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DEPARTMENT OF THE ARMY

FIELD MANUAL
6-02.45 (FM 11-45)

Signal Support to Theater Operations

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Field Manual
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Headquarters
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Signal Support to Theater Operations

Contents

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Page

Preface

FM 6-02.45 is the Army's doctrine for Theater Signal. It is consistent with and expands on the doctrine in Joint Pub 6-0, FM 6-0, FM 3-0, FM 24-1, and FM 100-6. It contains the Command, Control, Communications, Computers and Information Management (C4IM) guidelines necessary for theater communicators to support warfighters in the contemporary operational environment (COE).

This manual is applicable at strategic, operational, and tactical levels of war, special operations, smaller scale contingencies (SSC), homeland security (HLS), and military operations other than war (MOOTW). The content is based on lessons learned from operational experience, combatant commander operational requirements, current concepts, programmatic initiatives, and new technology infusions. These factors create doctrinal issues that may affect future warfighting operations. This doctrine examines how new concepts, systems design, network protection, organizational structure, and user responsibilities have changed the role of the Signal Corps in providing C4IM to the Army.

This manual introduces several new organizational constructs that will bridge the gap between the current and objective Theater Signal force and make signal organizations relevant across all components (Active, National Guard, Reserve) of the Army. It also provides information on the planned phase-out of several legacy force structures.

This manual provides the doctrinal foundation for force design, combat development, professional education, and training of Theater Signal units and personnel. It establishes and reiterates that effective C4IM operations are vital to the warfighter's mission. This manual provides information to combat arms, combat support, and combat service support leaders and planners on how Theater Signal supports their operations.

The proponent for this publication is the United States Army Signal Center. Send comments and recommendations on DA Form 2028 directly to: Commander, United States Army Signal Center and Fort Gordon, ATTN: ATZH-CDD (Doctrine Branch), Fort Gordon, Georgia 30905-5075, or via e-mail to doctrine@gordon.army.mil. Key all comments and recommendations to pages and paragraph numbers to which they apply. Provide reasons and rationale for your comments to ensure complete understanding and proper evaluation.

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

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Chapter 1

Theater Signal Transformation

The Army is transforming in response to changes in the global political, military, and technological environment and in accordance with national level strategic and political decisions on how best to adapt to this changing environment. Concurrent with the overall Army transformation from the current force through the Stryker force to the future force, the theater signal force is undergoing far-reaching transformations. These changes to theater signal forces are driven by the changes to the Army as a whole and serve as enablers to the Army transformation. This chapter discusses the changing Army and its effect on the Signal Corps.

THEATER SIGNAL OPERATIONAL ENVIRONMENT

1-1. The Department of Defense (DOD) defines an operational environment as a "composite of all the conditions, circumstances, and influences that affect the employment of military forces and bear on the decisions of the unit commander." The theater signal operational environment that drives theater signal doctrine and force structure includes all of the elements of the larger operational environment that affect all US forces, and the additional factors imposed by the requirements, characteristics, and doctrine of the forces supported by theater signal. Highlights of the changes to the theater signal operational environment are summarized in Figure 1-1.

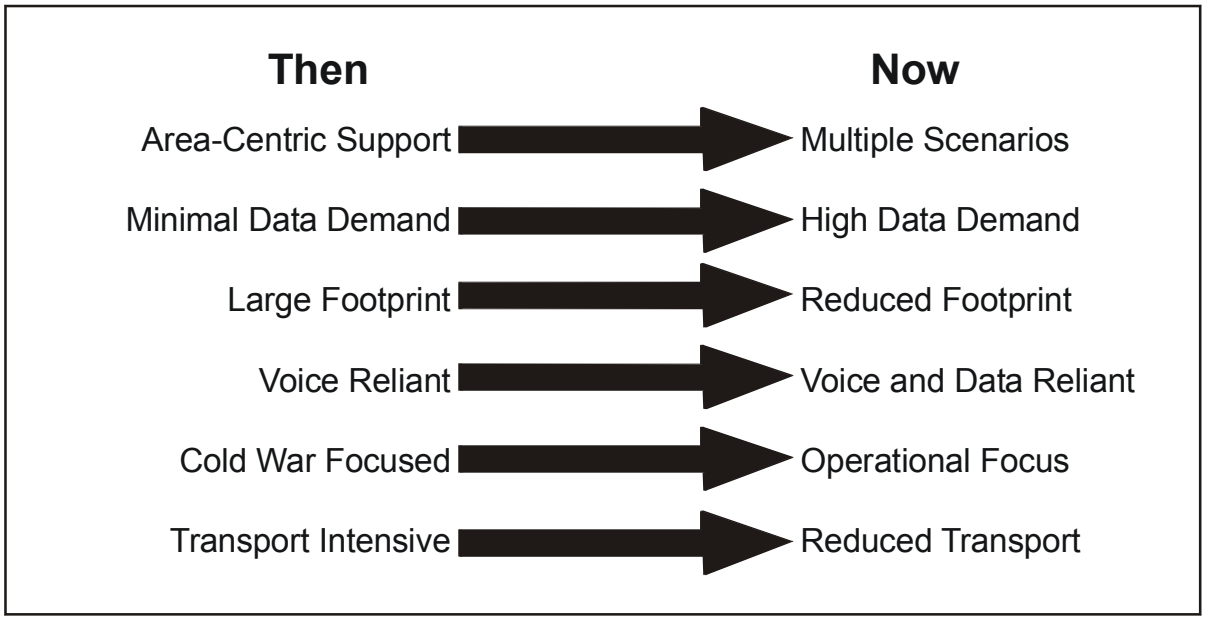


Figure 1-1. Evolving Signal War Fight

THE CHANGING ARMY OPERATIONAL ENVIRONMENT

1-2. Today, the warfighter's environment changes quickly due in part to rapid development, deployment of new technologies, and the constant change in the types of terrain and operations to which they are forced to adapt.

1-3. As our technological capabilities change and expand, so too do the capabilities of our enemy. In today's global technological environment, hi-tech developments make new capabilities available to both friendly and adversary forces alike.

1-4. The types of threats facing the United States extend from smaller, lower-technology opponents using more adaptive asymmetric methods to larger modernized forces engaging deployed US forces in more conventional symmetrical ways. Threats to peace and stability exist in the form of military powers, terrorism, narcotics trafficking, and organized crime. In some possible conflicts (or in multiple, concurrent conflicts), a combination of these types of threats could be especially difficult to defend against.

1-5. Contemporary strategic thought recognizes that the origin of potential threats involves some degree of uncertainty. Adversaries may no longer present themselves clearly in terms of intent, capability, or modes of operation. The very nature of conflict is uncertain, as is the form it will take. However, in light of this uncertainty, the following trends are recognized:

- Diminishing protection afforded by geographic distance.
- Increasing threats to regional security.
- Increasing challenges and threats emanating from territories of weak and failing states.
- Diffusion of power and military capabilities to nonstate actors.
- Increasing importance of regional security arrangements.
- Increasing diversity in the sources and unpredictability of the locations of conflict.
- Cyber attacks provide the opportunity for individuals or small groups to wreak havoc on networked services and information that may have impact on a local, regional, and global scale.

1-6. The threat of terrorist attacks against US citizens and US interests around the world has become the nation's most pressing national security issue. American and allied military strikes in response to such attacks are likely to lead to further terrorist strikes against American and allied citizens and interests, both in the United States and abroad. This aggression will likely take a variety of forms and may include cyber attacks by terrorist groups themselves or by targeted nation-states.

1-7. Even more likely are cyber attacks by sympathizers of the terrorists, hackers with general anti-US or anti-allied sentiments, and thrill seekers lacking any particular political motivation. During the past few years, the world has witnessed a clear escalation in the number of politically motivated cyber attacks, often embroiling hackers from around the world in regional disputes. In addition, the number, scope, and level of sophistication of cyber attacks unrelated to any political conflict are increasing rapidly. Where antecedent attacks were relatively benign, recent attacks have targeted vital

communications and critical infrastructure systems. In the future, cyber attacks will evolve further, exposing vulnerabilities not yet identified by computer security experts. For example, the recent Code Red and Nimda worms each exploited new vulnerabilities in Microsoft's Internet Information Server (IIS) software.

1-8. The same technologies that in the past were key to our information and technical superiority now enable our enemies to offset our warfighting and technological dominance. The challenge to leaders and planners at all levels is to maintain information and technological dominance in spite of the availability of high technology resources to our adversaries and potential adversaries.

ARMY MISSIONS

1-9. The Army continues to prepare for, and participate in, efforts that span the entire spectrum of military operations: from peacetime military engagement, to smaller scale contingencies (SSC), to full-scale war. It is essential to understand that Army forces participate in almost all operations as part of a joint team. Combatant commanders rely upon Army forces to conduct sustained land operations as a part of an overall strategy involving land, air, sea, and space forces. Land operations support the full spectrum of operations to include offensive, defensive, stability, and support operations:

- **Offensive operations**—intend to destroy or defeat an enemy with the purpose of imposing US will on the enemy and achieving decisive victory.
- **Defensive operations**—defeat an enemy attack, buy time, economize forces, or develop conditions favorable for offensive operations. Defensive operations alone are not expected to achieve a decision; they are employed to create conditions suitable for a counteroffensive to enable US forces to regain the initiative.
- **Stability operations**—promote and protect US national interests by influencing the threat, political, and information dimensions of the operational environment through a combination of peacetime, developmental cooperative activities, and coercive actions in response to a crisis. Inherent to stability operations is the deterrent effect of knowing that US forces are prepared to transition to other operations if necessary.
- **Support operations**—assist civil authorities, foreign or domestic, as US forces respond to crises or relieve suffering.

1-10. While operations at the lower end of the scale are more probable and numerous, operations at the higher end are the most dangerous and demanding. Therefore, major combat operations (MCO) and higher-level SSC operations are the benchmark for standards of preparedness.

1-11. Often it is necessary to engage in decisive operations with the purpose of defeating aggression or preempting actions that would threaten US interests. The following actions outline the character of future military operations:

- Strengthen resistance capabilities and efforts of indigenous forces.
- Deter aggression by the repositioning of pre-positioned equipment; redeploy forward-stationed air, ground, maritime, and amphibious forces; and rapidly deploy continental United States (CONUS) based and allied forces into the theater.
- Defeat enemy attempts to create an operational exclusion zone by securing regional deployment facilities from disruption; establishing regional air and missile defenses; securing entry to littoral waters as required; destroying enemy air, missile, and command and control (C2) capabilities; and destroying enemy war supporting infrastructures such as communications, electrical power, and transportation means.
- Conduct entry operations through multiple points of entry with combat forces able to fight immediately upon arrival, achieve operational surprise, and begin the destruction of enemy air defenses, fires, intelligence, surveillance, reconnaissance (ISR), and C2 systems.
- Conduct decisive operations against critical objectives throughout the enemy's area of operations. These operations require the integration of precision fires, maneuver, and assault to negate the enemy's ability to respond effectively and to fragment enemy combat forces, deny them freedom of maneuver, and isolate them from sustainment or reinforcement. Decisive operations are conducted until the enemy's capabilities are disintegrated and capitulation or armistice conditions are achieved.
- Reestablish regional stability by disarming residual conventional and paramilitary forces and restoring civil order.

ARMY TRANSFORMATION

1-12. The Army is transforming itself in response to the changes in its operational environment. Some of the key changes in Army operations include the following:

- Lighter, more strategically deployable forces.
- Reliance on reach-back logistics and intelligence support.
- More mobile forces.
- More lethal forces.
- Increased area of control/area of influence for smaller tactical formations, leading to enclave operations as opposed to a linear battlefield.
- Reduced physical and logistical footprint.

- Emphasis on information superiority as an element of combat power. At its essence, information superiority is about Army forces being able to see first, understand first, and act first.
- Information centric/network centric force.
- Leveraging of technology, especially information technology (IT), at all levels as an enabler to other transformational capabilities.
- Joint and coalition operations are the rule, not the exception.

Although the above items are not a comprehensive list of the Army transformations, they are aspects that have profound effect on theater signal forces.

EFFECT ON THEATER SIGNAL

1-13. Strategic and tactical theater signal forces are transforming along with all of the Army. The following paragraphs discuss the areas in which theater signal transformation is occurring. Appendix A examines high-level trends as well as technological sustainment considerations that are likely to affect theater signal organizations and planners.

MISSION

1-14. The theater signal mission has expanded significantly in the following areas.

Demand for Data Services

1-15. The technical scope of the theater signal's mission has expanded to include numerous new data services and significantly increased bandwidth. These services are discussed in detail in Chapter 2.

1-16. Technological trends and economic factors that have driven the civilian world to leverage IT into savings of manpower, time, and transport have driven the same trade-offs for the forces supported by theater signal.

1-17. The deployed or tactical environment demands the same data services as the garrison. In addition to the economic factors that drive demand for data services in garrison, deployed forces must have interoperability with the sustaining base for all forms of logistic support as well as for C2 and intelligence. Deployed forces can't afford less automation in the field. The demand for data bandwidth in the field follows parallel exponential growth curves as for garrison. The baseline for customer service is providing and/or enabling the functionality of the customer's garrison electronic desktop environment in the field. This applies to both bandwidth and services.

1-18. This translates to an exponential growth in user demand for data services and a corresponding increase in bandwidth to support those services. The extent to which Internet Protocol (IP) services have grown and continue to grow within the Army in a garrison environment is representative of this trend. Figure 1-2 illustrates Army IP growth.

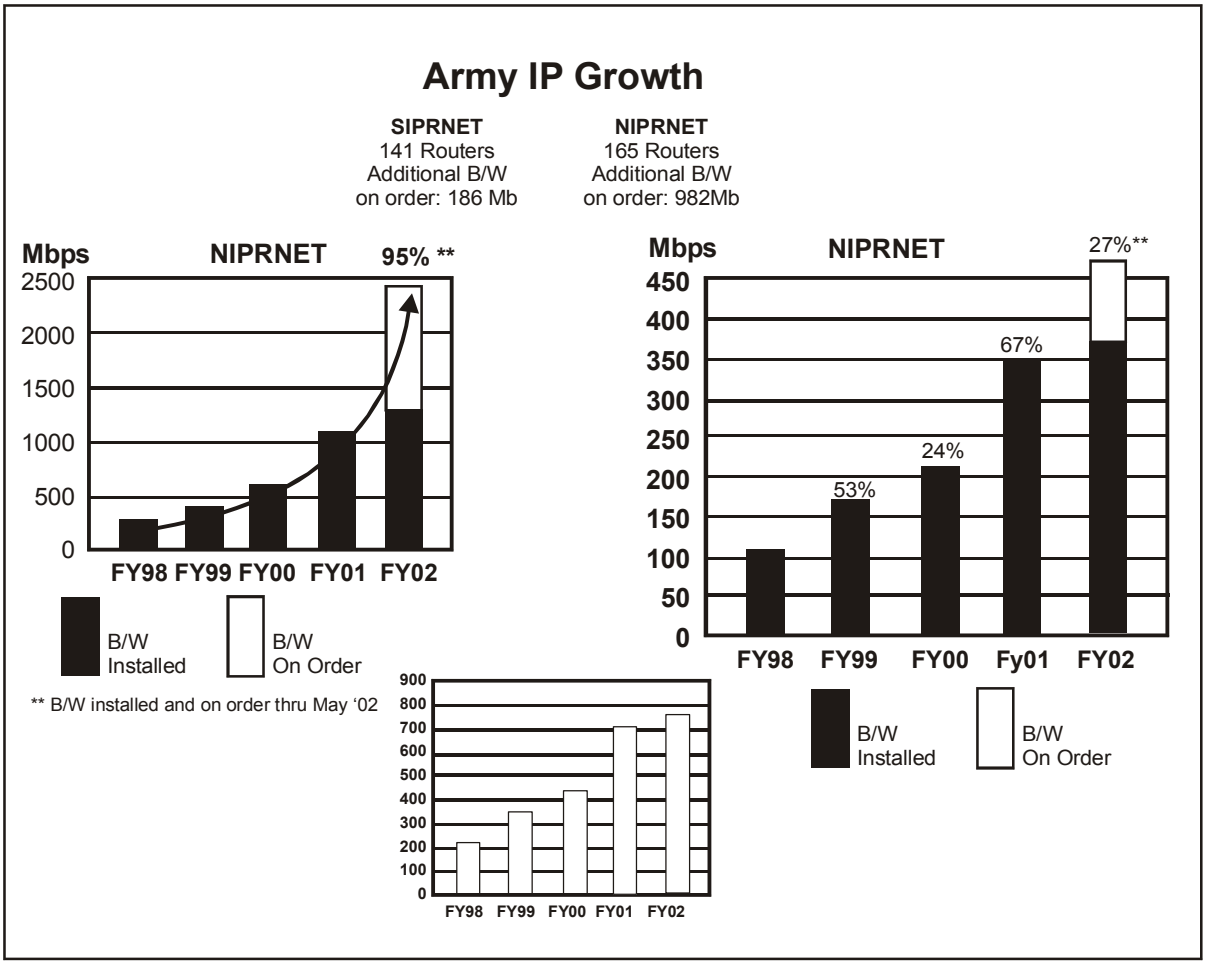


Figure 1-2. Army IP Growth

1-19. Another way of viewing the increase in the demand for satellite communications (SATCOM) bandwidth is as bits per second per soldier. Figure 1-3 illustrates the growth in this metric between Operation Desert Storm and Operation Iraqi Freedom.

1-20. The demand for data services brings with it an increased demand for cable and wire installation services. Current field experience is that the addition of Unclassified but Sensitive Internet Protocol Router Network (NIPRNET), Secret Internet Protocol Router Network (SIPRNET), and video teleconferencing (VTC) to the baseline of user services has resulted in a three-fold increase in the amount of wire and cable installation services that must be provided by theater signal units.

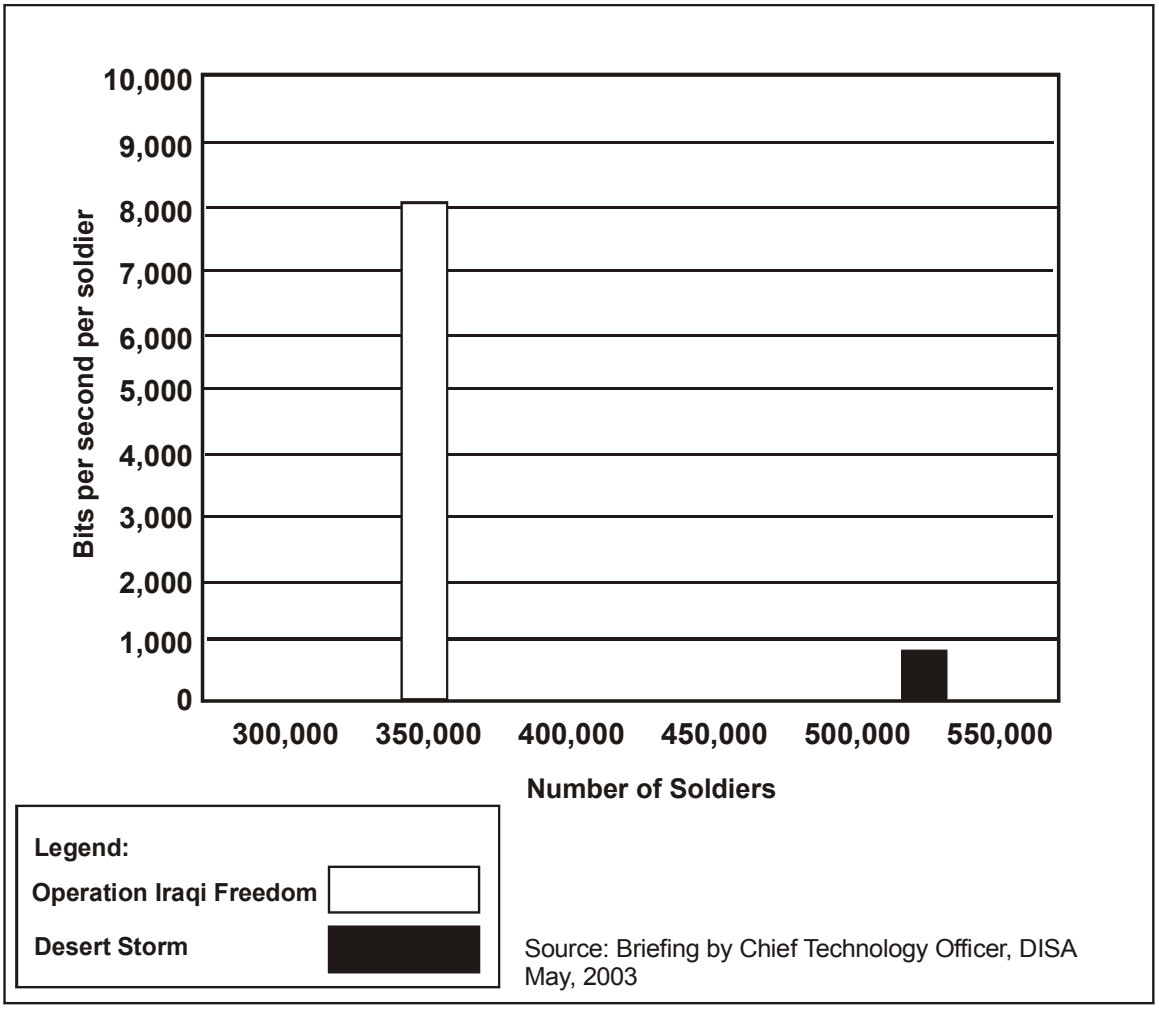


Figure 1-3. SATCOM Bandwidth per Soldier

Cyber Defense

1-21. Cyber defense is a popular term for computer network defense (CND). CND is a subelement of information assurance (IA), which is in turn a sub-element of network operations (NETOPS). The mission of theater signal forces has significantly expanded in CND as well as in overall NETOPS. Previously, responsibility for the subelements of NETOPS was fragmented. Organizational responsibilities for these functions are discussed in detail in Chapter 3.

1-22. NETOPS, IA, and CND mission areas help ensure the availability, integrity, identification, authentication, confidentiality, and nonrepudiation of friendly information and information systems while denying adversaries access to the same information/information systems. IA incorporates cyber defense protection, detection, and reaction capabilities, including restoring information systems. It provides end-to-end protection to ensure data quality and protection against unauthorized access and inadvertent damage or

modification. Cyber defense by means of CND incorporates those actions taken to protect, monitor, analyze, detect, and respond to unauthorized activity within DOD information systems and computer networks. Cyber defense activity employs IA protection activity and includes deliberate actions taken to modify an assurance configuration or condition in response to a CND alert or threat information.

NOTE: IA is focused on building in protections and then performing recovery when protections are not adequate, while cyber defense is focused on actions (protect, monitor, analyze, detect, and respond), and includes IA protection in response to an IA alert or threat.

1-23. Adequate cyber defense requires the following:

- **Protection capabilities**—include emission security, communications security (COMSEC), computer security, and information security incorporating devices such as access control, cryptography, network guards, and firewall systems that are used by all the information transport and service providers in a theater or other area of responsibility (AOR).
- **Detection capabilities**—include the ability to sense abnormalities in the network through the use of anomaly and intrusion detection systems. Timely detection of abnormalities, to include attack, damage, or unauthorized modification, is key to initiating system response and restoration actions.
- **Reaction capabilities**—incorporate restoration as well as other information operations response processes. Capability restoration relies on established mechanisms for prioritized restoration of minimum essential systems and networks.

Joint/Coalition Support

1-24. Theater signal forces are frequently called upon to provide network services such as local area networks (LANs) and wide area networks (WANs) to coalition partners. These coalition local area networks (C-LANs) and coalition wide area networks (C-WANs) may operate at both classified and unclassified levels.

1-25. Because many joint and coalition partners may not have adequate quantities of compatible network equipment, or may not have computer network equipment at all, theater signal forces are frequently called upon to provide user equipment as well as services.

Nontraditional Support Relationships

1-26. Theater signal units are frequently called upon to accompany and support organizations outside traditional echelon affiliations. It is not unusual for theater signal units to support corps, division, or lower headquarters that would normally draw their primary signal support from their own organic assets or from assets associated with their echelon. Sometimes this is due to the theater signal units having the greater technical capability. Other times, it is simply a matter of geographic proximity. An example of this support is shown during Operation Iraqi Freedom, when

theater signal units accompanied elements of the Third Infantry Division in the march into Baghdad in order to provide adequate SATCOM capability.

1-27. The result is that theater signal units render support on an anyone-, anytime-, and anywhere-basis. Theater signal units are among the earliest responders in the establishment of a theater of operations. They are exposed to all of the hazards of the battlefield and require the same force-protection and self-protection measures and capabilities traditionally associated with much lower echelon tactical forces.

DOCTRINE

1-28. Theater signal doctrine has evolved in the following areas to support the Army's changing roles and missions.

Electronic Parity Between Garrison and Field

1-29. Theater signal forces' doctrinal objective is to provide the connectivity, bandwidth, and services required to virtually replicate the garrison operational electronic desktop environment to supported customers in the field. The baseline for field services is no longer significantly more austere than the services and functionality provided in garrison.

1-30. Theater signal must provide technological parity with the garrison IT environment. The shortening of support chains requires units in the field to interface more directly with suppliers and agencies that are more exclusively civilian than in the past. These direct interfaces require technological compatibility, which currently includes access to the Internet, compatibility with the Web page practices and Web-based applications of both civilian and government agencies, and the evolving nature of e-commerce. Examples of these technological parity and compatibility requirements include:

- Supply clerks in the field must have the qualitative and quantitative IT and communications support to maintain the same productivity (process electronic transactions at the same rate) as in garrison.
- Personnel clerks, medical personnel, and all other disciplines of logistic support must also have this same type of support.

Army Knowledge Management (AKM)

1-31. In concert with the overall Army transformational goals of becoming an info-centric and network-centric force, the signal doctrinal perspective has expanded beyond the technical aspects of physical management of communications and information processing systems to a broader view of knowledge management.

1-32. The AKM strategy is the center of the Army's information revolution. It is the enabler for mission operations, knowledge generation, information delivery, and technology innovation.

1-33. The AKM vision encompasses a transformed Army, with agile capabilities and adaptive processes, powered by world-class, network-centric access to knowledge systems and services, and interoperable with the joint environment. It embraces Army and DOD imperatives for information dominance, and integrates technology, e-business, and knowledge-management concepts.

1-34. The AKM framework consists of three interrelated components:

- **Intellectual capital**—The expertise, experience, and insights that reside in the workforce—military, civilian, and industry partners—coupled with new strategies for harnessing human capital.
- **Infostructure**—The hardware, software, and communications information technologies and associated architectures and facilities that ensure universal access, security, privacy, and reliability of Army and DOD networks.
- **Change catalysts**—The innovative policies, governance structures, and culture changes that create a network-centric environment and a knowledge-based workforce.

1-35. The AKM strategic plan, endorsed by both the Army's secretary and chief of staff in August 2001, delineates five goals:

- Adopt governance and cultural changes to become a knowledge-based organization.
- Integrate knowledge management concepts and best-business practices into Army processes to improve performance.
- Manage the infostructure as an enterprise to enhance capabilities and efficiencies.
- Scale the Army Knowledge Online (AKO) Web site as the enterprise portal to provide universal, secure access for the entire Army.
- Harness human capital for the knowledge organization.

1-36. As a strategic concept, AKM will continuously incorporate change. The AKM vision, framework, and strategic-plan goals are constant guideposts, while the specific objectives associated with each goal will change as actions are completed and new initiatives are started.

Commercial Off-The-Shelf (COTS) Technology

1-37. Extensive reliance on COTS technology is, and will continue to be, a permanent reality on the battlefield. (This is in contrast to previous concepts that regarded the use of COTS as an aberration or temporary condition to be remedied by future systems developed and acquired by traditional military specification methods.)

1-38. The pace of technological advance has made COTS a permanent feature of the battlefield. Moore's Law predicts that the available processing power of computers doubles every 18 months, and this shows no sign of leveling off. Civilian industry typically replaces or upgrades desktop personal computers (PCs) every two to four years in order to remain compatible with the world. In order to remain current, units in garrison tend to upgrade at about the same rate. The traditional military acquisition process has been designed with the

intent of going from idea to initial operational capability (IOC) in approximately 5 years under ideal conditions. Under real conditions, 15 to 20 years is not unusual. The traditional materiel acquisition process will not deliver IT in a manner adequate to keep Army forces current and compatible with their operational and support environment.

1-39. The enabling of garrison services in the field and extensive use of COTS are already being implemented as much as possible by the warfighters and by theater signal units out of necessity. Because these concepts have not been previously recognized as doctrinal norms, the implementations have been carried out piece-meal in an ad-hoc, nonstandardized manner. In the case of equipment, this has occurred independently in the different theaters, resulting in multiple equipment configurations.

1-40. Doctrinal recognition of the increased quality of support requirement and the COTS environment is only a first step in meeting the challenges this poses, which include:

- **Funding**. Because acquisition and logistics concepts have not been adapted to COTS, technology insertions in the field have historically been accomplished with contingency and operational funds rather than with normal procurement funds. This has detracted from the equipment availability and other aspects of unit readiness that the funds were intended to maintain.
- **Training and logistical support**. Training and logistical support for technology insertions executed outside the normal acquisition process is ad-hoc and lacks the efficiencies of standardization.
- **Manning**. The six-year process for designing and implementing changes to Tables of Organization and Equipment (TOEs) is a major impediment to manning signal units with school-trained soldiers for the rapidly developed COTS solutions. This is further complicated by the interaction of the force development process with the formal acquisition process. The challenge is getting the Army materiel acquisition and logistic support systems to officially recognize and support COTS equipment. This recognition is required in order to authorize the equipment on organizational documents.

1-41. Signal leaders and planners must engage logisticians and planners of other disciplines at all echelons to adapt Army management and support systems to meet the support requirements of COTS equipment. The Signal Corps must educate other functional areas on the capabilities COTS provides to the warfighter.

Leased Commercial Communications

1-42. Leased commercial communications are critical to the success of theater signal in meeting the demand for connectivity and services. Force structure and equipment must be designed and acquired with this parameter in mind. An example of this is the acquisition and fielding of multiband SATCOM terminals that are capable of accessing commercial satellites as well as military satellites.

"About 80 percent of our capability over there was commercial satellite..." LTG Peter Cuviello, Army Chief Information Officer (CIO)/G6, referring to Operation Iraqi Freedom, quoted in National Defense Magazine, July 2003

Commercial (Contractor) Support

1-43. Extensive reliance on commercial sector support is, and will continue to be, a permanent reality of theater signal operations. Introduction of commercial (contractor) support begins almost immediately following deployment in order to free up tactical signal assets for follow-on deployments.

TACTICS, TECHNIQUES, AND PROCEDURES (TTP)

1-44. One of the more tangible changes in the way the Army fights that drives changes in theater signal force structure and TTP is the shift from the contiguous battlefield of the Cold War era to operating and fighting from widely separated enclaves.

1-45. Although the Army retains the capability to fight in a linear, contiguous battlefield, enclave operations are more the norm than the contiguous battlefield of the Cold War era. The enclaves of forces supported by theater signal are more often than not beyond line-of-sight (BLOS) distance from each other. The agility, strategic deployability, and economy of force considerations that drive combat forces to smaller forces in enclaves as opposed to larger forces in a contiguous battlefield also operate against having forces available to secure line-of-sight (LOS) relays. This creates a greater demand for BLOS transmission services such as SATCOM and troposcatter communications (TROPO). It reduces, but does not eliminate, the critical demand for and utility of LOS transmission systems. This factor is reflected in the design of the new theater signal force structure. Figure 1-4 illustrates the changing battlefield.

1-46. Radio systems will typically be co-located in the same enclave with the headquarters elements they support. This is in contrast to the Cold War norm of remoting radio systems as far away as practical from their supported headquarters. In the typical enclave deployments since Desert Storm, enclaves have most often been surrounded by, or in close proximity to, the local population. In these situations, the locations of the enclaves, and hence the headquarters elements, are readily known to the enemy. In such situations, remoting radio systems away from their supported headquarters elements to reduce detection of those headquarters by their electronic signature becomes a moot point. Economizing on the forces' need to provide physical security becomes the more important factor. This reduces requirements for LOS systems, particularly those specialized for up-the-hill/down-the-hill applications.

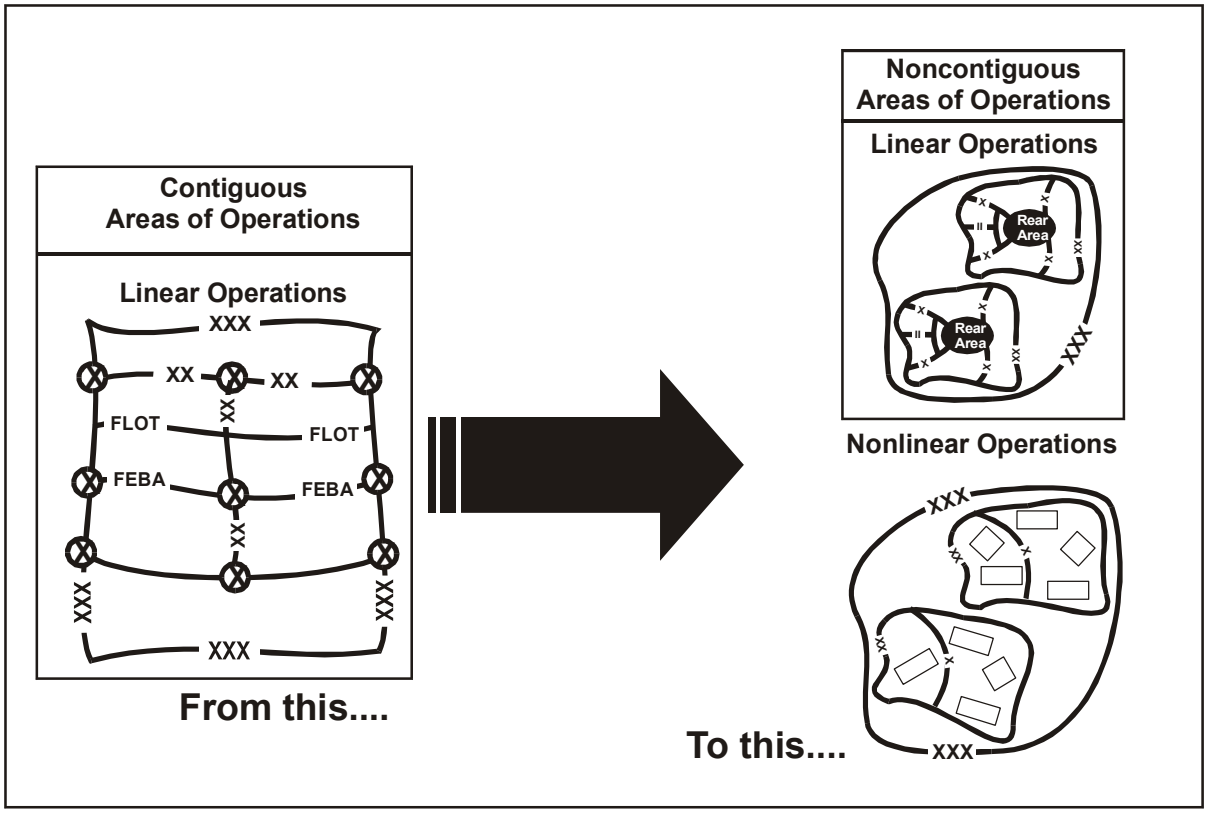


Figure 1-4. Changing Battlefield

1-47. The emergence of a peer competitor of the United States could drive these trade-offs back the other way in the future. Another circumstance that could force a return to remoting of emitters would be a threat that has anti-radiation missiles capable of being targeted on communications emitters. The doctrinal principle is that the commander optimizes overall force protection and command post survivability. In this case, it is the TTPs and the force structure that change to adapt to the environment.

1-48. The nonlinear battlefields and guerrilla environments of Operation Enduring Freedom and Operation Iraqi Freedom have highlighted other changes in force protection requirements for theater tactical signal units. A synopsis is presented below. Lessons learned topics are discussed in more detail in Appendix B.

- Theater signal troops require the same protective individual equipment (for example, body armor) as the combat forces they accompany. Based on the experience of Operation Iraqi Freedom, theater signal units may be called upon to accompany combat arms brigades. Force development planners need to ensure that this equipment is included in requirements documents (TOEs) and authorization documents (Modified Tables of Organization and Equipment [MTOEs]).

- Theater signal units require greater self-protection capability than has traditionally been designed into them. This capability includes, but is not limited to, additional crew served weapons such as heavy machine guns, automatic grenade launchers, night vision devices, and night vision weapons sights. Force development planners need to insure that this equipment is included in requirements documents (TOEs) and authorization documents (MTOEs).
- Weapons proficiency requires greater emphasis than has been traditional within the signal regiment and within combat support and combat service support in general. This applies to both individual and crew served weapons. Commanders must provide both personal example and resources (range time, funds, instruction, and ammunition) to make this happen. At the higher command and planning levels, the budgeting functions are critical in ensuring adequate ammunition availability to train all unit members on all unit weapons, to include crew served weapons.
- TTPs for signal site defense planning and execution must acknowledge that signal units rarely have sufficient organic troops to effectively establish and defend a perimeter large enough to contain all of their equipment. The bottom line is that signal units must cluster with other units for a common defense and/or be augmented with more soldiers specifically for defense.
- Signal leaders, trainers, and staff members at all levels must acquire a detailed knowledge of Global Positioning System (GPS) technology and develop TTPs adapted to its nuances. Effective employment of GPS technology is a staff and leader function as well as a technical operator skill. GPS, in conjunction with other command, control, communications, and computer (C4) technology, has enabled combat forces to operate at a much higher tempo and under conditions of far less visibility than in conflicts prior to GPS. Effective use of GPS is critical for signal as well as other combat support and combat service support disciplines in order to keep pace with the GPS-enabled combat forces we support and to survive on the fluid, noncontiguous battlefield, made more fluid and more noncontiguous by the new operational modes of those combat forces.
- In the noncontiguous battlefield, errand runs (for example, getting critical parts, moving critical personnel from site to site) common to signal operations must be managed and defended by organizing them into convoy operations. This adds to the time and manpower required to accomplish tasks compared to operations on the contiguous battlefield with secure rear areas. Leaders and planners must allow for these requirements when they occur, and seek to minimize such requirements by prior planning and preparation. When convoy operations are mounted, they must be large enough and adequately equipped to effectively defend themselves and have adequate navigation and communications equipment. As with perimeter defenses, banding together with other units can result in more effective defense by providing for larger convoys. Force development planners need to insure that convoy defense is considered in selecting

equipment for requirements documents (TOEs) and authorization documents (MTOEs). Such equipment may include, but will not necessarily be limited to, vehicle weapons mounts and armored high mobility multipurpose wheeled vehicle (HMMWV) variants.

FORCE STRUCTURE

1-49. Theater signal is undergoing several significant force structure changes in order to meet the expanded mission requirements and strategic deployability requirements of the supported force. The most significant of these changes is the replacement of the theater area signal battalion and theater composite signal battalion with the integrated theater signal battalion (ITSB). The details of force structure changes are provided in Chapter 5 and Appendix C.

1-50. Current operational concepts require combat forces to achieve rapid deployability by placing heavy reliance on the capability to reach back to the sustaining base for access to national assets, intelligence, and logistics support. This drives requirements for increased wideband communications in general, and for SATCOM in particular. These requirements are reflected in the new force designs.

Chapter 2

Signal Support in Theater

This chapter discusses the mission of signal support in theater, to include support principles and objectives and end-user services in the current and transformed force.

SUPPORT PRINCIPLES AND OBJECTIVES

2-1. Theater signal support accommodates many types of situations. It has the capability to deploy, interface, and interoperate with equipment from other services, allies, and commercial and host-nation infrastructures. It decreases dependence on strategic air, sea, and rail lifts and enables a more rapid and flexible response. Theater signal support provides a ubiquitous communications architecture for all requirements of our forces. The following paragraphs discuss some of the principles and objectives of theater signal support.

PRINCIPLES

2-2. The over-arching principle of signal support is that it must meet the needs of the user by—

- Achieving effective information management.
- Defending and protecting against information warfare.
- Planning, deploying, operating, and maintaining all information services as an integrated system to enable an information service centric environment.
- Applying in-depth knowledge of all individual service components and a systems-engineering approach in the planning and deployment of information services.
- Organizing as you fight.
- Training as you fight.
- Equipping organizations with up-to-date technology.
- Providing the services and connection points to enable the use of user-owned and -operated terminal equipment to function in a field environment the same as in garrison.

2-3. Signal units provide "whatever it takes" assistance to customer organizations when higher-level doctrinal principles break down. For example, while the Army doctrinal principle of emphasizing user-owned and -operated terminal equipment (e.g., telephone instruments, secure telephone units [STUs], fax machines, and PCs) remains in effect, difficulties in implementing this principle have forced signal units to take extraordinary measures to lend terminal equipment to users and to assist them in acquiring

terminal equipment. This is especially true when supporting other services and coalition forces. The following paragraphs discuss other support principles.

Interoperability

2-4. Interoperability is necessary to ensure the success in any joint, multinational, or interagency operation. Interoperability is achieved among C4 equipment when components are interchangeable and information can be exchanged directly and satisfactorily between users.

2-5. Commonality is one means of achieving interoperability. Equipment and systems are common when:

- They are compatible.
- Each can be operated and maintained by personnel trained on one system without requiring additional specialized training for the others.
- Repair parts (components or subassemblies) are interchangeable.
- Consumable items are interchangeable.

2-6. Compatibility is also a means of gaining interoperability. It is the capability of two or more items or components of equipment or material to exist or function in the same system or environment without mutual interference. Electromagnetic compatibility, including frequency supportability, must be considered at the earliest conceptual stage and throughout the planning, design, development, testing and evaluation, and operational life cycle of all systems.

Liaison

2-7. Technology can never replace the face-to-face exchange of information between commanders. However, as the pace and complexity of operations increase, the commander must extend his presence through liaisons. Liaison officers (LNOs) provide the direct contact or communications between elements or forces that ensures mutual understanding, unity of purpose, and action. Critical functions of an LNO include monitoring, coordinating, advising, and assisting the command to which a team is attached.

2-8. In terms of mission accomplishment, the LNO is one of the most effective ways to ensure interoperability between organizations. The mission is enhanced when competent C4 support personnel are employed to extend the eyes and ears of the commander.

Flexibility

2-9. Flexibility is required to meet changing situations and diversified operations with minimal disruption or delay. Designing systems and networks that are mobile, transportable, and interoperable with joint, unified, coalition, and commercial facilities is just one way to obtain flexibility. Flexibility allows rapid integrations at all levels of joint and service C4 support. The connectivity achieved and maintained from flexible systems is particularly important during contingency operations. Flexibility

is a necessary adjunct to the other principles of interoperability, survivability, and compatibility.

Responsiveness

2-10. C4 systems must respond instantaneously to the warriors' demands for information. To be responsive, systems must be reliable, redundant, and timely:

- **Reliable.** C4 systems must be available when needed and must perform as intended. Reliability is achieved by designing systems and networks with low failure rates and error correction techniques; standardizing systems; establishing standardized procedures; countering computer attacks and electromagnetic jamming and deception; and establishing effective logistic support programs.
- **Redundant.** Redundancy is obtained through a multiplicity of paths, backups, self-healing strategies, and replications of data at several locations, which can be recovered quickly in the event portions of the network become destroyed, inoperative, or degraded.
- **Timely.** As weapon systems technology shortens the time between warning and attack, so must the processing and transmission time for warning, critical intelligence, and operation order execution information be compressed.

Mobility

2-11. The horizontal and vertical flow and processing of information must be continuous to support the rapid deployment and employment of joint military forces. Commanders at all levels must have C4 systems that are as mobile as the forces, elements, or organizations they support without degraded information quality or flow. More than ever before, modular design and micro-electronics can make C4 systems lighter, more compact, and more useful to warfighters.

Survivability

2-12. National policy dictates the survivability of both command centers and C4 networks through which the forces in the field receive command decisions and situational understanding. It is not practical or economically feasible to make all C4 networks or elements of a system equally survivable. The degree of survivability for C4 networks supporting the function of C2 should be commensurate with the survival potential of the associated command centers. The survivability of C4 networks is accomplished through applications and techniques such as dispersal of key facilities, multiplicity of communications nodes, hardening (electrical and physical), or a combination of these techniques.

2-13. The commander ensures the employment of both offensive and defensive information operations to protect friendly C2. Since C4 networks are crucial enablers for C2, they will present a high-value target to the enemy. Therefore, the protection of C4 networks is critical to the integrity of the force C2 infrastructure. Defensive information operations include measures to ensure the security of information and C4 networks through information protection, intrusion/attack detection, effect isolation, and incident reaction to restore information and system security.

Sustainability

2-14. C4 networks must provide continuous support during any type and length of operation. This requires the economical design and employment of networks without sacrificing operational capability or survivability. Examples that might improve system sustainability include:

- Consolidation of functionally similar facilities, which are closely located under one command or service.
- Integration of special purpose and dedicated networks into the Defense Information Systems Network (DISN) systems, provided they can offer equal or better service.
- Careful planning, design, and procurement of facilities and systems.
- Efficient management and operating practices and effective communications discipline.
- Maximum use of the DISN common-user subsystems.
- Judicious use of commercial services.
- Adherence to joint-approved architectures.

OBJECTIVES

2-15. The objective of signal support is to:

- **Provide one-stop shopping to the user for bandwidth and information services**. Providing customers with all their signal support needs enhances the interoperability, integrated defense, and the efficiencies of integrated management of communications and information services. The current Army force structure contains examples of shortfalls in the ability of the Signal Corps to achieve this objective. In cases where the Signal Corps has been unable to provide the quality and quantity of service required by customers, customers have developed stovepipe systems and operate them within their own force structures. In this context, stovepipe systems are comprised of assets such as wideband transmission and multiplexing systems that are traditionally owned and operated by signal units. An example of a stovepipe is the Trojan Special Purpose Intelligence Remote Integrated Terminal (SPIRIT) System used by the Intelligence community. Such stovepipe systems represent valid Army requirements as evidenced by the approval of senior decision makers for their creation and funding. Signal leaders must be aware of these systems because they will be encountered in the field. Signal leaders and planners in force generation and sustaining base roles must be

aware of these requirements and seek to increase the ability of signal units to meet these requirements.

- **Provide seamless transition to the customer from the garrison environment to the deployed/tactical environment**. This means providing the bandwidth and services to enable the virtual replication of the customers' electronic desktop environment in the field.
- **Provide support to specialized or individualized user information systems**. These types of systems provide customers access to, or specifically enhance their ability to perform, specialized missions or tasks through devices designed for optimum performance. Many of these user information systems will continue to undergo development and testing for potential inclusion in the future networks.

Combined Joint Task Force (CJTF) 180 February 2002

In support of CJTF 180 in Afghanistan, a theater signal battalion provided services to the US Air Force as one of its many customers. The theater signal battalion was called upon to ensure that the Global Air Transportation Execution System could reach back to the US Transportation Command. This critical link was necessary to provide near real-time, in-transit status to both passenger and cargo coming into and out of the AOR.

This instance became an example of "whatever it takes" support to specialized systems rather than one of seamless service. Even though the Global Air Transportation Execution System application uses a generic Transmission Control Protocol/Internet Protocol (TCP/IP) networking service, signal personnel had to work with the customer extensively and make custom adjustments to network security settings in order to accommodate the application.

Such scenarios are commonplace within the signal operation environment. This is simply one example of the many user-owned and -operated applications that require signal support.

END-USER SERVICES IN THE CURRENT AND TRANSFORMED FORCE

2-16. The following paragraphs discuss services considered to be the standard, or baseline, for enabling the garrison electronic desktop environment for the theater signal user in the field. These services are discussed from a user operational viewpoint. Technical information on the operation of these services is provided in Chapter 4. Figure 2-1 summarizes these requirements by echelon, and Figure 2-2 shows the bandwidths typically provided by signal units at the respective echelons in support of these services.

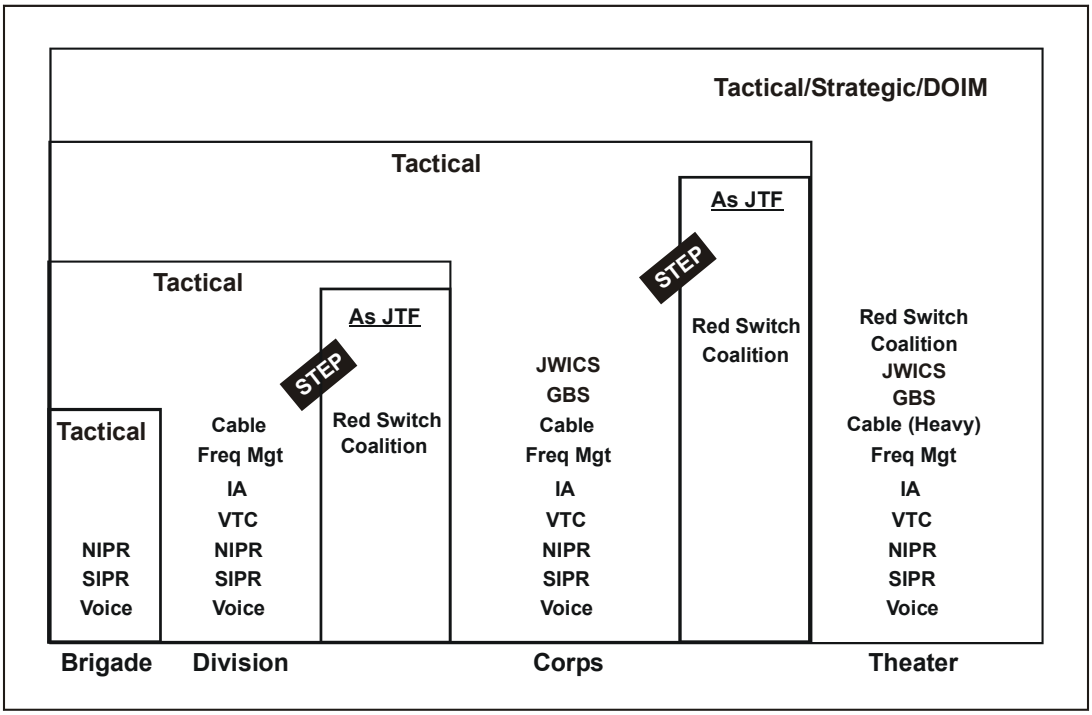


Figure 2-1. Signal Support Core Requirements

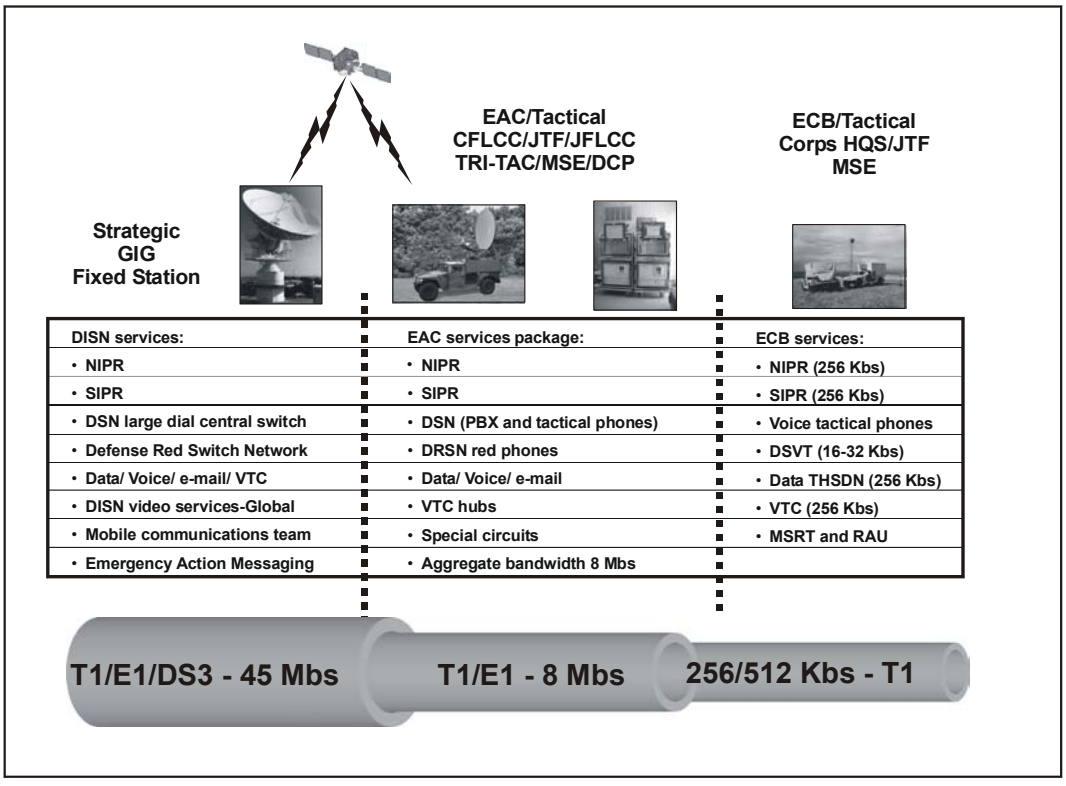


Figure 2-2. Strategic and Tactical Signal Support Services

NIPRNET

2-17. The NIPRNET is a highly used end-user service. It supports a wide variety of applications such as e-mail, Web-based collaboration and information dissemination, and connectivity to the worldwide Internet. It enables a myriad of reach-back logistic functions from deployed forces to the sustaining base, and lateral collaboration among deployed elements.

2-18. The paragraphs below provide examples that illustrate the criticality of the NIPRNET to the transforming Army. Because many infrastructure elements that supported the previous way of doing business no longer exist, NIPRNET is not a luxury but a necessity.

2-19. The traditional Army concept has been for the technician to identify repair parts by national stock number or part number from a parts manual. He then submits a requisition by national stock number or part number, which is processed and forwarded by administrative personnel until the requisition is finally filled and the part shipped.

2-20. Parts for PCs change so rapidly that even the manufacturers do not try to maintain parts manuals specific to a model and year of a PC in the same sense that parts manuals are maintained for specific models and years of cars. If a part such as an accessory card is needed for a PC that is over six months to a year old, chances are that the model of that accessory card that was current when the computer was built is no longer in production. The process of obtaining the new accessory card typically involves the technician navigating the Internet to identify a current model accessory card that is compatible with the one year-old computer. Telephone consultation with tech support provided by the manufacturer of the new card, with the manufacturer of the computer, or with both may be required. Additional items such as software drivers to make the new card compatible may also be identified in this research process. After this consultation, the order is placed. In some cases, the process is streamlined to the point that the technician gives a credit card number, and the order is placed with the supplier on the spot.

2-21. Another example of how the NIPRNET supports evolving Army operational concepts is shown with the reduction of transportation requirements for publications support of deployed units. The constraints on transportation that come with rapid deployments into enclave operations do not allow units to carry with them paper copies of all the field manuals, technical manuals, and other administrative publications they might need. What they can carry is their computer to access the publications on sustaining-base Web sites, a portable printer, and enough paper to print the needed manuals. This quantity of paper is further reduced by the units' ability to view the information on-screen without having to print it in every case. For extended deployments, the transportation and administrative burden is further reduced by the ability of users to obtain updates to publications as they occur. This is in contrast to the transportation and administrative burden of moving all the paper updates that the deployed force might need and managing the distribution of paper updates to all the holders of the various publications.

2-22. In this area alone, the Army is completely committed to operations based on the availability of NIPRNET. Many publications are only distributed electronically via posting on Web sites. They are not printed in bulk. Users are responsible for printing downloaded copies on their local printers. Deployed users do not have the option of ordering paper copies if the electronic versions are not available.

SIPRNET

2-23. The SIPRNET operates in a manner similar to the NIPRNET, but as a secure network. SIPRNET supports critical C2 applications. As with the NIPRNET, the SIPRNET provides access to many Web-based applications as well as the ability to send and receive US Secret information. These applications and capabilities enable the effective planning and execution of battle plans in a secure environment.

2-24. The SIPRNET supports a wide variety of applications such as e-mail, Web-based collaboration, and information dissemination. It enables a myriad of reach-back logistic functions from deployed forces to the sustaining base, and lateral collaboration among deployed elements. It is heavily used for C2 and intelligence functions. Demand for SIPRNET services is increasing because of its utility and ability to meet the security requirements for operational planning and collaboration.

COALITION NETWORK (C-LAN/C-WAN)

2-25. A coalition network (C-LAN/C-WAN) is a network created to support coordination and collaboration among US and non-US forces in the operational environment. C-LAN/C-WAN services support planning and execution of operations involving coalition forces. C-LANs and C-WANs operate at both Sensitive but Unclassified (SBU) and Classified levels. C-LANs and C-WANs may operate as local or limited regional entities, or they may connect to and extend the services of the Combined Enterprise Regional Information Exchange System (CENTRIXS). CENTRIXS is a standing classified-capable coalition network. CENTRIXS is discussed in greater detail in Chapter 4.

JOINT WORLDWIDE INTELLIGENCE COMMUNICATIONS SYSTEM (JWICS)

2-26. JWICS is important for its ability to provide classified, compartmented, point-to-point or multipoint information exchange involving voice, text, graphics, data, and VTC.

SECURE VOICE

2-27. Secure voice remains a user requirement. The role of secure voice in operations remains unchanged from its traditional usage. Secure voice connections may also be used for facsimile traffic.

NONSECURE VOICE

2-28. Nonsecure voice remains a customer requirement. In addition to voice, this service may also be used to carry facsimile traffic. Nonsecure voice includes requirements to provide connectivity to civilian telephone networks in the sustaining base and host nation. Additionally, the nonsecure voice network can be extended to joint, allied, and coalition subscribers.

DEFENSE RED SWITCH NETWORK (DRSN)

2-29. The DRSN is the worldwide secure switched network managed by the Defense Information System Agency (DISA). It provides high-quality secure voice, data, and conferencing communications services to senior decision makers.

VTC

2-30. VTC has become a mainstay collaboration tool both for forces in garrison and in deployed environments. It provides the best available technical alternative to face-to-face meetings to provide users human-factor feedback and interaction when they must collaborate from separate locations.

GLOBAL BROADCAST SYSTEM (GBS)

2-31. The GBS is significant to theater signal customers and providers because of its ability to alleviate congestion on other networks and its ability to deliver large volumes of data in formats not readily supported by other means. It also delivers data in large batches (files) simultaneously to multiple users. Examples include topographic data and large video files.

DEFENSE MESSAGE SYSTEM (DMS)

2-32. The DMS is the Army's portion of the global DOD DMS. It is a record traffic system that replaces the automated digital network (AUTODIN) and provides secure writer-to-reader electronic messaging for both organizational and individual users.

TACTICAL MESSAGE SYSTEM (TMS)

2-33. The TMS extends the DMS used in garrison into the tactical environment. All DMS intra/inter traffic into and out of the tactical area of operations is routed through the TMS.

IA

2-34. IA is the management area that ensures the availability, integrity, identification, authentication, confidentiality, and nonrepudiation of friendly information and systems and forbids the access to the information and systems by hostile forces. It is a service performed by signal soldiers that is largely invisible to the user. It becomes most visible when it fails.

CABLE AND WIRE INSTALLATION

2-35. Cable and wire teams are organic to the ITSB. These teams install, maintain, and repair aerial, buried, or underground cable, wire, and fiber optic transmission systems.

Chapter 3

Army Enterprise Systems Management

To enable the transforming Army to dominate a network centric battlespace, it is essential for Army information resources, also known as the Army Enterprise Infostructure (AEI), to be managed as a single, coherent, seamless enterprise in their context as elements of the larger DOD Global Information Grid (GIG). This chapter provides an overview of the AEI and discusses the Army Enterprise Systems Management structure.

OVERVIEW

3-1. The AEI is the Army's portion of the GIG and extends from the sustaining base to the tactical environment. It includes LANs, WANs, and all deployed networks. The AEI encompasses the command, control, communications, computers, and information management (C4IM) platforms and services supporting Army users, both in permanent stations and deployed, and the infostructure required to deliver these services efficiently and effectively.

NETOPS

3-2. NETOPS is an organizational, procedural, and technological construct for ensuring information superiority and enabling speed of command for the warfighter. It links together widely dispersed NETOPS centers through a command and organizational relationship and establishes joint TTPs to ensure a joint procedural construct. The NETOPS construct extends from the highest level of the GIG through the service level down to the lowest level of information networking. NETOPS is the conceptual toolbox and framework for Army Enterprise Systems Management. Figure 3-1 shows the GIG NETOPS.

NETOPS GOALS

3-3. The goals for Army NETOPS are to—

- Provide universal (and secure) access for authorized infostructure services to all Army customers within the Army infostructure—secure, single, sign-on plug and play capability.
- Accurately display a total and integrated situational awareness of the AEI.
- Predict impacts on the AEI of new/changed systems and operational contingencies.

- Redirect and reallocate AEI resources in near real-time to support Army response to a crisis or an unplanned event anywhere within the Army infostructure operational AOR.
- Provide consistent, robust, base level infostructure services to all authorized Army customers at the least cost feasible within Army operational constraints.
- Provide additional (above base level) infostructure services to Army customers on a reimbursable basis.
- Perform continuing and nonintrusive technology insertion to improve service levels or reduce the cost of providing current base-level services.
- Provide continuity of operations (CONOPS) plan capabilities.

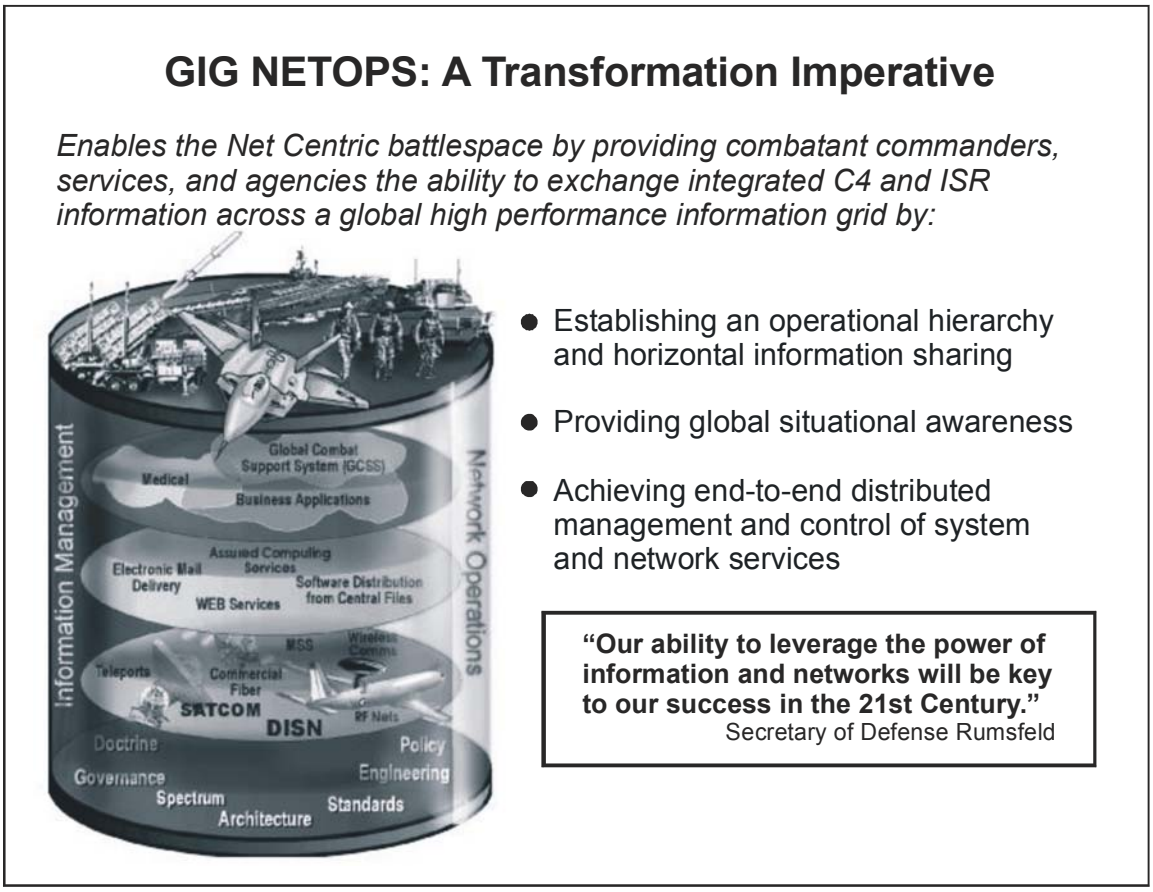


Figure 3-1. GIG NETOPS

NETOPS MISSION AREAS

3-4. NETOPS provides IT and situational awareness, protects information flow, and integrates network management, IA, and information dissemination management (IDM). Figure 3-2 depicts the NETOPS mission areas and functions.

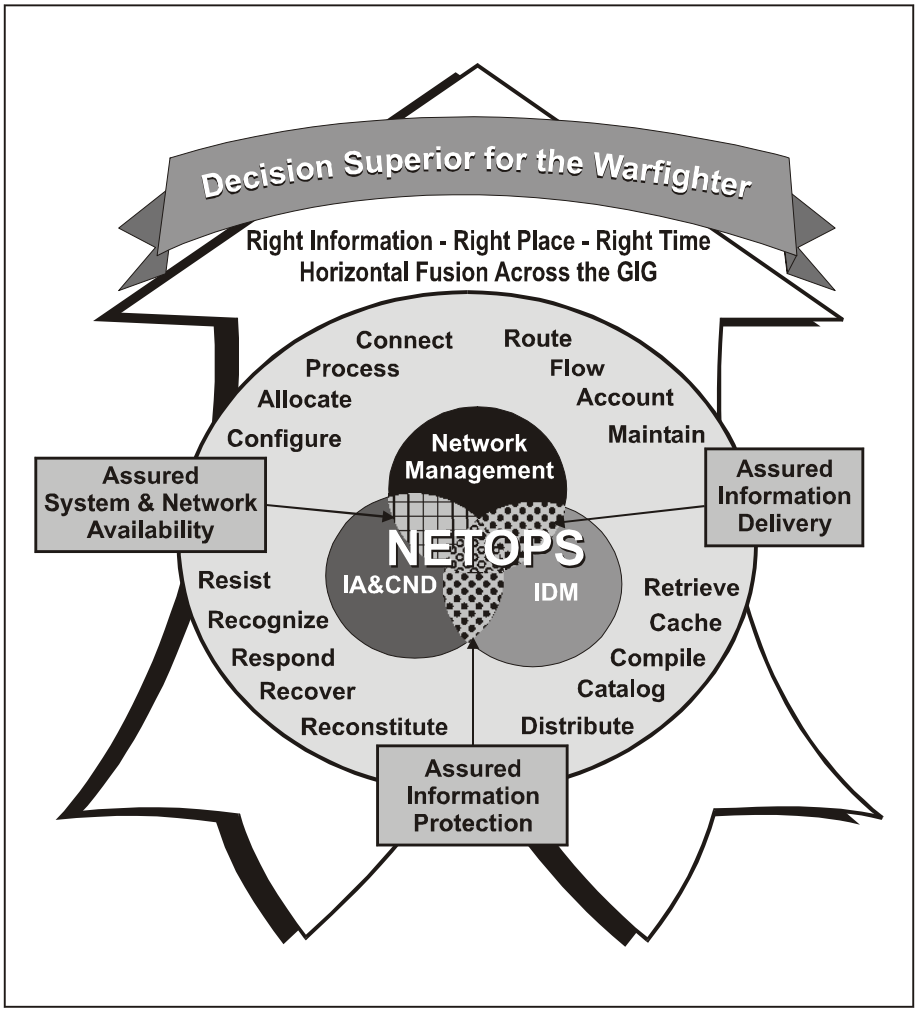


Figure 3-2. NETOPS Mission Areas and Functions

Network Management

3-5. Network management is the management of the network and the devices connected to the network. It includes:

- **Network management**—includes systems and applications management and comprises all the measures necessary to ensure the effective and efficient operations of networked systems, to include network devices, servers, storage devices, and end-user devices like printers, workstations, laptops, and hand-held computers. Synonymously, network management is composed of fault, configuration, accounting, performance, and security management.
- **Transmission systems management**—includes the day-to-day management of all transmission systems, for example, SATCOM, microwave, fiber, and metallic cable. Because of its criticality to theater signal, SATCOM management is often discussed as a separate discipline (see below).

