

MULE: Multifunctional Utility/Logistics and Equipment Vehicle

Presented by:

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Photo: US Army, Future Combat Systems

The Vision: Future Combat Systems (FCS)

FCS program is a joint, networked, system of systems that uses advanced communications and technologies to integrate the soldier with “families” of manned and unmanned platforms and sensors.

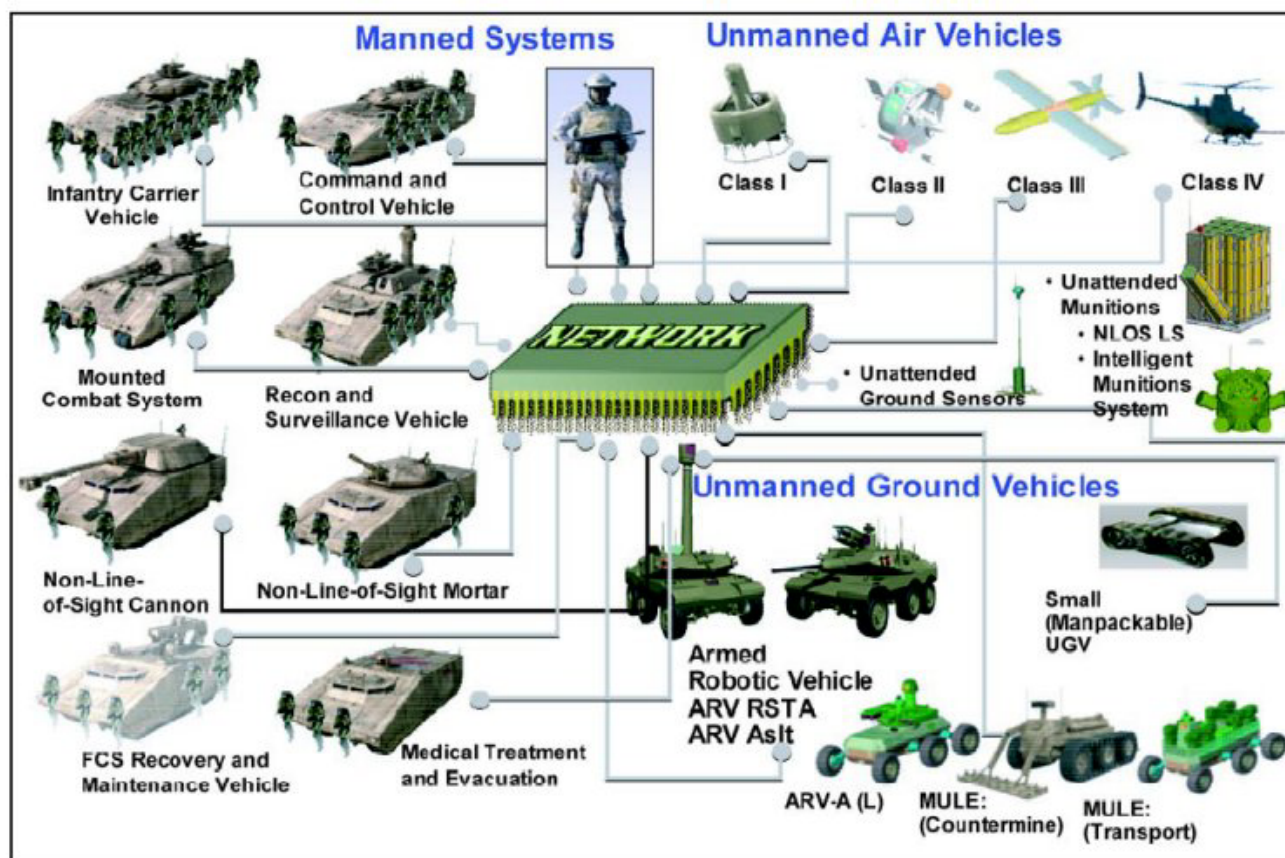


Photo: Global Security.org

What is a *MULE*?

The Multifunction Utility/Logistics and Equipment Vehicle (*MULE*) is an mission configurable, ***unmanned, semi-autonomous*** ground platform that provides transport of equipment and/or supplies in support of dismounted maneuver forces. It will also be capable of being armed in the role of support to dismounted infantry in close and air assault.

The MULE provides mobility sufficient to maneuver with the dismounted FCS force within an operational area, and is towed to the operational area by a larger vehicle. The MULE provides semi-autonomous navigation, possibly including automated loading/unloading of selected supplies.



Photo: Global Security.org

In Plain English....

- The *MULE* is a follower
- The *MULE* is unmanned
- The *MULE* is semi-autonomous (remote control, tele-operated, etc)
- The *MULE* has high mobility so it can “go where the soldier goes”
- The *MULE* has high utility to help carry the load of the individual soldier
- The *MULE* can communicate with the soldiers and the other systems of the FCS via a network
- The *MULE* can be a weapons platform
- The *MULE* can be a power station: Battery recharging and power generation
- The *MULE* is towable and air transportable
- The *MULE* has integrated sensing: day/night thermal, infrared, forward-looking, chemical-biological, etc

MULE Variants

FCS has defined three *MULE* vehicle variants, or TYPES.

