U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND – GROUND VEHICLE SYSTEMS CENTER

Vehicle Electronics & Architecture Overview

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VEA

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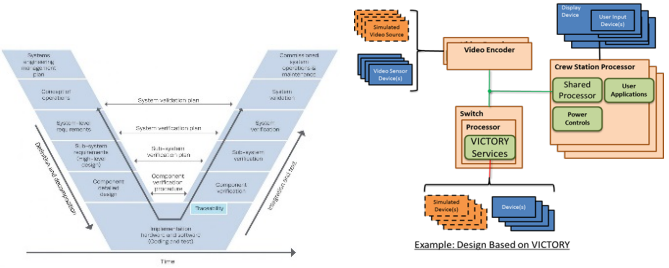
VEHICLE ELECTRONICS & ARCHITECTURES OVERVIEW

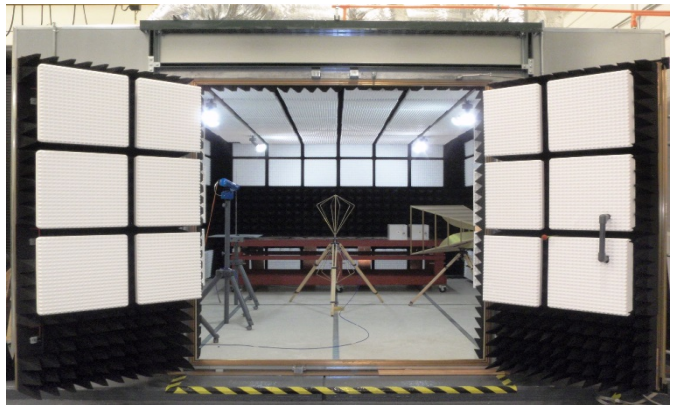
Vetronics

Electrical Power Distribution & Management

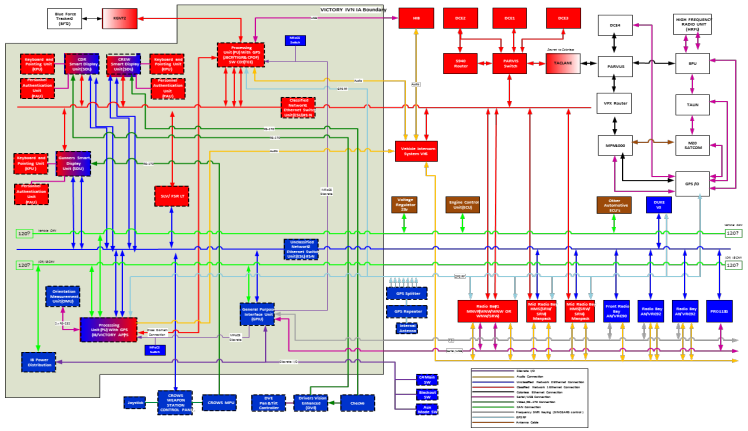
Engineering Services



EMI Analysis & Test

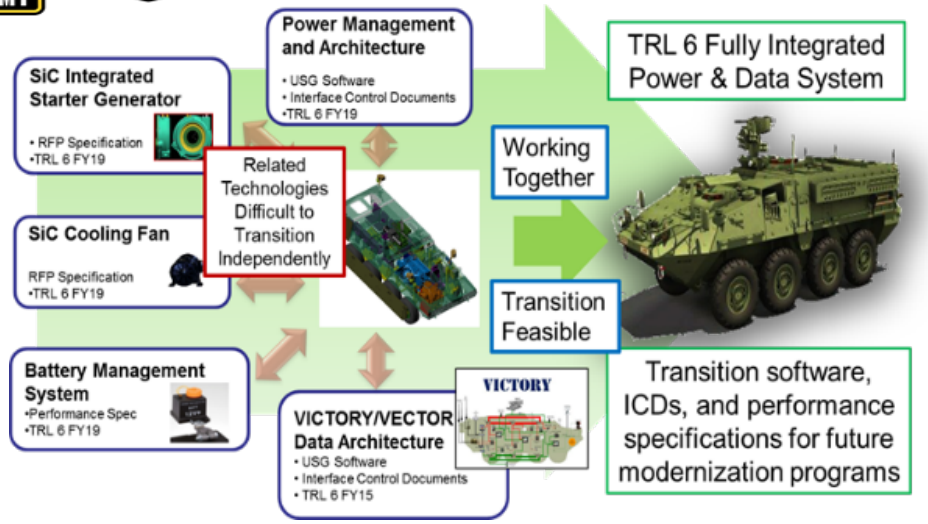


C4ISR Integration



Systems Integration Laboratories (SILs)