- **SATCOM management**—includes the day-to-day management of all apportioned and nonapportioned SATCOM resources.
- **Frequency spectrum management**—exists as a management area to ensure the combatant commanders and subordination commanders have cognizance of all spectrum management decisions affecting the area of operations. Additionally, it is composed of the efficient management of the electromagnetic spectrum to include the acquisition, allocation, protection, and utilization of radio frequency and call-sign resources.

3-6. Key aspects or focus areas of network management include:

- **Configuration management (CM).** The CM process includes all aspects of the infostructure configuration. The Army controls the introduction of new services and functionality to the end-user community without disrupting existing services. CM is also required to ensure compliance with operating and security policy.
- **Service level management (SLM).** The SLM process is how the Army defines, delivers, measures, and improves C4IM services. As such, it is expected to become the cornerstone of how the Army operates and manages the infostructure to deliver quality information management and telecommunications services.
- **Networthiness.** The Networthiness Certification process identifies and continually refines all required support for a C4IM system, particularly in the areas of supportability, interoperability, sustainability, and security. The process ensures that C4IM systems do not adversely impact the network and that it is sustainable throughout its lifecycle.
- **Asset and resource management (ARM).** The ARM process defines how both physical and logical property items are cataloged in terms of identification and use. The ARM process supports the identification of duplicative systems and their subsequent elimination by integrating the functionality and the data into a common system. The ARM process is complementary to the CM and SLM processes but includes nonconfiguration items and is focused on the accurate representation and use of property.

IA

3-7. IA is the management area that ensures the availability, integrity, identification, authentication, confidentiality, and nonrepudiation of friendly information and systems, and forbids the access to the information and systems by hostile forces.

3-8. **CND**. CND is the utilization of network management services and IA tools depicted as part of NETOPS. The protection capability of CND is accomplished through operations and maintenance of network and system devices, such as network guards and firewalls, that ensure emission, communications, computer, and information security. The capability to detect security anomalies on the network and to systems is enhanced via mechanisms that support near real time alerts and predictive analysis.

Correcting and restoring normal operations after various network and system anomalies have taken place are the key NETOPS elements of network management.

IDM

3-9. IDM is the management area concerned with providing the right information to the right person(s) at the right time. It addresses the awareness, access, and delivery of information. Additionally, IDM includes the safeguarding, compilation, cataloguing, storage, distribution, and retrieval of data. As such, it deals with the management of information flow to users in accordance with the commander's information policy. IDM segregates information into two types: planning and survival. Planners and decision makers use planning information gleaned from databases, Web pages, or files to determine future action. Survival information is much more time sensitive and is pushed over tactical networks and data links to warfighters and weapon systems.

3-10. IDM has technical and policy components. The technical component includes the electronic management of user privileges and access rights to network resources such as Web pages and databases, and the design and operation of electronic information filters. The policy component determines individual and group need-to-know and the setting of information priorities such as commander's critical information requirements and priority intelligence requirements.

AEI

3-11. The scope of the AEI includes Army information services worldwide accessing the GIG, to include the Top Secret/Sensitive Compartmented Information (TS/SCI) domain and/or networks, Army Secret security domain, Army SBU security domain, Army public information sites on the Internet, and a variety of telephony systems (for example, DRSN and Defense Switched Network [DSN]). The AEI includes core services such as e-mail, Web access, file and print servers, directories, AKO, Public Key Infrastructure (PKI)/Common Access Card (CAC), and Army enterprise applications such as personnel and logistics. It includes the active Army, the Army Reserve, and the Army National Guard. Figure 3-3 illustrates the physical scope of the AEI.

3-12. The current Army sustaining-base operating environment consists of a variety of geographically dispersed small, medium, and large installations and user sites (for example, Reserve Component centers, armories, and recruiting stations), in the CONUS and outside the Continental United States (OCONUS). Small installations are characterized by having less than 5,000 users, medium installations having 5,000-15,000 users, and large installations having excess of 15,000 users. Large headquarters complexes exist, such as Headquarters, Department of the Army (HQDA) in the Pentagon.

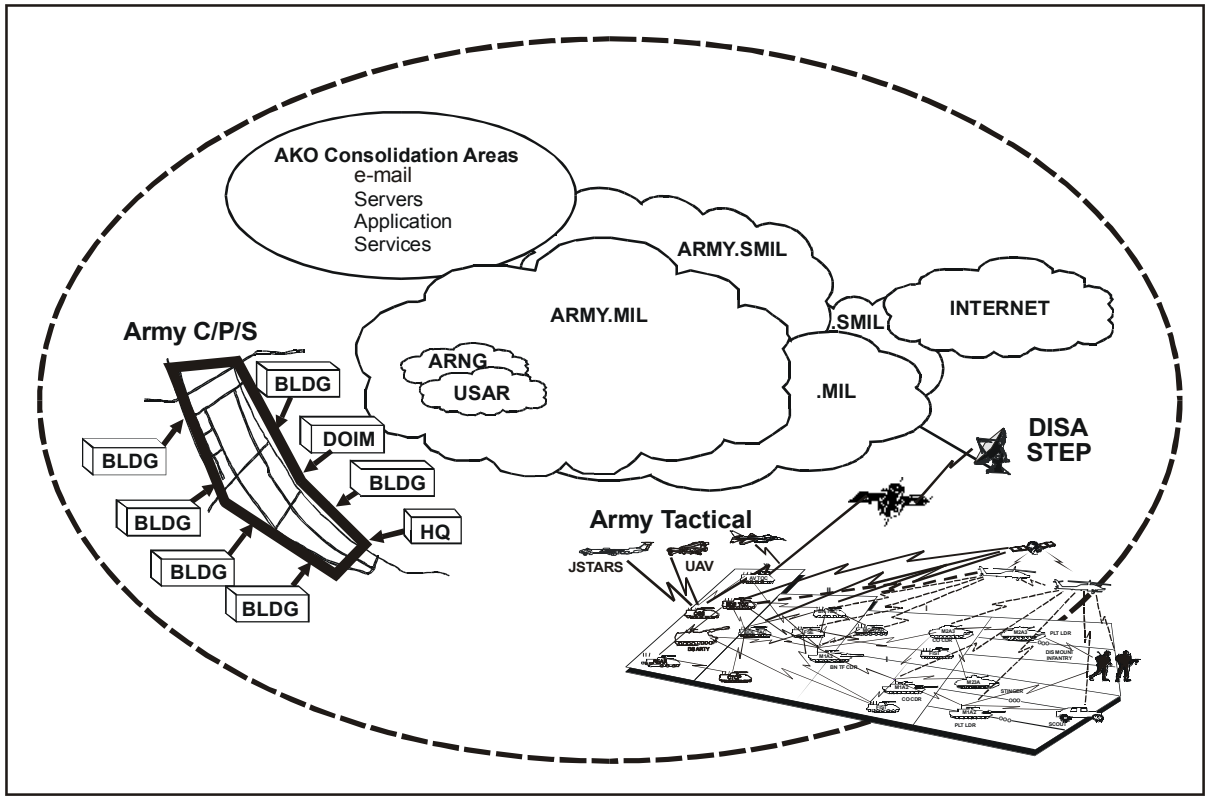


Figure 3-3. Army Enterprise View

3-13. Each installation typically hosts several IT facilities, providing support to not only Army users but also to other service/agency tenants. In addition, the Army has many mobile users who will need access to the AEI from outside the enclave. Thus, multiple separate communities of interest with varied IT requirements are found on most Army installations. Furthermore, the operations and maintenance of the IT systems at these locations differ from installation to installation. In some installations, Army personnel (military and civilian) perform operations and maintenance; in others, a mix of Army and contractor support is used. These disparities require consolidated operations and management, as the following paragraphs illustrate.

3-14. There are several commands that operate separate networks of their own to support their facilities located around the world, such as the Army Corps of Engineers, Army Recruiting Command, Space and Missile Defense Command, Intelligence and Security Command, and Medical Command (MEDCOM). These separate networks create duplication of effort in network management. In worst cases, having different networks with potentially different security policies and practices can create security vulnerabilities for the entire Army when the various networks are linked together with each other and/or with mainstream Army networks.

3-15. Some organizations provide global applications throughout the enterprise and perform selected network management functions to support those applications. Examples of such applications include the Total Army Distance Learning Program, the Transportation Information System, and the Army Human Resources System. For user and application support functions, such arrangements create inefficiencies in resource usage. In cases where the proponents of such applications acquire their own networking resources (for example, leased circuits, non-Army access to the Internet), security vulnerabilities can be introduced that affect the entire Army.

3-16. Some organizations have activities and isolated users located in other government and commercial leased facilities throughout CONUS and in some cases, OCONUS.

3-17. Deployed Army units use the tactical component of the AEI to access the GIG through DISA managed and service operated strategic tactical entry point (STEP), commercial satellite, military multichannel tactical satellite (TACSAT), and terrestrial communications links.

3-18. Currently, the management structure for the AEI cannot be described as seamless. Significant reorganizations are in progress or being planned towards the goal of seamlessness and single enterprise management. Still other commands and organizations are under analysis prior to the generation of concrete plans.

3-19. The many disparate operations discussed above are being transitioned to consolidated operations and management under US Army Network Enterprise Technology Command/9th Army Signal Command (NETCOM/9th ASC) to provide efficiencies of operation, consistent security practices, and consistent levels of service. Where it is not feasible for NETCOM/9th ASC to provide support (for example, for Army tenant units working on a Navy or Air Force installation), current support agreements will remain in effect.

MANAGEMENT OF THE AEI

3-20. Management of the AEI encompasses a number of different functions, some of which can overlap each other. The paragraphs below discuss these management functions.

Installation Infostructure Management

3-21. One aspect of the Army transformation that has major impact on signal operations is the transformation to centralized installation management under the Assistant Chief of Staff for Installation Management (ACSIM). Previously, installations were owned and managed by the various major commands (MACOMs). In the transformed environment, installation management is delegated by region to regional managers as illustrated in Figure 3-4.

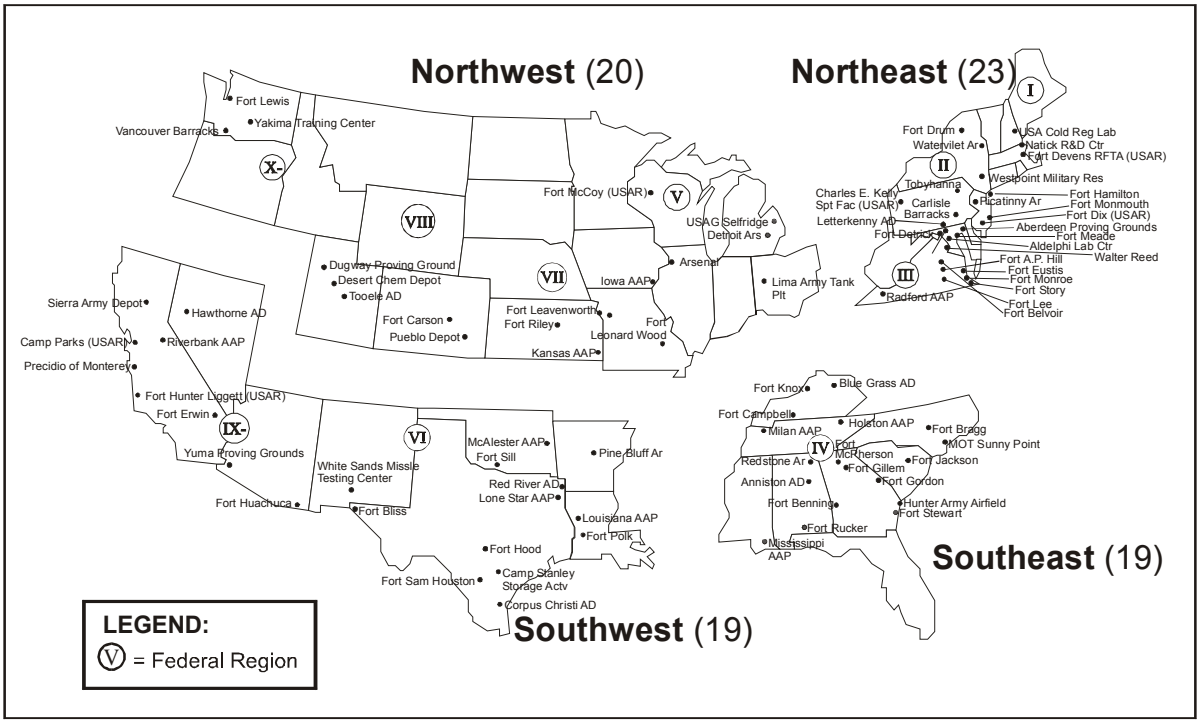


Figure 3-4. Army Installation Management Regions

3-22. With the transformation of the Army to centralized installation management, the ACSIM is responsible for providing telecommunications services for posts, camps, and stations. Installation level services are provided and administrated by local Directorates of Information Management (DOIMs). These DOIMs report directly to their local installation managers and are under technical control (TECHCON) of NETCOM/9th ASC. NETCOM/9th ASC exercises this TECHCON through the Army Network Operations and Security Center (ANOSC) for day-to-day operational issues and through the Regional Chief Information Officers (RCIOs) on policy and standards. NETCOM/9th ASC establishes RCIOs for each installation management region. RCIOs are NETCOM/9th ASC assets that are operational control (OPCON) to the installation regional managers.

3-23. NETCOM/9th ASC also exercises TECHCON through RCIOs of quasi-separate networks operated by other commands such as the Corps of Engineers.

3-24. Figure 3-5 depicts the top-level organizational relationships for AEI Systems Management.

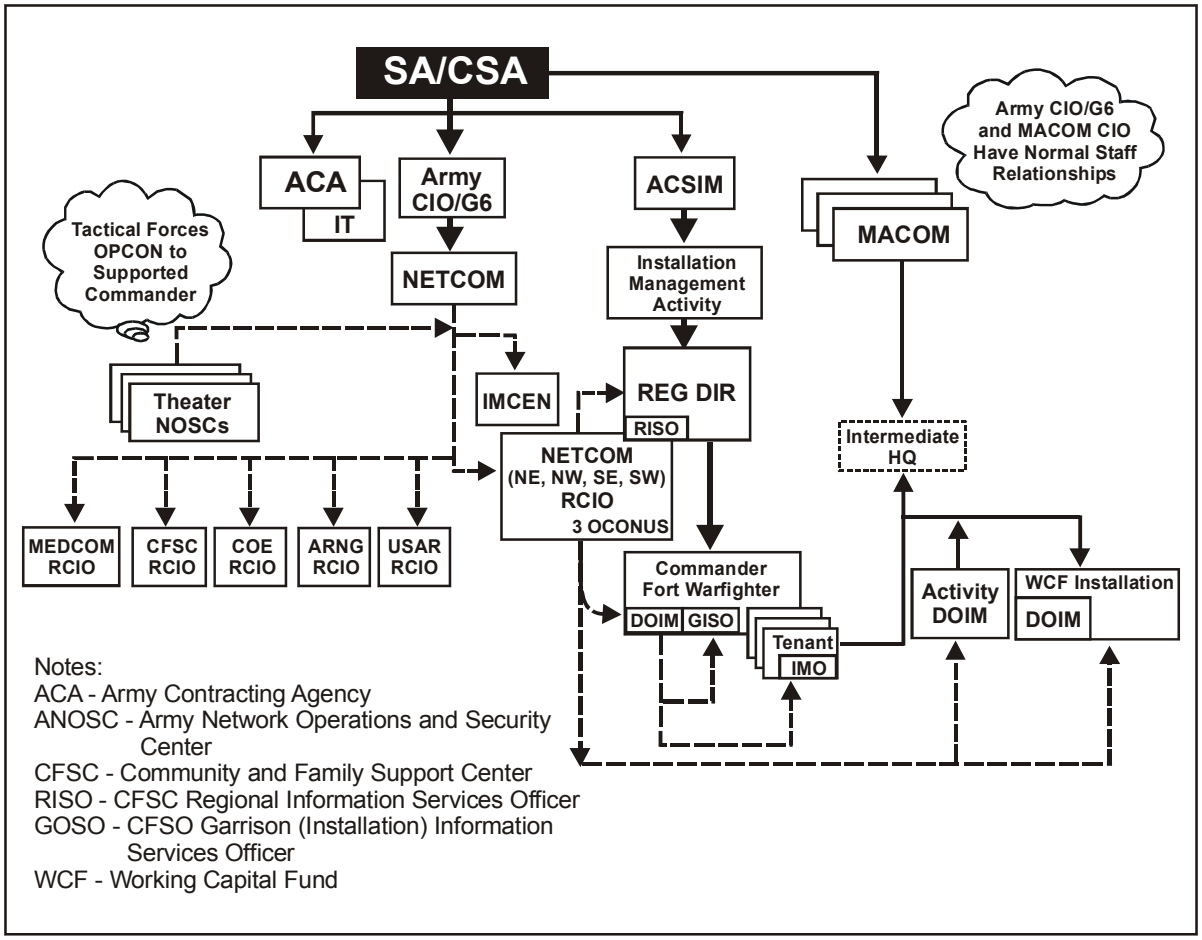


Figure 3-5. Organizational Relationships

3-25. Currently, most commands and tenant organizations on an Army installation are responsible for the operation and management of their own networks, e-mail servers, and desktops. (This is not always the case OCONUS.) The DOIM at each installation will become responsible for operation and management of all installation infostructure. While NETCOM/9TH ASC has the responsibility for operation and management of the enterprise level assets throughout the Army, the DOIM has the responsibility for installation specific IT assets. NETCOM/9TH ASC provides the technical guidance to the DOIM for the information management services depicted in Figure 3-6. In this way, standard basic service levels are provided throughout the enterprise, independent of a user's organization or location.

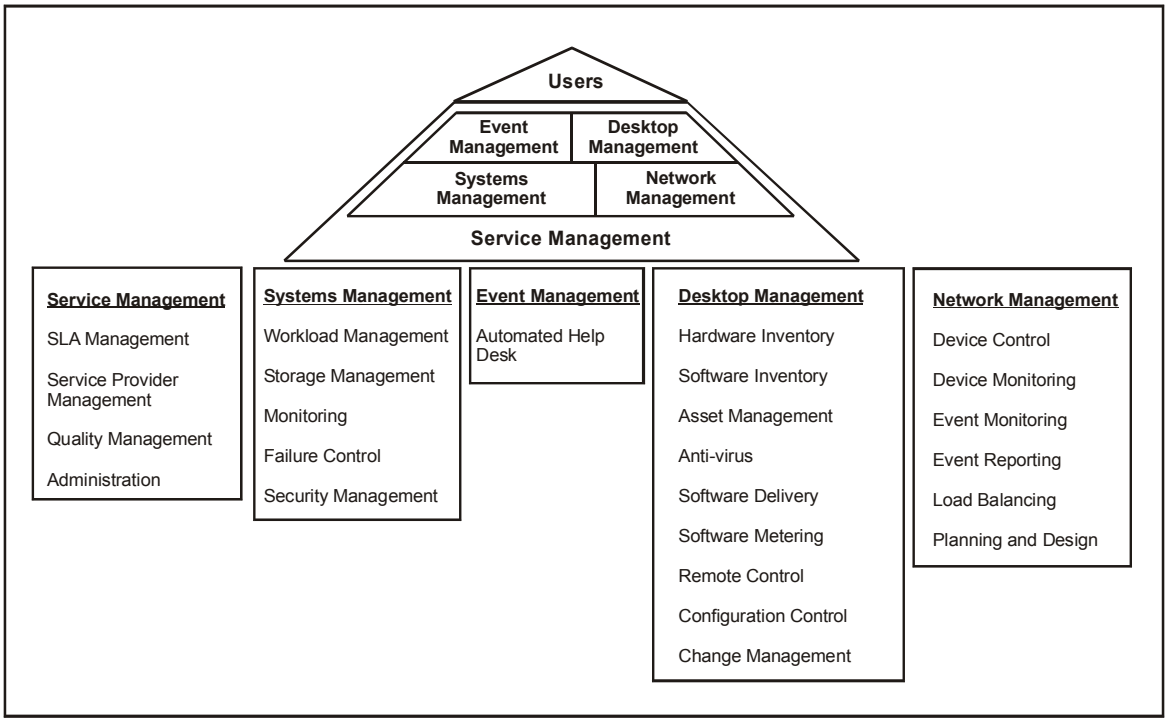


Figure 3-6. Information Management Services

3-26. The standardization and consolidation of NETOPS functions across the enterprise allow the Army to better utilize personnel required to perform these tasks and increase the quality of service provided to the end users while at the same time reducing the total cost of providing these services. However, as consolidation of routine functions causes the physical execution of those functions to move away from the physical proximity of the customer, the role of the local IT provider, generally the DOIM, changes to that of customer representative for the overall C4IM operations team.

3-27. Comprehensive remote management capabilities are established within the consolidated support areas. The goal is to maintain a high level of IT support and service at the installation and to reduce the inherent redundancies and inefficiencies with the current structure. This change in focus is accomplished at the local level by an equally significant change in how the C4IM management structure views its role.

Tactical Infostructure Management

3-28. The tactical portion of the AEI extends from Army component commanders to deployed forces supporting a joint, combined, or single-service task force. Deployed forces access reach-back applications through a STEP or Teleport site. NETCOM/9TH ASC, through its senior subordinate in-theater signal element, is responsible for the operation and maintenance of the Army's portion of the GIG in theater. (In some theaters, the senior Army theater signal element is a theater signal command-Army (TSC(A)). In others, the senior Army theater signal element is a signal brigade headquarters.)

3-29. In theater, the GIG is composed of enclaves of service-controlled assets connected by a network of DISA-controlled assets. The complex nature of the GIG in theater requires that all component NETOPS organizations work together closely, under the direction of the J6, to ensure the reliable operation of the GIG. This is made more complex by the increased use of inter-theater C4IM resources to support a given tactical operation. NETCOM/9TH ASC, through the ANOSC, operates and manages the Army's cross-theater C4IM support to the various warfighter commands.

Common Services and Applications Management

3-30. NETCOM/9TH ASC has responsibility for common C4IM services and applications throughout the Army. These common services and applications are provided in accordance with baseline service levels approved by the Army CIO Executive Board and funded by the ACSIM. Baseline services are defined by the service provider based upon affordability within available resources. Changes in resource baselines may necessitate changes in baseline services. Any adjustment in levels of service must be consistent and equitable. NETCOM/9TH ASC negotiates service level agreement extensions to baseline services through the DOIM. This pertains to any service requirement beyond established Army baseline for all identified services. The service level agreement extensions are based on performance measures such as availability, reliability, and response time that can be monitored to measure NETCOM/9TH ASC performance and customer satisfaction. In this way, standard service levels are provided throughout the enterprise. Common services and applications categories include:

- Telecommunications.
- Visual information.
- Automation.
- IA.

Functional Applications Management

3-31. Functional applications—such as personnel, logistics, financial, training, and medical—are the responsibility of their functional owner for the near-term. The long-term vision is to separate the link between functional application management and the management of underlying networks and processing systems. The functional owners are responsible for applications and content management, while NETCOM/9TH ASC provides the communications and processing services necessary to meet the functional owner's service requirements.

End-User Support Management

3-32. During AEI transformation, end-user support has undergone and continues to undergo major changes to standardize and centralize services to the maximum extent possible, resulting in service that is more effective and reduced the total cost of ownership. The Army baseline service levels are validated by the Army Enterprise Infostructure Management Steering Group and approved by the Army CIO Executive Board and the ACSIM. Services provided to the end user include:

- Standardized, consistent services for end-user devices (for example, desktop and laptop) and software applications.
- End-user devices delivered with preinstalled software.
- Remote desktop software upgrades and patches.
- Virtual desk side assistance (remote, real-time problem diagnosis and resolution).
- Single account logon using PKI/CAC.
- Single, integrated help desk or one-stop problem reporting and resolution.

NETWORK COMMON OPERATIONAL PICTURE (NETCOP)/NETWORK COMMON RELEVANT OPERATIONAL PICTURE (NETCROP)

3-33. As a result of the Army's ongoing transformation to an info-centric, network-centric force, the status of networks has achieved much greater visibility with warfighting commanders than in the past, putting it on par with the status of other combat assets such as tanks and artillery systems. This section discusses the organizations and processes that work together to assemble and provide this information to the warfighter, as well as performing a large portion of the day-to-day NETOPS tasks in the AEI.

3-34. The Deputy Secretary of Defense's 24 Aug 2000 Guidance and Policy Memorandum No. 10-8460-Network Operations calls for combatant commanders of unified commands to collaborate with their respective service component commands, DISA, Joint Task Force (JTF), and US Space Command to create and maintain a NETCOP. Additionally, the Joint NETOPS CONOPS directs each service to develop and disseminate a NETCOP for its portion of the GIG.

3-35. The NETCOP provides the ability for combatant commanders, service components, subunified commands, JTF, and deployed forces to rapidly identify outages and degradations, network attacks, mission impacts, C4 shortfalls, operational requirements, and problem resolutions at the strategic, operational, and tactical levels.

3-36. The Army extends the NETCOP concept by specifically including the criteria of relevance, resulting in the term NETCROP. The NETCROP integrates a capability that receives, correlates, and displays a view of voice, video, and data telecommunications networks, systems, and applications at the installation, tactical, region, theater, and global levels through the installations/deployed tactical forces, network service centers, Theater Network Operations and Security Center (TNOSC), and ANOSC respectively. Figure 3-7 illustrates the conceptual process by which the NETCROP may be distributed to the various organizations that have a need for this information.

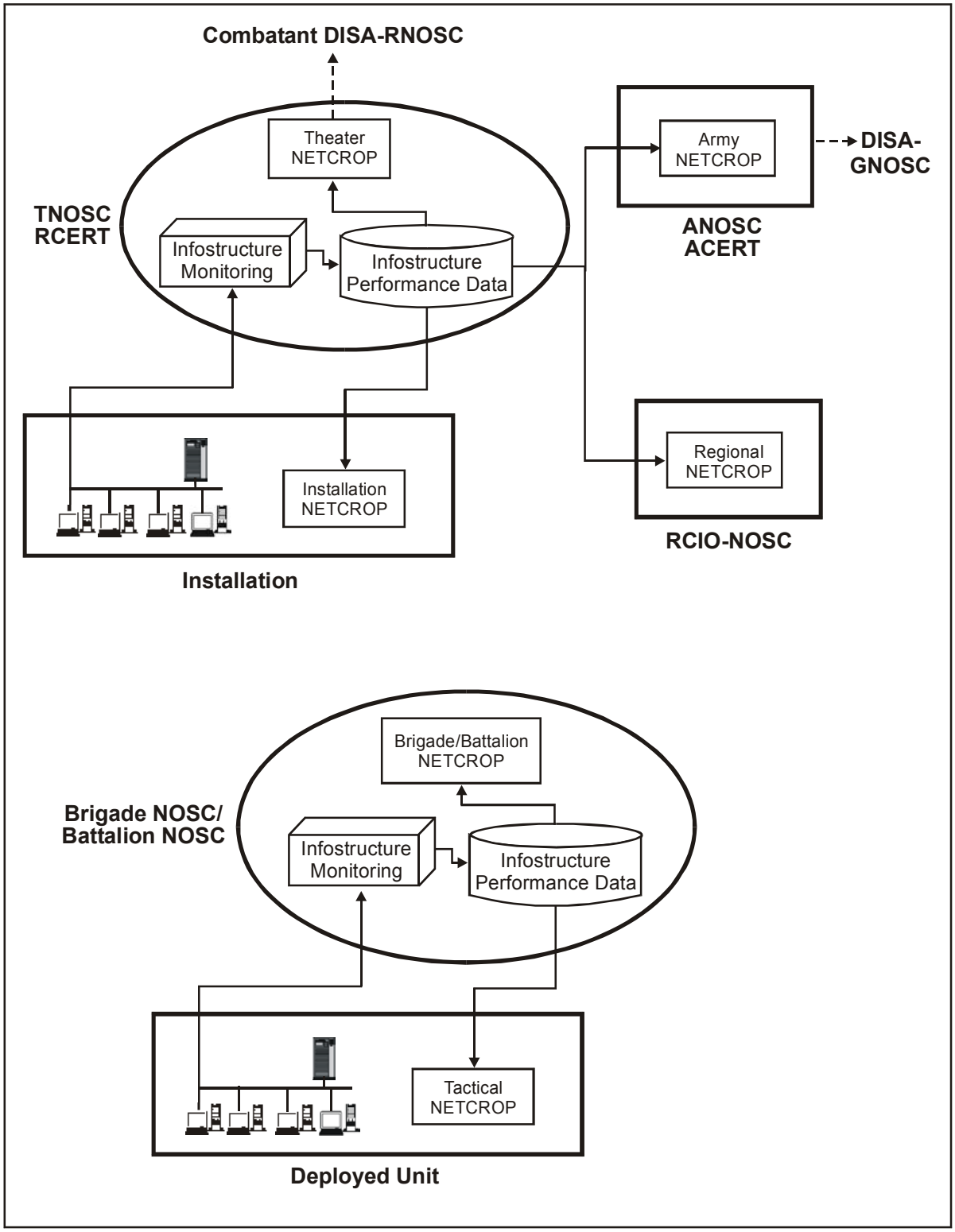


Figure 3-7. Dissemination of NETCROP Information

3-37. Coordination with DISA provides agreement on the information passed between DISA and other agencies. From that and other Army enterprise requirements, agreements are made for information to be pushed throughout the Army Network Operations and Security Centers (NOSCs). At each level, the required data is collected for analysis along with any other required data at that level. The NETCROP at each level reflects statuses, performance, and IA. At a minimum, the NETCROP includes telecommunication/system/ application fault and performance status as well as significant IA reports such as network intrusions or attacks.

ROLES AND FUNCTIONS OF KEY NETWORK MANAGEMENT ORGANIZATIONS

3-38. NOSCs and Computer Emergency Response Teams (CERTs) execute the real-time management and defense of networks and services. NOSCs are embedded in the structures of signal and information service provider organizations at various echelons. Reporting relationships for the NOSCs do not always follow the hierarchical lines of authority of the parent provider organizations.

3-39. NOSCs at all levels develop and provide NETCROP information. In general, lower echelon NOSCs provide information upward to higher echelon NOSCs on their assigned portions of the network. Higher echelon NOSCs provide consolidated NETCROP views downward to lower echelon NOSCs.

3-40. NOSCs perform the link and circuit management functions that were performed by their predecessor organizations, the battalion control centers, systems control centers, and network control centers. Additionally, they perform IA and IDM functions. These functions include, but are not limited to, LAN/WAN administration and CND that includes intrusion prevention, detection, response, and recovery.

3-41. Overall responsibility for CND within the Army belongs to NETCOM/9th ASC as specified in Department of the Army (DA) General Order number 2002-5. This function is executed in a layered manner by the NOSCs of the various echelons (under the TECHCON of NETCOM/9th ASC). Just as physical defensive operations are greatly enhanced by good intelligence support, CND is also greatly enhanced by focused intelligence and analytical support.

3-42. This analogy also applies to information feedback from defensive operations to improve the quality of the intelligence knowledge base. For this reason, signal organizations directly engaged in CND maintain close, direct liaison with their counterparts in the intelligence community. At the Army level, this is a close, formal relationship between NETCOM/9th ASC and the Army Intelligence and Security Command (INSCOM). The top-level operational interface point for this relationship is the combined facility shared by the NETCOM/9th ASC ANOSC and the INSCOM 1st Information Operations Command Army Computer Emergency Response Team (ACERT). The detailed breakout of operational procedures between these two organizations is still evolving and is beyond the scope of this manual. Because both organizations have technical capabilities that can significantly degrade network services if they are misapplied, the closeness of this

relationship is deemed so critical that the ANOSC was physically moved after its establishment to co-locate with the ACERT and other computer network operations forces. At lower echelons where both NOSCs and CERTs exist, the requirement for close coordination and liaison is equally critical.

3-43. Operations related to CND that are of particular interest to theater signal personnel are the gathering of forensic evidence to trace attacks and/or unauthorized network activities to their source and active incident response measures, either through law enforcement channels or through retaliatory network measures directed at foreign enemies. These operations fall under computer network exploitation and computer network attack respectively. Such actions are governed by intelligence oversight statutes and are coordinated/executed by the intelligence community under the OPCON of the G3/J3/C3 at the respective operational and strategic levels. Theater signal interface to these processes is usually through NETOPS interface points, the CERTs.

3-44. The US Army INSCOM establishes and operates CERTs under the OPCON of the G3 of the Army at the national level and G3/J3/C3 at lower levels. CERTs operate symbiotically with NOSCs to enhance the protection and defense of Army networks. CERTs do not exist at every echelon that NOSCs do. At echelons where both NOSCs and CERTs exist, they are co-located whenever possible to facilitate cooperation and collaboration. CERTs provide more sophisticated analytical tools than may be available in their counterpart NOSCs and a greater depth of expertise for enhanced incident response and recovery. The details of the interaction between CERTs and NOSCs are continuing to evolve and are beyond the scope of this manual.

ANOSC

3-45. The ANOSC's mission is to provide reporting and situational understanding for the Army's portion of the GIG. The ANOSC provides worldwide operational and technical support across the strategic, operational, and tactical levels. The ANOSC—as depicted in Figure 3-8—interfaces with all Army TNOSCs, functional NOSCs, the DISA Global Network Operations and Security Center (GNOSC), and other service NOSCs, where appropriate.

3-46. The ANOSC's general roles and responsibilities include the following:

- Operate in conjunction with the Army CERT in order to provide comprehensive CND for assigned networks.
- Collect near real-time status information on essential intra-theater gateways (STEP and Teleport) and other networks and information systems.
- Ensure implementation of approved DOD/Army policies and procedures for NETOPS.
- Provide near real-time global situational awareness of Army networks and systems to authorized organizations (for example, NETCROP).
- Coordinate problem resolution actions that effect operations in two or more theaters.

- Oversee the provisioning of domain name services (DNS) and IP management services for ARFOR.
- Implement policy and operational measures to ensure near real-time worldwide defense for the Army's portion of the GIG; these measures will be coordinated with the ACERT.
- Conduct reporting of worldwide facilities, telecommunications, and information system problems.
- Maintain liaison with DISA GNOSC, Army operations center, and the 1st Information Operations Command.
- Establish, in coordination with the US Commander in Chief, Space Command, DA Staff, INSCOM, and MACOMs, Army-wide procedures for dissemination of CND and related advisories, alerts, and warning notices, including those originating outside the Army and DOD.
- Monitor compliance with issued IA vulnerability alerts and direct Army-wide actions, including Army-wide information operations conditions changes, to defend Army computer network operations in coordination with the Army G3, commander, and ARFOR computer NETOPS.
- Coordinate with NETCOM G2 to refine priority information requirements in support of CND/IA operations.
- Chair the NETOPS communications configuration board and is a voting member of the AEI technical communications control board.
- Ensure global metrics for SLM are included in the Army NETCROP.

3-47. The ANOSC has the following responsibilities for networthiness:

- Ensure compliance with networthiness policies and procedures before any IT resource, network, system, or application is connected to the infostructure.
- Participate as required in networthiness reviews, tests, and forums.

3-48. The ANOSC has the following responsibilities for asset and resource management:

- Identify any new real or logical property that should be addressed in the ARM process.
- Identify assets or resources where usage pattern indicates a potential efficiency increase and identify how the efficiency increase might be realized.
- Receive, process, and forward requests to create subordinate ARM processes.

TNOSC

3-49. The TNOSC acts as a single point of contact for Army network services, operational status, and anomalies in the theater to other services operating in the theater. The TNOSC provides visibility and status information to the ANOSC, the Theater Communications Control Center (TCCC), and DISA Regional Network Operations and Security Center (RNOSC). In some theaters, the TNOSC may provide visibility to other service component

NOSCs. There are TNOSCs established in every theater of operation: CONUS, Europe, Pacific, Korea, South West Asia (SWA), and Southern Command (SOUTHCOM).

3-50. Assignment and C2 (OPCON, TACON, TECHCON, etc.) relationships of TNOSCs are situation and workload dependent. It is not the same for all theaters. Because these relationships can change much more rapidly than the normal update cycle for doctrinal publications, they are not depicted here.

3-51. This section addresses the functions common to all theaters and not specific functions that are unique to an individual theater. Theater common functions can be performed at multiple geographical locations, but they should be performed the same way at each location.

3-52. The TNOSC will perform or coordinate any task that spans the theater or multiple regional director regions. This provides consistent service among regions. It also places the operational function at the only location in the enterprise that would have visibility or awareness of what was happening in both regions.

3-53. The TNOSC's general roles and responsibilities include the following:

- Operate in conjunction with its counterpart CERT (usually a Regional Computer Emergency Response Team [RCERT]) to provide comprehensive CND of assigned networks.
- Exercise control and configuration as well as day-to-day management and protection of the networks, systems, and applications within the theater.
- Consolidate the NETCROP inputs of subordinate NOSCs and provide, via secure means (usually SIPRNET), views into the Army theater NETCROP to the combatant commander's TCCC, the Army component commander, and the ANOSC.
- Provide IDM support for organizations within the theater to include the dissemination of the NETCROP to the appropriate organizations and commands within the theater.
- Operate and manage all items located on the public or DISA side of the installation network infrastructure that are Army owned. Initially, this will include all long-haul communications resources used to connect the installation to the WAN backbone or to tie regions together, the installation gateway or Army DISN Router Program router, and any devices located in the communications zone between the security router and the installation gateway router.
- Operate and manage selected systems and networks within the installation based on the implementation of a consolidated management capability for those devices or systems.
- Develop a theater NETOPS CONOPS to supplement and address theater-unique missions and responsibilities.
- Include in NETCROP theater metrics for SLM.

- Report any violations of networthiness detected on Army networks.
- Identify any new physical or logical property that should be addressed in the asset resource management process.

3-54. The TNOSC has the following responsibilities for CM:

- Execute and enforce the policies and procedures promulgated by the Army CIO through the ANOSC for CM.
- Is a voting member of NETOPS communications control board.

3-55. The TNOSC has the following responsibilities for networthiness:

- Ensure all IT resources, networks, systems, or applications have a valid certificate to operate before connecting to the infostructure.
- Participate as required in networthiness reviews, tests, and forums.

NETOPS SUPPORT BELOW THE TNOSC LEVEL

3-56. Below the TNOSC, an OCONUS theater is typically divided into regions, and sometimes even subregions, for NETOPS support. When regions or subregions are defined, they will have some form of NETOPS capability that provides some of the functions of NOSCs. These regional capabilities may be fixed station or tactical. The assignment and command relationships for the facilities that provide these services are situation and workload dependent. Such facilities may or may not have the term "NOSC" in their names.

OTHER NOSCS AND NETWORK MANAGEMENT CAPABILITIES

3-57. The following paragraphs discuss other NOSC and network management capabilities.

DISA GNOSC

3-58. DISA manages the DISN through the GNOSC. The GNOSC provides the overall management control and technical direction of the GIG backbone. As the direct interface for the National Communications System (NCS), Office of the Secretary of Defense, and Joint Chief of Staff (JCS) customers, the GNOSC performs customer assistance and provides current operational GIG services at the strategic-national level.

3-59. The GNOSC's general roles and responsibilities include the following:

- Serve as the single manager to operate the DISN WAN and associated LAN.
- Integrate the overall DISN with all other networks provided by DOD components to extend DISN services to their installations.
- Advise the Chairman, JCS, and Commander, US Space Command, on matters regarding the allocation of DISN resources and network anomalies.
- Maintain visibility, to include security provisions, of the GIG through a DOD component-integrated global NETCROP. This is achieved through integration of DISA RNOSC and service/agency component feeds.

3-60. The DISA GNOSC has the following roles and responsibilities for SLM:

- Provide agreed upon levels of service for the WANs and LANs to support the Army infostructure and its defined critical services.
- Direct, monitor, and control DISA-provided telecommunications networks, and provide connectivity services to combatant commands, service, and agency networks in the theater.
- Provide exercise and contingency support to the J6 and JTF.
- Support the combatant commanders and components by creating and disseminating the NETCROP for the theater. This is accomplished by integrating NETOPS event and status information received from joint network operations and security centers.
- Coordinate solutions to problems involving DISA-controlled networks.

Functional Area NOSCs

3-61. Functional area NOSCs such as those that administer Corp of Engineers network(s) or MEDCOM network(s) are under TECHCON of NETCOM/9th ASC. The long-term goal is for functional area NOSCs and the National Guard and Army Reserve NOSCs to become absorbed by NETCOM/9th ASC and, in some cases, consolidated as the Army moves to a single enterprise network.

Lowest Tier Network Administration

3-62. Although deployable NOSCs with their associated data packages and teams may have subscribers directly connected to them, frequently there will be subordinate layers of network management capability below this level.

Nodal Data Teams

3-63. Below the battalion level, data network management and IA functions are performed by nodal data teams. In the case of the ITSB, these teams are organic to the nodal platoons. In legacy organizations, these teams are often task-organized locally and not uniformly recognized on TOEs.

Subscriber IT/IA Personnel

3-64. The lowest level of data network management and IA function is the cell of IT/IA personnel embedded in subscriber organizations. These personnel provide local management and support of unit and individual hardware and software. They are the first source of assistance to users in resolving problems. Personnel may be delegated selected machine and network management functions such as resetting passwords. They provide local expertise and support on applications, which are specific to their type of unit, such as Maneuver Control System for the maneuver unit.

Chapter 4

Theater Tactical Signal Architecture

This chapter discusses the theater tactical signal architectures. It covers the current force architecture, network standardization, rapid deployment contingency communications packages, non-ITSB generic contingency communications packages, and the notional deployment sequence. This chapter also covers the echelons corps and below (ECB) and stovepipe architectures.

CURRENT FORCE ARCHITECTURE

4-1. The following paragraphs discuss the architecture of the current force.

DISN

4-2. The DISN is the DOD communications network providing access to a variety of C4IM services and capabilities. The DISN cloud extends around the globe and provides services to warfighters where needed. These services and capabilities are extended to deployed users by the TSC(A)s in theaters (where they exist), theater tactical brigades, and subordinate ITSBs.

4-3. The DISN—

- Provides the long-haul transport component of the DOD portion of the GIG.
- Provides seamless interoperability.
- Provides constant connectivity.
- Provides positive control of network resources.
- Incorporates emerging technology as it becomes available.

4-4. The DISN infrastructure supports sustaining-base, long-haul, space, and deployable tactical communications capabilities. All equipment, technologies, and transmission media within the DISN are interoperable with other networks and information services within these segments.

STEP/Teleport

4-5. The STEP is the interface between the strategic layers of the DISN and tactical signal forces, providing support to the deployed user. The ITSB provides connectivity from any 1 of 15 worldwide STEP locations to deployed forces for access to the DISN. Tactical signal forces access the STEP via super high frequency (SHF) military SATCOM over the Defense Satellite Communications System (DSCS). Future enhancements to the STEP include providing a capability to receive and transmit via commercial band satellites.

4-6. A STEP site can be a single or dual site. A single STEP site supports one satellite coverage area and acts as a ground mobile forces hub terminal. A dual STEP site supports at least two satellite areas and duplicates the equipment requirements for subsystems located in the single STEP site. The goal of the STEP is to pre-position services and connectivity and make these services available to the deployed user.

4-7. The DOD Teleport System provides increased SATCOM capacity, improved interoperability of joint communications systems, and dynamic reconfiguration to meet the changing needs of a JTF, joint deployed headquarters, and the deployed forces. The purpose of the DOD Teleport is to expand on the capabilities currently provided by STEP sites and provide deployed warfighters continuous global access via multimedia radio frequency (RF). This multimedia RF includes existing Military Satellite Communications (MILSATCOM) systems (that is, SHF, ultra high frequency [UHF], and extremely high frequency [EHF]), future Ka bands, and commercial SHF wideband systems in the C, L, and Ku bands. High frequency (HF) will also be incorporated.

DISN Point of Presence (POP)

4-8. In many contingencies, the DISA will install additional capabilities in theater to provide access to the DISN. This POP is typically a commercially based satellite and/or terrestrial system that will provide similar services that are available at a STEP/Teleport site. DISN POPs are used to help alleviate the burden on the STEP/Teleport sites for satellite access. DISN POPs may be installed and co-located with the JTF headquarters and/or component command headquarters. Theater tactical signal forces may access DISA POPs when available.

END-USER SERVICES EXTENDED

4-9. TSC(A)s (in theaters where they exist), theater tactical brigades, and subordinate ITSBs provide standard end-user services. These services provide critical capabilities that enable effective planning and execution of the mission. The following paragraphs discuss these end-user services extended.

IP Data Network Services

4-10. The deployed ITSB sets up and configures access to data networks that allow the flow of information to and from the warfighter. These networks permit both secure and nonsecure information flow as well as access to coalition resources. Figure 4-1 depicts the NIPRNET and SIPRNET connectivity to the STEP, and Figure 4-2 shows this in detail.

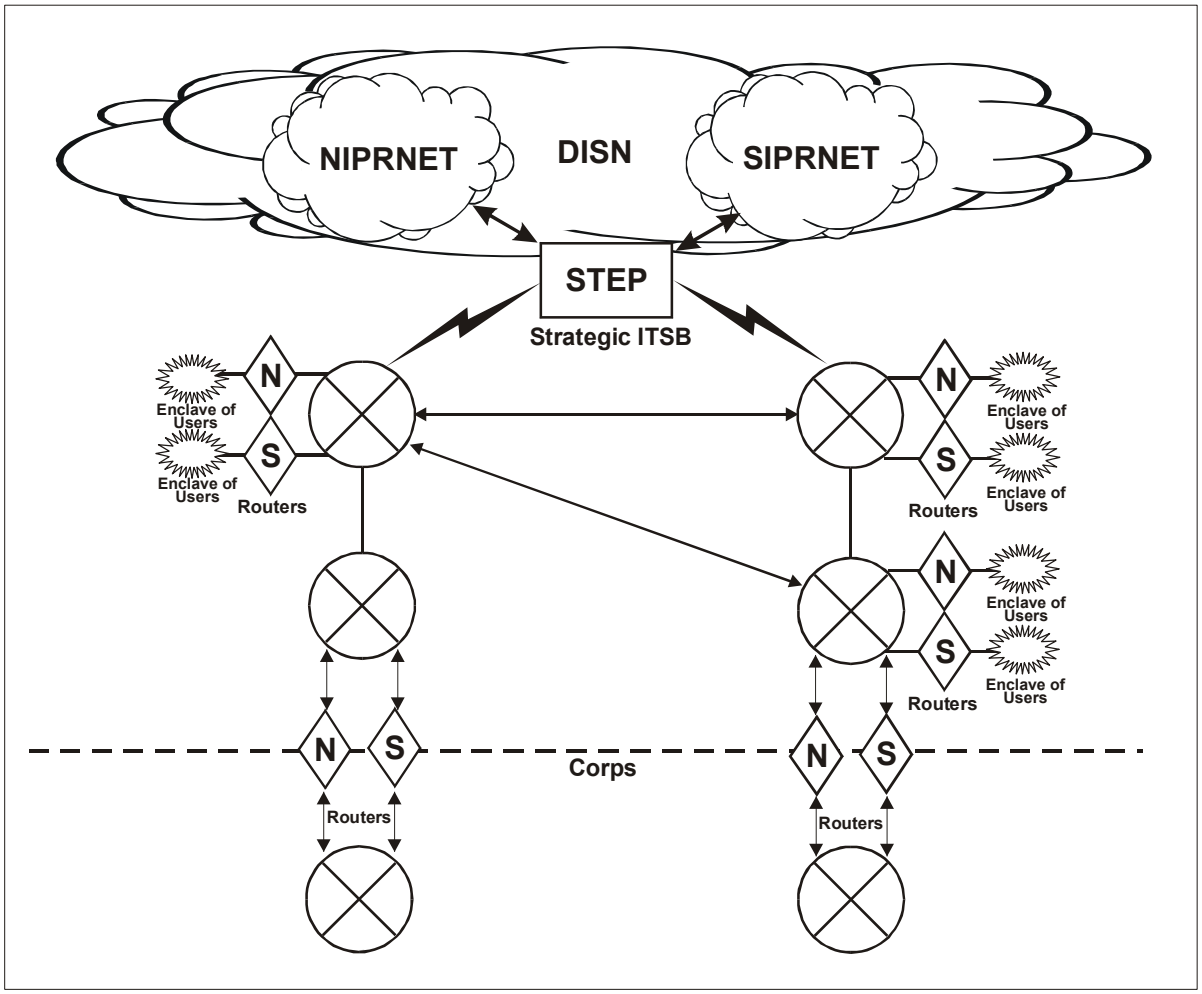


Figure 4-1. NIPRNET and SIPRNET Connectivity to the STEP

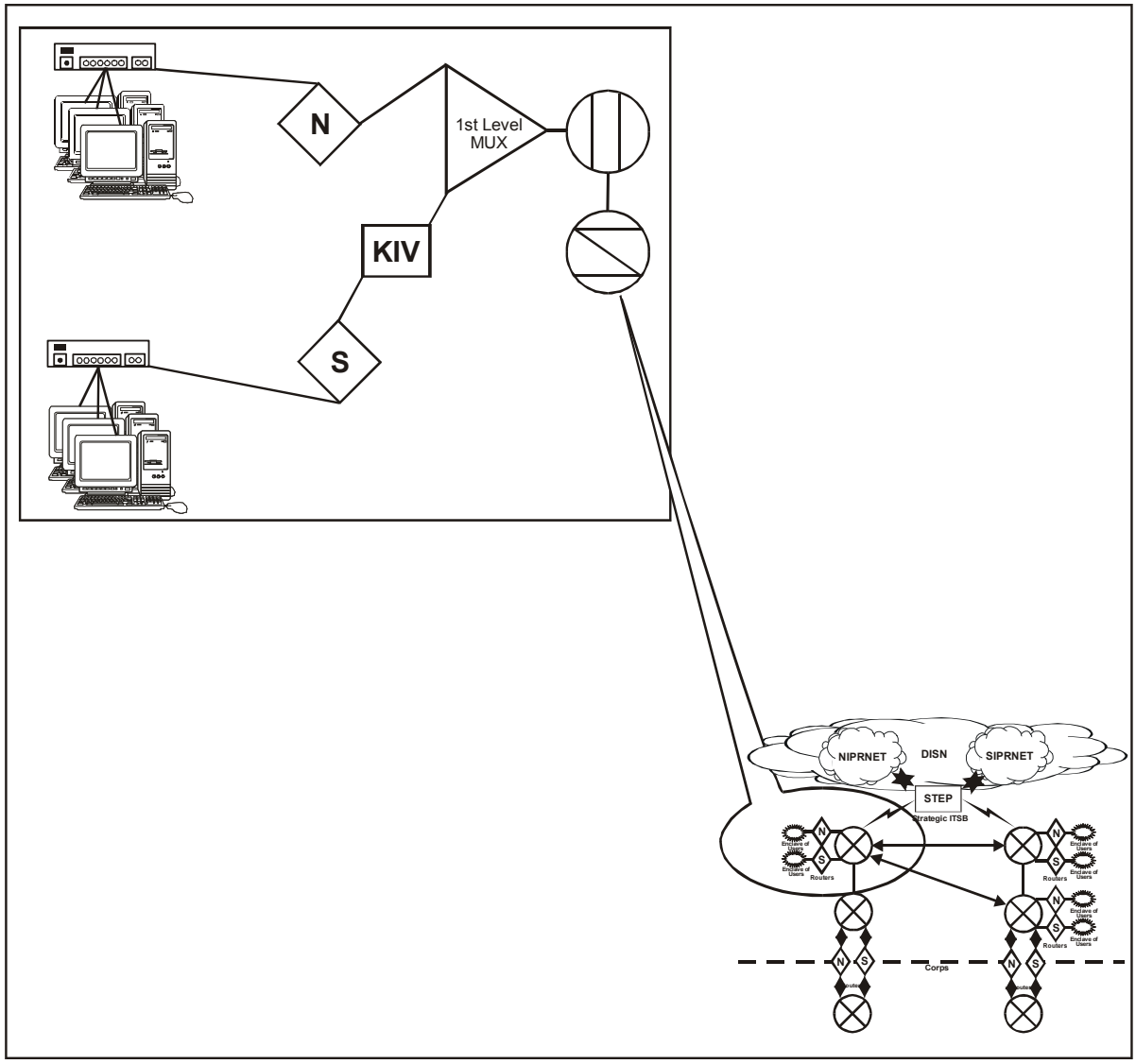


Figure 4-2. NIPRNET and SIPRNET Detailed

4-11. **NIPRNET**. The NIPRNET is a network of government-owned IP routers used to exchange sensitive information. In providing this service, theater signal acts in a role very similar to a civilian Internet Service Provider. The NIPRNET is a US Unclassified worldwide IP data network managed by the DISA. It is the consolidation of several service and agency networks with common protocols and standards. It supports connectivity over a high-speed network. NIPRNET availability is critical in support of C2 applications. Many DOD applications are based upon the ability for users to access the Internet/NIPRNET to perform their mission.

4-12. Access to the NIPRNET is obtained through a STEP site and is then distributed through an Unclassified theater network. NIPRNET access is also distributed to networks ECB through theater to corps gateways. These access points also act as routing boundaries for the design and engineering of the IP networks in support of the NIPRNET.

4-13. **SIPRNET**. The SIPRNET is a US Secret High worldwide IP data network managed by the DISA. It is made separate from the NIPRNET and secure by a combination of physical, procedural, and cryptographic measures. Users connect to the network at a selectable data rate that meets the mission requirements. The Regional Control Center, located in Washington, D.C., performs all SIPRNET configurations at the STEP.

4-14. Access to the SIPRNET is obtained through a STEP site. Similar to the NIPRNET, the SIPRNET is distributed throughout the theater using ITSB assets. The SIPRNET is also distributed to networks at ECB through theater to corps gateways.

4-15. **Coalition Network**. Generically, the coalition network service supports planning and execution of operations by US and non-US coalition forces in the operational environment. Much like the NIPRNET and SIPRNET, the coalition network service may require distribution throughout the theater of operation. Current coalition network services operate at the SBU level and at the Secret level.

4-16. Implementation of coalition network service can take a variety of forms. At the lowest level, it may be a LAN among coalition partners with little or no connectivity to other networks. On a larger scale, it may consist of theater or regional WANs among coalition partners, but still with limited or no connectivity to other networks. In its most developed form, the coalition network service may extend the worldwide standing coalition network known as the CENTRIXS to tactical coalition users.

4-17. CENTRIXS is a permanent, classified coalition network that provides e-mail, Web, and collaboration (chat) services. CENTRIXS merges the Pacific Command (PACOM) coalition network with the Central Command (CENTCOM) coalition network. Commander, Pacific Fleet serves as executive agent for this network. Assistant Secretary of Defense for Command, Control, Communications, and Intelligence provides a program management office to manage further CENTRIXS technical development. As of September 2003, CENTRIXS links over 50 partner nations.

4-18. CENTRIXS makes extensive use of tunneling technology and encryption to traverse other IP networks, enabling the flexible establishment and management of various separate virtual communities of users and interest groups within the overall CENTRIXS user community. CENTRIXS incorporates some managed (filtered) electronic connections to other networks that allow the transfer of releasable data between the various networks and communities of interest.

4-19. Management practices of the CENTRIXS network impose a degree of hardware and software standardization. CENTRIXS-compatible hardware and software are normally made available to non-US participants via foreign military sales channels.

4-20. In many ways, the NIPRNET, SIPRNET, and coalition networks provide similar types of capabilities. However, it should be noted that the requirements for each type of network might be dramatically different based upon the mission or the location being supported. Figure 4-3 depicts the coalition network and how it connects to the ITSB, and Figure 4-4 depicts this in detail.

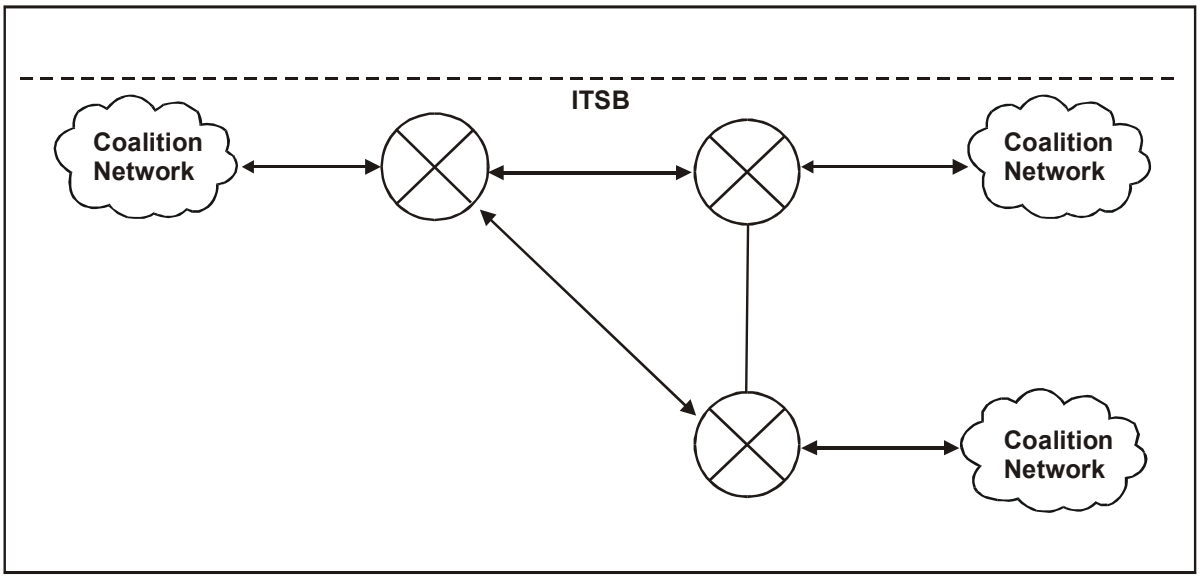


Figure 4-3. Coalition Network Connectivity to the ITSB

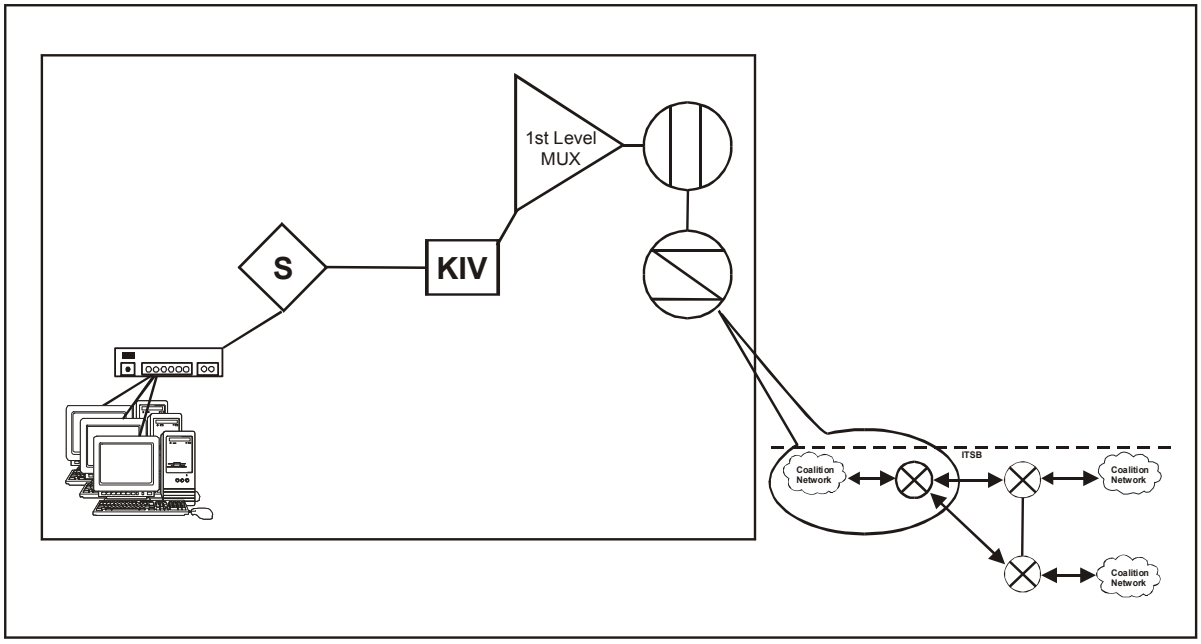


Figure 4-4. Coalition Network Detailed

JWICS

4-21. JWICS is the sensitive, compartmented information portion of the DISN. It incorporates advanced networking technologies that permit point-to-point or multipoint information exchange involving voice, text, graphics, data, and VTC. In the tactical arena, it is a service typically provided at higher echelons (corps and above).

Traditional Voice and Video

4-22. The following paragraphs discuss traditional voice and video employment in a theater of operations.

4-23. **Voice Services**. Switched voice service allows connections between and among garrison and theater locations. The service includes long-haul switched voice, facsimile, and conference calling. The ITSB extends the DSN voice service supporting the warfighter. DSN and the tactical switched voice network provide nonsecure and secure calls to other DSN and tactical subscribers.

4-24. Figure 4-5 depicts an overview of the DSN voice connections established and extended by the ITSB in a deployed location, and Figure 4-6 depicts this in detail.

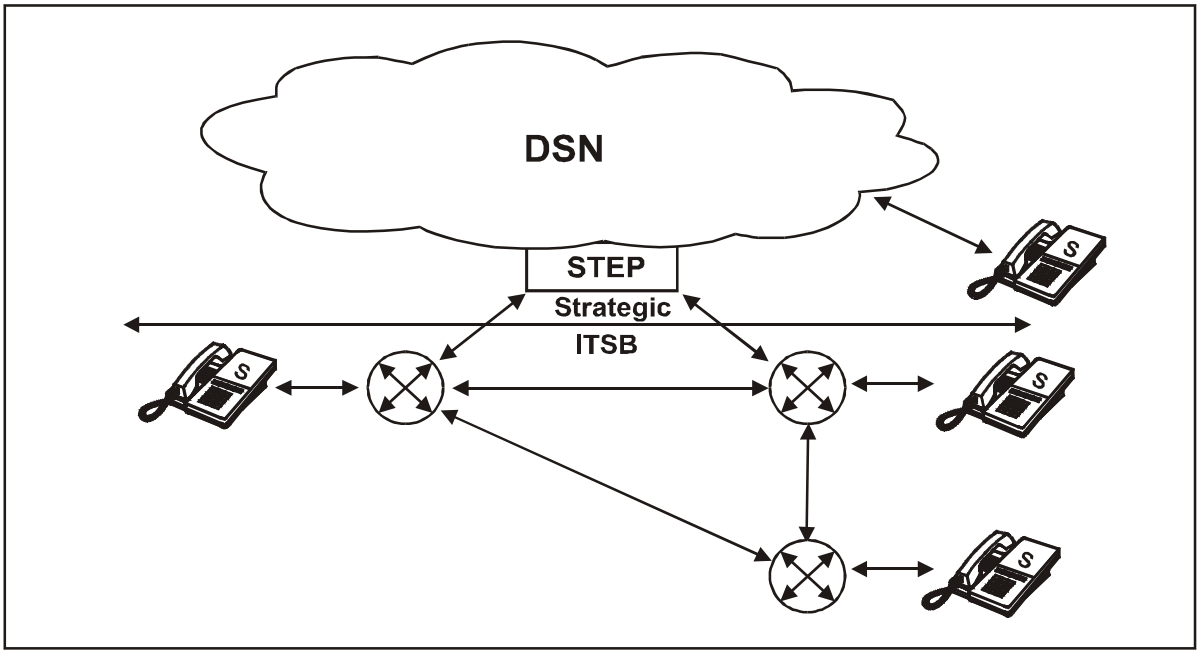


Figure 4-5. DSN Connectivity through the ITSB

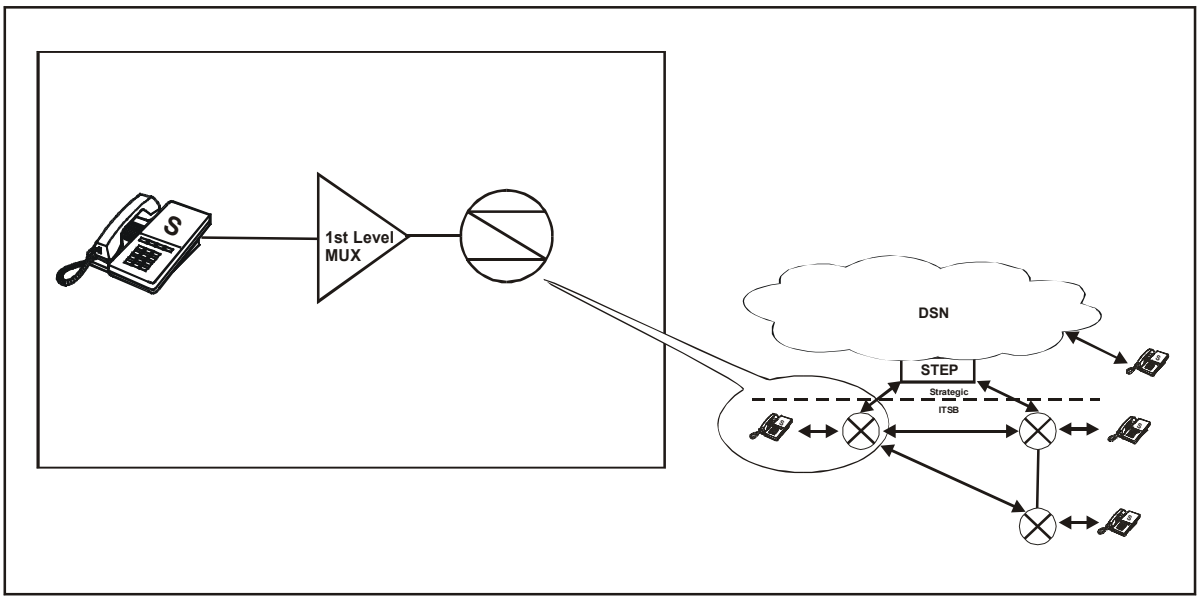


Figure 4-6. DSN Detailed

4-25. **DRSN**. The DRSN is the worldwide secure voice switched network managed by DISA. It provides secure voice C2 switches that offer high-quality secure voice, data, and conferencing capabilities to the senior decision makers and staff of the National Command Authorities, the combatant commander, MACOMs, other government departments and agencies, and allies. The ITSB extends the DRSN voice service supporting the warfighter. Figure 4-7 depicts the DRSN voice connections established by the ITSB, and Figure 4-8 depicts this in detail.

