

# ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2 Exhibit)

June 2001

BUDGET ACTIVITY <b>2 - APPLIED RESEARCH</b>				PE NUMBER AND TITLE <b>0602783A - Computer and Software Technology</b>				PROJECT <b>Y10</b>		
COST (In Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
Y10 COMPUTER/INFO SCI TECH	5142	3950	6154	0	0	0	0	0	0	0

**A. Mission Description and Budget Item Justification:**

**PLEASE NOTE: This administration has not addressed FY2003-2007 requirements. All FY 2003-2007 budget estimates included in this book are notional only and subject to change.**

The problem addressed in this program element is two-fold: 1) Current collaboration for decision making (planning and execution) is a manual process, not synchronized, sequential and slow, and 2) collaboration tools support the staff, not the Commander. Technical barriers to the accomplishment of this program include the non-existence of automated tools to support the flow and synchronization of data/information from humans to humans, from humans to computers, from computers to humans, as well as the fact that automation is currently too dependent on mouse and keyboard versus other modes of communication and understanding. The goal of the program element is to research and apply information and communications technology to enhance understanding and speed the decision cycle for commanders operating in the mobile dispersed environment envisioned for the Objective Force. Efforts capitalize on computationally intensive approaches that exploit the rapidly evolving capabilities of emerging information and communication technology to create innovative military capabilities so as to yield a significant and real military advantage on the battlefield. Focus is on providing general solutions that can be applied to a wide variety of command and control (C2) problems. Work in this project is conducted by the U.S. Army Research Laboratory, and is consistent with the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and Project Reliance. This program supports the Objective Force transition path of the Transformation Campaign Plan (TCP).

**FY 2000 Accomplishments**

- 3726 - Conducted experiments on distributed and collaborative group support environment in concert with Army Battle Labs.
- Modified collaborative tool set capabilities based on evaluations by the Battle Labs.
- Incorporated multimodal interfaces into collaboration tools to facilitate operations on the move (from Advanced Displays and Interactive Displays (ADID) Federated Laboratory Program).
- Incorporated course of action development and analysis tools (from ADID Federated Laboratory Program) into collaboration tools.
- Incorporated low bandwidth technology for Video Teleconferencing (VTC) from ADID Federated Laboratory program into collaboration tools to bring capability down to dismounted commander.

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## FY 2000 Accomplishments (Continued)

- Described techniques that will allow the Army user to access internet protocol network management information on tactical wireless networks to determine the availability of bandwidth at any given time. Based on this data, generate active database triggering mechanisms that prioritize data packages to be sent.
- Translated computer-generated broad courses of action (COA) into input scenarios for the Army's current warfighting simulation of choice and performed preliminary analysis on outcomes, for evaluation of man- or machine- generated future Objective Force COA's integrated collaboration technologies and transitioned to CECOM.
- Integrated collaboration technologies and transitioned to CECOM.
- 1416 - Evaluated performance of mobile ad hoc network algorithms and self-configuring mobility protocols that support secure multicast streaming for mobile wireless nodes.
- Integrated video streaming for mobile wireless nodes.
- Evaluated performance of energy-efficient, self-configuring, ad hoc routing and medium access control algorithms that supports unattended ground sensors.
- Evaluated performance of automated vulnerability assessment tools that perform continuous assessments of bandwidth-constrained mobile wireless networks and identifies a set of known configuration errors and susceptibilities.

Total 5142

## FY 2001 Planned Program

- 2499 - Conduct Battle Lab experiments with second-generation collaborative technologies in order to identify and address technology gaps.
- Integrate intelligent agent technologies that off-load routine tasks from the warfighter into collaboration tools in order to identify and quantify benefit to warfighter's decision making process.
- Utilize metrics for display design (developed in ADID Federated Laboratory) to enhance assimilation of information by commanders operating in a distributed environment - impact will be quantified.
- Measure and evaluate performance improvement of information management algorithms responding to network delay feedback.
- Conduct experiment to empirically measure processing overhead due to intranet routing protocols and compare to simulation results in order to identify most efficient protocol structures.
- Provide upgraded collaboration technology modules to CECOM's Agile Commander Advanced Technology Demonstration (ATD).
- 1362 - Enhance performance of mobile ad hoc network algorithms and protocols integrated with self-configuring mobility protocols that support secure multicast streaming for mobile wireless nodes.

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## FY 2001 Planned Program (Continued)

- Evaluate mobile ad hoc network algorithms and protocols integrated with self-configuring mobility protocols that support secure multicast streaming for mobile wireless nodes.
- Enhance energy-efficient, self-configuring, ad hoc routing and medium access control algorithms integrated with localization algorithms that support unattended ground sensors.
- Enhance automated vulnerability assessment tools with the capability to perform directed assessments of bandwidth-constrained wireless networks to confirm the existence of a set of known configuration errors and susceptibilities.
- Transition communications technology to CERDEC in support of FCS-related ATDs.
- 89 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.

Total 3950

## FY 2002 Planned Program

- 4154 - Evaluate and refine collaborative planning tools in support of evolving Objective Force command and control process, conduct and document the usability through experiments at TRADOC Futures Battle Lab and Agile Commander ATD.
  - Assess technologies for a low power, miniature radio that can be integrated in a miniature sensor to create a secure network to support forward-deployed unattended munitions, sensors and robotic prototype radio with integrated network protocols.
  - Define the requirements for a common network architecture for unattended sensor arrays, assess candidate protocols for very short duty cycle networks that use low power radios to control and transmit data from sensors, smart munitions and robots.
  - Provide mobile code for protecting tactical wireless networks, allowing Commanders to operate in a dynamically configurable environment.
  - Explore encryption algorithms and protection techniques for microsensors to reduce the vulnerability of unattended sensors arrays on the tactical battlefield.
  - Research various techniques that merge real time battlespace data to simulate proposed courses of action providing advantage and disadvantage insight of alternatives.
- 2000 - Communications and Networks Collaborative Technology Alliance development of next generation automated intrusion detection techniques that accommodate wireless, self-configuring, mobile ad hoc networks and adapt to varying resource constraints.
  - Communications and Networks Collaborative Technology Alliance development of denial-of-service mitigation techniques for wireless networks with mobile network routers.

Total 6154

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<u><b>B. Program Change Summary</b></u>	FY 2000	FY 2001	FY 2002	FY 2003
Previous President's Budget (FY2001 PB)	5173	3987	4141	0
Appropriated Value	5210	3987	0	0
Adjustments to Appropriated Value	0	0	0	0
a. Congressional General Reductions	0	0	0	0
b. SBIR / STTR	-131	0	0	0
c. Omnibus or Other Above Threshold Reprogramming	-20	0	0	0
d. Below Threshold Reprogramming	100	0	0	0
e. Rescissions	-17	-37	0	0
Adjustments to Budget Years Since FY2001 PB	0	0	2013	0
Current Budget Submit (FY 2002/2003 PB )	5142	3950	6154	0

Change Summary Explanation: Funding - FY 2002: Funding added (+2000) to develop next generation information assurance for the Army's future tactical wireless networks.