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THE TRI-BAND SATELLITE TERMINAL: A CASE STUDY IN ACCELERATED ACQUISITION AND PROGRAM MANAGEMENT OF ARMY COMMUNICATIONS SYSTEMS

by

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The Super High Frequency Tri-band Tactical Satellite Terminal (AN/TSC-143) is a multi-channel tactical satellite communications terminal that allows information to flow between major headquarters within the operational theater and the continental United States. The AN/TSC-143 program used an accelerated acquisition strategy which implemented the concepts of teaming, tailoring, concurrency, and Electronic Bulletin Board (EBB) to accelerate the process. The program successfully reduced the Procurement Administrative Lead Time (PALT) to 72 days, but many other challenges had to be managed during the procurement of this communications system. This case study examines the acquisition environment surrounding this procurement. The case study illustrates the differences between the typical acquisition environment and the communications systems acquisition environment. It also provides valuable insight into developing an acquisition strategy for similar programs.

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THE TRI-BAND SATELLITE TERMINAL: A CASE STUDY IN ACCELERATED ACQUISITION AND PROGRAM MANAGEMENT OF ARMY COMMUNICATIONS SYSTEMS

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ABSTRACT

The Super High Frequency Tri-band Tactical Satellite Terminal (AN/TSC-143) is a multi-channel tactical satellite communications terminal that allows information to flow between major headquarters within the operational theater and the continental United States. The AN/TSC-143 program used an accelerated acquisition strategy which implemented the concepts of teaming, tailoring, concurrency, and Electronic Bulletin Board (EBB) to accelerate the process. The program successfully reduced the Procurement Administrative Lead Time (PALT) to 72 days, but many other challenges had to be managed during the procurement of this communications system. This case study examines the acquisition environment surrounding this procurement. The case study illustrates the differences between the typical acquisition environment and the communications systems acquisition environment. It also provides valuable insight into developing an acquisition strategy for similar programs.

TABLE OF CONTENTS

I. INTRODUCTION

A. FOCUS OF STUDY

The acquisition environment surrounding the procurement of Army communications systems is one of continual change. The procurement of a communications system requires the consideration of unique issues that the normal developmental acquisition process does not need to contemplate. Recognizing and defining these issues is necessary before the normal acquisition process can be tailored to meet communications systems procurement requirements.

The focus of this study will be to provide the reader with some insight into how the Army procures its communications systems. More specifically, this case study will analyze and discuss the acquisition environment surrounding communications systems requirements and how it differs from the normal developmental acquisition environment. Essential program elements to include the management, contracting, testing, and support issues will be analyzed.

B. BACKGROUND

The AN/TSC-143 terminal is a highly mobile multi-channel satellite communications system that provides connectivity between major headquarters within the operational theater and the continental United States. The need for the tri-band capability was proven during Desert Shield Desert Storm (DS/DS) where a lack of Defense Satellite Communications System (DSCS) capacity forced the Army to rely heavily on leased commercial terminals operated by civilian personnel. The Army, as well as other component Services, spent a great deal of money leasing commercial terminals, in some cases at 14 times the normal cost, and took additional risks by placing untrained civilians in harm's way.

The acquisition of the AN/TSC-143 satellite terminals was an urgent and highly visible effort. The contract required the delivery of six tri-band capable terminals to the

Power Projection Army Command, Control, and Communications (PowerPAC3) Company within six months of contract award. Although the contractor assured the Government that it could do the job, the program required extensive integration of Non-developmental Items (NDI), commercial-off-the-shelf (COTS), and Government-Furnished Equipment (GFE) into a package that was C-130 transportable. There were no existing satellite terminals, commercial or military, with tri-band capability contained in such a small deployable configuration. This fact made the program even more challenging and placed it at higher risk of failure.

Several factors, such as the internal and external organizational influences, the urgent need, the constraints of the acquisition process, and other imposed constraints created an environment that required tight management of the program. Creative methods of streamlining the process, while ensuring that a fully operational system was delivered, had to be implemented. An acquisition program in this constrained environment had to identify problems and incorporate solutions rapidly just to keep the program on schedule.

C. OBJECTIVES

The objective of this case study is to identify the challenges associated with the fielding of an urgent communications requirement in today's acquisition environment. More specifically, this study will analyze the differences between the standard developmental acquisition environment and the accelerated acquisition environment surrounding communications systems procurement. A detailed analysis of the differences will provide a better understanding of the various influences on the acquisition of communications systems. The results of the analysis provide lessons learned and recommendations to program managers (PM) in similar acquisition environments.

D. RESEARCH QUESTIONS

1. Primary Research Question:

What is the current acquisition environment surrounding communications systems procurement?

2. Subsidiary Research Questions:

a. Why is the communications acquisition environment continually changing?

b. What are the characteristics of this changing acquisition environment?

c. How does the AN/TSC-143 program illustrate this environment?

d. How did the AN/TSC-143 program proceed in this environment?

e. What can we learn from the AN/TSC-143 program about managing communications programs in this environment of rapid change?

E. RESEARCH METHODOLOGY

The first objective of this research paper is to provide a comprehensive summary of the literature pertaining to the Department of Defense (DoD) systems acquisition polices, processes, and strategies. This literature review provided background information on the acquisition and fielding of DoD's major weapon systems. The literature review provides the basis and the structure for the analysis in Chapter IV. The Primary sources of information include current acquisition directives and instructions and Army regulations and guidance on acquisition reform. Additional sources included Defense Systems Management College publications.

The second phase involved a comprehensive examination of the entire AN/TSC-143 acquisition and the impact of various internal and external influences on the program. An analysis of the differences between the AN/TSC-143's accelerated acquisition process and the normal developmental acquisition process as stated in the literature review provides an understanding of the unique environment surrounding procurement of communications systems. Gathering information on the AN/TSC-143 terminal procurement required numerous interviews with personnel from the Program Management Office (PMO) and Army commands providing support services to PMs. These commands included the Communications Electronics Command (CECOM), Training and Doctrine Command (TRADOC), Operational Test and Evaluation Command (OPTEC), and the United States Army Information Systems Command (USAISC). Additional information was gathered from Defense Information Systems Agency (DISA); the office of the Director of Information Systems Command, Control, Communications, and Computers (DISC4); the Army's *Research, Development and Acquisition* (RD&A) and Armed Forces Communications Electronics Association (AFCEA) *Signal* journal articles; after action reports; Internet web pages; and lessons learned from the PMO, OPTEC, and the fielded unit.

F. SCOPE OF STUDY

This study analyzes the acquisition environment surrounding the acquisition of the Army's communications systems, specifically, the SHF Tri-band Tactical Satellite Terminal (AN/TSC-143). The period covered begins at the program's inception on 22 October 1993 and ends upon the terminals' acceptance on 15 April 1996. The various influences affecting the development of the terminal's mission need, performance requirements, acquisition strategy, source selection, testing, and fielding are analyzed. The analysis brings out the unique characteristics of communications systems procurement.

G. ORGANIZATION

This thesis consists of five chapters (I-V). Chapter I included a brief introduction and described the objectives of this thesis. Chapter II provides an overview of the defense systems acquisition environment and discusses acquisition polices and processes. Additionally, it defines acquisition strategy and the need for streamlining acquisition to maintain a technological edge. Chapter III outlines the development of the AN/TSC-143 program and thoroughly discusses the events leading to customer acceptance of the terminals. Chapter IV analyzes the data collected from the research conducted in Chapters II and III. Chapter V summarizes the analysis from the previous chapter. It uses the results from the research and analysis to draw conclusions, answer research questions, and make recommendations. Chapter V also provides recommendations for further research.

II. ACQUISITION ENVIRONMENT

A. INTRODUCTION

This chapter provides a description of the overall acquisition environment and the systems acquisition process as it applies to DoD. This chapter also introduces the reader to acquisition strategy and the NDI procurement process. A brief summary of the Army's systems acquisition environment and the organizations involved is also included. This material provides the framework needed to understand and analyze the specific challenges associated with managing program requirements and the influences that affect the acquisition process.

B. CHANGING ENVIRONMENT

For the past 40 years the military has been focused on countering a Soviet threat. The military has produced operational plans and weapon systems capable of defeating huge Soviet forces crossing into Germany through the Fulda Gap. With the fall of the Soviet Union in 1991, the United States military was in search of a new mission. DoD was concerned that the collapse of the Soviet military would dramatically reduce the funds Congress authorized for defense. This in turn would likely lead to a reduction in force (RIF), closing of numerous military installations, and massive restructuring of the component Services. In response to the fall of the Soviet Union and Congressional pressure to justify the military requirements, President Clinton ordered a review of likely military threats to U.S. interests. The President had the Secretary of Defense formulate a strategy and mission plan to defeat those potential threats. The results of the review were reported in September 1993. It envisioned the military's mission as fighting two major regional conflicts (MRC) nearly simultaneously using a revised strategy of power projection rather than forward presence. The new mission and strategy allowed for considerable reductions in the military's personnel, equipment requirements, and installations.

The perceived reduction in threat allowed the public's interest to move toward more socioeconomic concerns. The public's and therefore Congress' focus after the end of the Cold War shifted toward the budget deficit and a desire to balance the budget. The amount of public attention the budget was receiving, combined with the perceived size of the defense budget, obligated the President and Congress to reduce the amount of discretionary spending. In 1995, defense spending made up approximately 62 percent of the discretionary spending in the Federal budget [Ref. 1: p. 3]. The reduced budget has forced the military's leadership to make some tough decisions between modernization of weapon systems and maintaining the force structure and readiness.

To help relieve the budget pressures, several reform initiatives were undertaken following the Cold War to make the Government more efficient and effective in carrying out its functions. Vice President Gore's National Performance Review pressured Federal Government agencies, including DoD, to "work better and cost less." DoD is accomplishing this by promoting innovation in the workplace, practicing good business judgment, and implementing changes to laws, regulations, and processes that impede smart practices. [Ref. 2: p.1]

DoD's acquisition process came under increasing scrutiny due to several factors: (1) the public's perception of fraud, waste, and abuse in Government procurement, (2) the need to field state-of-the-art equipment, and (3) the reduced defense budget. Acquisition reform became a catch-phrase in DoD, and a cultural change began to take effect at the higher levels. The passing of the Federal Acquisition Streamlining Act of 1994 (FASA), the recent release of the new DoD 5000 series documents, and the automated Defense Acquisition Deskbook indicate that progress is being made.

As the Army downsized to fit the new mission requirements, it implemented several reform initiatives to streamline the acquisition process. The goals of the streamlined process were to field affordable state-of-the-art weapon systems capable of countering emerging threats. The Army's Acquisition Executive (AAE), Gilbert F. Decker, has challenged the Army acquisition community to analyze and control what it does, cut through red tape, and eliminate low value items. Mr. Decker has suggested some simple rules to follow in deciding whether or not to implement a streamlining technique:

- Does it make good business sense?
- Is it legal and ethical?
- Is the PM willing to be held accountable (or take credit) for it?
- Is it consistent with the PM's mission? [Ref. 3: p. 1]

The rapidly changing external environment has led to DoD's mission, funding, force structure, and weapon programs to be continuously under question and review. DoD's acquisition environment revolves around a continuous process of improvement and reform focused on re-engineering the Government's acquisition system.

C. ACQUISITION PROCESS

The Federal acquisition process revolves around three decision-making areas as shown in Figure 1. They are requirements generation, the acquisition system, and the Planning Programming and Budgeting System (PPBS). For the acquisition process to function efficiently, it is important that these three support systems work together effectively.

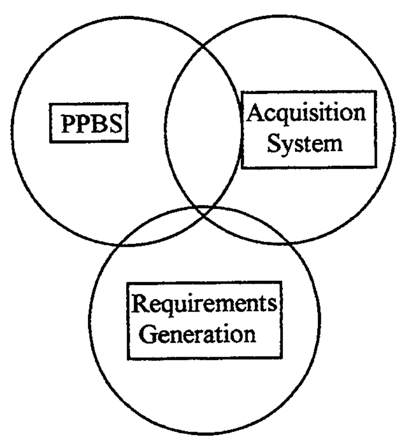


Figure 1. Acquisition Decision-Making Processes [Ref. 4: p. 8]

1. Requirements Generation

Requirements are generated from assessments of the military's capability to accomplish its assigned mission based on the future threat. The result of the assessment is the Mission Area Analysis (MAA), which identifies deficiencies in the military's capabilities. Once the MAA has identified a deficiency, alternative solutions are examined in order to resolve the deficiency. Non-material solutions are looked at first followed by: modification of existing system, modification of existing Allied system, new joint-service program, or a new service unique development program. [Ref. 4: p. 21]

If a non-material solution is not feasible, then a Mission Need Statement (MNS) is generated for a material solution. The MNS is a nonsystem-specific statement that defines the mission need in broad operational terms, identifies the threat to be countered as well as the projected threat environment in which the system needs to operate. For Army communications systems, the U.S. Army Signal Center, a component of TRADOC, is responsible for performing MAA and generating the MNS. Depending on the acquisition category (ACAT) of the program, the MNS is then forwarded to the appropriate operational authority for validation and approval. For ACAT I programs the MNS is approved and validated by the Joint Requirements Oversight Council (JROC) and a recommendation forwarded to the Defense Acquisition Board (DAB) for a decision on how to continue. For ACAT II-III (ACAT IV programs are now managed by systems commands) the MNS is approved and validated by the Service chief and forwarded to the component acquisition executive for action. [Ref. 4: p. 22-23]

2. Acquisition System

a) Acquisition Rules

The acquisition system is governed by statutes, regulations, specifications, standards, and various other forms of administration. Statutes provide direction for policy and procedure and are implemented through regulations and executive agencies. They are proposed, issued, and interpreted by several authorities, such as agency heads, congressional committees, boards, commissions, and courts. Procurement rules have been expanded annually, and are issued according to procedures and authorities granted by Congress. The rules are subject to interpretation and present some practicable challenges for managers attempting to improve the acquisition process. [Ref. 5: p.2]

b) Packard Commission

The Blue Ribbon Commission on Defense Management, the Packard Commission, was established by Executive Order 12526 on July 15, 1985. The President directed the commission to study defense management polices and procedures, including organizational and operational arrangements. In June 1986 the Packard Commission published its report. In its findings the Packard Commission noted that, "...all too many of our weapon systems cost too much, take too long too develop, and, by the time they are fielded, incorporate obsolete technology." The commission also recognized an increasingly bureaucratic and over-regulated process, and recommended changes including some of the following to improve the overall system:

- Greater use of off-the-shelf components, systems and services. New or custom-made products should be developed only when there are none available in the open market to meet military requirements.
- A high priority should be given to building and testing prototype systems before moving to full-scale development. Prototyping will let us "fly and know how much it will cost before we buy."
- Use of prototypes for early operational testing, which begins in the advanced development phase and goes on through full-scale development.

Actions have been taken to make many of the changes recommended by the Packard Commission. [Ref. 11: p. 4-5]

c) Defense Management Review

The Defense Management Review (DMR) reiterated the Packard Commission findings. The objectives of the review were: defense strength and readiness; new weapon systems at less cost and time; ensured achievement of planned performance; highest standards of integrity; and greater public confidence in administration by DoD. The DMR further addressed the need to rely on administrative leadership and effective managers to make the system work. It called for management improvement actions by DoD, by the administration, and by Congress. [Ref. 5: p. 110]

To create clear channels of command, the DMR specified that the civilian Service Acquisition Executive (SAE) would be responsible for all acquisition functions. For each group of programs in a Service, a Program Executive Officer (PEO) would operate under the SAE to manage assigned programs. PMs would report to the PEO and SAE. Systems and material commands within the Services are required to support programs but not duplicate the PEO or SAE management functions. [Ref. 5: p. 111]

To incorporate better systems development practices, the report addressed revisions in areas of procurement policies affecting competition, commercial products acquisition, and DoD's ability to employ commercial practices. Emphasis was placed on the use of prototypes at both the system and subsystem levels. The review also emphasized early, operationally realistic testing of prototypes. [Ref. 5: p. 110-114]

d) Federal Acquisition Streamlining Act of 1994

A new, simplified, acquisition environment was created with the enactment of the Federal Acquisition Streamlining Act of 1994. FASA, a major element of the President's "Reinventing Government" initiative, removed many of the barriers that precluded much of the U.S. industrial base from participating in the Defense market. Of the more than 650 unique laws regulating Government procurements, FASA repealed 55 laws and modified 175 others. FASA expanded the definition of "commercial products" and eliminated many of the unique requirements imposed on sales to DoD. It encouraged Government agencies to use commercial end-items and components, and required transition to an electronic (computer-based) procurement system. [Ref. 12: p. 32]

3. Major Weapon Systems Acquisition Process

The major weapon systems acquisition process assists the PM in developing, contracting, producing, testing, and supporting the validated mission requirements of the Armed Services. The changes enacted by FASA and implemented in the new DoD 5000 series publications will help enable PMs to provide the warfighter with weapon systems that are affordable and capable of defeating any emerging threat.

The major weapon systems acquisition process emerged from a study by the Blue Ribbon Defense Panel in 1970 and the issuance of DoD Directive 5000.1 in 1971. Further refinement came in 1976 when the Office of Management and Budget (OMB) published Circular A-109, titled "*Major System Acquisition.*" OMB Circular A-109 provides policy and guidance for the acquisition of major systems for Federal agencies, including DoD. The polices established by OMB Circular A-109 are intended to ensure the effectiveness and efficiency of the major system acquisition process. Guidance for implementation of this policy has recently been updated and is provided in DoD Directive (DoDD) 5000.1, "*Defense Acquisition*" and DoD Regulation 5000.2-R, "*Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs.*" Army Regulation (AR) 70-1, "*Army Acquisition Policy,*" implements DoD directives.

a) Acquisition Milestones and Phases

Providing operational military forces the weapon system resources needed to accomplish DoD objectives is the purpose of the acquisition process. The acquisition process is a sequence of activities that begins with the identification of a mission need, and extends through the introduction of a system into operational use. [Ref. 6: p. 11] The acquisition process described in DoD 5000.2-R is a sequence of program activity phases, milestone reviews, and decision points that lead to the fielding of fully supportable systems. It is structured in four phases, each separated by a major decision point or milestone as shown in Figure 2. This framework provides both a management and decision-making forum that facilitates the long-term acquisition process.

