TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

RAMP NDIA Brief

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Remote Armed Maneuver Platform

Armament Research, Development and Engineering Center's (ARDEC) On The Move- Armament & Technology Integration Demonstration *(OTM-ATID)* Effort

Mission/Purpose:

- Achieve an **integrated capability** in the area of Remote Weapon System command and control (wireless), platform integration, deployment and C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance), through the **development of an integration platform** to begin **discussions with the user community** in the area of Robotic Lethality, CONOPS & Techniques, Tactics and Procedures (TTPs).

Product:

- **Enhanced RWS command and control capability** with Man-in-loop remote lethal engagement of threats
- **Enhanced capability to track, engage and deliver effects** on target from a standoff location, **through the** integration of **Remote Weapon System (RWS) and RSTA (Reconnaissance, Surveillance, and Target Acquisition) technologies on a robotic platform**
- **Situational Awareness enhancements** through RSTA and the use of Decision Aide

OTM Integration Platform

Background

- At the direction of the Research, Development and Engineering Command (**RDECOM**) Commanding General, the RAMP program was begun to provide Wireless Robotic capability to existing and emerging RWS, integrated onto Mobile platforms.

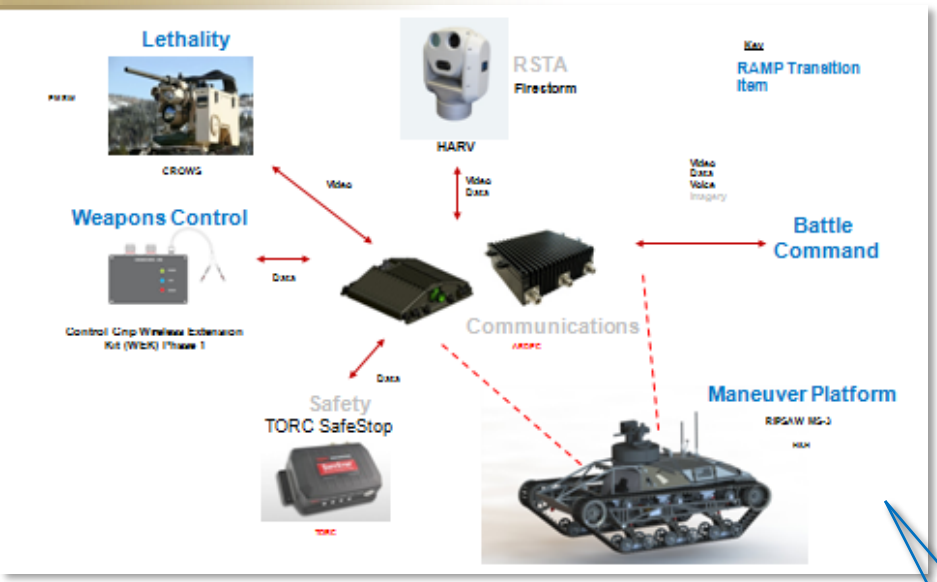
- Through the development of enabling ARDEC technology, the Wireless Extension Kit (**WEK**) and RWSs, RAMP will help transition these key technologies to the warfighter to support the development of CONOPS and TTPs to support RWS wireless engagement.

- Additionally, mature technology to support other family of systems, creating a family of wireless RWS solutions on Mobile and Stationary platforms.

RAMP Key Systems

- **Platform**- Surrogate Platform for evaluating OTM RWS requirements.
- **Remote Weapon System (RWS)-** Current and emerging systems.
- **Wireless Extension Kit (WEK)**- ARDEC's command and control technology for wireless RWS engagement.
- **Communications**- COTS Radio Frequency (RF) Radio.
- **RSTA**- External sensors to support RWS operation.
- **Safety**- COTS safety equipment.
- **C2**- Battle Command functionality for the system.

