

Battle Control System – Fixed (BCS-F)

Executive Summary

- Air Combat Command completed a Force Development Evaluation (FDE) on the Battle Control System – Fixed (BCS-F) Increment 3, Release 3.1.3 (R3.1.3) and fielded it at all U.S. air defense sites in December 2011.
- Results from testing found R3.1.3 supports North American Aerospace Defense Command (NORAD) air defense operations with shortfalls in training and technical system documentation, system security management, and system combat identification operations. R3.1.3 testing also revealed significant deficiencies in Information Assurance (IA).
- The Air Force completed IOT&E and FDE on the BCS-F R3.2 at all U.S. air defense sites in September 2012. R3.2 presented some IA improvements and achieved an interim Authority to Operate.

System

- The BCS-F is a tactical air battle management command and control system that provides the two continental U.S. NORAD air defense sectors, as well as the Hawaii and Alaska Regional Air Operation Centers, with commercial off-the-shelf hardware using an open-architecture software configuration. The system operates within the NORAD air defense architecture and is employed by the U.S. and Canada.
- The R3.2 upgrade includes the following system enhancements:
 - Improved tactical datalinks with additional Link 16 and Link 11 message types that enable the operators to better digitally control fighters, send amplifying intelligence information, and create a more comprehensive air picture
 - Air Tasking Order (ATO) and Airspace Control Order (ACO) integration with theater battle management core system data sources that enables the operators to view the most current ATO/ACO and correlate the information with military aircraft
 - Adaptation data modification tools to enable system administrators easier field changes to system adaptation files and to perform error checks with greater fidelity
 - System control manager interface improvements that enable the system administrator improved system performance monitoring and diagnostics
 - Global Area Reference System coordinate conversion tool that facilitates NORAD interface with global search and rescue efforts ensuring a common set of coordinates



- Remote Gateway Manager control through the virtual network computing interface that provides the operators a complete picture of the available datalinks and the flexibility to access link information from an operator workstation
- Auxiliary server for offline training and support capabilities at the U.S. air defense sectors
- Improved system capacities from 10,300 to 15,000 system tracks to support single sector continental United States operations

Mission

- NORAD and U.S. Pacific Command Commanders use BCS-F to execute command and control and air battle management in support of air sovereignty and air defense missions for North American Homeland Defense.
- Air defense operators employ BCS-F to conduct surveillance, identification, and control of U.S. sovereign airspace and control air defense assets, including fighters, to intercept and identify potential air threats to U.S. airspace.

Major Contractor

Thales-Raytheon Systems – Brea, California

Activity

- Air Combat Command completed an FDE of R3.1.3 at the System Support Facility at Tyndall AFB, Western Air Defense Sector, Eastern Air Defense Sector, Alaska Regional Air

Operations Center, and the Hawaii Regional Air Operations Center in December 2011.