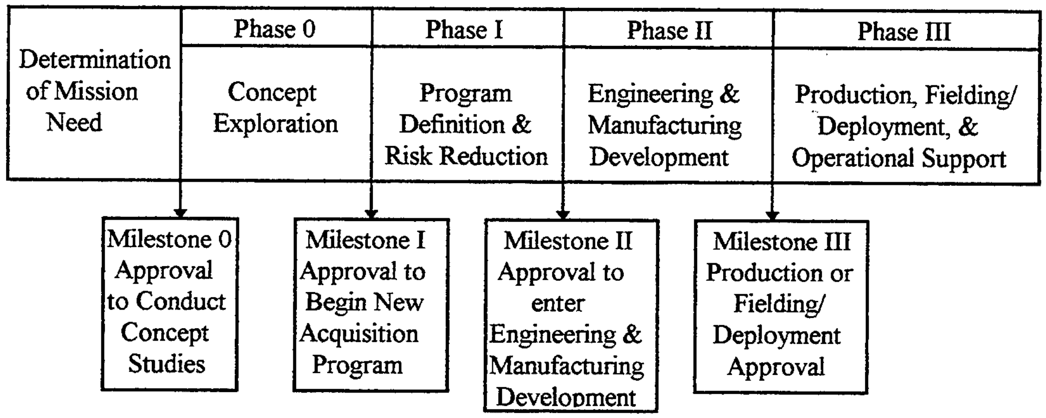


Figure 2. Acquisition Milestones and Phases [Ref. 7: p. 14]

Milestone 0, Approval to conduct Concept Studies, determines if a documented mission need warrants a study of alternative concepts to satisfy the identified mission need. Approval at this milestone results in an Acquisition Decision Memorandum (ADM) being sent to the Service office responsible for acquisition and initiates Phase 0, Concept Exploration. Studies of alternative concepts are conducted to identify the most favorable solutions to validated user needs. The component Service responsible for acquisition performs a Cost and Operational Effectiveness Analysis (COEA) and prepares the Operational Requirements Document (ORD). A PM is appointed during this phase to prepare the acquisition strategy, plans, and Acquisition Program Baseline (APB) before entering the Milestone I review. The APB document is the contract between the PM and the Milestone Decision Authority (MDA) that identifies cost, schedule, and performance objectives.

Milestone I, Approval to Begin a New Acquisition Program, determines if the results of Phase 0 justify establishing a new acquisition program. A successful Milestone I review authorizes the start of a new program, and begins Phase I, Program Definition and Risk Reduction (PDRR). Phase I further develops, demonstrates, and validates the most favorable alternative concepts. The critical design characteristics and expected capabilities of the system concept are clearly defined. Technical risk and cost drivers are identified and trade-offs made to reduce program risks. Funding requirements are programmed into the PPBS during this phase as well as the formal designation of a PM.

Milestone II, Approval for Engineering and Manufacturing Development (EMD), determines if adequate resources are available, if technology is attainable, and if the threat is still valid. The program's acquisition strategy and low rate production quantities, if required, are approved at this milestone. A developmental baseline is established to identify program cost, schedule, and performance objectives. Phase II, Engineering and Manufacturing Development, will translate the design approach with the most potential into a stable, producible, and cost effective system design.

Milestone III, Approval for Production or Fielding/Deployment, is the decision point for the final acquisition strategy and production baseline. Approval at this milestone demonstrates a commitment to build, deploy, and support the system. Phase III, Production, Fielding/Deployment and Operational Support, begins the deployment of the operational systems to tactical units. Phase III has been expanded to include the logistical support of the system, monitoring system performance, identifying shortcomings and deficiencies, and modifying the system. Once the system becomes obsolete, disposal instructions are requested. The disposal of the system signifies the end of Phase III.

DoD 5000.2-R requires that a SAE assign program responsibility to a PEO within three months after program initiation. [Ref. 8: p. 13 part 3] The PM, or Material Developer (MATDEV), assumes responsibility for managing the program during each phase of the acquisition process. When discharging its responsibilities, the MATDEV must not only ensure that the system meets minimum performance requirements, but also that it is delivered on schedule, in the required quantities, and within approved budget ceiling.

This acquisition process evolves a system from a paper description of a concept to hardware that will go into production and fielding. The acquisition of a defense system can take from eight to 16 years starting with identification of a mission requirement to fielding of the system. During those eight to 16 years, the program is controlled through the periodic business and technical decisions of the acquisition process. [Ref. 9: p. viii]

b) Contracting

Contracting is a major part of the acquisition process. As depicted in Figure 3, there are seven steps to the contracting process, not including the pre- and post-contracting processes. The formal contracting process begins with the acquisition plan. The acquisition plan provides a means by which the acquisition team can integrate its efforts into a coordinated and unified process. The Competition in Contracting Act (CICA) of 1984 requires "advance procurement planning and market research" that the acquisition plan provides.

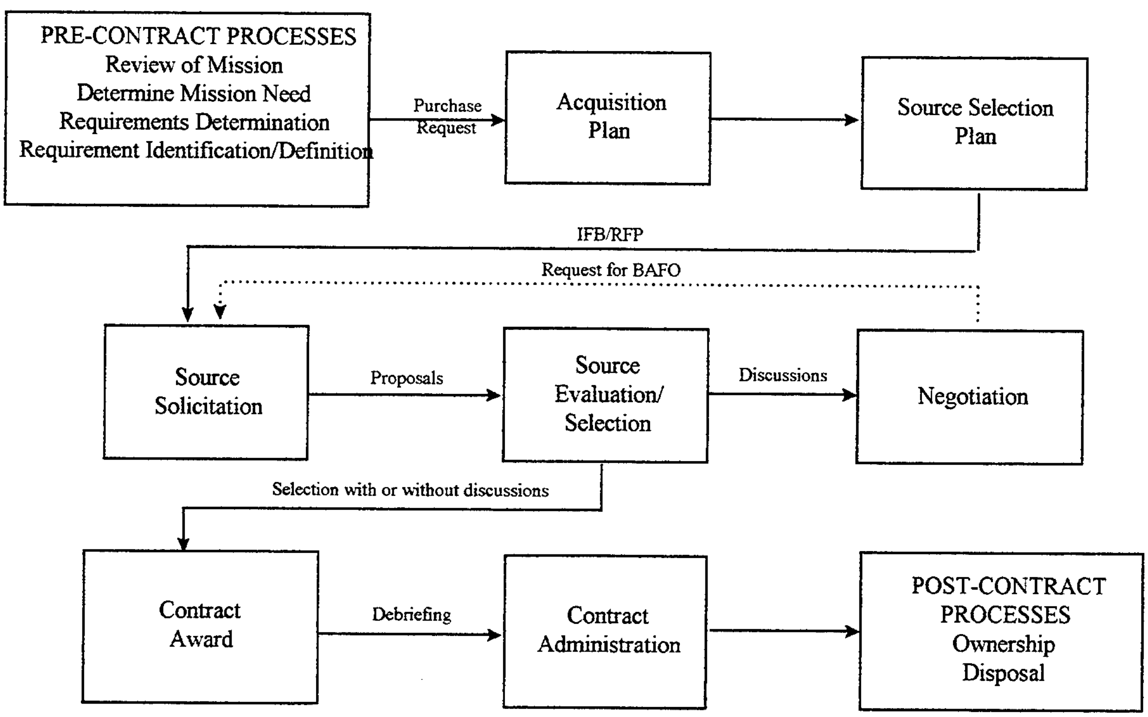


Figure 3. Contracting Process

The next step is developing the Source Selection Plan (SSP). The SSP begins the solicitation phase of the contracting process. Documentation and procedures for solicitation of proposals are created. Federal Acquisition Regulation (FAR) Part 15.612 states the minimum requirements that the SSP should include:

- Description of the organization structure
- Proposed pre-solicitation activities
- Summary of the acquisition strategy
- Statement of the proposed evaluation factors and any significant subfactors and their relative importance
- Description of the evaluation process, methodology, and techniques to be used
- Schedule of significant milestones

Once the SSP is approved by the Source Selection Authority (SSA), the contracting officer prepares the Request for Proposals (RFP) to solicit potential offerors. FAR Part 15 outlines the solicitation process and requirements for requesting proposals. Once offerors have responded to the solicitation with their proposals, an evaluation of the proposal is conducted. The purpose of this process is to determine how well each offeror can meet the contract requirements. The Source Selection Evaluation Board (SSEB), Source Selection Advisory Council (SSAC), and the SSA use the factors established in the RFP solicitation in making the source selection decision. To get the "Best Value" the contracting officer conducts negotiations with offerors in the competitive range. Upon receipt of offerors Best and Final Offers (BAFO) the evaluation process is conducted one final time. Following the final evaluation a recommendation is presented to the SSA. Award of the contract is made to the winning offeror as quickly as possible once the SSA determines which offer provides the "Best Value" to the Government. Within three days after the date of contract award, the contracting officer shall notify, in writing or electronically, each offeror whose proposal is determined to be unacceptable or whose offer is not selected for award. To the maximum extent practicable, a debriefing should occur within five days after receipt of the written request for debriefing.

The contracting process continues into the contract administration phase. There are 69 functions listed in FAR subpart 42.302 that the Contract Administration Office (CAO) shall perform. The 69 functions are encompassed under five major categories: (1) monitoring or surveillance, (2) review and approval, (3) determinations, (4) negotiations, and (5) issuance and control.

c) *Testing*

Test and evaluation of a system are a critical part of the acquisition process. "Test" denotes the actual testing of hardware and software to obtain data. These test data are valuable in developing new capabilities, managing the process, and making decisions on allocation of resources. "Evaluation" denotes the process whereby data are logically assembled and analyzed to aid in making systematic decisions. "Test and Evaluation" is the process by which a system or components are compared to requirements and specifications through testing. [Ref. 9: p. 29]

The role of test and evaluation in a NDI acquisition is exactly the same as in a typical developmental acquisition program. There is need for thorough, logical, systematic, and early test planning. It is also necessary to provide feedback in the form of well-documented, unbiased test and evaluation (T&E) results to system developers, users, and decision makers. The purpose of T&E in a defense system's development and acquisition program is to identify the areas of risk that need to be reduced or eliminated. During the early phases of development, T&E is conducted to demonstrate the feasibility of conceptual approaches, to minimize design risk, to identify design alternatives, to compare and analyze tradeoffs, and to estimate operational effectiveness and suitability. [Ref. 9: p. 38]

The testing process involves several agencies which must be brought together throughout the system's acquisition cycle as shown in Figure 4. The PMO, Test and Evaluation Command (TECOM), OPTEC, Army Material Systems Analysis Agency (AMSAA), Combat Developer (CBTDEV), and contractor are all involved in the test and evaluation plan. They meet formally through the Test Integration Working Groups (TIWG).

The PM is ultimately responsible for all aspects of the system development, to include coordinating the total T&E program. The PM normally has a deputy or assistant whose responsibilities include the supervision of testing as well as writing various test documents and reports. The PMO is responsible for writing reports and plans such as the Test and Evaluation Master Plan (TEMP). The information contained in the TEMP is influenced by the TIWG. The PM establishes and uses the

TIWG to help coordinate, plan, and discuss the testing and analysis effort. TIWG members include representatives from the development agency, the user, both developmental and operational T&E agencies, logistics, analysis, and training organizations. [Ref. 16: p. 4-1]

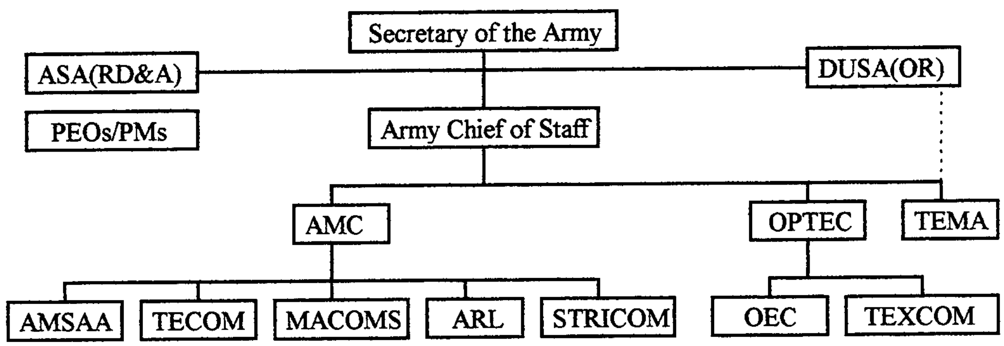


Figure 4. Army Test and Evaluation Structure [Ref. 16: p.3-6]

TECOM is the Army's developmental testing agency. TECOM, as presented in Figure 5, has facilities throughout the U.S. as well as locations outside the continental U.S. These subordinate facilities provide the people, equipment, and other resources to conduct various types of T&E. TECOM, through its various facilities, is responsible for planning, executing, and reporting the results of technical tests. Technical tests include development tests, technical feasibility tests, production qualification tests, joint tests, and contractor tests. TECOM is charged with maintaining the Army's major range and test facility base (MRTFB), maintaining the Army's T&E data base and researching, developing, and acquiring instrumentation and improved test methodology. [Ref. 16: p. 3-5]

The prime contractor is responsible for providing the Government with the required product. The prime contractor conducts its testing before Government tests and demonstrates that it is prepared to enter into Government conducted, or at least observed, testing. The contractor's testing during the initial phases of the acquisition cycle is likely to impact testing conducted by the Government during later phases. The contractor may even conduct some tests, observed by the Government, within its facility. [Ref. 16: p. 7-3]

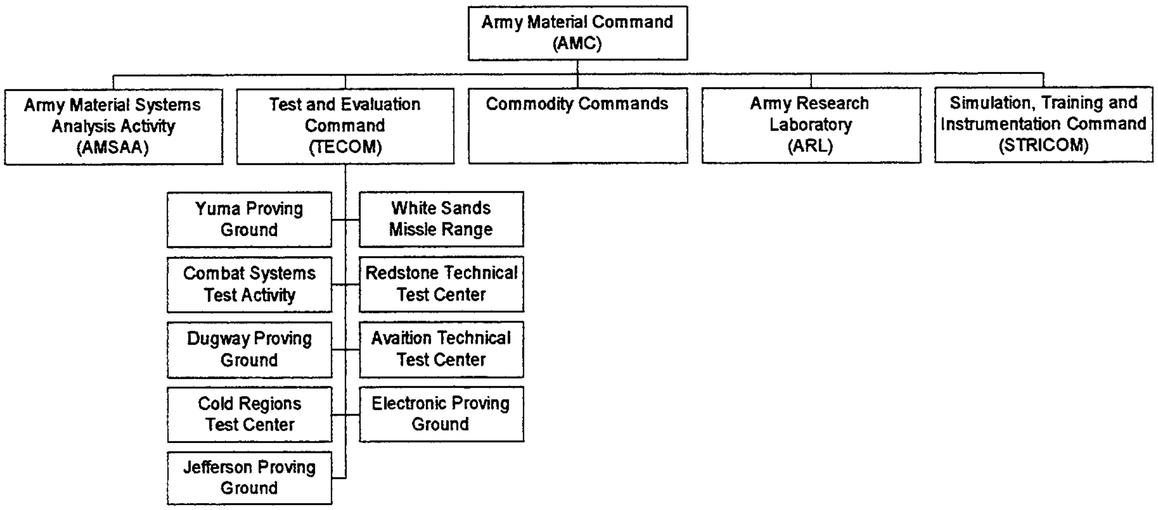


Figure 5. AMC and TECOM Structure [Ref. 16]

AMSAA is AMC's independent evaluator for the T&E process often referred to as the "honest broker." AMSAA is responsible for the Independent Evaluation Plan (IEP) as well as advising the tester and the program office on analytical issues, testing, and test documentation. AMSAA exerts influence on the statistical process controls of the tests in areas such as sample size, confidence levels, and test design. AMSAA conducts the analysis and evaluation of the testing and provides members to the TIWG. [Ref. 16: p. 3-5]

The CBTDEV is usually the "user" or the organization that represents the user and identifies the need for the system being developed. These agencies develop the doctrine and training for their respective branches based on overall Army tactics, doctrine, and guidance. They provide the MNS that initiates the development of a new system or the modification of an older system. [Ref. 17: p. 4]

d) Logistics Support

Another key area of program management is integrating the logistics support requirements for maintaining the system throughout its lifecycle. The focus of logistics support is on getting maintenance and repair parts support to the systems in the fielded units.

The maintenance plan addresses requirements related to such issues as level of repair, modification processes, facilities, personnel, and training. The Army uses a three-level repair model consisting of: Organizational, Intermediate, and Depot. The level of repair decision specifies the organizational level where a particular item will be repaired. This decision will either (1) generate a new repair capability, or (2) take advantage of an existing repair capability. Additionally, the repair of a particular item can be either (1) entirely supported at a single level, or (2) divided between several levels of repair. [Ref. 18: p. 308]

The first level of maintenance is called the Organizational level and is frequently referred to as the "operator" level. The maintenance tasks performed at this level include inspections, cleaning, lubrication, servicing, and minor adjustments. The relatively low maintenance skill levels required, at this level of repair, allow the maintenance technician to use checklists. [Ref. 18: p. 310]

The second level is the Intermediate, or field level. This level usually employs more highly trained personnel who perform component repairs. Some of the tasks may include adjustment, repair, extensive inspection, testing, and rebuilding of certain components. The testing and inspections performed at this level frequently require special tools, equipment, and test stations. [Ref. 18: p. 311]

The third level is the Depot level and includes: major modifications, alterations, inspections with disassembly, and retrofitting. This level of maintenance requires extensive maintenance training, and even engineering skills. The contractor who developed the item may become involved with maintenance at this level. The Depot possesses extensive tools and support equipment in order to perform maintenance. [Ref. 18: p. 311]

4. Planning, Programming, and Budgeting System

The PPBS was created by Secretary of Defense McNamara in 1960, to provide a formal structure for making decisions concerning the costs associated with the development of major weapon systems. The PPBS is DoD's official management system that uses programming to provide a bridge between the planning and budgeting of major weapon systems. The objective of PPBS is to assist DoD in making decisions about which major weapon systems are to be submitted in the President's budget given the budgetary constraints. [Ref. 4: p. 29-30]

D. ACQUISITION STRATEGY

The acquisition strategy provides the framework for achieving program objectives within resource constraints. It defines essential program elements to include the management, technical, resource, procurement and contracting, testing, training, deployment, support, and any other aspects critical to the success of the program. The acquisition strategy is formulated during Phase 0, Concept Exploration and Definition, and approved at the Milestone I decision. The acquisition strategy is updated during the subsequent acquisition phases, and approved at each milestone review. The primary goal in developing an acquisition strategy is to modify the acquisition process to achieve the optimal balance between cost, schedule, and performance objectives within basic policies established by DoDD 5000.1. [Ref. 8: p. 3 part 3]

DoD 5000.2-R allows the MATDEV to modify the acquisition process whenever and wherever practical. Modification of the acquisition process is known as tailoring. The results of tailoring the acquisition process is a reduction in administrative delays, program costs, and schedule.