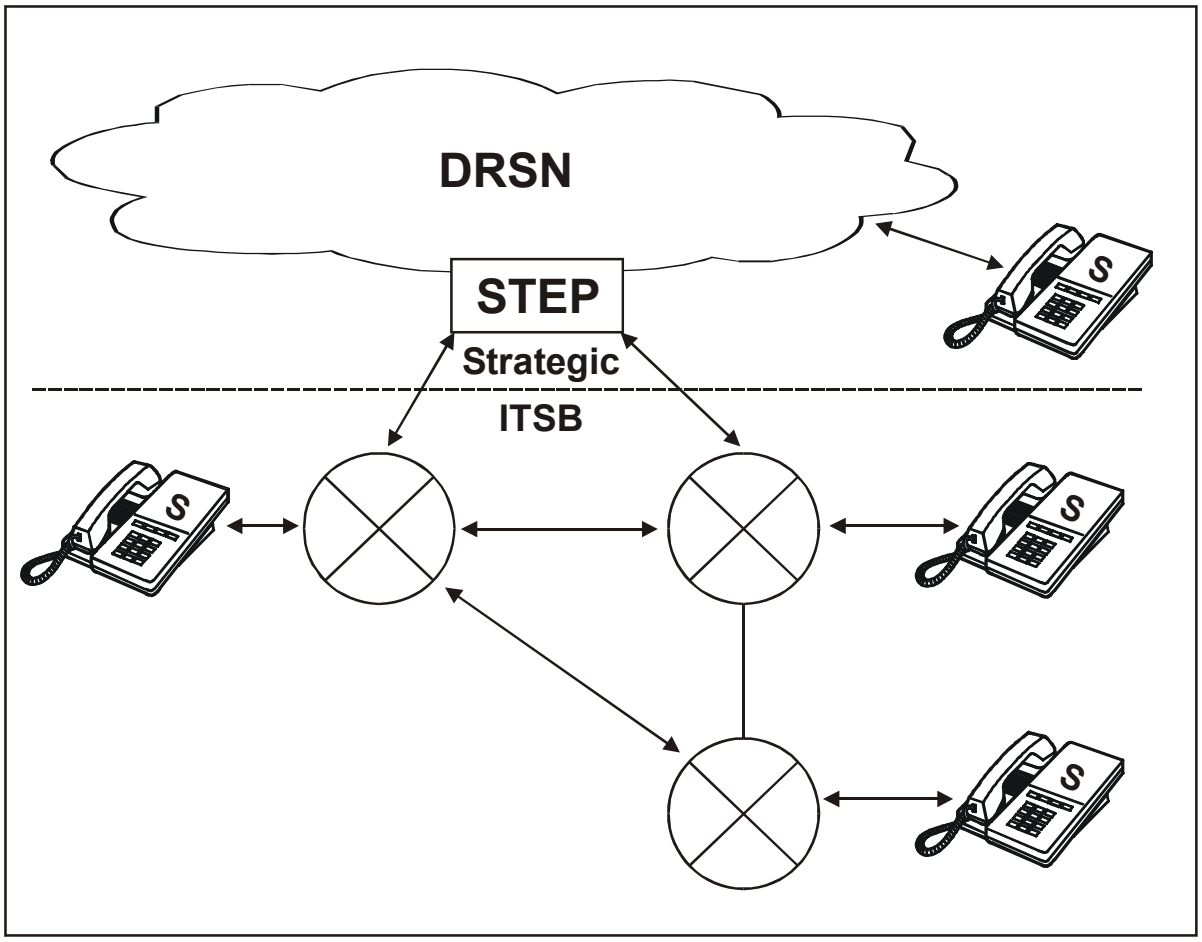


Figure 4-7. DRSN Connectivity through the Integrated Theater Signal Units

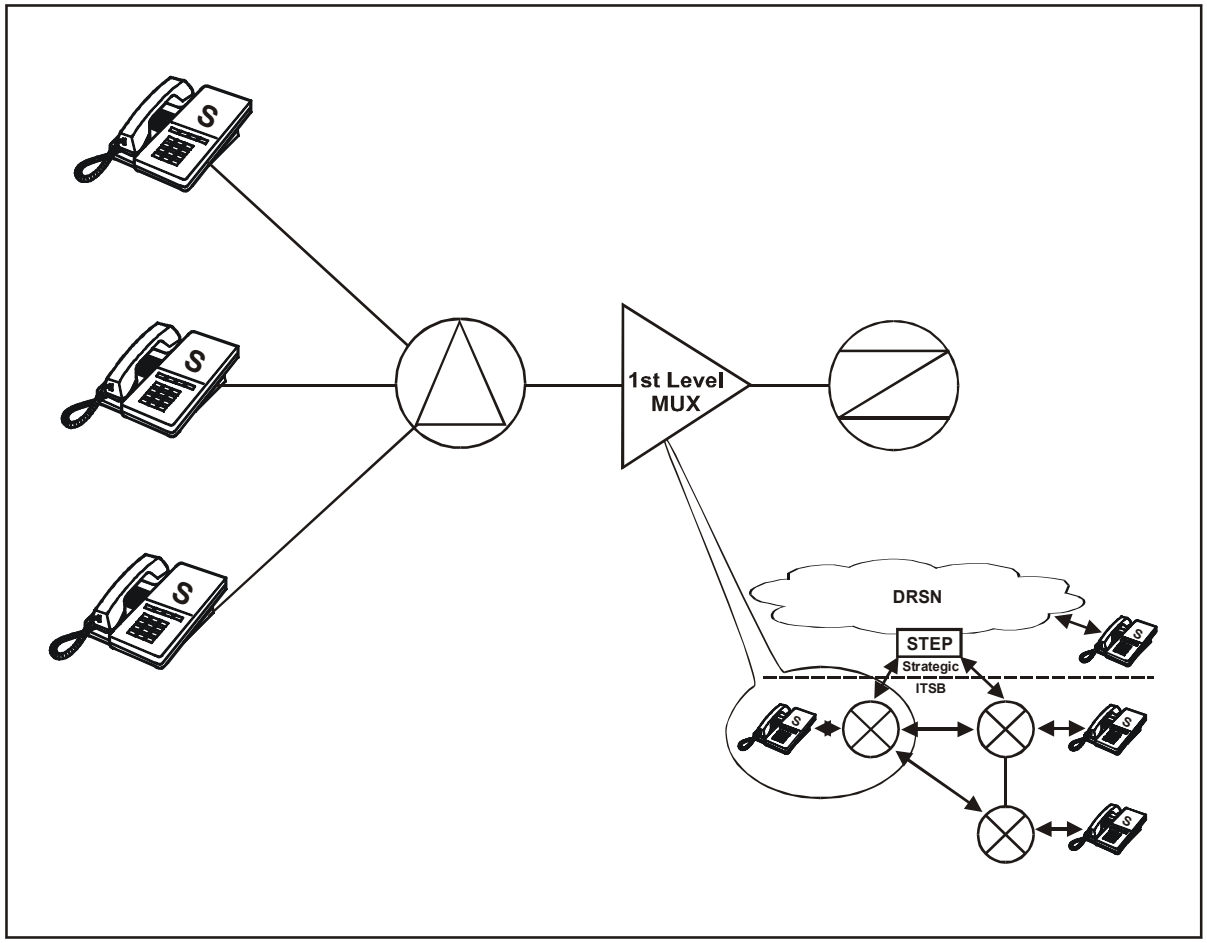


Figure 4-8. DRSN Detailed

4-26. **VTC**. The DISN global video system is a worldwide VTC service supplied by using hubs in CONUS and OCONUS locations. The DISN global video service provides a T1 connection from the video hubs to the STEP. The ITSB provides deployed warfighters with compatible video capability that can access the DISN global video networks.

4-27. The ITSB may also extend these VTC services to corps, as well as from one ITSB supported deployment, such as a JTF headquarters, to another ITSB supported deployment, such as ARFOR, by means of a VTC network within the deployed operational environment.

4-28. Figure 4-9 depicts an overview of the VTC connections established and extended by the ITSB in a deployed location, and Figure 4-10 depicts this in detail.

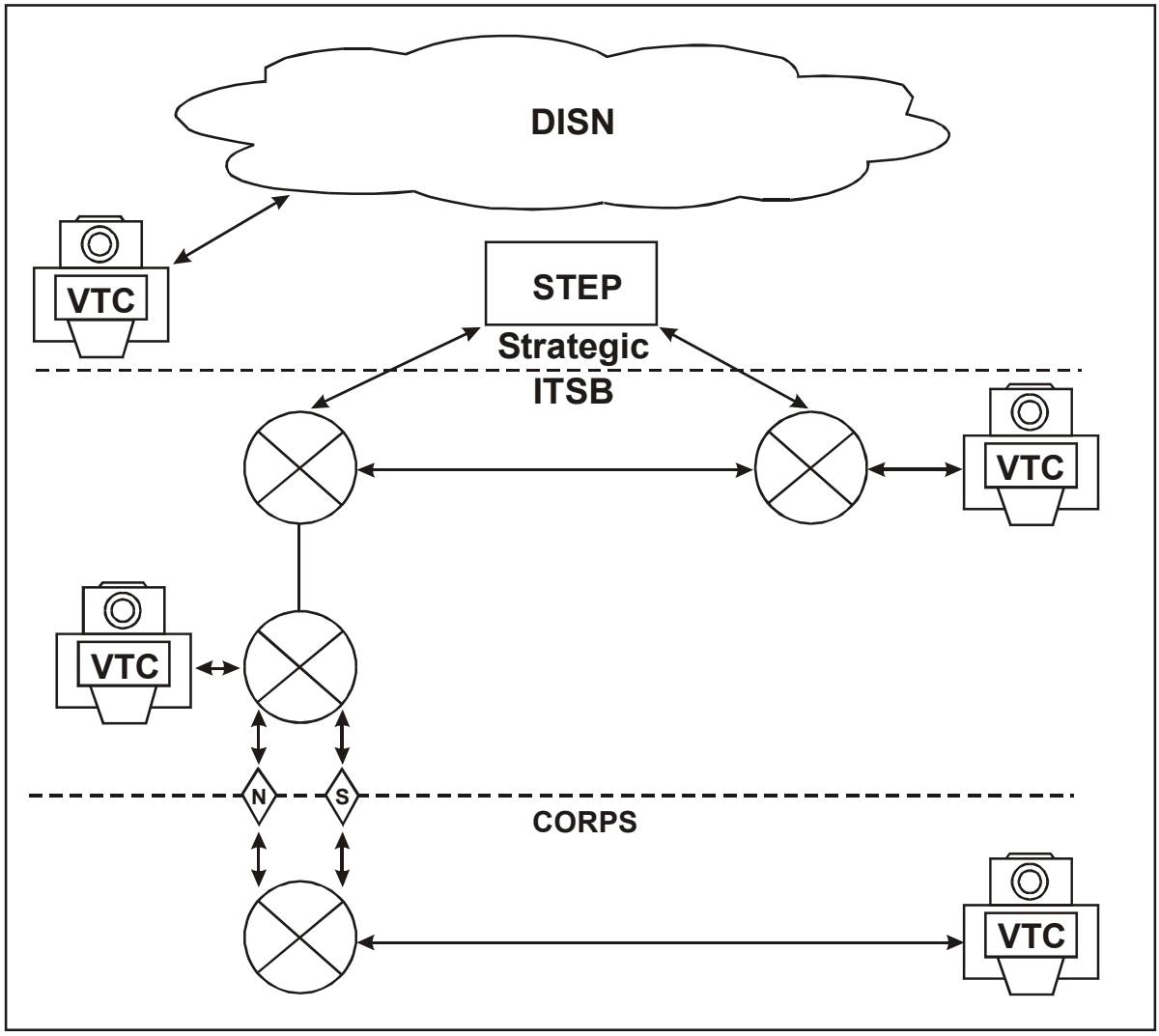


Figure 4-9. VTC Connectivity to Extended by the ITSB

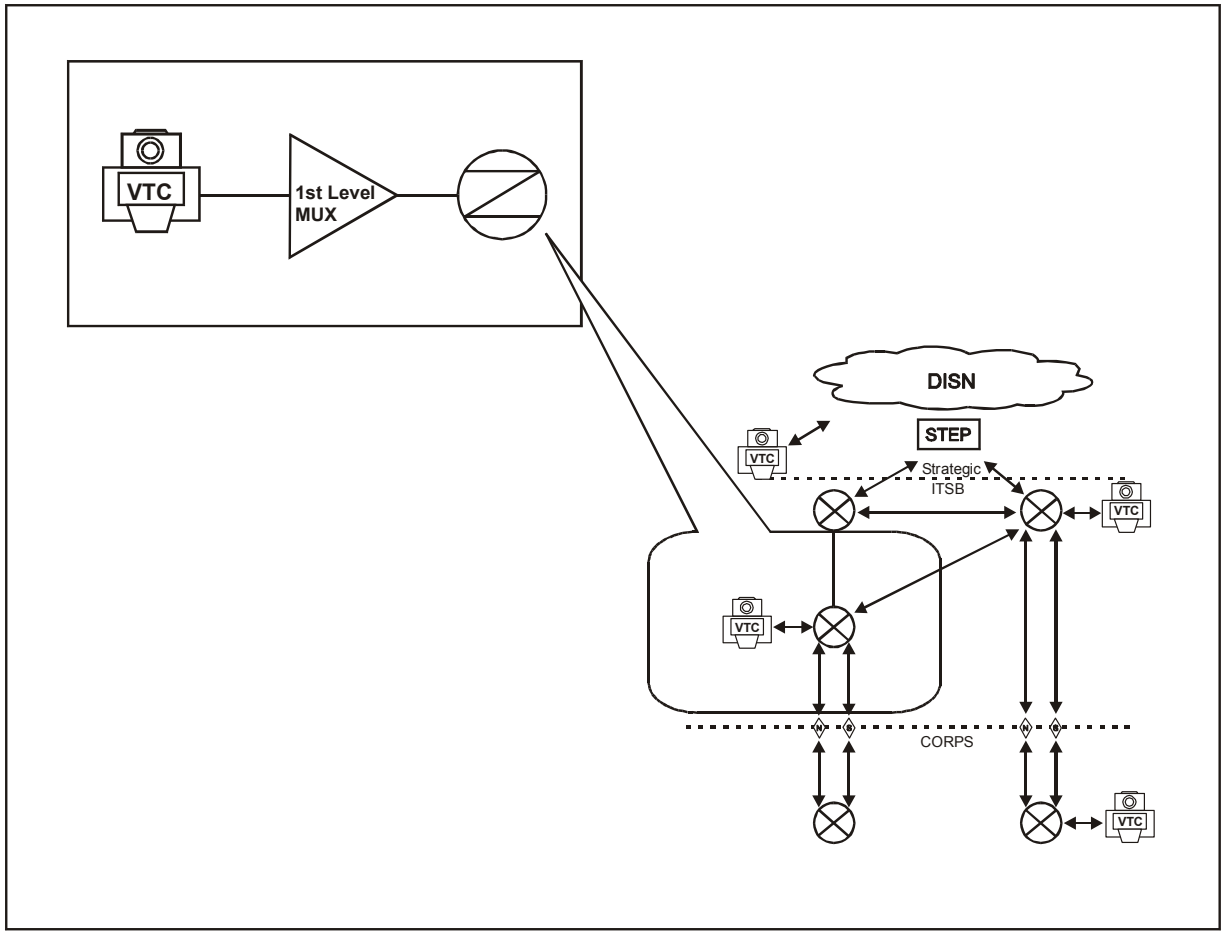


Figure 4-10. VTC Connectivity Detailed

Collaboration Services

4-29. Collaboration services are provided by H.323 and T.120 compliant services. H.323 collaboration services utilize the established theater IP network, and based upon the classification of the collaboration, may traverse the theater NIPRNET, SIPRNET, or coalition network.

GBS

4-30. The GBS is a system of information sources, uplink sites, broadcast satellites, receiver terminals, and management processes for requesting and coordinating the distribution of information products. It is a space based, high data rate communications link for the asymmetric flow of information from the United States or rear echelon locations to deployed forces. The GBS broadcast is capable of multiple levels of security. It is one-way; it only distributes information. Requests for information (user "pull") are made via other communications means.

4-31. The GBS system "pushes" a high volume of intelligence, weather, and other information to widely dispersed, low cost receive terminals, similar to the set-top-box used with the commercial direct broadcast satellite. The GBS capitalizes on the popular commercial direct broadcast satellite television technology to provide critical information to the nation's warfighters. What makes GBS so attractive is the ability to provide high-volume data directly into 18-inch antennas. Mobile force elements are no longer restricted by the requirement for large, fixed antennas to receive information formerly relegated only to command centers.

4-32. By broadcasting directly to selected users and groups of users, the GBS alleviates congestion on other communications networks.

4-33. GBS is an extension of the DISN and a part of the overall DOD MILSATCOM architecture. As such, it employs an open architecture that can accept a variety of input formats. It also exploits COTS technology. It interfaces with and augments other major DOD information systems such as the Global Command and Control System, as well as other theater information management systems. Eventually, GBS may supplant some theater information management systems. Figure 4-11 depicts the GBS broadcast architecture.

4-34. The GBS system consists of the following segments:

- **Broadcast management segment**—integrates, encrypts, and packages multimedia information and provides a bit stream to the primary injection points (PIP) for RF transmission to the satellite. GBS also has the capability to inject products directly from the theater it serves via a mobile facility known as a theater injection point (TIP). TIPs are assigned to theater signal brigades.
- **Space segment**—is a mixture of military and commercial satellites.
- **User receive terminal—**consists of a small satellite antenna, low noise block, and a receiver. It receives and converts the RF downlink signal into a bit stream for receive broadcast management decryption and distribution to end users. The receive broadcast-management subsystem of the user receive terminal includes a computer to store the downloaded information for later retrieval and processing. This computer can be operated as a stand-alone server with local clients, or it may be connected to a LAN and operated as a Web server to disseminate GBS products in that manner.

  NOTE: As of September 2003, the GBS is operational in some theaters but is not fully fielded.

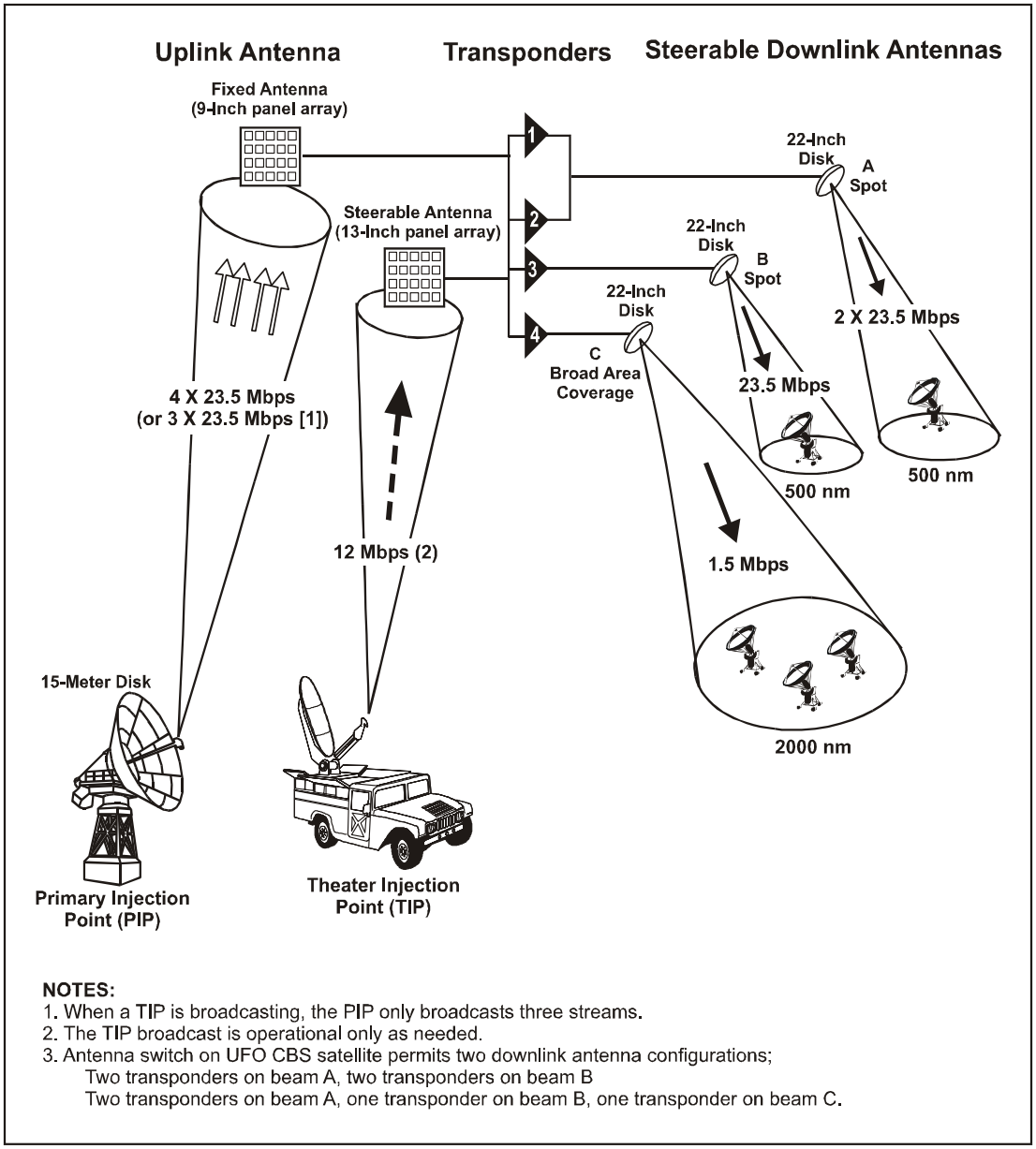


Figure 4-11. GBS Broadcasting Architecture

4-35. **GBS Services.** The following services are provided by the GBS to the end user/customer:

- **File transfer service.** The GBS system supplies a file transfer service for products that require delivery using File Transfer Protocol (FTP). Files are received by the transmit suite (satellite broadcast manager or theater satellite broadcast manager) using FTP and delivered to the receive suite (receive broadcast manager) to the end users using FTP. This service supports both push and pull techniques for file acquisition and distribution.

- **Immediate file delivery**. A GBS system provides the capability to send files through GBS without the latency incurred by the scheduling process.
- **Web service**. The GBS system supplies access to products that are made available using Universal Resource Locator (URL) product references. Selected material will be cached at the receive suite for transparent access by end users.
- **Video/Audio service.** Only one video/audio signal can be received per integrated receive decoder. A specific video program is selected via integrated receive decoder channel selection. Video is displayed on a user-supplied TV or monitor.
- **Black Cell service**. The GBS system supplies Black Cell classified video from a classified source to the satellite broadcast manager/PIP through the satellite to the appropriate receive suite capable of handling classified video.
- **Serial stream service**. The GBS system supplies a serial stream service in which the stream input to the satellite broadcast manager/PIP is replicated bit for bit at the output of the receive suite.
- **IP multicasting service (not yet implemented).** Supports the transfer of IP multicast data that must be tunneled from the source to the transfer suite. The receive broadcast manager forwards multicast streams of interest over the LAN. Multicast-enabled applications, which run on the user's workstation, are used to receive and display the multicast data. The multicast-enabled application must be configured for the specific stream of interest based on information in the program guide.

DMS

4-36. DMS is the Army's portion of the global strategic network with DMS-A extending this service to the tactical end user. It replaces the AUTODIN. The DMS provides a secure writer-to-reader electronic messaging system for organizational users and organizational electronic messaging to the Army.

4-37. The DMS operates in four separate security domains: Unclassified, Secret, Top Secret, and TS/SCI. DMS-A Secret domains are implemented similar to the Unclassified domain, and include their own message handling, directory, certificate, and service management subsystems.

4-38. All security domains implement a separate backbone infrastructure. The majority of DMS strategic users use the Unclassified domain. The majority of DMS-A (tactical) end users use the Secret High domain. The DMS-A Top Secret Collateral tactical users will use dial-up or inline network encryption to the Pentagon Telecommunications Support Center. DMS-A TS/SCI will use battlefield automation systems and tie directly into the Defense Intelligence Agency regional node.

TMS

4-39. The TMS is a group of DMS servers and devices in transit cases that extends the DMS into the tactical environment. The full-up TMS will provide the services of all security domains (Unclassified, Secret, Top Secret, and TS/SCI) to tactical users.

4-40. The TMS is being fielded in three blocks:

- **Block 1—**is the Secret-High service. (As of September 2003, Block 1 is partially fielded.)
- **Block 2—**will field the SBU capability.
- **Block 3—**will field the Top Secret and TS/SCI capabilities.

4-41. All DMS intra/inter traffic in and out of the tactical area of operations is routed through the TMS. Strategic Unclassified DMS messages will traverse through High Assurance Guard to and from the Secret High TMS.

4-42. The TMS extends the DMS services to battlefield automation systems (for example, Army Battle Command System, Global Command and Control System-Army, and Medical Communications for Combat Casualty Care) and existing platforms (that is, government off-the-shelf [GOTS] and COTS software and hardware) that host user agents and subordinate groupware server (SGWS) software. The SGWS is the TMS backbone server that connects the tactical environment to the sustaining-base DMS environment. The TMS will also provide the hub connectivity needed for messaging between tactical operations centers (TOCs). The TMS completes the DMS as a global messaging system, enabling SBU and Secret messaging worldwide from a tactical environment.

4-43. The TMS does not operate on the move. It consists of two TMS suites, per echelon (corps and division). Twenty-three EAC units get a total of 30 TMS suites based on their mission. Each user's SGWS is connected to both TMSs so that the movements of a single TMS do not interrupt service to the users.

IA

4-44. IA includes provisions for protection, detection, and response capabilities. First, the protection capability is composed of devices such as network guards and firewall systems that ensure emission security (EMSEC), communications security (COMSEC), computer security (COMPUSEC), and information security (INFOSEC). Second, the detection capability is the ability to determine abnormalities such as attacks, damages, and unauthorized modifications in the network via intrusion detection systems. Third, the response capability refers to the ability to respond to normal operation restoration as well as respond to a detected entity.

4-45. Theater tactical signal units provide IA services through their NOSCs at the signal battalion through TSC(A) levels. Data teams at each node provide IA services below the signal battalion level.

Wire and Cable Installation

4-46. The cable and wire platoon's and teams —

- Provide cable and wire connectivity between major headquarters and subordinate units.
- Provide cable and wire support from multichannel radio sites to terminating or switching equipment.
- Provide cable and wire connectivity between users, systems, devices, command posts, or switching centers.
- Provide cable and wire connectivity between area signal nodes and theater communications systems as tasked by the NETCOM and required by the ASCC or other major commanders.

NOTE: In this context, cable includes both fiber optic and metallic cable.

ITSB EXTENDING COMMON DISN SERVICES

4-47. By having the means and skill sets to provide the previously mentioned services, the ITSB can deploy into the battlefield or provide support to a JTF or a humanitarian relief effort. The following sections discuss such deployments and how the ITSB functions in that capacity.

JTF

4-48. A JTF is a joint force constituted and so designated by a JTF establishing authority (for example, Secretary of Defense, combatant commander, subordinate unified command, or existing JTF). A JTF may be established on a geographical area or functional basis when the mission has a specific limited objective and does not require overall centralized control of logistics. The mission assigned a JTF should require execution of responsibilities involving a joint force of a significant scale and closely integrated effort, or should require coordination of local defense of a subordinate area. Execution of JTF responsibilities may involve air, land, sea, space, and special operations in any combination, executed unilaterally or in cooperation with friendly nations. US-led JTFs should expect to participate as part of a multinational force in most future military endeavors throughout the range of military operations. A JTF will consist of two or more service components (for example, Army and Air Force). Figure 4-12 is a representation of a typical JTF organization.

4-49. The service component commanders are responsible for all administrative and logistical support for the assigned units. When determined by the JTF commander, functional component commanders may be designated to provide control over military operations. These commanders are normally the service component commanders with the preponderance of assets and the capability to best plan, task, and control the assets given the nature of the operation. For example, the ARFOR is often designated the Joint Forces Land Component Commander (JFLCC) with Marine Forces (MARFOR) assigned, and MARFOR can also be designated as the JFLCC with ARFOR assigned.

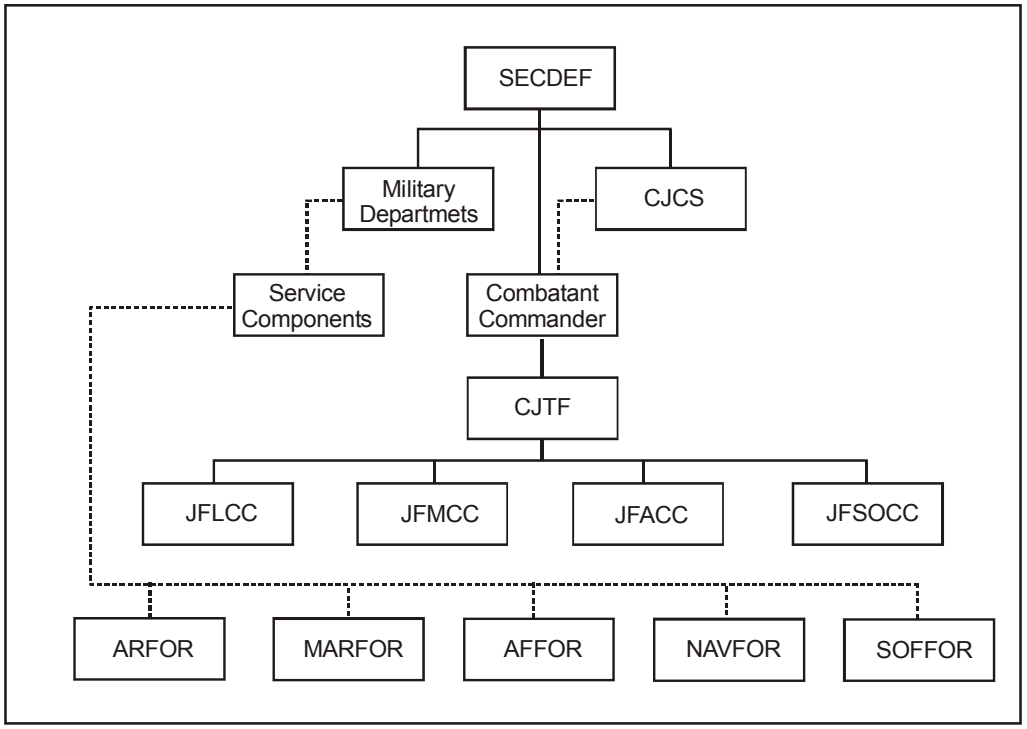


Figure 4-12. Typical JTF Organization

ITSB Theater Tactical Deployment

4-50. The ITSB may be called upon to provide support to a JTF and/or a service component headquarters in times of war or humanitarian relief efforts. In many cases, the ITSB that is available and resourced will provide the key elements to the first responders to the crisis location. Because JTF and service component headquarters are not fixed-size organizations, signal support will be scaled to the requirement based on mission, enemy, terrain, troops, time, and civil consideration (METT-TC). The support may be more or less than what is depicted in the notional diagrams that follow later in this chapter. Further, many support organizations that are not counted as part of a JTF headquarters or a service component headquarters will typically co-locate in the same enclaves with those headquarters elements. These enclave tenants also require signal support and must be taken into consideration by the signal provider.

4-51. ITSB assets are not allocated based purely on the type of headquarters being supported. The primary factors that determine the allocation of ITSB assets are:

- Number of geographically separate enclaves that must be supported and whether those enclaves are within LOS transmission distance of each other.
- Number of telephone and computer subscribers at each enclave.

- The specific services required at each enclave.
- The bandwidth required by each enclave, both for intra- and inter-theater communications.

4-52. The ITSB is organized around nodes. Each node is comprised of telephone switching, a data team, and transmission assets. In some cases, one node may have enough capacity to support several different organizations in one enclave. For larger enclaves, it may be necessary to assign multiple nodes to a single enclave to achieve the required capacity of all the required services. Some enclaves will be large enough to not only require multiple node teams for support, but also require the use of LOS radio to communicate within the enclave.

4-53. ITSB nodes are further categorized as major and extension. Major nodes have larger telephone and data packages and can support larger numbers of customers. They also have larger numbers of transmission systems so that they can serve as hubs in a hub-spoke network configuration. Extension nodes have smaller telephone switches and data packages and support smaller numbers of customers. They also have smaller numbers of associated transmission systems and will typically be used as spoke terminals in a hub-and-spoke network configuration. Extension nodes are not necessarily limited to the role of a spoke terminal, but they are less capable than major nodes in the hub role.

4-54. Chapter 5 provides a detailed description of the ITSB organizational structure and capabilities.

4-55. A typical deployment of ITSB assets may be to support an Army-led JTF as depicted in Figure 4-13.

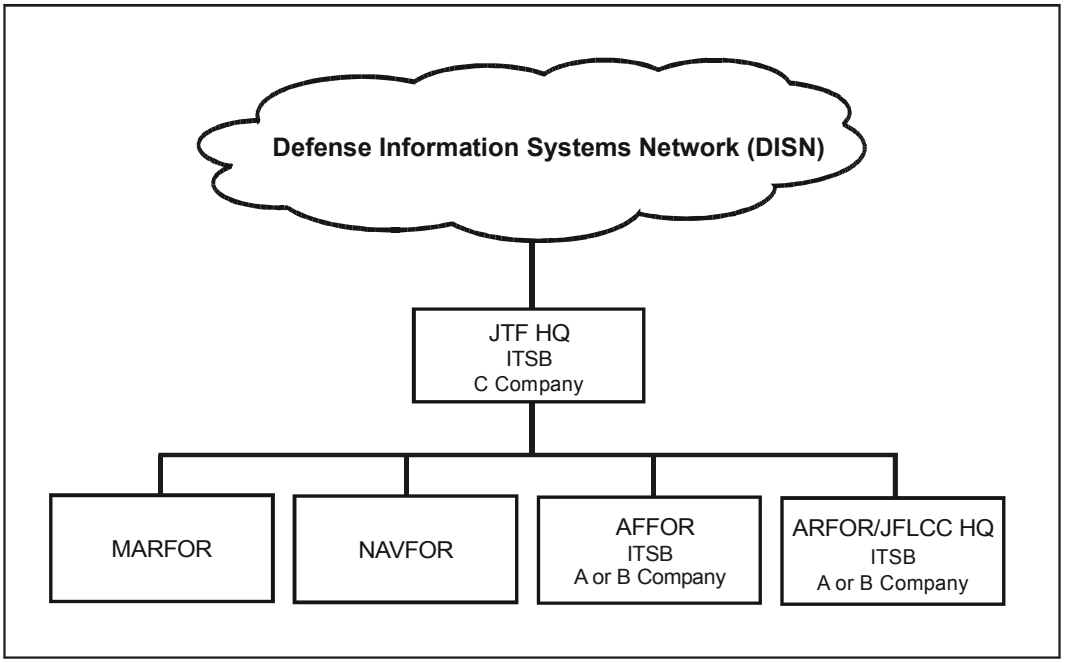


Figure 4-13. Notional ITSB in Support of JTF

4-56. The ITSB may deploy all three companies to support the JTF headquarters, the ARFOR/JFLCC headquarters, and other ARFOR assigned to the JTF. The equipment set of the ITSB is scaleable in that the architecture can be easily expanded without reconfiguring the entire network. Spokes can be added to the satellite systems, links added to the data systems, and additional voice switching capabilities may be added without interrupting existing service to users.

JTF Headquarters Support

4-57. This notional architecture depicts C Company of an ITSB in support of the JTF headquarters.

4-58. The ITSB may be called upon to provide support to a JTF headquarters in times of war or humanitarian relief efforts. In many cases, the ITSB that is currently in theater will provide the key elements to the deployed location.

4-59. The ITSB provides support to the JTF headquarters using its organic assets to:

- Extend DISN services from a STEP/Teleport site to the JTF.
- Provide connectivity from the JTF headquarters to service component headquarters:
  - ARFOR/JFLCC headquarters.
  - Air Force Forces (AFFOR)/Joint Forces Air Component Commander headquarters.
  - Naval Forces (NAVFOR)/Joint Forces Maritime Component Commander headquarters.
  - MARFOR headquarters/JFLCC headquarters.
  - Special Operations Forces (SOFFOR)/Joint Force Special Operations Component Commander/Joint Special Operations Task Force headquarters.
- Extend services as required to LNOs at coalition headquarters.
- Extend services as required to remote users.

4-60. Key points are:

- When available and operationally feasible, the JTF will access DISN services using existing theater infrastructure, DISN POP, commercial assets, and a STEP/Teleport.
- Not depicted but an important aspect of the JTF architecture are links between the component headquarters to provide intra-theater routing and redundancy. It is assumed that each component command also has connectivity to at least one STEP/Teleport as well as possible connectivity to existing theater and commercial assets.

4-61. Figure 4-14 depicts the ITSB using C Company to support a JTF.

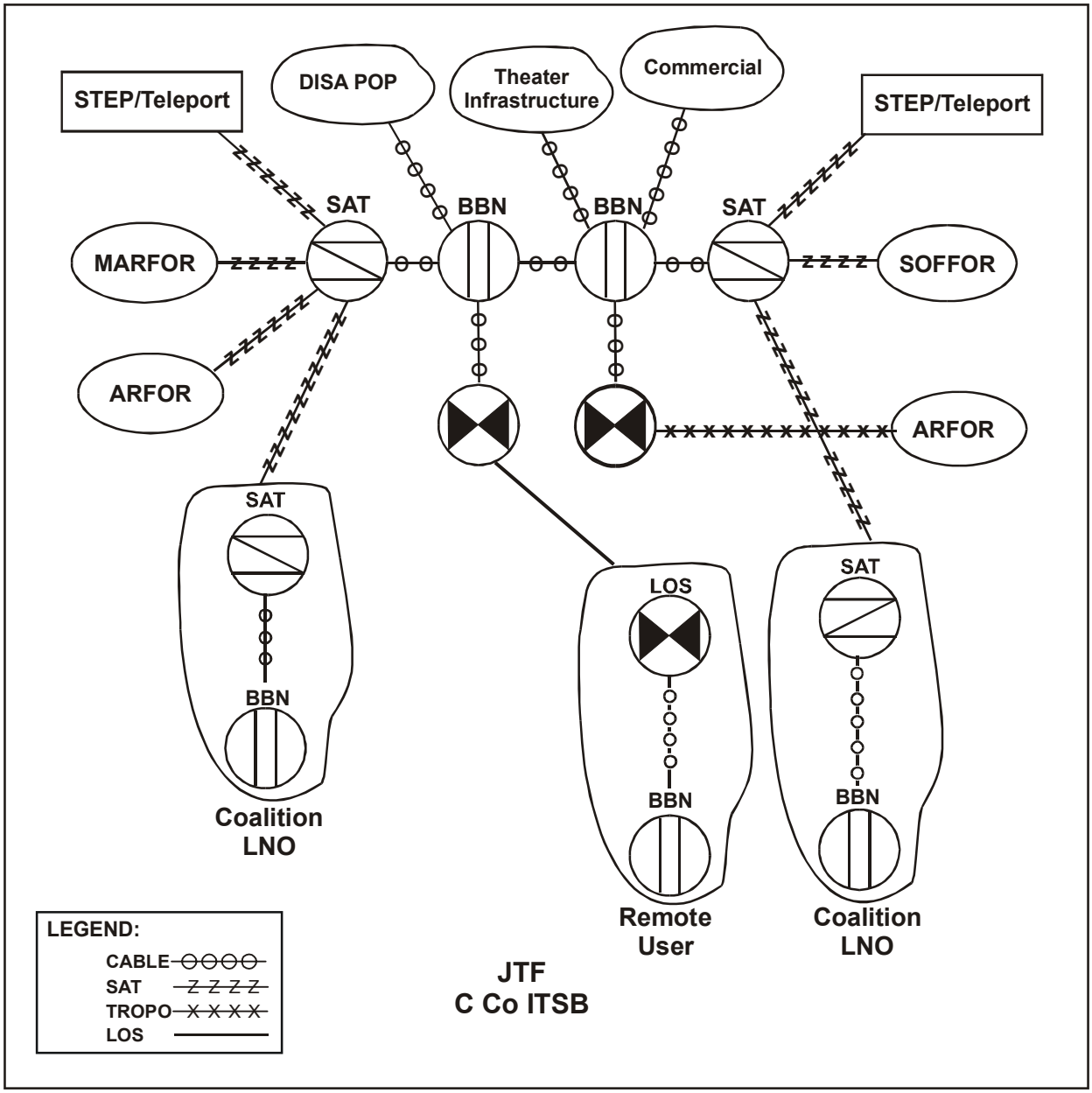


Figure 4-14. Notional ITSB Support to JTF Headquarters

ARFOR/JFLCC Headquarters Support

4-62. This notional architecture depicts A Company of an ITSB in support of the ARFOR/JFLCC headquarters.

4-63. The ITSB may be called upon to provide support to an ARFOR/JFLCC headquarters in times of war or humanitarian relief efforts. In many cases, the ITSB that is currently in theater will provide the key elements to deployed location.

4-64. The ITSB can provide support to a deployed ARFOR/JFLCC headquarters using its organic assets to:

- Extend DISN services from a STEP/Teleport site to the ARFOR/JFLCC headquarters.
- Provide access to commercial communications when available.
- Terminate connectivity from the JTF headquarters.
- Provide connectivity and extend services to:
  - ARFOR/JFLCC forward headquarters.
  - Division headquarters.
  - Air, sea, and rail ports of debarkation.

4-65. Key points are:

- Connectivity from the ARFOR/JFLCC headquarters to the subordinate Army unit is achieved by the ITSB, providing both ends of the link supporting the higher to lower Army signal doctrine.
- When available and practical, the ARFOR/JFLCC will access DISN services using existing theater infrastructure, commercial assets, and the STEP/Teleport.
- The ARFOR/JFLCC will also install links to other component headquarters where practical and possible and/or directed by the commander, JTF.

4-66. Figure 4-15 depicts notional architecture of A or B Company supporting an ARFOR/JFLCC.

Support to Deployed ARFOR

4-67. For purposes of illustration, this notional architecture depicts B Company of an ITSB in support of a division headquarters.

4-68. While a division headquarters nominally receives its primary signal support from its organic signal battalion and from signal battalion(s) of the corps above it, the ITSB may be called upon to provide support to a division headquarters because of technical capabilities not present in corps and division signal units, or because of the overall task organization of the forces in theater.

4-69. The ITSB can provide support to a deployed division headquarters using its organic assets to:

- Extend DISN services from a STEP/Teleport site to the division headquarters.
- Provide access to commercial communications when available.
- Terminate connectivity from the ARFOR/JFLCC headquarters.
- Provide connectivity and extend services to:
  - ARFOR/JFLCC forward headquarters.
  - Brigade task force.
  - Division headquarters.
  - Division rear.

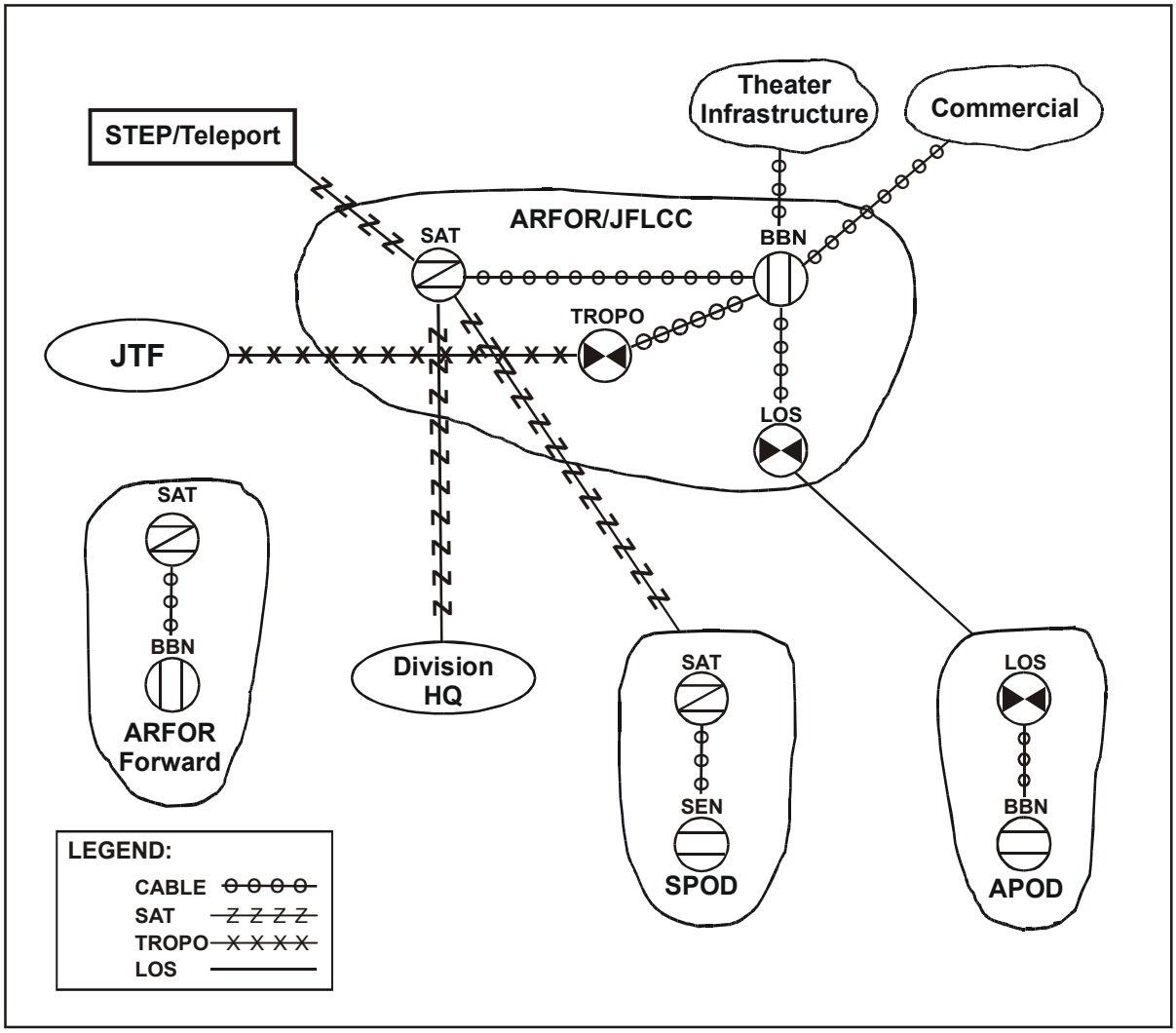


Figure 4-15. Notional ITSB Support to ARFOR/JFLCC

4-70. Key points are:

- When available and practical, the ARFOR/JFLCC will access DISN services using existing theater infrastructure, commercial assets, and the STEP/Teleport.
- The division headquarters will also install links to the supported brigades, additional division command posts (for example, division rear and division tactical command), and other locations as directed by the division commander.

4-71. Figure 4-16 depicts a notional architecture of an A or B Company supporting a division.

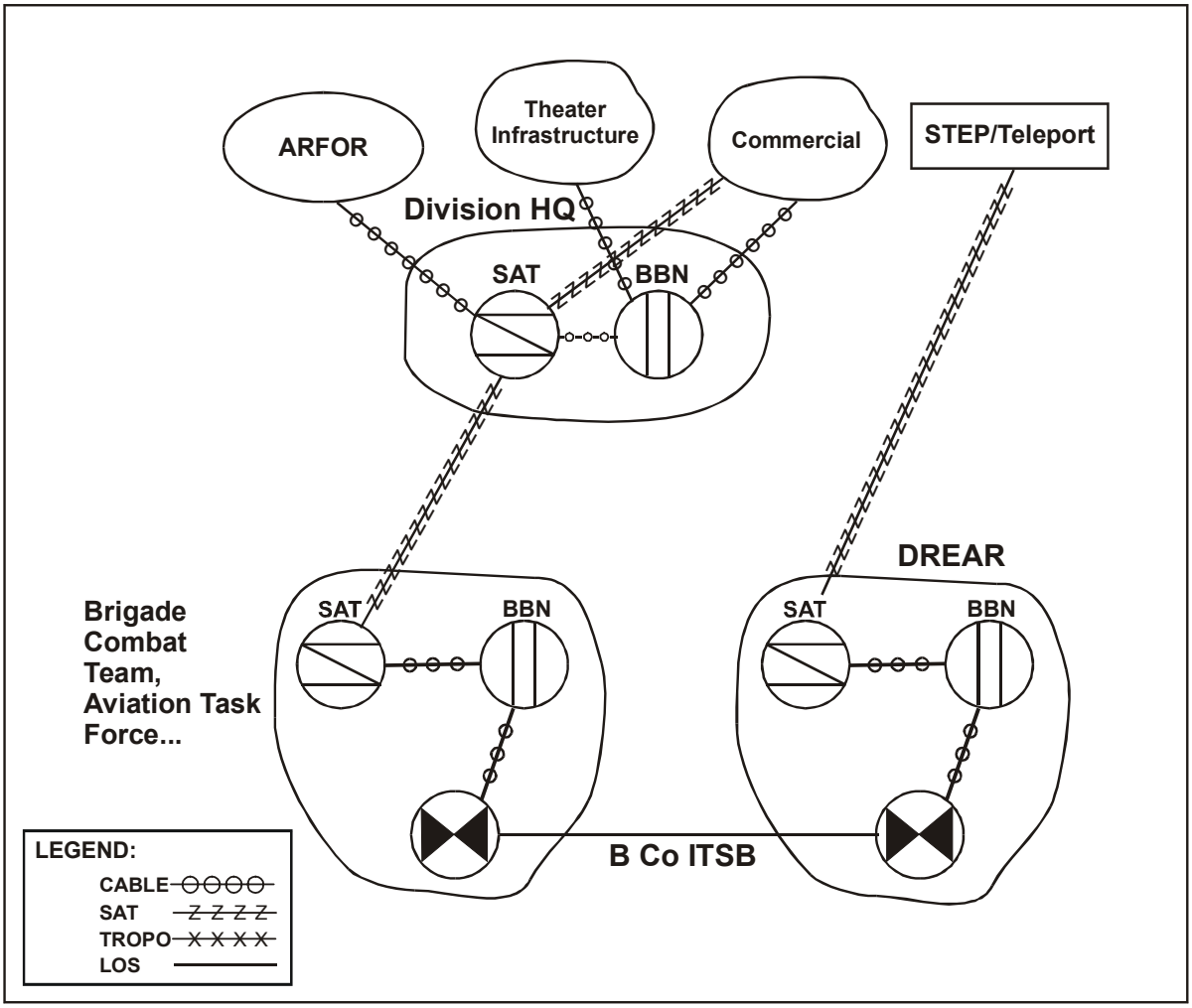


Figure 4-16. Notional ITSB Support to a Division

ITSB Support to Army Service Component Command (ASCC)

4-72. The ASCC receives, equips, marshals, stages, and moves units forward to the tactical assembly areas for employment. The ITSB has the capability to provide the rapid deployment and initial worldwide communications capability to the liaison teams and advanced elements of the ASCC headquarters. Follow-on communications will be engineered, installed, operated, and maintained by the ITSB, which provides the internal and external wire communications support, terrestrial multichannel and SATCOM facilities, COMSEC, and electronic maintenance, and is responsible for information management within the headquarters.

4-73. To support the force-projection Army, operational-level information services mesh seamlessly with those of the sustaining base, which may be located within CONUS or another theater. The ITSB internally has the assets to connect to the DSCS, commercial SATCOM, HF radios, or commercial fiber optic links for both connectivity and reach-back capability allowing for split-based operations.

4-74. The ITSB provides the support to the ASCC using its organic assets to:

- Provide access to the commercial and host nation infrastructure, when available.
- Terminate the connectivity from the JTF/JFLCC headquarters.
- Extend DISN service from a STEP/Teleport to the ASCC headquarters.
- Provide connectivity from the ASCC main, rear, logistics support activity, and home stations node.
- Provide connectivity with joint, allied, and coalitions forces.

4-75. The net effect of the ITSB is to allow forces to deploy worldwide without sacrificing their ability to exchange secure and reliable information in theater and with CONUS-based information resources.

4-76. Figure 4-17 depicts a notional architecture of A or B Company supporting an ASCC.

Support to SSC Operations

4-77. **Noncombatant Evacuation Operation [NEO])**. The ITSB may be called upon to provide support to NEO operations in times of war or humanitarian relief efforts.

4-78. The ITSB can provide support to deployed NEO operations using its organic assets to:

- Extend DISN services from a STEP/Teleport site to the NEO task force headquarters.
- Provide access to commercial communications when available.
- Provide connectivity and extend services to:
  - Local embassy.
  - Air, sea, and rail ports of embarkation.
  - Other remote users as dictated by the task force commander.

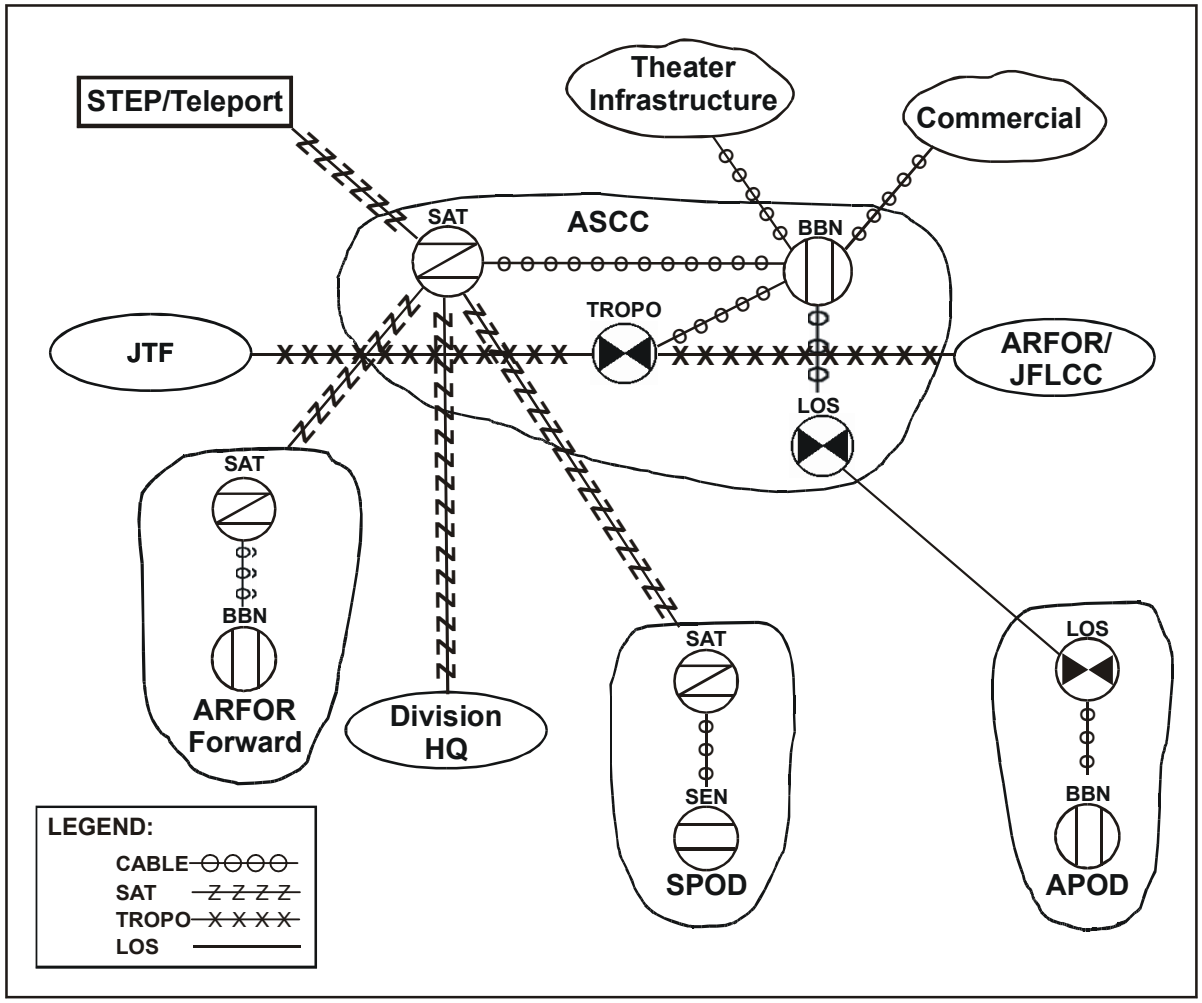


Figure 4-17. Notional ITSB Support to an ASCC

4-79. Key points are: NEO operations are characterized by a relatively small in-theater footprint. The overarching requirement is to provide inter-theater connectivity, allowing the NEO task force to communicate effectively back to the supported combatant command headquarters.

4-80. Figure 4-18 depicts a notional architecture of an ITSB company supporting NEO operations.

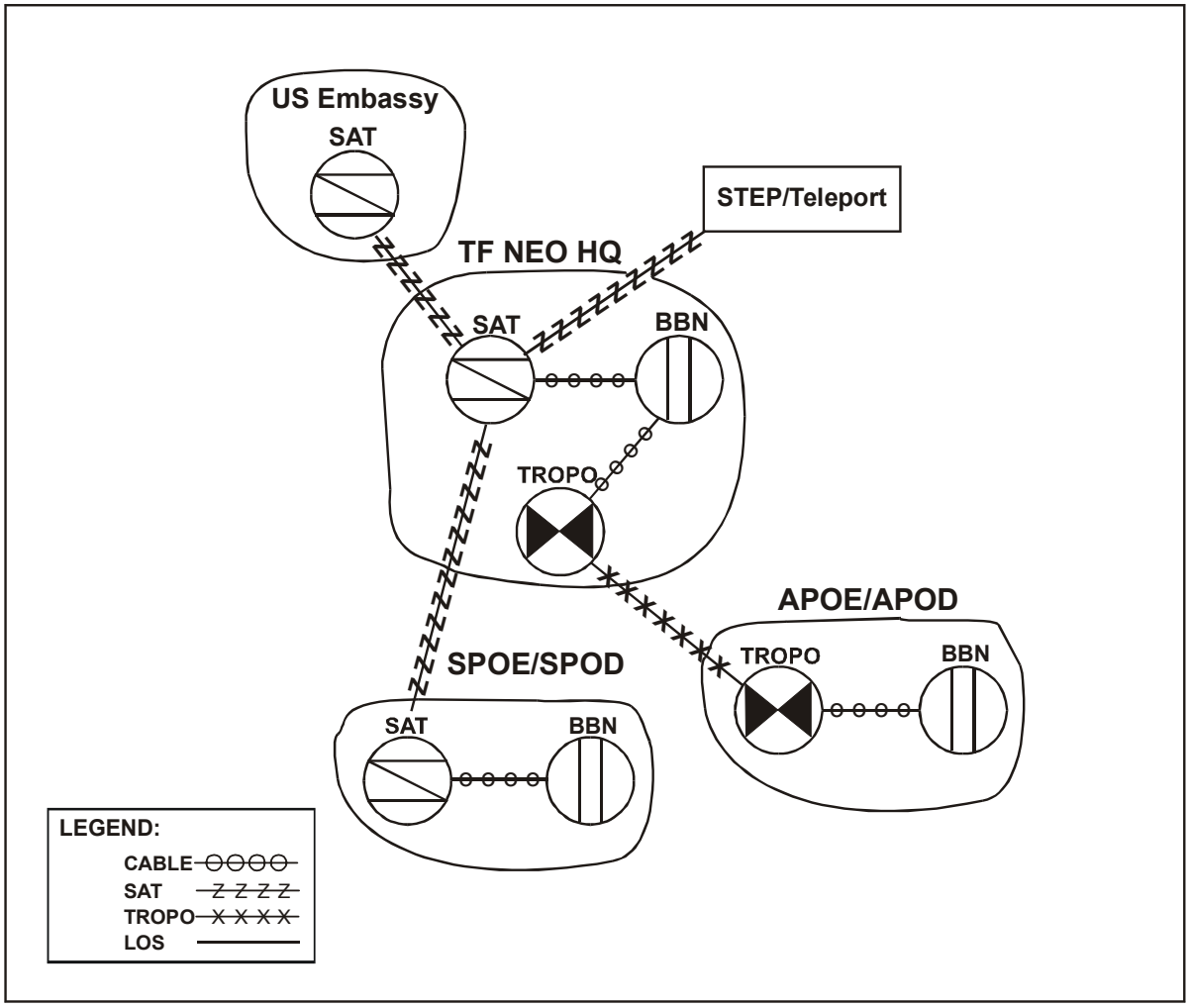


Figure 4-18. Notional ITSB Support to a NEO

4-81. **Homeland Security**. The ITSB may be called upon to provide support to the Homeland Security mission in the case of a terrorist attack in the United States. In many cases, the National Guard will be a key element of the first responders to the crisis location. National Guard ITSBs may be ordered onto active duty by the governor of their state in his role as Commander in Chief (CINC) of the state's National Guard to provide area communications first responder support, including restoration of communications for federal, state, and municipal authorities to use in crisis coordination.

4-82. The ITSB can support the first responders using its organic assets to extend services to the crisis response command post location by—

- Extending DISN services from a STEP/Teleport.
- Extending DISN services in coordination with the local DOIM from a post, camp, or station.

- Extending services by accessing commercial networks.
- Providing connectivity and extending services to the crisis/incident location and other remote users as directed.

4-83. Key points are: Critical to this support is the ability to interface with local, state, and federal agencies.

4-84. Figure 4-19 depicts an ITSB company supporting a Homeland Security crisis response mission.

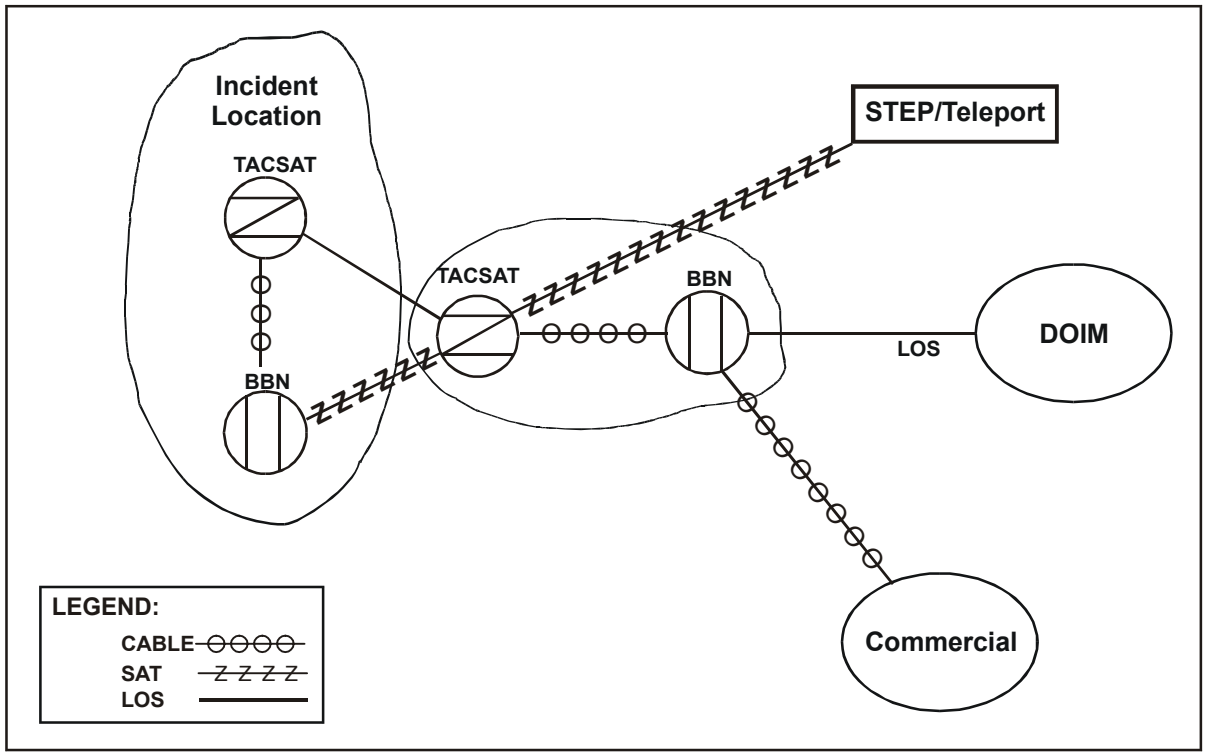


Figure 4-19. Notional ITSB Support to Homeland Security

COMMERCIALIZATION OF SIGNAL ASSETS

4-85. Historically, theater signal planners have leveraged transitioning to commercial networks and infrastructure in order to free up valuable tactical signal assets. Operation Desert Shield/Storm, Bosnia, Kosovo, and conflicts as recent as Afghanistan are examples of a tactical theater level communications element installing the initial communications infrastructure and transitioning that capability to a commercial provider.

4-86. Figures 4-20 and 4-21 depict a tactical network before and after commercialization respectively.

