



Advanced Planning Brief to Industry

*Joint Interim Force
Capabilities Office*

21 Sep 17

<http://jnlwp.defense.gov/>



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Core Mission and Investments

- **The Joint Non-Lethal Weapons Program** stimulates and coordinates non-lethal weapons requirements of the U.S. Armed Services, Coast Guard, and Special Operations Command and allocates resources to help meet these requirements
- **The Joint Non-Lethal Weapons Directorate** serves as the Department of Defense Non-Lethal Weapons Program Executive Agent's day-to-day management office

Science and Technology Investments

- Identify, mature, and demonstrate non-lethal technology solutions to address current and future capability needs
- Conduct applied research and develop methodologies and modeling tools that characterize NLW human and materiel effects and effectiveness

Research and Development Investments

- Facilitate development of new capabilities from Pre-Milestone A through the Technology Maturation and Risk Reduction Phase up to Milestone B
- Assist the Armed Services, Coast Guard, and Special Operations Command in transitioning projects to operational capability



Joint Non-Lethal Weapons Program (JNLWP) Focus Areas



Counter Personnel (CP)

- Deny areas to individuals
- Move individuals
- Disable individuals
- Suppress individuals



Counter Materiel (CM)

- Stop/disable vehicles
- Stop/disable vessels
- Stop/disable/divert aircraft
- Deny access to a facility

Key Attributes: Incapacitation and Reversibility

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Operational View: Capabilities-Based Assessment (Counter-Personnel)



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Operational View: Capabilities-Based Assessment (Counter-Materiel)



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Example: Emerging NLW Capability



High-Power Radio-Frequency Vessel Stopping (HPRF)

DESCRIPTION:

Design and develop a non-lethal vessel stopping capability that utilizes HPRF technology to disrupt critical engine control electronics to stop small vessels powered by outboard motors

OBJECTIVES:

- Disrupt and/or disable small uncooperative vessels in instances where Rules of Engagement may limit the use of kinetic weapon alternatives
- Provide a means to determine intent of inbound vessels, buying valuable time for wide variety of “escalation of force” options

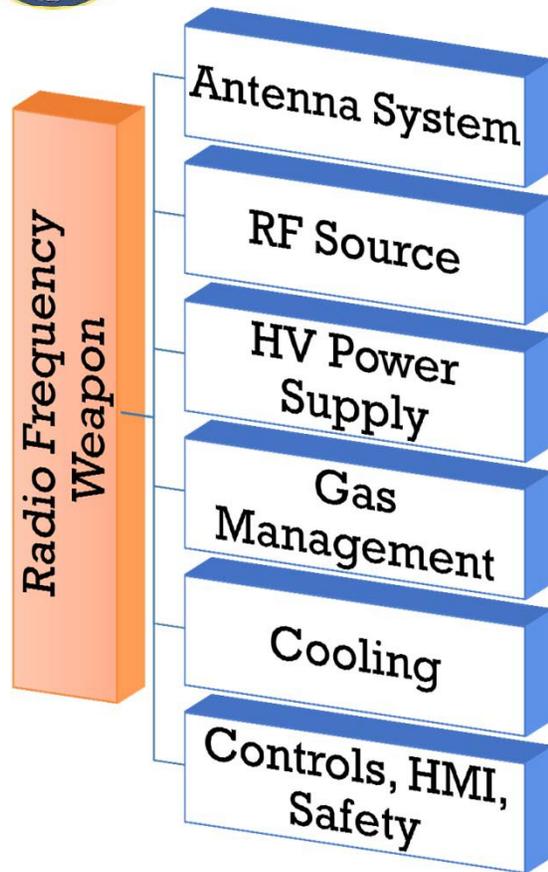


HPRF ADVANTAGES:

- Provides an extended range and 360-degree targeting (multi-target) capability
- Ability to immobilize targeted vessels
- Safe and reversible effects
- Pre-emplacment directly in front of the target not required



Equipment Functional Decomposition



Provides gain and beam steering

Raw RF power. Options: solid state, klystron, and magnetron vacuum tubes

Converts shipboard prime power to the pulsed high voltage needed for the source

Critical for high-power RF system operation and long-term reliability

As with all electronic products, heat must be removed

Human Machine Interface (HMI) challenge: make the high-tech useful to crew who have other jobs



