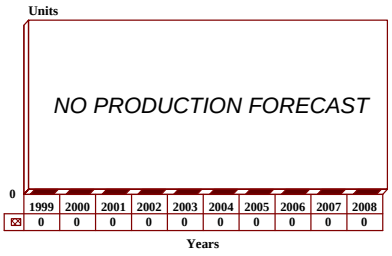
GBCS-L/H -Archived 7/2000

Outlook

- Development testing has uncovered problems which are impacting the schedule and prompted a budget rework
- IEWCS program will be completely replaced by Prophet
- Milestone III decisions and production will be based on new program

10 Year Unit Production Forecast
1999-2008



Orientation

Description. Ground Based Common Sensor – Light/ Heavy tactical sensors; vehicle-mounted signals intercept and precision location systems.

Sponsor
US Army
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(IEWCS Prime)

Status. EMD, LRIP, Milestone III pending.

Total Produced. An estimated 15 prototypes and LRIP units produced to date.

Application. Light, Airborne, and Air Assault Divisions, Armored/Mechanized Divisions and Armored Cavalry Regiments.

Price Range. GBCS unit cost is estimated at between US$12 and US$14 million.

Technical Data

Design Features. The Intelligence and Electronic. Warfare Common Sensor (IEWCS) program funded the development of a standardized, interoperable and interchangeable system of tactical signal interception, direction funding, and electronic countermeasures equipment. The IEWCS program was to develop

special tracked vehicles equipped for battlefield electronic warfare and capable of keeping up with fast-moving front-line units.

Signals Warfare Development, Project DL-12, provides for a family of integrated ground-based and heliborne intelligence and electronic warfare common sensor systems. The Ground Based Common Sensor (GBCS) is an intercept and emitter location system. It provides division commanders with the capability to search, intercept, listen to, precisely locate for hard-kill or order-of-battle resolution, or render ineffective through electronic attack, threat command and control and fire-control communications nets. It also identifies and precisely locates threat counter-mortar and counterbattery ground surveillance radar emissions, and identifies enemy conventional and Low Probability of Intercept (LPI) communications and non-communications emitters and jams enemy conventional and LPI communications emitters.

GBCS is an evolutionary system intended to continually overmatch threat capabilities through a continuous modernization philosophy. Modular components, commercial standards and open architecture features facilitate change in a cost-effective manner of changing parts via P3I vice whole system replacement. This open architecture feature satisfies the Army requirement to conduct tactical ground communications intelligence, electronic intelligence, electronic support, and electronic attack against threat communications and non-communications signals, and enhances the Commander's ability to outmaneuver and destroy the enemy by locating or jamming threat command and control, fire-control, and air defense centers.

The GBCS would be used in two platform configurations.

The GBCS-Light (GBCS-L) would be deployed on a highly mobile multipurpose wheeled vehicle (HMMWV) in support of Light Divisions.

The GBCS-Heavy (GBCS-H) would be deployed on a tracked vehicle in support of Armored and Mechanized Infantry Divisions.

The third platform of the Intelligence and Electronic Warfare Common Sensor System is the Advanced QUICK FIX (AQF) that provides for a material change to the existing heliborne QUICK FIX communications intercept, collection, processing, direction finding, and jamming system and will be deployed to Army Divisions and Armored Cavalry Regiments (ACR). Configured in a Black Hawk Helicopter (EH-60A), it provides the moving platform necessary to provide for location accuracy sufficient for "steel on target" requirements, as well as for extension of radio line of sight (LOS) against target emitters.

This project provided for EMD and testing of IEWCS systems and subsystems, leading to Milestone III and product improvement of systems after initial production.

The subsystems are:

The Tactical and Communication Jammer (TACJAM-A) would enhance the Division Commander's ability to outmaneuver and kill the enemy by isolating and suppressing enemy fire control and command and control (C^2) nets at critical points in the battle; provide electromagnetic overwatch of the threat C^2 spectrum inclusive of both conventional and modern modulations (LPI); freeze the enemy in place by jamming C^2; and eliminate enemy counter-fire by locating High Value Targets for targeting. TACJAM-A is a state-of-the-art modular and scaleable electronic support measures (ESM) and electronic countermeasures (ECM) subsystem configured for use on a variety of air and ground prime movers (tracked, wheeled and heliborne).

The Communication High Accuracy Location System (CHALS-X) provides the targeting capability required to support the Division Commander's requirement to locate and kill the enemy by providing the location of High Value Targets. Airborne systems mixed with ground-based systems will be capable of precisely locating enemy weapon systems and units (regardless of whether the enemy uses conventional or modern radios), producing target locations sufficiently accurate for first round fire by organic artillery.