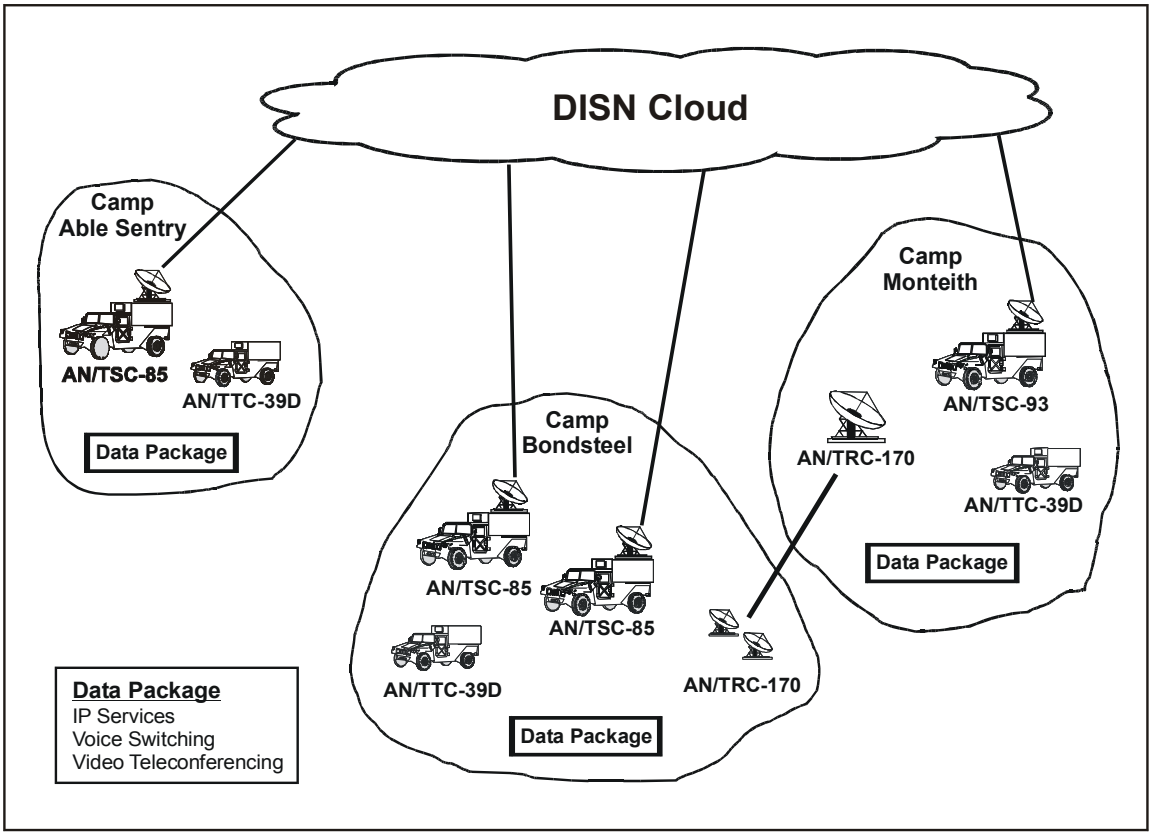


Figure 4-20. Before Commercialization

4-87. The ITSB should begin planning to transition the communications network to commercial means as soon as the operational scenario permits. Transitioning a communications network to another provider while ensuring interruption of services to the user is minimized is a complicated and precise process. Planning factors include:

- Commercial leased satellite.
- Other available commercial infrastructures.
- SIPRNET, NIPRNET, and routing schemes.
- IP addressing.
- Phone books and numbering schemes.
- VTC equipment and control mechanisms.
- DISN and commercial access.
- Wiring and cable plans.
- Cellular and satellite telephone capabilities.
- Wireless LAN and point-to-point services.

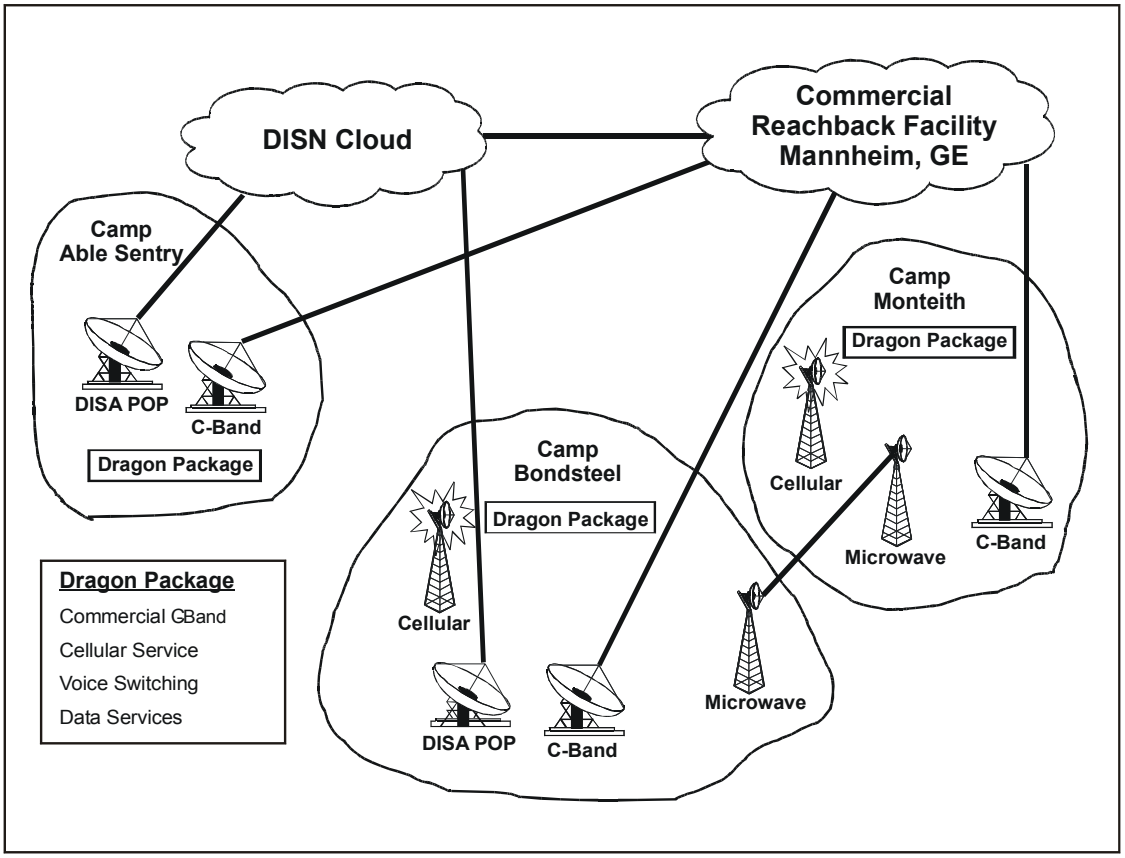


Figure 4-21. After Commercialization

4-88. Key points are:

- Coordination with the TSC(A) is important in maintaining visibility on the status of contractual negotiations and ensuring requirements are adequately identified and fed into the contract documents. Some of the TSC(A)s are Army Reserve units. This underscores the importance of dedicated training and coordination between the Reserve and Active Components to ensure seamless transition from a peacetime to wartime footing.
- Commercialization can be a long lead-time process. Consequently, it should be factored into the initial planning process. In fact, whenever possible, contracts for commercial services should be prenegotiated and coordinated well ahead of any potential deployment scenario.
- Standardization of a tactical signal infrastructure on COTS products facilitates the transition of services to commercial providers.

NETWORK STANDARDIZATION

4-89. Network configurations implemented by non-ITSB organizations are essentially the same as those implemented by ITSB organizations. The major operational difference is that non-ITSB organizations typically require significantly more task organization to achieve the desired network configuration.

4-90. Data packages in current organizations are not standard throughout the force because they were procured and assembled locally at different times under different circumstances in response to urgent operational requirements. The doctrinal solution to this lack of standardization is the accelerated centralized development and acquisition of standard hardware in conjunction with the change to the ITSB organizational structure. When missions must be executed with nonstandard data packages, detailed liaison between planners and the executing organizations is required to resolve potential compatibility problems. Appendix D provides an overview of some of the equipment deployed in the current force architecture.

4-91. Appendix E provides an illustration of a typical TRI-TAC DGM equipment employment.

RAPID DEPLOYMENT CONTINGENCY COMMUNICATIONS PACKAGES

4-92. Combatant commanders often require their supporting theater signal forces to define and maintain packages of equipment and personnel to support rapid insertion of forces into a theater. For the purpose of this manual, these are referred to as contingency communications packages. The content of deployed contingency packages will be determined on a case-by-case basis by METT-TC. The communications packages discussed below provide a standardized starting point for planners who are tasked with providing such packages. A key feature of this predefined baseline is that it relates services and number of supported subscribers to required airlift.

4-93. The communications packages illustrated for ITSB will be equipped with Army standard equipment fully supported by standard Army logistics practices. The communications packages illustrated for non-ITSB organizations are notional starting points for planning. Historically, non-ITSB organizations have developed the data package portions of their contingency communications packages locally, outside formal Army systems acquisition channels. Such packages are not standardized from organization to organization. When tasking non-ITSB organizations to provide contingency communications packages, planners should contact the providing organizations to learn the actual equipment configurations available.

4-94. Organizations needing to create or upgrade data packages prior to the fielding of Army type classified standard solutions should contact NETCOM/9th ASC G3. NETCOM/9th ASC G3 will provide assistance in equipment selection to obtain the maximum degree of standardization and interoperability among units and theaters that can be achieved under the circumstances.

4-95. The technical capabilities provided by communications packages from non-ITSB organizations are very similar to those provided by ITSB

organizations. The main operational difference is that communications packages provided by ITSBs typically come from a single platoon, or at worst, a single company. These individuals have lived together, trained together, worked together, and fought together under the same leadership. Such teams have greater cohesiveness than ad-hoc teams. Parent unit support to the deployed team has the advantage of coming from a single parent unit. In contrast, contingency packages assembled from non-ITSB organizations are likely to have elements from several different companies, battalions, and/or commands. Unit cohesiveness may not be as great. Parent unit support is less efficient when it comes from multiple parent units.

ITSB SMALL CONTINGENCY COMMUNICATIONS PACKAGE

4-96. The mission of the ITSB small contingency communications package is to provide an initial entry theater-strategic link in support of forward deployed contingency headquarters (for example, JTF or ARFOR) with follow-on support of forward tactical headquarters (for example, division rear and division tactical command). Figure 4-22 provides an example of a small contingency communications package. Table 4-1 identifies the services, capabilities, and transportability requirements of a small contingency communications package.

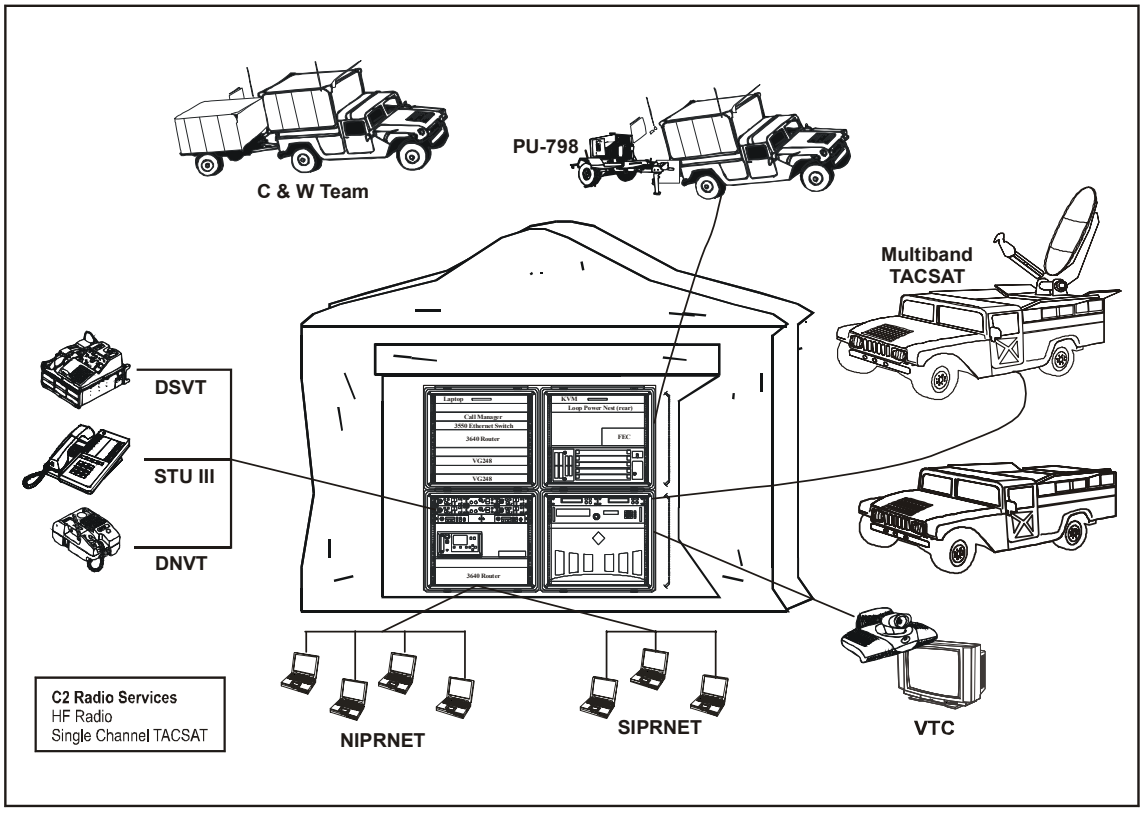


Figure 4-22. ITSB Small Contingency Communications Package

Table 4-1. ITSB Small Contingency Communications Package Example

Service	Qty/Criterion	Major Element/Component	Equipment	Crew
Voice (256 KB)		OIC OR NCOIC	N/A	1
DSN	96 subscribers plus 8 long locals	Multiband TACSAT (for example, Phoenix)	1xECV w/system 1xECV w/generator	4
DRSN	Available	BBN-early entry pkg	Data pkg in four transit cases: 1xHMMWV – cargo 1xPU-798 (10kw) trailer	3
VTC (256 KB)	1 Suite			
SIPRNET	50 subscribers			
NIPRNET	50 subscribers	Cable and Wire Team	1xHMMWV – cargo (wire and phones) 1xHMT cargo trailer (cable and wire)	3
JWICS	0 subscribers			
C-LAN/C-WAN	No	Maintenance Team	N/A	1
IA/Network Management	Yes		**Total Personnel**	12
Bandwidth	Up to 8 Mbps		**Total Equipment**: HMMWV Trailers (cargo and generator)	**Qty:** 4 2
Deploys (earliest)	N+18 hrs		**Transportation**: C130 C5 C17	**Sorties:** 7 1 2
IOM (99% of subscribers connected)	Arrival + 24 hrs			

Remarks

Up to three small contingency packages can be task organized within each ITSB.

When it is critical to minimize air transport requirements, the base band node (BBN) – early entry data package components can be shipped on a pallet, and one HMMWV and one generator can be transported later. In this configuration, the team is only 75 percent self-sufficient for ground transport and will be reliant on the supported unit for data package power.

Aircraft numbers required are estimates and include pallets for two personal bags per soldier. Food is not included.

Deployment times as required by supported combatant commander. Level of alert/standby to support times shorter than N+72 hours severely impacts training.

Bandwidths allocated to various services are for illustration only. Allocation in the field will be by METT-TC.

Total bandwidth available depends on the combination of ancillary equipment installed in the SATCOM terminal and on availability of bandwidth from the space segment (the bird); up to 8 Mbps can be achieved.

Switch capacity is listed; unit usually deploys with only a fraction of that number of phones.

ITSB MEDIUM CONTINGENCY COMMUNICATIONS PACKAGE

4-97. The mission of the ITSB medium contingency communications package is to provide an initial entry theater-strategic link in support of forward deployed contingency headquarters (for example, JTF or ARFOR) with follow-on support of forward tactical headquarters (for example, division rear and division tactical command). Figure 4-23 provides an example of a medium contingency communications package. Table 4-2 identifies the services, capabilities, and transportability requirements of a medium contingency communications package.

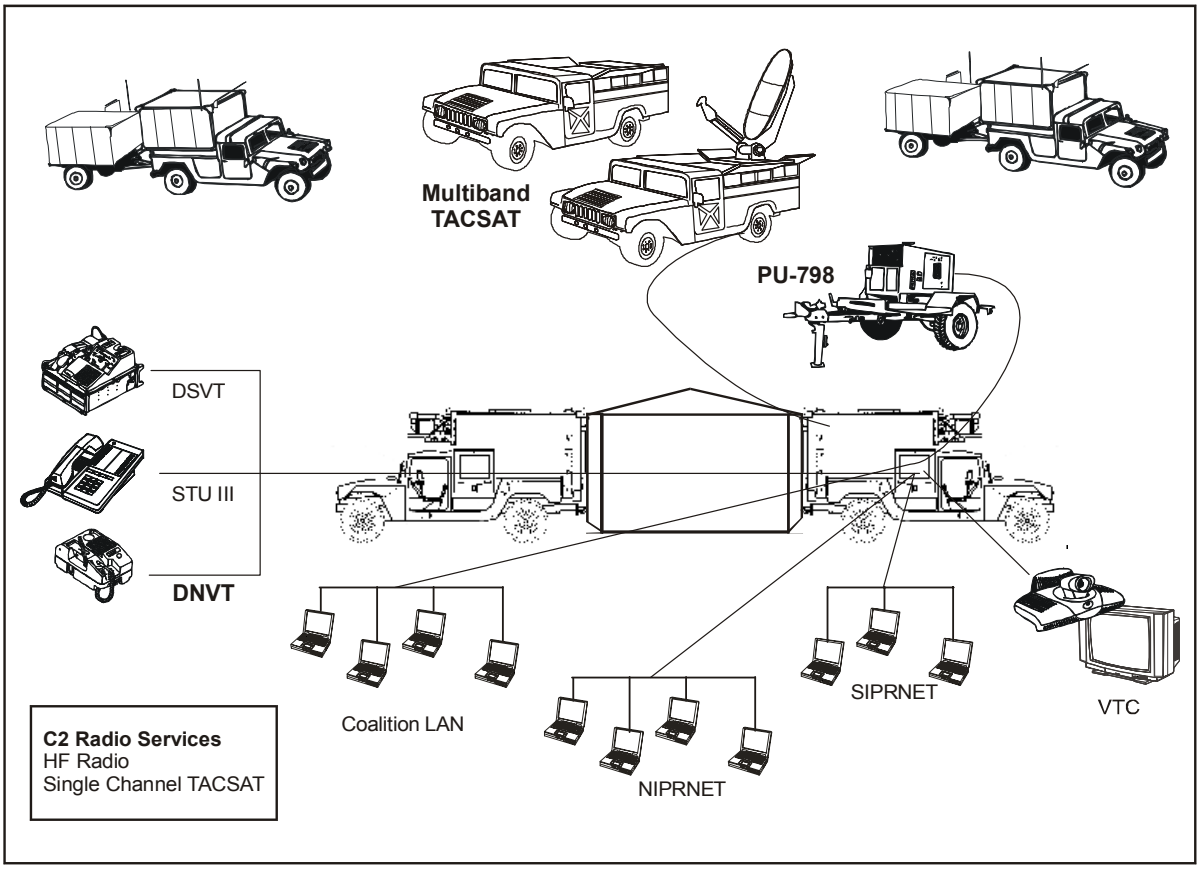


Figure 4-23. ITSB Medium Contingency Communications Package

Table 4-2. ITSB Medium Contingency Communications Package

Service	Qty/Criterion	Major Element/Component	Equipment	Crew
Voice		OIC or NCOIC	N/A	1
DSN	96 analog subscribers 60 tactical subscribers	Multiband TACSAT (for example, Phoenix)	1xECV w/system 1xECV w/generator	4
DRSN	Dedicated interface	BBN-Shelterized	1xECV w/system 1xECV w/TSM-210	5
VOIP	Up to 1000 subscribers		1xHMMWV – cargo	
VTC (384 K)	1 Suite		1xPU-798 (10kw) trailer	
SIPRNET (512K)	250 subscribers		1xHMT cargo trailer	
NIPRNET (512K)	250 subscribers	Cable and Wire Team	1xHMMWV – cargo (wire and phones)	5
JWICS (128K)	1 subscriber		1xHMT cargo trailer (cable and wire)	
C-LAN/C-WAN	Yes – 50	Maintenance Team	N/A	1
IA/Network Management	Yes		**Total Personnel**	16
Bandwidth	Up to 8 Mbps		**Total Equipment:**	**Qty:**
			HMMWV	6
			Trailers (cargo and generator)	4
Deploys	N+18 hrs		**Transportation:**	**Sorties:**
			C130	11
			C5	2
			C17	2
IOM (99% of subscribers connected)	Arrival + 48 hrs			

Remarks

Typically one extension node from the ITSB extension node platoon without LOS; augmented with wire and cable team and maintenance.

Initial communications for highest priority users arrival+24 hours.

Deployment times as required by supported combatant commander. Level of alert/standby to support times shorter than N+72 hours severely impacts training.

Bandwidths allocated to various services are for illustration only. Allocation in the field will be by METT-TC.

Total bandwidth available depends on the combination of ancillary equipment installed in the SATCOM terminal and on availability of bandwidth from the space segment (the bird); up to 8 Mbps can be achieved.

Aircraft numbers required are estimates and include pallets for two personal bags per soldier. Food is not included.

Switch capacity is listed; unit usually deploys with only a fraction of that number of phones.

ITSB LARGE CONTINGENCY COMMUNICATIONS PACKAGE

4-98. The mission of the ITSB large contingency communications package is to provide an initial entry theater-strategic link in support of forward deployed contingency headquarters (for example, JTF or ARFOR) with follow-on support of forward tactical headquarters (for example, division rear and division tactical command). Figure 4-24 provides an example of a large contingency communications package. Table 4-3 identifies the services, capabilities, and transportability requirements of a large contingency communications package.

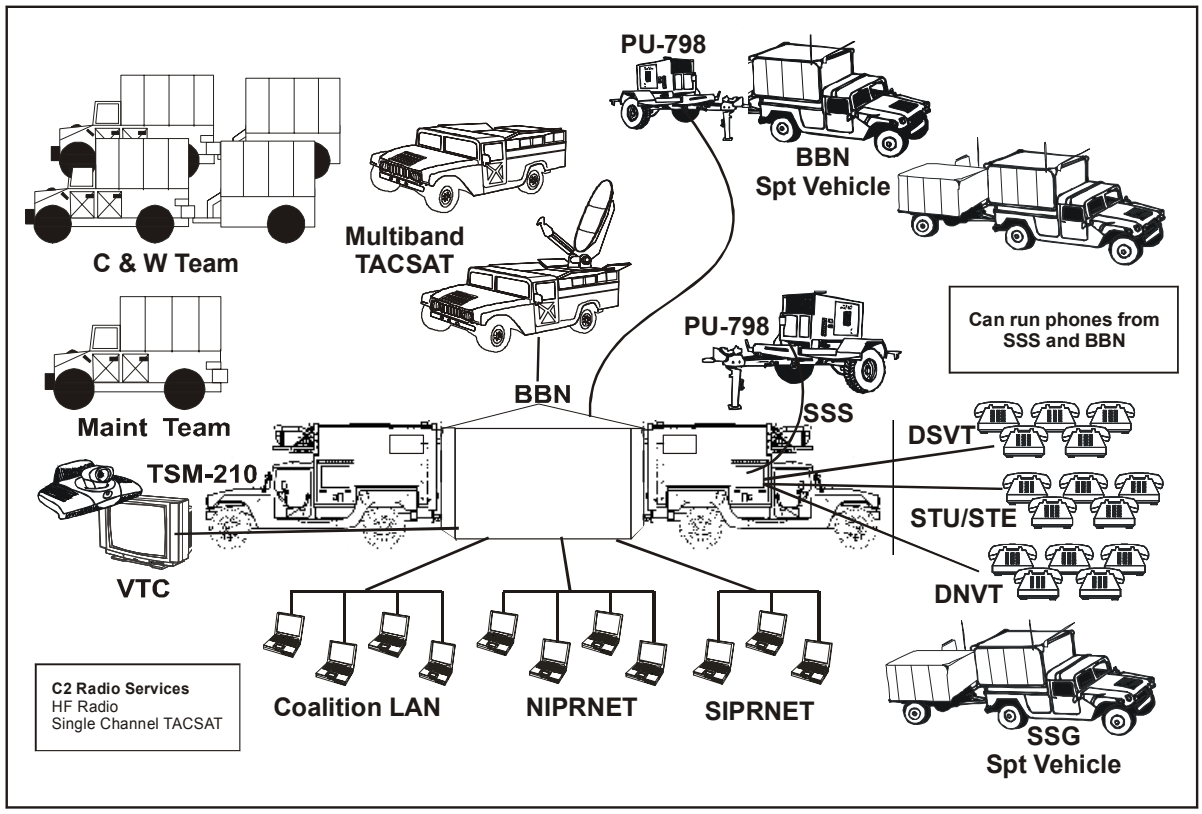


Figure 4-24. ITSB Large Contingency Communications Package

Table 4-3. ITSB Large Contingency Communications Package

Service	Qty/Criterion	Major Element/Component	Equipment	Crew
Voice		OIC	N/A	1
DSN	500 subscribers	NCOIC	N/A	1
DRSN	Dedicated interface	Multiband TACSAT (for example, Phoenix)	1xECV w/system 1xECV w/generator	4
VOIP	Up to 1000 subscribers	TTC-56 SSS	1xECV w/system 1xECV w/TSM-210	5
VTC (384 K)	1 Suite		1xHMMWV - cargo	
SIPRNET (512K)	500 subscribers		1xPU-798 (10kw) trailer	
NIPRNET (512K)	500 subscribers		1xHMT cargo trailer	
JWICS (128K)	1 subscriber			
C-LAN/C-WAN	Yes - 50	BBN - transit case	Data pkg in 10-14 transit cases: 1xHMMWV - cargo	3
IA/Network Management	Yes		1xPU-798 (10kw) trailer	
Bandwidth	Up to 8 Mbps	Cable and Wire Team	2xHMMWV – cargo (wire and phones)	7
Deploys	N+24 hrs		2xhigh mobility cargo trailer (cable and wire)	
IOM (99% of subscribers connected)	Arrival + 72 hrs	Maintenance Team	1xHMMWV – cargo	2
			Total Personnel	23
			Total Equipment: HMMWV Trailers (cargo and generator)	**Qty:** 10 6
			Transportation: C130 C5 C17	**Sorties:** 11 2 2

Remarks

Typically formed with elements of area node platoon augmented with cable and wire team and maintenance.

Bandwidths allocated to various services are for illustration only. Allocation in the field will be by METT-TC.

Total bandwidth available depends on the combination of ancillary equipment installed in the SATCOM terminal and on availability of bandwidth from the space segment (the bird); up to 8 Mbps can be achieved.

Aircraft numbers required are estimates and include pallets for two personal bags per soldier. Food is not included.

Switch capacity is listed; unit usually deploys with only a fraction of that number of phones.

NON-ITSB GENERIC CONTINGENCY COMMUNICATIONS PACKAGES

4-99. The following paragraphs discuss non-ITSB contingency communications packages.

NON-ITSB GENERIC SMALL CONTINGENCY COMMUNICATIONS PACKAGE

4-100. The mission of the non-ITSB small contingency communications package is to provide an initial entry theater-strategic link in support of forward deployed contingency headquarters (for example, JTF or ARFOR) with follow-on support of forward tactical headquarters (for example, division rear and division tactical command). Figure 4-25 provides an example of a non-ITSB small contingency communications package. Table 4-4 identifies the services, capabilities, and transportability requirements of a non-ITSB small contingency communications package.

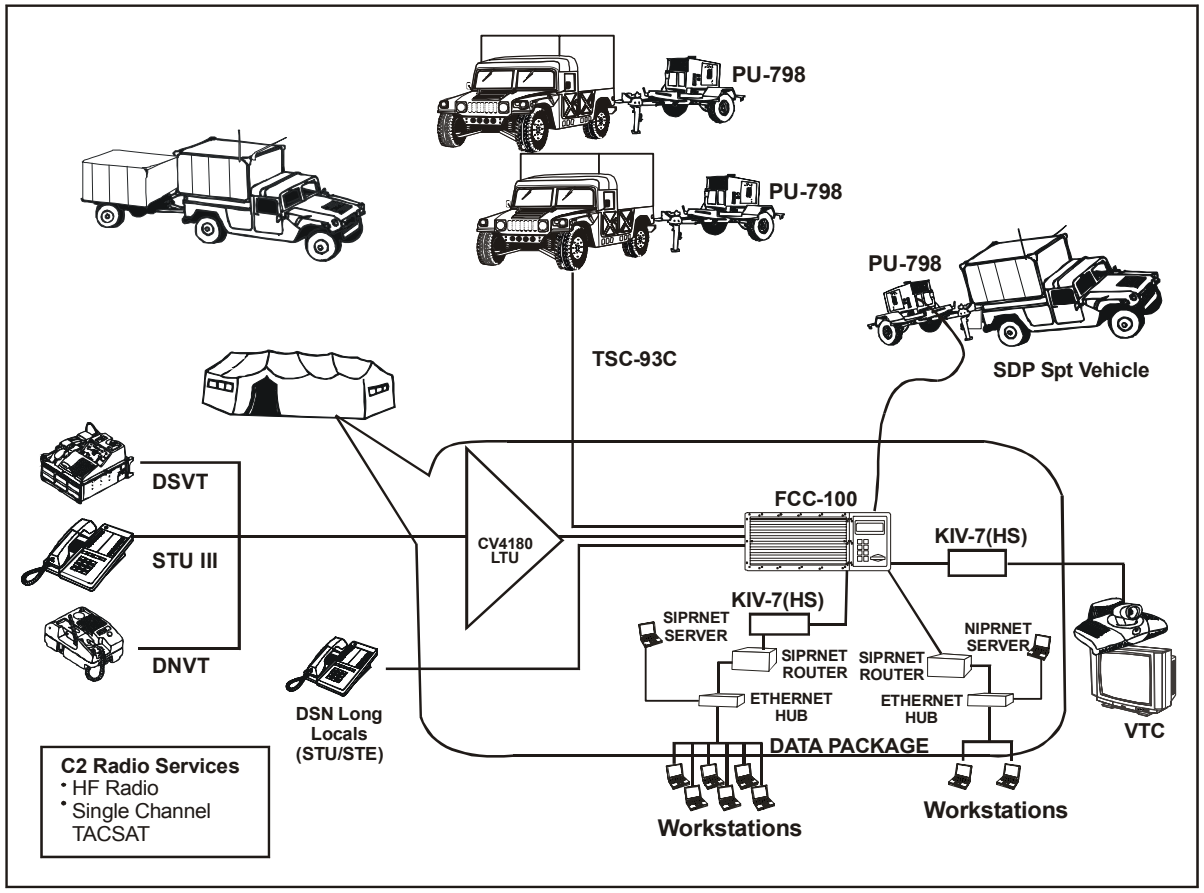


Figure 4-25. Non-ITSB Generic Small Contingency Communications Package

Table 4-4. Non-ITSB Generic Small Contingency Communications Package

Service	Qty/Criterion	Major Element/Component	Equipment	Crew
Voice (256 KB)		OIC or NCOIC	N/A	1
DSN	30 subscribers	TSC-93 TACSAT	1xECV w/system	4
DRSN	Available		1xECV w/generator	
VTC (256 KB)	1 Suite		2xPU-798 (10kw) trailers	
SIPRNET	50 subscribers	SDP-early entry pkg	Data pkg in four transit cases:	3
NIPRNET	50 subscribers		1xHMMWV - cargo	
JWICS	0 subscribers		1xPU-798 (10kw) trailer	
C-LAN/C-WAN	No	Cable and Wire Team	1xHMMWV – cargo (wire and phones)	3
IA/Network Management	Yes		1xHMT cargo trailer (cable and wire)	
Bandwidth	1152 Kbps	Maintenance Team	N/A	1
Deploys (earliest)	N+18 hrs		**Total Personnel**	12
IOM (99% of subscribers connected)	Arrival + 24 hrs		**Total Equipment:**	**Qty:**
			HMMWV	4
			Trailers (cargo and generator)	4
			Transportation:	**Sorties:**
			C130	8
			C5	2
			C17	2

Remarks

A multiband SATCOM terminal may be substituted for the AN/TSC-93 for greater versatility.

Aircraft numbers required are estimates and include pallets for two personal bags per soldier. Food is not included.

When it is critical to minimize air transport requirements, the data package components can be shipped on a pallet, and the fourth HMMWV can be transported later. In this configuration, the team is only 75 percent self-sufficient for ground transport on arrival.

Deployment times as required by supported combatant commander. Level of alert/standby to support times shorter than N+72 hours severely impacts training.

Bandwidths allocated to various services are for illustration only. Allocation in the field will be by METT-TC.

Total bandwidth available depends on the combination of ancillary equipment installed in the SATCOM terminal and on availability of bandwidth from the space segment (the bird). In some combinations, up to 8 Mbps can be achieved. Number shown is realistic for planning purposes when the configuration of the tasked unit equipment is not known.

Switch capacity is listed; unit usually deploys with only a fraction of that number of phones.

NON-ITSB GENERIC MEDIUM CONTINGENCY COMMUNICATIONS PACKAGE

4-101. The mission of the non-ITSB medium contingency communications package is to provide an initial entry theater-strategic link in support of forward deployed contingency headquarters (for example, JTF or ARFOR) with follow-on support of forward tactical headquarters (for example, division rear and division tactical command). Figure 4-26 provides an example of a non-ITSB medium contingency communications package. Table 4-5 identifies the services, capabilities, and transportability requirements of a non-ITSB medium contingency communications package.

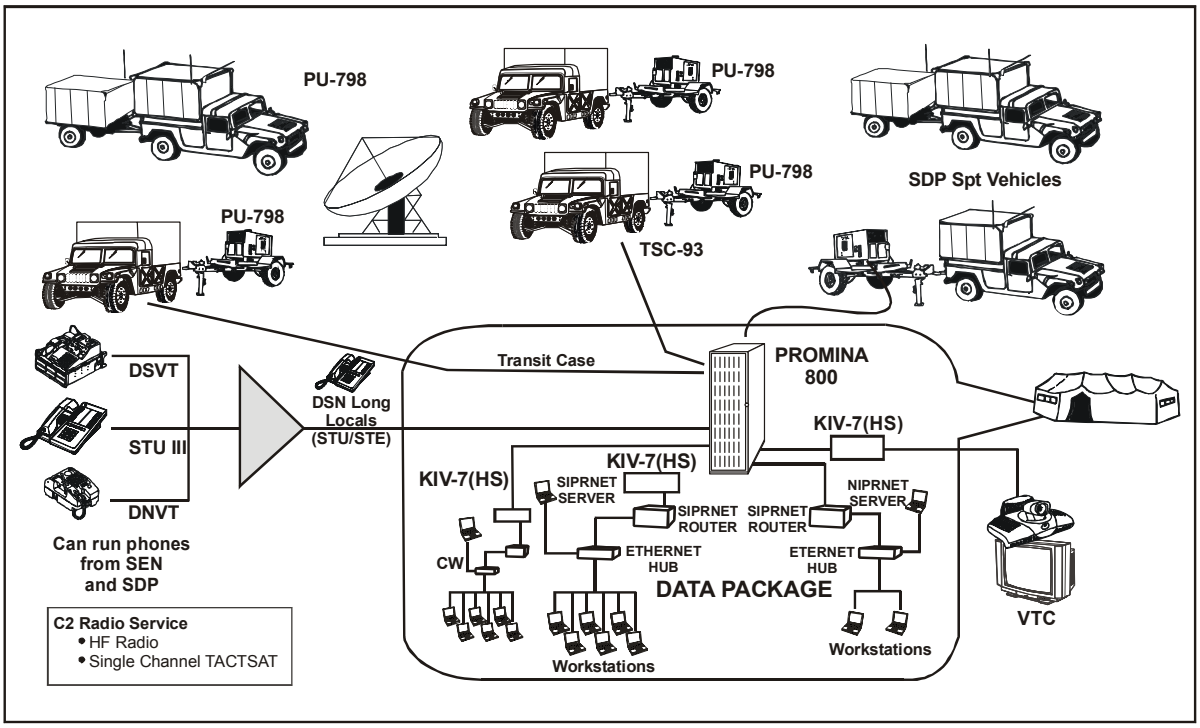


Figure 4-26. Non-ITSB Generic Medium Contingency Communications Package

Table 4-5. Non-ITSB Generic Medium Contingency Communications Package

Service	Qty/Criterion	Major Element/Component	Equipment	Crew
Voice		OIC or NCOIC		1
DSN	140 subscribers	TSC-93 TACSAT	1xECV w/system	4
DRSN	Available		1xECV w/generator	
VTC (384K)	1 Suite		2xPU-798 (10kw) trailers	
SIPRNET(512K)	250 subscribers	TTC-48 SEN	1xHMMWV w/system	3
NIPRNET(512K)	250 subscribers		1xPU-798 (10kw) trailer	
JWICS (128K)	1 subscribers	SDP	Data pkg in 10-14 transit cases	5
C-LAN/C-WAN	Yes - 50		2xHMMWV – cargo	
IA/Network Management	Yes		1xHMT cargo trailer 1xPU-798 (10kw) trailer	
Bandwidth	2048 Kbps	Cable and Wire Team	1xHMMWV – cargo (wire and phones)	5
Deploys	N+18 hrs		1xHMT cargo trailer (cable and wire)	
IOM (99% of subscribers connected)	Arrival + 48 hrs	Maintenance Team	N/A	1
			Total Personnel	19
			Total Equipment:	**Qty:**
			HMMWV	6
			Trailers (cargo and generator)	6
			Transportation:	**Sorties:**
			C130	12
			C5	2
			C17	3

Remarks

Initial communications for highest priority users is Arrival +24 hours.

A multiband SATCOM terminal may be substituted for the AN/TSC-93 for greater versatility.

Aircraft numbers required are estimates and include pallets for two personal bags per soldier. Food is not included.

Deployment times as required by supported combatant commander. Level of alert/standby to support times shorter than N+72 hours severely impacts training.

Bandwidths allocated to various services are for illustration only. Allocation in the field will be by METT-TC.

Total bandwidth available depends on the combination of ancillary equipment installed in the SATCOM terminal and on availability of bandwidth from the space segment (the bird). In some combinations, up to 8 Mbps can be achieved. Number shown is realistic for planning purposes when the configuration of the tasked unit equipment is not known.

Switch capacity is listed; unit usually deploys with only a fraction of that number of phones.

NON-ITSB GENERIC LARGE CONTINGENCY COMMUNICATIONS PACKAGE

4-102. The mission of the non-ITSB large contingency communications package is to provide an initial entry theater-strategic link in support of forward deployed contingency headquarters (for example, JTF or ARFOR) with follow-on support of forward tactical headquarters (for example, division rear and division tactical command). Figure 4-27 provides an example of a non-ITSB large contingency communications package. Table 4-6 identifies the services, capabilities, and transportability requirements of a non-ITSB large contingency communications package.

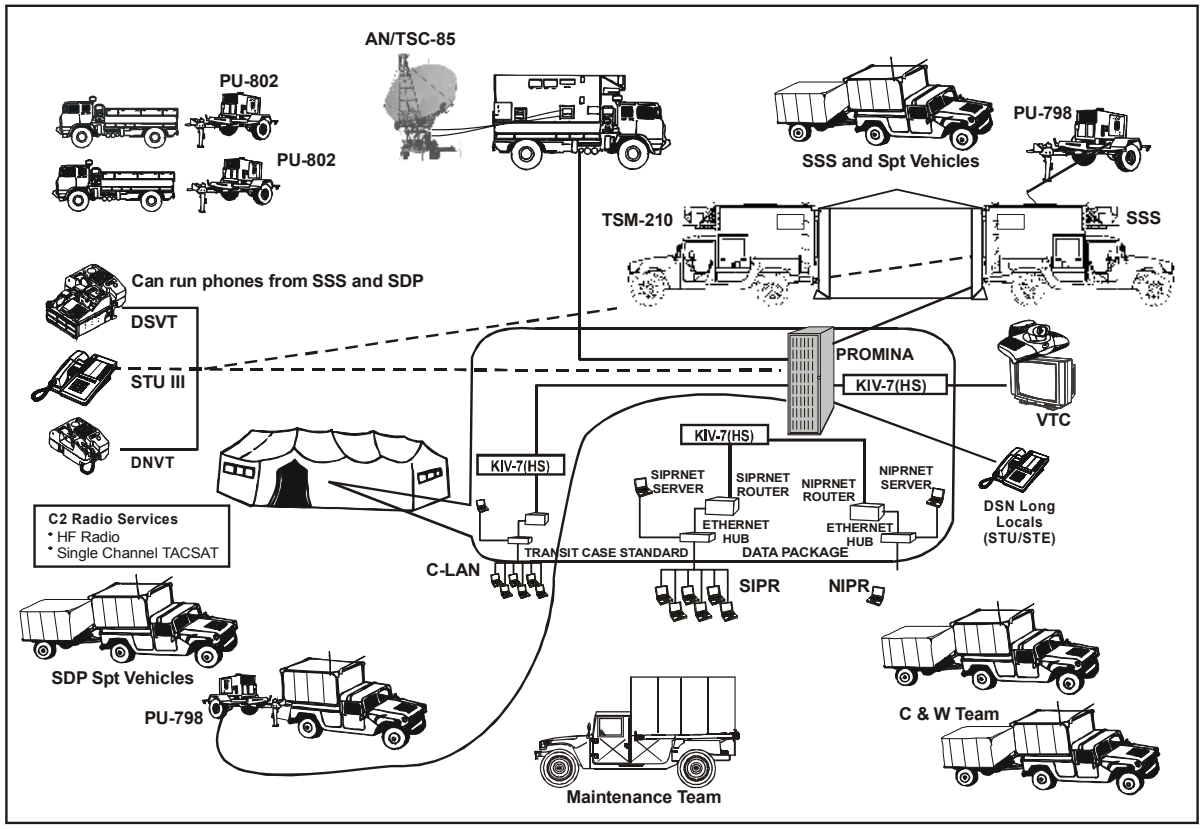


Figure 4-27. Non-ITSB Generic Large Contingency Communications Package

Table 4-6. Non-ITSB Generic Large Contingency Communications Package

Service	Qty/Criterion	Major Element/Component	Equipment	Crew
Voice		OIC and NCOIC	N/A	2
DSN (1152K)	400 subscribers	TSC-85	1x5-ton / MTV w/shelter	4
DRSN (128K)	2 subscribers		1x2.5-ton / LMTV w/8' antenna	
VTC (385K)	1 Suite		1x2.5-ton / LMTV	
SIPRNET (1152K)	500 subscribers		2xPU-802 (15kw) trailers	
NIPRNET (512K)	250 subscribers		Antenna on Trailer (QRSA or LHGXA)	
JWICS (128K)	1 subscriber	TTC-56 SSS	1xECV w/system	5
C-LAN/C-WAN (128K)	Yes - 50		1xECV w/TSM-210	
IA/Network Management	Yes		1xHMMWV – cargo	
Bandwidth	4096 Kbps		1xPU-798 (10kw) trailer	
Deploys	N+24 hrs		1xHMT cargo trailer	
IOM (99% of subscribers connected)	Arrival + 72 hrs	SDP-Transit Case	Data pkg in 10-14 transit cases: 2xHMMWV – cargo 1xHMT cargo trailer 1xPU-798 (10kw) trailer	5
		Cable and Wire Team	2xHMMWV – cargo (wire and phones)	7
			2xHMT cargo trailer (cable and wire)	
		Maintenance Team	1xHMMWV – cargo	2
			Total Personnel	25
			Total Equipment: MTV HMMWV Trailers (cargo and generator)	**Qty:** 3 8 9
			Transportation: C130 C5 C17	**Sorties:** 15 3 5

Remarks

A multiband SATCOM terminal may be substituted for the AN/TSC-93 for greater versatility.

Aircraft numbers required are estimates and include pallets for two personal bags per soldier. Food is not included.

Bandwidths allocated to various services are for illustration only. Allocation in the field will be by METT-TC.

Total bandwidth available depends on ancillary equipment installed in the SATCOM terminal and on availability of bandwidth from the space segment (the bird); up to 8 Mbps can be achieved. Number shown is realistic for planning purposes.

Switch capacity is listed; unit usually deploys with only a fraction of that number of phones.

NOTIONAL DEPLOYMENT SEQUENCE

4-103. Actual deployment of theater signal and supported forces into a theater will be determined on a case-by-case basis by METT-TC. The notional sequence below provides a basis for understanding the process of developing signal capability in a theater and its relationship to organizational structure:

- The initial theater signal contingency package will be based on one of the three package types (small, medium, or heavy). The size will be selected based mainly on the number of subscribers to be supported, but all the factors of METT-TC will be considered.
- The initial contingency package deploys and begins operations. Departure from home station occurs notification (N)+18 hours for small, medium, and heavy. Transportation time to theater is not under the control of the signal organization. Upon arrival, the initial package sets up and begins operation and maintenance of services within arrival+24 hours for small, medium, and heavy.
- In the case of ITSB, the initial contingency package will typically be a single node provided by any of the nodal platoons in the battalion.
- In the case of non-ITSB forces, the initial contingency package may be provided by a power pack company or task organized from other forces available.
- As the supported force grows, the initial contingency package will be augmented by additional elements such as cable and wire, additional multichannel SATCOM, TROPO systems, multichannel LOS systems, and additional voice and data switching. In some cases, the contingency package will be left in place and simply augmented. In others, arriving signal elements will replace elements of the contingency package in order to free them for follow-on deployments such as the onward movement of forward elements of the supported headquarters.
- In the case of an ITSB, the follow-on elements will come mostly from the parent company or battalion providing the contingency package. This includes early cable and wire support by the organic wire and cable capability of the ITSB.
- In the case of non-ITSB forces, follow-on elements will come from a variety of sources. To the extent possible, they will come from the parent unit providing the contingency package. Because non-ITSB forces do not have the technological diversity of the ITSB in single battalions, some of the follow-on augmentation is likely to come from other organizations such as composite battalions.
- If a semipermanent or permanent installation is required to free up tactical signal units for redeployment, elements of the Tactical Installation and Networking (TIN) Company may be deployed to install wiring and networking equipment commensurate with the permanence of the facilities and the requirements of the supported force.

- As the TIN establishes semipermanent or permanent network facilities, it trains the using unit(s) of the facilities in the operation and maintenance of the equipment installed and prepares for redeployment.
- Planning for transition to contractor support begins as early as possible in the overall deployment planning process. This is to free tactical signal assets as quickly as possible for follow-on or future deployments. The goal is to transition to contractor support as soon as the local security/force protection situation makes it feasible. Typical lead times for the contracting process are in the range of 30 to 120 days from initiation of planning to contractors on the ground.

ECB ARCHITECTURES

4-104. In addition to providing support to theater level headquarters and other theater level elements, a normal task for theater signal units is to provide upward connectivity for corps and division signal units in order to extend services to corps and division level users and to enable reach back for those echelons. Figure 4-28 illustrates the key features of the signal architecture at ECB to which theater signal units must interface. Figure 4-29 provides a simplified version of Tactical Internet connectivity at maneuver brigade and below.

STOVEPIPE ARCHITECTURES

4-105. There is not a formal definition for the term stovepipe architecture or stovepipe system. Stovepipe architecture refers to the design of systems that serve only a narrowly defined community of users and have limited or no interoperability with other user communities. The Army seeks to avoid the establishment and maintenance of stovepipe systems because the lack of interoperability hinders the seamless exchange of information necessary for info-centric operations, and because they divert resources from providing communications and information services to the Army as a whole.

4-106. While the Army seeks to avoid stovepipe systems, some systems have developed in response to bona-fide requirements that could not be met by the common user systems and services provided by the Signal Regiment. Examples of signal shortfalls that have driven the establishment of such systems include classification level, bandwidth, and quality of service. The fact that these systems have competed effectively for resources at some level to come into existence and to remain in existence testifies to the validity of the requirements they fill.

4-107. Signal leaders will sometimes encounter such systems in the field, and may be required to provide varying degrees of support to them. On some occasions, they may be required to provide interfaces between these and other systems even though such interfaces were not originally designed into the respective systems.

4-108. Signal leaders and planners (for example, force developers, combat developers, and materiel developers) should strive to make future mainstream signal forces capable of meeting the user requirements that drive stovepipe systems so the number of such systems can be reduced.

4-109. One example of a stovepipe system is the AN/TSQ-190 TROJAN/TROJAN SPIRIT II Communications Central. This system is discussed in the following paragraphs.

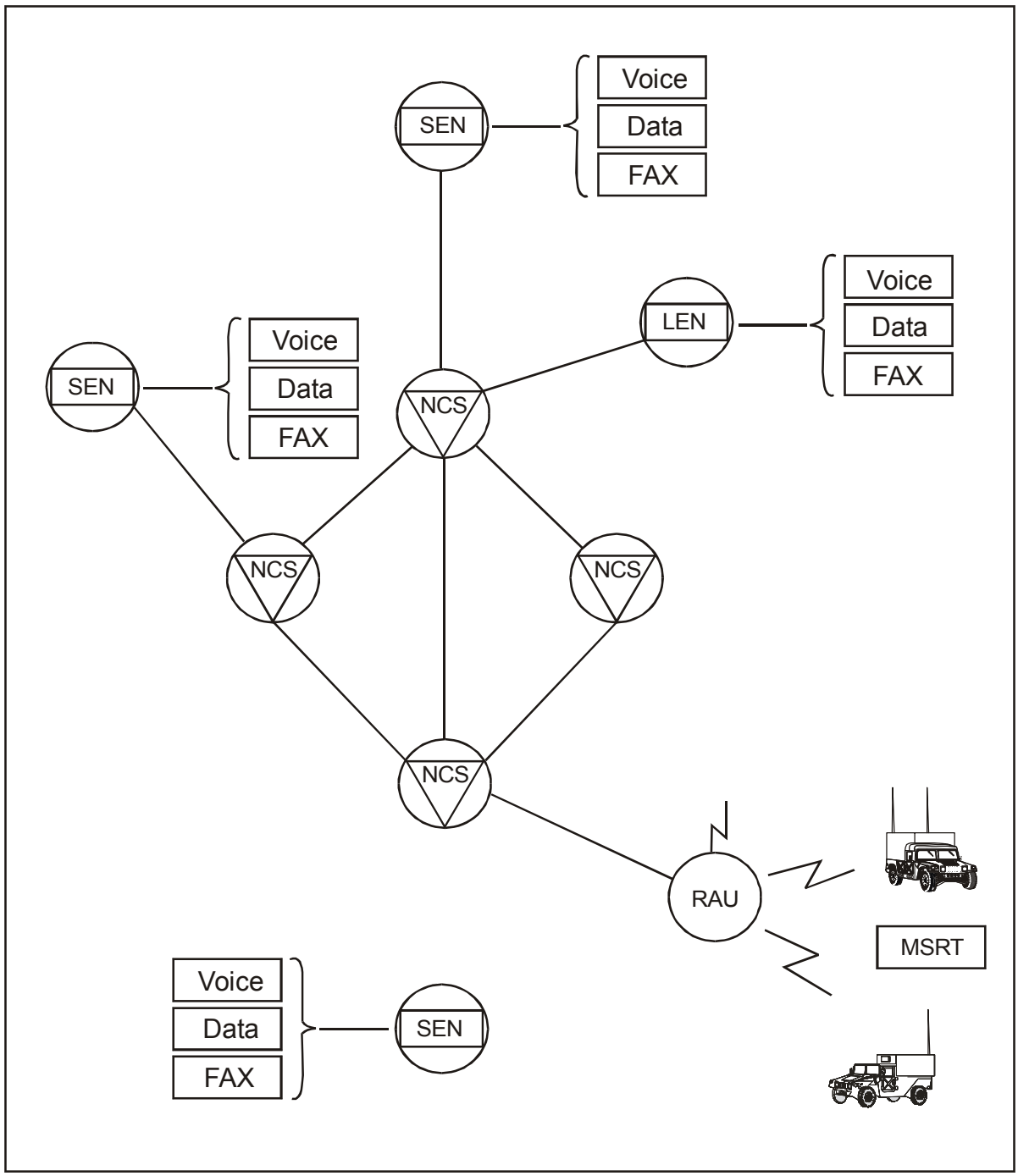


Figure 4-28. Simplified MSE Diagram

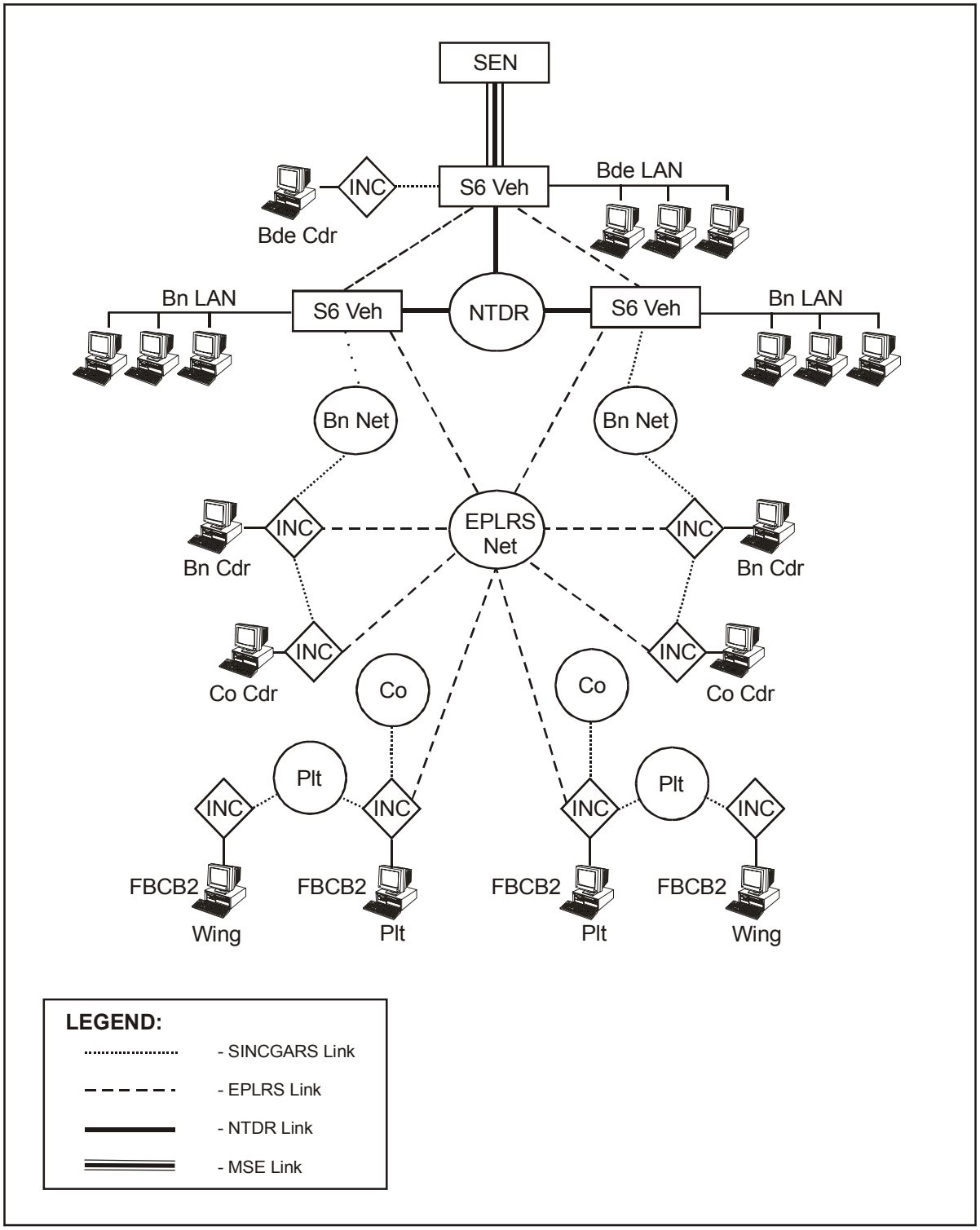


Figure 4-29. Simplified Tactical Internet Connectivity

AN/TSQ-190 TROJAN/TROJAN SPIRIT II COMMUNICATIONS CENTRAL

4-110. The TROJAN SPIRIT system is an intelligence dissemination satellite terminal that provides access for intelligence processing and dissemination systems. It was developed because of an inability of the Army common user system to provide TS/SCI service and, to an extent, provide the bandwidth required for intelligence services and products.

4-111. The SPIRIT II program, a follow-on to SPIRIT I, provides a much more robust terminal and increased capability. It is a near-term fix for high-capacity imagery data communications capability. It consists of secure voice, data, facsimile, video, and secondary imagery dissemination capabilities. The system will receive, display, and transmit digital imagery, weather and terrain products, templates, graphics, and text between CONUS/OCONUS bases and deployed forces.

4-112. The Communications Central extends the current worldwide TROJAN fixed station architecture to the tactical intelligence force structure in a mobile configuration. It has alternative communications capabilities down to brigade level, and uses existing external alternate current/direct current power sources or the on-board, tunnel-mounted, 10-kilowatt diesel generator. Supporting components are:

- A primary heavy high mobility multipurpose wheeled vehicle (HHMMWV) shelter subsystem consisting of secure voice and data and SATCOM processing and dissemination equipment integrated into an S-788/G shelter mounted on an M-1097 HHMMWV. The enhanced combat vehicle (ECV) is replacing the HHMMWV.
- The C/KU-band SATCOM mobile antenna platform for ECB or a tri-band SATCOM trailer for EAC.
- A spare equipment maintenance subsystem consisting of a second S-788/G shelter carried on an M-1097 HHMMWV.

4-113. The TROJAN SPIRIT II SATCOM system supports up to 14 circuits (eight TS/SCI and six collateral) using variable baud rates from 4.8 to 512 Kbps per channel on C, Ku, or X frequency bands. System connectivity capability includes DSNET1, DSNET3, MSE, Tactical Packet Network (TPN) interfaces, and LAN connectivity. The TROJAN SPIRIT II is shelter mounted on two HMMWVs. The system's two workstations also allow the operators to receive and disseminate secondary imagery, signal intelligence databases and reports, and unmanned aerial vehicle video. This capability allows the TROJAN SPIRIT II to serve as a temporary communications set for the analysis and control element during redeployment or split-based operations.

4-114. The TROJAN SPIRIT II combines the TROJAN Data Network (TDN) with mobile switch extensions to offer a worldwide, forward-deployed, quick-reaction reporting and analysis link. This corps and division asset provides dedicated intelligence communications that is intended to augment EAC and ECB in-theater communications. It will conduct split-based and inter- and intra-theater operations through the range of military operations.

4-115. Connectivity is provided through the Fort Belvoir TROJAN switching center that currently connects TROJAN systems at various US bases with front-end antenna arrays located worldwide. The Communications Central combines this network with mobile switch extensions to offer a worldwide, forward-deployed, quick reaction reporting and analysis link. Figure 4-30 depicts TDN connectivity.

4-116. The TDN is a router, TCP, or IP based network. It is overlaid on the communications network that links the AN/FSQ-144(V) TROJAN CLASSIC central operating facilities and switch extensions at various US bases with remote collection facilities worldwide. The TDN is subdivided into three electronically and physically separated networks that correspond to the three security levels required of the system. As with the TROJAN CLASSIC architecture, the TDN has a TROJAN Network Control Center in the TROJAN Switch Center at Fort Belvoir, VA, to provide configuration control and network management. The three networks of the TDN are:

- **TDN-1**. The TDN-1 operates at the Secret security level and is the gateway to DSNET1. It provides data exchange between TROJAN Classic facilities, switch extensions, and SPIRITs.
- **TDN-2**. The TDN-2 operates at the TS/SCI security level. It provides data exchange between selected TROJAN sites requiring access to the National Security Agency network.
- **TDN-3.** The TDN-3 operates at the TS/SCI security level and is the gateway to JWICS. It provides data exchange between TROJAN Classic facilities, switch extensions, and SPIRITs.

4-117. Although currently there are shortfalls in Army common user communications systems capability, current actions and plans allow the TROJAN SPIRIT to serve as an example of these problems being corrected. For the long-term solution, the requirements and planning documents for the Warfighter Information Network-Tactical (WIN-T) system provide for the bandwidth and security capabilities to carry this and other intelligence requirements. (WIN-T is the next generation Army common user system.) As a near-term action to provide for a degree of integrated network management, the signal and intelligence communities have agreed to provide automated visibility for signal network management facilities into the TROJAN SPIRIT network. This is one significant step towards the goal of a single Army enterprise network.

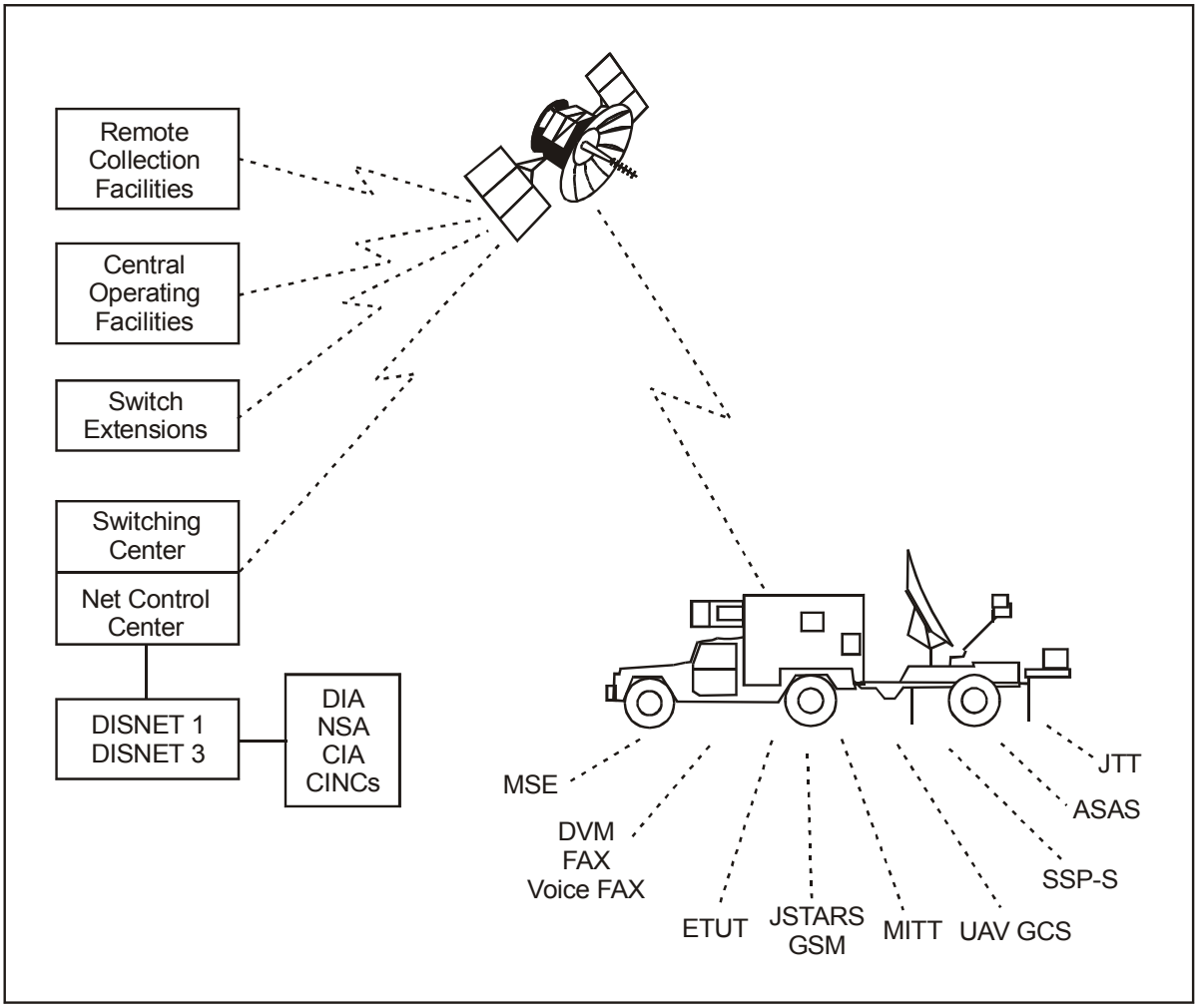


Figure 4-30. TROJAN Data Network Connectivity

Chapter 5

Theater Strategic and Tactical Signal Organizations

This chapter discusses the missions, functions, and salient characteristics of the fully implemented theater signal organizations of the current force, both strategic and tactical. It discusses the command and support relationships for theater signal units in peacetime and how some of these relationships would change in wartime. The detailed information on assignments, task organizations, and organizational structure is a snapshot in time and is intended to be informative and illustrative, not authoritative. The authority for and changes to command and support relationships come from a variety of sources such as orders and operation plans (OPLANS). The authority for organizational structures is exercised through the ARFOR development process and is promulgated by authorization documents such as MTOEs. The authoritative documents can change with little or no notice for a variety of circumstances.

NEW/SIGNIFICANTLY MODIFIED FORCE STRUCTURES

5-1. New and modified force structures have been developed to keep theater signal relevant in meeting warfighter communications requirements. These new structures significantly reduce the need to task organize signal assets. These force structures will be phased in gradually and will co-exist with units of the current force structure during the transition period.

5-2. The new and significantly modified force structures include:

- ITSB.
- TIN Company.
- Combat Camera (COMCAM) Company.
- NETCOM/9thASC (formerly U.S. Army Signal Command).
- NOSCs at various echelons.

5-3. In addition, data packages are integrated into existing organizations at several echelons. Other significant changes include integrating GBS TIPs and joint command, control, communications, and computers packages (JC4Ps) into selected new and existing organizations.

FORCE STRUCTURES BEING PHASED OUT

5-4. Refer to Appendix C for information on forces being phased out.

ORGANIZATIONAL STRUCTURE

5-5. Appendix E provides illustrations for both active and reserve components structures.

STRATEGIC/FIXED STATION

5-6. Due to the fluid nature of the common operational environment, theater strategic/fixed station signal organizations may find themselves operating at or supporting the strategic, operational, or tactical level of war. For the purpose of this manual, the terms strategic and fixed station describe organizations that do not deploy from their home stations, and include organizations that provide intra- and/or inter-theater communications supporting both power projection and C2 systems that span from the warfighter through the Secretary of Defense to the President of the United States. While organizational structures of strategic/fixed station organizations are different and unique, the fundamental mission (C2 and signal support) remains the same for all organizations.

TOE 11800 NETCOM/9TH ASC

5-7. In accordance with Department of the Army General Order Number 2002-05, Headquarters, Army Signal Command was reorganized and redesignated as the NETCOM/9th ASC. This expanded the mission of the organization to full enterprise level responsibility for networks and systems. Figure 5-1 shows the organization of the NETCOM/9th ASC.

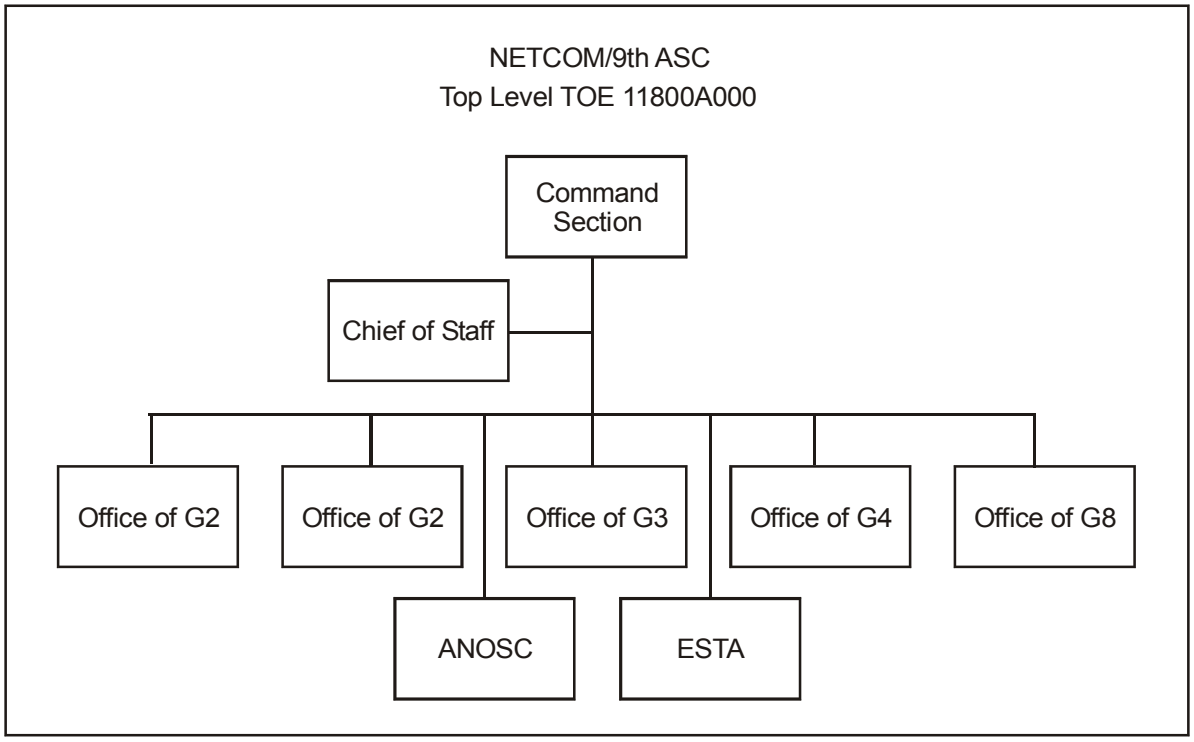


Figure 5-1. NETCOM/9th ASC

5-8. Headquarters, NETCOM/9th ASC has a standard G-staff (G1-G4 and G8) and is located at Fort. Huachuca, Arizona. It maintains a staff and leadership presence in the NCR. The headquarters is able to deploy headquarters elements and subelements to the field in order to directly support warfighter requirements or to augment subordinate units.

