

Future Combat Systems (FCS) Spin Out 1 Systems

Executive Summary

There are several technological challenges with Future Combat Systems (FCS) Spin Out 1 systems. These challenges include developing sensors that are able to detect, classify, and track multiple vehicular and personnel targets, communicating over the air to individual communication nodes, and meeting reliability requirements.

System

- Spin Out 1 is a subset of the FCS program.
- Spin Out 1 fielding allows the Army to leverage technology enhancements developed as part of the core FCS program and other developmental program activities to support current forces. 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-System Common Operating Environment Standard Edition 1.8 and Battle Command Software Build 1
 - Four Channel Joint Tactical Radio System Ground Mobile Radio
 - Intelligent Munitions System (IMS)
 - IMS is a system of unattended ground sensors linked to lethal and non-lethal anti-vehicle and anti-personnel munitions via integrated and robust command and control systems.
 - The Army plans for the IMS to meet the requirements of the 2004 National Landmine Policy.
 - The IMS-dispensing module will use Handheld Manpack Small Form Factor (HMS SFF) H (two-channel) radio running the Soldier Radio Waveform (SRW).
 - Unattended Ground Sensors (UGS)
 - Tactical UGS include the Intelligence, Surveillance, and Reconnaissance (ISR) and Biological, electro-optical nodes and the Radiological and Nuclear nodes.
 - Tactical UGS will use HMS SFF A (single channel) radios running the SRW.
 - Urban UGS consist of small, lightweight imaging and intrusion detection sensors emplaced in structures such as buildings, caves, and tunnels.
 - Urban UGS will use Zigbee radios for sensor nodes and an HMS SFF A running the SRW for the handheld gateway.
 - Non-Line-of-Sight Launch System (NLOS-LS)
 - The precision attack missile is designed to use uncooled imaging infrared (UCIIR), semi-active laser



- or grid attack engagements to attack targets (out to 40 kilometers). Without In-Flight Target Updates (IFTUs), the UCIIR range against moving targets reduces.
- The system includes a Container Launch Unit, which holds 15 missiles and the 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 or if required, soldiers can manually input a fire mission to the Container Launch Unit. Missiles may be fired from a variety of vehicles or from the ground.
- The NLOS-LS will use a HMS SFF J radio running SRW.

Mission

- Current Force BCTs will use Spin Out 1 enhancements in all military operations – offensive, defensive, and stability and support.
- FCS network components will be integrated into Current Force BCT vehicles such as Abrams, Bradley, High Mobility Multi-purpose Wheeled Vehicle, and Command and Control Centers such as Warfighter Information Network-Tactical Point of Presence vehicles, and mobile and stationary Tactical Operations Centers.
- The Army intends Spin Out 1 capabilities to enhance BCT situational awareness, force protection, and lethality by using the following systems:
 - Intelligent Munitions System
 - BCT commanders will employ IMS to constrain enemy maneuver, enhance friendly maneuver through economy of force, and protect friendly forces.
 - Units will use IMS to detect, classify, track, and engage targets under man-in-the-loop control or autonomously, as desired by the employing commander.

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- Unattended Ground Sensors
 - Units will employ UGS to provide perimeter defense, surveillance, target acquisition, and situational awareness, including ISR, electro-optical, radiological and nuclear warning.
 - Units will deploy UGS to detect and identify objects of interest and automatically populate the common operating picture with intelligence information via Force XXI Battle Command Brigade and Below (FBCB2).
 - Tactical UGS is designed to provide enhanced situational awareness, increased early warning for force protection, and increased surveillance capability to BCT platoons and companies.
- Urban UGS is designed to provide a leave-behind, network-enabled reporting system to provide situational awareness in urban settings, as well as residual protection for cleared areas in urban environments.
- Non-Line-of-Sight Launch System
 - BCT commanders will use precision attack missiles to attack moving and stationary point targets, such as tanks, armored troop carriers, and non-armored targets out to 40 kilometers. These missiles will use UCIIR, semi-active laser or grid attack, or both to attack targets. Without IFTUs, the UCIIR range against moving targets is reduced.

Activity

Intelligent Munitions System

- The IMS Test and Evaluation Master Plan (TEMP) was approved as Annex I of the FCS TEMP in June 2006. The Army was required to update Annex I in June 2006.
- The program completed a System Requirements Review in August 2006. A System Functional Review is planned for October 2006. A Preliminary Design Review is scheduled for March 2007.

Unattended Ground Sensors

- DOT&E approved the UGS Annex as part of the FCS TEMP in June 2006.
- The program completed Preliminary Design Review I in November 2005. The program completed a second Preliminary Design Review in February 2006 due to issues with system radios.
- The Army delayed the Critical Design Review (CDR) (originally scheduled for September 2006) because of delays in getting government-furnished radios.
- In 2006, the Air Force used Tactical UGS in the Joint Expeditionary Force Exercise. Tactical UGS capabilities demonstrated during this exercise included the ability to detect moving targets and the ability to communicate this information over long and short ranges.

Non-Line-of-Sight Launch System

- The contractor and Army continue to develop the sensor, algorithm, and missile in preparation for the CDR in December 2006. Captive flight tests of the missile's infrared and semi-active laser seeker were conducted in arctic and tropical environments in 2006.
- The Army and contractor continued to develop the user interface for the Container Launch Unit as well as the tactics, techniques, and procedures for employing the system.

Assessment

Intelligent Munitions System

- There are several technology challenges, including: developing sensors that can detect, classify, and track

multiple vehicular and personnel targets; meeting reliability requirements; and integrating sensors, command and control, and munitions to achieve effectiveness requirements.

- The IMS program schedule was compressed by a six-month delay in awarding a System Development and Demonstration contract.
- Developmental delays could jeopardize FCS and Landmine Alternative production and deployment schedules.

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 communication 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 Tactical UGS and Urban UGS is underdeveloped (e.g., how many modules actually make up a system).

Non-Line-of-Sight Launch System

- The program office and the user have identified potential problems with the upcoming test events and have worked to mitigate them. Efforts to develop the soldier interface for the Container Launch Unit should reduce operational testing and fielding problems.
- Flight test technical problems could increase program risks because of the limited time and resources to correct problems and conduct additional testing.

Recommendations

- Status of Previous Recommendations. Recommendations for the Intelligent Munitions System remain valid:
FY05 #1: The Army must complete and execute a reliability growth plan.
FY05 #2: The Army should continue to develop and implement a risk mitigation plan in case the Joint Tactical Radio System is not available in time for system integration.

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- FY06 Recommendations.

Unattended Ground Sensors

1. The Army should assess UGS suitability during Spin Out 1 operational testing because there are no plans to upgrade UGS between the Spin Out 1 and Spin Out 2 assessments.

Non-Line-of-Sight Launch System

1. The Army should conduct adequate countermeasure testing early in the NLOS-LS flight test program, as countermeasures have proven to be problematic for some systems.

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