Industry Day

BAA# 07-010

http://www.onr.navy.mil/02/baa/

Affordable Electronically Scanned Array Technology for
Next Generation Naval Platforms

March 15, 2007

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Welcome

- **Welcome remarks by**
  - **CDR Chris Rouin, ONR 313**

Presentation Data Classification

- UNCLASSIFIED meeting

- DO NOT discuss classified numbers

- No Proprietary Discussions Planned

- ITAR discussions (if needed at wrap-up)

Written questions (non proprietary) are strongly preferred. Government will make best effort to post Q&A's on ONR BAA Website.

Participants are strongly urged to refer to http://www.onr.navy.mil/02/baa/ for any updates and amendments

The RADAR is a ship's first line of defense

Challenges for Shipboard Radars:
- XX tons weight (loading and moment)
- YY watts Power consumption
- Considerable power wasted (heat)

The ship is essentially built around the radar which impacts the performance, weight and moment; therefore the overall cost and size of the ship.

Why Address Affordability?

- **"If you have a solution but it isn't affordable, then you *DO NOT* have a solution!"**

- **Norman Augustine's Law # XVI : "** *In the year 2054, the entire defense budget will purchase just one aircraft. This aircraft will have to be shared by the Air Force and Navy 3-1/2 days each per week except for leap year, when it will be made available to the Marines on the extra day.* **"**

Affordability is a always critical consideration for ESAs

BAA 07-010 Scope

- Addresses *Innovative Electronics Technology* that will impact ESA *affordability*

- Includes 6.2 and 6.3 (Applied Research) funds

- Encompasses Radar (S-Band and X-Band)

- Encompasses Electronic Warfare / Electronic Attack

- "Affordability" specifically means "*Life Cycle Affordability*"

Expected BAA Response Includes:

- Offerers are strongly encouraged to address Electronics Technology "component Chains"
  - More on this shortly

- Phase 1 and Phase 2

- Objectives: 40% cost reduction in Life Cycle Cost (LCC)
  - We are looking innovative and potentially disruptive electronics technologies that can provide ***$B's savings in life cycle costs***

Planned Program Approach and Scope:

- Program focus is on *electronics technology* development that will advance the state of the art in critical technologies that can demonstrate an affordable solution at technology readiness level *(TRL) 5*. The program will be accomplished in a phased approach as follows:

  - **Phase 1 -** Offerors will develop and demonstrate basic **critical component technologies.** This could, for example, be one or multiple critical components needed to enable a *relevant and well defined architecture*. **(Base Contract for example)**

  - **Phase 2 -** Offerors will demonstrate components (*component chains*) that can be integrated into a *representative array environment* for the relevant architecture. **(Options for Government to exercise)**

TX RF Element Chain Demo (Phase 1)
(*Relevant Architecture Illustrative example*)

Control Interface		Radiated Output
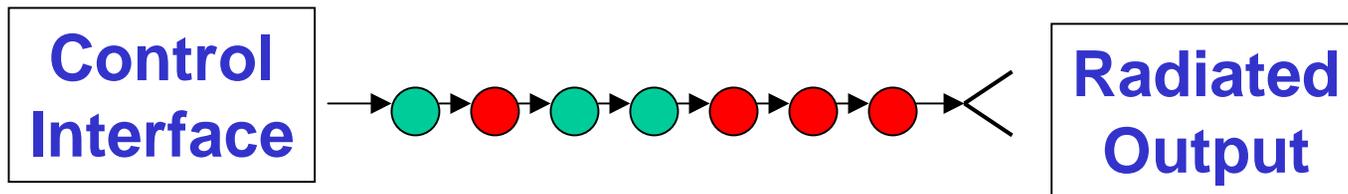
🟢 = **Components in Chain at TRL 5/6+**

🔴 = **Component in Chain Requiring Development under Phase 1**

Example Component Functions:

1. Waveform generation / synthesis / modulation
2. Signal Combining
3. Beamforming
4. RF power Amplification
5. Isolation and filtering
6. Radiation
7. "House keeping" functions

This is an example of a Phase 1 (Base) Development

TX RF Element Chain Demo (Phase 2)
(*Illustrative Example*)

Sample Module

Control Interface

Electronically Scanned Beams

Radiated Output
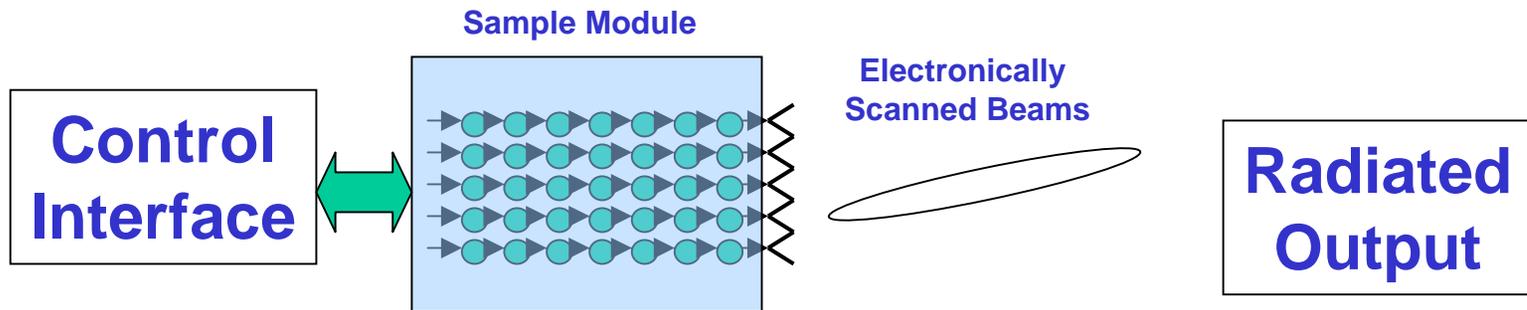
Fractional Array Demonstration at minimum TRL 5 (TRL 6 preferred):