The Common Modules ELINT Subsystem (CMES) provides search, intercept, direction finding (DF), precision location and analysis of the primary non-communication (radar) battlefield threat emitters. While operating in a fully automatic mode, it enhances the Division Commander's ability to outmaneuver and kill the enemy by specifically identifying High Value Targets such as enemy counter-mortar, and counterbattery ground surveillance radar at critical points in the battle and provides precise emitter locations with targeting accuracy.

The United States Marine Corps is utilizing the same subsystems as the GBCS and configuring them in a Light Armored Vehicle as a part of the Mobile Electronic Warfare Support System (MEWSS) improvement program.

This unclassified project is a part of the National Security Agency's Defense Cryptologic Program (DCP), Program Element 030885G, which provides a

portion of the funds required for the development of the precision location subsystem and system integration of GBCS-L and GBCS-H.

Operational Characteristics. The signals intercept and emitter location systems will search, intercept, locate, identify, and provide electronic countermeasures against enemy communications and non-communications emitters beyond the Forward Line of Troops. The ground-based element will provide a single system capable of performing the missions of four currently fielded electronic warfare (EW) systems: TRAILBLAZER, TEAMMATE, TACJAM, and TEAMPACK.

The Ground Based Common Sensor would provide Division Commanders with an advanced signals intercept and precision emitter location capability. The sensors will deploy with the forces to intercept and identify opposing C^3I emitters and radars. The GBCS units would provide electronic countermeasures against these communications or precision location information, making an artillery fire-for-effect first shot possible. GBCS would meet the ground commander's requirement for communications intelligence, electronic intelligence, electronic support, and electronic attack against enemy forces.

Situation development information will be transmitted to the Technical Control and Analysis Element (CAE) of the All Source Analysis System (ASAS) and targeting information will be transmitted through the TRACKER system to their respective users.

Acquisition Strategy. In November 1995, the US Army competitively awarded a five-year (basic plus four one-year options) contract to continue development and to acquire the IEWCS systems required to meet initial Army needs. Procured during the first two years of the contract were: Limited Production, Urgent (LP(U)) units of the Ground Based Common Sensor-Light (GBCS-L) system and Low Rate Initial Production (LRIP) units of the Advanced QUICK FIX (AQF). The contract also provided for continued software and hardware development to correct existing deficiencies and/or to meet Operational Requirement Document (ORD) performance for all IEWCS systems, including the Full Scale Engineering Development (FSED) models of the GBCS-Heavy systems.

The LP(U) GBCS-L systems were scheduled to undergo Initial Operational Test & Evaluation (IOT&E) in FY98, leading to a full production MS III decision review in 1QFY99. The LRIP AQF systems and the upgraded FSED GBCS-H systems were to undergo a joint IOT&E in FY99, leading to full production MS III decision reviews in 1QFY00.

The acquisition strategy was: following MS III decision approvals, full-scale production for all three systems (GBCS-L, GBCS-H, and AQF) collectively were to be awarded competitively.

Program Budget Decision No. 290 in late 1998 changed all this, reworking the entire program and changing to a significantly COTS-based approach to meet the EW needs of front-line forces. The new effort was designated Prophet.

Variants/Upgrades

GBCS-L (MLQ-39) would deploy with Armored and Mechanized Infantry Divisions. It was designed to be mounted in an HMMWV and transportable by C-130 or C-141.

GBCS-H (MLQ-38) would deploy with Light, Airborne, and Air Assault Divisions, as well as Armored Cavalry Regiments. It was designed to be carried by the tracked Bradley variant Electronic Fighting Vehicle (EFV) and transportable by C-5 or C-17.

Program Review

Background. The Army had been fielding a variety of battlefield electronic warfare systems to support front-line units Four in particular – TRAILBLAZER, TEAMMATE, TACJAM and TEAMPACK – carried the brunt of the workload. Having four different systems proved awkward. They were not totally interoperable, logistics support was inefficient, and they were not totally compatible with key airborne assets. As a result, the Army decided to develop the Integrated Electronic Warfare Common Sensor (IEWCS) for its armored and mechanized infantry divisions and its airborne and air assault divisions. Based on analysis of the needs of front-line units, a set of fully interoperable, standardized systems was created which could search, intercept, locate, identify, and provide electronic countermeasures against enemy communications and non-communications emitters.

Work progressed on several fronts. In 1989, the Army awarded a contract to a Lockheed Sanders/AEL team for engineering development of the TACJAM-A, an upgraded ground jamming system to replace the

MLQ-34. Because of the variety of considerations in planning TACJAM-A and developing funding sources for all of the work under consideration, there were delays in awarding contracts for the work. The Army awarded a contract for engineering and manufacturing development (EMD) of IEWCS, the GBCS-L GBCS-H and Advanced QUICK FIX. The TACJAM-A Electronic Countermeasures ECM subsystem was updated and an option awarded on the PM Bradley multiyear contract to procure an EFVS for GBCS-H.

