Government requests assistance defining the system controller logic and physical/data link/network data flow requirements necessary to automate node discovery, link management, and topology management functions for the ACP system.

Background

At a very basic level, the ACP system will route and relay data traffic between multiple Ku-band links via a consolidated antenna architecture housed within a MMP. The ACP system potentially decomposes into five major components:

- Radio Frequency Equipment (RFE) – radio assets using the Common Data Link waveform to provide variable throughput of 200 Kbps, 2 Mbps, 10.71 Mbps, and 44.73 Mbps.
- Antenna – radiates energy via three directional and one omni-directional apertures.
- Antenna Controller - manages availability of data links and presents status information to the system controller.
- Central Routing Unit (CRU) –routes data traffic to appropriate destination.
- System Controller – interrogates antenna controller and presents data link availability to routing engine within the CRU. Interrogates RFE and provides data rate to routing engine within the CRU.

In order to establish link with a deployed asset, it is necessary for the system to detect and manage the formation of a bi-directional communication session. During this process, the omni-directional beam will broadcast and receive position information, which will convert into pointing commands used to establish a data link. Formation and management of communication sessions requires exchange of information related to status, session initiation, error detection, and flow control. There are hardware and software elements corresponding to each of these functions that define signal standards and data structures. For example, once link establishment occurs, the data rate continuously updates based upon the detected error rate. Since data rate, or throughput, is traditionally an input variable to routing algorithms, this information continuously is provided to the routing engine for incorporation into link state calculations and distribution of link state information.

Engineering Study to be Performed

The offeror shall perform an engineering study to determine an optimal data management strategy for exchanging system management information between major system components. The offeror shall define all data attributes necessary to provide node discovery, link, and network management awareness between the physical, data link, and network layers. The offeror shall investigate industry standards that allow transfer of physical/data link layer information to the central routing unit for processing by the routing engine. The offeror shall research and identify standards to manage contention for antenna availability between CRU interfaces. The engineering study shall contain data flow models as a visual representation of the mapping between OSI layers for request system functions. Each data model shall include data structures, signal standards, and interface specifications between system components.

The anticipated period of performance for this effort is not to exceed two months. The Government will provide an interoperability profile containing the RF characteristics of the CDL communication stack corresponding to the OSI model.

Reference Documents

1. ACP Notional Characteristics Description – Attachment 1 to this BAA.

TOPIC 10

Electronically vs. Mechanically Steered Antenna Study

Introduction

The Government would like to do a risk/benefit analysis on one area that could significantly affect cost and schedule for ACP antenna design. As such, the Government would like do a study on all pros and cons of developing ACP with an electronically-steered and a mechanically-steered antenna.

Background

Historically, the Government has spent significant time and money to develop an electronically steerable phased array antenna to facilitate communication for ACP. Due to the complexity of requirements and system interoperability issues there have been many delays to the development of ACP antenna design. The electronically-steered antenna solutions have encountered serious problems surrounding TX/RX isolation, in-flight vibration effects, creation of VTUAV center of gravity issues, thermal performance, and size & weight. While these issues can no doubt be resolved with further development time and dollars, the Government feels that a mechanically steerable antenna may be another path to meet threshold requirements for ACP capability. Therefore, there is a need to do an objective risk/benefit analysis around both solutions so the Government can make a proper decision at the program office about how to proceed.

Engineering Study to be Performed

The offeror shall identify and document all pros and cons of electronically-steered and mechanically-steered antenna design with respect to the ACP program threshold based upon the axis of analysis attached to this study. This analysis shall also include the risks associated with incorporating each type of antenna design into the ACP system. The offeror may enhance the study with additional brainstormed categories of analysis. The anticipated period of performance for this effort is not to exceed two months.

Reference Documents

1. ACP Notional Characteristics Description – Attachment 1 to the BAA.
2. Axis of Analysis -

Axis of Analysis	Group Description	Attribute
Technical	Quality	G/T
		Tx/Rx Isolation
		Impact on Other Systems
		Reliability
		Maintainability
		Vibration Resilience
	Transmission	Tx Gain
		Rx Gain
		Tx Azimuth HPBW
		Rx Azimuth HPBW
		Tx Elevation HPBW
		Rx Elevation
		Tx Scan Loss
		Rx Scan Loss
		Tx Sidelobe levels
		Rx Sidelobe levels
		Return Loss
		Axial Ratio
	Thermal Performance	Thermal Performance
	Power	EIRP
		Consumption
	Physical	Weight
		Steering Response Time
		Distribution (CG)
		Spatial Dimensions
Programmatic	Cost	Manufacturing
		Development
		Training
		Support
		Disposal
	Time	Production cycle time
		Development
		Training
		Support
	Misc	Modularity of Design to Future Program Goals

TOPIC 11

Application of Commercial Technologies Feasibility Study

Introduction

The desired operational capabilities promised by the ACP system pose unprecedented technical challenges to successful implementation. The degree of maturity associated with certain capabilities varies from nascent to partially proven. Spurred by existing customer demand, commercial industry has addressed some of these technical challenges that could potentially augment ACP capability. The Government requests assistance to investigate the application of emerging and established commercial technologies to fulfill specific capability requirements and mitigate development risk for the ACP system.

Background

By sheer virtue of integration within the context of unique information assurance and operational requirements, the US armed forces is primed to incorporate the cutting edge of systems development. The ACP system will be deployed in adverse environments characterized by an ever present threat of data and technology compromise. As such, the ACP system shall clearly demonstrate the following information assurance related capabilities:

- Jam resistance for radio frequency communications
- Anti-tamper protection of system elements deemed critical to national security interests or CPI
- Authentication and anti-spoofing controls

The effectiveness of the ACP system deployed as a VTUAV MMP operating from the littoral environment is predicated upon implementation of the following operational capabilities:

- Automation of link formation and management
- High data rate information transfer in marine environments
- Automated tracking of mobile communication partners
- Simultaneous control of multiple unmanned assets across diverse control units

Engineering Study to be Performed

In order to meet the advanced capability requirements of the ACP system, the offeror shall research pertinent technology developments in the aforementioned areas. The offeror shall document the results of analysis relating to cost, maturity, implementation examples, complexity of implementation, estimated implementation schedule, maintainability, and supportability. If technologies have not been demonstrated in the commercial market, the offeror shall provide a timeframe for market release. The offeror shall provide a matrix outlining traceability between technologies and ACP required capabilities. The offeror shall disclose all intellectual property constraints associated with identified technologies. The offeror shall also provide current point of contact information for identified technologies. The anticipated period of performance for this effort is not to exceed two months.

Reference Documents

1. ACP Notional Characteristics Description – Attachment 1 to this BAA.

TOPIC 12

Miscellaneous/Open Category

Engineering Study to be Performed

The Government is interested in receiving white papers on any other topics which offer potential for advancement and/or improvement of the ACP Program. The white paper is not restricted in any way to the subject of the study, except to the extent that any innovative ideas being proposed to be studied by the offeror shall relate directly to the ACP Program. All deliverables requested under this BAA (i.e. white papers, cost proposals, resumes) are also required in response to this particular topic/category. In addition, the white paper shall state why the offeror's particular engineering topic proposed should be a study conducted on behalf of, and funded by, the Government. All data arising out of these engineering studies performed on behalf of the Government shall be free from any and all proprietary restrictions. Study results will be presented and made available to Government and open to industry at the Industry Day referenced in the BAA. The period of performance for any studies proposed under this miscellaneous/open category is not to exceed two months.

Reference Documents

1. ACP Notional Characteristics Description – Attachment 1 to the BAA.