Following the guidance of DoD 5000.2-R, MATDEVs look for existing systems that can be employed "as is," or can be slightly modified to meet requirements. The term NDI covers material available from a wide variety of sources with little or no development effort required by the Government. [Ref. 9: p. 3] If an existing or modified system can meet stated requirements, the system can be procured using a NDI acquisition strategy. [Ref. 9: p. viii] The NDI acquisition strategy focuses on procurement of commercially available systems that may require slight modifications to support military requirements. A NDI system is defined in DoD 5000.2-R as:

(1) Any previously developed item of supply used exclusively for governmental purposes by a Federal Agency, a State or local government, or a foreign government with which the United States has a mutual defense cooperation agreement.
(2) Any item described in (1) that requires only minor modification or modifications of the type customarily available in the commercial marketplace to meet the requirements of the procuring department or agency.
(3) Any item described in (1) or (2) solely because the item is not yet in use (FAR 2.101[12]). [Ref. 8: p. 5 part 3]

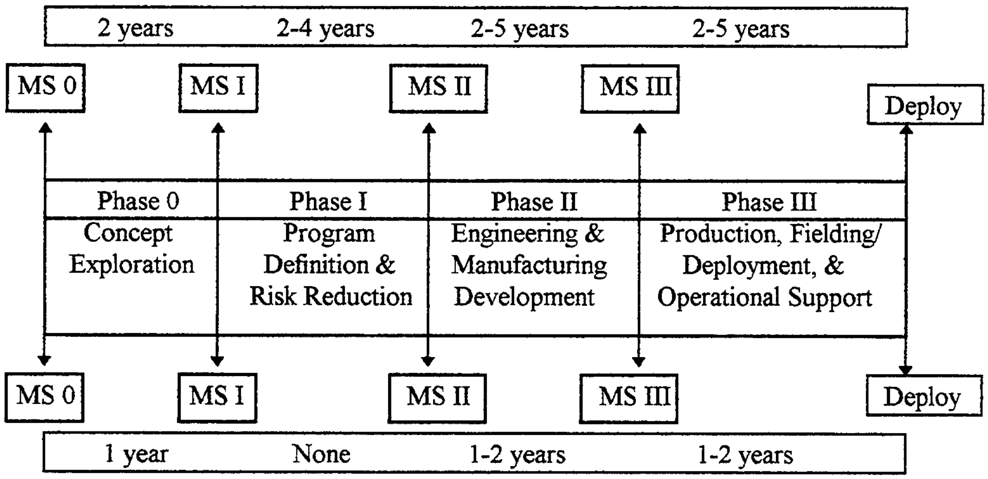
The Army has slightly altered the definition and application of NDI acquisition. The Army uses three distinct NDI categories:

(1) Off-the-shelf or basic NDI -- products that are used in the same environment for which they were designed and no developmental modifications are required.
(2) NDI adaptation -- products needing adaptation for use in an environment different from that for which they were designed.
(3) NDI integration -- products requiring integration of NDI components and subsystems. [Ref. 9: p. 3]

A NDI acquisition strategy requires the use of a tailored version of the standard acquisition process. Tailoring includes approaches such as overlapping, combining, or deleting phases of the acquisition process. The tailored acquisition process should allow the most efficient process of meeting program requirements, with regard to the degree of risk involved. Tailoring the acquisition process through the use of a NDI strategy provides many opportunities as well as challenges that the PM must consider. [Ref. 9: p. 4]

A NDI strategy permits a shortened acquisition process, which allows for a rapid response to an operational need. NDI systems can be fielded in considerably less time than full developmental systems as shown in Figure 6. This can be extremely important for programs where the mission need is urgent. [Ref. 9: p. 4]

Standard Acquisition process 8-16 years



NDI Acquisition Process 3-5 years

Figure 6. Comparison of Standard and NDI Acquisition Process [Ref. 13: p. 2]

NDI also pose challenges not associated with full development programs. Performance trade-offs may be required to gain the advantages from pursuing a NDI acquisition. Operational suitability and the performance capabilities of a NDI system may require trade-offs since a NDI has been developed for other than DoD needs. The PM must ensure that the NDI system meets the user's needs and operates properly in the user's environment. [Ref. 9: p. 4]

E. ARMY'S SYSTEMS ACQUISITION ORGANIZATIONAL STRUCTURE

The acquisition environment surrounding Army weapon systems procurement is complex, dynamic, and tends to focus resources on ACAT I and II procurements. The emphasis on acquisition reform has allowed the Army to create an organization solely dedicated to the procurement of its major weapon systems. Following the guidance of the DMR, the Army has streamlined the hierarchy involved in the material development and logistics support of its systems.

The Army's acquisition needs are primarily managed by three separate, but intertwined Army organizations: (1) Army MATDEVs, (2) AMC support centers, and (3) TRADOC CBTDEV. Each of these organizations is instrumental in developing, fielding, and supporting all weapon systems throughout their life-cycle, as depicted in Figure 7.

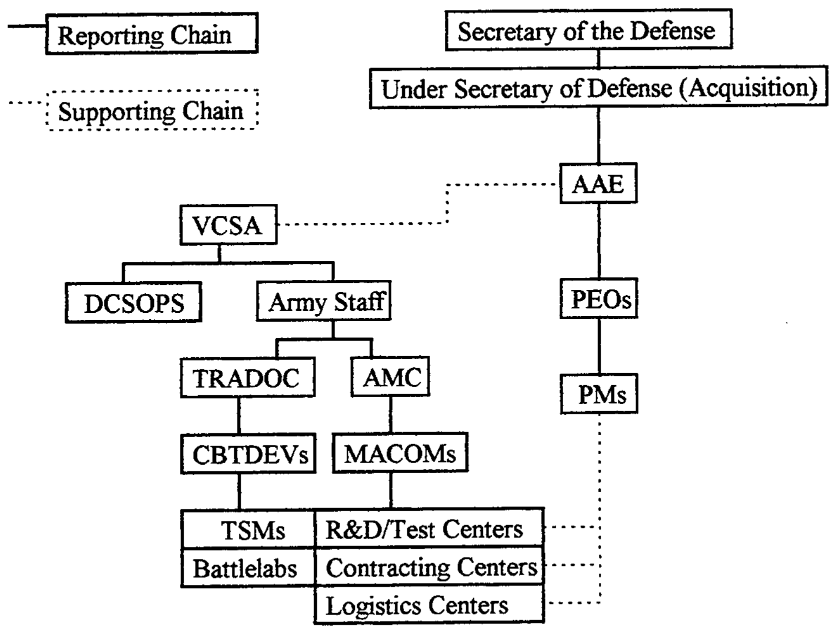


Figure 7. Acquisition Systems Organizational Relationships

PEOs are the MATDEVs for all the Army's major weapon systems. The PEO reports to the AAE, and oversees assigned programs to ensure that all necessary support is available. The PEO provides the planning, programming, budgeting, and execution necessary to guide assigned programs through the acquisition process. The PEO ensures that functional (matrix) support to subordinate PMs is planned and coordinated with the supporting organization. The PEO approves acquisition plans for assigned programs once concurrence is obtained from the contracting officer, the special competition advocate, the appropriate matrix elements from the supporting command, and the small or disadvantaged business utilization office. [Ref. 14: p. 2-2]

The program, project, or product managers plan and manage acquisition programs consistent with the policies and procedures issued by the AAE and appropriate publications. The PMs develop and submit requirements for financial, personnel, and contractor support to the PEO. The PMs coordinate for required functional support from the appropriate materiel command.

The Army Material Command (AMC) is tasked to buy, develop, field, and support all weapon systems for the Army's warfighter. AMC focuses its efforts in three special "core" centers: (1) Logistics and Readiness Centers (LRCs); (2) Research and Development Centers (RDECs); and (3) Acquisition Centers. AMC's major subordinate commands (MACOMs) work with the PMs to map out material acquisition strategies to take the warfighter's needs from research, through engineering design and manufacturing development, to final acquisition and fielding. AMC's subordinate commands provide matrix support to all PEOs, PMs, and Project offices in testing, engineering, contracting and cost analysis, quality assurance, and logistics support. AMC works closely with TRADOC Centers to help establish the final requirements for new weapon systems. The PM, AMC, and TRADOC work together to determine how these requirements can best be met within the guidelines, approval, and available funding provided by Congress and DoD. [Ref. 15: p.1]

TRADOC is the CBTDEV for all Army weapon systems. It develops, evaluates, and approves U.S. Army doctrine and materiel requirements, and plans and evaluates these products as required to support decisions. Additionally, the CBTDEV prepares and coordinates the Critical Operational Issue and Criteria (COIC) for materiel systems and information systems having tactical missions. The CBTDEV approves the COIC for those systems that are not reserved for approval by the Office of the Deputy Chief of Staff Operations and Plans (DCSOPS).

F. CHAPTER SUMMARY

DoD's acquisition system is influenced by continuous change in both the internal and external environments. The trend has been toward a simplified and more flexible system that can provide the user with a quality product in a relatively short time.

Acquisition reform has become DoD's key initiative to maintaining modernization of weapon systems while reducing the defense budget.

This chapter introduced the reader to some of the factors and key initiatives that have transformed the defense systems acquisition process. It also described the decision making process in terms of requirements generation, the acquisition system, and PPBS. A description of DoD's standard acquisition process and how it can be tailored using NDI to meet the changing environmental conditions or constraints were also presented. Finally, a brief summary of the various organizations influencing the acquisition of Army weapon systems was provided to indicate the complex relationships that the acquisition process must embrace.

III. TRI-BAND TACTICAL SATELLITE TERMINAL

A. INTRODUCTION

This chapter will provide the reader with an understanding of the framework and background in which the AN/TSC-143 system was acquired. First, a brief description of the AN/TSC-143 terminal and an outline of the program's management history will be presented. Second, this chapter will describe the acquisition environment and summarize the major events that took place up to customer acceptance of the terminals. This information provides the necessary background for understanding the acquisition environment and the impact of the various streamlining initiatives. A sequence of events is included in Appendix B.

B. SYSTEM DESCRIPTION

The Prototype Tri-band Tactical Satellite Terminal incorporates a combination of COTS, NDI, and GFE components. The terminal, as shown in Figure 8, is a self-contained unit mounted on a single Heavy High Mobility Multi-purpose Wheeled Vehicle (HHMMWV), and is roll-on, roll-off deployment capable via C-130 aircraft. The terminal operates in the Super High Frequency (SHF) range and has significantly higher communications throughput than existing military satellite terminals. The terminal has the flexibility of accessing both military and commercial satellite constellations on three separate frequency bands. Additionally, a switch has been integrated into the system that supports up to 35 subscribers (expandable up to 200) and is interoperable with Mobile Subscriber Equipment (MSE) and Tri-Service Tactical (TRITAC) communications networks. [Ref. 21: p. 1-2]

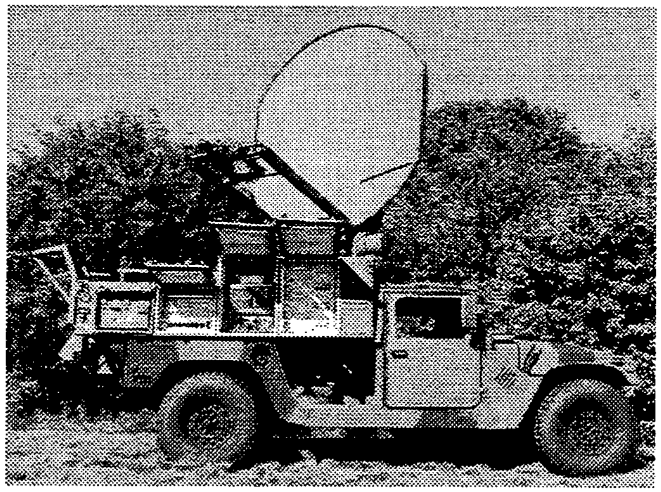


Figure 8. AN/TSC-143, Tri-band Tactical Satellite Terminal

C. PROGRAM MANAGEMENT

The AN/TSC-143 procurement presented some difficult challenges to the PM. The swift notification process, lack of formal (written) direction, and unrealistic cost and schedule constraints were but a few of the obstacles placed in the program's path. The added turmoil of the military downsizing, restructuring, pressure to succeed, and turnover also had a significant impact on the program's management. A brief outline of the events that took place from a program management perspective follows.

The PEO for Army Communications (PEO COMM) and the PM Satellite Communications (PM SATCOM) were notified telephonically, by a representative from the DCSOPS on 23 September 1993, of the need for a tri-band capable terminal. During the conversation, the DCSOPS representative stated that the program office should use a NDI and COTS based acquisition process, limit the procurement to six terminals, and not exceed $9.9 million in program cost. The DCSOPS representative stated that further guidance would be provided later.

PM SATCOM immediately set up a special project office headed by a Special Project Officer (SPO), Lieutenant Colonel (LTC) Sidwell, and composed of functional experts from CECOM to oversee the acquisition process. The SPO worked with TRADOC Systems Manager (TSM) SATCOM, and industry to develop and refine the performance requirements of this terminal. The SPO's efforts focused on balancing performance requirements with cost and schedule constraints to ensure the user's needs were adequately met.

The schedule constraint was seen as the most difficult challenge, and a tremendous amount of effort was placed on reducing cycle time. The SPO received dedicated matrix support from CECOM. This enabled him to use a dedicated, goal-oriented, team approach to reduce cycle time. The team adopted a zero-based requirements philosophy, where any requirement that did not make sense was modified or deleted. An Electronic Bulletin Board (EBB) was also established to maintain a continuous dialogue with industry. The Statement of Work (SOW) was limited to the requirements that could be satisfied by industry in the short time available. Many of the logistics, training, and testing deliverables were tailored to meet the unique requirements of the program or deleted entirely. As a result, the number of data items was reduced from 41 to 11 during development of the Procurement Data Package (PDP). [Ref. 17: p.5]

On 22 October 1993, DCSOPS validated the requirement for six satellite terminals capable of accessing both the military and commercial satellite constellations. The six satellite terminals would be fielded to the first PowerPAC3 company. The company was to be activated in June 1994, as the 269th Signal Company. On 7 January 1994, DCSOPS released a formal memorandum validating the urgent requirement for the six terminals. By this time, the SPO was ready to release the RFP.

Immediately following award of the contract the special project office was dissolved. PM SATCOM placed the program under Product Manager Tactical Satellite (PM TACSAT), LTC Mazzucchi, to monitor and manage the program as shown in Figure 9. PM TACSAT relied on the SPO and the Project Leader, Paul Hancik, to oversee the program. A new Procuring Contracting Officer (PCO) was selected to manage contract modifications.

During this period the emphasis was on monitoring the terminals' production. The contractor's prototype, the TRI-SAT terminal, had to be reconfigured to meet the military's specific requirements. The specifications required the integration of several new and/or upgraded NDI components that increased power requirements and weight. The cascading effect of each change tended to create numerous other problems that slowed the production of the terminals. Configuration management and integration of the components became a much higher risk area than originally thought.

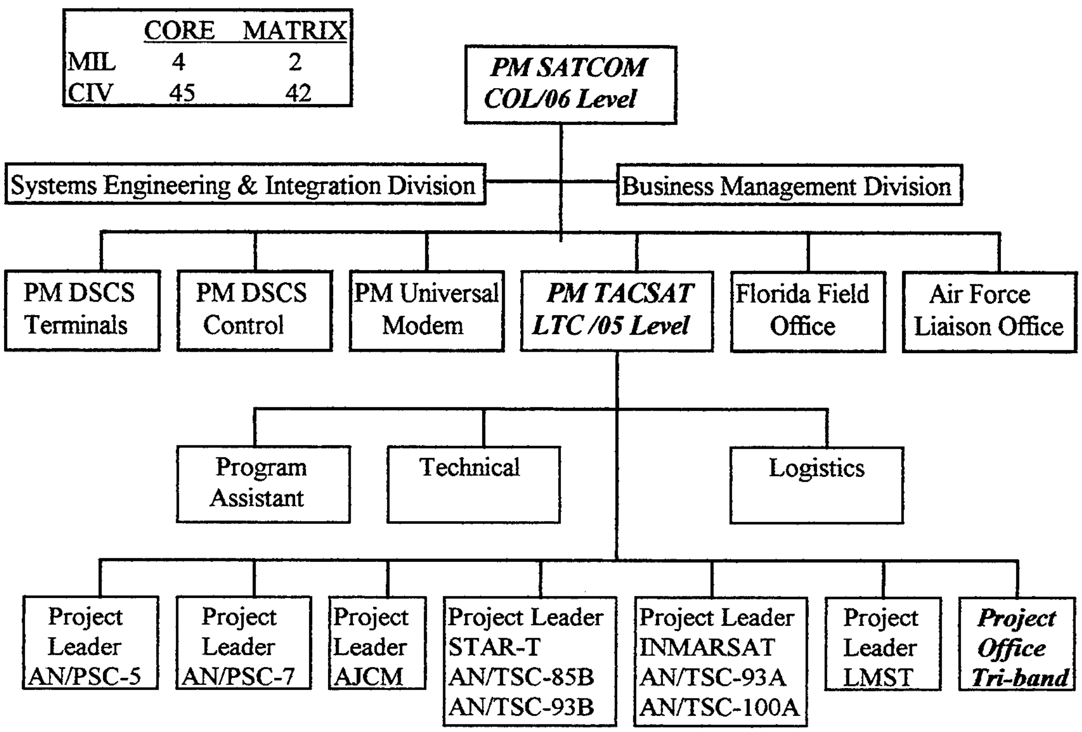


Figure 9. Satellite Communications Organizational Structure [Ref. 26: p. 2-3]

In June 1994, LTC Mazzucchi was promoted to the rank of Colonel and selected to be the PM for Military Strategic/Tactical Relay (MILSTAR). LTC Sidwell was made the acting Product Manager for PMO TACSAT until the centrally selected Product Manager, LTC Ludwig, arrived. While acting as Product Manager, LTC Sidwell evaluated the potential dollar value of future tri-band programs. With the support of PEO COMM, the SPO formally requested that a new program office for tri-band procurements be created. The request for a dedicated tri-band program office was ultimately approved in April 1995.

In December 1994, LTC Ludwig arrived and LTC Sidwell was selected to start up the Universal Modem Product Office. LTC Ludwig's basic branch was Artillery, and he had very little experience with communications systems. This lack of communications background was offset by his acquisition experience and expertise in managing programs. Upon arriving, LTD Ludwig was briefed on the progress of the AN/TSC-143 program and the impact of the integration, software, and reliability problems being experienced.

During this time the USAISC Commander, Signal Center Commander, and DISC4 became heavily involved in the program's progress. The PowerPAC3 Company had been activated and missions in Haiti and Bosnia were developing. The USAISC Commander was applying pressure on PEO COMM to deliver the terminals.

The terminals continued to experience technical problems through the end of 1995. The original contract delivery schedule was slipped to May 1996. Thirteen modifications to the original contract, most of which granted schedule extensions, had been approved. In consideration for each contract modification that allowed a slip in the schedule, the Government received several terminal enhancements and other benefits such as additional training and extended warranties at no additional cost.

LTC Beatty was centrally selected to be the Tri-band's first Product Manager. Upon his arrival in December 1995, he picked up responsibility for all tri-band type terminal programs in the military, to include responsibility for Defense Intelligence Agency (DIA), Special Operations Forces (SOF), Joint Communications Support Element (JCSE), Marine, and Air Force terminal requirements as shown in Figure 10.

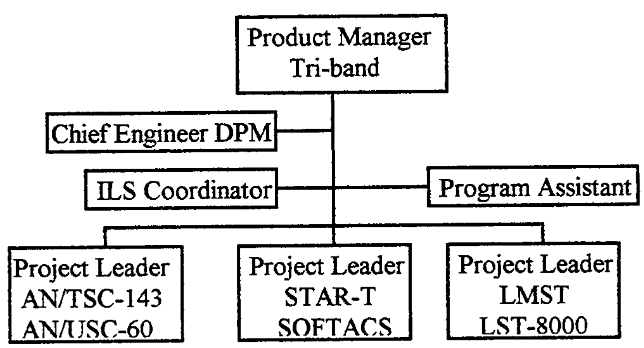


Figure 10. Tri-band Program Office

By March 1996, the terminals had been completely retrofitted, and all major problems, except reliability, had been resolved. The terminals were sent to Fort Huachuca for operational testing and customer acceptance. On 15 May 1996, after completion of tests at the Marine Corps Air Ground Combat Center, Twenty-nine Palms, California, the six terminals were conditionally accepted by the 269th Signal Company.

D. BACKGROUND

1. Requirements Generation

a) Mission Need

During DS/DS the Army Chief of Staff, General Vouno, recognized the need for liaison teams to be integrated into the U.S. component forces and coalition forces for command and control purposes. To do this General Vouno initiated a program called Project 5/Directed Telescope.