FY92 accomplishments included awarding a contract for fabrication of TACJAM-A ESM and ECM EMD subsystems. Contractors delivered a TACJAM-A ESM prototype subsystem in place, the first EFVS to the IEWCS integration contractor, and the Army exercised an option for two additional EFVSs for GBCS-H and continued E&MD. Engineers also delivered the first GBCS-L prototype platform to the IEWCS integration contractor.

In FY93, the Army continued integrating the GBCS/AQF at a cost of US$36.819 million. The program office exercised the RDT&E option for GBCS-L EMD, conducting a Critical Design Review. The last two EFVS platforms were delivered to the integration contractor and three GBCS-L platforms were delivered for integration (US$6.749 million).

FY94 saw the Army resume TACJAM-A EMD and coding/testing of CHALS-X frequency hopping software. The GBCS/AQF integration effort, including a special In-Process Review and Contractor Test, was funded at US$15.44 million.

In FY95, US$20.9 million was budgeted to continue GBCS/AQF integration. Plans included improving GBCS/AQF by adding the capability to intercept, process, and locate pre-formatted communication signals and additional special modulations. A Customer Test on GBCS-L was included. US$1.749 million was spent to conduct an operational demonstration customer test/development test (OCDT) on GBCS.

FY96 accomplishments included completing TACJAM-A ESM development (US$241,000) and investing US$7.401 million to continue GBCS/AQF integration, fielding EMD Models of GBCS and AQF Systems to Task Force XXI, and improving GBCS/AQF by including other advanced communication modifications and techniques, as well as advanced signal analysis and improved signal sorting parameters. Integration of TACJAM-A ECM into AQF was begun. Other efforts included US$1.749 million for an Operation Demonstration Customer Test/Development Test on GBCS, and US$3.044 million for high-level software design and initial hardware development. Contractor maintenance support for Task Force XXI cost US$925,000.

IOT&E for GBCS-L was rescheduled from 4QFY96 to 4QFY97 due to integration problems. This was again changed in FY98, with GBCS-H moved to FY99. These changes were to support Milestone III decisions moved to 1QFY99 and 1QFY00, respectively.

The FY97 planned program included US$4.122 million to continue GBCS/AQF improvements, including advanced digital modulations and techniques and remote collection techniques, finish ECM subsystem integration into AQF, begin integration into GBCS-L and GBCS-H, and other product improvements resulting from Task Force XXI evaluations. US$8.506 million was budgeted for GBCS/AQF software fixes. US$1.107 million was earmarked to conducting training and provide contractor depot repair in support of IOT&E for GBCS-L. US$1.072 million was allocated for contractor maintenance for Task Force XXI.

The FY98 planned program was to continue development and final modification of the CCA boards of the TACJAM-A ECM system that would be incorporated in GBCS-H and AQF. Increased TACJAM-A special signal capabilities were to be developed and platform integration problems corrected. US$5.009 million was budgeted to continue development and integration of GBCS-H. US$1.5 million was to be used to fix central software issues, with US$4 million allocated to contractor field tests and follow-on fixes. US$3.049 million had been set aside to conduct training and provide contractor depot level repair in preparation for and support of IOT&E for GBCS-L. US$10 million was budgeted for IOT&E on GBCS-L, with US$200,000 going into preparations for GBCS-L Milestone III.

Another US$1.386 million had been set aside for Full-band DF Calibration, US$2.3 million for OPTEC Support for IOT&E, GBCS-L, and US$691,000 for Small Business Innovative Research/Small Business Technology Transfer Programs (SBIR/STTR).

The FY99 planned program budgeted US$7.728 million to continue development and integration of GBCS-H, with US$8 million set aside for IOT&E on AQF/GBCS-H. Another US$200,000 had been programmed to conduct Milestone III on GBCS-L. US$300,000 was to be used to prepare documentation in preparation for Milestone III on AQF/GBCS-H.

GAO Report - Electronic Warfare: Test Results Do Not Support Buying More Common Sensor Systems (Letter Report, 03/24/98, GAO/NSIAD-98-3). The General Accounting Office (GAO) conducted a follow-up review of the IEWCS program, focusing on whether

results of testing conducted since its previous review support continued IEWCS production.

The letter from the GAO to the Department of Defense:

B-276172
March 24, 1998
The Honorable William S. Cohen
The Secretary of Defense
Dear Mr. Secretary:

We have completed our follow-up review of the Intelligence and Electronic Warfare Common Sensor (IEWCS) program, which is to provide the Army and the Marine Corps with improved signals intelligence capability. In 1995, we suggested the Army's fiscal year 1996 IEWCS procurement request be reduced because operational testing to prove the system worked properly was not scheduled until fiscal year 1997. 1) In 1996, we reported the Army had prematurely committed to low-rate production the prior year and recommended that additional IEWCS production planned for fiscal year 1997 be canceled. 2) In response, the Department of Defense (DoD) reduced the number of systems to be procured, but permitted the Army to proceed. To assist the Congress in its oversight of DoD's management of systems acquisitions, we conducted this follow-up review to determine whether results of testing conducted since our previous review support continued IEWCS production.