NETCOM/9th ASC Mission

5-9. The NETCOM/9th ASC is the single authority to operate, manage, and defend the Army's enterprise level infostructure. It delivers seamless enterprise level C4 information technology common user services and signal warfighting forces in support of the combatant commanders and ASCC commanders. The NETCOM/9th ASC operates, sustains, and defends the Army's portion of the GIG, enabling force projection and delivery of decisive combat power.

5-10. NETCOM/9th ASC is designated as a direct reporting unit to the CIO/G6. The Army CIO/G6 provides oversight of the NETCOM/9th ASC. NETCOM/9th ASC is under the limited OPCON of the US Army Forces Command (FORSCOM) for tactical CONUS force provisioning, specifically for the purpose of—

- Organizing and employing CONUS tactical commands and forces in concert with unique requirements noted in the Secretary of Defense Memorandum dated 6 April, 2001, Subject: Forces For and the Chairman Joint Chiefs of Staff (CJCS) Instruction 3110.10, enclosure A, Appendix C.
- Assigning operational tasks.
- Designating objectives.
- Resourcing operational requirements.
- Providing staff actions in direct support of mobilization requirements.
- Providing deployment or deployment sustainment operations.
- Providing Active Component/Reserve Component integration oversight.
- Providing oversight of training and exercises.

5-11. NETCOM/9th ASC works closely with all US Army Reserves (USAR) and Army National Guard signal forces to ensure integrated signal support is available to support combatant commander requirements. Strategic communications systems will be available and operational to fully support split-based operations. NETCOM/9th ASC's emphasis is on operation, maintenance, and defense of critical strategic C4 systems and networks and the training of combat-ready Active Component, the National Guard, and the USAR EAC signal forces for worldwide deployment. EAC signal forces and the systems they operate must provide rapid and responsive world-class services anywhere, anytime.

5-12. NETCOM/9th ASC has a multinational and multitheater AOR. Subordinate NETCOM/9th ASC organizations extend from North America to Europe and Asia. Specific locations include CONUS, Alaska, Puerto Rico, Germany, England, Italy, Belgium, Netherlands, Honduras, Qatar, Saudi Arabia, Kuwait, Bahrain, Korea, Japan, and Hawaii.

5-13. NETCOM/9th ASC's mission includes:

- Protect our force and care for the NETCOM/9th ASC family.
- Engineer, install, operate, maintain, and defend C4 systems and networks throughout the Army enterprise.
- Provide global Army NETOPS.
- Deploy, sustain, and redeploy signal forces.
- Exercise C2 of assigned and attached forces.

5-14. NETCOM/9th ASC also performs the following tasks and functions:

- Provides a centralized configuration control capability to monitor and control configuration changes of Army tactical and strategic voice and data switches to ensure switch interoperability and compliance with joint directives.
- Manages the Army Military Affiliate Radio Systems Program.
- Engineers and provides fast reaction support to worldwide NETCOM/9th ASC C4 operational systems, forces, and associated signal initiatives.
- Manages all facilities engineering and environmental issues incident to the deployment, sustainment, and redeployment of EAC signal assets.
- Provides engineering support to the TSC(A)s as required and/or requested.
- Ensures that NETCOM/9th ASC facilities worldwide are adequate to support the mission.
- Deploys signal staff augmentation individuals and teams on a worldwide basis in support of warfighting forces in those instances where the TSC(A) is not deployed or where augmentation to the TSC(A) is required.
- Deploys network management and system security teams worldwide to engineer, install, operate, and maintain data networks in support of JTF and Army and nongovernmental agencies. Such teams also provide tactical interface for the Army NOSC and TNOSC.
- Serves as the proponent for quality assurance/quality control for communications infrastructure; operates and deploys a total quality assessment team to provide quality assessment and quality control assistance to power projection and support platforms and to all levels of the Defense Information Infrastructure, to include related systems, networks, and subnetworks.

Enterprise Systems Technology Activity (ESTA)

5-15. A significant portion of the NETCOM/9th ASC transformation was the transformation of its subordinate US Army Network Engineering Telecommunications Activity to the ESTA.

5-16. The ESTA mission is to develop, implement, and enforce enterprise systems management (ESM) processes and activities required to operate and manage the transformed, consolidated Army infostructure at the enterprise level. ESTA—

- Establishes ESM policies and procedures, and executes necessary actions to ensure seamless C4IM common user services are provided within a secure NETOPS framework across the enterprise.
- Provides operational policy and functional staff oversight for ESM operations to NETCOM/9th ASC regional units and RCIOs.
- Coordinates external requirements with the HQDA staff and major Army command CIOs.
- Assesses and develops requirements as the ESM functional proponent.
- Develops, staffs, and manages service level agreements for the enterprise.
- Conducts required operational engineering and architectural review to ensure new systems and enabling technologies or capabilities fielded within the Army infostructure comply with enterprise-level standards, practices, and procedures.
- Serves as command focal point for policy formation, and operation and management of NETCOM/9th ASC-wide AKM initiatives.
- Engineering, installing, operating, maintaining, and defending C4 systems and networks throughout the Army.
- Providing technical expertise to restore C4 systems and networks.
- Executing long haul and base communications programs.
- Planning, implementing, and fielding enterprise infostructure management for the Army GIG.
- Serving as CIO/G6 chief technology office.
- Providing oversight of all Army activities related to the allocation, allotment, and assignment of RF spectrum.
- Formulating IA policies and plans.

ANOSC

5-17. The ANOSC is a subordinate element of NETCOM/9th ASC. For information on the missions and functions of the ANOSC, refer to Chapter 3.

CONUS TNOSC

5-18. The CONUS TNOSC is a subordinate element of NETCOM/9th ASC. For information on the missions and functions of the TNOSC, refer to Chapter 3.

US ARMY SIGNAL ACTIVITY-INTELLIGENCE AND SECURITY COMMAND (ASA-INSCOM)

5-19. The ASA-INSCOM is under the C2 of NETCOM/9th ASC and under OPCON of the US Army Intelligence and Security Command. The commander is dual-hatted as the G6, INSCOM. The ASA-INSCOM's mission is to provide planning, programming, budgeting, engineering, installation, and operational management of secure and nonsecure telecommunications to the National Security Agency, HQDA, INSCOM, and NETCOM/9th ASC.

TOE 11622A STRATEGIC/FIXED STATION SIGNAL BRIGADES

5-20. This unit's mission is to command and control EAC strategic signal battalions and sustaining-base organizations and to support the power projection platform required to support force projection and split-based operations. Individuals of the organizations, except the chaplain, can assist in the coordinated defense of the unit's area or installation. The unit depends on appropriate elements of the theater Army for legal, combat health support, and finance. Additionally, it depends on installation motor pools for government-furnished equipment transportation support. Figure 5-2 shows the organization of an HHC strategic signal brigade. The following paragraphs describe the tasking, mission, and capabilities of the HHC strategic signal brigade.

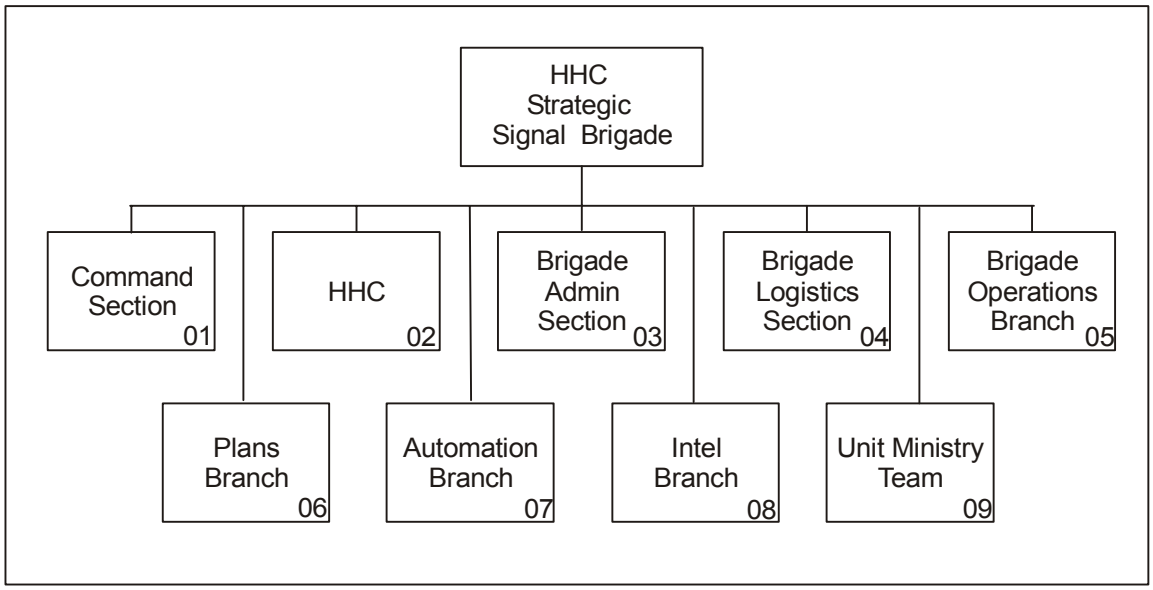


Figure 5-2. HHC Strategic Signal Brigade

Command Section, PARAGRAPH 01

5-21. The command section provides C2 and staff supervision over the brigade's units.

HHC, PARAGRAPH 02

5-22. The HHC provides the command and administrative personnel for housekeeping operations.

Brigade Admin Section, PARAGRAPH 03

5-23. The brigade admin section provides the personnel and equipment to support the administrative requirements of the brigade.

Brigade Logistics Section, PARAGRAPH 04

5-24. The brigade logistics section provides the personnel and equipment to support the logistical requirements of the brigade.

Brigade Operations Branch, PARAGRAPH 05

5-25. The brigade operations branch has staff responsibility for planning, coordinating, and supervising the operational function of the brigade.

Plans Branch, PARAGRAPH 06

5-26. The plans branch's responsibilities are to advise commanders, staff, and other command, control and communications (C3) users on the capabilities, limitations, and employment of all tactical and nontactical signal assets available to the command.

Automation Branch, PARAGRAPH 07

5-27. The automation branch advises the staff on information management, automation policy, and technical matters. It performs or supervises system analysis and programming functions, and supervises the installation, operation, and maintenance of automated communications.

Intel Branch, PARAGRAPH 08

5-28. The intelligence branch provides the commander with all-source intelligence assessments and estimates at the operational and strategic levels dealing with enemy capabilities, intentions, and vulnerabilities. It predicts enemy courses of action; produces threat estimates to support doctrine, training, and combat developments; ensures proper dissemination of intelligence information and products; and evaluates, interprets, analyzes, and produces general intelligence products in support of DOD requirements.

Unit Ministry Team, PARAGRAPH 09

5-29. The unit ministry team is responsible for ministering to the members of the brigade. This team has a chapel activities specialist (E4, 71M) who works under the supervision of the brigade's chaplain and is responsible for the administrative functions associated with assisting the chaplain.

Tailored Strategic Fixed Signal Brigades

5-30. The following strategic/fixed station signal brigades are organized under the TOE 11622A. However, they are highly tailored to the specific requirements of the theaters to which they are assigned.

5-31. **2nd Signal Brigade.** This brigade is a subordinate command of NETCOM/9th ASC, with OPCON vested in US Army Europe (USAREUR). The 2nd Signal Brigade's mission is to install, operate, and maintain the communications infrastructure and systems capable of extending the GIG on order to Army, joint, and combined forces.

5-32. **21st Signal Brigade.** This brigade is a subordinate command of NETCOM/9th ASC. The 21st Signal Brigade's mission is to provide for the integration of telecommunications services that include tactical and fixed stations for the DOD and other federal agencies within CONUS and provide visual documentation of US, allied, and hostile forces during combat operations and peacetime training exercises.

5-33. **160th Signal Brigade**. This brigade is a subordinate command of NETCOM/9th ASC. The 160th Signal Brigade is OPCON to US Army Forces, Central Command (ARCENT) during peacetime. Its command and support relationships can change during wartime. The 160th Signal Brigade's mission is to command and control EAC strategic signal battalions and sustaining base organizations to support split-based operations.

5-34. **516th Signal Brigade.** This brigade is a subordinate command of NETCOM/9th ASC, with OPCON vested in US Army, Pacific (USARPAC). The commander, 516th Signal Brigade, is dual-hatted as the USARPAC Deputy Chief of Staff, Information Management (DCSIM). The 516th Signal Brigade's mission is to provide signal support to Pacific warfighting forces, provide theater C4 policy and programming functions, and advise the commanding general, USARPAC, on resources required by major subordinate commands (MSCs) for C4 systems, to include deployable assets.

STRATEGIC MODULES

5-35. Strategic/Fixed station signal organizations are individually tailored to the theaters where they are located. They are assembled from standardized TOE modules. Figure 5-3 shows the strategic modules.

NOTE: The term CINC in the context of theater combatant commander is retained in this section to reflect the titles of organizations as they appear in the TOE databases that document them.

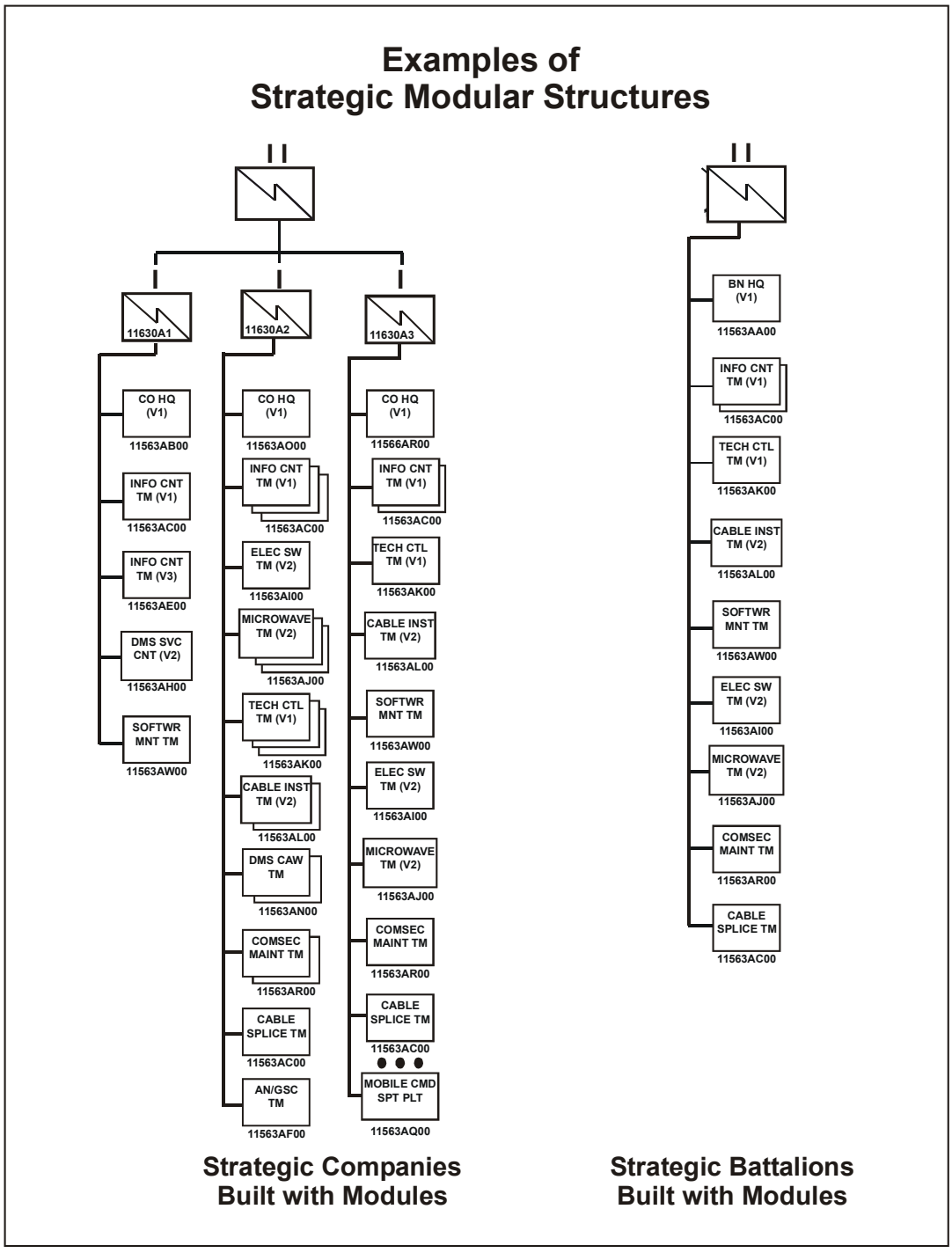


Figure 5-3. Strategic Modules

TOE 11563AT00, 11563AU00, 11563AV00 EAC Technical Control Center (TCC) Team

5-36. The mission of the TCC team is to provide record telecommunications for a given regional area. The differences among the TOE variants are mainly the sizes of the teams. Refer to current TOE documents for more detailed information.

5-37. The TCC team—

- Operates and maintains automated telecommunications equipment central and associated peripheral devices 24 hours a day, 7 days a week.
- Maintains record copy files.
- Provides methods and results analysis.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11506AG00 EAC Automated Gateway Message Switch (AGMS) Team

5-38. The mission of the AGMS team is to provide record telecommunications and e-mail to a regional area as part of the DMS.

5-39. The AGMS team—

- Operates and maintains the AGMS and DMS equipment and ancillary devices.
- Performs traffic and circuit monitoring and restoration.
- Provides general service records communications and e-mail to a regional area.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11563AC00, 11563AD00, 11563AE00, 11567AM01, 11567AH01 EAC Information Center Team

5-40. The mission of the information center team is to provide automation and information support to all units in a given regional area. The differences among the TOE variants are mainly the sizes of the teams. Refer to current TOE documents for more detailed information.

5-41. The information center team—

- Provides signal support including information and data automation.
- Installs, operates, and maintains multifunctional/multiuser information processing systems including peripheral equipment and auxiliary devices.
- Provides planning, requirements analysis, design, development, testing, installation, maintenance, and training for all automated data processing systems in a region.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11563AW00 EAC Software Maintenance Team

5-42. The mission of the software maintenance team is to provide software support for a regional area.

5-43. The software maintenance team—

- Troubleshoots and repairs existing application software.
- Designs, prepares, edits, and tests computer programs.
- Modifies existing application programs to support the user's requirements.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11566AB00, 11567AK00 EAC COMSEC Material Direct Support Activity (CMDSA) Team

5-44. The mission of the CMDSA team is to provide COMSEC custodian functions, COMSEC equipment maintenance, and COMSEC logistics functions to a geographic area. The differences between the TOE variants are mainly the sizes of the teams. Refer to current TOE documents for more detailed information.

5-45. The COMSEC CMDSA team—

- Provides COMSEC custodian functions to include COMSEC material account management, the safeguarding of COMSEC material, and COMSEC material inventories and reports.
- Provides direct support/general support level maintenance of COMSEC equipment, controlled cryptographic items (CCI), radio receivers and transmitters, and other associated equipment.
- Provides COMSEC logistics functions to include procurement, maintenance, and transport of COMSEC equipment and material.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11564AK00 EAC COMSEC Logistics Support Unit (CLSU) Team

5-46. The mission of the CLSU team is to provide COMSEC and radio equipment maintenance and COMSEC logistics functions to a geographic area.

5-47. The CLSU team—

- Provides direct support/general support level maintenance of COMSEC equipment, CCI, radio receivers and transmitters, and other associated equipment.
- Provides COMSEC logistics functions to include procurement, maintenance, and transport of COMSEC equipment and material.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11563AR00, 11563AI00 EAC COMSEC Maintenance Team

5-48. The mission of the COMSEC maintenance team is to provide electronic maintenance of COMSEC and radio equipment for a geographic AOR.

5-49. The COMSEC maintenance team—

- Provides COMSEC and radio equipment maintenance for a geographic AOR.
- Provides direct support/general support level maintenance of radio receivers, transmitters, COMSEC equipment, CCI, and other associated equipment.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11563AO00, 11563AI00, 11564AM00 EAC Electronic Switching System (ESS) Switch Team

5-50. The mission of the ESS switch team is to provide operation and maintenance of commercial electronic switching systems and equipment associated with switched network operations in a given regional area. The differences among the TOE variants are mainly the sizes of the teams. Refer to current TOE documents for more detailed information.

5-51. The ESS switch team—

- Installs, initializes, and operates unit level and direct support maintenance on electronic switches and network operations equipment 24 hours a day.
- Implements network control center-generated changes to support operational requirements.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11564AE00 EAC Emergency Action Center Switch Team

5-52. The mission of the emergency action center switch team is to provide emergency and contingency switching communications to a region during peace, war, and military operations other than war (MOOTW).

5-53. The emergency action switch team—

- Operates and maintains emergency and contingency switching communications 24 hours a day.
- Plans, engineers, and controls emergency and contingency switching communications.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11563AJ00, 11563AP00, 11564AF00 EAC Microwave Team

5-54. The mission of the microwave team is to provide installation, operation, and maintenance of microwave communications systems at a microwave site. The team performs engineering quality control and continuity testing of microwave circuits, trunks, links, systems, and facilities. The differences among the TOE variants are mainly the sizes of the teams. Refer to current TOE documents for more detailed information.

5-55. The microwave team—

- Configures, aligns, operates, and performs unit level and direct support maintenance on microwave communications equipment and associated devices.
- Monitors, fault isolates, and restores telecommunications circuits, trunk groups, systems, and associated commercial and military interface equipment.
- Maintains circuit, link, system, and station records and reports.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11563AK00, 11564AN00 EAC Technical Control Facility (TCF) Team

5-56. The mission of the TCF team is to provide an intermediate level of operations and maintenance control within the DISN. The TCF provides OPCON and technical direction over a given geographic area and number of DISN facilities and systems. The differences between the TOE variants are mainly the sizes of the teams. Refer to current TOE documents for more detailed information.

5-57. The TCF team—

- Responds to operational direction from the DISA and to operate and maintain control elements.
- Exercises TECHCON, coordination, and supervision over subordinate DISN facilities, transmission systems, and networks.
- Responds immediately to any deterioration or failure of DISNs, equipment, trunks, or circuits that are causing degradation or loss of service to users of the DISN.
- Performs quality control tests and measurements on all trunks, channels, circuits, and equipment for which the TCF is responsible.
- Directs and managing HF radio communications systems in support of the DISN.
- Depends upon the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11564AL00 EAC Facility Control Office (FCO) Team

5-58. The mission of the FCO team is to provide the highest level of operations and maintenance control within the DISN. FCOs are designated by each DISA area to provide OPCON and technical supervision over Level 4 and Level 5 DISN facilities within a designated geographical area.

5-59. The FCO team—

- Provides operational direction over the TCF within its region.
- Provides operations 24 hours a day, with sufficient communications capabilities to coordinate with the appropriate DISA Level 2 facility and provides OPCON over subordinate facilities.
- Schedules and coordinates with the Defense Communications Agency for approval of authorized outages.
- Functions as the reporting facility for all assigned subordinate DISN facilities, transmission systems, and networks.
- Develops specific operating procedures pertinent to the area of assigned responsibility.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11564AG00, 11563AL00, 11563AM00 EAC Cable Installation Team

5-60. The mission of the cable installation team is to provide installation and maintenance of base support cable and wire systems in a given regional area. The differences among the TOE variants are mainly the sizes of the teams. Refer to current TOE documents for more detailed information.

5-61. The cable installation team—

- Installs and maintains copper and fiber optic cable systems.
- Installs and maintains repeaters, restorers, voltage protection devices, telephones, distribution frames, and related equipment.
- Installs and uninstalls wire systems, including telephones.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11564AC00, 11568AI00 EAC Cable Splicer Team

5-62. The mission of the cable splicer team is to provide permanent and emergency splicing of copper and fiber optic cable systems, as well as installation and maintenance of base-support cable and wire systems. The differences between the TOE variants are mainly the sizes of the teams. Refer to current TOE documents for more detailed information.

5-63. The cable splicer team—

- Provides permanent and emergency splicing of copper and fiber optic cable systems.
- Installs and maintains copper and fiber optic cable systems.
- Installs and maintains repeaters, restorers, voltage protection devices, telephones, distribution frames, and related equipment.
- Installs and uninstalls wire systems, including telephones.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11563AX00, 11563AY00, 11564AG00 11567AG01 EAC Contingency HF Radio Team

5-64. The mission of the contingency HF radio team is to provide emergency and contingency radio communications to a region during peace, war, and MOOTW. The differences between the TOE variants are mainly the sizes of the teams. Refer to current TOE documents for more detailed information.

5-65. The contingency HF radio team—

- Operates and maintains contingency HF radio communications 24 hours a day.
- Plans, engineers, and controls contingency HF radio communications.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11566AH00 EAC CINC UHF SATCOM Team

5-66. The mission of the CINC UHF SATCOM team is to establish combatant commander UHF SATCOM networks for emergency and contingency operations.

5-67. The CINC UHF SATCOM team—

- Operates and maintains UHF SATCOM 24 hours a day.
- Plans, engineers, and controls UHF SATCOM networks.
- Commands and controls the combatant commander UHF SATCOM networks.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11566AC00 EAC SATCOM Terminal Team, AN/GSC-40

5-68. The mission of the SATCOM terminal team, AN/GSC-40, is to provide earth terminal communications as part of the special communications system (SCS) to establish combatant commander networks and to disseminate highly specialized critical user information.

5-69. The AN/GSC-40, SATCOM terminal team—

- Provides UHF SATCOM deployed in a network configuration as part of the SCS, which is operated and maintained by the Army, Navy, and Air Force.
- Provides a fixed command post terminal configured to provide specific SCS network C2 functions and the means for disseminating highly specialized critical user information.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11566AI00 EAC SATCOM Terminal Team, AN/MSC-64(V)2

5-70. The mission of the SATCOM terminal team, AN/MSC-64(V)2 is to provide earth terminal communications as part of the SCS to establish combatant commander networks and to disseminate highly specialized critical user information.

5-71. The AN/MSC-64(V)2, SATCOM terminal team—

- Provides UHF SATCOM deployed in a network configuration as part of the SCS, which is operated and maintained by the Army, Navy, and Air Force.
- Provides a mobile terminal to deploy and access the SCS network and to disseminate highly specialized critical user information.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11566AL00, 11566AE00, 11566AM00 EAC Radio Terminal Station Team, AN/TRC-194

5-72. The mission of the radio terminal station team, AN/TRC-194(V)1 and (V)2, is to provide satellite ground communications as part of the military strategic and tactical relay (MILSTAR) system. It establishes combatant commander networks and emergency action message (EAM) dissemination, force direction and integrated tactical warning and assessment (ITW&A) reception, and summary transmissions. The differences between the TOE variants are mainly the sizes of the teams. Refer to current TOE documents for more detailed information.

5-73. The AN/TRC-194, radio terminal team—

- Provides EHF uplink and SHF downlink interfaces to the MILSTAR and fleet SATCOM EHF package payloads.
- Manages assigned communications resources and user priorities.
- Provides baseband interfaces to user equipment groups, which supports the transmission of voice, teletype, and facsimile.
- Provides backward compatibility with existing MILSATCOM systems.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11566AM00 EAC Radio Terminal Station Augmentation Team, AN/TRC-194(V)

5-74. The mission of the radio terminal station augmentation team, AN/TRC-194(V), is to provide a supervisor for two or more MILSTAR AN/TRC-194(V) systems.

5-75. The AN/TRC-194(V), radio terminal augmentation team—

- Supervises two or more AN/TRC-194(V) terminal teams.
- Provides overall maintenance, training, and mission sustainment of two or more ground command post terminals.
- Provides daily coordination and contact with supported combatant commanders regarding mission support requirements and system status.
- Manages assigned communications resources and user priorities.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11564AR00 EAC SATCOM Terminal Team, AN/TSC-86

5-76. The mission of the SATCOM terminal team, AN/TSC-86, is to provide earth terminal communications as part of the DSCS to establish combatant commander networks and for EAM dissemination, force direction and ITW&A reception, and summary transmissions.

5-77. The AN/TSC-86, SATCOM terminal team—

- Provides SHF interfaces to the DSCS that provides simultaneous communications with up to four other terminals.
- Manages assigned communications resources and user priorities.
- Processes multiple, medium, and wideband-digital voice data, and teletype signals.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11563AF00 EAC SATCOM Terminal Team, AN/GSC-52(V)1, and 11567AF00 SATCOM Terminal, AN/GSC-52(V)1, Augmentation Team

5-78. The mission of the SATCOM terminal team, AN/GSC-52(V)1, is to provide earth terminal communications as part of the DSCS to establish combatant commander networks and for EAM dissemination, force direction and ITW&A reception, and summary transmissions.

5-79. The AN/GSC-52(V)1, SATCOM terminal team—

- Provides SHF interfaces to the DSCS that can simultaneously transmit and receive up to 12 communications carriers.
- Manages assigned communications resources and user priorities.
- Provides survivable antijam, antiscintillation, voice, and digital data SATCOM using the universal modem system.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11564AH00 EAC SATCOM Terminal Team, AN/GSC-52(V)2 – Mobile

5-80. The mission of the SATCOM terminal team, AN/GSC-52(V2)–mobile, is to provide earth terminal communications as part of the DSCS to establish combatant commander networks and for EAM dissemination, force direction and ITW&A reception, and summary transmissions.

5-81. The AN/GSC-52(V)2-mobile, SATCOM terminal team—

- Provides SHF interfaces to the DSCS that can simultaneously transmit and receive up to 12 communications carriers.
- Manages assigned communications resources and user priorities.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.
- Requires theater transportation assets not organic to the team to be moved. Site teardown and loading to move takes approximately five days, while site setup takes approximately two weeks.

TOE 11566AF00 EAC SATCOM Terminal Team, AN/FSC-78

5-82. The mission of the SATCOM terminal team, AN/FSC-78, is to provide earth terminal communications as part of the DSCS to establish combatant commander networks and for EAM dissemination, force direction and ITW&A reception, and summary transmissions.

5-83. The AN/FSC-78, SATCOM terminal team—

- Provides SHF interfaces to the DSCS that can transmit up to nine communications carriers and receive up to 18 communications carriers.
- Manages assigned communications resources and user priorities.
- Provides survivable, antijam, antiscintillation, voice, and digital data SATCOM using the universal modem system.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11564AO00 EAC SATCOM Terminal Team, AN/GSC-39

5-84. The mission of the SATCOM terminal team, AN/GSC-39, is to provide earth terminal communications as part of the DSCS to establish combatant commander networks and for EAM dissemination, force direction and ITW&A reception, and summary transmissions. The differences between the TOE variants are mainly the sizes of the teams. Refer to current TOE documents for more detailed information.

5-85. The AN/GSC-39(V)1, SATCOM terminal team—

- Provides SHF interfaces to the DSCS that can transmit up to nine communications carriers and receive up to 18 communications carriers.
- Manages assigned communications resources and user priorities.
- Provides survivable, antijam, antiscintillation, voice, and digital data SATCOM using the universal modem system.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11564AP00 EAC Dual-Site SATCOM Terminal Augmentation Team, AN/GSC-39(V)1

5-86. The mission of the dual-site SATCOM terminal augmentation team, AN/GSC-39(V)1, is to provide satellite system operator-maintainer augmentees to a site having two SATCOM systems. The team provides earth terminal communications as part of the DSCS to establish combatant commander networks and for EAM dissemination, force direction and ITW&A reception, and summary transmissions.

5-87. The AN/GSC-39(V1) dual-site SATCOM terminal augmentation team—

- Provides augmentation of SATCOM system operator-maintainers to a site with two SATCOM terminals.
- Provides SHF interfaces to the DSCS that can transmit up to nine communications carriers and receive up to 18 communications carriers.

- Manages assigned communications resources and user priorities.
- Provides survivable, antijam, antiscintillation, voice, and digital data SATCOM using the universal modem system.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11563AZ00 EAC SATCOM Terminal Team, AN/GSC-49(V)3

5-88. The mission of the SATCOM terminal team, AN/GSC-49(V)3, is to provide earth terminal communications as part of the DSCS to establish combatant commander networks and for EAM dissemination, force direction and ITW&A reception, and summary transmissions.

5-89. The AN/GSC-49(V)3, SATCOM terminal team—

- Provides SHF interfaces to the DSCS and a single carrier with beacon and spread spectrum communications tracking. The universal modem system provides conference-selected terminals.
- Manages assigned communications resources and user priorities.
- Provides survivable antijam, antiscintillation, voice, and digital data SATCOM using the universal modem system.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11563AQ00 EAC Mobile Command Support Platoon

5-90. The mission of the mobile command support platoon is to provide combatant commander communications support in the form of secure frequency modulated (FM) radio, UHF TACSAT, and record telecommunications message support.

5-91. The mobile command support platoon—

- Installs, operates, and maintains secure FM radio communications.
- Installs, operates, and maintains UHF TACSAT communications.
- Installs, operates, and maintains record telecommunications message support.
- Installs, operates, and maintains data communications and information systems.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11564AS00, 11567AJ00 EAC Visual Information (VI) Team

5-92. The mission of the VI team is to provide a means to document combat and noncombat Army, joint, and combined operations using film, video, audio, multimedia imaging, and VI equipment. The differences between the TOE variants are mainly the sizes of the teams. Refer to current TOE documents for more detailed information.

5-93. The VI team—

- Operates film, video, and audio equipment to document combat and noncombat Army, joint, and combined operations.
- Operates broadcast, collection, television production, and distribution equipment.
- Installs, operates, and maintains VI equipment and systems to VTC equipment in support of Army, joint, and combined operations.
- Operates electronic multimedia imaging equipment to provide decision graphics and images to Army, joint, and combined operations.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11564AI00, 11567AA00, 11564AJ00, 11566AJ00, 11567AN00 EAC ARFOR Information Support Team

5-94. The mission of the ARFOR information support team is to provide staff oversight and coordination for C4 support to combat and noncombat Army, joint, and combined headquarters. The differences among the TOE variants are mainly the sizes of the teams. Refer to current TOE documents for more detailed information.

5-95. The ARFOR information support team—

- Plans, operates, coordinates, and manages the supported unit's telecommunications systems and information systems support functions for C4.
- Coordinates and directs information processing systems, to include data system studies, and prepares documentation and specifications for proposals.
- Provides oversight of the installation and maintenance of copper and fiber optic cable systems, wire systems (including telephones), repeaters, restorers, voltage protection devices, distribution frames, and related equipment.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11564AQ00 EAC STEP Team and STEP Augmentation Team TOE 11568AE00

5-96. The mission of the STEP team is to provide a tactical interface to the DSCS that establishes combatant commander and JTF networks, and for EAM dissemination, force direction and ITW&A reception, and summary transmissions.

5-97. The STEP team—

- Provides SHF interfaces to the DSCS that can provide simultaneous communications with up to four other terminals.
- Manages assigned communications resources and user priorities.

- Processes multiple, medium, and wideband-digital voice, data, and teletype signals.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11566AN00 EAC Status Control Alerting and Reporting System (SCARS) Team

5-98. The mission of the SCARS team is to provide data transmission and reception of EAM traffic for North Atlantic Treaty Organization (NATO) affiliated organizations.

5-99. The SCARS team—

- Provides only NATO-approved EAM injection into NATO EAM system.
- Links US combatant commander, Europe into the NATO EAM system.
- Provides two-man (NATO) control over system and crypto materiel and equipment.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11563AS00 EAC Direct Support/General Support Electronic Maintenance Team

5-100. The mission of the direct support/general support electronic maintenance team is to provide electronic equipment maintenance of microwave, cable, and wire systems and VI equipment for a geographic area.

5-101. The direct support/general support electronic maintenance team provides direct support/general support level maintenance—

- For a geographic AOR.
- On microwave communications equipment and associated devices.
- On repeaters, restorers, voltage protection devices, telephones, distribution frames, and related equipment.
- On VI equipment and systems to include VTC equipment.

5-102. The team depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11564AB00, 11568AJ00 EAC Electronic Maintenance Team

5-103. The mission of the electronic maintenance team is to provide electronic equipment maintenance of COMSEC, radio, telecommunications, and microcomputer equipment for a geographic AOR.

5-104. The electronic maintenance team—

- Provides electronic equipment maintenance for an AOR with a small volume of equipment.
- Provides direct support/general support level maintenance on radio receivers, transmitters, COMSEC equipment, CCI, and other associated equipment.

- Provides direct support/general support level maintenance on microcomputers, electromechanical telecommunications terminal equipment, facsimile machines, and other associated equipment and devices.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11566AO00 EAC G6 Plans Team

5-105. The mission of the G6 plans team is to provide plans, operations, staff oversight, and coordination for C4 support to Army, joint, and combined headquarters.

5-106. The G6 plans team—

- Plans, operates, coordinates and manages the supported unit's telecommunications systems, and information systems support functions for C4.
- Provides spectrum planning and management.
- Coordinates and directs information processing systems, to include data system studies, and prepares documentation and specifications for proposals.
- Provides oversight of the installation, operation, and maintenance of electronic switches and network operations equipment, radio receivers and transmitters, and other associated equipment.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11566AK00, 11566AO00 EAC CINC Communications Team

5-107. The mission of the CINC communications team is to provide combatant commander communications support in the form of secure FM radio, UHF TACSAT, and COMSEC equipment maintenance. The differences between the TOE variants are mainly the sizes of the teams. Refer to current TOE documents for more detailed information.

5-108. The CINC communications team—

- Installs, operates, and maintains secure FM radio communications.
- Installs, operates, and maintains UHF SATCOM.
- Maintains COMSEC equipment.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11563AG00, 11563AH00, 11567AL00 EAC DMS Service Center (DSC) Team

5-109. The mission of the DSC team is to provide organizational and individual messaging for customers in a regional area. The differences among the TOE variants are mainly the sizes of the teams. Refer to current TOE documents for more detailed information.

5-110. The DSC team—

- Operates and maintains the DMS equipment and ancillary devices.
- Provides organizational and individual messaging to customers in a geographic AOR.
- Performs systems administration and help desk functions for electronic messaging and mail systems.
- Performs COMSEC material management functions and information systems security functions for the DMS.
- Installs, operates, and performs unit level maintenance on the DMS cable and wire communications systems, COMSEC devices, and associated equipment.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11563AN00 EAC DMS Certification Authorization Workstation (CAW) Team

5-111. The mission of the DMS CAW team is to provide DMS COMSEC material support and management for customers in a regional area.

5-112. The DMS CAW team—

- Provides COMSEC material issue and support to DMS users in a geographic AOR.
- Performs COMSEC material management functions and information systems security functions for the DMS.
- Depends on the appropriate organizations for administrative and logistical support and health and financial services.

TOE 11568AG00 EAC Communications Management Support Team

5-113. The mission of the communications management support team is to provide DOD communications support as necessary to assist the United States Secret Service (USSS) perform its protective function.

5-114. The communications management support team—

- Maintains continuous liaison with the USSS.
- Functions as the sole authorized Army activity, in support of a DOD directive, as managed by DISA, to provide communications support for the USSS.
- Arranges for and provides the necessary administrative and logistical support to effectively accomplish the assignments.
- Documents every USSS request to ensure that it accurately reflects the requesting and approving authority.

TOE 11568AH0 EAC Antenna Maintenance Team

5-115. The mission of the antenna maintenance team is to provide general support for emergency and scheduled maintenance services and quality assurance inspections for antenna and antenna support structure for the Army and other government agencies.

5-116. The antenna maintenance team—

- Provides maintenance services for antennas and antenna support structures.
- Provides quality assurance inspection for antenna maintenance services performed by the team or contractors.
- Must be certified as communications cable and antenna systems maintainers with an additional skills identifier of J2.

TOE 11568AK EAC Emergency Action Messaging System Team (EAM)

5-117. The mission of the emergency action messaging system team is to provide a national secure C2 (nuclear/chemical) network used to support the National Capital Region and Air Force Missile Launch Control Centers on a 24X7 basis.

5-118. The emergency action messaging system team—

- Operates and maintains the communications networks for emergency action message system.
- Maintains and disseminates record traffic.

TOE 11XXXXXX RNOSC

5-119. The mission of the RNOSC is to perform NETOPS, providing strategic, reach-back, and sustaining base information and network service to support combatant commanders, organizations, and agencies within the assigned AOR.

5-120. The RNOSC also provides—

- Operations and maintenance of RNOSC-level C4 information systems and services.
- Network management within its area of operation.
- IA operations.
- IDM.
- Single point of coordination for end-to-end connectivity to the GIG and C4 infrastructure for the combatant commander it supports.

TACTICAL

5-121. Due to the fluid nature of modern conflict, theater signal organizations may find themselves operating at or supporting any level of war (strategic, operational, or tactical) regardless of the level for which they were designed. This may change on a day-to-day basis within a single operation or conflict. This manual defines tactical communications as communications systems or networks that enable the exchange of information among mobile deployed forces in an area of operations, and between mobile deployed forces and nondeployed elements. Tactical communications systems are mobile, deployable, quickly installed and disassembled (compared to fixed systems), secure, and durable. The majority of the deployable signal organizations under NETCOM/9th ASC are normally tasked to support warfighter organizations that are nominally at the operational level of war.

SRC 11602L TSC(A)

5-122. Currently, the future roles and missions of the TSC(A) are under review. This review will be heavily influenced by lessons learned from Operation Enduring Freedom, Operation Iraqi Freedom, and the Global War on Terrorism.

5-123. The TSC(A) plans, engineers, and manages the Army's portion of the TIG and provides the G6 staff to the ASCC. The TSC(A) is a MSC of the NETCOM/9th ASC and is under the OPCON of the supported ASCC (with the exceptions noted below for reserve component TSC(A)).

5-124. The TIG must be flexible and responsive to operational changes if the necessary C2 systems are to be available at the right time and place. C2 tools, such as information systems and VTC capabilities, have become increasingly important to the JTF and ASCC commanders. Complex systems such as these require that the TSC(A) early entry module be in the theater early to ensure the commander's C2 requirements are met in the deployment and entry phase of the operation.

5-125. The TOE for a TSC(A) is a headquarters and headquarters company (HHC), which can exercise C2 over a wide variety of other signal organizations.

5-126. The total TSC(A) consists of all operational and strategic level signal organizations within the AOR supporting the ASCC. These organizations may include—

- Multiple theater tactical signal brigades or elements thereof.
- Strategic/Fixed station signal brigade or elements thereof.
- COMCAM company.
- Theater signal maintenance company.

5-127. The actual number of theater signal brigades and the number and type of their subordinate signal units deployed to the theater of operation depend on the METT-TC. Figure 5-4 shows the organization of the HHC TSC(A).

5-128. The HHC TSC(A)'s mission is to—

- Provide C2 and supervision for units assigned and attached to the TSC(A).
- Formulate and implement plans, policies, and procedures for the engineering, installation, operation, and management of assigned portions of the TIG.
- Provide management of the TIG, to include centralized management of voice, data, messaging, and VTC capabilities.
- Provide communications planning and management of special purpose communications/information systems.
- Provide intelligence and security support and oversight to subordinate commands.

- Provide ASCC IA and information protection planning and management for the theater communications system, and support the protect, detect, and react strategies of the Army as directed by the ASCC G6.
- Provide oversight of records management to the ASCC.
- Establish the JCCC, with augmentation from other services, when tasked.
- Provide the Army's portion to the JCCC, when established.

5-129. The TSC(A)—

- Plans, engineers, and manages signal support systems installed by the TSC(A), and network interfaces with systems installed by other units, to include joint, combined, and allied.
- Formulates and implements signal support plans, policies, and procedures for the ASCC. Provides staff management of the TIG, to include theater operational COMSEC, IA, and information protection.
- Provides OPCON over the theater COMSEC Logistics Support Center and other facilities that provide general support/specialized repair activity. Backs up direct support COMSEC maintenance and supply in those theaters where the theater Army area command (TAACOM) TSC(A) does not perform the function.
- Provides the DCSIM staff to the ASCC. This DCSIM staff develops the policies and procedures for using signal support assets within the ASCC. It provides assistance to units within the area of operations and to other ASCC staff elements. The personnel within the DCSIM staff are assigned to the HHC, TSC(A), but they are normally collocated with the ASCC headquarters.
- Exercises staff supervision over the DCSIM staff.
- Provides oversight of records management to the ASCC.
- Provides battlefield spectrum management to include allocation, assignment, and control of radio frequencies for Army, joint, and coalition elements throughout the theater in coordination with host nation agencies, if so tasked.
- Provides communications engineering support and coordination of requirements for special-purpose communications/information systems.
- Provides planning and staff management of the ground mobile forces/TACSAT Theater Satellite Communications Monitoring Center and Army ground mobile forces in the theater of operations.
- Works closely with the DISA concerning DISN.
- Coordinates with the host nation communications organizations for planning and using the assets within the ASCC.
- Provides planning and coordination of TSC(A)'s transportation requirements.

- Provides planning, staff supervision, and implementation of the public affairs program and command information programs for the TSC(A).
- Provides staff supervision, investigation, inquiries, surveys, studies, and reports of inspector general matters within the TSC(A).
- Provides staff supervision of comptroller matters of management consultant services, management surveys, and programming, budgeting, and controlling funds within the TSC(A).
- Provides coordination of operations and planning and evaluates and prepares reports of nuclear, biological, chemical (NBC) activities throughout the TSC(A).
- Provides coordination of engineering support facilities supporting the TSC(A).
- Assists in the coordinated defense of the unit's area or installation.
- Performs unit maintenance on organic equipment.
- Provides management and coordination of volume reproduction units and VI units at EAC.
- Provides staff supervision of software management, to include managing all signal software, managing all noncombatant service support software, and advising the command and staff on automation matters.

5th Signal Command

5-130. The 5th Signal Command is a subordinate TSC(A) of NETCOM/9th ASC and is under the command of NETCOM/9th ASC, with OPCON vested in USAREUR. The 5th Signal commander is dual-hatted as the USAREUR DCSIM. The 5th Signal Command's mission is to provide a combat ready, forward deployed signal force providing responsive theater tactical, strategic, and installation signal support to NATO and US warfighters in the USEUCOM across the spectrum of operations.

311th Theater Signal Command

5-131. The 311th Theater Signal Command is a USAR TSC(A) with the mission to deploy to the theater of operations as a Force Package 1 unit. It performs C2 for assigned and attached signal units and formulates and implements plans, policies, and procedures for US Forces, Korea (USFK) and PACOM C4IM systems. In peacetime, the US Army Reserve Command (USARC) commands the unit. In wartime, the unit is under the command of the NETCOM/9th ASC and under the OPCON of Eighth US Army (EUSA), USARPAC, or a combined or JTF. Also, in wartime the commander of the 311th is dual-hatted as the G6/J6 of the supported force.

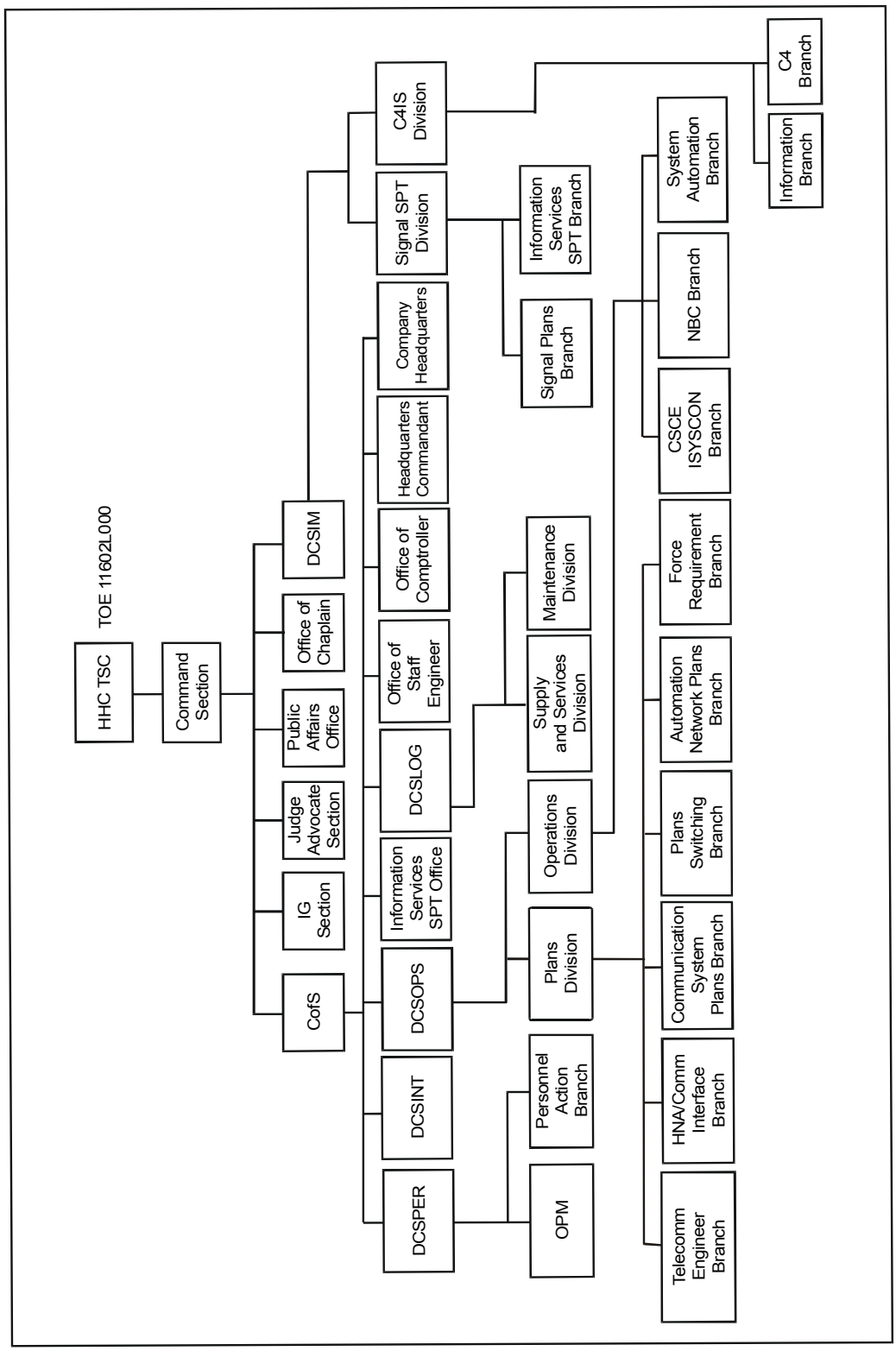


Figure 5-4. HHC TSC(A)

335th Theater Signal Command

5-132. The 335th Theater Signal Command is a USAR TSC(A) with the mission to manage telecommunications infrastructure for Southwest Asia (South Asia, Middle East, North Africa) in support of US Army Forces, Central Command (USARCENT)/Third US Army and Central Command during peacetime and contingency operations. In peacetime, the USARC commands the unit. In wartime, the unit is under the command of the NETCOM/9th ASC and under the OPCON of USARCENT. Also, in wartime the commander of the 335th is dual-hatted as the G6/J6 of the supported force.

TOE 11632 THEATER TACTICAL SIGNAL BRIGADE

5-133. The mission of the theater tactical signal brigade is to command and control two to five signal battalions and other assigned or attached signal forces such as separate companies. These may be ITSBs or any combination of ITSBs, area signal battalions, or composite signal battalions. Figure 5-5 shows the organization of the HHC theater tactical signal brigade.

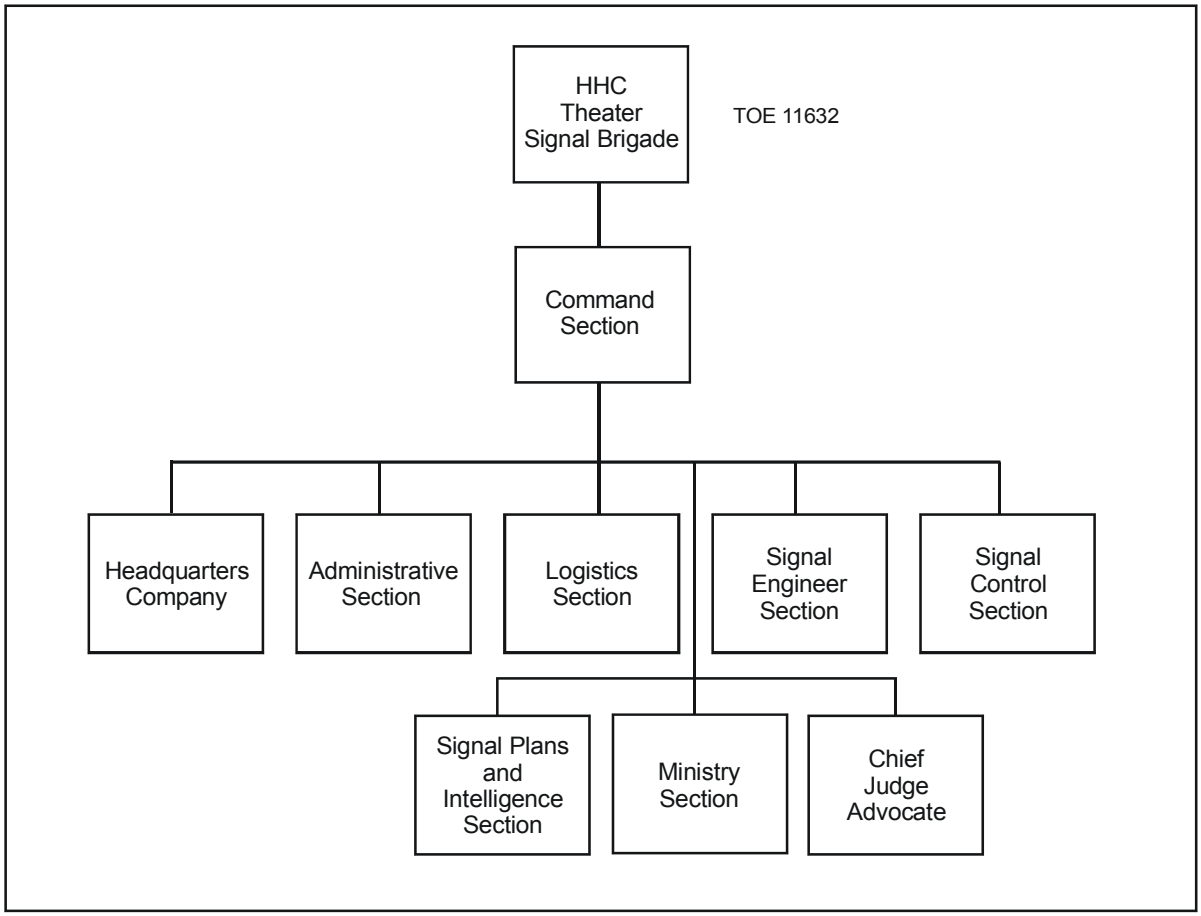


Figure 5-5. HHC Theater Tactical Signal Brigade

Command Section

5-134. This section provides C2 and staff supervision over the HHC theater tactical signal brigade.

Headquarters Company

5-135. The HHC commander is responsible for C2 and coordination of the company's mission.

Administrative Section

5-136. This section operates under the staff supervision of the S1 officer and provides administrative and personnel actions for the entire brigade, advising the commander on all issues pertaining to personnel administration. This section also provides staff assistance to the subordinate units.

Logistics Section

5-137. This section operates under the staff supervision of the S4 officer, and provides staff supervision for all logistics actions and develops logistics plans for the brigade. This section also advises the brigade commander on all matters pertaining to logistics and maintenance.

Signal Engineer Section

5-138. This section is the communications systems planning element for the brigade. It conducts detailed systems engineering studies and develops plans for establishing communications systems. Some of the specific actions performed by this branch include—

- Determining the technical characteristics of circuits.
- Determining equipment suitability and adaptability with existing military indigenous communications systems.
- Ascertaining the types of installations and employment required to provide quality transmission over installed circuits and systems.
- Handling frequency requests and associated records for the brigade units.

5-139. The branch also maintains direct coordination with the communications systems control element (CSCE) section, keeping the section informed of current and future needs for rerouting or reconstituting circuits and facilities throughout the communications system.

Signal Control Section, CSCE

5-140. This section provides effective operational management and responsive systems control. This section's main objective is to optimize the performance of the deployed network in the face of a constantly changing network configuration. A database is established and maintained to assist in near real-time control of communications systems and to assist the signal plans and intelligence section in systems planning and engineering.

Signal Plans and Intelligence Section

5-141. This section plans, coordinates, and supervises the plans and intelligence requirements of the brigade.

Ministry Section

5-142. This section provides religious and welfare support.

Chief Judge Advocate

5-143. This section provides legal services support by personnel of the Judge Advocate General Corps and provides advice and assistance to commanders and staffs on matters concerning operational and administrative law.

1st Signal Brigade

5-144. This theater tactical signal brigade is under the command of NETCOM/9th ASC, with OPCON vested in USFK/EUSA. The 1st Signal Brigade commander is dual-hatted as the EUSA G6. The 1st Signal Brigade's mission is to provide a combat ready, forward deployed signal brigade for responsive theater tactical, strategic, and installation signal support to combatant commanders, United Nations Command, Combined Forces Command, USFK, and warfighters in the EUSA across the spectrum of operations. During wartime, the 1st Signal Brigade comes under the OPCON of the theater signal command for the PACOM or EUSA area of operations.

7th Signal Brigade

5-145. This theater tactical signal brigade is under the command of NETCOM/9th ASC, with OPCON vested in USAREUR. The 7th Signal Brigade maintains a combat ready, forward deployed signal force to deploy, install, operate, and maintain seamless theater tactical information system support to US and NATO warfighters in the USAREUR/USEUCOM AOR.

11th Signal Brigade

5-146. This theater tactical signal brigade is under the command of NETCOM/9th ASC and provides signal EAC support to CENTCOM, USARCENT, and PACOM. The 11th Signal Brigade's mission is to provide support to worldwide contingencies in response to Joint Staff, HQDA, and NETCOM/9th ASC mission directives to install, operate, maintain, and restore C4 systems across the spectrum of conflict. They also provide daily signal and DOIM support in the CENTCOM AOR with the forward stationing of the 54th Signal Battalion.

93d Signal Brigade

5-147. This theater tactical signal brigade is under the command of NETCOM/9th ASC. The commander, 93d Signal Brigade, is dual-hatted as the DCSIM G6, US Army South (USARSO). The 93d Signal Brigade's mission is to provide support to worldwide contingencies in response to Joint Staff, HQDA, and NETCOM/9th ASC mission directives to install, operate, and restore theater tactical communications across the spectrum of conflict.

228th Signal Brigade and 261st Signal Brigade

5-148. These National Guard theater tactical signal brigades are under the command of the National Guard during peacetime. In wartime, the units are under the command of the NETCOM/9th ASC and are assigned in accordance with applicable OPLANS.

359th Signal Brigade

5-149. This theater tactical signal brigade is under the command of USAR during peacetime. In wartime, the unit is commanded by NETCOM/9th ASC and is assigned in accordance with applicable OPLANS.

GBS TIP

5-150. Selected theater tactical brigades are equipped and structured to install, operate, and maintain the GBS TIP. The GBS TIP enables in-theater forces to transmit information via the GBS as opposed to only being able to receive information transmitted by the Primary Injection Points (PIPs) located in CONUS. Currently, the Army has three GBS TIPs. For further information on the GBS TIP, see Chapter 4.

TOE 11XXXXXX ITSB

5-151. The centerpiece of the current force transformation of theater tactical signal units is the ITSB. The ITSB is organized into multifunctional elements, each containing all of the switching equipment, the transmission systems, the data network management systems, and the C2 and data network management resources that comprise a complete signal node. This is a fundamental shift from battalions containing single function companies (for example, SATCOM or TROPO companies) such as the composite signal battalions that are among the structures being replaced. The ITSB differs from the area signal battalions being replaced in that it is multifunctional to a lower level and to a greater degree. (The theater area signal battalion is multifunctional in that it incorporates both transmission, switching, and systems control assets.) The ITSB incorporates BLOS systems, wideband data, and computer network management capabilities into its design that are not present and/or not integrated in the designs of the structures it replaces.

5-152. The multifunctional nodal structure of the ITSB reflects a train-as-you-fight and organize-as-you-fight philosophy. This alleviates one of the greatest difficulties of the current structures which is to task organize from multiple organizations to form a single communications node to support a single customer enclave. Under such conditions, C2 of the node is an ad-hoc and often fragmented arrangement. Under ITSB, the entire node is under the command of one organization. That organization is the same organization that lives together and trains together in garrison and field environments. Therefore, unit cohesion is enhanced.

Operation Enduring Freedom

The scenario below is representative of deployments that have occurred since Desert Shield/Desert Storm.

Beginning in November 2001, elements of a theater signal battalion were tasked to relieve elements of the Special Operations Signal Battalion in Afghanistan. The signal battalion being relieved was supporting a Special Operation Forces headquarters, with a normal (to the customer) array of voice, SIPRNET, NIPRNET, message, and voice capabilities. The relieving unit was to expand this operation to support two additional headquarters. The scope of support was to be expanded to include VTC and DRSN. An additional requirement was to quickly commercialize the operation, especially the satellite transmission services in order to free up tactical signal assets for follow-on deployments.

To assemble a team with the required skill sets to provide these services, the relieving signal battalion had to create a task organization of 50 personnel (which later grew to 75) from eight companies spread over three battalions and four commands.

The only available sources for key pieces of up-to-date equipment required to provide these services were COTS items. No suitable type-classified items existed. Hence, no suitable items were on the TOEs for the two battalions. These critical pieces of equipment were acquired by or for both units at different times and places using a variety of contingency funds and redirection of operational funds. Soldiers were not school trained on this equipment. Unit training required for individuals was of the magnitude and nature of full major upscale military occupational specialty (MOS) changes (for example, 71L Administrative Specialist and 31L Cable Systems Installer-Maintainer to Information Systems Operator-Analyst [then 74B, now 25B]).

The COTS equipment sets developed by the two battalions were not the same, even though the functionalities provided were similar. Because the equipment was not the same, instead of being able to fall in on the equipment in place and assume the mission, the relieving battalion had to be trained by the battalion being relieved. This made personnel from the battalion being relieved unavailable for other missions.

The challenges posed by these ad-hoc task organizations and equipment sets were overcome by the extra-ordinary efforts of the soldiers on the ground and the planners and leaders who supported them. This degree of improvisation and task organization should not be considered a model for future operations.

5-153. The ITSB design facilitates deployment planning. The ITSB engineers, installs, operates, and maintains up to three major and 12 extension command, control, communications, computers, and information technology nodes in support of the combatant commanders of unified or specified commands, ASCC, or JTF/JFLCC. The ITSB basis of allocation is one per JTF/JFLCC, one per ASCC, and one per 15 supported headquarters.

5-154. One of the training benefits of multifunctionality is that it is only necessary to assemble a platoon or a company in order to train end-to-end systems level tasks. In single functional organizations, it was often necessary to assemble an entire battalion or brigade to train this level of tasks. Another benefit of multifunctionality to the company and platoon level is that it trains leaders faster in a systems view of communications than single function units. This prepares a base of highly qualified, versatile leaders for higher echelons as those leaders advance in their careers. Appendix E provides an illustration of a sample network configuration. The focus of this figure is equipment employment; it does not represent any particular organization or scenario.

Organizational Description

5-155. The mission of the ITSB is to provide the capability to engineer, install, operate, and maintain up to three major and 12 extension multifunctional C4 information technology nodes in support of customer organizations as tasked. ITSB support to the customer is tailored based on factors such as the number of geographically separate enclaves that must be supported, the number of telephone and data subscribers, the telecommunications and information technology services required, and the bandwidth required. Typical customers of the ITSB include the combatant commanders of unified or specified commands, ASCC commanders, or JTF/JFLCC.

5-156. The ITSB will typically be assigned to theater tactical signal brigades, although it may be assigned or attached to other higher-level organizations as well.

5-157. The ITSB and its subordinate companies are multifunctional organizations that are designed in a modular fashion. Modules are designed around communications nodes so that support to the customer can be easily tailored in a scalable fashion by deploying the required number of nodes.

5-158. Each node module includes voice switching and data networking capabilities, along with a mixture of transmission systems such as SATCOM, TROPO, and LOS. Deployed or detached nodes operate under the same internal chain of command as they live and train within garrison and in non-detached status.

5-159. The ITSB supports the doctrinal objectives of enabling reach-back support and enabling a similar level of electronic information services, as does the garrison environment for its supported customers. This is accomplished through the wide-band SATCOM and TROPO systems organic to each nodal module and by the integrated data networking and voice switching systems and operators organic to each nodal module. The SATCOM systems provide the capability to link back to the sustaining base as well as provide other C2 linkages. The TROPO systems support this requirement by providing intra-theater BLOS linkages to other nodes with reach-back links in cases where reach-back links are consolidated. Planning ranges for TROPO systems are generally 150 kilometers for the heavy variant and 100 kilometers for the lighter version.

5-160. The SATCOM and TROPO systems organic to the various nodal modules support the warfighter in the enclave style deployments of the nonlinear, noncontiguous battlefield. These systems provide the wideband links needed for inter-enclave communications when enclaves are deployed at greater than LOS distances from each other. Although LOS is heavily terrain dependent, maximum LOS distances are typically considered to be 30 to 40 kilometers.

5-161. The ITSB is composed of a battalion HHC and three companies. Alpha or Bravo companies are identical, while Charlie Company is slightly heavier in terms of switching, TACSAT, and LOS, as well as having the TMS for the battalion and heavy versus light TROPO.

HHC

5-162. The ITSB HHC provides for C2, staff planning, and supervision of a battalion consisting of the three companies to include any augmenting units, personnel, or material assets. The HHC also provides administrative and logistical support for the battalion to include: unit administration for assigned or attached units; staff supervision of signal, automotive, power generation, and environmental control equipment; and coordination of bulk fuel resupply for all units assigned to the battalion. Figure 5-6 depicts the organization chart for the components of the HHC.