VEA MOBILE DEMONSTRATOR (VMD)



Schedule & Cost

Milestones	FY16	FY17	FY18	FY19
SNR – Stakeholder Needs Development	SNR			
SRR – System Requirements Development		SRR		
SFR – Define System		SFR		
CCR – Capabilities and Concepts			CCR	
IPR – In-Process Review				IPR
VMD – Integration				vehicle
RTTR – Ready To Test				RTTR
VMD – Testing				6
PTR – Product Transition				PTR
Total Funding: $41.79M	**$9.374M**	**$12.455M**	**$11.895M**	**$8.067M**

Problem Statement:

Combat vehicle power systems have proprietary interfaces and are limited to incorporate data & software advancements. This results in high integration costs for new technology which has to be repeated for each combat vehicle platform.

Mission:

Demonstrate on a combat vehicle a power and data architecture common across combat vehicle requirements enabling a reduction in volume and weight of current components and increased available power and bandwidth for integration of new technologies such as advanced protection, lethality and network systems.

Payoff:

- Validates architecture implementation via a system design on a relevant platform (Stryker)
- Fuel savings of > 10% w/power management
- Combat vehicles will be able to distribute significantly more electrical power enabling integration of advanced weapons, networks and protection systems.
- Reduction in volume and weight of power conversion and distribution components by 50-75% over current technology.
- Provides mature standards and specifications to support future combat & infantry vehicle modernization programs