Due to the success of the teams in providing command and control of the widely dispersed U.S. and multi-national forces, the liaison mission was adopted as part of Army doctrine. This doctrine led to the concept and ultimate development of the PowerPAC3 company.

The Army's Signal Center began to look at lessons learned from DS/DS. One of the major lessons learned was that reliance on commercial systems was necessary due to the limited capacity of the DSCS. If an organization was not a high priority on the Pentagon's list of satellite users, it could not get access to a military satellite. Even if the organization was on the high priority list, the flexibility of military satellite system was limited by a bureaucratic process that required many levels of approval before getting access to the satellite. Commercial satellite systems could be accessed upon demand. The commercial satellite industry was thriving and could send up state-of-the-art satellites rather quickly and at reasonable cost. The cost of putting new defense satellites in orbit was prohibitive. [Ref. 19: p. 15]

Considering the trend toward commercial satellite communications, the Signal Center began to develop requirements for integrating commercial satellite equipment into future military satellite terminals. The Signal Center's efforts to acquire funds for developing a prototype tri-band satellite terminal were restricted by the limited resources, changing threat, and uncertain mission of the armed forces during this period. Even though the Signal Center could not acquire the funds, commercial contractors could see the military's need for a tri-band terminal. Several contractors consulted the Signal Center and Battle Lab at Fort Gordon, Georgia, for a better understanding the Army's requirements. Some of these contractors began independent research and development (IR&D) of their own prototypes.

b) Mission Validation

In May 1992, General Gordon R. Sullivan, the Army Chief of Staff, organized the Louisiana Maneuvers Task Force (LAM TF) based on the original 1941 Louisiana Maneuvers concept. The purpose of the LAM TF was to experiment with new emerging technologies during real world exercises and evaluate how effective those technologies were in meeting doctrinal missions. [Ref. 20]

A portion of the LAM TF was devoted to the development of a Commercial Space Package (CSP) of which satellite communications were a major part. The LAM TF took the Army's PowerPAC3 concept developed during DS/DS and demonstrated the requirement for commercial satellite access. Following the recommendations of the LAM TF General Officer Working Group (GOWG), DCSOPS validated the doctrinal requirement for the PowerPAC3 company to have Tri-band capability. The company's mission would be to provide command and control communications (commercial and military) connectivity between the Army forces, multi-national forces, and other service components by way of six liaison teams. The basis for the unit's mission profile was derived from multiple approved US Army TRADOC scenarios. The scenarios included Southwest Asia, Europe, Northeast Asia, and Latin America. Based on these scenarios, requirements were generated to ensure that the

AN/TSC-143 could operate in the expected environmental and tactical field conditions. [Ref. 22: p.5]

2. Contracting

a) Developing System Requirements

Requirements generation was a two-part exercise that involved minimum essential performance requirements and RFP performance specifications. Several contractors were lobbying officials at the Department of the Army (DA) level to have their commercial tri-band terminals fill the Army's new requirement. Many of these manufactures had developed commercial satellite terminals for organizations such as the Cable News Network (CNN), National Security Agency (NSA), DIA, Central Intelligence Agency (CIA), and the Army's Military Intelligence (MI) community. A short synopsis is provided to give the reader a better understanding of the events that led to the actual terminal performance requirements.

DCSOPS tasked the AN/TSC-143 SPO and Army Signal Center to develop the minimum performance requirements on 22 October 1993. The requirements were based on the projected scenarios, in which these terminals would operate. The Signal Center, as previously stated, had already developed some requirements for a prototype tri-band terminal, now called the SHF Tri-band Advanced Range Extension Terminal (STAR-T). Due to time constraints, those minimum requirements were used as a baseline. The minimum requirements document was a two-page memorandum signed by the Signal Center Commander on 9 December 1993, and submitted to DCSOPS for inclusion in the procurement directive.

The minimum essential requirements were created for DCSOPS to use in the memorandum validating the urgent requirement for these terminals. The requirements generated for the RFP were much more detailed and included several military specifications. The Signal Center was adamant about enforcing as many of the requirements and military specifications as possible.

On 4 January 1994, the Signal Center issued a message stating that the activation of the PowerPAC3 unit had been moved up to June 1994 due to a Post Cold War Command and Control Study. The study concerned command and control problems experienced during operations in DS/DS and Somalia. With the activation of the unit accelerated, the AN/TSC-143 procurement was now considered urgent. DCSOPS validated the urgent requirement, but mandated that the acquisition be a "Best Value" competitive process rather than sole source. DCSOPS generated the formal tasking memorandum on 7 January 1994, formally validating the urgent requirement for six Prototype Tri-band Tactical Terminals (PT3).

b) Source Selection

Since DCSOPS required that the contract be awarded under conditions of full and open competition using a "Best Value" source selection, innovative techniques had to be implemented to reduce the normal time required for proposal evaluation, negotiation, and contract award.

The SPO continued to focus on the schedule constraint. It was understood that the Procurement Administrative Lead Time (PALT) had to be reduced considerably if the program was going to meet the schedule objective. The normal cycle time in CECOM for PALT had been 234 days [Ref. 17: p. 1]. The SPO decided to focus on the short-term goal of shortening the PALT by deleting, waiving, and hastening the normal process whenever and wherever he could.

Due to the finite amount of time available, the SSA decided to limit the evaluation to key discriminators. Logistics support was not considered key to this program due to the short life expectancy and therefore was not evaluated. Instead, offerors were given a ceiling price for initial spares and maintenance support and required to submit a maintenance plan within 30 days of contract award. The past performance records of all potential offerors, program management abilities were considered acceptable, and therefore excluded from the evaluation. To further expedite the process, the project office began assessing performance risk before release of the

RFP. The project office used the EBB to request that all interested offerors submit the required information early. [Ref. 17: p.7]

The program was first announced in the *Commerce Business Daily* (CBD) on 10 November 1993. Following the CBD announcement, a series of discussions and meetings between the project office and industry took place to clarify and modify requirements. In developing the RFP requirements, the Signal Center attempted to enforced numerous specifications beyond the minimum requirements they had generated earlier. Most of this "requirement creep" was stopped by support from PEO COMM and the CECOM Commander.

The RFP was released on 12 January 1994, and by 11 February 1994, seven proposals had been received. To speed the evaluation process, the proposals were limited to 100 pages for technical factors, 25 pages for performance risk factors, and no limit on price factors. The SSP limited the amount of review by eliminating the SSAC and using only a SSEB to make recommendations to the SSA in determining the "Best Value" proposal. The source selection structure is shown in Figure 11. No SSAC was needed due to the level of experience of both the SSEB Chairperson and the SSA, and the schedule constraints. The SSP designated the Branch Chief SATCOM/ MILSTAR Branch, a GS-14 position, to be the SSA. The SSP required the SSEB Chairperson to be a GM-15. [Ref. 23: p.5]

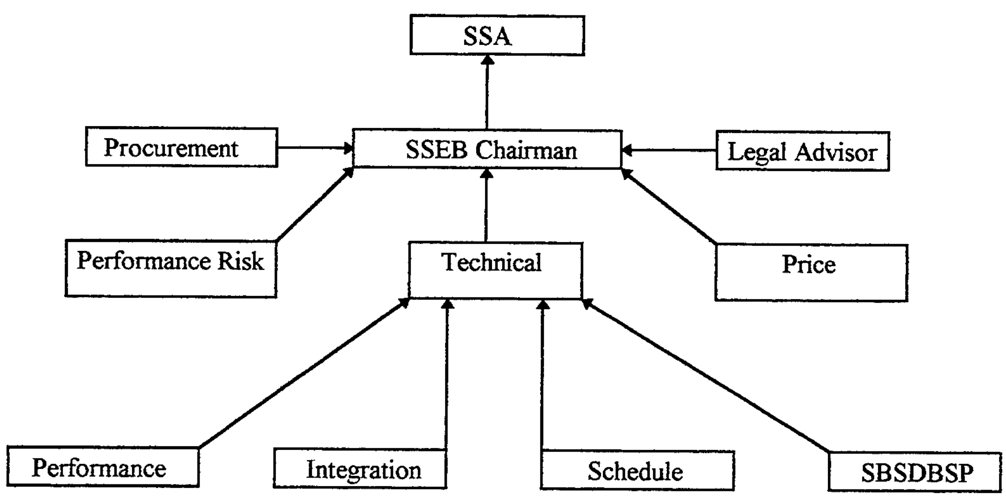


Figure 11. Source Selection Structure [Ref. 24: p.9]

The factors evaluated were technical, price, and performance risk. The technical factor was considered more important than price and performance risk factors combined. The technical factor was significantly more important than price. The price factor was more important than the performance risk factor.

Within the technical factor, the performance subfactor was equal in importance to the integration subfactor. The performance and integration subfactors combined were significantly more important than the schedule and small business subfactors combined, and the schedule subfactor was significantly more important then the small business subfactor. All offerors had to be rated as acceptable in each subfactor shown in Figure 12 to be eligible for award.

- ■ Technical
  - Performance
    - ♦ Antenna Performance
    - ♦ Data Quality
    - ♦ Effective Isotropic Radiated Power (EIRP) and Gain/Temperature (G/T)
    - ♦ Reliability and Maintainability
    - ♦ Powers Source and Power Consumption
    - ♦ Switch and First Level Multiplexer
  - Integration
    - ♦ Mechanical Design
    - ♦ External Interfaces
    - ♦ Operational Capabilities
  - Schedule
    - ♦ Schedule
    - ♦ Test
    - ♦ Delivery
  - Small Business and Small Disadvantaged Business Subcontracting Plan (SBSDBSP)
- ■ Price
- ■ Performance Risk

Figure 12. Factors, Subfactors, and elements of Evaluation Criteria [Ref. 24: p.5]

After narrowing the competitive range to four offerors, Items for Negotiations (IFNs) were discussed and BAFOs submitted and evaluated. A final recommendation was made to the SSA on 23 March 1994.

c) Contract Award

On 24 March 1994, a Firm-Fixed-Price (FFP) contract for six prototype Tri-band SHF Tactical Satellite Terminals was awarded to GTE in the amount of $7,756,801.

A debriefing was conducted on 12 April 1994 to successful and unsuccessful offerors. At the debriefing, it was felt that the level of detail and data analysis provided in GTE's proposal greatly lowered the risk associated with each required subfactor. GTE's proposal provided a well thought-out and organized presentation of information, and when IFNs were required, responses were provided to proposal format.

3. Engineering

To develop the AN/TSC-143 terminal the prime contractor teamed with COMSAT RSi (RSi) to develop a prototype terminal called TRI-SAT. GTE had experience in switching equipment and systems integration while RSi had experience and a solid reputation as a reliable satellite communications equipment manufacturer. Only 36 percent of the components were manufactured by GTE and RSi [Ref. 25: p. 98]. The other 64 percent came from ten other well-known vendors in the communications industry.

The proposal data GTE submitted were based on the TRI-SAT capabilities that were similar, but not the same as the AN/TSC-143 required specifications. GTE was too optimistic in expressing its ability to manage what it thought would be simple modifications. The TRI-SAT terminal was a commercial tri-band prototype terminal GTE had developed independently and displayed to senior Army officials before award of the AN/TSC-143 contract. The terminal is similar in appearance to the AN/TSC-143 but did not meet many of the military specifications as stated in the RFP.

Problems began to surface shortly after award of the contract. A post-award conference was held 12 April 1994, to discuss concerns with variations between GTE's proposal and the RFP specifications. During the conference several issues were clarified and resolved, but one issue escalated. GTE representatives indicated that the terminals exceeded the specified weight by 700 pounds [Ref. 26: p. 3]. The representatives expressed serious doubt in GTE's ability to overcome this problem within the schedule and funding constraints. On 19 April 1994, three weeks after award, the first "cure" notice was sent to GTE threatening termination for default. John Marino, GTE Vice President for Army Tactical Communications Operations, responded to the cure notice with assurances that GTE would meet the weight specification.

Two months later GTE began to experience significant integration and software problems. The requirement for interoperability with existing military satellite terminals and tactical switching systems was a much more complex task that required extensive modification and testing of GTE's TRI-SAT terminal.

In June 1994, GTE substituted its TRI-SAT terminal for scheduled testing rather than using the AN/TSC-143 terminal. This was due to the extensive technical problems being experienced in integrating the AN/TSC-143 components. Additionally, GTE wanted to see how well its commercial terminal performed under battlefield conditions during the Advance Warfighting Experiment (AWE). Fort Gordon's Test and Evaluation Coordination Office (TECO), a sub-office of OPTEC, became heavily involved during the test that used military operators. This test showed that the system had substantial shortfalls in meeting the DSCS certification requirements, although it easily met all commercial satellite certification requirements. At this point it was suspected that GTE would have difficulty meeting DA's required delivery date of 30 September 1994.

4. Testing

Although these AN/TSC-143 terminals would mostly consist of NDI and COTS components, they were required to interface with existing tactical communications systems, DoD strategic systems, and commercial systems. As a result, there was an extensive need for interoperability and performance testing. However, it was obvious that time and money did not allow the test community to conduct business as usual.

Four essential test events were established by the PM that had to be passed before final acceptance of the system by the gaining unit. They were the in-plant acceptance test (IPAT), the DSCS and Commercial Satellite Certification tests, a field installation acceptance test (FIAT), and an OPTEC sanctioned customer test. The TECO at Fort Gordon would plan and supervise the operational test during a field training exercise at Twenty-nine Palms, California, supported by military personnel from the gaining unit. The formal environmental, roadability, and airlift tests were deleted in place of the contractor providing an acceptable analysis to the PM that confirmed compliance. Interoperability testing and certification of the switching equipment would be conducted under the supervision of the JITC at Fort Huachuca, Arizona. [Ref. 17: p. 6]

A summary of the events that transpired is given to emphasize the outside influences and test-fix-test nature of this accelerated procurement. The information was gathered through interviews with the project leader, Paul Hancik, and chief testing officer, Dennis Evanchik.

The First Article Test (FAT) began early September 1994, four weeks before the required delivery. The test was halted by GTE before completion due to a series of critical technical failures. A second attempt at completing the FAT was made one week later. Although improvements were made, numerous failures caused GTE to halt the test again. GTE recognized that the terminals would not be ready by the required delivery date, and decided to negotiate a contract modification. The contract modification established a new delivery date of 15 November 1994 and increased the weight specification by 200 pounds. The modification was approved by the Government representatives in consideration of several enhancements to the terminals at no additional cost. A third attempt to complete the FAT was conducted from 20 October through 16 November 1994. Serious deficiencies continued to be experienced in the terminals.

A briefing was conducted for PEO COMM in November 1994 with PM SATCOM and GTE. The purpose of the meeting was to re-evaluate program progress, terminal status, and generate a new delivery schedule. USAISC was urging PEO COMM to deliver the terminals. The activation of the 269^{th} Signal Company in June 1994 made the requirement for these terminals even more urgent. After receiving assurances from GTE that problems would be fixed and renegotiating the delivery plan, PEO COMM decided to send five of the terminals to Fort Huachuca, Arizona, with one stopping at Fort Monmouth to undergo DSCS certification from 18-21 November 1994.

The DSCS certification was conduct by a DISA representative whose initial analysis of data suggested the terminal be certified. Additional analysis of the data had to be accomplished before certification was completed. Along with certification, DSCS performed a successful interoperability test between the AN/TSC-143 and existing military satellite terminals. Upon completion of the tests the terminal was sent to Fort Huachuca to join the other four terminals.

This terminal arrived at Fort Huachuca on 12 December 1994. A FIAT was conducted on the five terminals. Significant shortfalls in the performance of the terminals caused GTE to stop the test on 19 December 1994. A briefing was conducted for the USAISC Commander, Major General (MG) Leffler, to determine how to continue. MG Leffler stated, that although GTE was having difficulties, he felt GTE was still showing progress, and since the "glass was half full" he decided to press on with the fielding. Terminal delivery had been extended to March 1995. The GTE personnel at Fort Huachuca continued to modify, test, and fix problems with the terminals. New Equipment Training (NET) began 3 March 1995 after the equipment successfully passed a series of readiness tests that determined the terminals could be used for NET training. Following the training a final acceptance test was conducted and the results presented to the USAISC Commander. The results of the test indicated significant problems still existed with reliability, specification compliance, and other critical anomalies. At the close of the briefing PM SATCOM proposed three options for terminal acceptance to the

USAISC Commander: (1) accept all five terminals; (2) accept three terminals; or (3) delay acceptance of all terminals. He recommended option three, delay acceptance, in order for GTE to further address reliability and operating temperature concerns. The USAISC Commander concurred with the PM's recommendation and directed GTE to conduct a temperature characterization test, improve reliability, and retrofit all terminals before any further testing would be considered. To facilitate the new guidance, GTE decided to ship two of the five terminals back to Taunton, Massachusetts, and a third one to RSi in Duluth, Georgia, to analyze reliability problems and begin retrofitting the terminals. One of the remaining two terminals at Fort Huachuca would be used to support temperature testing at White Sands Missile Range in New Mexico, while the other terminal was subject to shock and vibration analysis during a 20-mile road test.

On 5 May 1995, PM SATCOM received a program completion plan from GTE that identified all activities remaining on contract and a plan for final acceptance testing on 10 July 1995 with conditional acceptance on 20 July 1995. Due to the additional technical problems caused during the retrofit, testing was not conducted as GTE planned.

A meeting was conducted in early September 1995 between PM SATCOM, DISA, and DSCS operations at Fort Monmouth to establish a downsized re-certification test since the initial test had resulted in excessive anomalies. During the second week of September 1995, the terminals successfully passed DSCS re-certification.

On 6 September 1995, GTE gave another briefing to PM SATCOM addressing terminal progress and requesting numerous waivers from the original specifications in the RFP. During the briefing GTE stated that any "further effort on the terminals beyond implementation of the previous defined retrofits will have low payoffs." GTE had indicated the contract terms for acceptance of the terminals "as built," to be negotiated considering the request for waivers. Following this meeting, PM SATCOM prepared a test assessment for user reaction to the test data and potential work-around solutions. The waivers were approved, and GTE continued with its final retrofits.

In January 1996, a final acceptance test was conducted on all six terminals in Taunton and all were conditionally accepted by PM SATCOM. The Government's formal acceptance form, DD250, was signed in consideration for a full-time GTE representative on-site (Fort Huachuca) for one year after fielding. GTE was also required to complete retrofits on all terminals and ship all six terminals back to Fort Huachuca for the operational test and customer acceptance by April1996.

a) Contract Modifications

There were 13 contract modifications approved during this program. Two of them were strictly administrative while the rest were for schedule extensions and waivers of certain specifications. In consideration for the contract modifications, the Government received numerous enhancements to the terminals, additional training, a full-time GTE representative on-site, and a one-year extended warranty. The total cost to the Government was $9,521,108.94 for the program while the total cost of all six terminals was estimated at just under $20,000,000. The contractor, GTE, was willing to use its funds ($10 million overrun) in an attempt to gain the advantage of being awarded the follow-on STAR-T contract.

E. CHAPTER SUMMARY

The AN/TSC-143 acquisition illustrates the intricate environment surrounding communications systems procurement where last minute notifications, little written guidance, extensive outside organizational influences, and extremely challenging requirements are the norm. Developing an acquisition strategy to accommodate these factors is vital to the successful fielding of the equipment being procured.