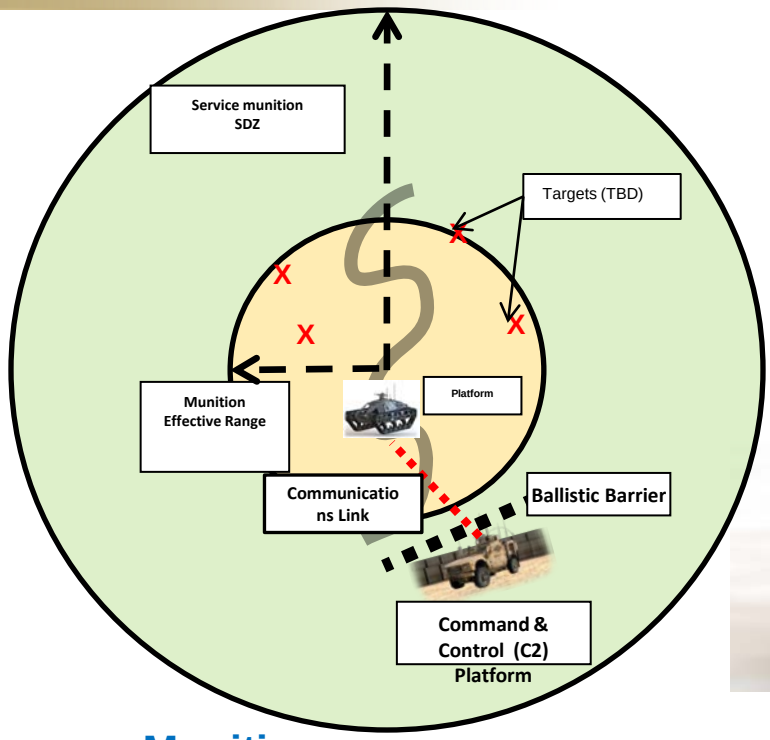
RAMP OTM Demonstrator SV-1/2



APC M113 Command and Control (C2) Platform
RWS, Platform and HARV OCU

H&H MS3 Weapon Optimized Platform
CROWS II 50 Cal RWS
Wireless Extension Kit (WEK) 1 Technology
HARV Integration
Communications Backbone

RAMP OTM Demonstrator OV Chart



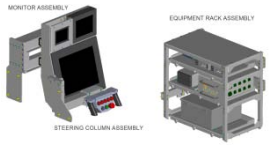
Maneuver

- MS3 surrogate vehicle
- MS3 modifications & Vehicle Integration Kit (VIK) development
- Weapons Integration onto MS3 Platform

RIPSAW Mil Spec-3

OTM Integration Platform

Battle Command



C2 Platform or TOC

- Develop, Integrate RWS C2 Package onto platform or C2 TOC

Munition

7.62mm & .50 Cal SRTA* & Ball Live Fire

Lethality

CROWS

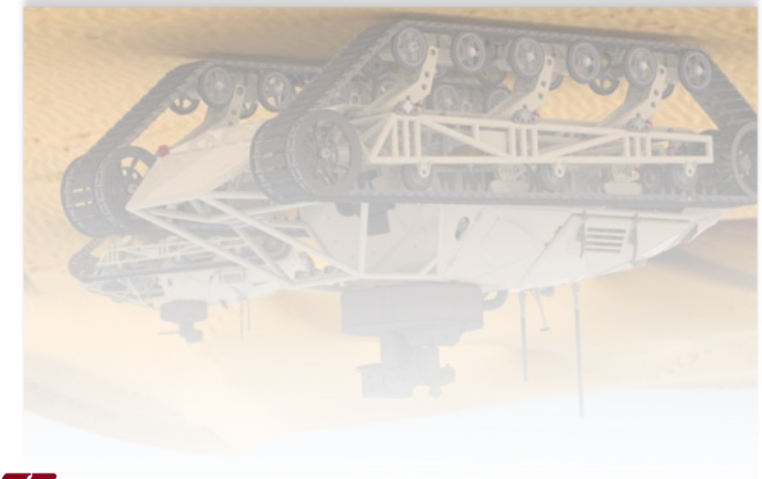
- CROWS (.50cal/ & 7.62 mm capable)
- Phase 1 WEK Tele-Operation

Weapons Control

Control Grip Wireless Extension Kit (WEK) Phase I

*SRTA- Short Range Training Ammunition

OTM-ATIP Weapon and Technology Road Map Objective



Mil Specification 3 Ripsaw

Side view

3/4 view

+

Advanced Remote/Robotic Armament System (ARAS) 50 Cal RWS

RAMP Key Functionality

- Provide Wireless RWS command and control & engagement.
  - Enhanced Slew to cue capability
  - Support Lethal and Non-lethal engagement
  - OTM capability
  - Support Hunter-Killer CONOPs
  - Enhanced RSTA capability

- Mature WEK technology to provide enhanced capability for integration to create larger family of wireless RWS systems.

Wireless Extension Kit (WEK)

- RAMP supports the development and maturation of a Wireless Extension Kit (WEK) which provides a leap ahead capability in the employment and operation of RWS for robotic or fixed-site applications.
- This is done by providing wireless functionality to current and emerging RWS.
- RAMP's leap ahead capability provides engineers with a better understanding of how RWS are deployed, and impacted from supporting On-the-Move (OTM) TTPs.

Challenges

- Working with TRADOC and User Community to define Operational ConOps for employment of RAMP and Robotic like assets.
- Working with Army to better define RWS and robotic emerging requirements.
- Working with Army to translate operational user requirements into system requirements to establish technology performance baseline
- Working with government and industry to leverage GOT/COTs technology for RWS applications.

