

## ARMY PROGRAMS

### Force XXI Battle Command, Brigade & Below (FBCB2)

**F**BCB2 is a digital battle command system that links together brigade, battalions, companies and platoons tactical combat and combat services and support vehicles. Its primary purpose is to accurately and quickly disseminate/display friendly and enemy unit locations, and to communicate orders, overlays, and graphical tactical control measures throughout the force. The system consists of a small-ruggedized computer, a display, and a digital radio that is used for line-of-sight FM communications either Single-Channel Ground and Airborne Radio System or Enhanced Position Location Reporting System. The system also has a connection to a Global Positioning System receiver for self-location.

At the brigade and battalion tactical operation centers (TOCs), the Tactical Internet interfaces with Army Tactical Command and Control System (ATCCS), an Ethernet-based local area network of computers representing the functional areas of intelligence, maneuver, air defense, combat service support, and fire support. This interface permits the information collected and disseminated via ATCCS systems to be rapidly passed through the Tactical Internet to FBCB2 computers. Likewise, the position reports of individual and unit locations are passed upwards through the FBCB2 and Tactical Internet into the ATCCS systems for dissemination throughout the force. The Tactical Information Management System at the brigade TOC performs network initialization and management functions.

Army systems with a computer processor and display mounted in them will receive the FBCB2 software often referred to as Embedded Battle Command software. Examples of Army systems that employ the Embedded Battle Command software include the M2A3 Bradley Infantry Fighting Vehicles and the M2A2 SEP main battle tanks. In addition to the tactical vehicles, the ATCCS component computers have Embedded Battle Command software installed to facilitate the interface between FBCB2 and ATCCS.

#### TEST & EVALUATION ACTIVITIES

The Army conducted one operational test during the month of December 2001 at Fort Hood, Texas. The operational test was followed by a developmental test conducted in September 2002 at Fort Huachuca, Arizona. The operational test was intended to be the Initial Operational Test and Evaluation (IOT&E) supporting a Full-Rate Production Decision, but a few days before the test began it was downgraded to a limited user test (LUT 2A) by senior Army leadership. The test was downgraded because the entrance criteria were not met during the pilot test, there were unresolved doctrinal issues concerning network security, the TOC server and the mass data loader, and the documentation was not complete. Documentation that was not signed at the start of the test included significant changes to the Operational Requirements Document and the Test Evaluation Master Plan. The LUT was conducted with no changes made to the events, instrumentation, data collection, or analysis. There was no acquisition decision made at the conclusion of the limit user test. A developmental test, Field Test 5, was conducted at Fort Huachuca in September 2002 to determine readiness to proceed to the rescheduled IOT&E in FY03.



*Force XXI Battle Command, Brigade & Below enhances the Army Battle Command System by providing automated tools to facilitate the battle command process. It enhances the ability of the soldier to operate in an unpredictable and changing environment, across the spectrum of conflict.*

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## TEST & EVALUATION ASSESSMENT

Based on testing of FBCB2 within the 4<sup>th</sup> Infantry Division architecture, survey data through interviews suggests that FBCB2 assists commanders in their ability to maneuver their forces and synchronize their combat power. Commanders also indicate that situation awareness provided by FBCB2 permits them time to focus more on commanding. These results highlight the potential of FBCB2; however, these anecdotes reflect satisfaction in FBCB2 when it works, and do not reflect the inconsistent performance that has been observed to date. Furthermore, operational testing conducted to date has been restricted to near-ideal conditions of Electronic Warfare (EW)/ Informational Warfare (IW), weather, and terrain. Degradation in FBCB2 performance is expected when tasked to perform in more stressful environments. Tactics, techniques, and procedures also remain immature. Testing in the mentioned environments is required in order to demonstrate that FBCB2 is operationally effective and suitable. Testing must also be conducted for any new employment architectures for FBCB2. New architecture designs will introduce new performance and interoperability challenges.

During the December 2002 LUT 2A, FBCB2 performance was marginal:

- The average percent of the blue force that was visible on an FBCB2 screen was 68 percent, with one quarter of the force able to see fewer than 50 percent of the blue platforms.
- Several specific message categories deemed to be essential, such as Nuclear, Chemical, and Biological reports, bridge and obstacle reports were not delivered in a timely manner, with only 33 percent of the force notified within 20 minutes and only 48 percent of the force ever receiving these messages. These messages are broadcast over the Tactical Internet to quickly notify all elements of the force.
- Unit Task Reorganizations is an essential part of military operations and the ability to re-organize quickly is a Key Performance Parameter for FBCB2. Attempts to task reorganize during this test resulted in frequent system lock-ups, and excessive time was spent trying to reinitialize the system.
- The message completion rate for command and control message traffic remained unsatisfactory at approximately 69 percent, although the speed of message completion was satisfactory at 2-3 seconds.
- The transmission of lengthy orders and graphical overlays from higher to lower echelons using FBCB2 was not reliable. Some orders were truncated as they passed from Maneuver Control System (MCS) to FBCB2, and certain features on overlays do not render accurately on an FBCB2 system when created on an ATCCS computer; the resulting potential for tactical confusion in identifying the locations of the friendly and enemy forces is not satisfactory.
- There were frequent failures of the Common Message Processor and the Common Tactical Picture software in ATCCS when messages were passed between ATCCS and FBCB2. When failures did occur, the re-booting of the ATCCS computers was required, a procedure that took 20-30 minutes. As FBCB2 software is hosted on ATCCS computers at battalion and brigade TOCs, this remains an FBCB2 concern.
- The observed Mean Time Between Essential Function Failure was approximately 150 hours when the FBCB2 hardware, software, and the other critical elements of the Tactical Internet were considered.

The FBCB2 program had re-scheduled the IOT&E to take place in the spring of 2003; however, DOT&E was recently informed that operational testing of FBCB2 has been postponed indefinitely. Test and Evaluation Master Plan (TEMP) revisions were nearly finalized during FY02, and in addition to the IOT&E, the Army had included a cold-regions test in Alaska, a force effectiveness operational test at the National Training Center, and a test in restricted or complex terrain at the mock village and training area around Fort Knox. The revised TEMP, when submitted, should include rescheduling of these tests and inclusion of adequate EW/IW testing.