1) 1996 Defense Budget: Potential Reductions, Rescissions, and Restrictions in RDT&E and Procurement (GAO/NSIAD-95-218BR, Sept. 15, 1995).

2) Electronic Warfare: Additional Buys of Sensor System Should Be Delayed Pending Satisfactory Testing (GAO/NSIAD-96-175, Sept. 27, 1996).

The report text:

IEWCS objective is to provide improved signals intelligence

IEWCS is being concurrently designed and produced to provide select Army and Marine Corps units with improved signals intelligence and electronic attack capability against communications systems used by hostile forces. Through fiscal year 1997, the Army and the Marine Corps have spent a total of US$750.8 million to develop IEWCS and procure 17 systems for the Army and the Marine Corps. These IEWCS systems have been or are to be fielded on Army light vehicles, heavy armored vehicles, or EH-60 helicopters, and Marine Corps light armored vehicles.

Commitment to IEWCS LRIP was premature

The DoD Comptroller considered our 1995 report in evaluating the Army's fiscal year 1997 budget request and reduced the Army's planned second procurement of EH-60 IEWCS systems from four to one. Subsequently, we monitored the IEWCS program in anticipation of forthcoming 1996 developmental tests.

In September 1996, we concluded on the basis of the developmental test results that the Army had prematurely committed to LRIP of the unproven IEWCS system and planned additional LRIP that was not justified by test results. We also pointed out that the Army had plans to enter full-rate production without demonstrating that IEWCS could meet minimum acceptable operational performance requirements. Furthermore, we concluded that unless this acquisition strategy was changed, the Army was at risk of becoming committed to procuring an unsatisfactory system requiring redesign and retrofit to achieve acceptable system performance.

We recommended that the Secretary of Defense require the Army to cancel the planned fiscal year 1997 procurement of one EH-60 IEWCS system; establish specific, measurable, minimum acceptable performance requirements; and demonstrate IEWCS capability to meet these requirements before proceeding with additional procurement. DoD did not cancel planned fiscal year 1997 production, but did agree that the Army should establish key performance parameters before conducting Initial Operational Test and Evaluation planned for fiscal year 1997. (Operational testing is DoD's primary means of determining if a system will be effective and suitable in a realistic combat environment.)

Results in brief

Test results now available do not support continued IEWCS production. The Army postponed operational testing scheduled for fiscal year 1997 that was to demonstrate IEWCS operational effectiveness and suitability in a realistic combat environment. The Army replaced operational testing with less-rigorous developmental testing, which showed that the system has serious hardware and software problems.

Furthermore, fiscal year 1996 tests of IEWCS on a Marine Corps vehicle showed that the Marine Corps' IEWCS prototype also has serious problems, including inaccurately identifying the direction to hostile communication systems by as much as 100 degrees.

Although the Army plans to conduct additional research and development work on IEWCS, in the interim, it still intends to contract for five more systems while trying to correct the problems. Lastly, despite the IEWCS system's many problems, the Marine Corps has joined with the Army and is procuring two IEWCS systems.

Operational testing canceled while serious problems remain

Subsequent to our 1996 report, the Army postponed the planned fiscal year 1997 operational test of IEWCS. Instead, the Army conducted additional less-rigorous developmental testing of the system on Army vehicles and an operational assessment of IEWCS on a Marine Corps vehicle. These tests revealed that serious problems remain to be corrected for IEWCS on both the Army and the Marine Corps platforms.

Army addressing hardware and software problems

According to the IEWCS Project Manager, the Army is concentrating on overcoming 47 software-related technical issues and 19 hardware and maintenance issues identified during additional developmental testing on Army vehicles. While many of the specifics of the problems are considered classified by the Army, in general, the software issues focus on system robustness, system accuracy, ease of use, and system throughput. According to program officials, there are several software problems for which no short-term fixes exist and additional systems engineering will be required at some later date. The hardware issues deal generally with system accuracy, and the maintenance issues with reliability. In addition to those problems, the Army remains concerned about the inability of IEWCS systems to demonstrate the ability to share data with each other. This is necessary for precisely locating hostile communication sources so they can be attacked, the primary reason why the Army wants IEWCS.

Test of Marine Corps IEWCS revealed serious problems

Tests of the Marine Corps' prototype IEWCS system have also revealed serious problems. In September 1996, after the planned Army operational test was postponed, the Army's Test and Experimentation Command (TEXCOM) at Fort Huachuca, Arizona, conducted a less rigorous operational assessment of an IEWCS system mounted in a Marine Corps light armored vehicle.

In preparation for the test, the Marine Corps identified criteria to measure 46 parameters of the system. During the assessment, however, Army testers only attempted to achieve 26 of the Marine Corps' criteria, and the system experienced significant problems. For example, the system was expected to identify the direction to the source of an intercepted communications signal within 5 degrees, but experienced inaccuracies of up to 100 degrees.