The informal notification process, which left the PM with little information on the mission or requirements of the terminals, provided only a "heads up" to the PEO and PM but no formal authorization to begin the procurement.

The lack of any written guidance from DCSOPS forced the program office to guess at what the best solution would be. Without a validated MNS or ORD, the SPO had to conduct additional research to determine what the need was, and then conduct market research to determine what was available in the commercial market place. This additional work took time and effort that could have been better utilized.

Once written guidance from DCSOPS was received, the program's source selection progressed much faster. The use of terms like "urgent" and "prototype" allowed the procurement to bypass several acquisition processes. Most of the streamlining initiatives the SPO used focused on meeting the schedule objective rather than achieving the performance requirements. Waiving, deleting, and rushing through portions of the normal acquisition process early in the program increased the risk of achieving the technical requirements. The SSP had listed the technical subfactors of performance and integration as significantly more important than the schedule subfactor, but in reality schedule seemed to take priority.

Involving the Army's Signal Center in developing the requirements tended to slow the acquisition process. The numerous requirements (military specifications) the Signal Center tried to enforce were not affordable nor realistically achievable within the schedule constraints. The acquisition reform that was taking place in the acquisition field had not been introduced to the Army Signal Center. The Signal Center's culture still clung to the old way of doing business, and it was not ready to streamline the process by reducing military specifications.

Building and testing of the terminals exposed the technical difficulties that were to plague the program. The proposal submitted by the contractor assured the Government that the terminals would meet or exceed all performance requirements within the cost and schedule constraints. GTE had already built a prototype terminal capable of meeting commercial requirements, certifications, and specifications. The Government was confident in GTE's ability to deliver and did not question the data provided in the proposal. Additionally, no bid sampling was conducted before award due to the time constraints and the inflexibility of the testing community.

The attempt to field the terminals to the PowerPAC3 company in September 1994 was a waste of time. It was known that the terminals had significant technical shortfalls prior to shipping. The decision to ship the terminals was made as a result of high level pressure to deliver the terminals for real world missions in Haiti and Bosnia, and assurances from the contractor that the terminals would be fixed before fielding. The second attempt to field the terminals had similar problems as the first fielding, except the

Government had waived several specifications in an attempt to speed the delivery. The third fielding attempt was more successful, and the terminals were conditionally accepted by the 269th Signal Company. The Government received numerous enhancements to the terminals and maintenance support agreements in consideration for the numerous delays.

PM SATCOM held the contractors to the FFP contract requirements as much as possible. The terminals came in under $9.9 million, but exceeded the schedule objective by 18 months. Performance requirements were significantly modified in order to deliver the terminals by April 1996.

This chapter has provided a broad overview of the acquisition history for the AN/TSC-143 program. The program issues will be analyzed in greater detail in the following chapter.

IV. DISCUSSION AND ANALYSIS

A. INTRODUCTION

This chapter provides a discussion of the AN/TSC-143's acquisition process focusing on the similarities and differences of the program as compared to the standard acquisition process. The areas to be discussed are the management environment, organizational influences, requirements generation, contracting, testing, and logistics support. Previous chapters have presented the historical facts behind acquisition reform, the current acquisition process, and the background of the AN/TSC-143 acquisition. Many of these areas are complex and have interrelated issues. An analysis of why the AN/TSC-143 acquisition was different will follow each area discussed. This will lead to a better understanding of how the AN/TSC-143 program succeeded, but with some difficulty, in an environment of limited resources and increasing public scrutiny.

B. ENVIRONMENT

1. Management Environment

a) Similarities and Differences

The acquisition environment has changed significantly since the AN/TSC-143 program was initiated. A change common to both communications and other types of acquisitions was massive downsizing. This downsizing triggered several organizational mergers and restructuring.

There were a number of effects of the downsizing on the communications management environment. The downsizing mergers and restructuring seemed to have the effect of increasing the organization's size and responsibilities. The number of new communications programs continued to grow, and the levels in the decision making process increased.

The first difference is the merging of PEO COMM with PEO Command and Control (C2), completed July 1995, which actually expanded the PEO's influence and organizational size. The PEO's position, now called Program Executive Office Command, Control, and Communications Systems (PEO C3S), was designated a two-star billet rather than the previous one-star billet. The merging of PEOs increased the number of programs PEO C3S had responsibility for, while the downsizing of CECOM decreased the number of functional (matrix) support personnel available to manage individual programs. Shortly after the merger a complete restructuring of all PMOs under PEO C3S was planned to further consolidate the organization. PM MILSTAR, PM GPS, and PM SATCOM were to merge into PM MILSATCOM. This was in reaction to the continued cuts in resources being mandated from senior leaders.

The second difference was the growth in new ACAT III and IV communications programs. This normally required a special project office to be formed with a SPO and project leader to manage the initial requirement. The management team would work together to get the contract awarded. Once awarded the special project office would be disbanded. The program would then be managed by a project leader with a product manager overseeing all the projects under the product category. The Product Manager TACSAT was responsible for all tactical satellite communications ground equipment, single and multi-channel. Once the request for a Tri-band Program Management Office was approved, the Product Manager Tri-band took over responsibility for all tri-band capable tactical satellite terminal programs. As a result of the increased number of Tri-band projects the project leaders typically had more than one project assigned.

The third difference in management of this program from the normal acquisition process was the length of the decision making chain, which stretched at times from the Project Leader, Special Project Officer, Product Manager, Program Manager, to the PEO. This in combination with the turnover in the key managers slowed the decision making process considerably. Personnel in the chain were empowered to a certain extent, but the majority of decision making authority lay with the PM SATCOM, who had up to 20 other individual programs going at the same time.

b) Analysis

To explain the increase in communications organization size and program growth we must look into the Army's senior leadership vision of the future. The growth in the communications requirements is a result of the CSA's Force XXI initiatives and vision of information warfare. Force XXI is the Army's overall vision for reshaping the land force through digitization, force modernization, and doctrinal changes, to accomplish its mission well into the 21st Century. Digitization brings the power of communications technology to the soldier allowing them to dominate the battlefield. The CSA's vision of information warfare permeates all branches of the Army with the need for using and managing real-time information to control the events shaping the battlefield. The CSA set up the LAM TF to evaluate "leap ahead" technologies during AWEs. These commercial state-of the-art technologies are being successfully tested during AWE battlefield exercises. The CSA vision combined with the LAM TF evaluations has increased pressure to integrate the technology into existing weapon systems or architectures quickly. This has led to a number of small communications programs being initiated that can quickly develop and field "leap ahead" systems using commercial-off-the-shelf components. The accelerated acquisition cycle is now fielding operational systems in two to five years from mission validation. Additionally, the useful life-span of military communications systems has been reduced to between five and ten years and continues to shrink. Currently commercial industry technology becomes obsolete in about 18 months. The military systems are expected to follow the same trend. The shrinking life-span creates the need to initiate new replacement programs as soon as the previous generation is fielded. This has significantly increased the number of programs managed under the PM. In the AN/TSC-143 case, five other Tri-band programs have been initiated since the fielding of the AN/TSC-143. The STAR-T, SOFTACS, AN/USC-60, LMST, and LST-8000 have all followed the AN/TSC-143. The STAR-T and SOFTACS are full developmental programs while the AN/USC-60, LMST, and LST-8000 are accelerated NDI type procurements. The STAR-T is the replacement terminal for the AN/TSC-143, while the other systems have a validated mission need that required slightly different configuration and performance specifications, but all are tri-band capable systems.

In addressing the number of levels in the management of a communications system procurement, one must look at the increase in the number of new programs while the organizational structure remains the same or declines. PM SATCOM is responsible for a multitude of programs including all strategic and tactical, single and multi-channel, UHF, SHF, and EHF, ground satellite terminals in the Army as well as other Federal agencies and component Services. This is a massive responsibility that requires a large number of project leaders, project managers, and product managers to be placed under the PM. In addition, many of the requirements generated are considered "urgent," which increases the need for dedicated management. The AN/TSC-143 program was managed, at times, three levels below the PM. The most important decisions were made at the PM and PEO levels while day to day operational decisions were at the Product Manager, SPO, and Project Leader level. The reason PM SATCOM must use this extended chain of decision making is due to the size, number, and urgency of new requirements that must be individually managed. Extending the decision making process to lower levels has had a negative impact on the management of small programs. The PM must rely on information from less trained and experienced individuals, and delegate more decision making responsibilities to those individuals. This increases the risk of problems occurring in these programs that could significantly delay the program and increase cost.

One of the purposes of acquisition reform was to reduce the levels of management review programs must go through before a decision is made. This reduction in management reviews creates a much flatter organizational structure where decisions are made by the PM, PEO, and MDA. This keeps the decision making level down to a maximum of three levels, which is ideal for large programs, where the PM is only responsible for one program. As stated earlier, PM SATCOM has a multitude of responsibilities that encompass a wide variety of programs both large and small. As new requirements are validated and received by the PM, the PM must create new project offices using available resources. When the PM is assigned additional programs, he/she must delegate the decision making responsibility to less trained and experienced individuals. This deepens the decision making levels and slows down the acquisition process. As a result, the PM tends to focus attention on the larger programs and provides minimal oversight and direction to each of the smaller programs.

With this in mind, alternatives are suggested that may help reduce the risk to the programs under the PM by reducing the number of programs the PM must manage. One alternative is to enforce a cap on the number of programs a single PM can manage. This alternative would require more PM positions to be created, which in the current downsizing environment is less likely to occur. With the pressure to downsize the Acquisition Corps there is little chance the AAE could get authorization for more PM positions to lessen the number of programs under a single PM. Another alternative for PEO C3S programs is to separate the strategic and tactical type procurements. The strategic systems could be managed by either the USAISC systems command, or the CECOM material command. This would allow PM SATCOM and other PMs under PEO C3S to devote more time and attention to fewer projects that would lead to proactive decision making and problem solving. This alternative would, over the long run, decrease cost and increase likelihood of meeting program objectives by allowing the more experienced and well-trained PM to actually manage the program rather than just being responsible for it.

2. Organizational Influences

a) Similarities and Differences

The organizational influences on communications procurement management are, in some ways, similar to the influences on the management of developmental procurements. Some of the organizations such as CECOM, a subordinate command of AMC; the Signal Center, a component of TRADOC; and PMO SATCOM, which falls under PEO C3S are typical influences on any acquisition. Communications program management is also similar to other acquisition agencies in that the PM office manages multiple programs.

The difference between communications procurements and other procurements is the involvement of several unique organizations in the procurement of Army communications systems. Organizations such as DISC4, DISA,USAISC, and JCS (J6) have a significant role to play in the development and operational requirements of any new communications asset. Organizational relationships are shown in Figure 13.

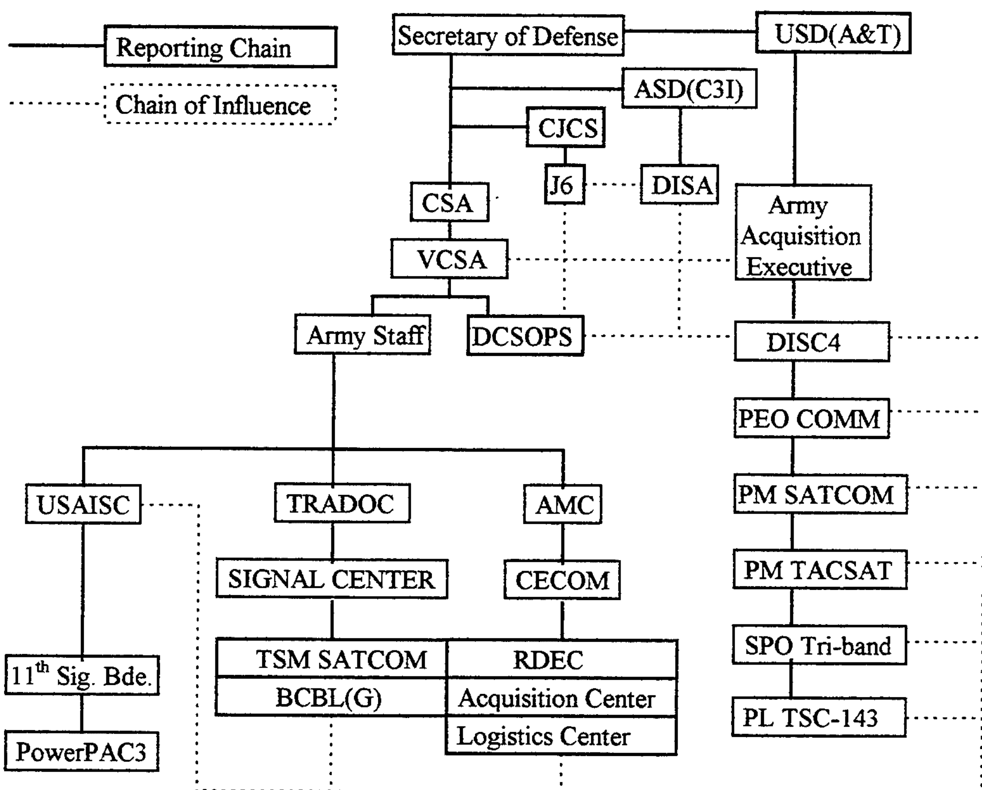


Figure 13. Communications Systems Organizational Relationships

The DISC4 has Army Staff responsibility and serves as the military deputy to the AAE for Army Information Mission Area (IMA) activities. These include establishing and approving policies, procedures, and standards for the planning, programming, life-cycle management, and use of the Army IMA resources. The DISC4 oversees the activities of PEOs managing command, control, communications and computer information systems acquisition programs. In addition, DISC4 develops standards for data and interoperability of products, to include joint and combined programs, and administers the Army Spectrum Management Program. DISC4 was the directing authority for the AN/TSC-143 program. This organization monitored the AN/TSC-143 program to ensure that interoperability requirements and other standards were incorporated into the system so that it would be part of the IMA. [Ref. 14]

DISA, under the Assistant Secretary of Defense for Command, Control, Communications and Intelligence (ASD(C3I)), conducts requirements assessment for compatibility, interoperability, integration, and adherence to communications standards. The Joint Interoperability Test Center (JITC), a part of DISA, is tasked with certifying communications equipment from all services. DISA was heavily involved in certifying the AN/TSC-143 switch before contract award, and the DSCS certification prior to the customer acceptance test. [Ref. 14]

USAISC, a major U.S. Army Command, is responsible to the geographical CINCs, DCSOPS, and JCS (J6) for executing directed communications missions in various theaters of operation. Units under its command operate and maintain the communications equipment on the battlefield. USAISC did not become heavily involved in the AN/TSC-143 program until the initial attempt to field the terminals during September 1994. As the user of the terminals, USAISC was very concerned about the terminals operational capabilities and refused to accept them until the minimum performance specifications were met. Its primary focus before September 1994 was on activating the PowerPAC3 company and getting the personnel and equipment ready to perform its mission.

Not depicted in Figure 13 are the relationships that exist at the two and three star level between the Signal Center, CECOM, DISC4, DISA, USAISC, and JCS (J6) commanders and directors. Additionally, the ASD (C3I), Emmett Paige Jr., is also a significant influence as he was the commander of both the 11^{th} Signal Brigade (the PowerPAC3's higher headquarters) and USAISC during his military service. Many of these senior leaders have known each other for years and have watched the evolution of the Defense Department's communications architecture. They all have come from communications backgrounds and have seen both the strategic and tactical needs of the warfighter.

b) Analysis

The number of high-level organizations that influence the procurement of all communications systems is a unique characteristic of the communications environment. To manage and control DoD's massive information architecture properly, all requirements related to command, control, and communications are filtered through these dedicated organizations to ensure these systems meet DoD, Federal, and international requirements as well as the warfighter's needs. The limited frequency spectrum combined with international and domestic laws, policies, and regulations providing guidance of the use of those frequencies and power outputs makes the proper management of communications standards vital.

Every military unit and weapon system program are a potential customer of PEO C3S since information is required to be transmitted and received throughout the battlefield at all times. The way in which the warfighter receives their information must be transparent. The warfighter has little time to concern themselves with communications architecture, interoperability, frequency, and access power problems. The strategic and tactical networks must merge to a single seamless standard so that the warfighter can take out their cellular phone on the battlefield and call anywhere in the world. Additionally, they must be able to receive and transmit a variety of incoming information (video, graphical, text, and voice to name a few) without the worry of ensuring interoperability of the various systems. The numerous stovepipe systems that were fielded in the past have to be modified or replaced so that one massive, yet manageable, interoperable system that incorporates the communications policies of both the U.S. and foreign Governments. This massive undertaking requires the organizational structure currently in place to manage the overwhelming DoD communications and information needs.

The tremendous influence of the Signal Community (ASD(C3I), DISA, JCS(J6), DISC4, USAISC, CECOM, and Signal Center) when supporting a communications procurement has allowed smaller programs such as the AN/TSC-143 to flow through the requirements generation process easily.

C. ACQUISITION PROCESS

1. Requirements Generations

a) Similarities and Differences

The requirements generation process of the AN/TSC-143 program was quite different from what would be considered normal in the acquisition environment. The differences included the MAA process, the notification, the constraints, and the lack of a MNS or ORD. A further difference concerns the urgency of need and the designation of this terminal as a prototype.

The first difference was how the MAA was conducted. The Signal Center generated the requirement for PowerPAC3 to have tri-band capability, although it had to sell the need to the LAM TF GOWG. The Signal Center, with the support of the DISC4 and USAISC Commander, successfully worked with the LAM TF GOWG to prove the need for tri-band capability.

The second difference was that the LAM TF GOWG acted directly under the CSA's authority as represented by DCSOPS. Once the LAM TF evaluated the need and approved a particular requirement to meet that need, it would orally notify DCSOPS for immediate validation. DCSOPS would get the CSA's oral approval, reprogram funds for the procurement, and then orally notify the procurement agency, DISC4 all the way down to the SPO level. This allowed the normal requirements generation process to be accelerated, with DCSOPS making it a DA directed procurement.

The third difference was the information provided by DCSOPS in the verbal directive that placed a number of mandates normally decided by the PM and/or PCO. These mandates greatly influenced the program's acquisition process. They were:

- Utilize a NDI and COTS based acquisition process
- Limit acquisition to a fixed quantity of six terminals
- Operational requirement date of 30 September 1994
- Budget ceiling of $9.9 million in OPA FY94 reprogrammed funds
- Use "Best Value" competition for source selection [Ref. 30]

No MNS or ORD was ever generated for the terminal. Instead, a list of minimum essential requirements was incorporated into the formal validation and directive document dated 7 January 1994, and provided to the SPO on 13 January 1994. This was over two months after the CBD solicitation notice, and well after the initial oral notification.

The urgency of this requirement increased with the on-going real world operations in Iraq, Somalia, Haiti, and Bosnia. As a result, DCSOPS stated in the formal validation and directive document that this was an "urgent requirement" and that it was considered a "Prototype Super High Frequency (SHF) Tri-band Satellite Terminal For the Power Projection Command, Control, and Communications (PowerPAC3) Company." Both the urgency of need and prototype designation make this quite different from the normal requirements generation.