Alpha and Bravo Companies

5-163. Alpha or Bravo companies are comprised of the same elements and are identical in all functional areas. They consist of a company headquarters platoon, an area node platoon (light), an extension node platoon (light), and a data cable and wiring (DCW) platoon. Figure 5-7 depicts the organization chart for the components of the Alpha or Bravo Company.

5-164. **Company Headquarters Platoon**. The company headquarters platoon provides for C2, staff planning, and supervision of a company consisting of three platoons to include any augmenting elements, personnel, or material assets. The headquarters platoon provides limited administrative and logistical support of the company, which includes unit administration for assigned or attached elements, supply support, NBC support, and weapons support. The company headquarters performs unit level and direct support maintenance on all organic communications-electronics (CE) and COMSEC equipment. The company headquarters also performs up to organizational level maintenance on all organic automotive, power generation, and environmental control equipment and provides for organic food service in both field and garrison environments. The battalion HHC augments the company headquarters.

5-165. **Area Node Platoons.** The area node platoons provide the services and soldiers to maintain and deploy two TROPO teams AN/TRC-170(V)3, a data team, a LOS supervisory team with two multichannel teams AN/TRC-138 and two multichannel team AN/TRC-174, a telephone switchboard team AN/TTC-56, and a TACSAT team AN/TSC-85C.

5-166. **Extension Nodes**. The extension nodes provide the services and soldiers to maintain and deploy two telephone switchboard teams AN/TTC-48C(V)4, two multichannel teams AN/TRC-173B, two data packages, and two TACSAT teams AN/TSC-93C.

5-167. **DCW**. The DCW will provide the services and soldiers to maintain and deploy two DCW sections each containing two DCW teams.

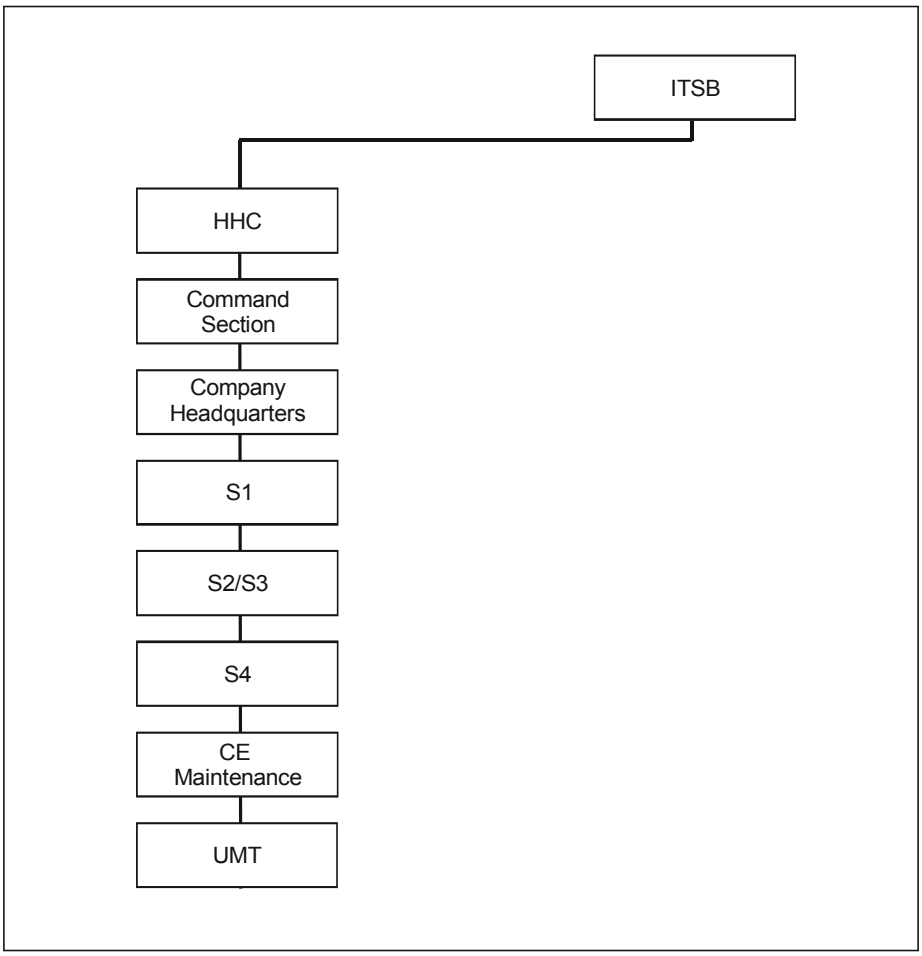


Figure 5-6. HHC Organizational Chart

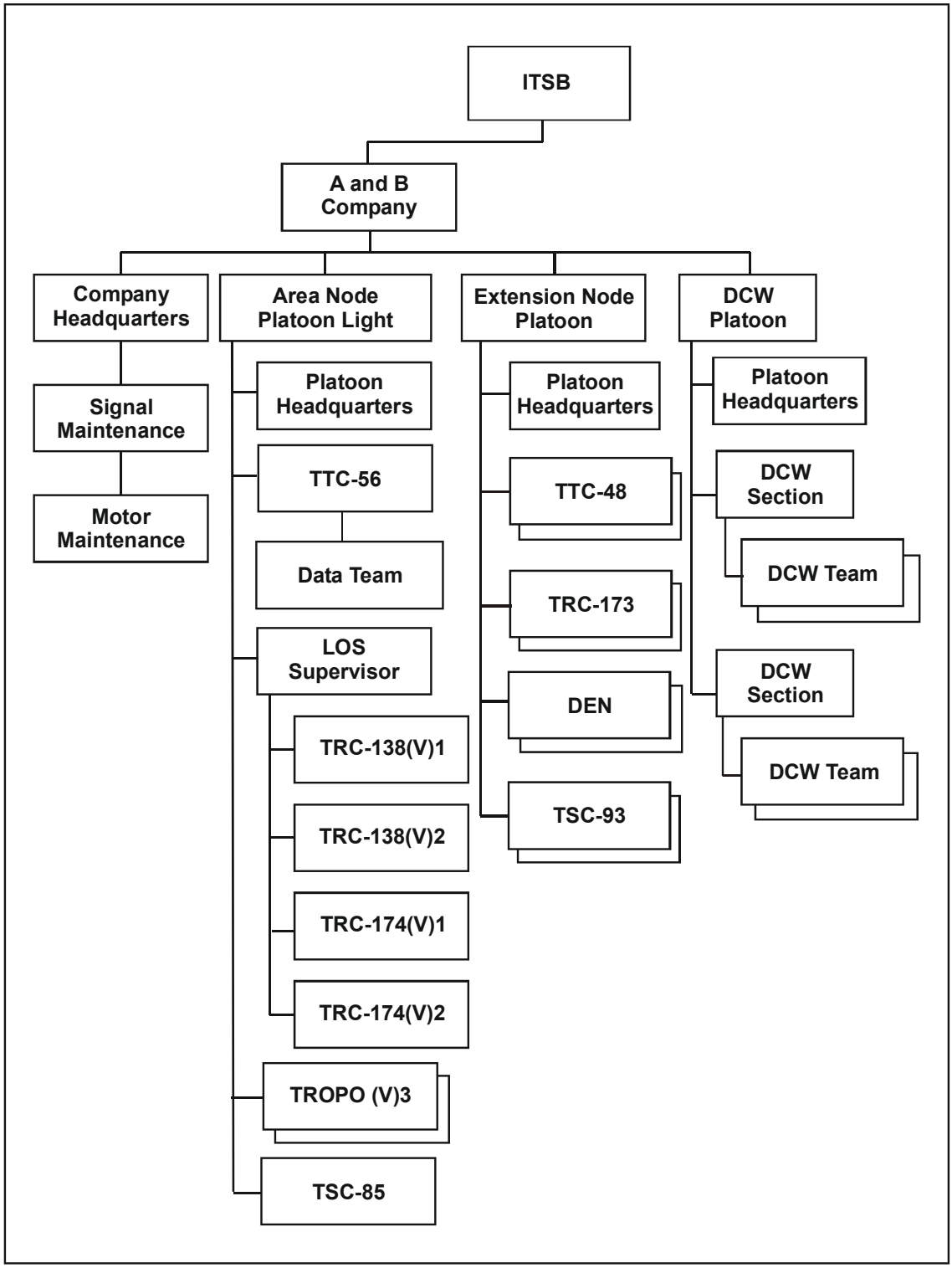


Figure 5-7. Alpha and Bravo Company Organizational Chart

Charlie Company

5-168. Charlie Company is comprised of many of the same elements as Alpha or Bravo companies and provides the same functional services, but is able to support a larger operation in terms of end-users and equipment. Charlie Company consists of a company headquarters (headquarters) platoon, an area node platoon (heavy), an extension node platoon (heavy), and a DCW platoon.

5-169. **Company Headquarters Platoon**. The company headquarters provides for C2, staff planning, and supervision of a company consisting of three platoons to include any augmenting elements, personnel, or material assets. The headquarters platoon provides limited administrative and logistical support of the company, which includes unit administration for assigned or attached elements, supply support, NBC support, and weapons support. The company headquarters performs unit level and direct support maintenance on all organic CE and COMSEC equipment. The company headquarters also performs up to organizational level maintenance on all organic automotive, power generation, and environmental control equipment and provides for organic food service in both field and garrison environments. The battalion HHC augments the company headquarters.

5-170. **Area Node Platoon**. The area node platoon provides the services and soldiers to maintain and deploy a TROPO supervisory team with three TROPO teams AN/TRC-170(V)3, a data team, an LOS supervisory team with two multichannel teams AN/TRC-138C and two multichannel teams AN/TRC-174B, a telephone switchboard team AN/TTC-56, a TACSAT team AN/TSC-85C, and a TMS team.

5-171. **Extension Node Platoon**. The extension node platoon for Charlie Company provides the services and soldiers to maintain and deploy three telephone switchboard teams AN/TTC-48C(V)4, a LOS supervisory team with three multichannel teams AN/TRC-173B, two BBNs, and two TACSAT teams AN/TSC-93C.

5-172. **DCW Platoon**. The DCW will provide the services and soldiers to maintain and deploy two DCW sections that each contains a DCW team.

5-173. Figure 5-8 depicts the organization chart for the components of Charlie Company.

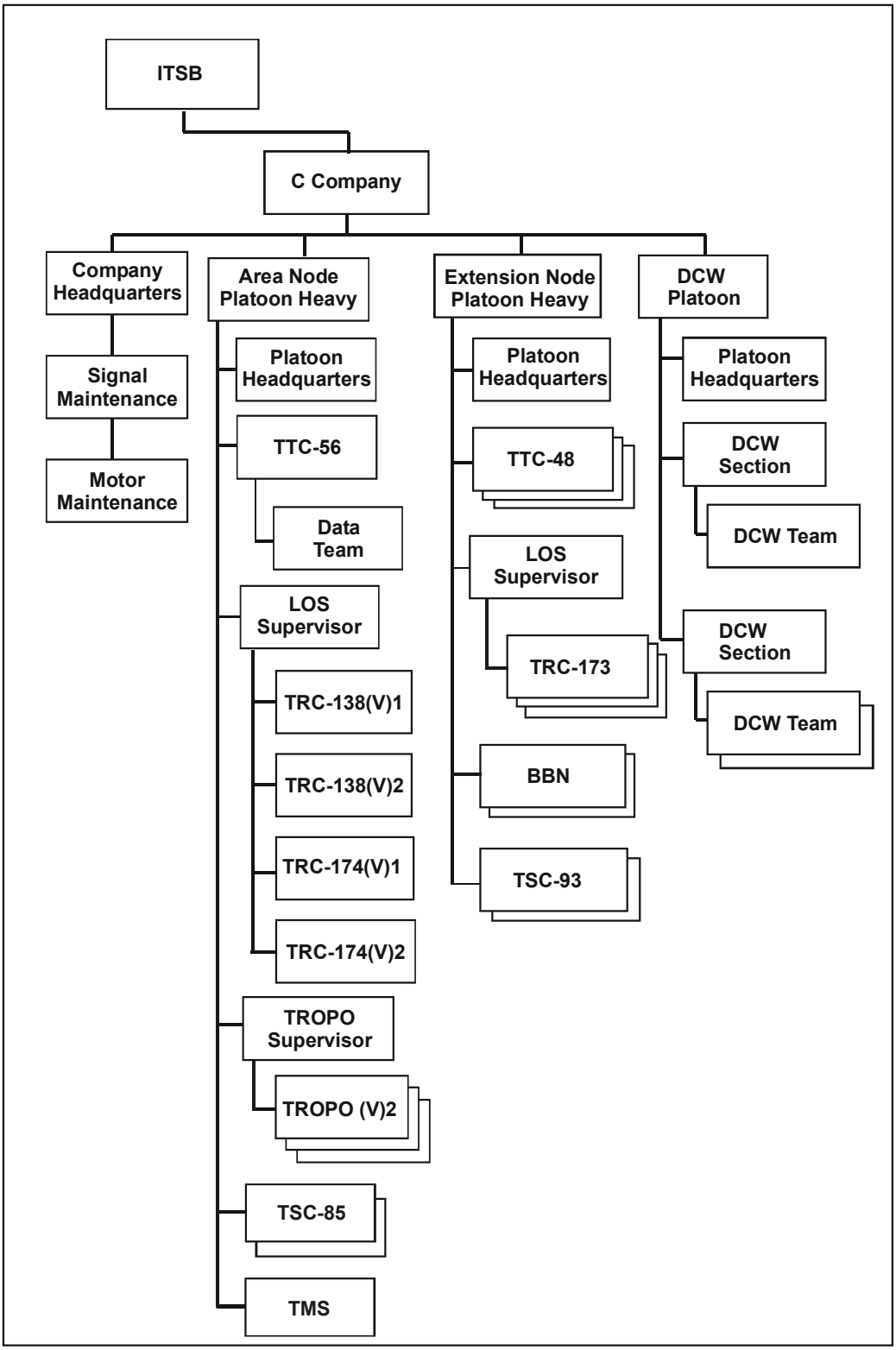


Figure 5-8. Charlie Company Organizational Chart

TOE 11XXXXXX TIN COMPANY

5-174. The TIN Company grew out of a need to provide responsive and agile advanced network installation services for critical missions such as Defense Communications System (DCS) restoral and for elements occupying fixed or semi-fixed facilities. In contrast to the cable and wire companies that it replaces, the company has the technical expertise and equipment to configure and operate computer network LANs and WANs. Replacement of cable and wire companies is not on a one-for-one basis.

Organizational Description

5-175. The mission of the redesigned TIN Company is to deploy in support of combatant commands, JTF, JFLCCs, ASCC, and TSC(A)s. The TIN Company provides rapid DCS installation and restoral. The TIN Company provides follow-on tactical support to signal packages for semipermanent/permanent tactical automation, network installation, and information system support utilizing user provided bill of materials. The TIN Company also provides quality assurance testing and handoff coordination.

Concept of Operations

5-176. One (or more) TIN Company deploys to an area of operation. The company is attached under the OPCON of a higher Army signal unit or G6 staff section or under an organization responsible for joint communications until an Army signal headquarters deploys into theater.

5-177. TIN Company headquarters—

- Assesses mission requirements and assists in building the Bill of Materials.
- Provides technical expertise to interpret and implement engineer implementation plans for communication systems.
- Advises the supported commander on aspects of network installation to include inside plant, outside plant, LAN installation and initialization, and DCS restoral.
- Performs quality assurance testing and handoff of installed and restored systems.

5-178. TIN platoons—

- Install, maintain, and repair aerial, buried, or underground cable, wire, and fiber optic transmission systems.
- Repair and maintain indigenous cable, wire, and fiber optic systems, and provide antenna and tower construction and repair.
- Provide LAN installation and cabling.
- Provide automation support to include LAN initialization, network security, DMS, DRSN, SIPRNET, NIPRNET, and VTC.
- Install or restore the DSCS terminal.
- Install or restore a strategic to tactical interface path.

5-179. Platoons/Sections/Teams can operate autonomously to support battlefield enclaves. The TIN Company can also deploy tasked organized teams, sections, or platoons to support SSC in CONUS and OCONUS.

5-180. Figure 5-9 is the organization chart for the components of the TIN Company.

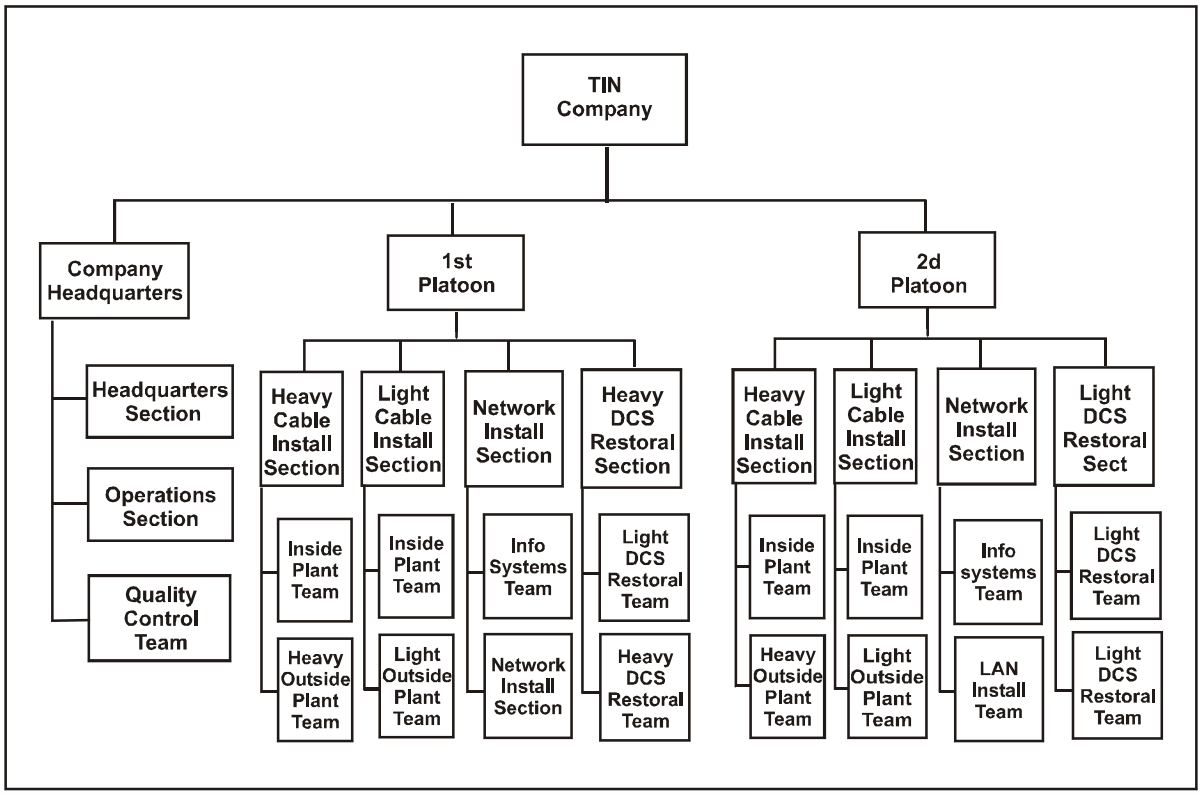


Figure 5-9. TIN Company Organizational Chart

5-181. The TIN Company has the capability to restore or install critical pieces of the DCS, which include the DSN, the DSCS, and the DISN. It brings software application expertise, network installation and administration, and information system security support to the battlefield. A thorough planning phase must identify work requirements, specific core competencies, an estimated Bill of Materials, and personnel requirements. This company must be trained, equipped, and prepared to deploy anywhere in the world to support a wide range of information requirements. It serves as a springboard for organic theater communications and information systems providers, assisting in the integration of reinforcing signal forces for the warfighting commander. The TIN Company is designed to assist the gaining command in three main areas of information system support: automation, network installation, and DCS restoration.

TOE 11690A COMCAM

5-182. The COMCAM mission is to provide documentation covering air, sea, and ground actions of armed forces in war, MOOTW, catastrophes, natural disasters, and training activities (such as exercises, war games, operations, and peacetime engagements). It allows C2 and management authorities not at the scene to visualize the essence of ongoing activities. Its primary use is as an operational decision-making tool and does not include imagery specifically acquired by intelligence activities.

5-183. COMCAM documentation is an essential battlefield information resource that supports strategic, operational, and tactical mission objectives. Sharing COMCAM documentation, as required, simultaneously supports the operational and planning requirements of commanders and decision makers from the warfighter through National Command Authority levels. It is a fundamental tool for commanders and decision makers that, when utilized properly, is an effective combat multiplier.

5-184. The theater operational commander determines collection requirements based on local mission objectives and is the releasing authority for all COMCAM imagery.

5-185. At the theater level, the COMCAM Company is attached to the TSC(A) and is collocated with the ASCC G3, with the TSC(A) providing electronic maintenance support.

5-186. Figure 5-10 depicts the organization chart and the components of the COMCAM Company.

5-187. The COMCAM Company provides the following capabilities to the theater:

- Staff planning, control, and supervision of the operations of the company, to include any augmenting personnel or materiel assets.
- COMCAM equipment maintenance by on-site repair, replacement, or evacuation to civilian contractors.
- Liaison to supported units, joint collection management tool (JCMT), and other service COMCAM elements.
- Capability of landing by parachute when organized to support airborne operations.
- Establishment, operation, and maintenance of COMCAM facilities supporting the theater and subordinate tactical command post headquarters. This includes—
  - COMCAM editing for the electronic processing of digital still and motion imagery acquired by organic documentation teams, weapons system video, or other COMCAM field units located in the theater area of operation.
  - Operating support facilities to provide tailored still and motion media products, graphics products, narration support, and video reports on short suspense.
  - Presentation and exploitation of visual imagery in support of operational requirements.

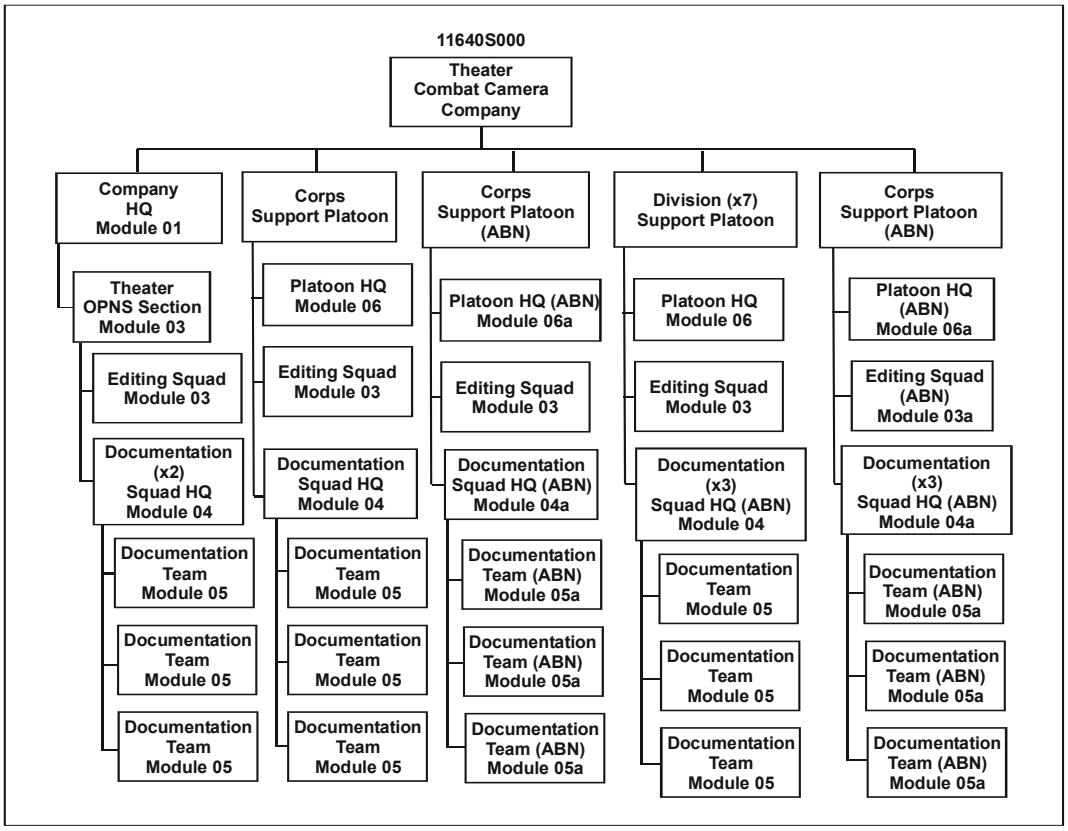


Figure 5-10. COMCAM Organizational Chart

5-188. COMCAM platoons support operational requirements and provide continuous COMCAM documentation for historical purposes, to include ground and aerial documentation/acquisition of visual imagery. Transmission is accomplished via the most reliable transmission means available: combat net radios (CNRs), single-channel TACSAT radios, LANs, or DSN and commercial telephone lines.

TOE 43648A TACTICAL SIGNAL MAINTENANCE COMPANY

5-189. The following paragraphs discuss the tactical signal maintenance company.

Mission

5-190. The mission of the tactical signal maintenance company is to provide CE general support level maintenance for a TSC(A). The tactical signal maintenance company is assigned to a theater area support group, TOE 63622L, normally attached to a headquarters and headquarters detachment, theater signal battalion.

5-191. The tactical signal maintenance company provides—

- C2 for three signal support maintenance platoons, TOE 43568LA00.
- An automated test equipment diagnostics and repair facility.

- A theater record of COMSEC.
- Limited direct support maintenance capability for ground support equipment for each signal brigade.

5-192. Figure 5-11 shows the organization of a tactical signal maintenance company.

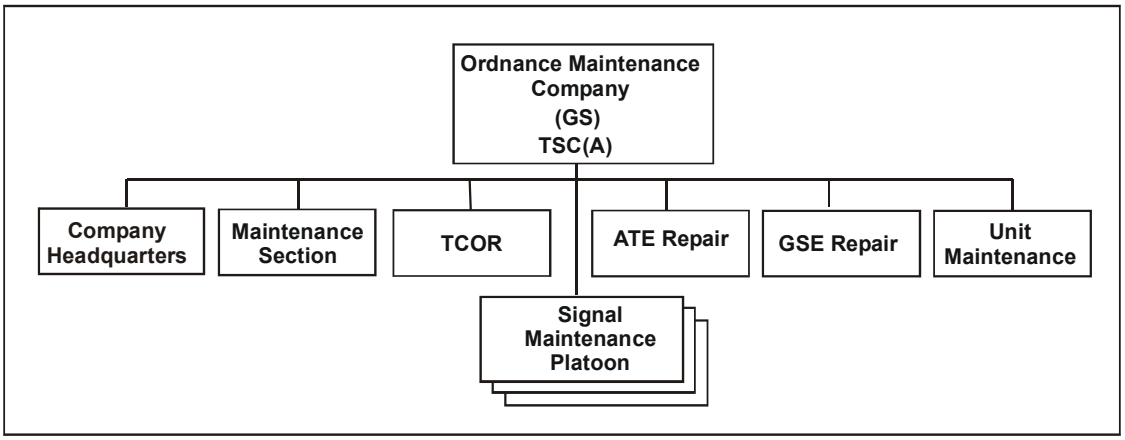


Figure 5-11. Theater Signal Maintenance Company Organizational Chart

TOE 43468A TACTICAL SIGNAL MAINTENANCE PLATOON

5-193. The following paragraphs discuss the tactical signal maintenance platoon.

Mission

5-194. The mission of the tactical signal maintenance platoon is to provide dedicated sustainment maintenance and Class IX supply support for unique tri-service tactical communications (TRI-TAC), mobile subscriber equipment (MSE), computers, and conventional communications/electronics end items and components for a TSC(A) signal brigade. The tactical signal maintenance platoon is assigned to a theater signal maintenance company (gs) normally attached to a signal battalion.

5-195. The tactical signal maintenance platoon provides—

- CE repair capability.
- Class IX supply support.
- Maintenance on COMSEC equipment.

5-196. The tactical signal maintenance platoon provides—

- Appropriate elements of the theater Army for religious, legal, combat health support, finance, personnel and administrative services, and supplemental transportation support.
- The composite signal battalion for food service support.
- The parent company headquarters, TOE 43648a000, or the signal battalion for unit maintenance.

5-197. Figure 5-12 shows the organization of the theater signal maintenance platoon.

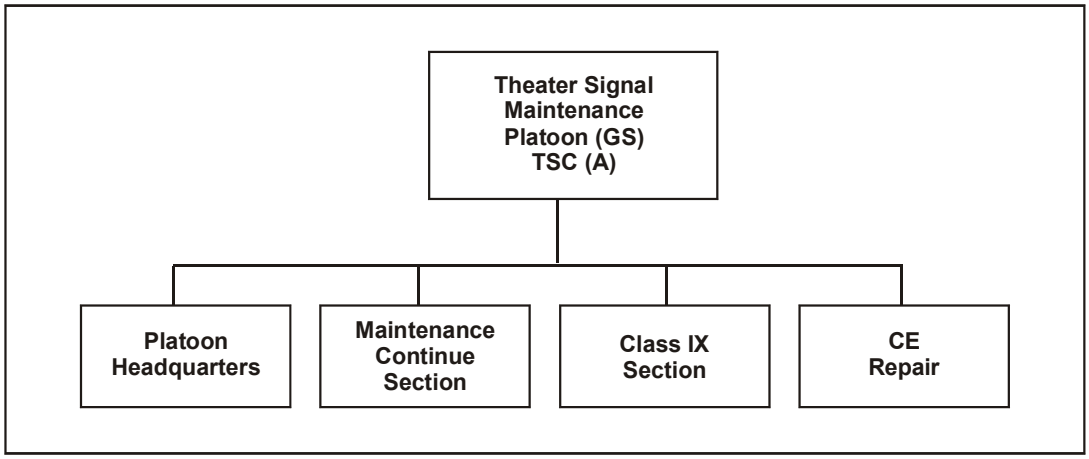


Figure 5-12. Theater Signal Maintenance Platoon Organizational Chart

1ST SATELLITE CONTROL (SATCON) BATTALION

5-198. The 1st SATCON Battalion's mission is to provide communications network and satellite payload control of the DSCS for the National Command Authority (NCA) and joint warfighters. The seven critical defense information systems networks routed through the DSCS constellation are DSN, DMS, VTC, DRSN, Telemedicine, SIPRNET, and NIPRNET. Figure 5-13 shows the organization of the 1st SATCON Battalion. The following paragraphs describe the tasking, mission, and capabilities of the 1st SATCON Battalion.

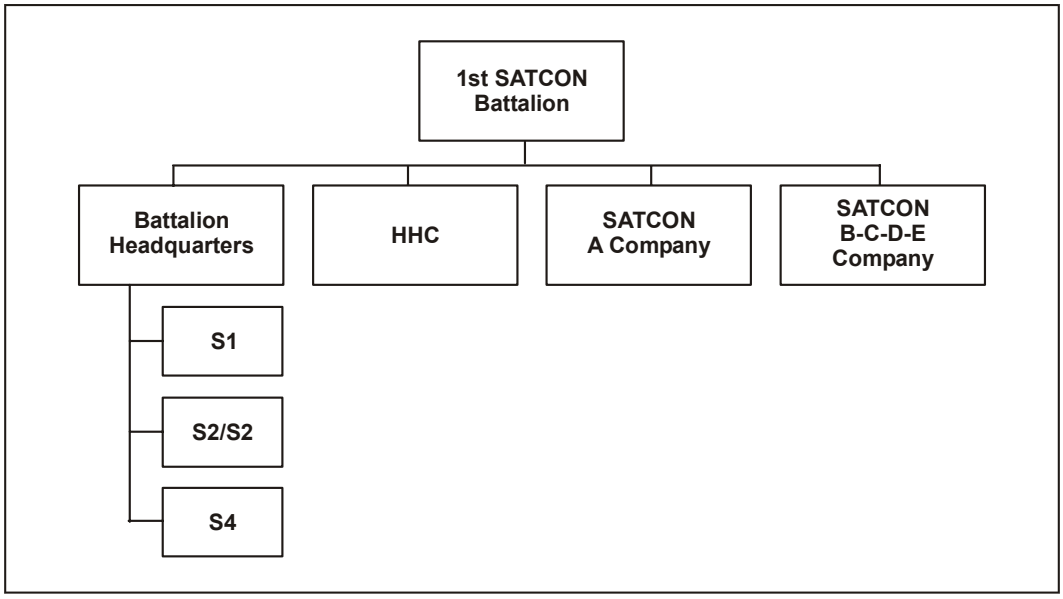


Figure 5-13. 1st SATCON Battalion

BATTALION HEADQUARTERS

5-199. The battalion headquarters provides C2, services, support, and staff assistance for the five DSCS Operations Center (DSCSOC) companies (A–E) located worldwide and the HHC containing the DSCS Operational Control System Certification Facility (DCF).

S1

5-200. The S1 provides administrative services for the operational companies. While the companies receive some administrative service at their deployed locations, the S1 retains a major role in supporting its companies. The S1 coordinates the assignment of 31S soldiers throughout the battalion and closely manages assignments of 31S soldiers with the additional skill identifier of 1C. Additionally, awards, leaves, evaluations, and personnel actions normally accomplished in a battalion remain within the S1's scope of support.

S2/S3

5-201. The S2/S3 provides training and certification for satellite controllers and is responsible for verification of all certification of assigned personnel.

S4

5-202. The S4 maintains oversight of logistical systems in all of its forward deployed companies. The companies receive some support at their deployed locations, to include supply and maintenance of common military systems and equipment. However, the unique components comprising the satellite control system are beyond the capability of those locations to support. Additionally, the logistic sections provide contract management and oversight.

HHC

5-203. The HHC contains the battalion staff elements and the DCF, whose unclassified mission is to operate, maintain, and sustain three contingency DSCS platforms to provide network, payload, and platform control of the DSCS satellites as directed by the NCA.

Companies A, B, C, D, and E

5-204. Companies A, B, C, D, and E have the same mission to provide communications network and satellite control of the DSCS satellites. A Company is structured at a higher strength than the other companies because it has additional DSCS control equipment and a greater capacity for monitoring satellites, thus requiring more personnel to accomplish the control mission. Companies B through E are structured at the same level.

Appendix A

Emerging Systems and Concepts

This appendix examines high-level trends as well as technological sustainment considerations that are likely to affect theater signal organizations and planners. It suggests trade-offs that should be considered by planners of future theater signal forces and equipment. Where possible, it identifies key indicators that may signal the need for future changes or serve as barometers for the magnitude of those changes. These indicators are not prescriptive. The drivers of change are categorized as user requirements/opportunities and signal-specific requirements/opportunities.

USER DRIVEN FUTURE CHANGES

A-1. Many of the future changes that will affect theater signal will be directly attributable to user requirements. These requirements can be broadly categorized as technological and organizational/operational.

TECHNOLOGICAL

A-2. For the purpose of this discussion, user driven technological changes relate to technologies and factors that are directly visible to the user. Users will tend to adopt these technologies on their own based on their obvious potential for operational benefits, or be forced to adopt them to avoid obsolescence. Users will often adopt technological changes first and then seek signal support later. The following paragraphs discuss technological changes.

Leveraging of Technology

A-3. The Army continuously seeks to gain operational advantage through the leveraging of technology. Wireless data communications technology is a major area for which there is continuous and increasing pressure for expansion.

A-4. The most prominent requirement for wireless technology is to enable higher and higher echelon headquarters to command and control their subordinates while on the move. The challenges to the Signal Corps include selecting technologies that will fit in available RF spectrum, selecting computer operating systems and network management systems that can adapt to rapidly changing network topologies, and providing services in a reliable and secure manner.

A-5. Installation time/materials/manpower savings over stationary radio systems and wire and cable are also factors that drive requirements for wireless services.

A-6. Opportunities to make scarce areas of expertise available further forward on the battlefield will drive communications-based reach-back support applications such as telemedicine and other forms of teleexpert.

A-7. Enhanced collaboration tools will drive Army requirements as they are developed and adopted in the civilian world and in garrison.

A-8. Army organizations will be directly driven by requirements to maintain compatibility with e-government initiatives. The Army interfaces with other DOD and non-DOD government agencies at all levels (local through federal) for a myriad of functions ranging from support relationships to legal and regulatory compliance. The Army must maintain the ability to interface with these agencies in their normal way of doing business.

ORGANIZATIONAL/OPERATIONAL

A-9. Organizational/Operational changes are those that do not have an obvious technological factor directly driving them. Changes in the user organizational structure or operational practices can affect communications and information service requirements even if these changes are not directly attributable to technological factors. An example of such a change is the shift in emphasis from the contiguous battlefield to the noncontiguous, enclave-oriented battlefield. Another example would be the introduction to or elimination of echelons from the C2 structure.

A-10. Unit of action (UA)/Unit of employment (UE) is a concept that is currently being explored by the Army. This concept includes making organizations smaller, more deployable, agile, capable, and intrinsically joint. This could potentially result in the elimination of a layer of C2, which would cause a reduction in the number of signal links needing to be established and maintained on the battlefield, and a corresponding reduction in the size and/or number of signal units in the force.

A-11. The purpose of this manual is not to endorse or dispute any of the proposals under consideration, but to project some of the possible implications of these concepts to signal support.

UA

A-12. A UA is defined as a brigade size fighting force that will be able to operate and maneuver rapidly anywhere within a 75-kilometer (47-mile) radius of its parent unit. A major signal impact of this is that 75 kilometers (47 miles) is BLOS communications range.

A-13. The intent is for organic and user-owned and -operated equipment to completely satisfy UA communications requirements, and UA communications and information services to be operated on the move.

A-14. The laws of physics dictate a trade-off among the parameters of useful bandwidth, available RF spectrum, and the directionality of antennas. The omni-directional antennas likely to be chosen for on-the-move operations will make less efficient use of available RF spectrum. Competition among users for available spectrum will increase.

A-15. One projection is that the additional combat capabilities and expanded area of interest/area of influence of the UA will drive requirements to provide JWICS connectivity down to the UA level.

A-16. If or when the UA/UE concept is adopted, these changes will not occur instantaneously across the board. Existing forces will co-exist with UA/UE structures for a period of several years. Often, with the adoption of new doctrine with a new force structure, the old generation forces must implement as much of the new doctrine as they can (within technological limitations) during the transition period. If a current combat arms brigade is required to operate in a similar manner to a Stryker or future force UA, then there is a greater signal impact. Current combat arms brigades do not have sufficient organic communications and information services to execute this concept. They especially do not have sufficient BLOS multichannel capability. To come close to exercising the UA profile, a current brigade would require signal augmentation. By normal command and support relationships, the first choice for this augmentation would be the signal battalion of the parent division, or a signal battalion of the parent corps. Because current division and corps level signal battalions are limited in BLOS capability compared to theater signal units, the task is likely to be assigned to a theater signal unit. The modularity of the ITSB makes it a good candidate to provide such augmentation.

UE

A-17. The UE is a headquarters element that will command, control, and support several UAs with the capability to serve as a joint or coalition headquarters. UEs that are built from the ground up are expected to have sufficient organic communications resources to execute the concept.

A-18. As with the UA, it is almost a certainty that current organizations will remain in the force structure for several years during the transition period. In a similar manner, it is likely that these current organizations (corps and division headquarters) will be expected to seek creative ways to implement as much or the new doctrine as possible prior to being converted to the new structure.

A-19. Theater signal units are likely to be tasked to fully support corps and division headquarters operating as quasi-UEs or to augment their organic communications capabilities. Providing signal support to a corps or division headquarters operating in a UE mode is little different than supporting a traditional theater headquarters. Theater signal forces are already structured for this, making the transition transparent to them. The limitations in BLOS capability at corps and below make augmentation of organic signal assets a likely scenario. The modular structure of the ITSB makes this augmentation easily tailorable.

SIGNAL SPECIFIC TECHNOLOGICAL OPPORTUNITIES AND TRENDS

A-20. There are several technological trends that are likely to impact the Signal Corps in general and theater signal in particular, which are less visible to the nonsignal user. These behind-the-scene technologies enable the Signal Corps to perform its job.

BLOS OPTIONS

A-21. The increased demand for BLOS service forces the Signal Corps to investigate options for increasing this capability. The following paragraphs discuss some of the options available for providing BLOS.

TROPO

A-22. TROPO is not as versatile as, nor does it have the range of, SATCOM. Thus, previous Army decisions have been to focus on SATCOM. However, TROPO is a proven technology that has the potential to support selected links and reduce the demand for scarce satellite bandwidth. To maintain the viability of TROPO, recapitalization will be necessary to improve equipment reliability and logistic supportability, and to reestablish schoolhouse training.

Low Earth Orbit (LEO) Constellations

A-23. In addition to the familiar use of military and civilian geostationary satellites, there is discussion of establishing additional constellations of LEO that would operate in a manner similar to IRIDIUM. Such constellations could provide additional bandwidth and on-the-move capability. Systems design considerations include:

- Omni-directional antennas to adapt to the moving satellites will result in lower bandwidth than what could be obtained with directional antennas.
- If directional antennas are used, they will require tracking mechanisms with wide ranges of motion. These would be more expensive to acquire and maintain than antennas with limited or no tracking mechanisms.

Airborne Relays

A-24. Concepts for airborne relays are not new. The increased demand for BLOS bandwidth combined with limitations on the availability of satellite bandwidth may drive adoption of one or more systems of airborne relays.

A-25. Many signal planners are aware that availability of bandwidth in the space segment of SATCOM systems is a major consideration, as well as the availability of earth terminals. What is less often considered is that parking space in geostationary orbit for new satellites is also a constrained resource. If satellites are placed too close together, multiple satellites will be illuminated by the beam width of a single ground station antenna. Planners cannot automatically assume spending enough money to put up more satellites will increase that available space segment bandwidth. This manual does not attempt to predict when the geostationary parking space resource will become saturated. Changes in the allocation of frequencies for SATCOM and advances in the technologies that enable efficient use of RF spectrum (for example, modem and multiplex technologies) will affect the saturation level of this resource. Signal planners making long-term technology decisions must consider the question of saturation of orbital parking space for systems and operational concepts that would increase the number of orbital platforms.

A-26. Airborne relay concepts include both stationary and nonstationary platforms. Key system design considerations for airborne relay systems are discussed below.

A-27. As with satellite systems, nonstationary airborne platforms will require ground stations to have either omni-directional antennas or directional antennas with tracking mechanisms. This creates a trade-off between cost and bandwidth. Nearly the same trade-off applies in the case of mobile ground users and stationary airborne platforms. The difference is that there is some possibility of frequency reuse through strategically positioning the stationary airborne platforms and using tracking antennas on the mobile ground stations.

A-28. Stationary platforms such as tethered aerostats or high altitude lighter-than-air ships with good station keeping capability can be equipped with relays that are compatible with existing multichannel TACSAT or LOS ground stations. The ground stations can continue to use their fixed or relatively fixed directional antennas (in some cases, SATCOM ground antenna systems have tracking systems with limited ranges of motion in order to deal with slight imperfections in satellite orbit). Ground stations would become dual use. In the case of SATCOM compatible relays on the aerial platforms, the platforms would be deployed in a manner that the antennas of all the supported ground stations would be pointing in directions well away from the orbital plane of satellites. This would enable the ground stations to reuse the satellite frequencies without creating interference.

A-29. Physical security must be planned for airborne relays. This is not meant to imply that security is impossible, or that the costs would outweigh the benefits. Asymmetric threats must be given special consideration in the cases of stationary or nearly stationary platforms. It does not require a missile, manned aircraft, or a gun to attack such a platform. A radio controlled model airplane loaded with incendiary material could be carried to altitude by weather balloons and then released, posing a serious threat to a lighter-than-air ship.

ADVANCED CABLE AND WIRE CAPABILITIES

A-30. Advanced cable and wire capabilities will remain a requirement for theater signal units for the foreseeable future. The proliferation of personal computers and other automation systems on the battlefield will continue as the Army pursues its goal of becoming a network-centric force. These computers will have to be integrated into LANs and WANs. This requires high quality cabling, both metallic and fiber. A user who previously required only a telephone will require a telephone and at least a NIPRNET connection. Many will require SIPRNET connections as well. Due to the added complexity of data cabling, this results in approximately a threefold increase in wire and cable installation over the telephone.

A-31. This requirement will only be partially mitigated by wireless networking technologies. This is not to say that Army use of wireless networking technologies will not or should not increase. Planning for adoption of wireless networking capabilities must take into consideration the following inherent limitations:

- Availability and application of encryption technologies for wireless links is a consideration. Although encryption technology is becoming more conveniently available to battlefield automation users, it still requires planning and detailed system design work to make it a reality.
- Jamming technology that would be effective against wireless networking can be assembled from inexpensive, simple, and readily available components. Disposable jammers could be packaged as small as hand grenades and still have several hours of battery life. Such devices would be a highly asymmetric threat to US forces operating in an urban environment. In such an environment, it is often necessary to permit normal civilian traffic very close to the facilities occupied by US forces. An enemy could conceal several such devices within effective range of the US-controlled buildings, and deploy replacements as the batteries run down. Because of its small size, even small pieces of trash would provide effective hiding places for the devices. If the United States were to deploy hand-held direction finding equipment suitable for finding and disabling disposable jammers, the task would be a significant drain on the scarce manpower of the small-footprint forces planned for the future. Such disposable jammers could easily incorporate or be deployed with booby traps, further increasing the threat to US personnel.
- The availability of supporting spectrum space will always be a consideration in the adoption of wireless technologies.
- Electronic signature generated by wireless networking can be a consideration depending on the technology level of potential adversaries.

A-32. Cable and wire systems are not subject to the limitations listed above.

EQUIPMENT DOWNSIZING AND MULTIFUNCTIONALITY

A-33. Current trends for miniaturization of components and downsizing of equipment are expected to continue. This will integrate more functions into single boxes and shelters. Integration of voice switching and data networking capabilities with transmission systems in single shelters will enable Army signal units to become lighter and deploy with reduced footprints.

A-34. This increased density of functions within single shelters will pose new training challenges to theater signal since individual soldiers must acquire the skills to operate all of these functions because there is not room in the shelter for the number of operators that previously performed the functions. This is likely to lead to the redefinition of existing MOSs or the establishment of new ones.

WIN-T

A-35. The WIN-T is the Army's future tactical deployed communications network. The original Warfighter Information Network (WIN) concept was developed in the 1994-1995 timeframe. The first WIN-T operational requirements document (ORD) was written as a replacement system for the current MSE/TRI-TAC networks and was Joint Requirements Oversight Council approved on 12 December 2000. The original ORD, written before the Army Transformation initiative, was optimized for the defense, was TOC centric in nature, called out a requirement for shelters, had limited information dissemination capabilities, had limited handheld capabilities, and required terrestrial and manned relay sites.

A-36. Beginning in October 1999, the Army leadership began a process that is designed to make the force lighter, quicker to deploy, and more strategically responsive worldwide. Operational vignettes using future force offensive concepts, highlighting the qualities of increased mobility over greater operational distances, and relying on real-time situational awareness exposed that the Joint Requirements Oversight Council approved WIN-T requirements would not deliver the desired future force capability. As a result, the WIN-T ORD underwent a significant rewrite in January 2002 to focus the requirements for an offensive-oriented, highly mobile future force. The new ORD defines requirements in very broad, conceptual terms. It specifically outlines requirements and avoids any suggestion of how to satisfy the requirement. Table A-1 highlights the major differences between the two ORDs.

Table A-1. Major Differences Between Old and New WIN-T ORDs

Old ORD	New ORD
• Focus on Force XXI • TOC centric • Optimized for defense • Interoperability (joint, allied, and coalition)	• Focus on future combat system, UA, and UE concepts • Commander centric: mission command • Optimized for offensive operations • Survivability: low probability of intercept/low probability of direction • Sensor to shooter • Integrated command, control, communications, computers, intelligence, surveillance, reconnaissance (C4ISR), and maneuver • Enhanced versatility (joint, allied, and coalition) • Adaptability (modular, tailorable, and scalable)

A-37. The end state for the WIN-T ORD is to describe a requirement for an integrating communications network—scaleable, modular, and easily upgradeable—for the future force units of purpose that bridges the sustaining base to the tactical communications network. The ORD will also support Army command of joint and combined task forces (for example, JTF, JFLCC, CJTF, and Commander Forces Land Component Command). The overarching challenge is to provide a highly mobile capability for UA and some UE, as well as provide the static, fixed infrastructure that supports large command posts at the ARFOR/JTF echelon.

A-38. It is also important to note that the WIN-T fielding is not dependent on the Army Transformation, future combat system, or Future force force design updates. The Signal Corps will field WIN-T as an Future force system and/or as a replacement for the current MSE/TRI-TAC systems. WIN-T is also the replacement communications system for the TROJAN SPIRIT (TS-SCI).

A-39. **General Capabilities**. WIN-T is the integrating communications network for the future force. It will integrate and synchronize the overall network infrastructure and services by providing the high speed and high capacity backbone network and overarching NETOPS functionality. The paragraphs below discuss the general capabilities of the WIN-T.

A-40. Transmission systems include:

- SATCOM:
  - Ka, Ku, UHF, X, and C bands (includes an on-the-move capability).
  - GBS.
- High capacity LOS (on the move):
  - Wideband network waveform.
  - Tactical Common Data Link.
- Secure wireless LAN.
- Airborne communications relay payload.
- Personal communications device (PCD).

A-41. NETOPS includes:

- Network planning/management functions:
  - Plan and manage transmission systems.
  - Plan and manage WIN-T services.
  - Monitor the WIN-T network and interfaces.
  - Configure and reconfigure the WIN-T network and interfaces.
  - Plan and allocate IP addresses.
  - Plan and allocate spectrum for the future force network.
  - Provide bandwidth management, policies, and procedures.

- IDM:
  - Plan and manage IDM policies and user profiles.
  - Implement quality of service.
  - Provide interoperability with the GIG and other services.
- IA:
  - Plan, configure, manage, and monitor IA systems.
  - Access control lists.
  - Coordinate firewall policy.
  - Establish demilitarized zone (DMZ) architecture.
  - Implement DOD PKI and Electronic Key Management System systems.

A-42. End user devices include:

- Secure and nonsecure phones.
- VTC conferencing units.
- PCDs.

A-43. Additional capabilities include dynamic spectrum management and opportunistic use of RF spectrum, advanced antenna technology, multiband, multimode, steerable, and self-aligning. The actual implementation of the above capabilities is entirely contractor dependent. The basis of the ORD is to provide an overarching requirement. The challenge of the contractor is to decompose the requirement into an architecture that supports all of the tenets of the future force and the WIN-T ORD.

A-44. Because fielding schedules are fluid and can be changed by a variety of unpredictable factors such as budget priorities and program slips, this manual does not project a fielding schedule for WIN-T.

A-45. The ongoing challenge to signal planners and materiel developers is to achieve the goals of the program with technology that is current as of the date of fielding and to maintain currency of technology during the life of the system rather than the date of program initiation. Success of the program will be determined by its ability to meet this challenge.

QUALITY OF SERVICE AND BANDWIDTH MANAGEMENT

A-46. Network converged services have been facilitated by exponential growths in bandwidth availability in the commercial and consumer environment. Tactical bandwidth requirements have followed the same trend, but unfortunately, bandwidth availability has not maintained a commensurate pace. In addition, network converged services are much more dependent upon and susceptible to anomalies in network quality, including continuous bandwidth availability, network latency, delay, and jitter. Network acceleration and compression technologies have been exploited to help offset the lack of bandwidth, but together these accomplishments only provide a band-aid to a larger and more pressing problem. The available bandwidth must satisfy the critical warfighter requirements, and in the

tactical environment, this requires establishing and implementing network wide quality of service policies and procedures.

A-47. Fortunately, many of the most critical warfighter service requirements are typically low bandwidth in nature and have a higher likelihood of operational success in an austere environment if they have the requisite priority for transport. Bandwidth management and quality of service provide the means to do just this by allocating bandwidth as appropriate based on a network-wide quality of service policy and managing bandwidth distribution between users and/or applications.

A-48. Currently, standards-based, quality of service implementations are still not widely rooted in the commercial environment. In addition, many proprietary solutions to network tagging and bandwidth acceleration have gained wide acceptance but lack any basis of interoperability.

A-49. One potential quality of service solution that emerging programs (WIN-T and JTRS) are evaluating is differentiated services. Differentiated services (RFC 2474/3168/3260) are realized by mapping the code point contained in the IP packet header field to a per-hop behavior at each network node (router) along its path. Per-hop behaviors will be implemented by employing a range of queue service and/or queue management disciplines on a network node's output interface queue. However, service providers are not required to use the same node mechanisms or configurations to enable service differentiation within their networks, and are free to configure the node parameters in whatever way that is appropriate for their service offerings and traffic engineering objectives. The signal community must standardize on nodal parameters to ensure a consistent configuration across the WAN.

A-50. In the near future, the signal community will soon be faced with the challenge of maintaining and enforcing quality of service across the network. In much the same way that TTPs are associated with firewall planning, quality of service planning will become a prerequisite to routine network operations. However, as contrasted to firewall planning (identifying users and application ports), quality of service planning will encompass much more fidelity, including identifying and prioritizing users, identifying critical applications, and establishing the quality of service requirements. Recognizing this challenge, future programs of record like the WIN-T and JTRS participate in a Department of the Army G6 chaired working group to identify the candidate standards and protocols (including quality of service implementations) to ensure there is a network-wide standard for implementing a quality of service policy.

EVERYTHING OVER IP - NETWORK CONVERGENCE

A-51. Based on the warfighter's increased adoption of COTS products and services, and a trend to increase mobility and reduce command post size and infrastructure, it is natural that deployed services follow commercial trends of network convergence. Network convergence is the trend whereby services that were previously provisioned over separate infrastructures tend to consolidate upon established protocols (IP in the de-facto case) and thus are candidates for delivery over the same IP infrastructure. Whereas previous dynamic bandwidth allocation between separate network infrastructures

required comprehensive and complicated underlying multiplexing architectures (for example, asynchronous transfer mode), convergence upon IP as the common transport lends itself to natural dynamic bandwidth allocation, contingent upon successful policy-based management of the quality of network services.

A-52. Network convergence also offers many additional benefits from a warfighter perspective. Individual services such as voice, video, data, and intercom that previously required separate and distinct cabling infrastructures can now be consolidated on a single cable. This consolidation results in a significant cost and manpower savings, reduces the cabling infrastructure in command posts, and thus the set-up and teardown times, and enhances overall mobility. Additional benefits may be realized in reduced personnel training and management of a signal underlying IP.

IP TUNNELLING TECHNOLOGY

A-53. There will be an increase in IP tunneling technology to create virtual private networks for various communities of interest and to pass higher levels of classified/compartmentalized information through networks of lower levels of classification. IP tunneling technology will be a large factor in solving the problems of providing TS/SCI service to the users who require it.

SUSTAINMENT

A-54. Some technological changes will be driven purely from a sustainment perspective, that is, to allow users to continue operation at their present levels of effectiveness.

A-55. Army users are driven by the same factors that drive civilian users to adopt technological advances just to stay on par with their environment. In many instances, staying on par for the Army relative to both friendly organizations and potential foes will entail the adoption of new capabilities such as enhanced collaboration tools as mentioned above.

A-56. Frequent hardware and software upgrades will be required just to maintain present basic user collaboration capabilities. Such capabilities include such simple things like exchanging documents and files efficiently with other organizations. When other organizations have upgraded to more advanced versions of word processors, spreadsheets, or other applications, an organization may have no choice but to upgrade to maintain compatibility. Even though many upgraded applications have file formatting options to retain a measure of backwards compatibility, an organization cannot afford the inefficiency of having to frequently call other organizations back to request that documents or files be resent in down-level format. To avoid such disruptions, the Army will need to stay at or near the leading edge of new releases of basic tools such as word processors, spread sheets, and presentation tools (for example, PowerPoint).

NOTE: Centralized software acquisition and support under Enterprise Systems Management is expected to alleviate many of these potential problems from an Army-internal perspective. The planners and leaders who make upgrade decisions at the enterprise level should consider the factors listed in this section.

A-57. Some hardware and software upgrades will be driven by what is available in the market. As equipment wears out, modernization may be forced on organizations because the old model is simply no longer available or cannot be supported with repair parts. Likewise, additional licenses of the old software may no longer be available. Organizations will sometimes be forced into across-the-board technology upgrades just to maintain internal compatibility.

A-58. Applying a best value for cost philosophy is a useful predictor of future investment levels required to maintain the present level of functionality (such as file sharing compatibility). If purchasing adequate new hardware and software for a desktop work environment costs X dollars today, then whatever the best value available in the marketplace at the next upgrade cycle is likely to be pretty close to what that user needs to remain at the same level of functionality and compatibility with the outside environment. Flat line budgeting does not necessarily allow for keeping up with advances adopted by peers and for maintaining operational advantages over potential opponents who may be budgeting for more than status-quo.

A-59. In addition to interfaces with government agencies, nearly all Army organizations have requirements to access commercial Web sites in order to conduct their business. Logistics elements in particular need to be able to access the Web sites of civilian contractors as well as government supply agencies. Army organizations will upgrade their hardware and software as required in order to maintain compatibility with their outside world. They will demand communications and information services comparable with competitive civilian businesses.

A-60. Linking this need to maintain compatibility to civilian Web site practices provides a useful barometer for the baseline of Internet bandwidth required for Army customers. Civilian Web site operators, particularly those engaged in e-commerce, design their Web pages so that they will download at a speed that is regarded as acceptable to their typical customers. For example, if their customers are using dial-up Internet access, the vendors will adapt their Web page designs so that they will not lose business to customer annoyance at excessive download times. If or when the typical customer has greater bandwidth, vendors will add features to their Web pages to take advantage of this capability while staying within the bounds of customer tolerance.

A-61. This is not to say that the baseline of Army user Internet bandwidth requirements should be the same as typical household bandwidth. An Army supply clerk may need several times as much bandwidth with the corresponding greater download speed in order to process his required number of transactions in a day. What it does mean is that if typical civilian customer bandwidth goes up by a factor of two, and Web page size goes up

correspondingly, then Army users are likely to need to double their Internet access bandwidth in order to process the same number of transactions per day as before.

INFORMATION DISSEMINATION MANAGEMENT – TACTICAL (IDM-T)

A-62. IDM-T is the tactical implementation of the DISA-developed IDM services, orchestrated through the IDM-T Program Office at Fort Monmouth, New Jersey. It uses a set of Web-based tools to locate and deliver information products to tactical users, managing information flow over available communications. IDM-T enables the intelligent transport of information from multiple sources to the appropriate tactical user via both "push" and "pull" techniques.

A-63. The IDM-T software infrastructure consists of commercial and government software packages, and currently resides on a ruggedized Sun-based server in a TOC, with LAN and satellite-based communications interfaces. Users access the IDM-T server via a standard Web browser (for example, Internet Explorer) on a laptop or desktop computer connected through the tactical LAN.

A-64. The four key IDM-T operational concepts include:

- A unit-tailored IDM-T portal that provides an operational capability to meet staff information requirements and battle rhythm timed information exchanges through a standard Web browser interface, increasing the warfighter's ability to exchange critical information quickly and easily.
- A unit-tailored channel structure that controls the flow of information, allocates communications resources, and prioritizes information flow, enabling implementation of the Commander's Dissemination Policy.
- Information exchange through publish, subscribe, and alert functions that enable users to send and receive critical information to the right staff member at the right time, without the overhead of managing large, dynamic distribution lists on both classified and unclassified networks.
- Directory replication that enables large directories of information to replicate automatically from rear servers to forward units via optimized routing over high speed links, reducing traffic and bandwidth needs on lower-speed tactical LANs.

A-65. IDM-T is currently being integrated with the GBS for the management of information products received over GBS transmission facilities. A single server will host both IDM-T and the GBS receive broadcast manager. The combined architecture will provide the following capabilities:

- Document management and information dissemination.
- Enhanced information search capabilities.
- Information categorization and storage.
- Product and mission profiling as well as product advertising.

A-66. As a key enabler of information superiority objectives, IDM-T provides for information awareness, access, delivery, and support services. The vision of the IDM-T program is to support the disadvantaged user with wideband transport of critical situation awareness products. As IDM-T doctrine and technologies mature, they will continue to play a critical role for current, Stryker, and future forces.

Appendix B

Selected Lessons Learned from Operation Enduring Freedom and Operation Iraqi Freedom

The collection and analysis of lessons learned from Operation Enduring Freedom and Operation Iraqi Freedom are ongoing processes, just as the operations themselves are ongoing as of the September 2003 writing of this manual. This appendix is not a complete set of lessons learned. Instead, it focuses on selected lessons learned that are already influencing signal doctrine and force structure.

FORCE PROTECTION ON A NONCONTIGUOUS BATTLEFIELD

B-10. The noncontiguous battlefield and guerrilla environments of Operation Enduring Freedom and Operation Iraqi Freedom have highlighted force protection requirements for theater tactical signal units that are much greater than those that were projected, equipped for, and trained for under Cold War doctrines. The following paragraphs discuss some of these requirements.

EQUIPMENT

B-7. Based on experiences from Operation Iraqi Freedom, theater signal support personnel accompany combat arms units during the performance of their duties. An example of this occurred when theater signal units accompanied combat elements of the Third Infantry Division on the march to Baghdad. To ensure that signal troops receive adequate protection from small arms fire, they require the same protective individual equipment (for example, body armor) as the combat forces. This is in contrast to the Cold War norm that assumed that theater signal units would locate and operate only in protected, rear areas. Force development planners need to ensure that this equipment is included in requirements documents (TOE) and authorization documents (MTOEs).

B-8. On the nonlinear battlefield, there are no protected rear areas; everywhere is the front-line. Theater signal units require robust weapons (for example, heavy machine guns, automatic grenade launchers, night vision devices, and weapon sights) for self-defense, both during convoy movement and at the halt. Ideally, possessing the appearance and equipment of a formidable defense can be a deterrent to an attack. Signal soldiers need and deserve every edge that robust weaponry provides if and when a battle occurs. Force development planners need to insure that this equipment is included in requirements documents (TOE) and authorization documents (MTOEs).

TRAINING

B-9. Weapons qualification and combat-worthy weapons proficiency are not the same. True weapons proficiency is not a task to be set-aside after obtaining annual qualification. Weapons proficiency must be cultivated as a way of life, much like personal physical fitness. Commanders, leaders, and planners must provide both personal example and resources (range time, funds, instruction, and ammunition) to make this happen.

B-10. All unit members should be trained, qualified, and proficient on all unit-crew served weapons in addition to their individual weapons. Both primary and alternate weapon crew members pull shift, go on sick call, and are often detailed to jobs away from the vicinity of their assigned weapons and/or the signal site, they get hurt, and even killed. With the demands of normal signal operations and the turmoil of battle, primary and alternate weapons crews are not sufficient to ensure that weapons will be manned and effective during battle.

B-11. Land navigation proficiency is equally as important as weapons proficiency. The combat arms forces supported by personnel assigned to theater tactical signal units have fully embraced the operational capabilities that the GPS offers, allowing them to rapidly and accurately move over vast distances of featureless terrain, sometimes with limited map coverage and under conditions of limited visibility. Operational doctrine and planning require theater tactical signal units to keep pace while avoiding or bypassing enemy strong points and maneuvering around minefields and other obstacles. While the ability to navigate and negotiate obstacles on the battlefield has always been critical, it was never more evident than during the tragic ambush of the 507th maintenance company during Operation Iraqi Freedom when the company missed a turn at a road intersection ventured into uncleared territory.

B-12. Proficiency with the GPS does not replace or reduce the requirement for proficiency with maps and compasses, nor does it reduce the requirement to issue and carry maps and compasses in sufficient quantities. Many of the GPS sets likely to be encountered in signal units have either inadequate map storage and display capability or no map storage or display capability at all. Knowing the numerical coordinates of a position will not provide the critical information obtained from a map. Maps can provide you with information about terrain within the vicinity of your location, the location of nearest bridge, enemy positions or obstacles, or identification of the road on which you are traveling. Proficiency with both GPS and maps enables theater signal units to move about with the same speed and accuracy as the force they support.

B-13. Effective unit employment of GPS is as much a leader and staff function as an individual skill. Leaders and staff members must be thoroughly familiar with the strengths, nuances, and potential pitfalls in the employment of the technology in order to make effective plans and to train their subordinates in its proper use. The need to develop detailed familiarity with the technology and the need to develop and train TTPs that compensate for its nuances are shown in the following examples.

B-14. Some techniques for designating waypoints are more precise than others. For example, designating a waypoint by range and bearing from a known waypoint is less precise than recording it directly or plotting it on a map and reading the coordinates from the map. The greater the range from the known waypoint, the greater the potential error when the waypoint is used. Many GPS sets only display to the nearest degree. At long distances from the reference waypoint, the distance represented by this +/- ½ degree can be significant. If an off-set technique is used to mark a road junction and the bearing is not at or near right angles to the road, the error along the road can be significantly greater than the normal high degree of accuracy that users expect of GPS and enough to cause the user to take a wrong turn. Using the wrong technique can lead to a dangerous false sense of security.

B-15. Under conditions of operational stress and fatigue and conditions of difficult navigation, turnoffs and jogs in the road are often easily missed. Marking turns in the route with GPS waypoints and then providing subsequent nearby waypoints along the direction of the turn is a useful technique to reduce this confusion. In contrast, if only major changes in the general direction of the route are marked, soldiers could easily miss a short dogleg in the desired route and end up in a minefield or hostile neighborhood. While numerous factors contributed to the ambush of the 507th Maintenance Company, a preliminary after-action report indicates that only a smaller number of more general waypoints were programmed into the unit GPS set(s) in the area of a critical missed turn. Under these conditions, the GPS sets would have indicated that the unit was still heading in the general direction of the next waypoint even after the turn was missed. The full potential of the available GPS sets to avert missed turns was not realized.

B-16. The above examples are only a small sample of possible pitfalls and compensating techniques in the use of GPS. Leaders at all levels must study the technology thoroughly and practice with it frequently to develop the complete understanding and intuitive feel for its strengths and weaknesses required to fully realize its potential as a combat multiplier and life saver.

SITE DEFENSE PLANNING

B-17. Signal unit defense plans must consider the nature of signal operations, organizations, and the equipment to be realistic and effective. Only under certain circumstances are the personnel of a typical signal unit or node enough to maintain a perimeter large enough to adequately protect all of the unit's systems. Even under such ideal instances, units would find great difficulty manning the entire perimeter and manning all of its communications systems concurrently.

B-18. The mathematics to calculate the potential for a signal unit to establish and maintain a perimeter is fairly simple. Generally, two-person fighting positions should be placed approximately 20 meters (66 feet) apart, and single-person positions may be placed about 10 meters (32 feet) apart. These distances provide reasonable assurance that enemy soldiers will not be able to infiltrate between the positions while facilitating battlefield tasks such as redistributing ammunition, replacing fallen individual soldiers or fallen crew members on crew-served weapons, communicating with adjacent positions, and rendering first aid to injured soldiers in adjacent positions. Greater

distances interfere with these functions. Frequently, terrain, weather, visibility, and other factors dictate closer spacing. The diameter of the perimeter can be calculated by multiplying the number of positions that the unit can man by the spacing and dividing by 3.14.