In addition, other significant weaknesses observed during the assessment of the Marine Corps' IEWCS system included ineffective active noise reduction headsets, leaving operators unable to hear intercepted communications, and IEWCS system crashes when operators used the digital tape recorder storage system. The Marine Corps system also required frequent recalibration to try to get accurate readings of the direction of intercepted signals. As a result of these and other problems, the system failed every 4.08 hours on average, though the desired mean time between operational mission failure rate is 65 hours. Upon completion of the Operational Assessment, TEXCOM described it as an "extremely complex, maintenance heavy, contractor dependent system."

Additionally, the assessment of the Marine Corps' IEWCS system was not representative of expected operational conditions and was hampered due to mechanical problems with the vehicle's generator and air conditioning. As a result, instead of being tested on-the-move, the vehicle sat in place, connected to external electrical power and air conditioning to keep the IEWCS components activated. This limitation precluded testing of the system's capability to operate while moving and therefore 20 of the 46 performance parameters could not be tested.

Marine Corps begins IEWCS LRIP despite poor test results

Despite the poor test results, the Marine Corps approved LRIP of two IEWCS systems. According to officials of the Marine Corps Operational Test and Evaluation Activity who reviewed the results, the assessment (1) demonstrated that the Marine Corps' IEWCS system had potential, (2) provided a yardstick to measure future progress, and (3) provided focus for continued development. Therefore, the Marine Corps decided to award an US$11 million contract for two IEWCS systems in December 1996.

Revised acquisition strategy still allows some production

Since the 1996 test of the Marine Corps' IEWCS prototype, the Army has revised its acquisition strategy and now plans to conduct additional research and development work on the IEWCS system to try to improve its performance. In addition, the Congress denied the Army's fiscal year 1998 budget request for $26.8 million for continued IEWCS production, citing the failure of the Army to submit the system to operational testing.

However, even though the Army acknowledges the system's problems, it still intends to use funds provided by the Congress prior to fiscal year 1998 to contract for two more IEWCS systems for light vehicles and three more IEWCS for EH-60 helicopters. The Army plans to contract for these five systems before the results of its additional research and development efforts are known and before a rescheduled operational test is conducted in May 1998.

Recommendation

The Army plans to contract for five more IEWCS systems without demonstrating that additional research and development efforts have corrected known deficiencies. Therefore, we recommend that you direct the Secretary of the Army to delay contracting for additional IEWCS systems until operational testing demonstrates that the system's many problems are fixed.

Agency comments

In written comments on a draft of this report, DoD concurred with the report and our recommendation. According to DoD, the Army has revised its plans, taken steps to reduce the technical problems we cited, and no longer intends to procure additional IEWCS systems in fiscal year 1998. Furthermore, DoD stated that the Army has adjusted the program's schedule to ensure that no further procurement decisions will be made without supporting operational test results.

Program Budget Decision No. 290 on Army C^4 Program Army – IEW Ground Based Common Sensor/Electronic Warfare Development (PE 0604270A, BA 5)

(TOA, dollars in millions)	FY 1999	FY 2000	FY 2001
Service Estimate			
IEW Ground Based Sensor (OPA)	**US$12.1**	–	–
RDT&E, A (PE 0604270A, BA 5)	US$16.4	US$38.6	US$55.5
Alternative Estimate	–	US$27.5	

The Army's IEWCS system was intended to modernize the Army's signals intelligence equipment at the division level. Due to problems with development and achieving a level of maturity and reliability necessary to begin operational testing, the IEWCS program managers deferred five IOT&Es planned between 1994 and 1998. The Army decided at the May 1998 operational test readiness review to downscope the 1998 IOT&E to a combined Development Test/Operation Test (DT/OT) and restructure the IEWCS program. The Army renamed the restructured IEWCS program Prophet, with a Milestone III production decision moved to the first quarter FY03.

As now envisioned, Prophet is to be a division-level signals intelligence (SIGINT) system. Its primary mission will be to electronically map radio frequency emitters on the battlefield. The Army budget includes US$38.6 million in FY00 and US$55.5 million in FY01 in RDT&E, A funds for Prophet. In addition, US$28.5 million is available in FY99 for IEWCS/Prophet. To date, the Army has identified US$5.5 million of the US$16.4 million in FY99 RDT&E, A funds to initiate Prophet in FY99. The Army has no current plans for the remaining FY99 resources.