MULE TYPES I and II will utilize a common basic mobility platform. Type III may require modifications to the basic platform:



Photo: Lockheed Martin

- TYPE I: Transport
- TYPE II: Air Assault
- TYPE III: Countermine

MULE Requirements

Vehicle Requirements:

Parameter	Requirement
Gross Vehicle Weight (GVW)	5000 lb
Payload	1926 lb <i>(2400lb goal)</i>
Transportability (3 units minimum)	USAF C-130 Roll-on/Roll-off Transportable
Range	62 miles on-road, 31 miles cross-country
Fuel Sustainment	3 days of high-intensity operation without refueling
Operating Temperature	-60 to 140 degrees F
Power Generation	Must generate exportable power, capable of interfacing with the Land Warrior Battery System
Wearout	No assemblies/components requiring replacement in less than 9300 miles or 2 years of operation

MULE Requirements

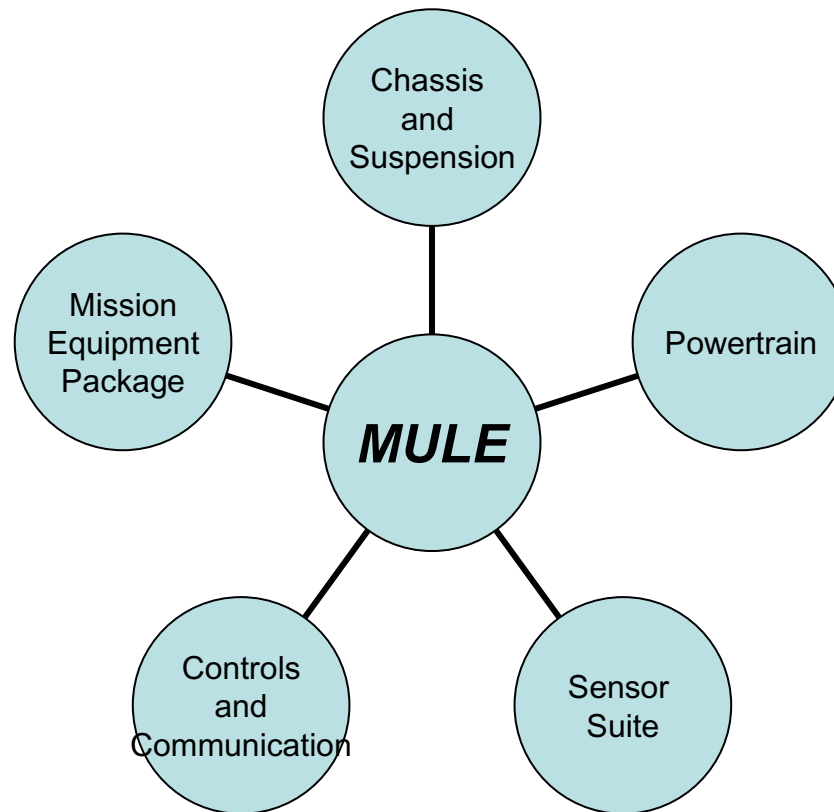
Vehicle Mobility:

Parameter	Requirement	Goal
Hard Surface Speed	32 mph	56 mph
Complex Terrain Speed	5 mph	13 mph
Dash Speed	0 to 30mph in less than 12 seconds	--
Towing Speed	28mph	--
Approach/Departure Angle	15 degrees	--
Grade Climbing	60%	--
Side Slope Traverse	40%	60%
Vertical Obstacle (Step Climbing)	20 inches	28 inches
Gap Crossing	28 inches	40 inches
Water Fording Depth	30 inches	50 inches
Turning Radius	16.5 feet (curb-to-curb)	--

MULE Design Team

- Alternative Fuels Students
- Full-time KRC Engineers
- Part-time KRC Student Employees
- Army Research Lab (ARL) Engineers

MULE Core Areas



Existing *MULE* Concepts?



Some may meet *MULE* requirements, some may NOT!

MULE Information Sources

- US Army, Future Combat Systems (FCS)
<http://www.army.mil/fcs/factfiles/mule.html>
- Boeing, Lead Systems Integrator for FCS
<http://www.boeing.com/defense-space/ic/fcs/bia/flash.html>
- Defense Advanced Research Projects Agency (DARPA)
<http://www.darpa.mil>
- Global Security Military Ground Systems, FCS/UGV
<http://www.globalsecurity.org/military/systems/ground/fcs.htm>
- Lockheed Martin, Ground Vehicle Systems
http://www.missilesandfirecontrol.com/our_products/groundvehicle.html
- Rod Millen Special Vehicles, Unmanned Ground Combat Vehicle
<http://www.rodmillen.com/special.htm>
- iRobot Government and Industrial Robots, FCS SUGV
<http://www.irobot.com/governmentindustrial/>