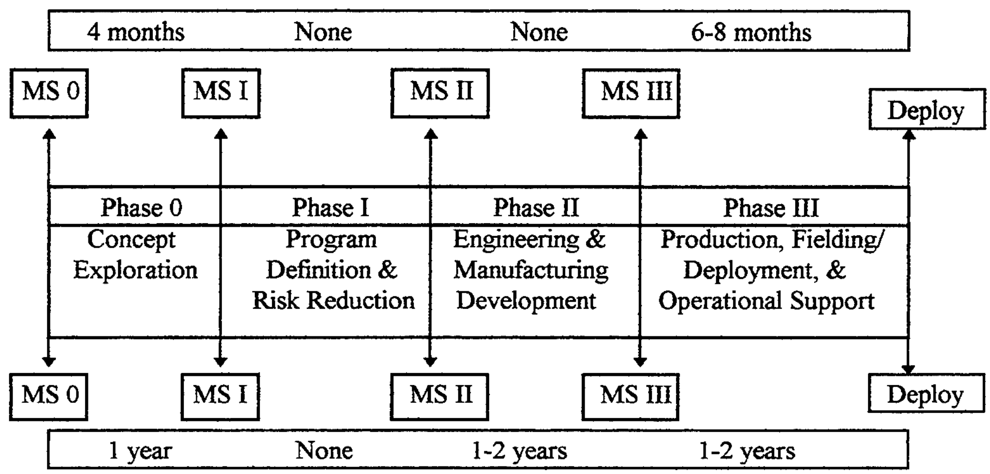
b) Analysis

Why was the requirement generation different? The need for Tri-band capability was based on the PowerPAC3 company mission. The PowerPAC3 company mission was still being developed and the company would not exist until July 1994. USAISC was tasked to build a modified table of equipment (MTOE) for the PowerPAC3 company based on the doctrinal concept the LAM TF GOWG had approved. The Signal Center knew that whatever the mission would be it would require tri-band capability. The PowerPAC3 requirement for tri-band capability was evaluated and approved by the LAM TF GOWG and DCSOPS with the persistence of the Signal Center. The AN/TSC-143 terminal performance requirements were to fit the mission profile of the PowerPAC3 company. This was a lesser objective of the Signal Center, which had actually championed the tri-band capability. The key role of the Signal Center, as a CBTDEV and user representative, allowed it to influence the mission need and finesse the requirements generation process to meet its own strategic objectives. The Signal Center's strategic objective was to modernize and expand the existing military satellite capability with state-of-the art ground terminals capable of accessing commercial satellites. The Signal Center, with the support of the Signal Community, aggressively pursued its objectives and searched out opportunities for achieving success.

Another unique characteristic in the requirements generation process was the verbal notification of the requirement directly to PM SATCOM by the validating and approving organization, DCSOPS. This was done for several reasons. First, the small size of the acquisition required no formal reviews or approvals. Second, the lobbying efforts of the contractors and Signal Center set the tone for how quickly this could be done. Third, the Army's need to prove that acquisitions could be achieved well under the eight to 16 year norm. Fourth, the expected activation date of the PowerPAC3 company moved from FY96 to June 1994.

The verbal guidance specifically limited the procurement to six tri-band capable terminals to be fielded within one year at a cost under $9.9 million using a NDI/COTS approach. The cost constraint from DCSOPS was primarily based on the lobbying efforts of several contractors who had assured Army leadership that they could provide the terminals within that figure. Keeping the cost below the $10 million threshold allowed the funds to be reprogrammed without notifying Congress and allowed for further streamlining of the acquisition process. The fixed quantity of six terminals was in line with the PowerPAC3 liaison mission that consisted of six teams. The lobbyist had assured the leadership it could provide the six terminals within six to eight months of contract award [Ref. 21]. The schedule was viewed by the PM and SPO as the most difficult challenge. Even if DCSOPS had not mandated a NDI/COTS strategy the schedule constraint would have. The schedule was mandated because of the Post Cold War Study that moved the activation date of the PowerPAC3 company up to June 1994 [Ref. 27]. This was due to the potential increase in operations throughout the world. The study cited command and control issues in Iraq, Somalia, Rwanda, Haiti, and predicted the same issues would occur in Bosnia if the U.S. were to become involved. The primary concern was that command and control communications were still limited in mobility and capacity. Industry's assurances that a six to eight month delivery schedule was achievable led DCSOPS, considering the June activation date, to mandate a required delivery date of 30 September 1994. This gave the SPO a goal of 120 days for contract award. The schedule anticipated for this procurement is depicted in Figure 14.

Projected Schedule of AN/TSC-143 Prototype Program 10-13 months



Average NDI Acquisition Process 3-5 years

Figure 14. Comparison of Standard and NDI Acquisition Process After Ref. [13: p. 2]

The reasons no MNS, ORD, or other formally written document had been generated were a combination of the urgency of need and lack of technical knowledge needed to generate the minimum specifications within the office of the DCSOPS. The SPO was required to work with the Signal Center immediately just to begin to understand the actual requirements. With the on-going real world missions in Iraq, Somalia, Haiti, and the potential for Bosnia, the requirement became urgent. This prompted a lot more verbal notifications and actions to be initiated before a validated requirement being formally generated. The verbal notifications did originate from the proper authority (DCSOPS) and it was, therefore, appropriate to take action.

The urgency of need arose from the Post Cold War Command and Control study that indicated an immediate need for the PowerPAC3 company. The study brought out the fact that command and control communications access continued to be a problem in Somalia, Rwanda, and Haiti. The potential for further involvement in the Bosnia crisis along with the continuing North Korean and Iraqi threats escalated the need for these terminals to be delivered to the PowerPAC3 company. This upgraded the requirement from a normal NDI process to an urgent NDI process. According to Army officials at the DCSOPS, Signal Center, and DISC4, the AN/TSC-143 was urgently needed. Failure to provide these terminals by 30 September 1994 would "seriously degrade the Army's capability to support joint and combined operations"[Ref. 28]. Until the need was met, Army officials believed less cost-effective and less-capable alternatives would have to be used. This would result in less capable command and control of forces on the ground and potentially higher attrition rates of Army assets.

The SPO attempted to streamline the acquisition process further by asking for approval of a Justification and Approval (J&A) letter by DCSOPS to limit competition due to the urgency of need. DCSOPS' response to the PCO was to use full and open competition to get the "Best Value." Additionally, there had been extensive contact between certain contractors and the Government organizations involved with this acquisition that could have been perceived as less than an arm's length relationship. Concerns over the possibility of protests under the Procurement Integrity Act mandated that the source selection use full and open competition in order to get the "Best Value." The term "urgent" was used to instill a sense of priority into those working directly on the program.

Further analysis of the urgency of need indicates that other assets were available that could access commercial satellite bands. While no other satellite terminal in DoD's inventory provides all the capabilities planned for the AN/TSC-143, several systems in the inventory or that were commercially available offered significant capability. For example, the AN/TSC-85B and AN/TSC-93B provide access to the military satellite band while the TROJAN SPIRIT provides the commercial band access. The TROJAN SPIRIT was a classified Military Intelligence initiative (now unclassified) which could be considered a precursor to the AN/TSC-143 effort, but was limited to a single commercial satellite band. Additionally, the lease of commercial mobile satellite ground terminals from ALASCOM and various other vendors can provide commercial access. Accordingly, the Army may have had more time, if necessary, to develop and test the AN/TSC-143 without excessive schedule pressure. The risk of integrating state-of-the-art technologies with existing systems poses significant obstacles that may take time to overcome. With the alternatives currently available to fill the tri-band capability the AN/TSC-143 program should not have been considered urgent.

The term prototype was one of the first indications that this program was high risk. Prototype suggests that this terminal is a research and development effort. It also alludes to the fact that this terminal had never been manufactured, tested, or certified as a commercially available system. As mentioned in previous chapters, industry had developed its own prototypes in anticipation of the evolving military satellite capacity constraints, but there were no existing tri-band terminals in the military or commercial inventories that had been tested and certified as fully operational. There had been some classified programs that had used the commercial frequency bands, but they were not similar to the AN/TSC-143 configuration or performance requirements.

The term prototype was used because no operationally proven tri-band system existed in either the commercial or military inventories. The term prototype combined with the limited procurement of six terminals allowed the program to avoid type classification and further streamlined the normal acquisition process.

2. Contracting

a) Similarities and Differences

There were numerous similarities between the standard and AN/TSC-143 contracting processes. The performance requirements were developed under the team concept, but enforced by the CBTDEV who actually had final approval. A FFP type contract was decided to best fit this procurement by the PCO based on the information that was provided. The program was solicited using the CBD, and a formal RFP was put together and sent out to potential offerors. Proposals were received from offerors and evaluated. Discussions were held with those offerors determined to be in the competitive range. A BAFO was presented to the SSEB followed by a recommendation to the SSA. The contract was awarded, and debriefings were held with offerors upon request. This contracting process resulted in no protests filed.

Even though there were numerous similarities, there were still a few differences between the two contracting processes. Some of the differences were, the lack of an acquisition plan, the mandated "Best Value" source selection, thoroughness of market research, choice of contract type, the approval authority and timing of the SSP, the structure of the review process, and the time it took to award the contract. Additionally, the lack of bid sampling for a prototype procurement was unusual. While the development of performance requirements was similar to the normal process, the designation of those requirements as thresholds or objectives was unclear.

The first difference was the lack of a formal acquisition plan. The acquisition plan, as stated in FAR 7.101, coordinates and integrates the efforts of all personnel responsible for an acquisition. Informal planning in the past had led to situations where the PCO had inadequate time to conduct the procurement effectively. An acquisition plan is required by the FAR for all acquisitions.

The second difference concerned the mandate for a competitive "Best Value" process, even though DCSOPs had validated and approved this program as an urgent requirement. Normally the contracting officer determines the best approach to take given the type of procurement and specific schedule and cost constraints.

The third difference was in the conducting of market research. Market research is normally divided into market surveillance and market investigation. As stated in AR 70-3, the objective of market surveillance is to gather sufficient data to identify technical capabilities and industrial capacity to meet potential user-identified requirements. This provides a general sense of products available in the market, as well as their characteristics and capabilities. Market investigation, on the other hand, is conducted to gather sufficient data in direct response to the user's need as identified in the MNS that should form the basis for developing the acquisition strategy for a particular requirement. The market investigation also provides the basis for determining whether to procure competitively or from a sole source, how logistics support should be provided, and what additional testing should be done. The market research for the AN/TSC-143 program was limited to what the industry had provided during the AFCEA and AUSA conventions. The prototypes were displayed and their expected capabilities heavily promoted without testing or certification by an independent organization. At the urging of the Signal Center, the Battle Command Battle Lab at Fort Gordon, Georgia, (BCBL(G)) had conducted some limited surveillance of the market place, but nothing that could be considered market investigation. The BCBL(G) determined the technology required was well developed and reliable. This was based on several untested prototypes that industry had already developed. None of the prototypes had been tested and most of the data from industry were based on tests of individual components and not on an integrated system. The SSEB technical personnel relied on the integrity of the data contained in the offerors' proposals to make a determination of the "Best Value" proposal. The data were never independently verified to ensure their validity.

The fourth difference concerned the selection of contract type. In pursuing a high risk acquisition, the Government wants to share the risk with the contractor and provide an incentive for the contractor to overcome any obstacles faced during the procurement. A FFP contract is normally used for products that are already established and costs are known. There is little risk to the contractor, so it is willing to set a FFP for the program. When the product has never been produced or tested before, several other contract types may provide better incentives for a contractor to perform at its best. The integrity of the FFP type contract requires the contractor to deliver the system on time, at cost, and to performance standards. Some of the contractors in industry were eager to get into the multi-channel satellite communications market as it is one of the few growing markets in DoD. GTE, in particular, saw this as an opportunity to become the sole source provider of all the Army's multi-channel communications equipment. GTE was already fielding the MSE system to the Army's division level units and had previously fielded the TRITAC switching system for Echelons Above Corps units. To reduce the Governments perceived risk, the contractor assured the Government that the necessary modifications to its prototype would be easily achieved.

The fifth difference was that the SSP was approved by the SSA on 6 January 1994, one day before the formal validation of the urgent Tri-band requirement was approved, and two months after the formal solicitation was placed in CBD.

The sixth difference was that the SSA was designated as the Branch Chief SATCOM/MILSTAR Branch (a GS-14 position) in the SSP while SSEB Chairperson was designated, by rank, as a GM-15. Although the SSP had not designated the SSA by rank, it did place a senior ranking person in the position of reporting to a junior ranking person.

The seventh difference was in the structure of the source selection organization. As stated in Chapter II, the organization normally consists of a SSA, SSAC, and a SSEB. The fact that no SSAC was used in the source selection process was quite different from the normal process. The SSAC normally consists of senior personnel who have a significant amount of acquisition experience. The SSEB evaluates each of the factors listed in the RFP and provides those findings to the SSAC. The SSAC compares the findings for each proposal to the findings of the other proposals to determine the overall "Best Value." The SSAC then presents the "Best Value" recommendation to the SSA.

The eighth difference in the contracting process, and the one that stands out the most, is the amount of time it took to award the contract. The normal PALT for CECOM was 234 days, the SPO's goal was 120 days, and the program actually completed the PALT in 72 days. To accomplish this, the SPO put together a team of dedicated experts from all the functional areas (procuring, designing, engineering, testing, and contracting). This team concept is now known as an Integrated Product Team (IPT) and is considered a standard practice that grew out of the acquisition reform process. A series of tailoring processes such as use of an EBB, reducing the Contract Data Requirements List (CDRL), and limiting the SOW to only what was essential were used to speed the contracting process. The EBB was used extensively to clarify to all offerors any questions or comments that had been presented. Avoiding the postal or any other delivery system saved valuable time and money in distributing up-to-the-minute information.

The ninth difference was the fact that no bid sampling was conducted before award of this procurement contract for "prototype" terminals. The term prototype as discussed earlier refers to a developmental program. This was a procurement that required delivery of a fully operational system within a year of notification of the requirement. Not conducting bid sampling placed a significant amount of trust in the unverified data analysis contained in the contractors' proposals.

The final difference was in defining the threshold and objective performance specifications the terminal would be required to meet. The AN/TSC-143 program was a prototype system that would be the foundation of all tri-band terminals to follow. The mission of the PowerPAC3 company was unique and therefore the AN/TSC-143 should have been designed specifically to satisfy those unique requirements.

b) Analysis

The reasons for the differences in the AN/TSC-143 contracting process were primarily generated from the constraints DCSOPS placed on the PM. The schedule constraint of one year drove the entire contracting process while the other constraints such as NDI/COTS, "Best Value" competition, and $9.9 million ceiling defined the boundaries. In addition, a combination of factors such as a one-time buy, urgency of need, and the small dollar value of the procurement allowed for an informal contracting process that reduced the amount of time needed to award the contract.

Forgoing the acquisition plan in this program was seen as appropriate due to the dollar size and short duration of the program. Additionally, the one-time buy allowed for an informal planning process. FAR 7.103 allows the head of an agency to waive detail and formality requirements, as necessary, for planning acquisitions having compressed delivery or performance schedules because of the urgency of the need. As stated in DFARS 207.103, no written acquisition plan is required for one-time procurements or procurements costing under $15 million in a single year. The contractor developed its own acquisition plan that was included as part of the submitted proposal. The acquisition plan was updated as the contractor saw fit throughout the acquisition process.

The mandate for a "Best Value" competition from DCSOPS was due to concerns over the Procurement Integrity Act. Certain contractors in the industry had been working extensively with the signal community on the future communications needs of the Army. In particular, was the Signal Centers involvement with several contractors during the push for tri-band capability to resolve the limited DSCS capacity problems experienced during DS/DS. This may have led to the perception of a less than arm's length relationship between certain contractors and organizations involved in the procurement. Additionally, DCSOPS had also been lobbied by those same contractors and based most of its constraints on the information it had received from those particular contractors.

Market research was inadequate for several reasons. First, the actual performance requirements had not been fully determined when the NDI acquisition strategy was mandated by DCSOPS. The senior leadership had been successfully lobbied by industry into thinking that the tri-band capable terminals were already fully developed and met or were close to meeting the necessary DSCS certification and military testing requirements. Furthermore, the SPO had little time to examine the market and independently verify the industries true capabilities. The Signal Center supported industry's assurances that the AN/TSC-143 terminals could be fielded within the DCSOPS mandated constraints.

An analysis of the selection of a FFP type contract for this procurement is necessary to determine why it was selected and if any other alternatives may have better incentives for contractor to perform. The FFP selection was based on the perceived risks in meeting the schedule constraint not in achieving the technical performance requirements. The PCO made the decision based on information from technical personnel on the acquisition team as well as face-to-face meetings with industry. Industry had repeatedly assured the Government that it could easily produce the terminals and, in fact, had already developed several prototype terminals using its own IR&D funds.

FAR 12.207 limits the use of contract types allowed for procurement of commercial items. The FAR states that "agencies shall use firm-fixed-price contracts or fixed-price contracts with economic price adjustment for the acquisition of commercial items. Use of any other contract type to acquire commercial items is prohibited." This severely limited the PCO's options.

The SSP was not approved until two months after the solicitation announcement on the CBD. This was due to lack of information on performance requirements and knowledge on what the evaluation criteria should be. The acquisition team knew the minimum AN/TSC-143 requirements and, since this was an urgent procurement, decided to place the solicitation on the CBD and work with industry to help create the performance requirements. Most of the initial work on the program was strictly verbal, which was followed-up in writing at a later date. It took several months for the team (including industry) to develop and agree upon the performance requirements and evaluation factors that would achieve a "Best Value" selection.

The SSA was designated as the Branch Chief SATCOM/MILSTAR because the program was not considered a "major system" as defined under DoDD 5000.1. The SSEB Chairperson was senior to the SSA for reasons unrelated to the source selection process. However, since the individual selected was highly qualified and willing to participate as the SSEB Chairperson he was designated as such in the SSP.

The SSAC was seen as an unnecessary level of review considering the experience level of the SSA and SSEB chairperson and schedule constraint. The low dollar value and urgency of need for this program allowed an informal organizational structure to be used. The informal procedures were recognized by the Comptroller General, who had offered little guidance. Thus, there was no general legal requirement for a SSAC.

The speed in which the contract was awarded can be attributed to the efforts of both the CECOM Acquisition Center and the SPO. The Acquisition Center recommended that the acquisition team use a package of experimental streamlining initiatives, known as PACER, to help meet the program objectives. Although these initiatives assisted the team in awarding the contract in a record 72 days, the success was primarily attributed to the high level of interaction and openness of all parties involved. The SPO had brought in all parties (Government and Industry) and made them a part of the decision process. Industry had substantial input to the RFP that helped speed the submission of their proposals. This involvement was occurring back in late 1993, early 1994 time-frame and makes it different from the standard contracting process.

Another area that deserves further analysis is the use, or lack of use, of bid samples. The FAR imposes no restrictions on the use of bid samples in negotiated procurements, but testing and inspection of the samples are limited by 41 U.S.C. 253c and 10 U.S.C. 2319 to qualification requirements. When asked why no bid sampling was conducted, the indications from the PMO were that it was not feasible due to the schedule constraints. The winning contractor would have only six months to get the terminals produced, tested, and accepted by the gaining unit if the 120 day contract award goal was achieved. The PMO personnel also stated that not all potential offerors had a prototype system. The concern over full and open competition to all potential offerors, even those who did not have a prototype, influenced the decision not to conduct bid sampling. With the imposed time constraint it would have seemed logical to exclude those offerors who had never attempted to build this product before. The competitive range should have been limited to those offerors who had built prototypes. A requirement should have been included in the RFP for contractors to submit their prototypes for testing. This would have determined which offeror stood the best chance of meeting the performance requirements within the allotted time.