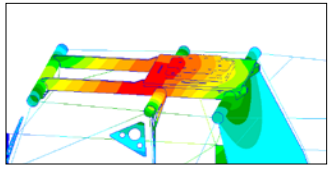
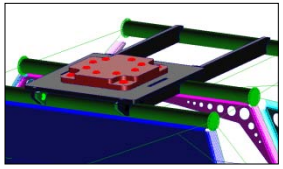
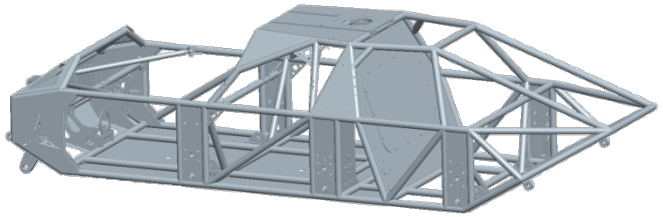
Technical Challenges

Due to the lethality and nature of RWS, these system place stringent and aggressive requirements on the technology at the subsystem level.

- RWS network and communications requirements challenges can be characterized as needing:
  - Low Latency
  - High Bandwidth
  - High QoS
  - High Reliability
- Other technical challenges
  - RF challenges created from being on the move
  - Low Latency/Low Bandwidth codec development for video transmission to support RSTA functionality.
- Future employment of Security/Encryption on communications links

RAMP Engineering Activities

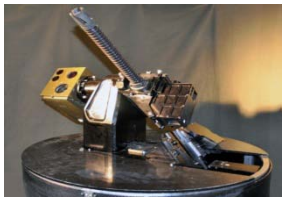
Dynamic Structural Analysis for MS3 w/ CROWS 50 Cal (Completed)

- Determined viability of firing CROWS on MS3
- Analyzed frame deflection, stress, and mode shapes

" Good News Story"

ARAS 7.62 and MS3 SWAP Study (On-Going)

- ARAS RWS CAD Integration
- Preliminary SWAP Analysis

Radio (C4ISR) Characterization Study (On-Going)

Motorola

COBHAM

Current Best Technical Approach (BTA)

Wireless Extension Kit (WEK) Development/Integration (On-Going)



Design Optimization for Video

OTM-ATIP Weapon and Technology Road Map

		Increment 1	Increment 2	Increment 3
Maneuver	Platform	• MS3 VIK development •Integration onto RIPSAW MS3	Continue Integration onto RIPSAW MS3	Integration onto current or updated MS Platform Version
Lethality/ Protection	RWS	•CROWS II Split Screen (7.62 mm or 50 Cal capable) •Integration of Phase 1 WEK (Tele-Operation) •Begin development of Phase 2 WEK Enhancements	•CROWS 50 Cal •Integration of Phase 2 WEK (Tele-Operation Enhancements)	•ARAS 50 Cal RWS* •Bore sited Optics Package •Integration of Phase 2+ WEK Enhancements* •TRL 5/6 •Full Tele-Operation
	Slew-to -Cue	None- Only receive S-T-C message, can not be accepted by system only displayed. Manual Slew to position by Gunner	•Increased Slew-to-cue capability •Initial integration with external RSTA sensors	•Increased Slew-to-cue and Hunter-Killer capability •Integration with external RSTA sensors and BC decision aid SW
	Non-Lethal Technologies		•Begin looking at potential technologies and integration strategy for Non-lethal technologies	•Tech insertion of Non-Lethal Technologies
C4ISR	Communications	•Begin work with CERDEC and others to ID emerging requirements and architecture •Feasibility of current REDSHIRT Architecture and H&H Radios/Cameras •Acquire radios: CERDEC/H&H/Other	•Continue Radio Characterization Studies to ID radio to meet WEK 2 radio requirements.	•Update, increased robustness communication network to support integrated (Data, Video, Imagery and Voice) requirements •Address Crew Compliance Req
	RSTA	•Limited external support •Work to integrate HARV onto platform •Begin to look at integration strategy for RSTA assets and RWS.	•Full RSTA candidates integration	RSTA fully integrated with Firestrom.
	Command and Control (C2)	•Acquire, & Integrate C2 Package onto: M113 APC, or C2 TOC	•TBD	TBD
	Battle Command (BC)	NA	Begin initial integration strategy of RSTA assets and RWS with Decision-Aid SW	Firestorm Decision Aide Capability and integration into RWS

RAMP Deliverables

Project Deliverables

- *CROWS and initial ARAS 7.62/50 cal. vehicle/platform integration*
- *Wireless Weapon command/control via Wireless Extension Kit (WEK)*
- *Preliminary Hunter-Killer Capability (HARV/CROWS/Firestorm)*
- *System Level, and Subsystem Requirements and Specifications*
- *Limited Scope Capstone Demonstration and Live Fire*

RAMP Pathfwd (Continue)

- *ARDEC PATH FORWARD*
  - *Continue to mature WEK Technology.*
    - *WEK Safety Documentation, Fabrication and Assembly*
    - *RWS Suite Engineering Level Testing (ELT) and Integration*
  - *Communications TIM with CERDEC to identify emerging RWS and Tele-Operation Requirements (Planning Phase)*
    - *ARDEC will provide RWS Overview, & present system requirements (Picatinny)*
    - *CERDEC will provide overview of communication technologies that may meet system needs (APG)*
  - *User engagement to define Operational Requirements for RWS deployment.*
    - *Working with ARDEC Liaison's to interface with User community to develop CONOPS and Requirements.*


Questions?