B-19. When a signal site is established with 50-meter (164 feet) spacing between systems so that a single mortar round will not cause damage to more than one system, the size of the site rapidly grows beyond the capacity of the unit to man an effective perimeter.

B-20. Vehicular-mounted communications systems project large silhouettes and are extremely vulnerable to small arms and indirect fire. When at a semipermanent or permanent halt, often the most prudent defensive measure would be to place these systems in buildings or field fortifications, rather than relying on dispersion for protection. This approach also has the advantage of facilitating a smaller, more manageable and defensible perimeter.

B-21. Clustering with other units at the semipermanent or permanent halt can provide a common defensive perimeter. Since most combat support and combat service support organizations also have defensive problems, such clustering is mutually beneficial. The exception to clustering as a norm would be when the enemy has sufficient electronic warfare capability coupled with adequate firepower to threaten clustered units based on information gathered from the electronic signature of the signal unit. In such cases, commanders must make their decisions based on their assessments of the relative severity of the different threats.

Appendix C

Organizations Being Phased Out

This appendix lists the force structures being phased out as a result of the transition to the ITSB structure and organizations being phased out for other reasons.

FORCE STRUCTURES BEING PHASED OUT

C-1. The following organizational structures are being phased out as a result of the transition to the ITSB structure.

SIGNAL BATTALION (COMPOSITE), TOE 11626L

C-2. This unit's mission is to provide C2 of assigned or attached units. This unit—

- Provides C2, staff planning, and supervision of a signal battalion, consisting of two to five companies.
- Maintains a consolidated property book for assigned units.
- Supplements an assigned unit with food service and motor maintenance support.
- Provides religious support for the battalion.
- Provides a unit maintenance technician (light), who is responsible for ensuring that maintenance is correctly performed in the unique communications companies.

C-3. Figure C-1 shows the signal battalion (composite).

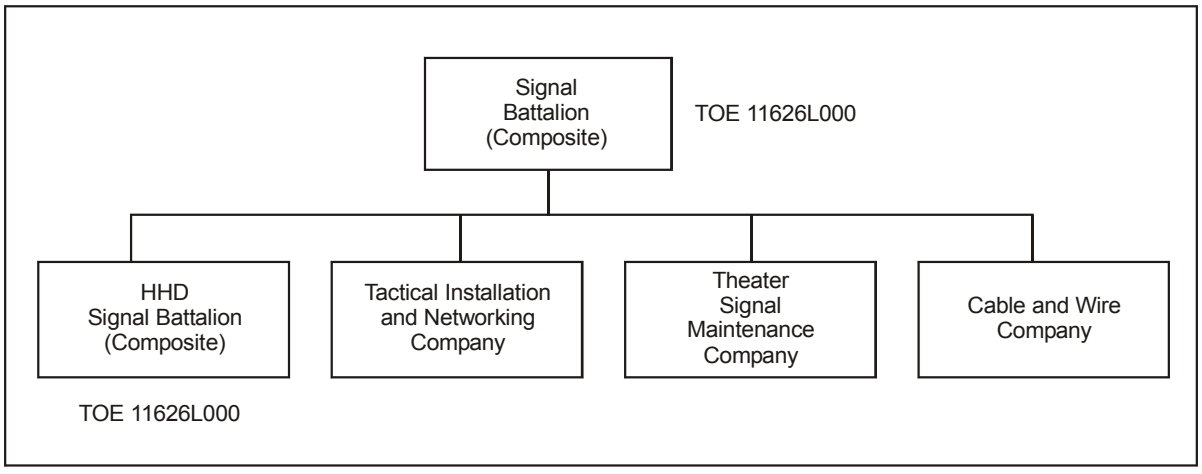


Figure C-1. Signal Battalion (Composite), TOE 11626L

SIGNAL TELECOMMUNICATIONS BATTALION (AREA), TOE 11635L

C-4. This unit's mission is to install, operate, and maintain communications nodes. This unit provides two extension nodes to support medium-sized functional commands (such as the MEDCOM or personnel command [PERSCOM]).

C-5. This unit can install area communications system facilities consisting of three or four area nodes, 12 small extension nodes (SENs), and two medium headquarters extension nodes with three organic area signal companies.

C-6. Figure C-2 shows the signal telecommunications battalion (area), and Figure C-3 shows the doctrinal employment of a signal telecommunications battalion.

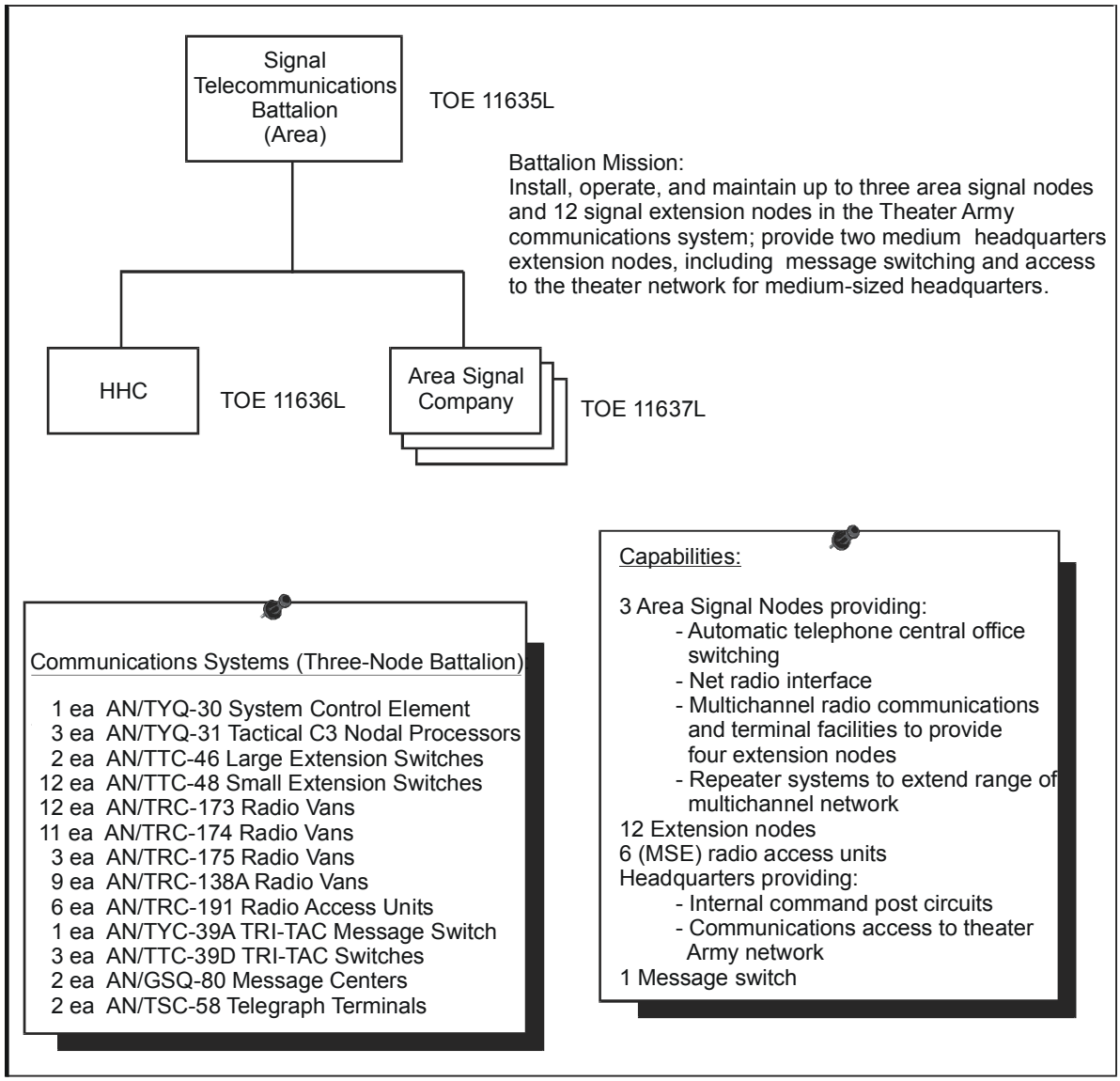


Figure C-2. Signal Telecommunications Battalion (Area), TOE 11635

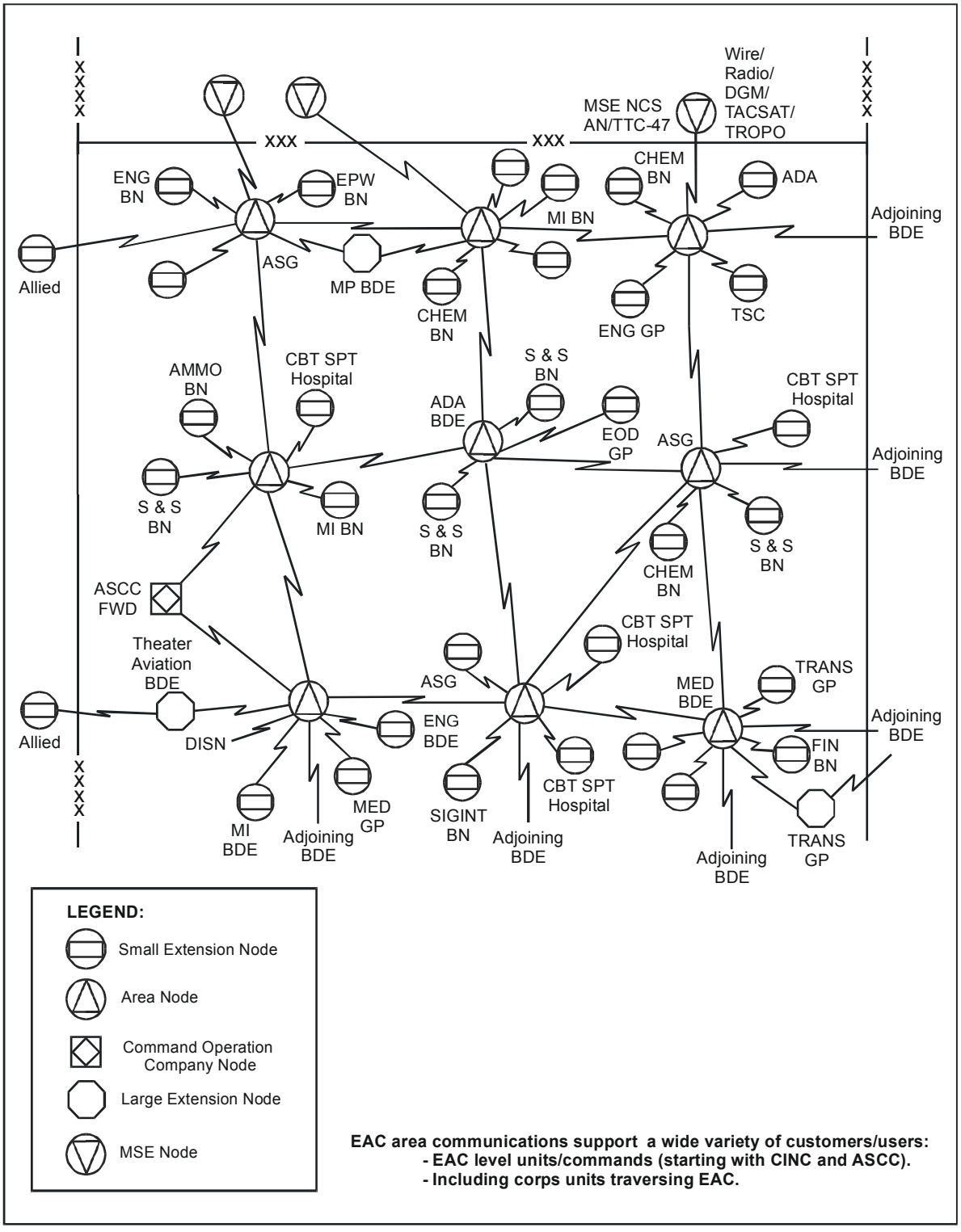


Figure C-3. Doctrinal Employment of a Telecommunications Battalion

HHC Signal Telecommunications Battalion (Area), TOE 11636L

C-7. This unit's mission is to—

- Provide C2 and administrative and logistical support for a signal telecommunications battalion (area).
- Install, operate, and maintain two medium headquarters extension nodes for internal command post communications and access to the area communications system.

C-8. The headquarters provides—

- C2, staff planning, and supervision of the battalion.
- Administrative and logistical support for the battalion to include—
  - Unit administration for assigned or attached units.
  - Staff supervision of automotive, power generation, and air conditioning equipment maintenance.
  - Backup unit maintenance and vehicle recovery for organic companies.
  - Bulk fuel resupply for units assigned to the battalion.
  - COMSEC direct support maintenance for the battalion.
- Two medium headquarters extension node platoons that provide internal command post circuit and message switching, communications access, and over-the-counter service to the ASCC area communications systems for a medium size headquarters (for example, TAACOM, MEDCOM, engineer command [ENCOM], PERSCOM, transportation command [TRANSCOM], and other comparable sized units).
- Message switching facility for operation at one of three area nodal centers.
- Consolidated property book for assigned units.

C-9. Figure C-4 shows the HHC signal telecommunications battalion (area).

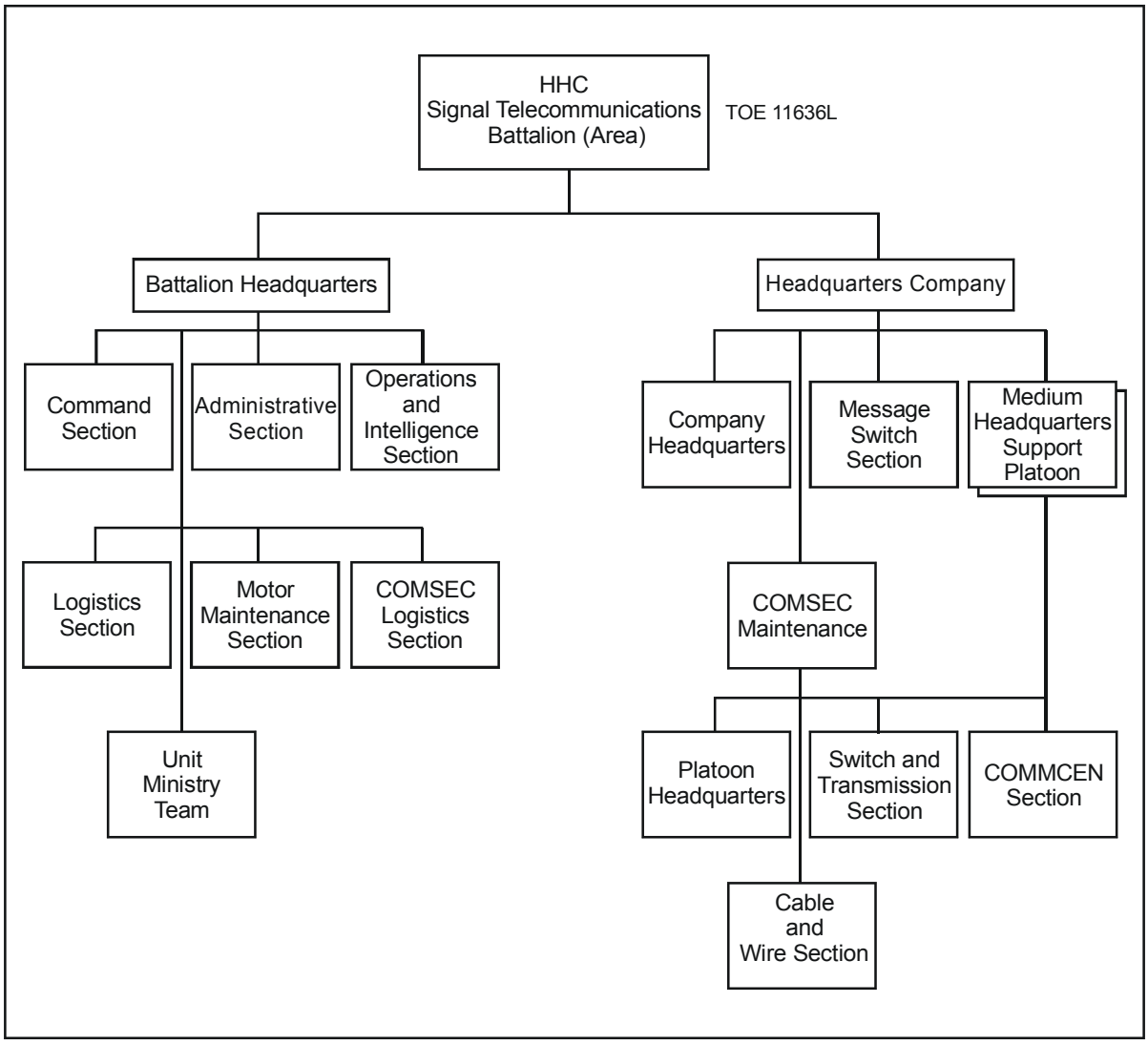


Figure C-4. HHC Signal Telecommunications Battalion (Area), TOE 11636L

Area Signal Companies (A, B, and C), TOE 11637L

C-10. This unit's mission is to install, operate, and maintain an area node and extension signal nodes in the common-user area nodal system of the theater communications system (TCS). An area signal company area node provides—

- Automatic telephone office switching facilities, AN/TTC-39D.
- Net radio interface (NRI) for frequency modulated voice radio access to the TCS.
- Multichannel radio communications facilities that terminate systems between the area node, adjacent area nodes, and extension nodes.
- Multichannel radio terminal facilities, AN/TRC-173, that provide four extension switching nodes for units requiring access to the TCS.

- Multichannel radio communications repeater stations, AN/TRC-174, which extend the range of the multichannel radio system.
- CSCE, AN/TYQ-31, for the management and control of the signal node facilities.
- Food service and unit level maintenance of organic equipment and direct support maintenance on organic signal equipment.
- MSE radio access units (RAUs), AN/TRC-191, that provide subscriber access to the TCS.

- Food service and direct support maintenance for CE equipment organic to HHC signal telecommunications battalion (area).

C-11. Figure C-5 shows the area signal companies A, B, and C.

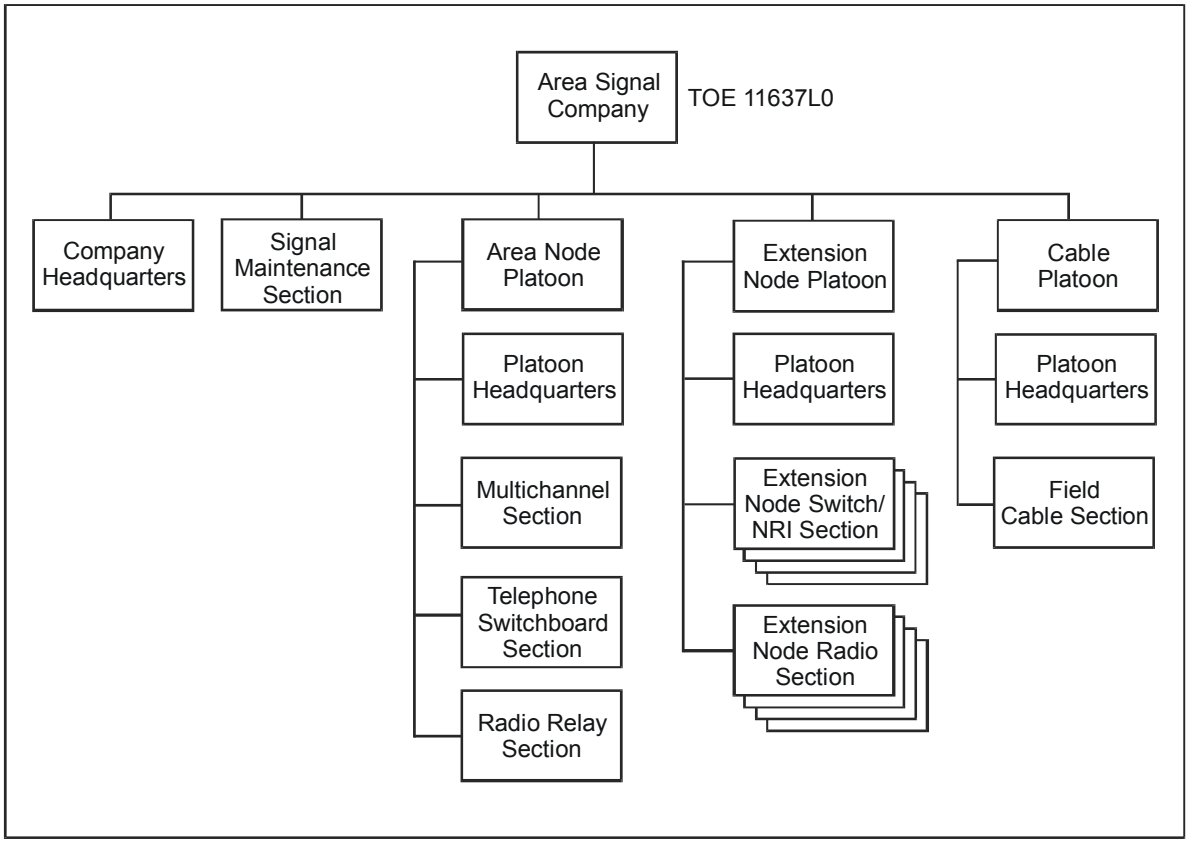


Figure C-5. Area Battalion Companies A, B, and C, TOE 11637L

THEATER TACTICAL SIGNAL BATTALION (TTSB), TOE 11685A

C-12. The TTSB's mission is to install, operate, and maintain nodal communications support for the commander of the ARFOR component to a combatant commander or JTF contingency operation or a MCO deployment.

C-13. This unit accomplishes its mission with an HHC signal battalion and four communications companies (two command support companies, a minor support company, and a major support company). Figure C-6 shows the TTSB.

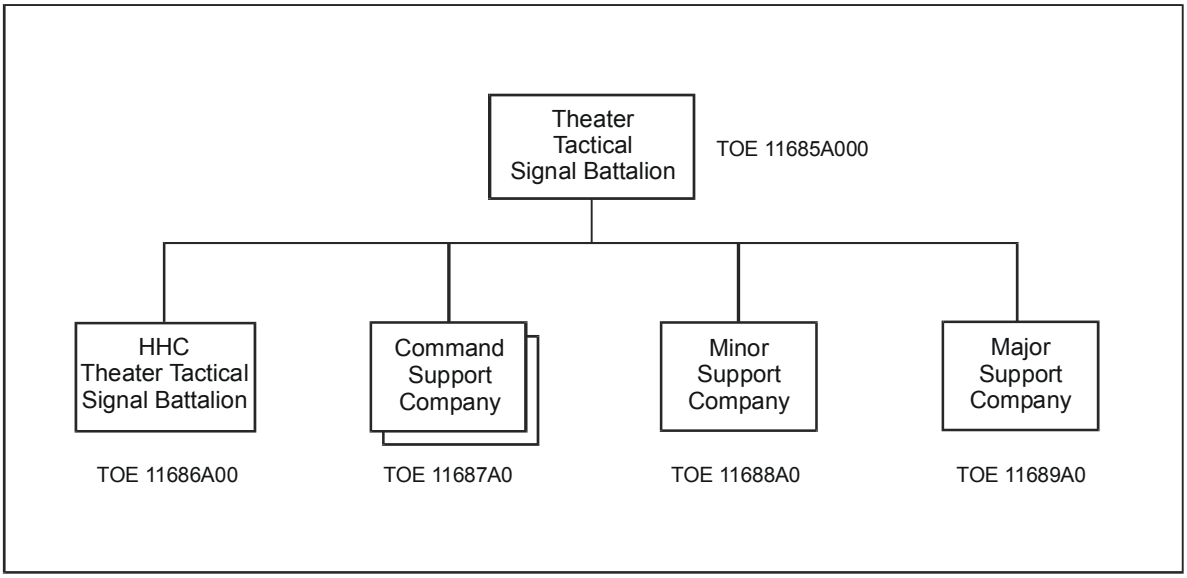


Figure C-6. TTSB, TOE 11685A

HHC TTSB, TOE 11686A

C-14. This unit's mission is to provide C2 of assigned or attached units and logistics support and internal security to the headquarters.

C-15. This unit—

- Provides C2, staff planning, and supervision of a signal battalion consisting of four companies.
- Maintains a consolidated property book for assigned units.
- Provides organic food service, unit maintenance support, and direct support maintenance of organic CE/COMSEC equipment.
- Provides religious support, food service support, and direct support of organizational COMSEC equipment.

C-16. This unit depends on assigned units for unit maintenance of wheeled vehicles, generators, and air conditioners. It also depends on the ASCC for unit-level health, legal, finance, personnel, administrative, and food services; COMSEC maintenance; and supplemental transportation and vehicle recovery. Figure C-7 shows the HHC TTSB.

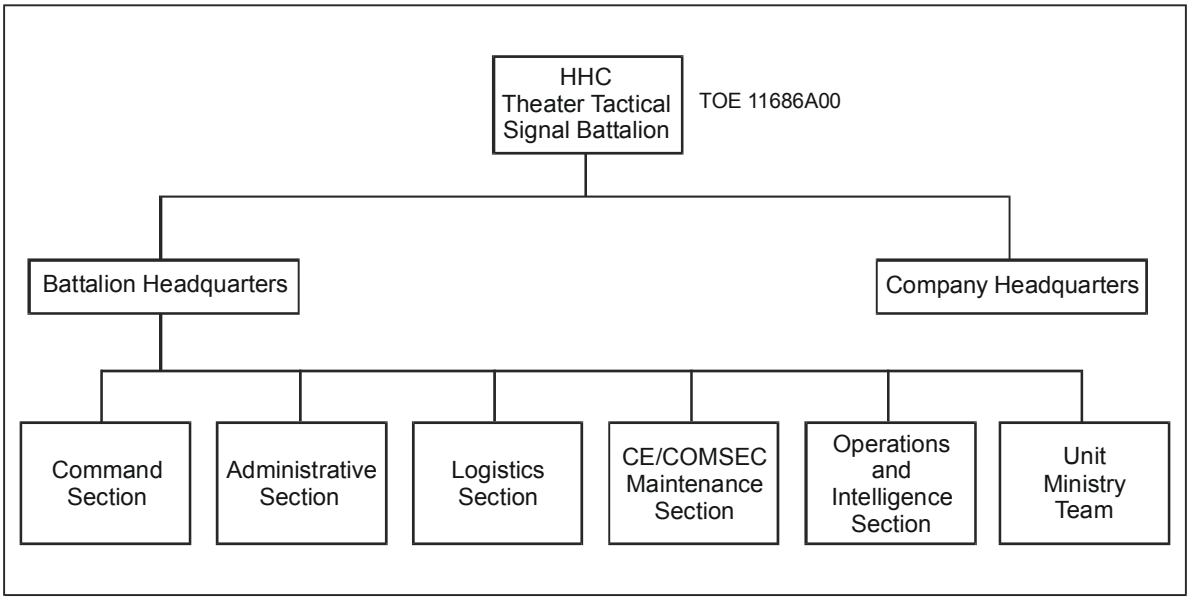


Figure C-7. HHC TTSB, TOE 11686A

TTSB Command Support Company, TOE 11687A

C-17. This unit's mission is to provide nodal communications support for the ARFOR components to a CINC or JTF contingency operation or a MRC deployment.

C-18. This unit provides—

- Food service and unit level maintenance of organic equipment and direct support of organic CE/COMSEC equipment.
- Automatic telephone office switching facilities, AN/TTC-39D.
- CSCE, AN/TYQ-31, for the management and control of the signal node facilities.
- AN/TSC-85B/93B SATCOM terminals to provide secure, high data rate communications via satellite link.
- Installation, operation, and maintenance of two TROPO systems, AN/TRC-170(V)2. These systems can span a distance of up to 161 kilometers (100 miles) with maximum traffic channels.
- One MSE RAU, AN/TRC-191, to provide subscriber access to the TCS.
- Installation, maintenance, and repair of indigenous cable and wire systems.

C-19. Each command support company is authorized an additional 61 secure telephones and 210 nonsecure telephones with appropriate associated support items of equipment (ASIOE) to provide service to those organizations that do not provide their own instruments.

C-20. This unit depends on the HHC TTSB for refueling services, unit-level administration, religious support, and direct support for COMSEC equipment. The unit depends on the TSC for health, finance, legal, and transportation services. Figure C-8 shows the TTSB command support company.

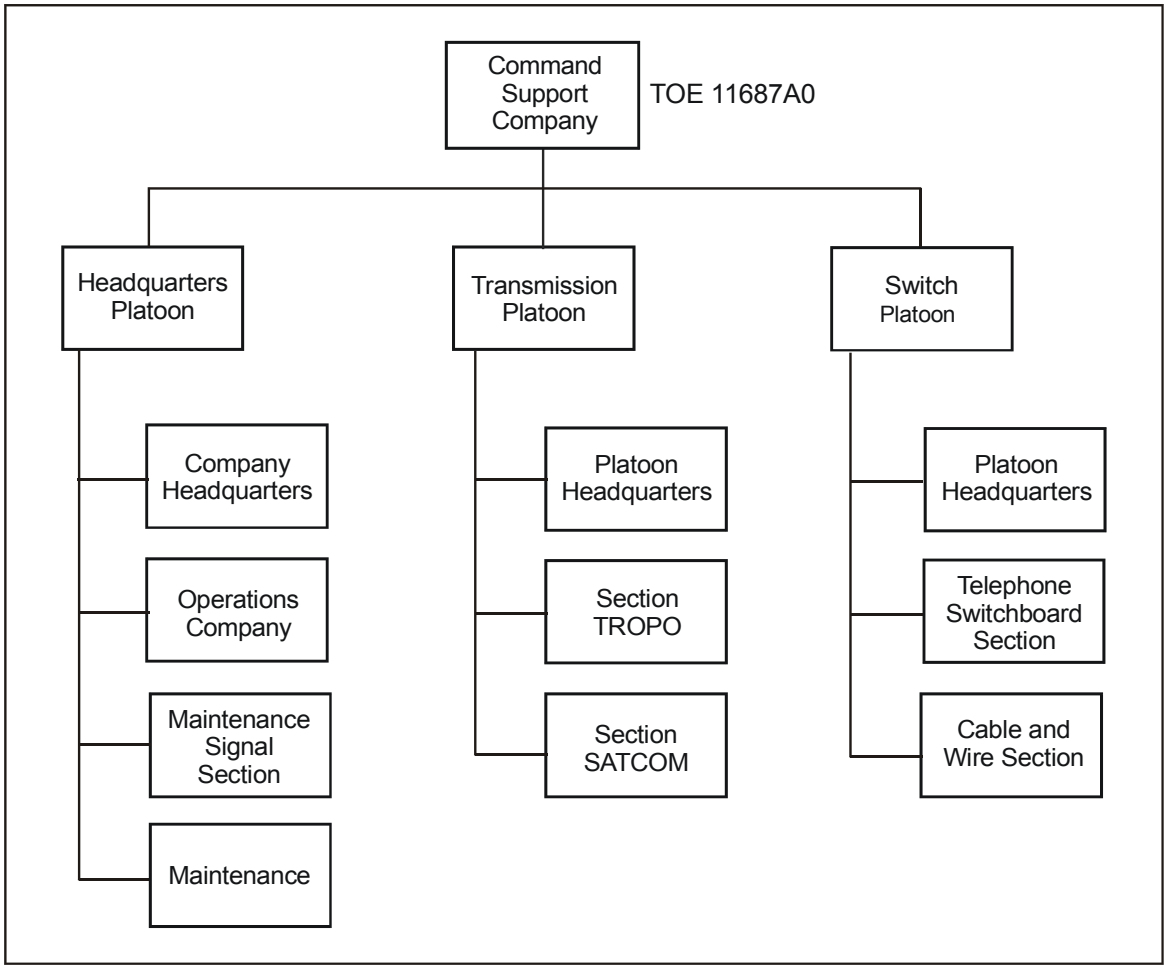


Figure C-8. TTSB Command Support Company, TOE 11687A

TTSB Minor Support Company, TOE 11688A

C-21. This unit's mission is to provide nodal communications support for the ARFOR components to a CINC or JTF contingency operation or an MRC deployment. This unit provides—

- Food service and unit level maintenance of organic equipment and direct support maintenance of CE/COMSEC equipment.
- Automatic telephone office switching facilities, AN/TTC-39D.
- CSCE, AN/TYQ-31, for the management and control of the signal node facilities.

- Two AN/TSC-93B SATCOM terminals to provide secure, high data rate communications via satellite link.
- Installation, operation, and maintenance of two TROPO systems. These systems can span a distance of up to 161 kilometers (100 miles) with maximum traffic channels.
- One MSE RAU, AN/TRC-191, to provide subscriber access to the TCS.
- Installation, maintenance, and repair of indigenous cable and wire systems.

C-22. Figure C-9 shows the TTSB minor support company.

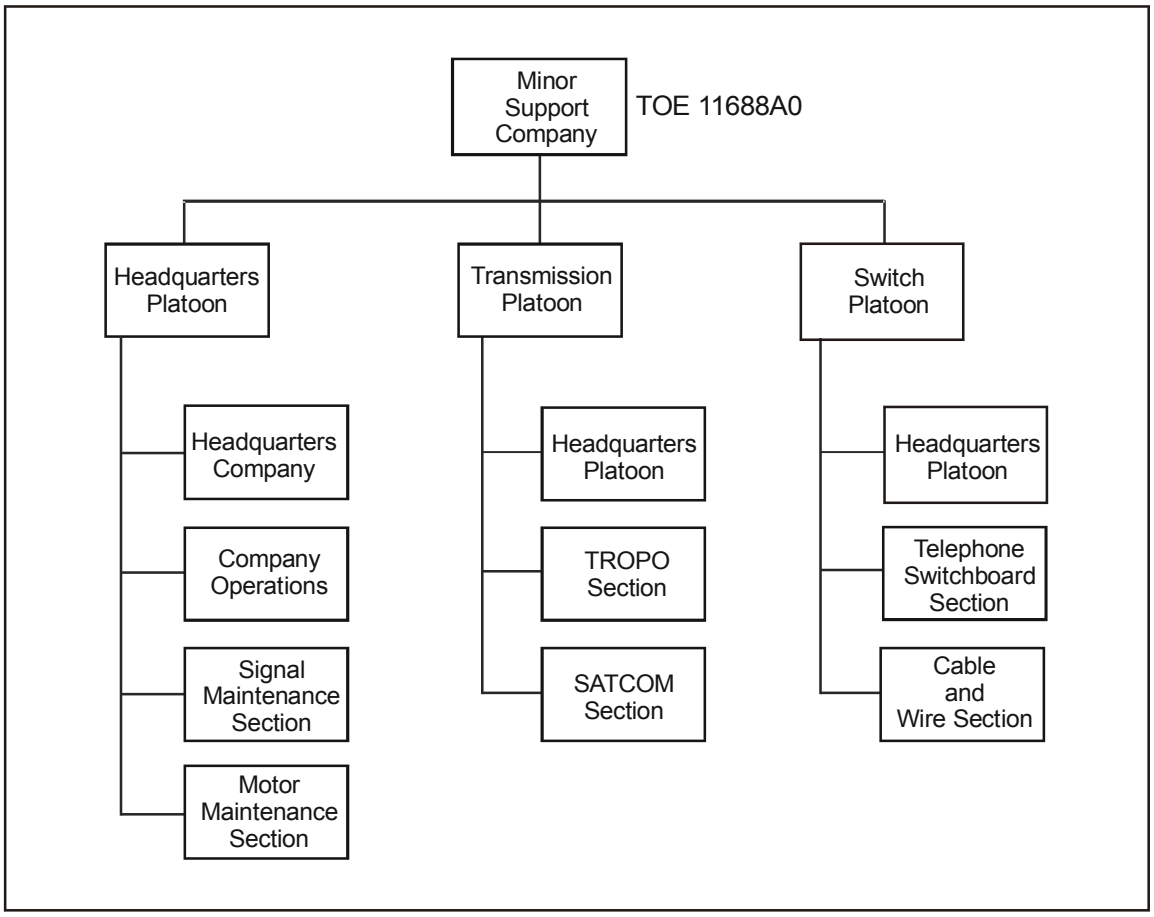


Figure C-9. TTSB Minor Support Company, TOE 11688A

TTSB Major Support Company, TOE 11689A

C-23. This unit's mission is to provide nodal communications support for the ARFOR components to a CINC or JTF contingency operation or a MRC deployment. This unit provides—

- Food service and unit level maintenance of organic equipment and direct support maintenance of CE/COMSEC equipment.
- Automatic telephone office switching facilities: one AN/TTC-39D and one AN/TTC-46.
- CSCE, AN/TYQ-31, for the management and control of the signal node facilities.
- Message switch, AN/TYC-39, equipped to provide secure automatic message switching service.
- Two AN/TSC-85B SATCOM terminals to provide secure, high data rate communications via satellite link.
- Installation, operation, and maintenance of two TROPO systems that can span a distance of up to 161 kilometers (100 miles) with maximum traffic channels.
- One MSE RAU, AN/TRC-191, to provide subscriber access to the TCS.
- Installation, maintenance, and repair of indigenous cable and wire systems.
- Multichannel radio communications facilities to terminate systems.
- A flyaway message switch to provide record data communications message support and over-the-counter service for both classified and unclassified customers.
- A mobile gateway van (MGV) to provide an extension of the nonclassified NIPRNET into the tactical deployed theater.

C-24. Figure C-10 shows the TTSB major support company.

SIGNAL VI COMPANY (TA), TOE 11613L

C-25. Signal VI company (TA) provides—

- Tailored VI products, including graphics, to support operational requirements.
- Historical documentation to support the Army VI documentation program.
- Processing, maintenance, and repair support of VI to ASCC units beyond the capacity of those units.

C-26. Figure C-11 shows the signal VI company (TA).

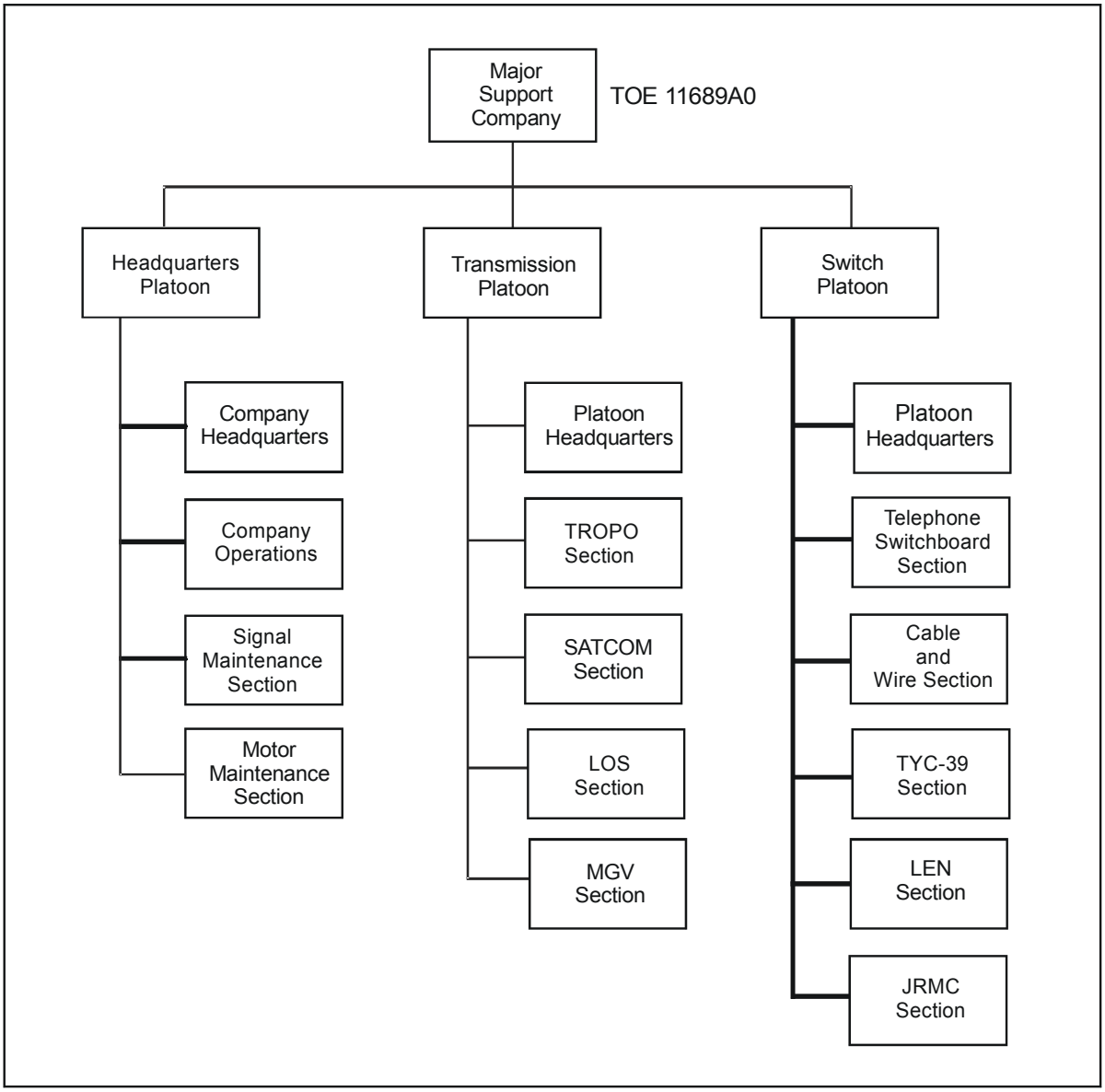


Figure C-10. TTSB Major Support Company, TOE 11689A

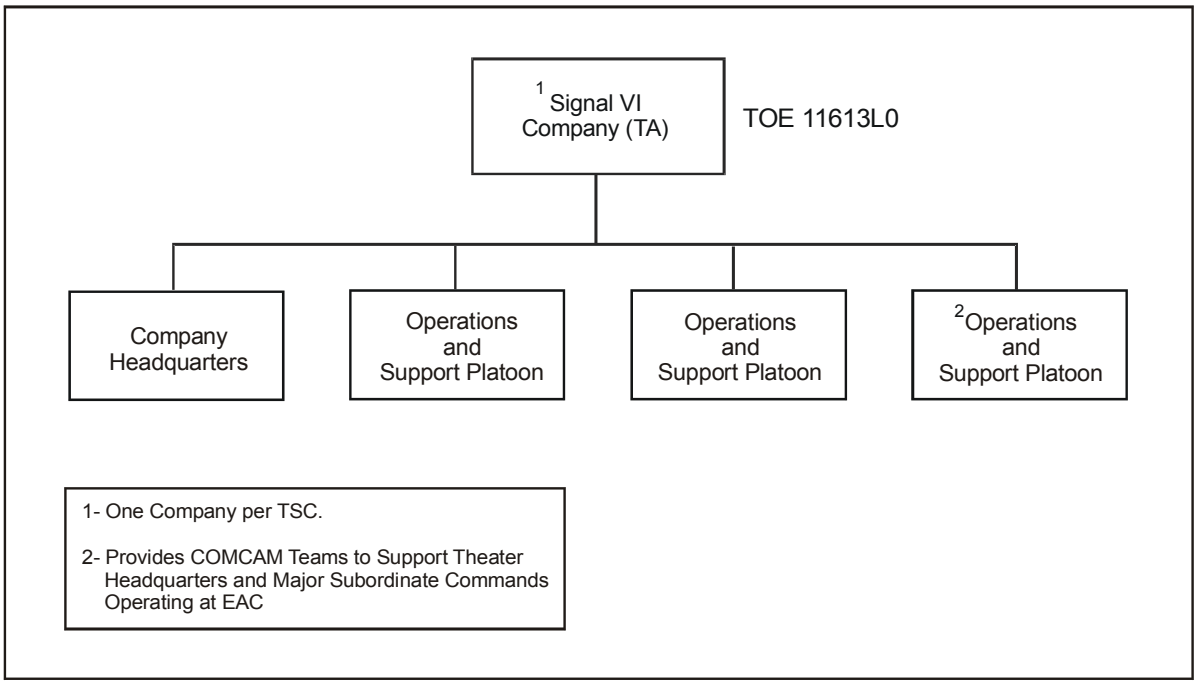


Figure C-11. Signal VI Company (TA), TOE 11613L

POWER PAC3 COMPANY, TOE 11600A

C-27. The POWER PAC3 company's mission is to rapidly deploy and support initial information service requirements of the ASCC. Working in concert with deployed Army mobile liaison teams, the organizations are mutually supportive and can meet the entire gamut of communications/information needs of the ground component commander until the arrival of the TSC. The company can extend US strategic communications systems to support allied forces.

C-28. The POWER PAC3 company is a critical C2 communications provider, which serves to ensure success during power projection operations. The unit is highly mobile and is tailored to any warfighting ground component commander's mission essential communications and information needs.

C-29. The POWER PAC3 company can deploy into a logistically austere theater with little or no communications infrastructure. The unit must sustain itself for up to 45 days; therefore, the operator/maintainer must maximize all equipment.

C-30. This unit provides—

- Command, staff planning, control, and supervision of the operations of the company to include any augmenting of personnel or material assets.
- Vehicular, electronic, and COMSEC maintenance and repair, as well as supply facilities to support company operations.
- Communications network planning and management.

C-31. On ARFOR deployment, the POWER PAC3 company's configuration is determined by mission requirements. Generally, the POWER PAC3 company supports the ARFOR main command post, ARFOR forward command post, and six LNO signal support teams (SSTs). Each section provides a variety of communications capabilities for the headquarters it supports. Assets from the LNO teams could extend the theater information infrastructure to support other or additional support missions. Figure C-12 shows the POWER PAC3 company's AOR support requirements.

PAC3 Company Headquarters

C-32. The headquarters company has a headquarters/contingency section, network management section, motor maintenance section, CE/COMSEC maintenance section, and LNO teams.

C-33. This company is responsible for the C2, management, network engineering, maintenance, supervision, and support of company personnel to include LNO SSTs and any augmentation assets.

C-34. The contingency company engineers the installation of the communications systems required for the ARFOR, supervises and manages the operation of the network, and resolves technical problems.

PAC3 Heavy Hub Platoon

C-35. The heavy hub platoon has a multichannel TACSAT section, future SEN section, single-channel TACSAT section, LOS section, and switchboard and cable section. This platoon is responsible for the following information services (secure and nonsecure) at the ARFOR main command post:

- Digital voice switching.
- Commercial and host nation communications access.
- LOS multichannel radio.
- SATCOM.
- Cable and wire operations and message processing.
- NIPIRNET (e-mail) access.

C-36. A typical support package provides 128 local secure terminal connections, four local LAN loops, and connectivity to eight extended LANs via X.25 ports that support access to the TPN.

C-37. This unit is authorized an additional 70 secure telephones and 222 nonsecure telephones with appropriate ASIOE to provide service to those organizations that do not provide their own instruments.

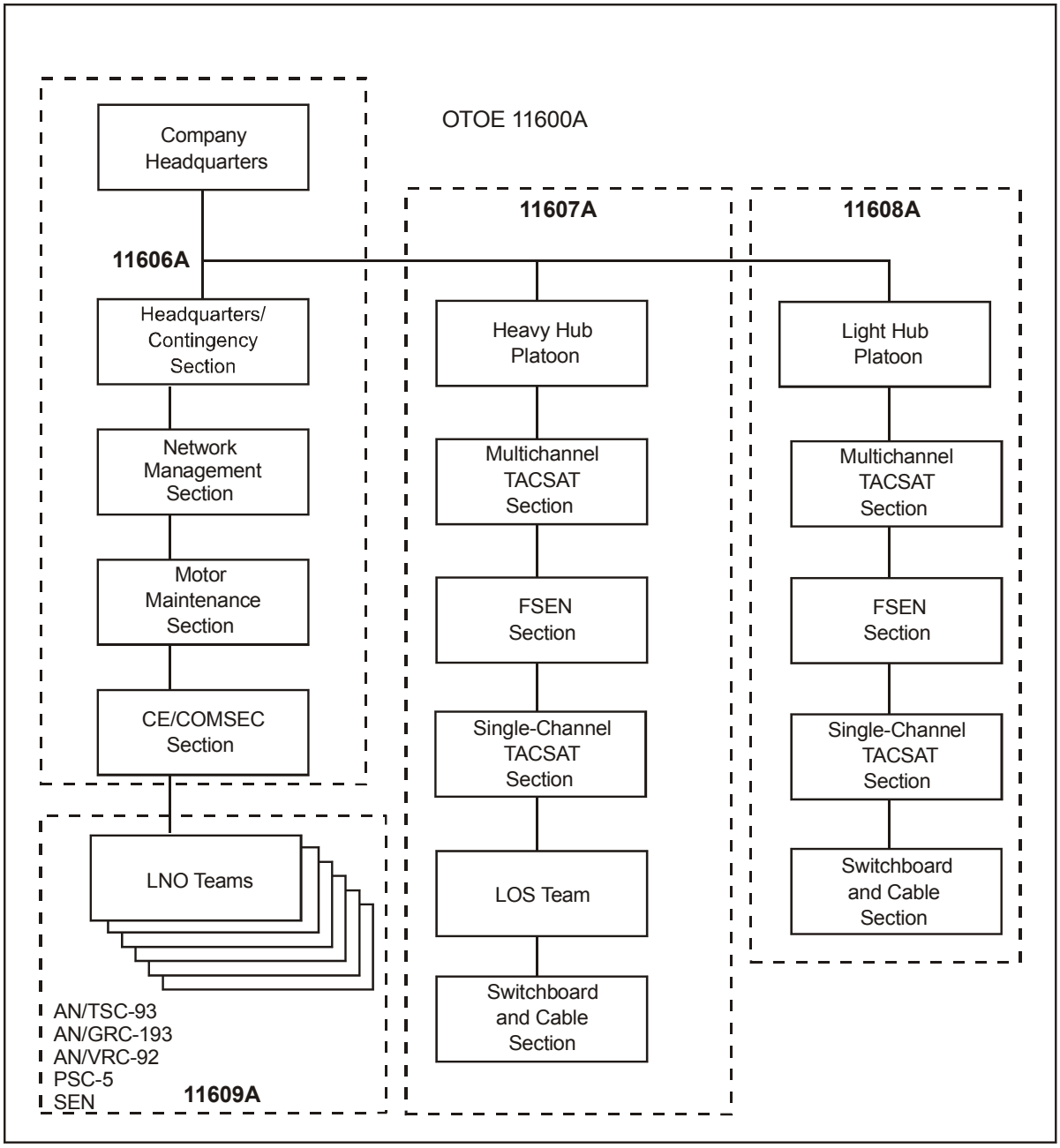


Figure C-12. Power PAC3 Company, TOE 11600A

PAC3 Light Hub Platoon

C-38. The light hub platoon has a multichannel TACSAT section, future SEN section, single-channel TACSAT section, and switchboard and cable section. This platoon installs, operates, and maintains communications equipment at ARFOR forward command posts and provides information services (secure and nonsecure) to include message processing and NIPIRNET (e-mail) access. This is done through SATCOM, cable and wire operations, digital voice switching, and commercial and host nation communications.

C-39. A typical support package provides 96 local secure terminal connections, three local LAN loops, and connectivity to six extended LANs via X.25 ports that support access to the TPN.

C-40. This unit is authorized an additional 70 secure telephones and 222 nonsecure telephones with appropriate ASIOE to provide service to those organizations who do not provide their own instruments.

PAC3 LNO Team

C-41. The LNO team has six liaison SSTs. Each SST has multichannel TACSAT, voice/data switching, and single-channel TACSAT. The SST is assigned to an Army LNO team and attached to a designated joint, coalition, or allied headquarters.

C-42. The POWER PAC3 company's LNO SST installs, operates, and maintains communications equipment and provides information services to the liaison team. This is done by SATCOM, digital voice switching, and commercial and host nation communications access. Each LNO SST is tailored to mission requirements and has a standardized integrated command post shelter.

C-43. Each team has the necessary equipment assigned to it for direct communications back to ARFOR main command post and/or ARFOR forward command post. A typical support package provides 32 local secure terminal connections, one local LAN loop, and connectivity to two extended LANs via X.25 ports that support access to the TPN. For full-scale POWER PAC3 company deployment, these SSTs should provide full information services to 16 subscribers per site.

C-44. This unit is authorized an additional 12 secure telephones and 48 nonsecure telephones with appropriate ASIOE to provide service to those organizations who do not provide their own instruments.

SIGNAL COMPANY, TROPO (LIGHT), TOE 11667L

C-45. This unit's mission is to provide multichannel TROPO communications links for long-distance communications. This unit (AN/TRC-170(V)3)—

- Installs, operates, and maintains eight TROPO communications links (two terminals per link). These links can span a distance of up to 161 kilometers (100 miles) with maximum traffic channels.
- Provides circuit patching and limited test facilities that provide a limited technical control capability.

- Provides food service and performance of direct support maintenance on all organic signal and COMSEC equipment, and unit maintenance and vehicle recovery on organic equipment.

C-46. Figure C-13 shows the signal company, TROPO (light).

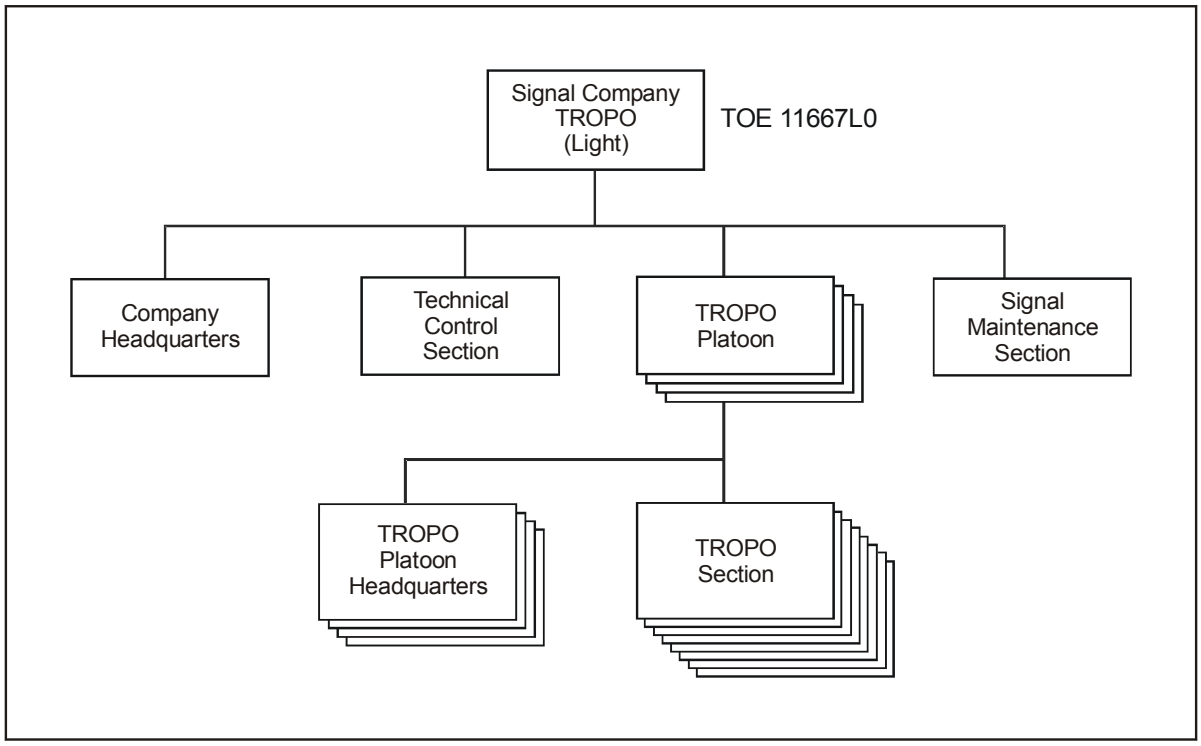


Figure C-13. Signal Company, TROPO (Light), TOE 11667L

SIGNAL COMPANY, TROPO (HEAVY), TOE 11668L

C-47. This unit's mission is to provide multichannel TROPO communications links for long-distance communications in the communications zone. This unit—

- Installs, operates, and maintains four TROPO communications links (two terminals per link). These links can span up to 241 kilometers (150 miles).
- Operates in dual or quad diversity mode (space and frequency).
- Provides food service.
- Provides direct support maintenance on all organic signal and COMSEC equipment.
- Provides unit maintenance and vehicle recovery on organic equipment.

C-48. Figure C-14 shows the signal company, TROPO (heavy).

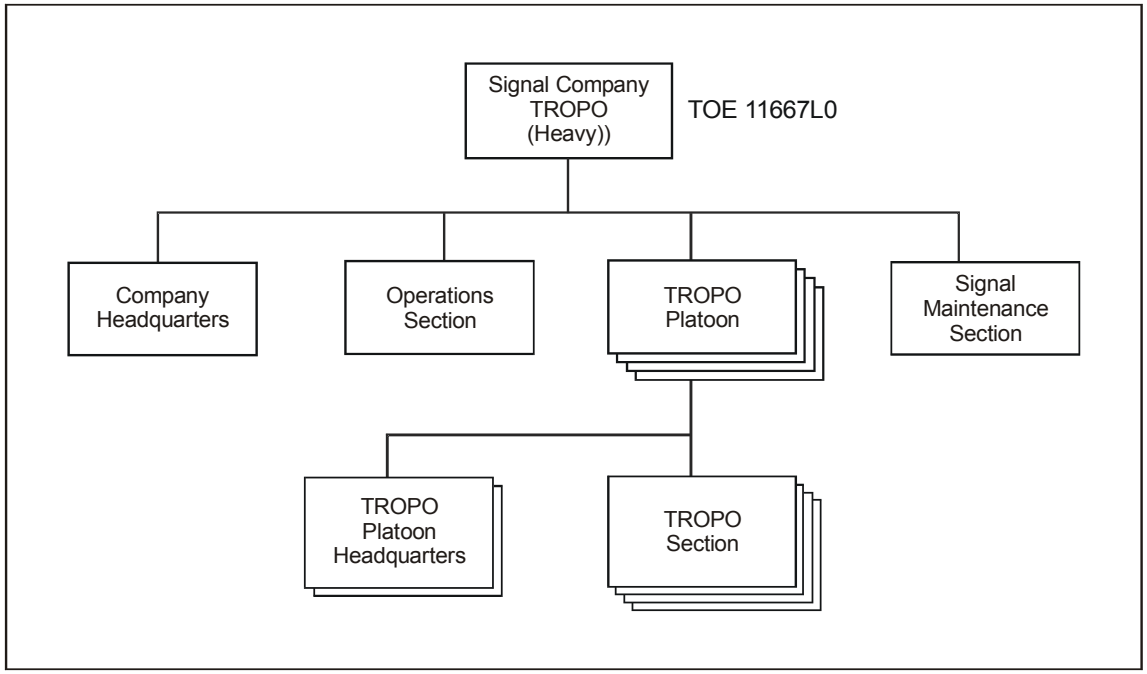


Figure C-14. Signal Company, Tropo (Heavy), TOE 11668L

SIGNAL COMPANY (COMMAND OPERATIONS THEATER), TOE 11669L

C-49. This unit's mission is to provide communications facilities in the TCS for an EAC MSC, ASCC headquarters, or an equivalent size headquarters. The signal company (command operations theater) provides—

- Installation, operation, and unit maintenance of communications facilities supporting a major headquarters, which includes a main and rear or jump capability.
- Food service and unit-level maintenance of organic equipment and direct support maintenance of CE/COMSEC equipment.
- Two circuit switches, AN/TTC-39D, providing service for up to 744 local telephones and one large extension switch providing service for up to 176 subscribers, both secure and nonsecure.
- Two TCCs for circuit patching, testing, and controlling terminal communications facilities.
- Four high-capacity LOS radio repeaters.
- Two 96-channel multiplex terminals for terminating the connecting links between the headquarters and two separate TCS switching centers.

- Two message switches, AN/TYC-39, equipped to provide facsimile service and normal message handling services to include over-the-counter service and messenger services with limited motor messenger capability.
- Two antenna erection teams to assemble and disassemble the antenna towers, extending the LOS multichannel over natural and manmade obstruction.

C-50. Figure C-15 shows the signal company (command operations theater).

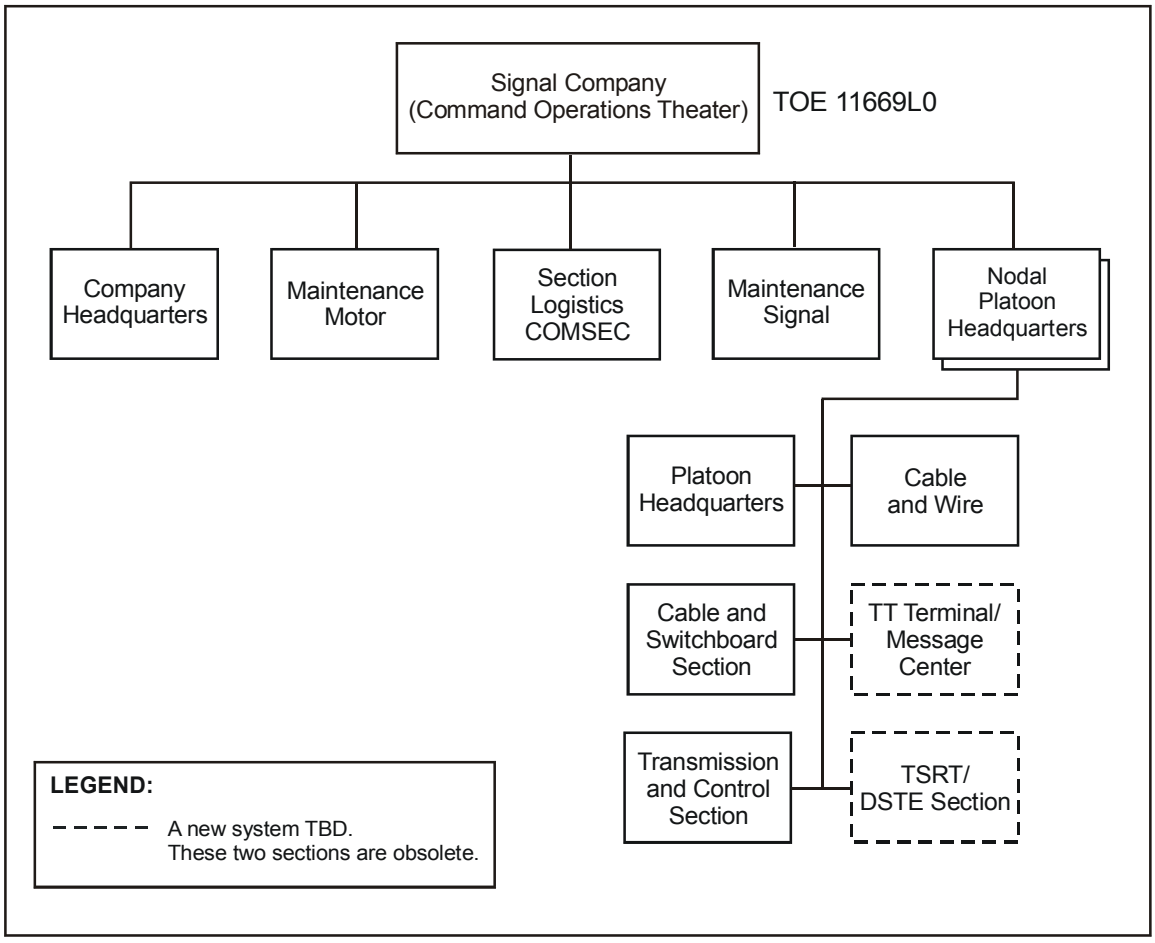


Figure C-15. Signal Company (Command Operations Theater), TOE 11669L

SIGNAL TACSAT COMMUNICATIONS COMPANY, TOE 11603L

C-51. This unit's mission is to provide TACSAT terminal facilities at major communications switching nodes and command posts in a TCS. The mission determines the type and quantity of TACSAT systems and identifies the tailoring of the TOE to support the requirement. This unit—

- Installs, operates, and maintains 16 SATCOM terminals: eight AN/TSC-85s and eight AN/TSC-93s or six AN/TSC-85s and 10 AN/TSC-93s.
- Provides multichannel TACSAT that provides connectivity between key EAC headquarters based on distance, terrain, criticality of links, and the need to augment LOS relays.
- Provides unit maintenance on all organic equipment and direct support maintenance on organic COMSEC and signal equipment.
- Provides supplemental food service support.

C-52. Figure C-16 shows signal TACSAT communications company.

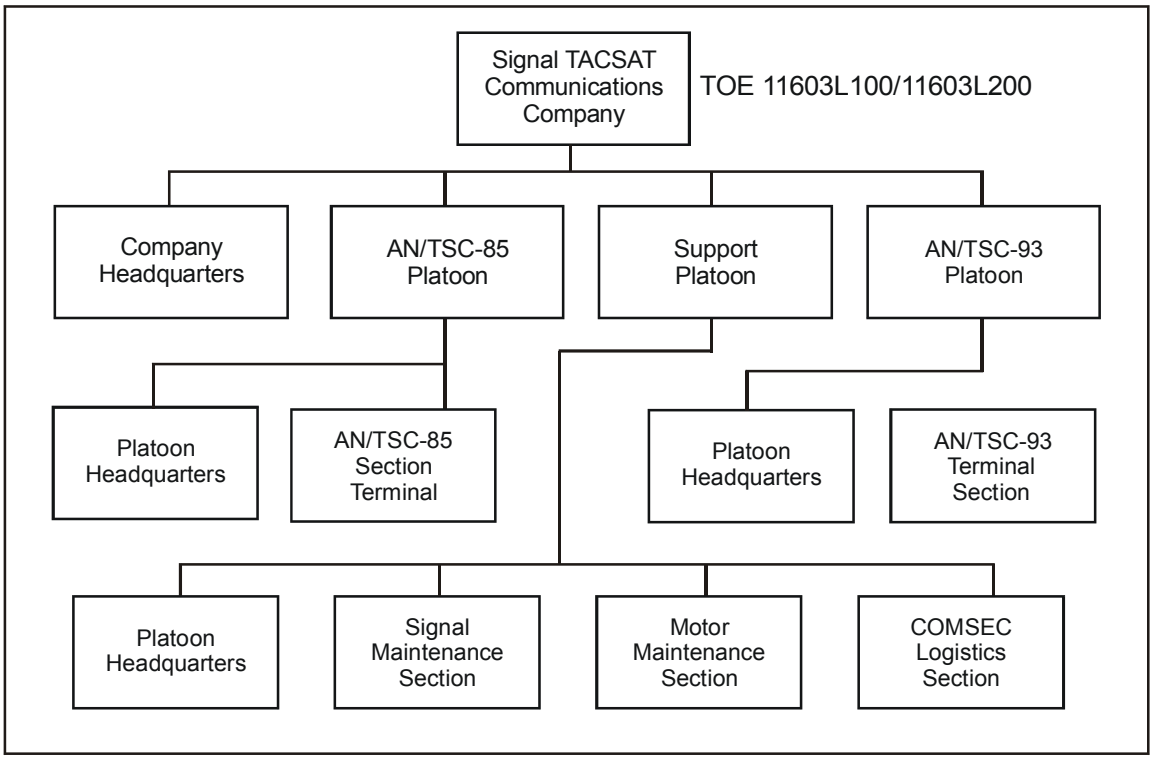


Figure C-16. Signal TACSAT Communications Company, TOE 11603L

THEATER TACTICAL SIGNAL COMPANY (SEPARATE) (TTSC [SEP]), TOE 11674A (385TH SIGNAL COMPANY)

C-53. The TTSC's (SEP) mission is to install, operate, and maintain nodal communications support for the commander of an ARFOR component to a CINC or JTF contingency operation or a major theater war (MTW). The TTSC (SEP), as a separate company, can be assigned to a strategic signal battalion, theater signal brigade, or TSC. The unit may be forward deployed or CONUS-based and deployed in support of an ASCC JFLCC, subordinate unified command, JTF, single-service force, or theater CINC. The TTSC (SEP) provides the following information and signal support services:

- Secure and nonsecure voice and data.
- Host nation/Commercial telephone access.
- Increased theater connectivity.
- CNR interface.
- TPN interface.
- Global Command and Control System-Army connectivity.
- LAN technical support (systems management assistance).
- Multiple means of long-range communications.
- Flood search routing.