Key Requirements

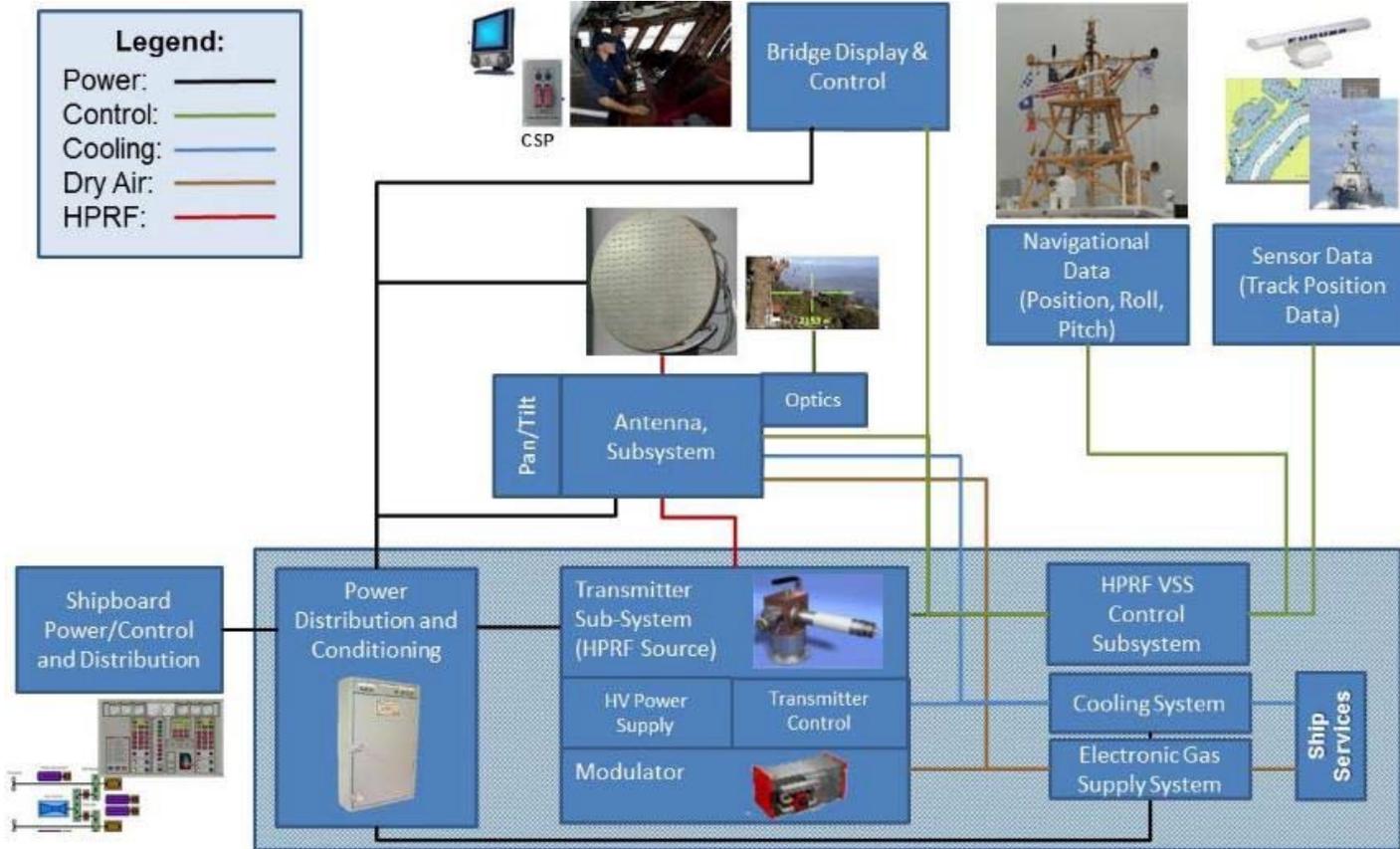


| Operational Requirement | |
|--------------------------------|--|
| Sea State | Three |
| System Weight | ≤2200lbs |
| Vessel Platform | SL-120 (Cyclone-class size vessel) |
| Environmental | MIL STD-810G (Humidity, Green Water, Salt Spray) |
| RF Transmitter | |
| Transmitter | Magnetron |
| Transmitter PWR to Antenna | 4-10 MW |
| Transmitter Tuning Band | 2600-3950 MHz |
| Modulation | Pulsed |
| Antenna | |
| Antenna Frequency Range | 2600-3950 MHz |
| Antenna Polarization | Horizontal |
| Horizontal Gain | 30-33 dBi |
| Antenna Weight | ≤400lbs |
| AZ/EL Articulation | Mechanical or Electrical (Range TBD) |
| Modulator | |
| Drive | 4-10 MW |
| Pulse Width | Variable, Remote Programmable |
| Pulse Repetition Frequency | Variable, Remote Programmable |
| Voltage | Variable, Remote Programmable |
| Arc Detection | Yes |
| Voltage and Current Monitoring | Yes |
| Thermal Management Solutions | Yes |
| Sub-Assemblies | Modulator Assembly, High Voltage Power Supply |
| Input | 440V/60Hz/3-Phase |



