

## Future Combat Systems (FCS) Spin Out 1

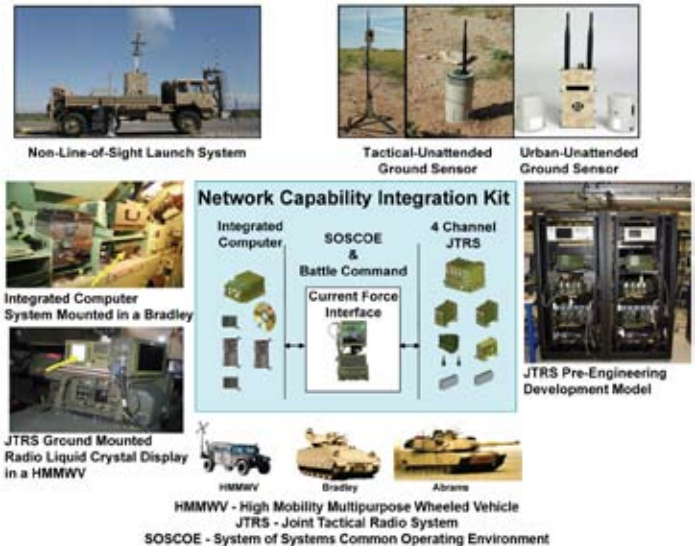
### Executive Summary

There are several technological and programmatic challenges with Future Combat Systems (FCS) Spin Out 1 systems. These are:

- Development of sensors that are able to detect, classify, and track multiple vehicular and personnel targets
- Communicating over the air to individual communication modes
- Meeting reliability requirements
- Allowing sufficient time between Non-Line-of-Sight Launch System (NLOS-LS) flight tests to discover and fix problems that may occur

### System

- Spin Out 1 is a subset of the FCS program.
- The Army plans to field Spin Out 1 systems to Current Force Heavy Brigade Combat Teams (BCT) in FY10 prior to FCS BCT fielding.
- Planned Spin Out 1 capabilities include:
  - Network Capability Integration Kit
    - Integrated Computer System
    - System-of-Systems Common Operating Environment (SOSCOE) Standard Edition 1.8 and Battle Command Software Build 1
    - Pre-Engineer Development Model (EDM) Four Channel Joint Tactical Radio System (JTRS) Ground Mobile Radio
    - Other surrogate radios (Zigbee and Munitions Sensor Receiver Transmitter) for Unattended Ground Sensors (UGS) are for pre-Milestone C testing only and are not intended for either the IOT&E or fielding
  - Unattended Ground Sensors (UGS)
    - Tactical UGS (T-UGS) include a Gateway, the Intelligence, Surveillance, and Reconnaissance (ISR) sensors, Radiological and Nuclear (RN) sensors, and Electro-Optical/Infrared (EO/IR) sensors.
    - Urban UGS (U-UGS) are small, leave-behind imaging and intrusion detection sensors emplaced in structures such as buildings, caves, and tunnels.
  - Non-Line-of-Sight Launch System (NLOS-LS)
    - The system includes a Container Launch Unit, which holds 15 missiles (maximum range out to 40 kilometers), and a Computer and Communications System.



- In Spin Out 1, the Battle Command for the Non-Line-of-Sight Launch System is the Advanced Field Artillery Tactical Data System.

### Mission

- Current Force BCTs will use Spin Out 1 enhancements in all military operations – offensive, defensive, and stability and support.
- The Army intends Spin Out 1 capabilities to enhance BCT situational awareness, force protection, and lethality by using the following systems:
  - Unattended Ground Sensors (T-UGS and U-UGS)
    - Units will employ UGS to provide perimeter defense, surveillance, target acquisition, and situational awareness, including RN, and high-yield explosive RN early warning.
  - Non-Line-of-Sight Launch System
    - BCT commanders will use precision attack missiles to attack moving, stationary, and point targets, such as tanks, armored troop carriers, and artillery, air defense, and communications sites.

### Activity

#### Network Capability Integration Kit

- A limited capability FCS Network passed simulated UGS sensor data for target generation during exercise JFEX.

- The FCS Network, using surrogate and pre-EDM JTRS radios, supported assessing sensors and Class I UAV during an experimental exercise (Experiment 1.1) at Fort Bliss, Texas.