The details of the Prophet Program were not articulated with any degree of specificity in the Army's FY00 Budget Estimate Submission (BES) or in subsequent information provided by the Army. In fact, "Prophet" is not referenced in the FY00 BES. The draft Operational Requirement Document (ORD) for Prophet is being coordinated within the Army and was to be completed by January 1999. As a SIGINT program, Prophet must be in compliance with the Joint Airborne SIGINT Architecture (JASA). The JASA determines the system architecture (i.e., designates the protocol, hardware, software, system interfaces, etc.). The Army has earmarked US$1.7 million in the FY99 RDT&E, A budget for JASA compliance. Eleven months are estimated for this effort (two months formulating the statement of work and revising the contract with Lockheed Martin, six months to develop the JASA itself, and three months for National Security Agency coordination). Since the Army planned to initiate the JASA effort in January 1999, the JASA for Prophet will not be in place until 2QFY00.

The FY99/00 Prophet requirements presented by the Army include:

FY99 Requirements (Total US$5.46 million).

- US$300,000 to conduct Milestone II for Prophet.
- US$2.3 million to develop communications intelligence (COMINT) subsystem.
- US$800,000 to investigate and demonstrate existing technology and commercial off-the-shelf (COTS) hardware as an alternative COMINT

capability for Tactical Communications Jammer (TACJAM- A).

- US$400,000 to conduct initial technical survey of available manpack COMINT receivers in preparation of Milestone II for Prophet.
- US$1.66 million for preliminary design of Common Remote/Reporting Architecture.

FY00 Requirements (Total US$38.55 million).

- US$4 million to procure long-lead items (Advanced QUICK FIX [AQF] aircraft displays).
- US$500,000 to procure COTS manpack radios.
- US$2.5 million to procure modified CDL datalink.
- US$2 million to start integration of manpack radios into HWMMVs.
- US$1 million to start antenna design for Prophet – Ground.
- US$2 million to start antenna design for Prophet – Air.
- US$6 million to upgrade AQF helicopters to current Black Hawk configuration.
- US$5.5 million to start TACJAM-A subsystem development (modified COTS).
- US$2 million to start development of a precision location capability.
- US$5.9 million to start integration of Prophet subsystems.
- US$600,000 to procure non-developmental Prophet ground control stations.
- US$50,000 to procure SICP shelters and incorporate them on HWMMVs.
- US$3.5 million for salaries and operating expenses.
- US$3 million to fix legacy systems based on DT/OT results.

The alternative estimate does not recommend funding the following FY99/00 amounts for Prophet given a realistic program start date of January 2000:

- US$3.8 million for FY99 Prophet (FY99 RDT&E, A) — Undertaking initiatives in FY99 to conduct a Milestone II, to develop COMINT subsystems, and to investigate/demonstrate hardware as alternatives for Prophet are premature when the Joint Airborne SIGINT Architecture (JASA), which will designate the protocol, hardware, software and interfaces, will not be completed until the second quarter FY00.
- US$6 million to upgrade AQF helicopters to current Black Hawk configuration (FY00 RDT&E, A) — Upgrading two Black Hawk helicopters to fleet standards is not a functional part of the Prophet system itself, and the Army has the option to provide a "conditional release" to fly these helicopters as needed for Prophet. Therefore, this effort may be delayed.
- US$5.9 million to start integration of Prophet subsystems (FY00 RDT&E, A) — Integration of Prophet subsystems in FY00 is premature and should be delayed to FY01 and FY02. This will allow for a complete maturing of the various Prophet software subsystems/datalinks being procured in FY00 as COTS, new development or upgrades.

In addition, the Army plans to utilize the US$3 million of FY00 RDT&E, A funds for follow-on efforts related to the IEWCS legacy system. This item must be funded with the available FY99 Other Procurement, Army (OPA) funds since it is for repairs of OPA-procured items.

The net impact is a reduction of US$27.5 million in FY00 RDT&E, A funds to the Electronic Warfare Development program. The alternative estimate offsets the recommended FY00 Prophet program budget of US$23.7 million with the FY99 RDT&E, A carryover of US$12.6 million, since the Army has not provided any rationale on the use of FY99 funds. In addition, the alternative identifies a FY99 OPA asset of US$9.1 million available for Army reprogramming to other priorities.

Request for Information/Sources Sought Notices. The Army began issuing a series of *Commerce Business Daily* notices seeking sources and input on COTS-based hardware and software which can meet battlefield electronic warfare needs for Prophet. According to program executives, the restructuring of the GBCS program will still offer an organic tactical signal intelligence capability that provides electronic mapping of the battlefield.

A January 1999 Request for Information (RFI) announced that the Product Manager for GBCS was conducting an industry survey for a datalink system to be used "to transmit/receive data from a ground control station to up to six airborne platforms. The system must have the capability to transmit/receive data among all six airborne platforms." The ground control link must be able to maintain communications with the airborne platforms even during on-the-move operations on the ground.

The Forward Link (FL) and the Return Link (RL) data rates must support airborne SIGINT data collection missions and be able to transmit up to 150 kilometers with hemispherical coverage both from the ground and from the air. The system is to operate at the SECRET Collateral security level. The ground control link will have to maintain communications with airborne platforms even during ground on-the-move operations (assuming unobstructed line of sight).