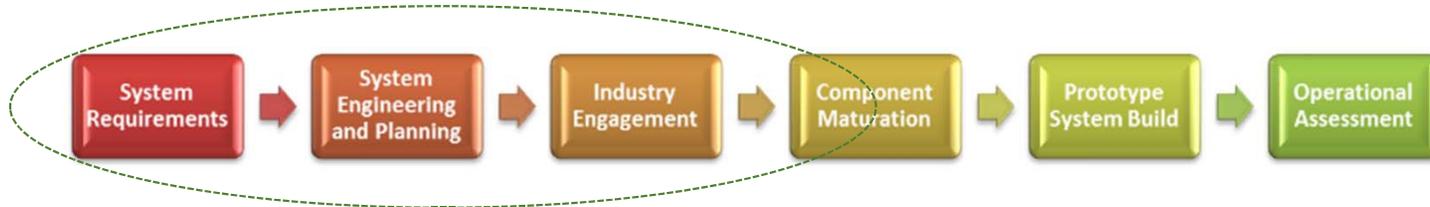


Basic System Block Diagram





FY 2018 Path Forward



- *Identify the best commercial and government ideas and technologies for both the entire Vessel Stopping Prototype system and its components while refining requirements and maturing near term hardware solutions*

- **FY18 Focused Effort**

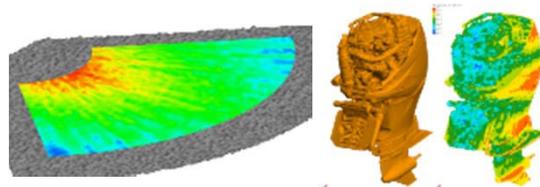
- *Formal and Informal Industry Engagement*
- *System Component Development*
- Systems Engineering and Planning
- Vessel Stopping Prototype S&T and M&S
- System Requirements Maintenance



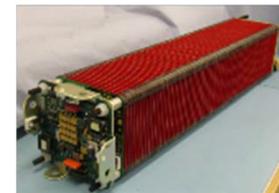
S-Band Slotted Array Vendor 1



S-Band Slotted Array Vendor 2



Sea Surface and Incident Field Modeling & Simulation



HV Modular Vendor 1

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Current/Planned Industry Engagement



| Task, Milestone, or Deliverable | FY18 | | | | | | | | | | | |
|---|---------|---|---|-------------|---|---|---------|---|---|-------------------|---|---|
| | 1st QTR | | | 2nd QTR | | | 3rd QTR | | | 4th QTR | | |
| Milestones / Decision Points | O | N | D | J | F | M | A | M | J | J | A | S |
| Industry Engagement | | | | RFP Release | | | | | | Industry Findings | | |
| Request for Information Execution | | | | | | | | | | | | |
| Request for Proposal Execution and Analysis | | | | | | | | | | | | |
| Independent Cost Estimation | | | | | | | | | | | | |

- RFIs released 2017
 - Solid State Modulator (AUG)
 - High Gain S-Band Antenna (AUG)
- RFIs planned for release 2017
 - Magnetron RF Source (SEP)
 - Thermal Management System (SEP)
 - Antenna Pan-Tilt Mechanism (SEP)
 - Complete HPRF System RFI (SEP)

- RFPs planned 2nd QTRFY18
 - Solid State Modulator
 - High Gain S-Band Antenna
 - Magnetron RF Source
 - Thermal Management System
 - Antenna Pan and Tilt Mechanism
 - Complete HPRF System RFI

- RFI response will shape RFP structure and engagement
- Industry Findings will encourage Industry vs Government Lead Systems Integrator decision making process
- *Contract Award FY19*



NLW R&D Indefinite Delivery/Indefinite Quantity Multiple Award Contract (IDIQ MAC)



- Broadly applicable but NLW-focused contract vehicle for accomplishing research and development objectives
- One-year base with four option years
- Four awards (29 June 2017):
 - American Systems Corporation
 - Applied Research Associates, Inc.
 - Applied Technology, Inc.
 - Booz Allen Hamilton Inc.



