ARMY TACTICAL SATELLITE COMMUNICATIONS

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Army tactical commanders in the future will have assured access to satellite communications systems that can be operational within 72 hours throughout the world.

INTRODUCTION

Global changes and fiscal realities have resulted in a fundamental change to our country's National Military Strategy. The National Military Strategy for the 1990s will increasingly rely on our capability to project joint forces combat power. A force which is at least 25 per cent smaller and based primarily in the United States, will require the need to be versatile and easily tailorable to accomplish a wide range of military operations. These forces will require the ability to assemble and move great distances, often with little or no warning.

With the changes to the National Military Strategy from a forward deployed linear European force to a U.S. based force having global contingency responsibilities, requires rapid, reliable, beyond line of sight communications both enroute and in a theater of operations. Rapid launch, assured access, tactical satellite communications uniquely provide this capability.

ARMY WARFIGHTING DOCTRINE

The Army's future warfighting doctrine, "AirLand Operations" envisions a much larger battlefield with reduced and highly dispersed forces. Battle in Airland Operations will not occur until enemy forces are significantly attrited by precision deep fire weapons. Unlike the previous warfighting doctrine, entire pieces of terrain will not be seized and held. Only key pieces of terrain will be held. The AirLand Operations forces will operate in a non-linear, highly mobile battlefield, requiring instant

and constant "communications on the move" at dynamic, beyond line of sight distances. Successful execution of AirLand Operations requires assured access, robust, secure, anti-jam tactical satellite systems that can support the tactical commander's command and control, intelligence and logistics requirements. Unlike current Army tactical satellite communications, where the bulk of satellite communications is at Corps and Divisions, successful AirLand Operations require assured access satellite communications at all echelons on the battlefield.

CURRENT TACTICAL COMMUNICATIONS ARCHITECTURE

The Army's current tactical command and control architecture is the Army Tactical Command and Control System (ATCCS). The ATCCS architecture consists of three communications systems and five computer systems serving the five battlefield functional areas of the tactical Army; Air Defense, Maneuver, Intelligence, Combat Support, and Fire Support. The communications system serving these battlefield functional areas consists of an Area Common User System (ACUS), the Combat Network Radio (CNR), and the Army Data Distribution System. These systems were designed primarily to serve a smaller, denser, non-dispersed battlefield with limited mobility requirements. The ATCCS architecture employs limited tactical satellite communications in the ACUS and CNR segment of the ATCCS architecture.

The bulk of tactical communications is carried by the Mobile Subscriber Equipment (MSE) System. MSE is a circuit switched digital cellular radio system. MSE was designed to support approximately 10,000 users (8000 wireline/2000 mobile) in a Corps area 150 X 250 miles. An Army Corps consists of over 100,000 soldiers. As we move to AirLand Operations, the Corps area increases to 400 X 1000 miles. These users will be highly mobile and widely dispersed. Additionally, since ownership of terrain will be questionable, especially hilltops, the connectivity becomes greatly jeopardized for terrestrial systems. Satellite communications will uniquely solve this dynamic MSE connectivity problem.

The existing Military Satellite Communications (MILSATCOM) System that provides satellite communications to the services is inadequate to support AirLand Operations. The current MILSATCOM System consists primarily of three systems; the Super High Frequency (SHF) Defense Satellite Communications System (DSCS), the Ultra High Frequency (UHF) Fleet Satellite Communications Systems (FLTSAT) System, and the UHF Air Force Satellite

Communications (AFSATCOM) System. DSCS provides for the greatest transmission capacity with some anti-jam capability. The FLTSAT and AFSATCOM systems have significantly less capacity, with no anti-jam capability. The Army has approximately 200 DSCS Ground Mobile Forces (GMF) terminals and over 3500 UHF manportable terminals. The GMF terminals are large and use eight or 20 foot dishes. These terminals are doctrinally found at Echelon above Corps (EAC), Corps and Division. The Army, Navy and Air Force share these systems with the National Command Authority, Commanders in Chief, Joint Chiefs of Staff, and other government agencies.