Both uploading and downloading will occur on the same link, with the downloading capability higher than the link uploading capability. This is to accommodate higher demands of downloading mapping data vs. uploading commands to the system. Program officials would like to procure a common datalink to increase interoperability with assets like the Guardrail Common Sensor and unmanned aerial vehicles.

One of the key differences between Prophet and the GBCS is that GBCS focused on the procurement of cutting-edge technology whereas officials now have a strong preference for commercial off-the-shelf or non-developmental equipment for Prophet. Companies having a system that could meet the requirements were asked to provide specifications, item description, and other pertinent material which would help program officials develop an acquisition strategy toward acquiring such a capability.

Program officials also set up an independent study team to examine the equipment for the communications intelligence component of Prophet. The COMINT unit was called the "heart of the system." It will monitor the battle environment and capture and demodulate radio signals so commanders can understand them.

Initial reports were that at least half of those responding the Request for Information had viable submissions.

In a December 1998 *Commerce Business Daily,* the Army sought industry information on COTS or Non-Developmental Item (NDI) electronic attack systems that can support tactical operations. These electronic systems would be considered for integration into heliborne and/or ground vehicle platforms. Under this Request for Information, the US Army solicited information on currently available systems or systems that could be modified in a quick and economical fashion. In addition, the maturity level of the system (i.e., present customer test results, fielding data, etc.) should be indicated, or a demonstration provided.

Required system characteristics include:

- The capability to jam fixed-frequency, burst, and low probability of intercept signals within the VHF band (frequency extension will be a future desire) with a minimum effective radiated power of 550 W out of a directional antenna,
- Jam signals having voice and data content with various modulation,
- Jam signals while on the move, and
- Operation independent of any other systems.

The respondents were asked to describe the signal environment and emitter density in which their system was evaluated. Respondents were to provide the maximum number of simultaneous emitters that the system can jam (convention or low probability of intercept signals or a combination of the two) and provide the time allotted for look-through.

Respondents were also to describe the types of jamming techniques and modulation types used, and report jammer effectiveness to the operator. They were also asked to describe harmonic suppression and inter-modulation prevention characteristics and methods, along with the suitability for mounting their system in a single light tactical vehicle (i.e., HMMWV, amphibious) and in an Army helicopter.

Proposed systems should comply with DoD standards, specifically Joint Technical Architecture-Army, Version 2. (This JTA may be viewed at: http://www-jta.itsi.disa.mil/) A proposed system should be capable of operation in a tactical environment, including heat, cold, rain, fog, dust, sand, wind, shock and vibration, explosive atmosphere, and other conditions found on the battlefield.

Respondents should describe system power requirements, provide mean time between failure data for hardware and software, and provide a concept of operations. In addition, a description of any special maintainability requirements and built-in-test capability should be provided.

Responses to this RFI were due on January 15, 1999.

Army officials have said that Prophet will key primarily on Prophet Air (PA) airborne systems. It will build on a core system in the 20 to 2,000 MHz frequency range, and feature LPI operations, data mapping, and datalink to ground stations. An interim capability will use the PRD-13 manpack SIGINT system, but plans are to leverage about 60 percent of existing integrated electronic warfare system (INEWS) technology into the new system.

Initial Prophet program plans call for installing 72 to 74 electronic attack systems on UH-60 Black Hawk helicopters and about the same number on HMWWVs. There are to be 14 ground control stations. The Marine Corps is interested in 12 units for inclusion in its

Mobile Electronic Warfare Support System (MEWSS). The Army plans to budget US$2.6 billion in production costs from FY06 through FY14.

Funding

US FUNDING

	FY97		FY98		FY99(Req)		FY00(Req)	
	QTY	AMT	QTY	AMT	QTY	AMT	QTY	AMT
PE#0604270A								
DL 12 Signals Warfare								
DL12 Development total	-	15.7	-	28.1	-	20.4	-	8.7
GBCS-L/H specific lines	-	14.8	-	15.6	-	20.4	-	TBD
GBCS (IEW TIARA)	-	41.4	-	-	-	25.4	-	TBD

NOTE: National Security Agency Program Element 030885G, Tactical Cryptologic Activities, provides some funding for these efforts. Program changes will make a significant difference in future budgets.

All US$ are in millions.

Recent Contracts

(Contracts over US$5 million.)