# ARMY PROGRAMS

- During 2007, the Army is integrating FCS Network systems into Current Force Vehicles (Abrams, Bradley, and HMMWVs), followed by testing of each platform.

## **Unattended Ground Sensors**

- Soldiers used both T-UGS and U-UGS in Experiment 1.1 to assess target detection, data fusion from multiple sensors, and network loading.
- Soldiers learned how to operate the U-UGS and established tactics, techniques, and procedures for U-UGS employment in an Air Assault Expeditionary Force Experiment.

## **Non-Line-of-Sight Launch System**

- The Army conducted several pre-qualification tests on the NLOS-LS warhead.
- The Army conducted flight tests of early prototype missiles in 2007.
- To reduce the technical risk, the Army decided the NLOS-LS Precision Attack Missile will use a boost sustain motor in lieu of the current pintle motor due to technical challenges.

## **Assessment**

### **Network Capability Integration Kit**

- The FCS Network is dependent upon functionality to be provided by software and JTRS variants. Most software is under test and only a partial capability will be provided for near term FCS Spin Out 1 testing. The Spin Out 1 Limited User Test (LUT) will utilize pre-EDM JTRS radios and surrogates, which may limit the Spin Out 1 FCS Network.

### **Unattended Ground Sensors**

- Technological challenges include: developing sensors that are able to detect, classify, and track multiple vehicular and personnel targets; communicating over the air to individual communications nodes; meeting reliability requirements, and integrating the command and control suite and individual sensors in order to achieve effectiveness requirements.
- The operational concept for employing both T-UGS and U-UGS is not yet developed.
- During Experiment 1.1, Soldiers found hand-emplaced T-UGS awkward to handle, which limited the system's operational use.
- The system under test in Spin Out 1 will not be the same configuration as the system under test in the FCS IOT&E. Many of the same technological challenges identified for the LUT have been identified as risk areas for follow-on tests.

### **Non-Line-of-Sight Launch System**

- The Army is involving Soldiers early in the design process with the NLOS-LS soldier interface. Developing interface systems that Soldiers can easily use in a combat environment should enhance operational performance.

- The program has been proactive with subcomponent testing and early flight tests. Flight tests with early prototype missiles demonstrated that NLOS-LS missiles could fly a ballistic trajectory. In follow-on tests, the missile exhibited launch and flight problems. The Army developed interim solutions to fix the faults and is working to resolve the remaining launch and flight issues.
- NLOS-LS warhead pre-qualification tests revealed that the simulator used by the contractor and the Army to test the missile's infrared and semi-active laser seeker did not have the necessary fidelity to evaluate warhead performance.
- DOT&E and the Army Evaluation Center recommended the program evaluate the effects of realistic Improvised Explosive Device threats against the warheads and motors inside the Container Launch Units because they are primarily transported in ground convoys. This test matrix was identified in the Test and Evaluation Master Plan (TEMP). The program has allocated the resources, but has not yet conducted these tests.

## **Recommendations**

### **Network Capability Integration Kit**

- Status of Previous Recommendations. There were no FY06 recommendations.
- FY07 Recommendations. The Army should ensure subsequent testing of the FCS Network as SOSCOE and Battle Command software mature and surrogate radios are replaced with JTRS production models and waveforms.

### **Unattended Ground Sensors**

- Status of Previous Recommendations. The one FY06 recommendation remains in that the Army should assess UGS suitability during Spin Out 1 operational testing as there are no plans to upgrade UGS between the Spin Out 1 and Spin Out 3 assessments.
- FY07 Recommendation. The Army should conduct a follow-on operational test following the Spin Out 1 LUT in order to assess the configuration that will be evaluated in the FCS IOT&E.

### **Non-Line-of-Sight Launch System**

- Status of Previous Recommendations. The one FY06 recommendation remains in that the Army should conduct adequate countermeasure testing early in the NLOS-LS flight test program. Previous efforts to field projectiles with discriminating or smart warheads have been successful against benign targets, but have been less successful against targets that employ passive countermeasures (FY06).
- FY07 Recommendation. The Army should begin testing the effects of IEDs against the Container Launch Unit as agreed upon in the TEMP.