- Nine functional areas:

- 1) Electrical Stimulus-Based Disabling Technology
- 2) Active Denial Technology (ADT)
- 3) Blunt Impact Technologies
- 4) Laser Technology
- 5) Sound and Light
- 6) Other Counter Personnel Technologies
- 7) High Power Radio Frequency/ Microwaves (RF/HPM)
- 8) Other Counter-Materiel* Technologies
- 9) Human Effects

* Counter-Materiel targets may include vehicles, vessels, aircraft, unmanned systems, equipment, facilities and infrastructure

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How Industry Can Help



Electrical Stimulus-Based Disabling Technology

- Reducing components size and weight
- Improving flight stability and accuracy/precision
- Designing deployable-on-impact electrodes with reliable attachment
- Minimizing target risk of injury from electrodes
- Identifying, targeting and disabling multiple targets with single activation of device

Active Denial Technology

- Advancing thermal cooling solutions
- Advancing batter and prime power solutions
- Advancing w-band source development (vacuum electronic devices and monolithic mm-wave integrated circuit)
- Developing w-band transmissive armor
- Researching w-band radio frequency material properties and conducting modeling



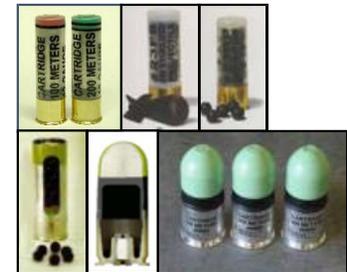


How Industry Can Help



Blunt Impact Technology

- Developing new blunt impact munitions and/or launchers to address current performance limitations:
 - Natural trade-off between increased effective range (min and max) and the risk of significant injury
 - Accuracy/dispersion at longer ranges
- Minimizing logistics and supportability issues associated with enabling technology
- Developing solutions to reduce blunt impact injury and improve accuracy for other NLW stimulus delivered in a projective (e.g. flash bang devices, HEMI)
- Improving capabilities of blunt impact injury models and instrumented test targets



Laser Technology

- Creating plasma at distance with a retina-safe wavelength laser
- Making attention-getting bright light from laser induced plasma
- Originating alert and warning sounds from laser induced plasma
- Causing auditory discomfort for personnel near plasma created at distance
- Generating intelligible voice commands from creating plasma at distance





How Industry Can Help



Sound and Light

- Reducing Size, Weight, Power Consumption, and Cost (SWAP-C)
- Improving range and intelligibility
- Advancing stabilization and targeting
- Developing optical-aid safety mitigation technologies
- Transmitting intelligible sound through structural barriers



Other Counter Personnel Technology

- Developing compelling, yet non-irritating malodorants & dissemination devices
- Clearing a space without entering
- Denying access to facilities
- Developing capabilities for longer range and duration effects
- Countering-swimmers/divers
- Developing and integrating autonomous NLW delivery systems and payloads
- Identifying novel non-lethal effects
- Evaluating Innovative uses for existing technologies





How Industry Can Help



High Power Radio Frequency/Microwaves (RF/HPM)

- Developing light weight, compact, high power (MW to GW pk) antenna systems capable of providing beam steering and antenna stabilization
- Developing high energy/power-density modulators, pulsed power, power conditioning, energy storage, and prime power
- Developing electrically efficient, high power, frequency agile RF sources
- Developing and utilizing models to predict electromagnetic interaction with complex structures and system response
- Assessing target vulnerabilities and evolution due to technology advancement, commercial market drivers, and threat progression
- Assessing and developing spatially diverse HPRF attack concepts (i.e. swarming)



Other Counter-Materiel Technology

- Reversibly stopping vehicles, vessels, and aircraft
- Defeating unmanned craft at operationally suitable ranges
- Denying exterior access to facilities, vehicles, and vessels





How Industry Can Help



Human Effects

- Understanding of stimuli effects in terms of injury potential and weapon effectiveness
- Familiarity with Human Effects policy documentation (3200.19) and relevant implementation guidance documents, including the Risk of Significant Injury and calculation methodology related to specific stimuli
- Understanding the specific relationship between human effects readiness and technological readiness
- Establishing testable parameters from known physiological effects
- Understanding potential modeling and simulation necessities





Joint/Service NLW POCs



Service NLW Central Action Officers

Army: (573)563-7092

Navy: (703)692-1512

Marine Corps: (703)432-8461

Air Force: (210) 925-5015

Coast Guard: (202)372-2032

Special Operations Command: (813) 826-1229

Joint Non-Lethal Weapons Directorate (<http://jnlwp.defense.gov/>)

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QUESTIONS?