NEXT GENERATION COMBAT VEHICLE ELECTRICAL POWER ARCHITECTURE IMPLEMENTATION

ISG Controller

Electric Propulsion Cooling Fan

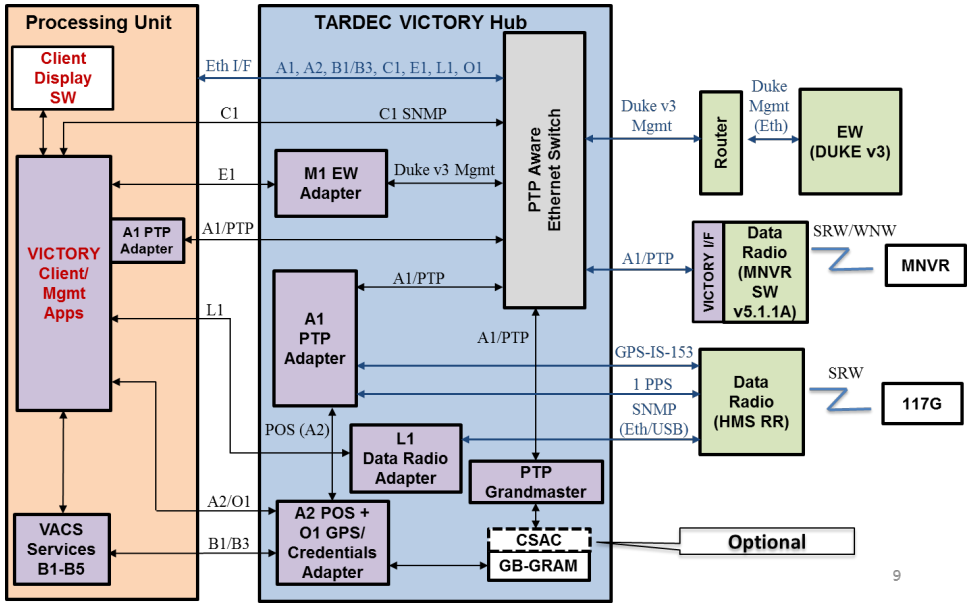
Bi-Directional Converters

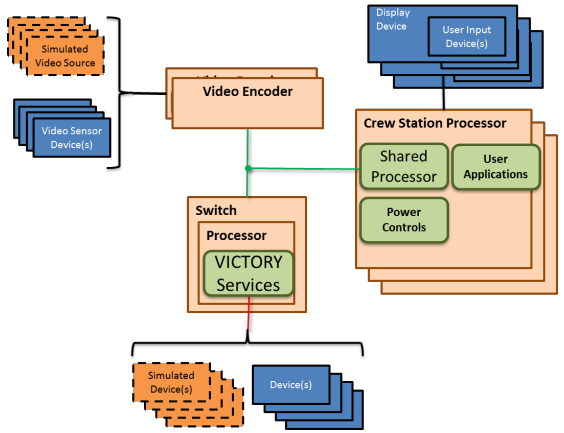
Low Voltage Power Controllers

High Voltage Power Controller

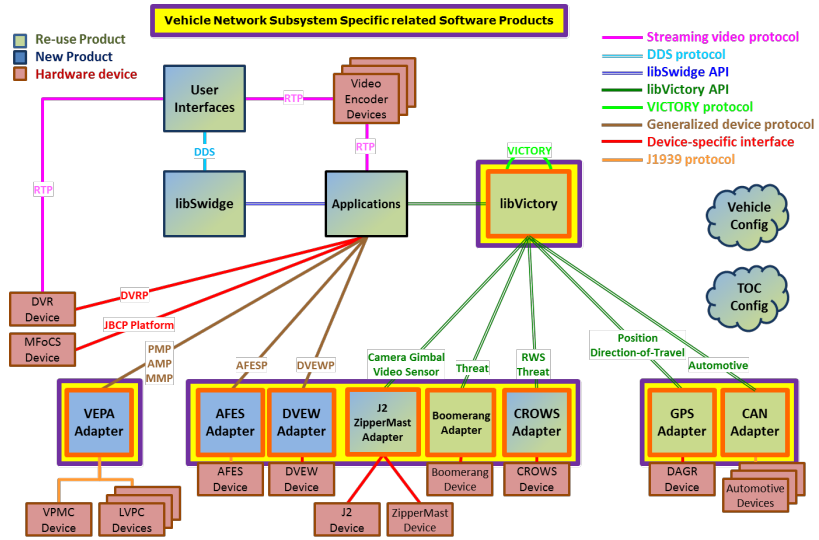
High Temp Coolant Pump

VETRONICS ARCHITECTURE





Example: Design Based on VICTORY

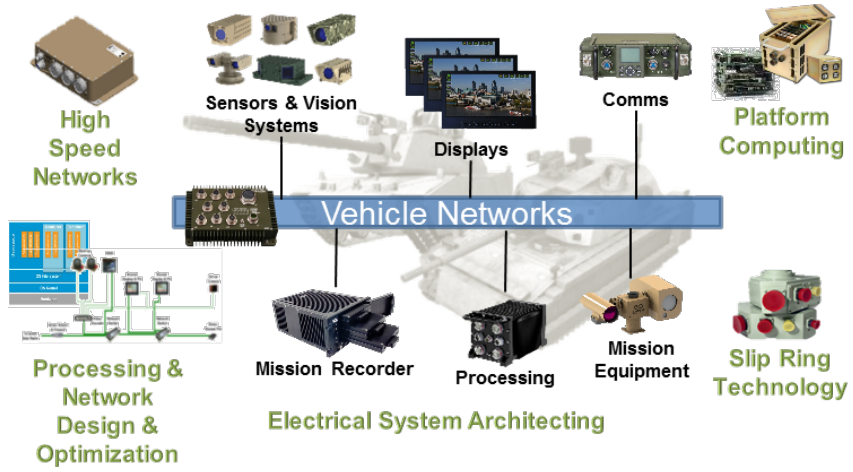


Objectives

- Mitigate implementation risk of networking onboard vehicle systems via VICTORY
- Distribute PNT information to devices and subsystems
- Demonstrate distributed timing to client devices via VICTORY
- Demonstrate remote control of C4ISR systems via VICTORY
- Demonstrate access control using VICTORY
- Demonstrate the art of the possible in reducing SWAP

ENHANCED - VEHICLE ELECTRONICS (E-VETRONICS) OVERVIEW

Program Overview



Progress

- **Begin developing the overall E-Vetronics architecture concept**
- **Begin concept development, market research, and requirements for the Advanced Slip Ring**
- **Develop Flexible I/O Architecture concept, market research, and requirements**