1. **Components can be integrated into array Environment**

2. **Demonstrate and Validate of Performance Metrics**
   - **Calibrate and form beams**
   - **"Wall-plug" Efficiency of chains**
   - **Noise behavior, etc…**
   - **Size, thermal constraints for array lattice**

3. **Comply with Open System Interfaces and Architectures**
   - **"plug and play" highly desired**

4. *Retire Risk sufficient for "drop-in" to relevant architecture*

Unclassified

Expected Deliverables (typical)

Data Deliverables –

- Technical and Financial Reports
- Presentation Material
- Other Documentation or Reports
- Interface Definitions and Drawings
- Final Reports

Hardware, Software and Firmware Deliverables –

…sufficient for the Government to utilize and independently recreate
results produced under contract:

- Hardware / material samples
- Software and Firmware code

Expected Deliverables (continued)

- Drawing deliverables may be in the form of "Engineering Level" working papers.

- The Government plans to perform independent testing of material, software, and firmware to assess performance metrics claimed by Contractors.
    - This may be done at both the Phase 1 (Base) and Phase 2 (Options) period of performance.

Proposal Evaluation Criteria

A. Overall scientific and technical merits of the proposal

1. Potential to provide cost reduction and life cycle cost affordability improvement to existing & future RADAR and EW systems.
2. Soundness and quality of the *technical approach* (components, component chains, and projected impact of array performance).
3. Compliance with Open Architecture (OA)/Modular Open Systems Approach (MOSA) practices and standards.
4. Clarity, thoroughness and correctness of identification / evaluation of *technical risks*.

B. Naval relevance, transition business plan and anticipated contributions of the proposed technology to RADAR and Electronic Warfare systems

1. Best value to the Government in terms of teaming with specialty vendors/developers and leveraging the performance and cost savings potential of their devices.
2. Ability of the offeror to provide technology of at least TRL-5 (TRL-6 preferred).
3. Clarity of deliverables proposed.

C. Offeror's capabilities, related experience, and past performance, including the qualifications, capabilities and experience of the proposed principal personnel

1. The quality of technical personnel proposed
2. The Offeror's experience in relevant efforts with similar resources
3. The ability to manage the proposed effort

D. The realism of the proposed cost

1. Total cost relative to benefit
2. Realism of cost levels for facilities and staffing

Candidate Technologies (Examples)

- High efficiency, high power amplifiers and amplifier chains

- Innovative architectures for AESAs

- Power Digital-to-Analog Converters

- Beamformers, beamforming components, and signal distribution networks (this may include digital receiver exciters)

- Other innovative techniques including but not limited to, component integration, thermal management, packaging, and manufacturing.

- Shipboard AESA calibration and tuning to both maintain long term performance and permit ship replaceable assembly (SRA) maintenance.
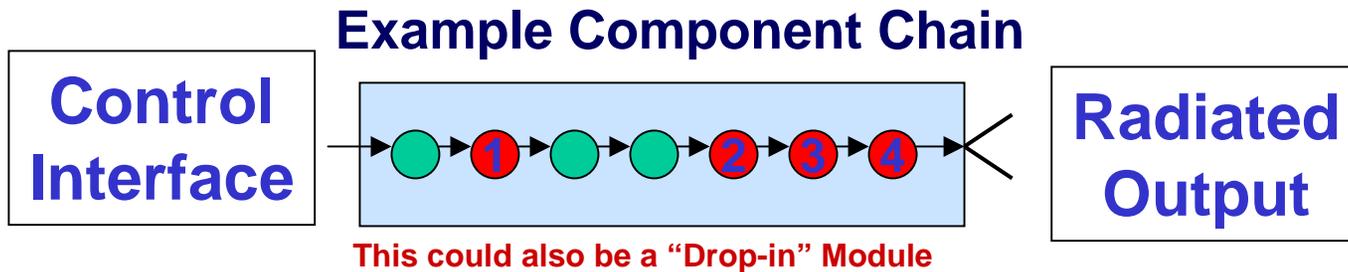
Proposals must clearly indicate how the innovation advances the technology state of art and provides value added. Cost and performance metrics will be considered.

Teaming and Leveraging is Encouraged

- ONR Discovery and Invention (D&I) Programs
  - ONR Funded 6.1 (Basic Research)
  - ONR Funded 6.2 (Applied Research)

- ONR Exploitation and Development (E&D) Programs
  - Example is the ONR Electronics Technology Demonstrator Program

- Other Government funded programs

- Other Industry / Academic funded programs

- Must clearly show "point of departure" and value added to the Government

Offerors May Consider Teaming

Example Component Chain

Control Interface

Radiated Output

This could also be a "Drop-in" Module

Example of Teaming:

- Company A "Specialty House" demonstrates *component 1* and *2*
- Company B "Specialty House" demonstrates *component 3*
- Company C "System Integrator" develops the *relevant architecture*, demonstrates *component 4*, integrates results into a *drop-in module,* and *validates overall performance metrics.*
- Companies A,B and C provide an *integrated transition business plan* the addresses *life cycle affordability*.

- Teaming is suggested where it makes best sense and adds value to the products delivered to the Government, however it is not a requirement.

Additional Presentations:

Radar Perspective and Objectives

SEWIP EA Plans

Electronic Warfare Goals

Cost Reduction/Life Cycle Improvement

Q&A's and Wrap-up

WRAP-UP

Questions and Answers, discussion, clarifications

CHAIR - Purdy

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The End