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- The Air Force fielded R3.1.3 to all U.S. air defense sectors and Canada in December 2011.
- In September 2011, the Air Force's 92nd Information Operations Squadron (IOS) completed an insider threat assessment on R3.1.3.
- The Air Force conducted developmental testing on R3.2 at the System Support Facility at Tyndall AFB from July through October 2011 and January 2012. Additionally, the Air Force accomplished an IA certification test at this time. The Air Force also conducted developmental testing at the U.S. operational sectors from February through July 2012.
- The Air Force conducted system interoperability tests in November and December 2011 to evaluate datalink compliance with military standards.
- The Joint Interoperability Test Command is evaluating critical information exchanges in R3.2; testing started in April and will end in November 2012.
- In April 2012, the Air Force's 92nd IOS conducted penetration and vulnerability testing on R3.2 at the System Support Facility.
- The Air Force's 92nd IOS conducted an insider threat assessment on R3.2 at the Eastern Air Defense Sector in August 2012.
- From April through August 2012, the Air Force Operational Test and Evaluation Center (AFOTEC) conducted IOT&E on R3.2 at the System Support Facility and two U.S. operational sectors. Air Combat Command conducted FDE at the other two operational sectors.
- Air Combat Command began integrated developmental and operational testing of R3.2.1 at the System Support Facility in September 2012. The Air Force intends for R3.2.1 to provide a fix for a critical deficiency discovered during R3.2 operational testing. This deficiency causes a loss of situational awareness for the operators conducting surveillance of the National Capital Region and results in an inaccurate air picture. The Air Force designed R3.2.1 to provide the ability to operate with mandatory International Civil Aviation Organization flight plan changes scheduled for November 2012, and provide an update to local radar site information.
- AFOTEC and Air Combat Command conducted operational testing in accordance with a DOT&E-approved Test and Evaluation Master Plan.
- Shortfalls in system security management and deficiencies in all IA assessment areas jeopardize secure system operations. Test results from the September 2011 insider threat assessment indicate R3.1.3 is deficient in the IA areas of protect, detect, react, and restore. The large number of outstanding deficiencies indicates the system's continued vulnerability to detect, withstand, or recover from attacks by cyber threats.
- R3.1.3 demonstrated adequate reliability, maintainability, and availability. R3.1.3 has an average system availability of 99.98 percent, with over 1,118 hours of system operation during operational test.
- Deficiencies still exist in R3.1 training for the intrusion detection system, the firewall, the local area network, the gateway manager, system doctrine, and combat identification. Additionally, R3.1 lacked adequate vulnerability management plans.
- A final assessment of R3.2 performance will not be available until all testing is completed in FY13 and DOT&E and the Air Force have analyzed the data. However, DOT&E preliminary analyses indicate:
 - A critical deficiency was discovered during operational testing at the Eastern Air Defense Sector. The BCS-F system did not reliably pass tracks to the Joint Air Defense Operations Center at Bolling AFB, Washington, D.C. This deficiency causes a loss of situational awareness for the operators conducting surveillance of the National Capital Region and results in an inaccurate air picture. The Eastern Air Defense Sector will not accept R3.2 until this deficiency is corrected. The Air Force planned to resolve this deficiency in R3.2.1, which underwent testing from September through October 2012.
 - R3.2.1 did not resolve the critical deficiency, and DOT&E assessed it as not effective and not suitable. The Air Force subsequently developed a new software release (R3.2.0.1), which completed testing at the end of November; preliminary data shows it fixed the critical deficiency. R3.2.0.1 also successfully demonstrated a temporary solution to operate with mandatory International Civil Aviation Organization flight plan changes. The permanent solution will be incorporated into R3.2.2. DOT&E will update the assessment of R3.2 once all test data has been received and analyzed.
 - Operational testing of R3.2 also uncovered the potential for BCS-F to provide inaccurate bearing and range information on an air track of interest. The effect of this deficiency is that commanders could make incorrect tactical decisions based on erroneous data. The operational sectors assessed this deficiency as critical, but Air Combat Command downgraded the severity and plans to implement a fix in R3.2.2, which the Air Force plans to start testing in January 2013.
 - Test personnel discovered six other critical deficiencies during R3.2 testing, but the Air Force paused testing,

Assessment

- DOT&E analyses of R3.1.3 concluded:
 - R3.1.3 is operationally effective and supports NORAD air defense operations, providing the ability to adequately perform core competencies and tasks required to accomplish the air defense mission.
 - R3.1.3 is operationally suitable with major shortfalls in logistics supportability, system documentation, and training. While training on datalink operations and combat identification have improved, system security training and training for differences in each new build still have major deficiencies.

- developed a fix for each critical deficiency, and demonstrated each fix during subsequent test events.
- The BCS-F is required to demonstrate a Mean Time Between Critical Failure of 10,000 hours with an operational availability of 99.98 percent. Six critical failures occurred during 699 hours of operational testing at the System Support Facility and the Eastern and Western Air Defense Sectors. Total system downtime at the System Support Facility and Eastern and Western Air Defense Sectors was approximately 44 hours for an operational availability of 90.5 percent during operational testing, which users consider inadequate given the mission of BCS-F. However, the Air Force has subsequently demonstrated fixes for the failures causing the downtime.

Recommendations

- Status of Previous Recommendations. The Air Force satisfactorily addressed all but three of the previous recommendations. The Air Force still needs to:
 1. Correct and formalize all BCS-F Increment 3 system documentation and training deficiencies.
 2. Develop a plan for remote workstation management to include sustainment, training, documentation, and IA compliance.
 3. Upgrade the System Support Facility to support a more robust BCS-F developmental and operational testing capability in order to minimize the impact of overall testing at the operational sites.
- FY12 Recommendations. The Air Force should:
 1. Improve R3.2 reliability and operational availability until these suitability requirements are demonstrated with statistical confidence.
 2. Continue to track and correct IA deficiencies.
 3. Demonstrate the permanent solution for R3.2 to successfully incorporate and process International Civil Aviation Organization flight plans.
 4. Update the R3.2 Test and Evaluation Master Plan to reflect planning and FY13 funding for R3.2 follow-on testing.

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