Another area requiring analysis is the development and enforcement of performance specifications. In attempting to allow the contractor flexibility in meeting performance requirements, the SPO tried to avoid calling out military specifications whenever possible. Problems with the TRADOC culture wanting to enforce the military specifications tended to slow the process as tradeoffs between cost schedule and performance were controlled by agencies not under the PM's control. Analysis of the performance requirements development is needed to determine why the Signal Center was adamant about keeping military specifications. After the need for these terminals was validated, the Signal Center, as the user representative, then generated the requirements the terminals would meet based on the STAR-T requirements rather than the PowerPAC3 requirements. The scenarios in which the PowerPAC3 company would participate, had the company's assets deployed primarily to Major Headquarters (division and above) in four specific geographical areas ranging from tropical to desert conditions. Some requirements for the STAR-T such as rapid setup and tear-down, temperature range down to -40 degrees Fahrenheit, and switching capability were probably not critical for the AN/TSC-143 mission requirement. Some of the STAR-T terminals may be deployed to colder regions such as Alaska, Norway, Sweden, etc., which require operation in temperatures as low as -40 degrees. Some of the stringent requirements were probably unnecessarily enforced on the AN/TSC-143 program considering where these terminals would be deployed.

The number of waivers approved for the AN/TSC-143 program in December 1995 indicated the requirements exceeded what was actually acceptable (threshold). The requirements that were modified are presented in Figure 15.

	Original Spec	Modified Spec	As Accepted
Reliability	MTBF>1000hrs	MTBF>400hrs	MTBF~150hrs
Weight	<4600lbs	<4750lbs	~4725lbs
Non-op Temp	-40 to +160	-24 to +160	-24 to +160
Operating Temp	-24 to +120	-24 to +110	-24 to +110
Set-up Time	<30 minutes	<2.5 hours	<2.5 hours

Figure 15. Specification Waivers [Ref. 29: p. 12]

In areas like reliability, further market investigation would have shown that no satellite terminal had ever come near achieving the 1,000-hour requirement as shown in Figure 16. The reliability factor was based on the MSE tactical switching systems reliability requirement rather than market research of the current satellite market. MSE switching systems had extensive research, development, and testing conducted under a foreign government before the U.S. military acquired the system. Given the tight schedule, cost constraints, and scenarios in which these terminals would operate, the Signal Center should not have been so adamant about enforcing all the specifications on the AN/TSC-143. The three satellite terminals presented in Figure 16 were deployable to environments world-wide while the AN/TSC-143 had a limited geographical area to support.

Terminal	AN/TSC-143	AN/TSC-85/93	LMST	SPIRIT II
MTBF (Spec/Actual)	1000/150	851/375	744/TBD	1000/500
Storage Temp	-24 to 160	-70 to 160	-25.6 to 149	-76 to 158
Operating Temp	-24 to 110	-25 to 125	-4 to 122	-25.6 to 125.6
Notes :	Switch SHF Tri-band HHMMWV No Trailer	No Switch SHF Single-band 5 Ton truck Trailer	No Switch SHF Tri-band No Vehicle Trailer	No Switch SHF Tri-band HMMWV Trailer

Figure 16. Comparison of Specifications from Similar Systems [Ref. 29: p.19]

More education and emphasis from the senior military leadership on acquisition reform may have prevented the Signal Center from sticking to MILSPEC requirements so adamantly. An actual cultural change must take place to shift the mind-set of relying on a single predetermined process to meet all our needs, to a new mind-set that accepts change and adapts to the environmental challenges. In the end, this inflexibility was probably the most time consuming problem the SPO had to manage.

As seen from the PM's perspective the unwillingness to bend the requirements made the acquisition virtually impossible. To take a complex prototype system that had never been produced or tested before, and attempt to field it fully operational to a tactical unit in less than a year was unrealistic. One way this program could have realistically met all the imposed objectives was to accept one of the prototypes the contractors had built but not tested "as is." This would have allowed the winning contractor to finish testing the prototype to ensure it met the requirements it was designed to meet, and then build six more terminals for the PowerPAC3 company within the six to eight month period.

3. Systems Testing

a) Similarities and Differences

The similarity between the AN/TSC-143 testing process and the normal testing process was limited to the involvement of OPTEC during the customer acceptance testing and the creation of the TIWG to decide what and how the tests would be conducted. Other tests such as the FAT were conducted which alludes to developmental testing, but were in actuality considered a progress check before shipping the terminals.

The differences started with no developmental testing or analysis being conducted on this prototype concept. Two other differences were the abbreviated test plan and the monitoring of the tests. In the AN/TSC-143 case, the tests were monitored and managed by technical representatives from CECOM rather than TECOM, AMSAA, or OPTEC. The final difference was the requirement for certification of the switch, the military satellite equipment, and the commercial satellite equipment from organizations outside the normal testing community.

The first difference was the lack of developmental testing. The mandate from DCSOPS was for a NDI product. This indicated the product was already developed and commercially available. DCSOPS assumed that there may be some modifications required, but based on the prototypes displayed, the advertised performance capabilities, and the contractors' assurances mandated the NDI strategy. The SPO had to manage the program with the constraints dictated by the requesting organization.

The second difference was the abbreviated test plan. A formal Test and Evaluation Master Plan (TEMP) was never created. In a normal acquisition, the TEMP describes the program's overall test and evaluation strategy. The TEMP is prepared as early as possible in the acquisition process (normally before Milestone I), and is designed to identify and integrate objectives, responsibilities, resources, and schedule for all test and evaluation to be accomplished before key decision milestones. There were no milestone decisions to be made in this program and the SPO working with the TIWG streamlined the testing requirements considerably. The SPO waived some of the critical tests (shock and vibration, and temperature cycling) due to time constraints, which later proved to delay the program.

The third difference was in monitoring of the tests conducted. The tests were always done by the contractor and monitored by the Government. In the AN/TSC-143 case, the Government was represented by technical personnel from CECOM who were considered matrix support to the SPO and project leader. The question of bias comes into play with the PMO influencing how the test results are presented. The results from the tests were key in deciding if the terminals were ready to be shipped to the 269th Signal Company.

The fourth difference was that the AN/TSC-143 had to go through three separate certification processes. The three certification processes were for the on-board switch, military satellite system, and commercial satellite system. These certifications were performed by DISA and International Telecommunications Satellite Organization (INTELSAT). DISA is the agency that certifies that military communications equipment meets specific criteria before it is allowed into DoD's communications architecture. INTELSAT is the agency that certifies commercial satellite equipment for access on the INTELSAT satellite network. JITC is DISA's testing agency that performs the interoperability and standard parameter checks. The commercial satellite equipment had to be certified by a civilian agency, INTELSAT, since DISA was not authorized to certify commercial satellite equipment.

b) Analysis

There are several reasons why developmental testing was not conducted. First, the schedule constraint required delivery of a fully operational system within one year of notification. This required the SPO to limit testing to only what was necessary. Furthermore, some of the contractors had used their own IR&D funds to begin development of a prototype tri-band capable terminal. The contractors' prototype terminals were not fully developed when the Army's tri-band requirement was validated and approved. None of the existing commercial prototypes being developed had ever been independently tested or certified. This made developmental testing more of a necessity. The combination of assurances by the contractors and the desire to acquire tri-band capability influenced the decision to not conduct any developmental testing. Developmental testing is normally a series of FATs that would operate under the test-fix-test concept until problems are resolved. Due to the unanticipated integration and reliability problems, the terminals went through more testing than was originally planned. According to the personnel in the PMO, some of the tests that should not have been waived were the shock and vibration tests as well as the temperature cycling tests. They felt that if these tests had been conducted earlier the terminals would have been fielded only a year past the required delivery date rather than 18 months.

A TEMP was never required for this program. There were no milestone decision points to go through, nor was it necessary for the program to be entered into the Future Years Defense Plan (FYDP) for programming of funds. The schedule constraint drove the SPO and TWIG to an abbreviated test plan. The test plan was satisfactory in checking the progress of the equipment, but lacked some of the standard tests required for equipment to operate in a battlefield environment. Again, the shock and vibration, and temperature cycling test should have been included in the test plan.

The monitoring of the contractor tests was done by CECOM matrix support personnel to accelerate the process. Many personnel in the program office felt the test community would make the schedule objective impossible. As a result, all the terminal testing was done with CECOM personnel monitoring and GTE personnel performing, except the FIAT which was managed by TECO, an office under OPTEC. This placed the PM in a much better position to monitor and manage the schedule, but may have biased some of the decisions to continue early in the program. The SPO felt that an onsite representative at the Taunton plant full-time would ensure that problems were identified and corrected quickly. The fact that the CECOM representative was the matrix support to the program office could lead to biased test data. If problems were discovered during testing the SPO could pressure the test monitor to paint a better picture of the results. The test results provided by the test monitor influenced the decision to ship the terminals to Fort Huachuca in November 1994. The test monitor had reported its findings accurately, but had put a positive spin on the contractor's ability to correct the deficiencies. The positive spin may have been provided as a result of the pressure to field the terminals on schedule.

The certification requirement for communications equipment is to ensure that the new communications equipment is in compliance with the accepted military, domestic, and international interoperability standards and operating parameters. DISA is capable of certifying the equipment that operates on the military information infrastructure, but the equipment operating on non-military networks must be certified by the commercial equivalent of DISA. In the AN/TSC-143 case, the INTELSAT organization is the commercial equivalent of DISA for satellite access certification.

Another concern that surfaced during the testing was the impact of the partially tested system in the hands of the using unit. This has both advantages and disadvantages. The advantages are that testing allowed the soldier to become familiar with the system and how it is supposed to work. The disadvantages are that if they were not brought in early on, they will probably develop a list of things they want added, modified, and deleted. Once the system has been produced it is difficult to accommodate any new requirements without extensive delays and added costs. This leads to extreme dissatisfaction and disappointment from the end user's standpoint. The user no longer feels a part of the equipment fielding team. Another disadvantage is that if the terminals were not fully tested, any failures, especially major ones, would lead to mistrust of the contractor; because the user would feel that the contractor was providing a substandard system. This stigma would follow the contractor at each subsequent step in the testing and acceptance of the terminals.

The special project office for the system felt that the DCSOPS had too high an expectation for this NDI program. NDI based acquisition programs are presumed to reduce the time and funds required to field a system significantly. The expected reduction in time is continuously being pushed without any significant change in the required steps to procure the system. This places tremendous pressure on the Program Office to ensure the system's testing schedule is adequate and capable of meeting time constraints. Trying to include all required testing becomes difficult and is a primary concern in fielding a NDI system on schedule. The SPO felt that NDI programs will continue to be tested in an accelerated fashion and that the tester must coordinate the test effort as early as possible. The SPO indicated that the advantages offered by the NDI based acquisitions were sometimes not being realized due to excessive testing and risk elimination. The SPO believed that the T&E community must look at the basis of a T&E program as risk management, not risk elimination. In addition, the SPO wanted the CBTDEV to develop a good set of requirements and then stick to them. Changing requirements severely affected the already intensive test schedule. The SPO believed the contractor should dedicate the right people to the test and concentrate on putting them at the right place during key test events. Although all agencies were involved and worked well together, the SPO stated that better management of the TIWG process could improve the results.

4. Logistics Support

a) Similarities and Differences

The only logistics support similarity was the GFE. The GFE was already established in the Army inventory and required little coordination to obtain the required logistics support.

Logistics support for the terminal's NDI components was managed quite differently from the standard process. The first difference was in the fact that this system was not type-classified, and therefore not managed under the Defense Logistics Agency (DLA). The second difference was in the expected life-span of the terminals, and the third difference was in the electronics industry's capacity to support the rapid turnover of technology at a much lower cost.

The SPO's plan was to have the terminals fully supported by the manufacturer through exercise of contract options. The terminals were not type-classified and were, therefore, outside the DLA management structure. The type classification is the Army's implementation of DoD requirement that an item is "approved for Service use" before expending procurement funds. Logistics support for standard items is normally accomplished in the preproduction phase and is subdivided into maintenance and supply support. The manufacturer's support structure for the AN/TSC-143 terminal was divided into a two-level approach. At the first level the contractor's representative is on-site to do organizational and intermediate repairs. If a problem requires higher level repairs, the equipment is transported back to the second level of maintenance. The second level is the manufacturer's plant, which is equivalent to the military's Depot-level repair. The manufacturer's plant has the ability to rebuild the entire system. The original AN/TSC-143 contract allowed for maintenance options to be executed throughout the five year lifecycle of the AN/TSC-143.

b) Analysis

The standard type classification was not required due to the urgent operational requirement. Additionally, the limited procurement without further intent of additional procurement, would not qualify the AN/TSC-143 for adoption as standard type classification in the Army inventory.

The support structure for the AN/TSC-143 was based on the terminal's expected lifecycle of five years. The constant turnover of technology has required the military to make decisions on whether to (1) spend billions of dollars to upgrade training, test equipment, and maintenance facilities, or (2) have contractor support equipment. The commercial industry can effectively and efficiently support equipment in most geographical areas with major repairs being performed at the manufacturer's plant. The rapid increase in technology and the electronics industry's ability to keep up with the changes allow many newer communications systems to be contractor supported and maintained at a much lower cost. The move to more contractor support may save the Army a tremendous amount of money in the training, test equipment, and facilities required to maintain state-of-the-art equipment.

Another unique characteristic of the communications environment is that the commercial industry leads the military in its ability to produce and support state-of-the-art technologies. Normally it is the military pushing the industrial base to maintain state-of-the-art; now it is public demand. Industry is now in the position of selling the military already developed and proven commercial state-of-the-art communications capabilities as well as the maintenance contracts to support that capability. This results in increased competition and a decrease in costs to the Government.

D. CHAPTER SUMMARY

The acquisition environment surrounding small communications systems procurements is complex and dynamic. This chapter provided discussion and analysis of the similarities and differences between the standard developmental acquisition process and the AN/TSC-143 acquisition process. The areas covered were the management environment, external organizational influences, requirements generation, contracting, testing, and logistics support. The analysis provided some insight into why the processes were different.

The management environment for the AN/TSC-143 program was one of a continuous increase in the number of programs while adjusting to the reduced work-force, turnover, and restructuring of the procurement organization. This is illustrated by the fact that the Tri-band programs were initiated in October 1993 with the AN/TSC-143, and by April 1996 five additional Tri-band programs have been validated and approved. The five additional programs are being managed in the Tri-band Product Office with the addition of only two more project leaders. Each project leader is now responsible for two different Tri-band programs.

The external organizational influences are unique to DoD's communications architecture. DoD's information infrastructure is extensive and includes every major weapon system procured. The military, domestic, and international standards and policies must be addressed before implementing a new communications system that will interface with the information infrastructure. Additionally, the rapid turnover of technology combined with the Army's Force XXI digitization initiatives requires extensive management of the Army's communications assets.

The requirements generation process was different in that the tri-band capability was a byproduct of the LAM TF evaluation of the PowerPAC3 company concept. The influences of the Signal Community helped justify the need for the PowerPAC3 company to have the tri-band capability. The verbal notification, which contained inadequate guidance in some areas while mandating unnecessary constraints such as NDI in other areas, is also typical in generation of communications requirements.

The contracting process for the AN/TSC-143 procurement was an excellent example of how to award a contract efficiently. The teaming concept combined with the various tailoring initiatives made the entire contracting process a success. The drawback in focusing on the contract award date was the reduction in market research and lack of bid sampling. For a prototype program market research should have been extensive before determining what the performance requirements were to be.

The testing process was also well-coordinated and sufficient. The problems were primarily generated from overly optimistic contractor proposals and inadequate market research. Having a representative from the program shop monitor the contractor testing may have biased the test reports that were being fed back to the PM, but additional checks and balances were in place to ensure that the terminals were not accepted unless they met the performance requirements as stated in the RFP. Any commercial communications equipment that will be operated on the battlefield should be subjected to shock and vibration, and temperature cycling tests. The certification process requirements ensured that the terminals would operate effectively in the commercial and military communications networks. The certification process went smoothly and caused no delays.

The logistics support for communications equipment is shifting to more and more contractor support. The massive amount of communications infrastructure and rapid turnover of technology has increased the cost of the military maintaining its information infrastructure. With industry leading the military in state-of-the-art communications systems, it is economically smart to continue the shift toward contractor supported and maintain systems.

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS -- ANSWERS TO RESEARCH QUESTIONS

1. Primary Question

- **What is the current acquisition environment surrounding communications systems procurement?**

This research shows the procurement process used for communications programs is different in many ways from the standard developmental acquisition process. Most of differences are due to program size, organizational influences, and availability of commercial-off-the-shelf components. The progress in electronics technology and the availability of that technology for military applications has increased the need for continual replacement of systems that rapidly become antiquated. To take advantage of the rapid advance of technology, the communications procurement agencies have accelerated the standard developmental acquisition process. The managers of the program were empowered to use innovative techniques to meet the challenges facing this communications systems procurement. In the AN/TSC-143 case study, many of the formal processes were not required or were waived to meet the urgency requirement.

The streamlined acquisition process combined with the reduction in system lifecycle and Force XXI initiative has significantly increased the number of programs under the PEO C3S. The growth in the number of programs combined with the reduction in personnel to manage the new programs increases the risk of making mistakes. More changes in procurement of communications systems will occur as technology advances and resources are reduced. Training and education of all procurement agencies and those organizations that influence the procurement process must continue in order to keep abreast of the most innovative and effective methods.

2. Subsidiary Questions

- **Why is the communications acquisition environment continually changing?**

Today's acquisition environment has been dramatically transformed due to the reduction in resources provided by Congress. This has forced DoD to look for new ways to conduct its business. One of the key initiatives DoD has selected is to reform the acquisition process.

The acquisition process is constantly changing in reaction to the external environment. The end of the cold war has shift the military's mission and reduced the resources it has enjoyed over the past few decades. The rapid development of new technologies has increased the need for modernization of our aging systems and has opened up many new opportunities to maintain our dominance on the battlefield. The need for weapons modernization and force readiness requires that the acquisition of systems be done faster, with fewer people, and at a lower cost.

The emphasis on Force XXI and the digitization of the battlefield following DS/DS has allowed communications systems procurement to lead the way in acquiring state-of-the-art equipment. The rate of technological advancement in commercial electronics has reduced the average life-span of military communications equipment to between five and ten years. Commercial technology becomes obsolete in about 18 months, and that period continues to shrink. The turnover of technology combined with the Force XXI initiatives has led to an increase in the number of communications programs under the PEO.

Combine the reduced life-span of electronic systems with a shrinking defense budget and the Army's increasing information requirements, and it becomes necessary to accelerate the acquisition process. The challenge is not only to do more with less, but to do it faster. Communications procurement agencies have been the initiator, as well as the test bed, for many new initiatives that let a user's requirement quickly become a reality.

Most previous communications systems acquisitions had followed the standard eight to 16 year acquisition process. The advances in commercial technology combined with the lower prices generated from the highly competitive electronics industry created the opportunity for the Army to quickly procure many state-of-the-art commercially available communications systems. The Army communications procurement agencies have been successful in reducing the time it takes to field a fully operational system. Some of the success can be attributed to the availability of NDI equipment, but most of the success rests in the manager's ability to push new methods of meeting program requirements. The innovative methods allowed for rapid decision making and encouraged many of the acquisition processes to flow concurrently rather than sequentially.

