Future C4ISR Technologies on Ground Platforms

Mr. Gary Blohm
Director, Communications-Electronics Research, Development and Engineering Center
732-427-3967
www.cerdec.army.mil
2 February 2009
CERDEC Mission

CERDEC

ACTD's
ATD's
ATO Development
ATO Research
SBIR
ILIR
ACIN

Technologies

PEO's and PM's

Intelligence Systems
Surveillance Systems
Reconnaissance Systems
Communication Systems
Computers
Command and Control Systems

C4ISR Systems

See
Hear
Disrupt
Deny
Communicate
Out Think
Survive

Know the Enemy Day or Night
Targeting
Deny the Spectrum to the Enemy
Enable Net Centric Operations
Command the Operation
Protect the Force

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.
CERDEC and TARDEC Collaboration

2008 Research and Development Lab of the Year for Collaboration Team

“Optimization of Communications and Electronic Warfare Antenna Placement on Mine Resistant Ambush Protected (MRAP) Vehicles”

Current Collaborative Efforts

• Improved Mobility and Operational Performance through Autonomous Technologies (IMOPAT) Army Technology Objective (ATO)

• Embedded Platform Antenna Systems (EPAS)

• In-Dash Concept

• C4ISR Integration
Closed Hatch Hemispherical Vision Integrated with Threat Cueing, Video Capture, and Slew to Cue Interrogation

- Improved Driving and Threat Detection
- High Frontal Resolution Closed Hatch Hemispherical Vision
- Target Handoff via Virtual Pointer
- Virtual Pointer in Weapon Sight for target handoff between Dismounts and SUGV
- WFOV Inset into 360° Vision With Touch Screen GUI
- Motion Based Cueing for Pop Up/Close-In Target Detection
- Separation and Steerable, Stabilized Gimbal (automatic & manual modes)
- Non-Lethal Suppression
- Improved local SA and operator cueing
- Acoustic Gunfire Detection
- 360° Video Recording with tagging
- NFOV for Interrogation and Optics Detection
- Rapid Slew to Cue from 360° Vision to High Resolution Imager
- WFOV Supports OTM Operations

Enabler for Improved Closed Hatch Survivability and Lethality
Today:
Antennas compete for limited topside platform space. Typical installation result in adverse antenna interactions, distortions to radiation patterns and high visual signatures.

EPAS Concept:
Vehicle platform design is modified to facilitate embedded feed systems and distributed antenna apertures at optimized locations to reduce antenna interactions, pattern distortions and visual signatures. Optimized aperture/feed locations determined through modeling and simulation.

WARFIGHTER PAYOFFS:
• Enhanced Multifunctional Communications/Sensor Performance
• Increased Survivability due to Elimination of Visual Signature
• Reduced Antenna Attrition and Logistics

Results:
Embedded multifunction apertures optimally distributed around platform to support communications, CIED Jamming, direction finding, and sensors.

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.
Joint Effort Between TARDEC & CERDEC

- Leverage Military / Commercial vehicular technologies to equip tactical vehicles with a common power/digital backbone
- Meet vehicle mission variant requirements by plugging “B-Kit” component systems into the existing “A-Kit” power and data infrastructure
- Eliminate duplicative systems resources by embracing pre-production design of power, data, and the C4 distribution backbone
- Provide migration path to future force C4ISR architectures
- Validate the requirements for a more cost effective and responsive process to integrate C4/RSTA with host vehicles

**In-Dash Concept / Status**

- Embedded data bus for plug and play C4ISR
- Modular rapidly reconfigurable C4ISR mission equipment packages for vehicle interchangeability
- Embedded conformal antennas
- Enhanced vehicular power generation systems and power management for C4ISR
- Integrated high capacity high efficiency environmental control systems with noise abatement controls
- Vehicle electronic multi-spectral stealth technologies

**Status:**

- Developing low-cost, quick-reaction prototype to refine tenets of concept-metrics will include manpower and mission re-configuration time
CERDEC Team with TARDEC For C4ISR Integration

Integrate Existing and Prototype Electronics and Sensors Into Currently Existing Tactical Vehicle and Optimize Performance and Interoperability

**Modeling and Simulation:** Efficient Upfront M&S is used to solve cosite interference and antenna blockage problems PRIOR to integration to save time and money in later testing and debugging

**EMI/EMC:** Smart Electromagnetic Interference and Compatibility Analysis PRIOR to integration

GTD Incorporating Earth Ground
RDECOM R&D Program of Record Chartered in 2006

- Provides a relevant environment to assess emerging technologies in a C4ISR System-of-Systems
- Conducts technical Live, Virtual, and Constructive technology demonstrations
- Mitigate risk for FCS Concepts and Future Force technologies
- Opportunities for acceleration of technology insertion into the Current Force
- Offers Continuous and Persistent Evaluations
- Venue for validation of Technology Readiness Levels
- Provides a Technology Transition venue
Collaboration Breeds Success

- Apply System of Systems Integration Principles Early
- Expand Relationships to Optimize C4ISR Technologies for Ground Platforms
- Leverage our Collective Strengths with our Industry Partners