



BAA 09-009

*“High Throughput Networking
Infrastructure”*

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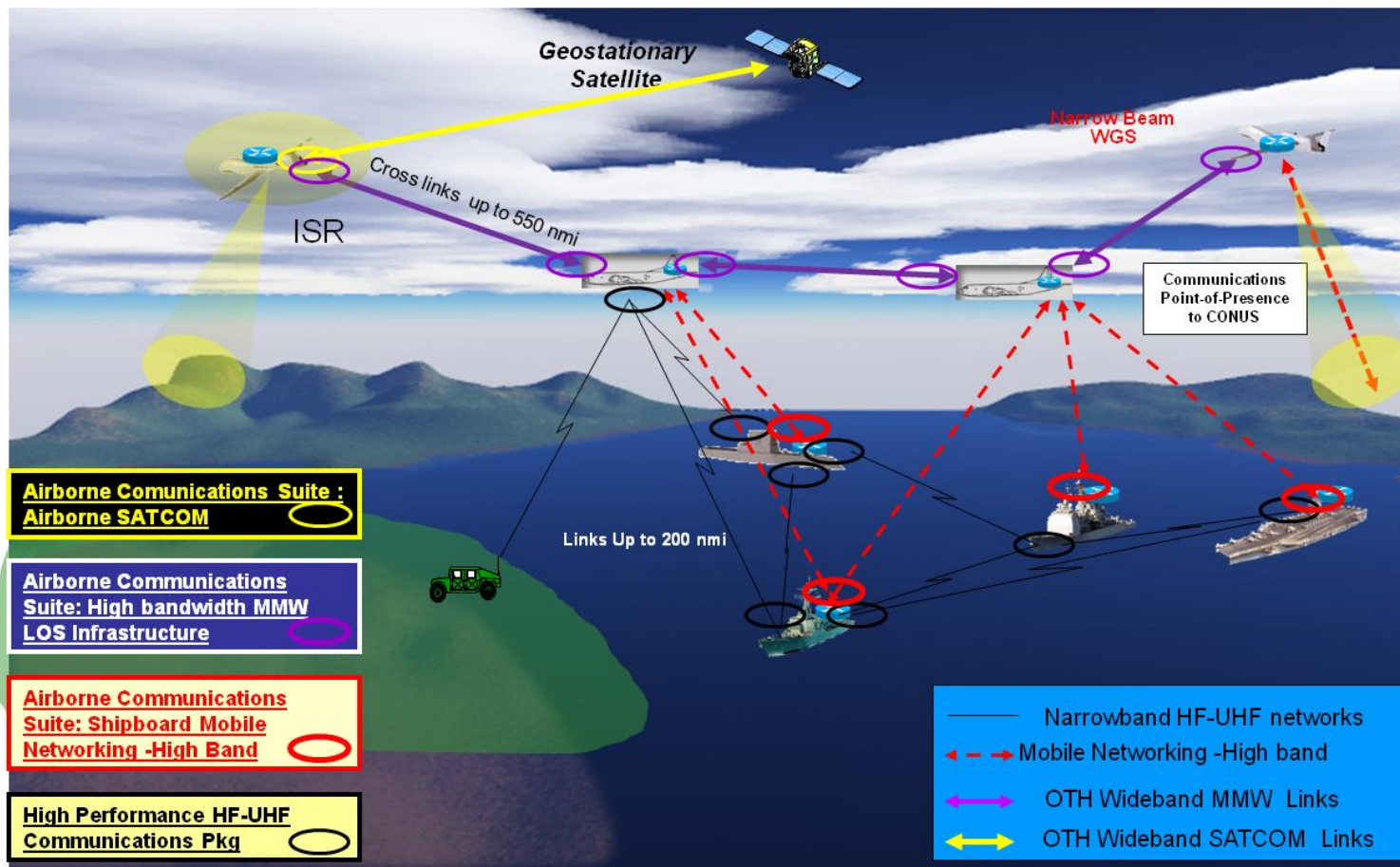


Overview

- Introduction
- Key Technology Interest Areas
- Program and Contracting concepts
- Timeline

Introduction

“High Throughput Networking Infrastructure”





Key Technologies of Interest

- Systems Design and Integration.
- Airborne, Shipboard and Ground Apertures.
- Radio System Technologies.
- Low Cost Components.
- Network Design.



Systems Design and Integration.

- Development efforts provide components that support reliable high throughput links at MMW and Ku Band for *Mobile Networking Highband* development.
- Government-led Integrated Product Team (IPT) concept.
 - Functionality, performance and interfaces to be identified within the IPT
- Systems design and integrator will assist the Navy in performing the systems integration function for integration of vendor-developed technologies.