Contractor	Award ($ millions)	Date/Description
Loral (LMCo)	29.5	Dec 1995 – Production and integration of IEWCS platforms, production of TACJAM-A, production of CHALS-X, along with production and integration of the GBCS-L/H, and Advanced QUICK FIX. (DAAB10-96-D-Q002)

Timetable

Month	Year	Major Development
3Q	FY94	Customer test for GBCS-L
4Q	FY94	Special in-process review supported Limited Procurement decision
1Q	FY95	Award contract for GBCS-L LPU
1Q	FY96	Award contract for GBCS/AQF LRIP
4Q	FY95	Complete special IPR on GBCS-LPU, field RDT&E models
2Q	FY96	Conduct Block 1 OCDT on GBCS/AQF, field RDT&E model of GBCS-L
Mar	1997	Participate in Advanced Warfighting Experiment at National Training Center (Force XXI)
Nov	1998	PBD No. 290 published
4Q	FY98	IOT&E on GBCS-L (old)

Month	Year	Major Development
Jan	1999	Prophet draft Operational Requirements Document
2Q	FY99	GBCS-L, Milestone III (old)
3Q	FY99	IOT&E on GBCS-H (old)
1Q	FY00	GBCS-H, Milestone III (old), Prophet development contract possible
	FY05	Prophet IOT&E

Worldwide Distribution

This is a **US** only program.

Forecast Rationale

Electronic combat and battlefield digitization is a top Army priority and driving force in equipment and tactics development. Exercises and combat experience revealed the Army's need for an aggressive approach to developing the ability to operate on an increasingly sophisticated battlefield of the future. The Army's Force XXI Advanced Warfighting Experiment at the National Training Center in March 1997 showed how the US will fight in the future, and how hostile forces will fight as well.

Creating the US electronic battlefield of the future has supported and encouraged the development of a variety of equipment and tactics to counter a foe's likely communications developments. The Army Modernization Plan noted that over the next decade, military forces worldwide will be improving their combat capabilities. Acquisition of advanced weapons and communications equipment is increasing, with an emphasis on quality, not just quantity.

Increasing interconnectivity and the ability to interface with other information systems coming to the battlefield will be important in ensuring that the Army has an electronic warfare capability suitable to future combat. Standardization reduces the cost and complexity of logistics support, an important consideration as defense budgets are reduced.

The Persian Gulf War proved that today's high-speed Army needs systems that can keep up with highly mobile, high-speed forces. In the Gulf, tracked vehicles broke down and had neither the mobility nor speed to keep up with the rapid advance of Coalition forces. IEWCS platforms, especially GBCS, have been designed to counter this very problem along with providing the most advanced EW capability feasible. In addition to mobility, the Army put significant effort into developing systems which can exploit/disrupt enemy systems as well as protect the forces with which they are deployed.

The new electronic combat strategy emphasizes smaller but technologically superior forces that are versatile, deployable and lethal. IEWCS, which would combine TACJAM-A, TRAILBLAZER, TEAMMATE and TEAMPACK capabilities, was to help the Army achieve its goal of meeting its 21st century tactical needs with less equipment. The award of the IEWCS build-to-model acquisition moved the entire effort, and therefore the individual projects, officially into production.

Electronic warfare is critical on the battlefield. Commanders must have information on the enemy's electronic order of battle and the capability to disrupt a hostile force's command and control communications. New systems are needed to keep up with technology on both sides of the forward line of own troops (FLOT). Budget cutbacks are decreasing the size and operating tempo of the Army, impacting overall production and the long-term levels of spares procurement and repair activities needed to support many systems, including the GBCS.

Planners pushed IEWCS. Funds were available, though constrained, to support IEWCS and the included efforts.

The GAO report reflects what is probably the result of this aggressive approach. It is not uncommon for the GAO to criticize EW development because of testing/ production scheduling. In this case, however, the GAO was partly on target. The Army had already slipped the development, and needed to evaluate its efforts.

IEWCS was an intelligent, but overly ambitious, approach to EW. Although the standardization of hard-

ware is important to improving the overall system, software development is a challenge. Cutting back from the large number of different systems used on the front line to a single system of systems was a logical approach, but the Army ended up trying to do too much with one system. The desired performance and reliability could not be achieved, testing was not working out, and a Milestone III production decision deferred.

The Army wisely decided to call an "all-halt" and step back to re-evaluate where it was, where it needed to be, and how to get there. By essentially stopping IEWCS and beginning a new effort, the Army is allowing itself to look at plans with a fresh eye unencumbered by established programmatics.

Nearly two-thirds of IEWCS technology may be able to be integrated to the new system, using what worked during testing and eliminating what did not. Prophet Air will be the key to the system, with the ground components providing early entry self-protection. Future plans call for moving the airborne components to an unmanned air vehicle (UAV).

Prophet plans and funding are a work in progress. By issuing the *Commerce Business Daily* notices, the Army hope to get solid information on technology and architectures which make success more likely and on which plans can be based. The Army is following the example of the other services in using commercially available equipment where possible to meet force needs. This hopefully will give units an electronic attack system that can be fielded quickly and affordably. The goal is a simple system that will not incur significant development costs, while at the same time give field commanders most if not all of the electronic combat capability they need.

Ten-Year Outlook

Production plans will be changed based on the new Prophet program.

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