DESERT STORM SATELLITE COMMUNICATIONS

Access to MILSATCOM systems is determined on a priority basis. Prior to Desert Shield/Storm, the low priority of the tactical users at theater and below resulted in minimal use of MILSATCOM for peacetime training or operational situations. In Desert Shield/Storm, the tactical user priority was recognized and MILSATCOM service was provided from all available resources, to included commercial resources. However, due to the extensive satellite communications requirements, MILSATCOM and commercial services could not satisfy the multitude of requirements. At the start of Desert Shield the CENTCOM satellite usage was very limited. Once Desert Storm operations started, satellite usage increased over 100-fold. In excess of 1500 satellite terminals were deployed to theater, of which over 75 percent were single channel manportable military and commercial units. Despite the limited capacity and self interference problems, single channel terminals were used for command and control from EAC down through Corps and Division levels. Fifty percent of the satellite communications traffic was carried by over 100 DSCS GMF terminals. Large commercial INTELSAT terminals provided another 25 percent. The remaining 25 percent included FLTSAT, AFSATCOM, and commercial INMARSAT. The satellite usage requirements were for both inter and intra-theater communications. Intra-theater satellite communications were especially important because of the vast operational area in which there did not already exist a communications infrastructure. Key Lessons learned from Desert Storm, which would apply to expected future scenarios, is that there was insufficient satellite communications capacity and existing terminals are too large to support the mobile tactical commander.

FUTURE TACTICAL SATELLITE COMMUNICATIONS

To meet the recognized requirements of the Army

tactical commander for AirLand Operations, the Army has been aggressively pursuing assured access satellite communications in both the satellite and terminal environments. To support the tactical Army's satellite communications requirements, the Combined Arms Command Army Space Institute and the Army Signal Center have developed an Army Tactical Satellite Communications Mission Needs Statement.

The future Army wartime communications architecture, now being developed by the Army Signal Center, requires three to four thousand 2.4 Kbps low data rate (LDR) secure, anti-jam, manportable terminals and over 300 secure, anti-jam, 1-1.5 Mbps medium data rate (MDR) terminals. LDR terminals would support a rough order of magnitude of 75-150 required single channel nets in a two Corps theater of operations. LDR manportable terminals must be less than twelve pounds, with a desired set-up/tear-down time of less than five minutes. The MDR terminals must be highly mobile and use less than 4.5 foot diameter dishes, with a set-up/tear-down time of less than 30 minutes. Rough order of magnitude throughput requirements for the MDR terminals are 20 Mbps, using 50 MDR terminals in a two Corps theater of operations. The MDR two Corps theater of operations would provide connectivity for roughly 15 highly dispersed enclaves. Approximately 90 percent of the LDR terminals are to be used by Divisions and Special Operations Forces for command and control. The remaining ten percent will be located at Corps headquarters, Corps artillery brigades, and Corps armored cavalry regiments. The MDR terminals are to be used to support "range extension" for the MSE system to provide the needed connectivity on the much larger battlefield. These terminals will be located at Corps and Division.

To support these terminals with assured access communications, the Army has been actively involved in two satellite communications programs; the DoD MILSTAR Program, and the Army's Lightweight Tactical Satellite Communications System (LTASS). With Congress redirecting MILSTAR to support the tactical commander, the Army considers MILSTAR to be the primary tactical satellite communications backbone support of the future. However, because of rainfall and foliage attenuation characteristics of EHF, the Army will continue to need assured access UHF and SHF communications in many areas of the world. Initial MILSTAR satellites are to provide only LDR capabilities with MDR capabilities not to be available until near the turn of the century.

To provide primary service in certain parts of the world and to augment the MILSTAR constellation in theater of operations where

additional capacity will be required, the Army last year approved the Army LTASS program. The LTASS will provide this additional coverage capability, surge capability, and augmentation capacity. For both MILSTAR and LTASS, assured access communications by the tactical commander is imperative.

The Communications Electronics Command (CECOM) Center for Space Systems is the Army's developer for the LTASS. CECOM Center for Space is expected to conduct a joint demonstration launch with the Defense Advanced Research Projects Agency (DARPA) in 1994 of it's lightweight tactical satellite communications system. The LTASS is an evolutionary technology demonstration of rapid launch EHF payloads. The initial launch is projected to provide one MDR channel with 32 LDR channels launched into an elliptical or geosynchronous orbit. The follow-on satellite is projected to be launched after 1997 and provide additional MDR and LDR channels.

The rapid launch vehicles expected to be used are the Pegasus and Taurus. The rapid launch capability provides a deterrent against an enemy antisatellite capability. The Taurus will provide rapid ground launch of 500 pounds into a geosynchronous or 12 hour elliptical orbit. The Taurus launch capability is expected to be available after 1997.
The Pegasus is air launched from a B-52, and capable of launching 280 pounds into an elliptical orbit. The Pegasus could be launched and provide operational capability within 72 hours to any theater in the world. Three to four lightsats launched into an elliptical orbit could provide theater commanders continuous coverage in an area of operations.

SUMMARY

The future AirLand Operations Army will require a different communications architecture than previously used. Assured access, anti-jam, mobile communications, throughout the dispersed and dynamic battlefield is imperative to making AirLand Operations successful. Satellite communications, with small, lightweight terminals, will become an integral part of this communications architecture. The Army is actively pursuing this change.