Typical Responsibilities

- Review and solidify requirements
 - Codify all requirements for the system and all components, subsystems, APIs, ICDs, etc.
 - Work with OPNAV and Acquisition (PMWs/PMAs) to ensure that their requirements are being addressed
- Work with the government and vendors (IPT) to assemble/integrate selected technologies into a system
- Plan, schedule and conduct component, sub-system and system reviews
- Schedule, coordinate and direct integration and testing events at the sub-system and system level



Airborne Apertures

- Airborne LOS apertures are MMW (>19 GHz) and Ku band (14-17 GHz)
 - Half duplex and Full duplex TCDL and variants (TBD)
 - TX at up to 135 Mbps and RX up to 45 Mbps
 - Air-to-surface ranges up to ~150 nmi
 - Air-to-air ranges up to 500 nmi
- Airborne SATCOM apertures support WGS at high bandwidths
 - ~10's of Mbps Asymmetrical
- Phased Arrays required for LOS to support networking
 - Fast switching and/or fast pointing required
- Low cost designs needed



Shipboard and Ground Apertures

- Shipboard LOS apertures are Ku band (14-17 GHz)
 - Half duplex and Full duplex TCDL and variants (TBD)
 - TX at up to 45 Mbps and RX up to 135 Mbps
 - Ranges up to ~150 nmi to airborne platforms
- Phased Arrays required for LOS to support networking
 - Fast switching and/or fast pointing required
- LOS apertures need to support 4 simultaneous links
- Low cost designs



Radio System Technologies

- HF-UHF Improvements:

- New techniques for use of HF and UHF bands

- (e.g., new approaches for achieving higher throughput, improved antenna technologies, jam-resistance)

- Low cost, light weight “surrogate satellite” technologies

- (e.g., use of conventional 3/25 kHz channels and “blue water” wideband channels)

- Wideband antennas (e.g., 20 MHz to 3 GHz) for high altitude platforms

- Radio Systems for >2GHz:

- FPGA-based signal processing radio architectures and implementations

- Supports wideband transmissions (TCDL, MNH, and others TBD)

- Commonality of design to suit multiple platforms

- Well defined interfaces

- Easily upgradeable as technology improves

- Common COMSEC (PEIP)



Radio System Technologies (cont'd)

- Radio System and Software Modules:

- Development of software libraries of cores for radio implementations (e.g., modulators/demodulators, equalization techniques, error correction codes)
- Designs will be FPGA-based
- "OPEN" software designs available to all developers
- Well defined interfaces
- Implementation in MATLAB/SIMULINK and testing on radio implementations required (tool kit)

- RF Distribution Systems and Architectures:

- Use of digital techniques for improved isolation on platforms
- Use of coherent combining to reduce size of apertures
- RF distribution systems compatible with new waveforms
- Digital distribution of signals using fiber optics



Low Cost Components

- Objective: Reduce the cost of key components needed for implementation of low cost phased arrays and radios
 - Components to be made available to all developers based on Government Purpose Rights
(e.g., phase shifters, LNAs, PAs and filters)
- Low cost components needed for:
 - Ku band for LOS Arrays
 - X band, K and Ka bands for SATCOM



Network Design

- Focused on implementation of networking using directional apertures
- Key developments include discovery mechanisms, network entry and pointing and tracking of nodes
- Performance simulation will be necessary
- Integration with radios and apertures is critical



Other Considerations

- Low Cost Architectures and Designs
 - Low cost of acquisition and ownership
- Open Architecture Designs
 - Results of developments to be open to all potential government contractors
 - Open interfaces, functional and system descriptions and software.



Sample Program Concept

← Majority of Development Effort →

	FY10			FY11			FY12			FY13			FY14		
System Design															
System Requirements Review		IDR				Final SYST DR									
System Architecture Development															
Preliminary Radio Requirements and Architecture															
Radio System Technologies															
Radio Designs			IDR		DR										
Radio Implementation					DR			FDR		TIM					
Basic Radio SW Module Development								FDR		TIM		TIM		TIM	
Radio SW Integration										TIM		TIM		TIM	
Integration with Apertures and Networking													TIM		
Aperture Development															
Aperture(s) Requirements and Architecture		IDR													
Component Identification															
Component Specification					DR										
Component Development					DR			DR		FDR					
Array(s) Design and Development					DR			FDR		TIM		TIM			
Integration with Radio and Networking													TIM		TIM
Network															
Network Requirements															
Network Design			IDR		DR			DR							
Integration with Radio and Apertures								FDR		TIM		TIM		TIM	

Note: Beyond Initial Phase, all efforts implemented through Task Orders



Contracting Concept

- White Papers followed by Proposals
 - White paper provides entry into the process
- System Design Phase followed by Implementation of Task Orders
- IDIQ Task Order Contract*
 - Initial, critical tasks identified in white paper and detailed in proposal
 - Subsequent tasks identified during initial phase and proposed approximately mid-way in initial phase

*Note: Time delay of ~60-90 days between proposed task and the acceptance and funding of the task.



White Paper Content

- Laboratory Project Manager and/or Principal Investigator
- Research Opportunity and Effort being addressed
- Technical Approach in detail
- Data, Reports, hardware and software/firmware deliverables.
- Recent technical breakthroughs that will reduce risk.
- Project plan showing schedule of individual tasks. The project plan shall reflect a 6-9 month initial phase for development of the proposed design, followed by an optional implementation phase.
- Funding plan showing requested funding per task and per month in each fiscal year for both the study phase and the implementation phase.
- Data Rights



Timeline

<u>EVENT</u>	<u>DATE</u>	<u>TIME (EASTERN STANDARD</u>
<u>TIME)</u> White Papers Due Date	Jan 29, 2009	2:00 pm
Notification of Initial Navy Evaluations of FY09 White Papers	Feb 20, 2009	
Full FY09 Proposal Due Date	Mar 30, 2009	2:00 pm
Notification of Selection for FY09 Award	May 15, 2009	
Issued FY09 Awards	Sep 15, 2009	

*These dates are estimates as of the date of this announcement.