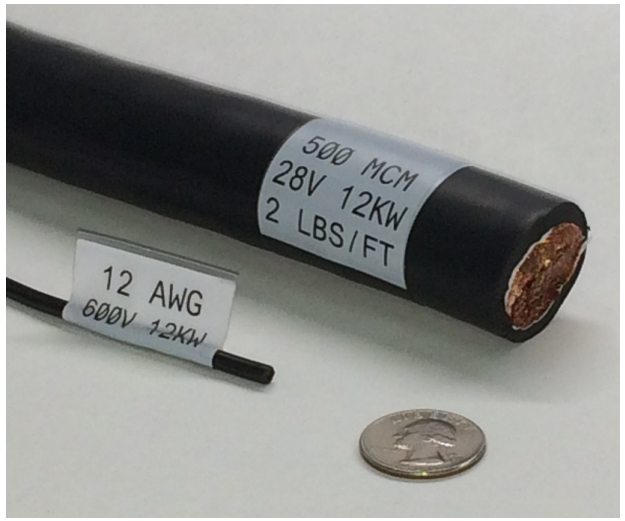
Overall Project Design

- Develop and demonstrate a military standard open architecture for combat vehicles to manage data, video, and power systems to enable future combat vehicle capabilities such as advanced protection, lethality and network systems.
- Challenges include developing a common solution across vehicle platforms, developing a standard open architecture that industry will adopt, and integrating high power technologies. These challenges are difficult to solve because the solutions require a holistic view and cannot be focused on a specific platform.

Timeline

Tasks	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Develop Architectural Concept							
Digital Containerization Architecture							
Advanced Slip Ring Development							
Flexible I/O							
Tactical Situational Awareness							
Mission Package Integration							
Bench Level Demonstration							
E-Vetronics Vehicle Integration							6
Funding (BA 6.2) $M	2.3						
Funding (BA 6.3) $M							

TECHNOLOGY FOCUS AREA: ARMY VEHICLE ELECTRONICS

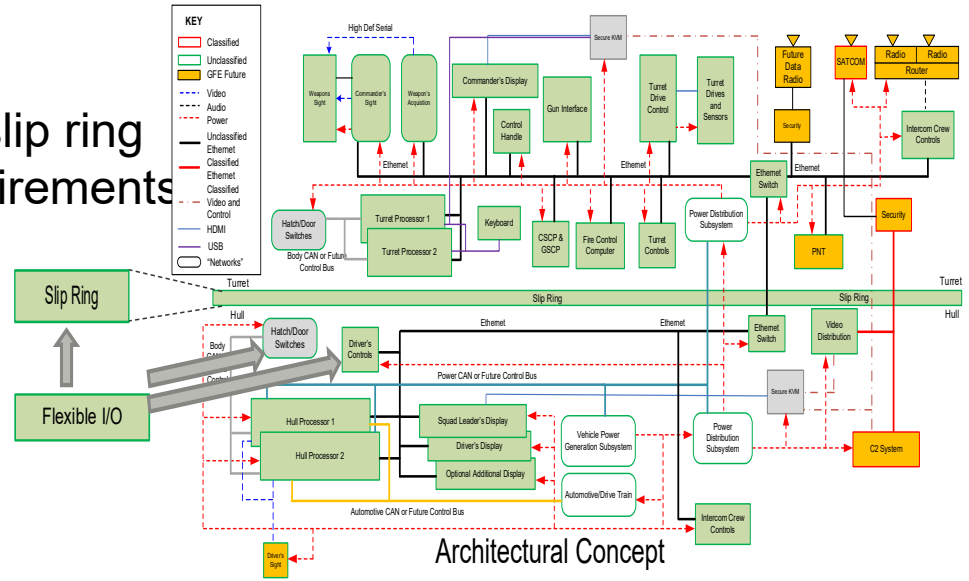


- **Tech Challenge 1: MIL-Rugged Technology Affordability**
  - Gap: Cost goals
  - Barrier: Low Volume for Mil Rugged Electronics
  - Resolution Timing: ASAP - Program Dependent

- **Tech Challenge 2: SiC Power Electronics**
  - Gap: Small Mil-Rugged Power Electronics
  - Barrier: Availability and cost of power switching devices and LRUs
  - Resolution Timing: ASAP - Program Dependent

- **Tech Challenge 3: Next Generation Slip Ring**
  - Gap: 600VDC, coolant, CAN, 10gbps Ethernet, 3rdGen FLIR slip ring
  - Barrier: No one has been funded to develop for emerging requirements
  - Resolution Timing: FY21 MET-D

Opportunities for Partnership FY19/20
- SiC 120kW DC/DC converter
- SiC 1MW Power Distribution
- Next Generation Slip Ring



Architectural Concept