In conclusion, the organizational influences on procurement of communications systems are important and must be included in the decision making process. Members of these organizations must be educated on acquisition reform and the acquisition process. The acquisition team must be empowered to lead the decision making process and develop an appropriate acquisition strategy.

- **What are the characteristics of this changing acquisition environment?**

Some of the unique characteristics of communications procurement are the organizations influencing the acquisition process, the growth in the number of small programs, industry's ability to push state-of-the-art technology to the military communications systems, and the speed in which state-of-the-art systems can be fielded. Additionally, significant restructuring of the procurement agencies and a consolidation of many PEOs and program offices have been conducted in order to use the limited personnel available more efficiently.

- **How does the AN/TSC-143 program illustrate this environment?**

The AN/TSC-143 reflects this environment by the challenges that it faced and overcame: the push toward commercial products (mandated NDI/COTS strategy), the urgent need for this state-of-the-art capability, the limited funding resources provided by DCSOPS, and the willingness to use untested streamlining methods (IPTs, EBB) and to accept setbacks in the program as a result of these methods.

- **How did the AN/TSC-143 program proceed in this environment?**

The program proceeded exceptionally well considering the mandated constraints, the internal and external restructuring and downsizing, and the untested prototype's performance requirements. The involvement of the PEO, PM, and SPO during the early phases of the program was instrumental in shaping the process. The implementation of the IPT allowed a streamlined award process that resulted in no protests, although the decision not to conduct bid sampling prevented the PM from making a realistic assessment of the industrie's capabilities. The objective performance requirements were later found to be unrealistic for this type of procurement. The TRADOC community insisted that the prototype meet the initial requirements as stated in the RFP rather than establishing realistic and acceptable thresholds. The decision to forgo some of the critical shock and vibration tests, and temperature cycling tests to save time proved faulty. Had these tests been required in the RFP, many of the problems would have surfaced earlier and been resolved. The primary causes of the delays in the program were limited market research; lack of bid sampling; lack of shock and vibration tests, and temperature cycling tests; and inflexibility of the performance specifications. Had the AN/TSC-143 been handled as a true prototype program, many of the requirements of the acquisition process would not have been reduced or waived.

Although many problems were encountered, the program did field six state-of-the-art terminals within a 30-month period. Thus, the normal acquisition cycle time was reduced from eight to16 years to two and one half years. The program initiatives generated a number of lessons learned which will be used on the five tri-band systems that grew from the AN/TSC-143 program. A new contract, which uses the AN/TSC-143 as its prototype, has already been initiated to replace existing military satellite terminals (TSC-93B and TSC-85B). This new program (STAR-T) will forgo some of the normal phases due to the AN/TSC-143 success and lessons learned. This next generation satellite terminal will be fielded as a joint terminal to the Army, Marine Corps, and JCSE.

- **What can we learn from the AN/TSC-143 program about managing communications programs in this environment of rapid change?**

The challenge of this program was to procure a NDI system to be fielded as an operational prototype to a tactical unit. Combine the NDI strategy with an extremely tight schedule, limited budget, and "Best Value" competition requirement, and an unrealistic expectation is created. The unrealistic mandates create a highly stressful environment where even the most innovative streamlining techniques cannot achieve all the expectations. The tactical unit receiving the terminals, disappointed in the performance of the system, unsuccessfully attempted to push the AN/TSC-143 terminals to the battlelabs and test organizations to use as training aids [Ref. 32].

The AN/TSC-143 replacement program, STAR-T, will incorporate the lessons learned into its acquisition process, allowing it to skip over phase II. The following are lessons learned from the AN/TSC-143 case study:

- Conduct thorough market analysis to evaluate industry's capability to meet desired performance requirements within cost and schedule constraints. The market analysis is critical in assessing the program risk areas and developing the appropriate acquisition strategy to mitigate those risks.
- The program's acquisition strategy should be developed by the PM after market investigation is thoroughly conducted. The strategy should then be approved by the MDA rather than dictated from higher levels. Lobbying efforts by contractors, no matter how persuasive and optimistic, should not be part of the decision making process.
- Be prepared to tell senior leaders about unrealistic constraints immediately. Realistically assess and report the chances of success given those constraints. The Army's "can do" attitude is appropriate in combat situations but must be kept in check in non-combat situations. The PM should not feel pressured into a "can do" attitude.
- Avoid use of a NDI strategy for complex prototype systems with short schedule and/or limited funding. If mandated, then the CBTDEV must be

flexible on performance requirements that would prevent the system from being fielded on schedule and within cost. If a NDI strategy is mandated for a prototype system, then the system should be purchased basically "as is."

- Keep program requirements focused on the original mission need. The CBTDEV enforced the STAR-T performance requirements on the AN/TSC-143 so that it could be used as the prototype for the STAR-T. The unique mission of PowerPAC3 may not have required these six terminals to meet the STAR-T requirements.
- For a validated "urgent" requirement, attempt to get J&A for using other than a "Best Value" solicitation.
- Decide how important schedule (urgency) really is and reflect that throughout the source selection process to include the rating of evaluation factors.
- Evaluate various contract types and methods to ensure the contractor has appropriate incentive to meet performance requirements.
- In an urgent procurement required to use full and open competition, limit competitive range to offerors who have bid samples. Then conduct appropriate test and evaluation on those bid samples to determine which offeror has the best chance of meeting program objectives.
- On limited procurements involve actual users early on, not just the user representative. This empowers the users, and provides them with a sense of ownership. A better understanding of the tradeoffs involved in the procurement may also result.
- Continue use of IPTs, tailoring, and EBB.

B. RECOMMENDATIONS FOR FURTHER RESEARCH

The following issues are recommended for further study:

- How can the PEO C3S properly manage the increase in the number of communications programs? What organizational changes are appropriate in an environment of downsizing.

- What is the impact of AMC MACOM personnel being recruited into the PEO to manage programs? The increase in the number of programs and a reduction in personnel has forced the PEO to use matrix support personnel to manage small programs. The majority of these individuals are GS-12/13 level individuals with program experience, but little formal acquisition education and training.
- How effective are the streamlining initiatives on major communications programs? Acceleration of a small communications program is much easier as most of the processes are informal and review levels are below the PEO.
- What are the organizations involved in communications procurement, and how do they influence the acquisition process? Communications requirements follow a unique approval process and are influenced by many organizations outside the procurement agency.
- What are the long-term effects on the program from reducing the PALT? Is there a point where significant risks are introduced? Many standard processes are accelerated or waived in order to focus on the short-term objective of reducing the administrative lead time before award of the contract.

APPENDIX A - ACRONYMS AND ABBREVIATIONS

AAE	Army Acquisition Executive
ACAT	Acquisition Category
ADM	Acquisition Decision Memorandum
AFCEA	Armed Forces Communications Electronics Association
AMC	Army Material Command
AMSAA	Army Material Systems Analysis Activity
APB	Acquisition Program Baseline
AR	Army Regulation
ARL	Army Research Laboratory
ASA(RD&A)	Assistant Secretary of the Army (Research, Development & Acquisition)
AWE	Advance Warfighter Experiment
BAFO	Best and Final Offer
BCBL(G)	Battle Command Battle Lab (Fort Gordon)
C3I	Command, Control, Communications, and Intelligence
C4IEWS	Command, Control, Communications, and Computers, Intelligence, and Electronic Warfare Sensors
CAO	Contract Administration Office
CBD	Commerce Business Daily
CBTDEV	Combat Developer
CECOM	Communications and Electronics Command
CIA	Central Intelligence Agency
CICA	Competition in Contracting Act
CINC	Commander in Chief
CNN	Cable News Network
COEA	Cost and Operational Effectiveness Analysis
COIC	Critical Operational Issue and Criteria
COTS	Commercial-Off-the-Shelf
CSA	Chief of Staff, Army
CSP	Commercial Space Package
DA	Department of the Army
DAB	Defense Acquisition Board
DCSOPS	Deputy Chief of Staff Operations and Plans
DIA	Defense Intelligence Agency
DISC4	Director of Information Systems for Command, Control, Communications, and Computers
DISA	Defense Information Systems Agency
DMR	Defense Management Review
DOD	Department of Defense

DODD	Department of Defense Directive
DODI	Department of Defense Instruction
DSCS	Defense Satellite Communications System
DS/DS	Desert Shield/Desert Storm
DT	Development Test
DT&E	Developmental Test and Evaluation
DUSA (OR)	Deputy Under Secretary Army (Operations Research)
EAC	Echelons Above Corps
EBB	Electronic Bulletin Board
EHF	Extra High Frequency
EIRP	Effective Isotropic Radiated Power
EMD	Engineering, Manufacturing and Development
FAR	Federal Acquisition Regulation
FASA	Federal Acquisition Streamlining Act
FAT	First Article test
FFP	Firm Fixed-Price
FIAT	Field Installation Acceptance test
FOT&E	Follow-on Operational Test and Evaluation
GAO	General Accounting Office
GFE	Government Furnished Equipment
GOWG	General Officer Working Group
G/T	Gain/Temperature
HHMMWV	Heavy High Mobility Multi-Purpose Wheeled Vehicle
IEP	Independent Evaluation Plan
IFN	Items for Negotiation
IMA	Information Mission Area
IPAT	In-Plant Acceptance Test
IR&D	Independent Research and Development
JCS	Joint Chiefs of Staff
JCSE	Joint Communications Support Element
JITC	Joint Interoperability Test Center
JROC	Joint Requirements Oversight Council
LAM TF	Louisiana Maneuvers Task Force
LMST	Lightweight Multiband Satellite Terminal
LRC	Logistics Readiness Center
LTC	Lieutenant Colonel
MAA	Mission Area Analysis

MACOM	Major Command
MATDEV	Material Developer
MAIS	Major Automated Information System
MDA	Milestone Decision Authority
MDAP	Major Defense Acquisition Program
MG	Major General
MI	Military Intelligence
MILSTAR	Military Strategic/Tactical Relay
MNS	Mission Need Statement
MRC	Major Regional Conflict
MRTFB	Major Range and Test Facility Base
MSE	Mobile Subscriber Equipment
MTOE	Modified Table of Organizational Equipment
NDI	Non-developmental Item
NET	New Equipment Training
NSA	National Security Agency
OMB	Office of Management and Budget
OPEVAL	Operational Evaluation
OPTEC	Operational Test and Evaluation Command
ORD	Operational Requirements Document
OSD	Office of the Secretary of Defense
OTA	Operational Test Agencies
PALT	Procurement Administrative Lead Time
PCO	Procuring Contracting Officer
PDP	Procurement Data Package
PDRR	Program Definition and Risk Reduction
PEO	Program Executive Officer
PEO COMM	Program Executive Officer Communications
PEO C3S	Program Executive Officer Command, Control, and Communications Systems
PM	Program Manager
PMO	Program Management Office
PM SATCOM	Program Manager Satellite Communications
PM TACSAT	Product Manager Tactical Satellite
PowerPAC3	Power Projection Army Command, Control, and Communications
PPBS	Planning, Programming, and Budgeting System
PT3	Prototype Tactical Tri-band Terminal
RD&A	Research, Development and Acquisition
RDEC	Research and Development Center
RDT&E	Research, Development, Test and Evaluation
RFP	Request for Proposal
RIF	Reduction in Force

SAE	Service Acquisition Executive
SBSDBSP	Small Business and Small Disadvantage Business Subcontracting Plan
SHF	Super High Frequency
SOF	Special Operations Force
SOFTACS	Special Operations Forces Tactical Assured Connectivity System
SOW	Statement of Work
SPO	Special Project Officer
SSA	Source Selection Authority
SSAC	Source Selection Advisory Council
SSEB	Source Selection Evaluation Board
SSP	Source Selection Plan
STAR-T	SHF Tri-band Advanced Range Extension Terminal
S&TCD	Space & Terrestrial Communications Directorate
STRICOM	Simulation, Training, and Instrumentation Command
T&E	Test and Evaluation
TECHEVAL	Technical Evaluation
TECO	Test and Evaluation Coordination Office
TECOM	Test and Evaluation Command
TEMP	Test and Evaluation Master Plan
TEXCOM	Test and Experimentation Command
TIWG	Test Integration Working Group
TRADOC	Training and Doctrine Command
TRITAC	Tri-Service Tactical Communications
TSM	TRADOC System Manager
UHF	Ultra High Frequency
U.S.	United States
USAISC	United States Army Information Systems Command
USD (A&T)	Under Secretary of Defense (Acquisition & Technology)

APPENDIX B - SEQUENCE OF EVENTS

Sequence of Events in the SHF Tri-band Tactical Satellite Terminal (AN/TSC-143) also known as the Prototype Tri-band Tactical terminal (PT3) :

Aug 90 - General Vouno, Army Chief of Staff, initiated PowerPAC3 concept called Project 5/Directed Telescope to support operations in Saudi Arabia (Desert Shield/Desert Storm).

Jun 91 - Signal School reviewed lessons learned from DS/DS and attempted to initiate a tri-band terminal requirement. A lack of funds prevents any real progress in developing the concept into a prototype system. Some contractors begin to develop prototypes which meet the Signal Centers projected minimum requirements.

Sep 93 - LAM TF CSP GOWG validated PowerPAC3 concept need for tri-band capability. California Microwave present products (STS terminal) currently available off the shelf.

22 Oct 93 - PM SATCOM notified of urgent requirement for six tri-band terminals.

25 Oct 93 - Special Project Office under PM SATCOM setup and staffed with matrix support personnel.

5 Nov 93 - Signal Center completed first draft of AN/TSC-143 minimum requirements based on projected STAR-T requirements.

8 Nov 93 - Emmett Paige, Asst. SecDef C3I, issued Policy for use of commercial satellite communications as an outgrowth of the Congressionally-mandated Commercial Satellite Communications Initiative (CSCI). Additionally, the Army was tasked with development of the concept of operations (CONOPS) for the tri-band terminals NLT 15 Mar 94

8/10 Nov 93-Met with DCSOPS to refine requirements, acquisition strategy. DCSOPS specifies they want "Best Value" competition rather than Sole Source.

10 Nov 93 - Announced program (synopsis) in *Commerce Business Daily* (CBD).

22 Nov 93 - Conducted discussions with industry on requirements. Several contrators have already developed prototype terminals and are lobbying to get the Army to accept them.

23 Nov 93 - Conducted one-on-one discussions with potential offerors to get a feel for the markets capability (feedback) and ensure realistic requirements.

26 Nov 93 - Emmett Paige issued guidelines for procurement and fielding of DoD tactical switched systems. This required all switches to be DISA certified.

3 Dec 93 - MG Gray sent message moving fielding requirement for terminals to 30 Sept 94 rather than the original date in FY96, the requirement is now made "urgent". This was due to a Post Cold War C2 study. MG Gray states that this is an opportunity to demonstrate rapid acquisition techniques. PACER (streamlining) initiatives are implemented.

7 Dec 93 - Established EBB for program.

9 Dec 93 - MG Gray provided two-page minimum essential requirements document to DCSOPS.

10 Dec 93 - Placed two-page minimum requirements on EBB

15 Dec 93 - Established Source Selection Board (SSEB and SSA only, no SSAC).

16 Dec 93 - Initiated requests for GFE equipment to be delivered NLT 31 Mar 94 to awarded contractor.

17 Dec 93 - Placed Statement of Work (SOW) and third version of requirements with industry comments on EBB

23 Dec 93 - Placed draft RFP sections B, L, and M on EBB.

28 Dec 93 - PCO issued message on EBB requesting preliminary info from vendors to evaluate risk

4 Jan 94 - Conducted pre-solicitation conference and one-on-one discussions with vendors

6 Jan 94 - Received final comments from industry on all drafts via EBB

11 Jan 94 - Completed Procurement Data Package (PDP)

12 Jan 94 - Released RFP

11 Feb 94 - Received proposals from industry

25 Feb 94 - Completed initial proposal evaluation

1 Mar 94 - Competitive range (7 offerors) briefed to SSA. Released Items for Negotiations (IFN)

8 Mar 94 - Received IFN responses and began interim evaluations

15 Mar 94 - Completed interim evaluations

17 Mar 94 - Briefed SSA on interim evaluation findings (3 offerors in competitive range), requested BAFO and sent out model contract.

21 Mar 94 - Received BAFOs

22 Mar 94 - Completed final evaluations

23 Mar 94 - Final evaluations briefed to SSA

24 Mar 94 - Awarded contract 7 days ahead of planned schedule to GTE for $7,756,801

Jun 94 - GTE uses their commercial TRI-SAT terminal during JWID 94 to see if it meets Army requirements. It failed the DSCS Certification

31 Sep 94 - Scheduled date for delivery of 6 terminals slipped. PM SATCOM approved.

17 Nov 94 - TM validation and verification and technical testing conducted by PM SATCOM and CECOM at GTE's Taunton plant.

18 Nov 94 - Mechanical integration of all six terminals completed. DCSC Certification completed by on-site DISA representative, John Rogers. Baseband in-plant acceptance test (IPAT) completed on three terminals.

21 Nov 94 - 67 Engineering Action Requests (EAR) initiated so far, of which a dozen are technical performance limiting concerns. BG Gust allows four terminals that have passed IPAT to be shipped to Ft Huachuca on 28 Nov with the fifth terminal shipped 31 Jan 95 after completion of successful IPAT. Terminal six has been cannibalized and several components must be repopulated before it can begin IPAT, Estimate terminal six will be ready by 30 Jun 95.

5 Dec 94 - GTE provides revised TMs and prepares to start soldier training. One AN/TSC-143 has been diverted for displayed at Signal Symposium to gather support for the Tri-band program.

16 Dec 94 - Closed 49 EARs of the current 70 EARs, 21 EARS still being worked.

19 Dec 94 - GTE institutes FRACA program on PT3 to track failures by cause, serial number etc.

31 Jan 95 - Five terminals arrive Ft. Huachuca to conduct technical testing followed by customer acceptance. Problems:
Reliability (150 actual vs. 1000 hr MTBF requirement)
Weight (323lbs overweight, 4600lb spec)
Autotrack Control Unit (1 dB vs. .5 dB spec)
Operating temp range (-24 to +110 F vs. -40 to +160 spec)
Flex Waveguide (raising and lowering antenna damages waveguide)
Generators (89db at 2 feet exceeds safety level)

13 Feb 95 - Two operator classes of 25 soldiers each begin

Jun 95 - BG Gust and GTE decided that all terminals needed to be taken back to GTE's Taunton plant and repaired.

25 Aug 95 - One terminal sent to White Sands Missile Range for Temperature testing.

8 Sep 95 - GTE plans to request waivers from initial specs on:
Reliability (reduced to 400 hr MTBF)
Weight (Increase spec to 4750lbs)
Autotrack Control Unit (increase to 1 dB)
Operating temp range (modify to -24 to +110 F)
Generators (change operator location from 2 to 8 feet)

Jan-Mar 96- Video teleconferencing held between 11th Sig. Bde, USAISC, SIGCEN, and PM SATCOM to monitor progress and make decisions on program. All problems except reliability resolved

Mar 96 - All six terminals sent to Ft. Huachuca with three to be user tested

Apr 96 - Training conduct on terminals, Primary Training Exercise (PTX) scheduled for May 96

5 May 96- Terminals taken to Twenty-nine Palms for user testing by Ft. Gordon's TECO personnel.

10 May 96 - PTX conducted, TECO personnel monitor the equipment

15 May 96 - 269th Signal Company accepts terminals

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