C-54. Figure C-17 shows the TTSC (SEP).

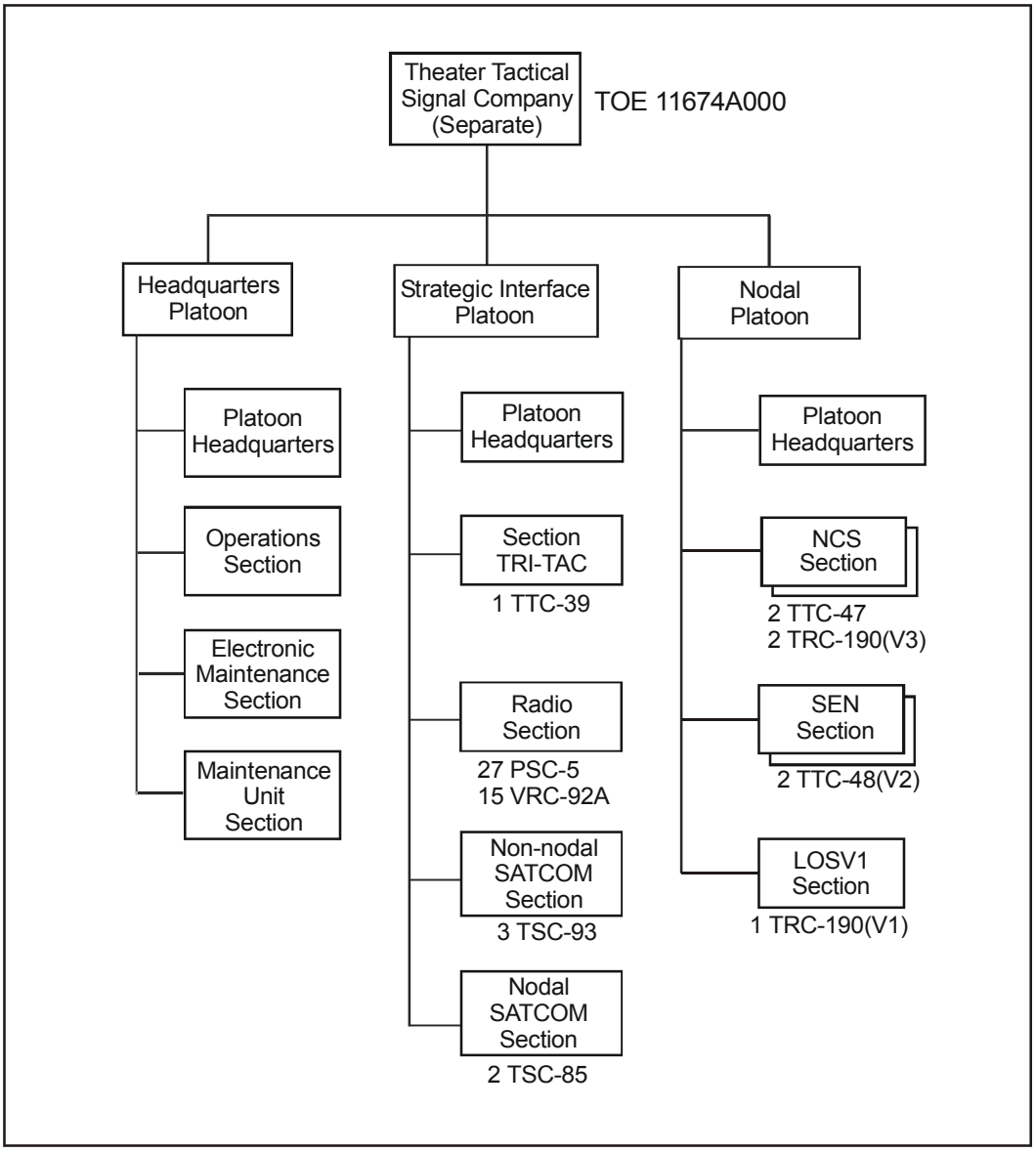


Figure C-17. TTSC (SEP), TOE 11674A (385th Signal Company)

OTHER ORGANIZATIONS BEING PHASED OUT

C-55. The following organizational structures are being phased out for other reasons.

SIGNAL COMPANY, CABLE AND WIRE, TOE 11623L

C-56. The cable and wire company's modular platoons and teams—

- Lay cable and wire between major headquarters and subordinate units.
- Provide cable and wire support from multichannel radio sites to terminating or switching equipment.
- Provide cable and wire connectivity between area signal nodes and theater communications systems as tasked by the NETCOM/9th ASC and required by the ASCC or other major commanders.

C-57. Figure C-18 shows the signal company, cable and wire.

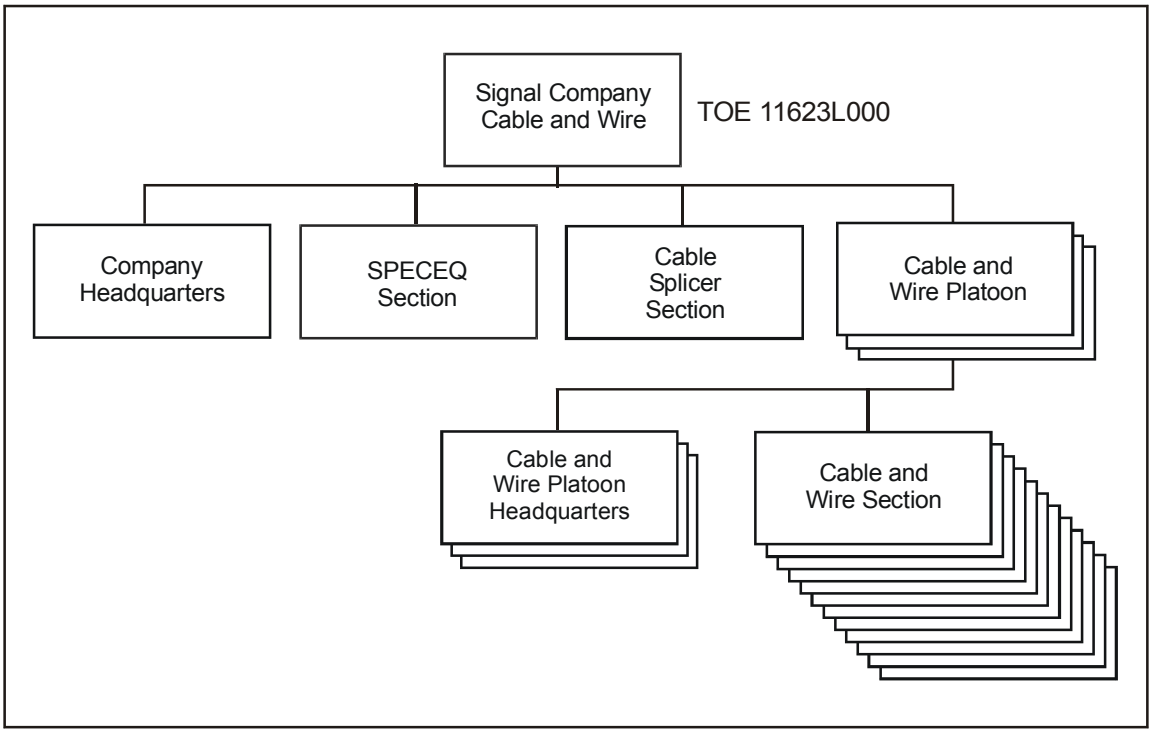


Figure C-18. Signal Company, Cable and Wire, TOE 11623L

SIGNAL DETACHMENT, REPRODUCTION SERVICES, TOE 11570L

C-58. The signal detachment, reproduction services' mission is to provide volume reproduction for all Army units at theater level. Individuals of these organizations can assist in the coordinated defense of the unit's area or installation. This unit installs, operates, and maintains a reproduction facility that provides volume reproduction services to units serviced. Reproduction services include duplicating, collating, binding, and packaging.

C-59. Figure C-19 shows the signal detachment, reproduction services.

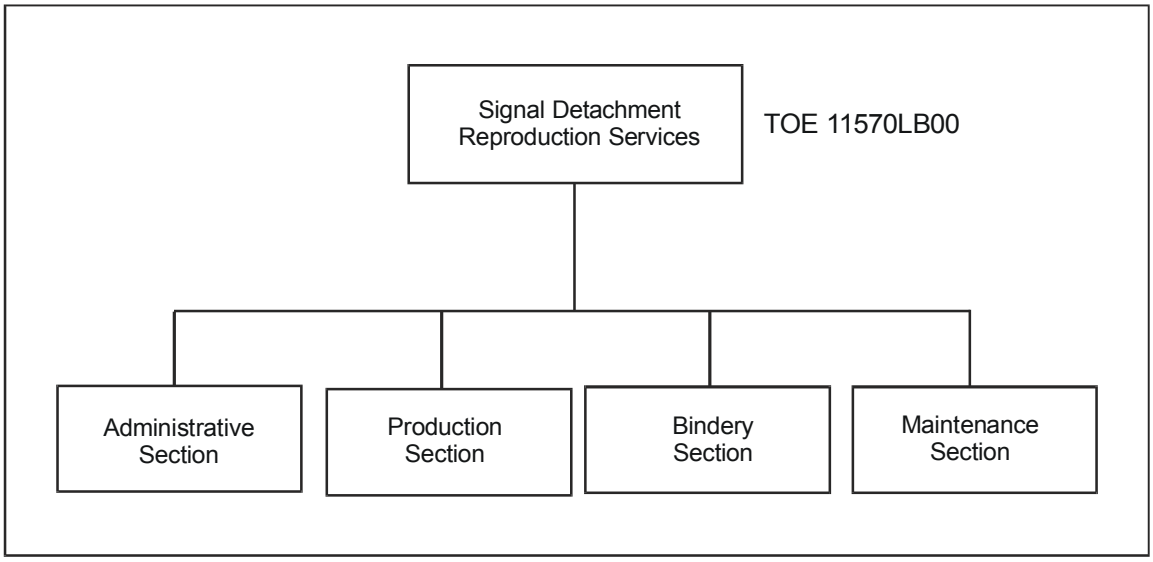


Figure C-19. Signal Detachment, Reproduction Services, TOE 11570L

Appendix D

Equipment Overview

This appendix discusses the equipment used to provide signal support to theater operations.

SATCOM TERMINAL

D-1. The following sections discuss some of the satellite systems installed, operated, and maintained in support of theater operations.

AN/TSC-85B(V)1, AN/TSC-85B(V)2, AND AN/TSC-85C(V)1 SATCOM TERMINALS

NSN: 5895-01-042-9859 (AN/TSC-85(V)2)
5895-01-284-8305 (AN/TSC-85B(V)1)
5895-01-463-4063 (AN/TSC-85C(V)1
References: TM 11-5895-1128-10 (AN/TSC-85B(V)1 & (V)2)
TM 11-5895-1684-13P (AN/TSC-85C(V)1)

General Information

D-2. The AN/TSC-85 terminals contain equipment to receive, transmit, and process low, medium, and high capacity multiplexed voice, data, and teletypewriter signals. Using encryption devices, they will process secure and nonsecure traffic. The terminals are intended for either point-to-point or multipoint operation in tactical communications systems. They can transmit one and receive up to four high data rate carriers. The AN/TSC-85(V)2 requires an external multiplex shelter to terminate the circuits. The terminals include modulation and demodulation equipment and a specialized pulse code modulation (PCM) signal processor. The terminals have external connections for an intercommunication set, field telephones, wideband 70 MHz, and chemical, biological, radiological (CBR) alarm. Figure D-1 shows an AN/TSC-85 with a lightweight high gain antenna.

Figure D-1. AN/TSC-85

Major Components

D-3. Table D-1 lists the major components of AN/TSC-85B(V)2 and AN/TSC-85C(V)1.

Table D-1. Major Components of AN/TSC-85B(V)2 and AN/TSC-85C(V)1

Components	Quantity	
	85B(V)2	85C(V)1
RT-1287/TSC receiver-transmitter orderwire	1	1
AM-6701/TSC RF amplifier	2	2
PP-7086/TSC power supply	2	N/A
PP-7712(V)2/TSC power supply	N/A	2
CV-3198A/TSC frequency converter	2	2
TD-1147/TSC multiplexer/demultiplexer TACSAT signal processor (tactical satellite signal processor [TSSP])	2	N/A
TD-1337/(V)1/G multiplexer/demultiplexer TSSP	2	N/A
CV-3201/TSC frequency converter	5	6

Table D-1. Major Components of AN/TSC-85B(V)2 and AN/TSC-85C(V)1 (Continued)

Components	Quantity	
	85B(V)2	85C(V)1
MD-945/TSC digital data modem	5	5
TA-312/PT telephone set	1	1
LS-147F/FI intercommunications station	1	1
AS-3036A/TSC antenna	1	1
C-10237/TSC antenna control	N/A	1
C-10348/TSC antenna control	1	N/A
TD-1069/G multiplexer (not basic issue)	N/A	4
TSEC/KG-27 security device (not basic issue)	N/A	4
MX-9635A/TSC echo suppressor	N/A	4
BZ236A/TSC fault alarm	1	1
TD-660B/G multiplexer	N/A	4
TD-1065 high speed data buffer	N/A	4
MD-1026 group modem	N/A	1
CV-1548A/G telephone signal converter	N/A	4
S250 shelter	1	N/A
S-280 shelter	N/A	1

Technical Characteristics

D-4. Table D-2 lists the technical characteristics of AN/TSC-85B(V)2 and AN/TSC-85C(V)1.

Table D-2. Technical Characteristics of AN/TSC-85B(V)2 and AN/TSC-85C(V)1

Characteristics	Description
Frequency range:	
Transmit	7250 to 7750 MHz
Receive	7900 to 8400 MHz
Power output	500 watts (nominal) at antenna
Operation:	
Single-channel (digital voice)	16/32 Kbps
Multichannel	6, 12, 24, 18-96 channels (48 Kbps per channel at true multiplex rates)

Table D-2. Technical Characteristics of AN/TSC-85B(V)2 and AN/TSC-85C(V)1 (Continued)

Characteristics	Description
Power requirements:	
AN/TSC-85B(V)2	115 volts alternating current (VAC) 10%, 50/60 Hz, single-phase
AN/TSC-85C(V)1	115 VAC 10%, 50/60 Hz, three-phase, five-wire
Antenna system	16' Lightweight High Gain X-Band Antenna (LHGXA); 8' parabolic antenna.

NOTE: Refer to TM 11–5895-1433-12-1 for additional information on the technical characteristics of AN/TSC-85B(V)2.

AN/TSC-93B(V)2 AND AN/TSC-93C(V)1 SATCOM TERMINALS

NSN: 5895-01-284-8307 (AN/TSC-93B(V)2)
5895-01-284-4064 (AN/TSC-93C(V)1)
References: TM 11-5895-1127-10 (AN/TSC-93B(V)2)
TM 11-5895-1127-34 (AN/TSC-93B(V)2)
TM 11-5895-1685-10HR (AN/TSC-93C(V)1)

General Information

D-5. The AN/TSC-93() terminals contain equipment to receive, transmit, and process medium and high capacity multiplexed voice, data, and teletypewriter circuits. Using encryption equipment, they will process secure and nonsecure traffic. The terminals are intended for point-to-point operation in tactical communications systems. They can simultaneously transmit and receive a single high data rate carrier. The terminals include modulation and demodulation equipment and a specialized PCM signal processor. Digital interfaces are set up using external connections for an intercommunications set, field telephones, wideband 70 MHz, and CBR alarm. These terminals are used as a communications link via satellite with the AN/TSC-85() or another AN/TSC-93(). Figure D-2 shows an AN/TSC-93() with an 8-foot antenna.

Figure D-2. AN/TSC-93 with 8-Foot Antenna

Major Components

D-6. Table D-3 lists the major components of the AN/TSC-93B and the AN/TSC-93C.

Table D-3. Major Components of AN/TSC-93B and AN/TSC-93C

Components	Quantity	
	93B	93C
RT-1287/TSC receiver-transmitter orderwire	1	1
CV-3201/TSC frequency converter	1	2
MD-945/TSC digital data modem	1	1
AM-6701/TSC RF amplifier	N/A	1
PP-7087 power supply	N/A	N/A
PP-7712(V)2/TSC power supply	1	1
CV-3189/TSC frequency converter	N/A	1
TD-1147/TSC multiplexer/demultiplexer (TSSP)	N/A	1
TD-1337(V)2/TSC multiplexer/demultiplexer (TSSP)	1	1
TD-754/G multiplexer	N/A	N/A
TD-660/G multiplexer	N/A	2

Table D-3. Major Components of AN/TSC-93B and AN/TSC-93C (Continued)

Components	Quantity	
	93B	93C
TD-1065/G high speed data buffer	N/A	2
MX-9635A/TSC echo suppressor	1	2
CV-1548/G converter	1	2
TSEC/KY-57 security device (not basic issue)	1	2
TD-1069/G multiplexer (not basic issue)	1	1
TA-312/PT telephone set	1	1
AS-3036A/TSC antenna	1	1
LS-1147F/FI intercommunications station	N/A	1
C-10237/TSC antenna control	N/A	1
C-10348/TSC antenna control	1	N/A

Technical Characteristics

D-7. Table D-4 lists the technical characteristics of the AN/TSC-93B and the AN/TSC-93C.

Table D-4. Technical Characteristics of AN/TSC-93B and AN/TSC-93C

Characteristic	Description
Frequency range: Transmit Receive	 7250 to 7750 MHz 7900 to 8400 MHz
Power output	500 watts (nominal) at antenna
Operation: Single-channel (digital voice) Multichannel AN/TSC-93 or 93C)	 16/32 Kbps 6, 12, 24, 18-96 channels (48 Kbps per channel at true multiplex rates)
Power requirements: AN/TSC-93 AN/TSC-93C	 115 VAC 10%, 50/60 Hz 5%, single-phase 1380 watts (nominal) 115 VAC 10%, 50/60 Hz 5%, three-phase, five-wire 5500 watts (nominal)

Table D-4. Technical Characteristics of AN/TSC-93B and AN/TSC-93C (Continued)

Characteristic	Description
Organic power:	
AN/TSC-93	PU-619 (modified)
AN/TSC-93C	2 ½ ton truck (two each)

TRI-BAND SATCOM TERMINAL AN/TSC-143

NSN: 5895-01-393-6264
Reference: TM 11-5895-1562-12&P-1
TM 11-5895-1562-12&P-2

General Information

D-8. The tri-band SATCOM terminals are intended for point-to-point operation in tactical communications systems. Figure D-3 shows an AN/TSC-143.

Figure D-3. AN/TSC-143

D-9. The AN/TSC-143 consists of nondevelopmental items, COTS, and government furnished equipment. It is configured on a HHMMWV (M1097), and is C-130 roll on/off capable.

D-10. The AN/TSC-143 operates in the SHF (C, X, and Ku bands), and is capable of operation in hub-spoke, mesh, or point-to-point configurations. It is interoperable with the AN/TSC-85B/93B and DSCS gateway terminals at the RF level (through the modems) and at the multiplex level (through the TSSP and integrated digital network exchange [IDNX]). It is capable of entering the commercial gateways using both C and Ku bands.

D-11. The AN/TSC-143 can be deployed worldwide and operate with any of the following satellites: DSCS, NATO, International Telecommunication Satellite Organization (INTELSAT), European Telecommunication Satellite Organization (EUTELSAT), Pan American Satellite Organization (PANAMSAT), Skynet 4, HISPASAT, and domestic satellites (for example, Spacenet, GSTAR, etc.).

D-12. The parameters for these satellites are stored within the AN/TSC-143 database and include corresponding uplink and downlink bands and the data rates available to a user. The AN/TSC-143 provides the required effective isotropically radiated power (EIRP) and gain/temperature (G/T) necessary to utilize the maximum data throughput capacity available in a specific area of deployment.

D-13. The AN/TSC-143 incorporates a beacon receiver that is compatible with all commercial and defense payload beacon signals, allowing accurate satellite tracking. The terminal meets the certification requirements of the DSCS and INTELSAT, allowing compatible operation with other users on the satellites and interoperation with other standard earth terminals. The AN/TSC-143 has commercial telephone access through its switch for positive terminal control in commercial satellite applications and an STU III for control in DSCS applications. Complete parameters and subsystems descriptions are provided in the technical manuals for the system.

D-14. The following subsystems of the AN/TSC-143 provide operational planning insights to the overall capability of the system.

D-15. **GPS Receiver**. GPS reception is provided by the AN/PSN-11 Satellite Signals Navigation Set, commonly referred to as Precision Lightweight GPS Receiver (PLGR). The GPS receiver provides accurate position and time information to the operator interface unit (OIU), which enables accurate pointing and tracking data to be generated. The GPS information is available to the operator on the OIU. The IEEE-488 converter is used to interpret information sent between the PLGR and the OIU.

D-16. **Baseband Group**. AN/TSC-143 baseband equipment supports switching and multiplexing. These functions are integrated by a patching capability that provides flexibility and accommodates future growth for new interfaces and functions. The baseband equipment includes:

- **Modem**. There are three satellite modems, SLM-8650, included in the AN/TSC-143. Each modem provides baseband data formatting, forward error corrections (FEC) coding/decoding, and waveform generation. One of the modems is used to modulate the incoming data stream for transmission over the satellite by the RF equipment. All three modems are used to demodulate separate received signals from

the satellite by the RF equipment. The modems provide DSCS, INTELSAT, and commercial C-band and Ku-band operation.

- **TSSP Digital Multiplexer, TD-1337(V)3/G**. The TD-1337(V)3/G is a synchronous time-division multiplexer/demultiplexer that provides a full-duplex capability interfacing the modems in the terminal with the rest of the baseband equipment in the terminal. The main purpose of the TSSP is to provide a point-to-multipoint or mesh network capability, supporting one satellite uplink supergroup and four (only three are used in this system) downlink supergroups.
- **Trunk Encryption Device (TED) (KG-194)**. The transmission security for aggregate data transmitted over the satellite payload is provided by three TEDs. This allows for encryption and decryption of up to three independent data streams for networked and multiple carrier operation.
- **Communications Security Equipment (TSEC/KY-57)**. The KY-57 is a wideband secure voice digital device that encrypts and decrypts digital voice orderwire traffic. The KY-57 is used in combination with the handset to provide a terminal-to-terminal orderwire through the TSSP.
- **IDNX**. The IDNX serves primarily as a first-level multiplexer. When communicating with other AN/TSC-143s, the IDNX can only be used in a point-to-point fashion (for example, the IDNX only has one trunk in this configuration). Alternatively, users may use the AN/TSC-143 IDNX to gain SATCOM access to remote IDNX networks by connecting to a cooperating terminal (not an AN/TSC-143), which is connected to an IDNX network. The IDNX is configured from the OIU.
- **Switch Multiplexer Unit (SMU) Keyboard and Display**. As the switching system for the AN/TSC-143, the SMU functions as an originating and terminating switch providing wire subscriber services. It routes calls to subscribers anywhere in the network and provides system timing. The SMU consists of a compact digital switch, a loop nest, and timing standard. The SMU loop nest can support up to 53 subscribers. The SMU can also support an additional seven DTGs, at rates up to 4096 Kbps for each DTG. There is also a separate power supply for the SMU, located directly under the SMU.
- **IP Router**. The IP router provides a packet switching capability to the AN/TSC-143 and is used to access hosts in the MSE packet network.
- **Transceiver**. The transceiver (transmitter/receiver) provides a 10 Mbps medium access LAN interface (through coaxial cable) to the router for switching, and converts the attachment unit interface of the router to ThinLAN interfaces used by hosts and LANs.
- **Automatic Key Distribution Center (AKDC)**. The AKDC interfaces with TEDs and loop key generators (LKGs), and provides automatic key generation, distribution, and storage.

- **LKG**. The LKGs provide crypto synchronization with a variety of terminal equipment (for example, digital secure voice terminal [DSVT], digital nonsecure voice terminal [DNVT], and EAC interfaces). Under switch control or manual operation, the LKGs perform synchronization, resynchronization, and key transfers, which operate and process end-to-end encrypted digital traffic.
- **Electronic Transfer Device (KYK-13)**. This electronic transfer device is a battery-operated, hand- or pocket-carried transfer and storage device, which can store up to six keys. It is used to load and transfer keys to a KYX-15, another KYK-13, or to compatible COMSEC equipment. The KYK-13 can receive keys from a KOI-18, KYX-15, or another KYK-13.
- **STU-III**. Critical voice and data communications are vulnerable to interception by moderately sophisticated, hostile, or criminal elements. The STU is a low-cost terminal that prevents the interception of valuable information. There is also a metal oxide varistor (surge suppressor) to prevent power surges from damaging the unit.
- **Call Service Position (CSP)**. The CSP is a staffed workstation that provides assistance to subscribers. This assistance includes upgrading the precedence of a call beyond the established level of a subscriber and establishing conference calls. The CSP is included as part of the AN/TSC-143, but is carried external to the terminal during transportation.
- **Patch Panel**. After signals are connected to equipment through the signal entry panel, the operator can use the patch panel and patch cables to connect various pieces of baseband equipment together.

D-17. **Power Source Group**. The power system provides backup power for 10 minutes to the OIU and the SMU and its support equipment to maintain user communications over terrestrial circuits. The power source group consists of:

- **Generator**. The 120-VAC, 60-Hz, single-phase, diesel-powered generator provides 5.8 kW continuously at 7,000 feet altitude and 102.50F. It consists of a three-cylinder, water-cooled, direct injection, diesel engine driving a 9-kW continuous duty generator. The engine control unit allows the operator to start the engine manually or remotely with a single switch. It also monitors engine oil pressure, temperature, and speed, and displays and reports any faults to the OIU. The associated fuel system provides both an integrated fuel tank that provides 12 hours of continuous operation and a removable five-gallon fuel can.
- **28V Power Supply**. The HHMMWV alternator supplies a 400-ampere, 28 volts direct current (VDC) signal to operate the AN/TSC-143. The branch circuit breaker panel distributes the 28 VDC (and 115 [120] VAC) power to the equipment in the pallet, as required.

- **Dual Power Converter**. The dual converter performs power conditioning. This unit accepts unregulated 85 to 265 VAC, 47 to 66 Hz, single-phase, and/or 21 to 33 VDC power, and provides conditioned and filtered 115 VAC, 60-Hz power for the equipment in the pallet. When both 120 VAC and 28 VDC sources are connected to the unit, a valid alternating current source is selected. If the alternating current source is outside the valid range (for example, 85 to 265 VAC and 47 to 66 Hz), the input is automatically switched to a valid 21 to 33 VDC source.
- **Uninterruptible Power Supply (UPS)**. The UPS also accepts 85 to 265 VAC, 47 to 66 Hz, single-phase, and/or 21 to 33 VDC power and selects the most valid when both are available. The UPS provides 115 VAC, 60-Hz power to the SMU and its support equipment and to the OIU to maintain user communications by way of terrestrial circuits. If both sources are invalid, the internal batteries provide 1 kW of backup power for 10 minutes.

System Configuration

D-18. The system configuration of the AN/TSC-143 is as follows:

- Prime mover: One M1097 HMMWV (carries the system).
- Two M998 HMMWVs (pull the generator and trailer).
- Power plant (generator): Two PU-801s (15-kW).
- Shelter: S250.

Crew

D-19. The crew for an AN/TSC-143 consists of the following:

- Three personnel (MOS 31S).
- Two personnel (MOS 31F).
- One personnel (MOS 31L, 31U, and 31W).

Tabulated Technical Characteristics

D-20. Table D-5 lists the technical characteristics of the AN/TSC-143.

Table D-5. Technical Characteristics of AN/TSC-143

Characteristics	Description
Performance Characteristics	
Routed Protocols	TCP/IP
	OSI CLNS (ISO 8473)
	OSI (CMNS) (ISO 8880)
	DECnet Phase IV and Phase V
	Novell IPX
	AppleTalk Phase 1 and Phase 2

Table D-5. Technical Characteristics of AN/TSC-143 (Continued)

Characteristics	Description
	Banyan VINES
	3Com XNS
	Xerox XNS
	3Ungermann-Bass XNS
	Apollo Domain
	Xerox PUP
	CHAOSnet
Bridging Technologies	Transparent Bridging
	IEEE 802.1 (d) Spanning Tree
	DEC Spanning Tree
	Source-Route Bridging
	Remote Source-Route Bridging
	Source-Route Transparent Bridging
IBM Protocol Support	SDLC Transport
	SDLC to Token Ring Conversion (SDLLC)
	LAN Network Manage
	CiscoWorks NetView Interface Option
	Local Termination of SDLC/LLC2 Sessions
	(Local Acknowledgement)
	NetBIOS Name and Caching Filters
	Transmission Groups/Class of Service
	SNA/LU Address Prioritization
	Proxy Explorer
	Virtual Ring
	Access Expressions
WAN Support	HDLC
	PPP
	X.25
	DDN X.25

Table D-5. Technical Characteristics of AN/TSC-143 (Continued)

Characteristics	Description
	Frame Relay
	SMDS Interface Protocol
	TCP/IP Header Compression
	Priority Output Queuing
	Dial Backup and Load Sharing
	Dial-on-Demand Routing via V.25bis (for circuit switching)
Routing Protocol Support	IGRP (for IP and OSI CLNS)
	RIP (IP)
	OSPF (IP)
	BGP (IP)
	EGP (IP)
	ES-IS (OSI CLNS)
	IS-IS (OSI CLNS)
	Protocol-specific routing for all protocols noted under Routed Protocols
Router Management/Security	Simple Network Manager Protocol (SNMP)
	Telnet Remote Access
	MOP Remote Access
	Priority Output Queuing
	User name/Password for Remote Access Security Control
	Access Lists (routing)
	Administrative Filtering (bridging)
	Debug Commands
	Ping Commands
	Syslog Event Logging
	Performance Tuning
LAN Interfaces	Token Ring 4 or 16 Mbps
Ethernet	AUI
Serial Interfaces	V.35, V.10, ISDN BRI, EIA 530, X.21, NRZ or NRZI, RS-232, RS-449, DCE or DTE (DTE only for EIA 530); Speeds up to 4 Mbps

Table D-5. Technical Characteristics of AN/TSC-143 (Continued)

Characteristics	Description
Mechanical:	
Antenna Type	Prime Focus, Offset Paraboloid
Mount Type	Elevation over Azimuth
Travel Range:	
Azimuth	f1350
Elevation	5° to 90° Operational range
Polarization	+900 Effective
Axis Drive Speed	Variable to 2 deg/sec nominal
Operational Characteristics	
Modems:	
Interoperability	EF Data SLM-4650, MD-1002, OM-73 and MD-945
Operation Modes	INTELSAT IESS-308 (IDR), INTELSAT IESS-309 (IBS), DSCS
Digital Data Rate	Selectable in 1 bit/s increments from 9.6 Kbps to 9.468 Mbps
Modulation Types	QPSK, Offset QPSK, and BPSK
Data Scrambling Types	OM-73 compatible, IESS-309, CCITT V.35 (EF Data/-Comstream compatible), Fairchild compatible, no scrambling
Transmit/Receive IF Frequency	Tunable in 2.5 kHz steps from 50 MHz to 180 MHz. Transmit IF tunable independent from Receive IF
Receive Buffer	Adjustable from 384 to 262 bits or to 144 bits in 16-bit increments. Allows continuous synchronous operation with payloads inclined at 10° at maximum data rate of 8.192 Mbps
Data Timing	Operator Selectable Internal, Transmit Terrestrial, External, and Receive Satellite Clock
Antenna:	
Transmit Frequency Range	C-Band 5850 - 6425 MHz
	X-Band 7900 - 8400 MHz
	Ku-Band 14.0 -14.5 GHz
Receive Frequency Range	C-Band 3625 - 4200 MHz
	X-Band 7250 - 7750 MHz
	Ku-Band 10.95 - 12.75 GHz

Table D-5. Technical Characteristics of AN/TSC-143 (Continued)

Characteristics	Description
Transmit RF Bandwidth	C-Band 575 MHz
	X-Band 500 MHz
	Ku-Band 500 MHz
	Variation +_2 dB maximum
Receive RF Bandwidth	C-Band 575 MHz
	X-Band 500 MHz
	Ku-Band 1800 MHz
	Variation _2 dB maximum
G/T (Clear Weather)	C-Band 16.5 dB/K 3.65 GHz < f < 4.0 GHz minimum
	16.5 + 20 log (f/4) dB/K 4.0 GHz < f minimum
	X-Band 21.0 dB/K minimum
	Ku-Band 25.0 + 20 log (f/1 1) minimum
EIRP	C-Band 65.0 dBW minimum
	X-Band 67.5 dBW minimum
	Ku-Band 71.5 dBW minimum
	Variation _2 dB maximum
VSWR	C-Band 1.4:1 Receive, 1.3: 1 Transmit maximum
	Ku-Band 1.4:1 Receive, 1.3:1 Transmit maximum
	X-Band 1.25: 1 Receive, 1.25: 1 Transmit maximum
Transmit C/No	All Bands 111 dB minimum
IF Input/Outputs	50 Ohm
Return Loss	IF Input 26 dB minimum
	IF Outputs 26 dB minimum
Transmit Power Handling	C-Band 500W CW
	Ku-Band 500W CW
	X-Band 500W CW

Table D-5. Technical Characteristics of AN/TSC-143 (Continued)

Characteristics	Description
Digital Multiplexer TD-1337	
Satellite Side (Super group) Interfaces:	
Format	Unbalanced NRZ
Rates	16 Kbps to 4664 Kbps in 8 Kbps increments or 4915.2 Kbps
Data 1	0.0 to -0.4V
Data 0	-2.2 to -2.6V
Input/Output Impedance	91 Ohms
Earth Side Interfaces (Balanced NRZ Group):	
Format	Unbalanced NRZ (two-wire system)
Rates	8, 16, 32, 64, 72, 128, 144, 256, 288, 512, 576, 1024, and 1152 Kbps. 4915.2 Kbps for TD-976 mode
Data 1	High side of two-wire system positive with respect to low side
Data 0	High side of two-wire system negative with respect to low side
Transmit Level	87mV to 3V
Receiver Sensitivity	50mV
Input/Output Impedance	100 Ohms
Group Modem Group Data:	
Format	Conditioned diphase
Rates	72, 128, 144, 256, 288, 512, 576, 1024, and 1152 Kbps
Data	Intelligence contained in signal transitions (rather than voltage levels)
Transmit Level	3.OV (2.4 to 3.6V) peak-to-peak
Receive Level	Transmit level fixed; receive level is that received through appropriate length of CX-11230/G cable
Input/Output Impedance	58 Ohms

Table D-5. Technical Characteristics of AN/TSC-143 (Continued)

Characteristics	Description
Power Requirements	
Input Power/Prime Input Power	120 VAC +/-l0%, 50 to 60 Hz, single phase
Acceptable Input Power	85 to 265 VAC, 47 to 66 Hz, single phase
Alternate Direct Current Power	28 VDC
Acceptable Direct Current Power	21 to 33 VDC
Environmental Requirements	
Sheltered Equipment	
Temperature:	
Operating	0 to +50° C (0 to 122°F)
Storage	-40 to +70° C (-40 to 158°F)
Humidity	To 100% non-condensing
Altitude:	
Operating	7000 feet (2100m.)
Nonoperating	40,000 feet (12,200m.)
Transportation Vibration	As encountered in mobile applications and commercial shipping environments
Outdoor Equipment	
Temperature:	
Operating	-40 to +50° C (-40 to 122°F)
Storage	-40 to +70° C (-40 to 158°F)
Humidity	To 100% condensing
Altitude:	
Operating	7000 feet (2100m.)
Nonoperating	40,000 feet (12,200m.)
Transportation Vibration	As encountered in mobile applications and commercial shipping environments
Reflector Assembly	
Temperature:	
Operating	-30 to +50° C (-22 to 122°F)
Storage	-40 to +70° C (-40 to 158°F)

Table D-5. Technical Characteristics of AN/TSC-143 (Continued)

Characteristics	Description
Humidity	To 100% condensing
Altitude:	
Operating	7000 feet (2100m.)
Nonoperating	40,000 feet (12,200m.)
Wind Limits:	
Operational	40 mph (64.36 km) gusting to 60 mph (96.54 km) without anchors
Survival	60 mph (96.54 km) without anchors and antenna deployed 90 mph (160.9 km) without anchors and antenna stowed
Ice Accumulation	0.5 inch (1.27 cm) maximum
Rain	Operational to 4 inches (10.16 cm) per hour
Salt/Solvents	Operational in normal coastal and industrial environments
Sand	Blowing typical desert environments
Transportation Vibration	As encountered in mobile applications and commercial shipping environments

FLYAWAY TRI-BAND SATELLITE TERMINAL (FTSAT) AN/USC-60A

NSN: N/A
Reference: N/A

General Information

D-21. The AN/USSC-60A FTSAT is a small, lightweight, tri-band SATCOM terminal, and its design is a unifold, lightweight tripod 2.4-meter antenna system of modular architecture that is highly transportable. The FTSAT is an affordable and proven SATCOM facility, certified for DSCS and INTELSAT operation.

D-22. The FTSAT is easy to set up and is integrated, contained, and transported in ruggedized transit cases. All transit case units are commercial airline checkable for ease of deployment. The terminal is also transportable on pallets by military aircraft. Terminal set-up and satellite acquisition is accomplished in less than 60 minutes. The FTSAT provides worldwide SATCOM operating over the following SATCOM systems:

- DSCS II/III.
- NATO IV.
- INTELSAT.
- EUTELSAT.

- PANAMSAT.
- Domestic Satellite Organization (DOMSAT).

D-23. The modular architecture of the AN/USC-60A terminals easily accommodates expansions such as a digital video, digital voice/fax transmission, secure communications, and network control. Figure D-4 depicts an AN/USC-60A.

Figure D-4. AN/USC-60A

TROPO SATELLITE SUPPORT RADIO (TSSR) AN/GRC-239

NSN: 5820-01-378-8778
Reference: N/A

General Information

D-24. The AN/GRC-239 TSSR is a field tunable, full duplex, LOS microwave radio terminal intended for rapid deployment. Characterized by ease of transport, short set-up and teardown times, and reliable operation under adverse environmental conditions, the TSSR is ideally suited for remoting communications from a main site, hub, or headquarters to an isolated or remote service component. It was designed to replace tactical CX-11230 dual coaxial cable runs or tactical fiber optic cable assemblages (TFOCA). Figure D-5 shows an AN/GRC-239.

Figure D-5. AN/GRC-239

Technical Characteristics

D-25. The TSSR can interconnect with any conditioned diphase or fiber optic trunk originating from TRI-TAC terminals, satellite systems, or COTS equipment. The TSSR can provide either analog voice or a digital voice orderwire. Table D-6 lists the technical characteristics of the AN/GRC-239.

Table D-6. Technical Characteristics of AN/GRC-239

Characteristic	Description
Frequency	14.4GHz – 15.25 GHz
Modulation	FM
Tuning Increments	100-KHz steps
Transmit–Receive Separation	Transmit and receive frequencies should be selected at least 100 MHz apart
Transmit Power	300 mW
Planning Range	5-10 miles
Single TRI-TAC Digital Trunk Group Data Rate	72-4608 Kbps
Balanced Nonreturn to Zero (Nrz) Group (from AN/TAC-1)	6.144 Mbps

ENHANCED TACTICAL SATELLITE SIGNAL PROCESSOR (ETSSP) SHM-1337

D-26. The following paragraphs discuss the ETSSP.

General Information

D-27. The ETSSP supports point-to-point, hub-spoke, mesh, and hybrid network configurations and can be used as either a hub or a spoke. It provides aggregate interfaces (enhanced and current) to satellite terminals using balanced/unbalanced NRZ, conditioned diphase (CDI), bipolar, and T-Carrier 3 (T1)/European Basic Multiplex Rate (E1).

D-28. The SHM-1337 is a direct replacement for the TD-1337.

Technical Characteristics

D-29. The ETSSP, also known as the Enhanced Satellite Hub Multiplexer Model SHM-1337, provides enhanced multiplexer features per MIL-STF-188-168 and is interoperable with the current TD-1337 multiplexers installed in the AN/TSC-85C, AN/TSC-93C, and AN/TSC-143 tactical satellite terminals.

SWITCHING CENTERS

D-30. The following sections discuss the switching centers.

SINGLE SHELTER SWITCH (SSS) AN/TTC-56

NSN: 5805-01-452-5730
Reference: TM 11-5805-803-13&P-1
TM 11-5805-803-13&P-2
TM 11-5805-803-13&P-3

General Information

D-31. The AN/TTC-56 SSS is a downsized, mobile, and transportable tactical digital circuit switch that includes a packet switch and a packet gateway fielded to EAC signal units. The AN/TTC-56 interfaces with DSN, NATO, commercial and tactical telephone switches, switchboards, and various subscribers' telephones.

D-32. The AN/TTC-56 SSS is an improved tactical circuit switch that is replacing the AN/TTC-39D circuit switch. It is housed in a lightweight, multipurpose shelter and mounted on an M1113 expanded capacity vehicle. The SSS provides voice and packet switching capability using small, lightweight, and modular switching equipment. It tows a trailer-mounted diesel engine generator set that provides 10-kW primary operating power for the system.

D-33. **Signal Interface.** Multiconductor and coaxial cable connections made at the signal entry panel accommodate signal traffic in and out of the SSS. Connector receptacles on these panels carry the signals through the shelter wall. Inside each signal entry panel, electrical surge arrestors and high voltage assemblies on the individual signal lines protect electrical equipment from transient high voltage pulses. All panel connector receptacles are waterproof. A hinged cover extends over the panel to provide additional protection against the environment. A grounding stud is located on each signal entry panel.

System Features

D-34. The following subscriber features are possible through the capabilities of the SSS:

- Subscriber profiles.
- Multilevel precedence and preemption.
- Precedence level dialing.
- Conference calling.
- Call security.
- Call forwarding.
- Zone restriction.
- Commercial network access.
- Compressed dialing.
- Direct dialing.

Technical Characteristics

D-35. Table D-7 lists the technical characteristics of the AN/TTC-56.

Table D-7. Technical Characteristics of the AN/TTC-56

Characteristics	Description
Power requirements: Prime power Auxiliary power Emergency power	 240 VAC, 60 Hz, signal phase +26.5 VDC (nominal) +24 VDC
Terminal capacity	Supports up to 300 digital subscribers [1] Provides 18 digital trunks groups
Voice conferencing	Up to four five-party conferences or combinations of up to one 14-party conference Two 10-party conferences or combinations of up to one 18-party conference Up to 20 preprogrammed conferences
Voice digitization rate	16 Kbps or 32 Kbps
Tactical High Speed Data Network (THSDN) overlay	Supports SIPRNET, NIPRNET (in tunnel mode), and VTC at up to approximately 4 Mbps

[1] NOTE: It is possible to connect a much larger number of subscriber loops to the AN/TSC-56. Different units have experienced different degrees of success in doing so. The 300 figure is provided as a starting point for planning purposes.

SEN SWITCH AN/TTC-48(V)2

NSN: 5805-01-310-2539
Reference: TB 11-5805-764-15
TM 11-5805-764-13-1
TM 11-5805-764-13-2
TM 11-5805-764-23P

General Information

D-36. The SEN switch is an attended mobile communications system that provides command posts with automatic local secure switching and wire subscriber access to MSE. The SEN C(V)1 and C(V)3 provide connections for 26 subscribers, while the SEN A(V)2, C(V)2, and C(V)4 provide connections for 41 subscribers. The SEN switch also has provisions to directly access commercial switching offices, interface with the CNR system, interface with a TACSAT terminal, and interface with an analog to digital converter. Individual computers, called host systems, and LANs interface with the SEN using the packet switch and its associated devices, the signal data converter, and transceivers. Figure D-6 shows a SEN.

NOTE: The information in this section applies to all models; when no distinction between models is made, the common name SEN is used.

Differences in EAC and MSE SEN

D-37. The EAC SEN switch provides EAC communications network access for 41 local subscribers, and has provisions to directly access commercial switching offices and to interface with the CNR system. Although the EAC SEN switch and one of the MSE SEN switches have the same model number, they are not internally configured the same. The EAC SEN switch interfaces with an AN/TTC-39D and operates at 32 Kbps data rate. The EAC SEN switch is equipped with a DNVT TA-1042 rather than the TA-1035/U used in the MSE SEN. Additionally, the SHF radio and antenna components are not provided with the EAC SEN switch.

Differences in EAC and MSE Subscriber Features

D-38. The subscriber-initiated affiliation and disaffiliation features of the MSE network do not function in an EAC communications network. Operators must manually enter, alter, and remove routing instructions and subscriber profile information from the EAC SEN switch database. After updating the database, all other subscriber features are the same.

AN/TYQ-127 COMMUNICATIONS DATA LINK AND AN/TTC-58(V) BBN

NSN: N/A
Reference: N/A

General Information

D-39. The AN/TYQ-127 is being fielded in response to urgent combatant commander requirements for tactical data capability. The key subsystems of the AN/TYQ 127 are COTS equipment, which the Army wholesale supply and maintenance system does not fully support.

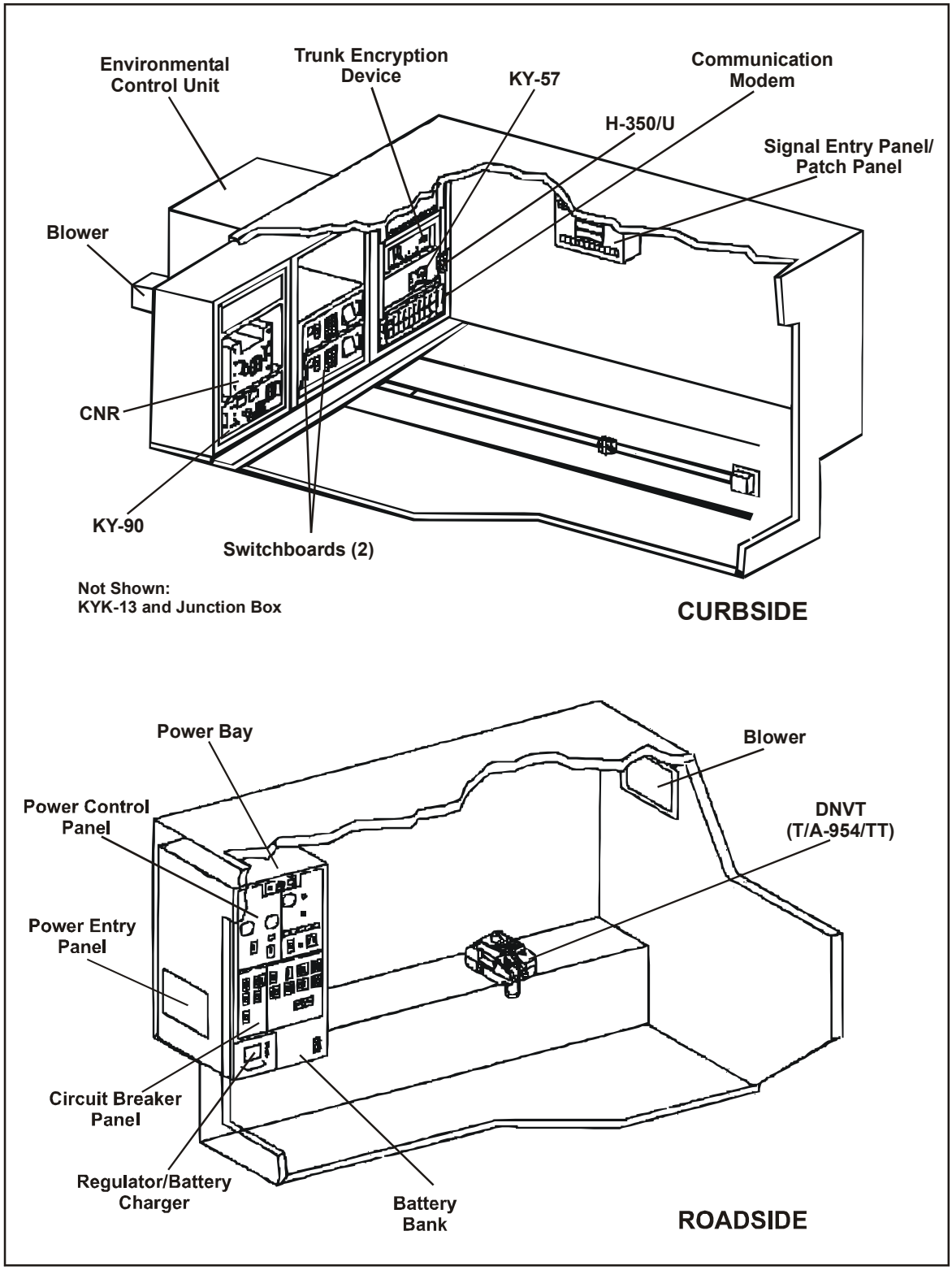


Figure D-6. SEN

D-40. The AN/TTC-58(V) BBN is being developed as a follow-on to the general technical requirement filled by the AN/TYQ-127. The AN/TTC-58(V) will be fielded in conjunction with the conversion of theater tactical signal forces to the ITSB structure. The BBN system will support the immediate need for data and voice services across the tactical battlespace. The BBN will combine voice, data, and video switching with existing and emerging organic transmission capabilities to provide a smaller, lighter, more capable system to augment today's ACUS, TRI-TAC, and MSE communications systems network. Additionally, the BBN will meet the requirement for improved tactical-to-strategic interoperability and inter- and intra-service data network interoperability. The BBN will provide a high speed data and video/imagery communications solution that will include a capability to accommodate higher throughput for data networks and provide a method for the effective use and allocation of bandwidth. Figure D-7 shows a BBN.

Figure D-7. AN/TYQ-127 BBN

PROMINA 800 (HUB) MULTISERVICE ACCESS PLATFORM

Commercial Item

General Information

D-41. The Promina 800 serves as a communications hub multiplexer. It supports local voice subscriber loops and switching, data, video, fax/modem, LAN, and imaging traffic, as well as ATM networking, advanced bandwidth management, integrated service digital network (ISDN), frame relay networking, multiprotocol routing and bridging, voice processing, and digital data networking. A typical customer would be a combatant commander/JTF size headquarters. The Promina 800 uses either an AN/TSC-85C or a multiple-link commercial satellite as a transmission medium. Figure D-8 shows an artist rendition of a Promina 800.

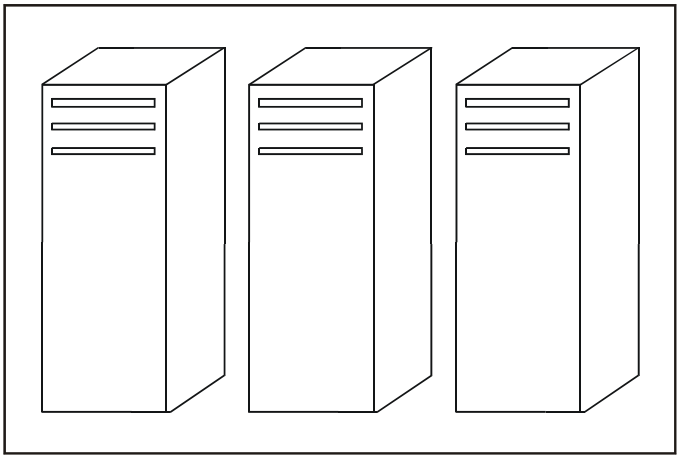


Figure D-8. Artist Rendition of a Promina 800

Technical Characteristics

D-42. The Promina 800 consists of a high-speed shelf and multiple extended expansion shelves. The high-speed shelf and extended expansion shelves accommodate redundant alternating current/direct current power supplies. The high-speed shelf provides for common equipment (processor and interconnect switching) modules, while the extended expansion shelves accommodates up to 16 standard interfaces, applications or features, and trunk modules per shelf.

PROMINA 400 (SPOKE) MULTISERVICE ACCESS PLATFORM

Commercial item

General Information

D-43. The Promina 400 fully integrates the functions of local voice subscriber loops and switching, data, video, fax/modem, LAN, and imaging traffic, as well as an ISDN switch/server and a frame relay switch/server. This multiplexer normally supports remote spokes in a typical hub-spoke network configuration. Typical customers would include JTF extension elements. The Promina 400 uses an AN/TSC-93C or AN/TSC-143 as a transmission medium. Figure D-9 shows an artist rendition of a Promina 400.

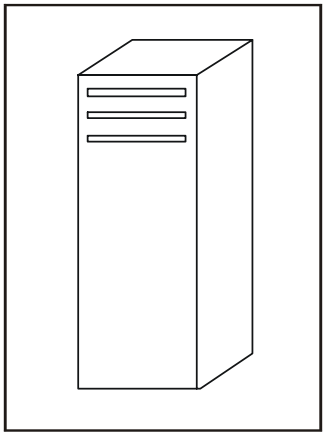


Figure D-9. Artist rendition of a Promina 400

Technical Characteristics of the Promina 800 and Promina 400

D-44. Because this is COTS equipment, specifications are subject to change without notice unless the government has made contractual arrangements to the contrary for government purchased units.

D-45. Both the Promina 800 and Promina 400 are tailored to mission requirements by the selection of cards installed. Table D-8 shows the specifications for the Promina 800 and Promina 400. Table D-9 shows the networking features of the Promina 800 and Promina 400. Not all of the features listed below will necessarily be installed at one time, and some features may appear in different quantities.

Table D-8. Technical Characteristics of the Promina 800 and Promina 400

Characteristic	Promina 800 Description	Promina 400 Description
Physical System Capacity [1]		
nx64 trunks	96	15
E1 or T1 trunks	96	15
E3 or T3 trunks	4 or 6	2 (ATM only)
ATM Virtual Trunks	32	8
ATM Port Bundles	128	32
Data ports	1,488	352
Voice ports	2,000	480
Physical Specifications		
Feature slots	128	24
Shelves	1–7	1–2
Physical design	Net.com cabinet, standalone, or rackmount	Cabinet, standalone, or rackmount
AC power (autoranging)	90 VAC–264 VAC 47 Hz–63 Hz	90 VAC–264 VAC 47 Hz–63 Hz
DC power	-48 VDC to -60 VDC	-48 VDC to -60 VDC
Dimensions (H x W x D)	84 in. x 22.09 in. x 32.56 in 213.36 cm x 56.11 cm x 82.7 cm	33.6 in. x 19 in. x 21.67 in. 85.3 cm x 48.26 cm x 55.04 cm
Ambient temperature	5°C–40°C 41°F –104°F	5°C–40°C 41°F –104°F
Relative humidity (noncondensing)	5%–95%	5%–95%

[1] Operational capacity is application dependent.

Table D-9. Networking Features of the Promina 800 and Promina 400

Networking Features	Description
Traffic types	Synchronous data; asynchronous data; ATM; LAN; frame relay; digital voice; analog voice; fax; voice band data; video; image
Transmission facilities	OC-3; E1; E3; T1; T3/DS3; fiber; microwave; satellite; DDS; X.21; EIA-422; EIA-530
Switching techniques	Cell; packet; frame; circuit
Voice interfaces	Digital: DS1; DAMI (G.703/704); Analog: 2/4 wire E&M; FXO; FXS
Voice signaling protocols	E&M; FXO; FXS; PLAR; SSDC5-A; COLISEE; R2; MLPP
Data interfaces	EIA-232; EIA-449/422; EIA-530; V.35; biphase; conditioned diphase; X.21; V.24; V.36
LAN interfaces	Ethernet; Token Ring
MDSL Interfaces	ETR 152

SHF RADIO SYSTEMS

D-46. The following sections discuss SHF radio systems.

AN/TRC-138A RADIO REPEATER SET

NSN: 5820-01-161-9419
References: TM 11-5820-926-12-1
TM 11-5820-926-12-2

General Information

D-47. The AN/TRC-138A is a tactical communications assemblage with multiple system deployment. It provides a 576-channel short-range wideband radio (SRWBR) link between the radio park at the top of the hill (TOH) and the AN/TRC-175 radio terminal set at the bottom of the hill (BOH). It is used as a radio repeater to provide a LOS (40 kilometers [25 miles] maximum) microwave link (24/144-channel) between two external AN/TRC-138As and as a radio/cable terminal to terminate up to 72/144 low speed channel systems (48 kilometers [25 miles maximum]). The AN/TRC-138A can terminate three PCM/digital group multiplexer (DGM) systems and is compatible with TRI-TAC.

Major Components

D-48. Table D-10 lists the major components of the AN/TRC-138.

Table D-10. Major Components of the AN/TRC-138

Components	Quantity
AN/GRC-222 radio sets	3
TSEC/KY-68 DSVT	1
TSEC/KG-84 loop encryption device	1
MD-1026 (P)/G group modems	3
LS-147F/F1 intercommunication station	1
TSEC/KY-57 voice encryption device	1
S-667C/TRC-138A shelter	1

Technical Characteristics

D-49. Table D-11 lists the technical characteristics of the AN/TRC-138A.

Table D-11. Technical Characteristics of the AN/TRC-138A

Characteristics	Description
Frequency range	4.4 to 5.0 GHz
Transmission range:	
LOS	Up to 40 kilometers (25 miles)
SRWBR	8 kilometers (5 miles)
Cable driver modem	8 kilometers (5 miles) with repeaters
RF output	1-3 W
Channelization	Time division mulitplexer
Number of channels	SRWBR 576 channel link (from AN/TRC-175) 24/144 channel link (node-to-node) from another AN/TRC-138A or AN/TRC-175
Orderwire:	
Digital voice	16 Kbps
Analog voice	300 to 1800 Hz at 3 dB bandwidth points
Weight	2,424 kilograms (5,240 pounds) including shelter
Power requirement	115 VAC ±6 volts, 50/60/400 Hz, three-phase
Power unit	PU-631
Mounting	S-667 shelter

AN/TRC-138C RADIO REPEATER SET

NSN: 5820-01-387-4544
References: TM 11-5820-1135-12

General Information

D-50. The AN/TRC-138C radio repeater provides a 32- to 144-channel internodal microwave link, up to 40 kilometers (25 miles). It is capable of communicating with adjacent nodes via radio or fiber optic cable links and can provide communications between the BOH and the TOH for up to 8 kilometers (5 miles). It is used as a radio/cable terminal to terminate up to three systems or as a radio repeater to extend the range of internodal multichannel links. The AN/TRC-138C is used in both PCM (12 to 96 channels) and DGM (36 to 144 channels) multichannel systems to satisfy operational requirements. The AN/TRC-138C fits into a smaller shelter than earlier models. By using two HMMWV/s rather than one 5-ton truck for tactical transport, this high mobility DGM assemblage (HMDA) can then be driven right onto the aircraft and right off into the area where needed.

Major Components

D-51. Table D-12 lists the major components of the AN/TRC-138C.

Table D-12. Major Components of the AN/TRC-138C

Components	Quantity
S-667C/TRC-138C (modified S-805/G) shelter	1
AN/GRC-222 radio sets	3
AN/VRC-46 or AN/VRC-90 radio set	1
C-10717/TRC control orderwire	1
ID-2324(V)/TRC alarm status indicator	1
MD-1026(P)/G group modems	3
MD-1272/G fiber optic modem receivers-transmitters	12
Reflector assembly	3

TROPO SYSTEMS

D-52. The following sections discuss the TROPO systems.

AN/TRC-170(V) RADIO TERMINAL SET

NSN: 5820-01-148-3977 (AN/TRC-170(V)2)
5820-01-148-3976 (AN/TRC-170(V)3)
References: TM 11-5820-934-13-1-3 (AN/TRC-170(V)2)
TM 11-5820-934-13-1-4 (AN/TRC-170(V)2)
TM 11-5820-934-13-1-5 (AN/TRC-170(V)2)
TM 11-5820-934-13-2-1 (AN/TRC-170(V)3)
TM 11-5820-934-13-2-2 (AN/TRC-170(V)3)
TM 11-5820-934-13-2-3 (AN/TRC-170(V)3)
TM 11-5820-934-13-2-4 (AN/TRC-170(V)3)
TM 11-5820-934-13-2-5 (AN/TRC-170(V)3)

General Information

D-53. The AN/TRC-170(V) provides tactical multichannel digital TROPO or LOS systems for transmitting analog and digital traffic. It can terminate one system and deploy at hybrid modes for internodal and extended range (skip node) communications. The AN/TRC-170(V)2 replaces the AN/TRC-132 TROPO. The AN/TRC-170(V)3 replaces the AN/TRC-112/121 TROPO. Figure D-10 shows an AN/TRC-170(V)2 heavy TROPO, and Figure D-11 shows an AN/TRC-170(V)3 light TROPO.

Figure D-10. AN/TRC-170(V)2 Heavy TROPO

Figure D-11. AN/TRC-170(V)3 Light TROPO

Major Components

D-54. Table D-13 lists the major components of the AN/TRC-170.

Table D-13. Major Components of the AN/TRC-170

Components	Quantity
AN/GRC-197 radio set	1
KY-68 DSVT	1
MD-1026( )(P)/G group modems	1
TSEC/KY-58 VINSON	1
KYK-13 electronic transfer device	1
QRA antenna system, 3 meters	1
TD-1236( )/G trunk group multiplexer	1
C-10602/TRC-170 voice orderwire control unit	1
MD-1023( )/G low speed cable driver modem	1
High power amplifiers (2 kilowatts) ((V)2)	2
High power amplifier (2 kilowatts) ((V)3)	1
Environmental control unit	1

Table D-13. Major Components of the AN/TRC-170 (Continued)

Components	Quantity
OM-61/TRC-170 TROPO modem	1
TSEC/KG-81 trunk encryption devices	2
SN-531/TRC-170(V)2 synthesizers	2
SN/531/TRC-170(V)3 synthesizer	1
TSEC/KG-84 dedicated loop encryption devices	2
951-211-1 high wind kit	1

Technical Characteristics

D-55. Table D-14 lists the technical characteristics of the AN/TRC-170.

Table D-14. Technical Characteristics of the AN/TRC-170

Characteristics	Description
Number of channels	8 to 144
Data rates	128 to 4,096 Kbps
Frequency range	4 to 5.0 GHz
Power output	2 kilowatts
Diversity	(V)2: Quad or dual (V)3: Dual bandwidth (V)2: 3.5 or 6 MHz (V)3: 3.5 or 7 MHz
Range	(V)2: 241 kilometers (150 miles) (V)3: 161 kilometers (100 miles)
Power requirement	120/208 VAC, 50/60/400 Hz
Weight	(V)2: 3,859 kilograms (8,500 pounds) (with shelter) (V)3: 2,656 kilograms (5,850 pounds) (with shelter)
Shelter	(V)2: Modified S-280 (V)3: Modified S-250

UHF RADIO SYSTEMS

D-56. The following sections discuss UHF radio systems.

AN/TRC-173 AND AN/TRC-173A RADIO TERMINAL SETS

NSN: 5802-01-316-0890
Reference: TM 11-5820-1090-12
TM 11-5820-1090-24P
TM 11-5820-1090-34

General Information

D-57. The AN/TRC-173 and AN/TRC-173A operate as radio or cable terminals and can terminate up to two 7 to 32 channels at 32 Kbps per channel or 7 to 64 channels at 16 Kbps per channel digital multichannel LOS systems.

Major Components

D-58. Table D-15 lists the major components of the AN/TRC-173 and AN/TRC-173A.

Table D-15. Major Components of the AN/TRC-173 and AN/TRC-173A

Components	Quantity
S-589 shelter	1
TSEC/KY-58 VINSON	1
AN/GRC-103(V)4 radio sets	2
Power supply 28 VDC	1
TSEC/KG-81 trunk encryption devices	2
AS-3047/GRC-103 antennas	2
AB-577 masts	2
MK-806 mast extension kits	2
LS-147F/FI intercommunication station	1
TD-1234( )/TTC remote multiplexer combiner (RMC)	4
CV-2500 frequency electronic converter	1
DA-437/GRC-103 dummy loads	2
MD-1023( )/G low speed cable driver modems	2
TA-312/PT	1
H-182/PT headset	1

Table D-15. Major Components of the AN/TRC-173 and AN/TRC-173A (Continued)

Components	Quantity
MD-1026( )(P)/G group modems (up to four per case)	2
KY-68 DSVT	1
KYK-13 electronic transfer device	1
KYK-15/TSEC net control device	1
Fill cable auxiliary components and spares	1
KOI-18 tape reader	1
TSEC/KG-84 dedicated loop encryption device	1
SINCGARS radio	1
AN/MJQ-19 power unit	1
C-10716 orderwire control unit	1

Technical Characteristics

D-59. Table D-16 lists the technical characteristics of the AN/TRC-173.

Table D-16. Technical Characteristics of AN/TRC-173

Characteristic	Description
Frequency range	Range 1.35 to 1.85 GHz (Band IV)
Power output	15 watts (Band IV)
Range	64 kilometers (40 miles)
Power requirement	115 VAC, single phase
Weight	2,179 kilograms (4,800 pounds)
Shelter	S-589

AN/TRC-173B RADIO TERMINAL SET

NSN: 5820-01-387-4952
References: TM 11-5820-1136-12
TM 11-5820-1136-24P
TM 11-5820-1136-34

General Information

D-60. The AN/TRC-173B radio terminal set provides radio termination and multiplexing for extension access links of 8 to 36 channels at 32 Kbps per channel or 7 to 32 channels. The maximum traffic channels provided are 64 at 16 Kbps per channel. The AN/TRC-173B provides direct interface with any mixture of four-wire analog and digital subscriber terminals through remote

multiplex equipment and interfaces directly with a unit level circuit switch, if required. The AN/TRC-173B fits into a smaller shelter than the A model. By using two HMMWVs rather than one 5-ton truck for tactical transport, this HMDA can then be driven right onto the aircraft and right off into the area where needed. Figure D-12 depicts the AN/TRC-173B.

Figure D-12. AN/TRC-173B

Major Components

D-61. Table D-17 lists the major components of the AN/TRC-173B.

Table D-17. Major Components of the AN/TRC-173B

Components	Quantity
S-589B/TRC-173B (modified S-805/G) shelter	1
AN/GRC-103(V)4 radio set	2
DA-437/GRC-103 dummy load, electric	2
CV-2500/GR waveform converter	1
C-10716/TRC control orderwire (OCU-1)	1
ID-2324(V)/TRC alarm status indicator	1
MD-1026(P)/G group modems	2
MD-1272/G fiber optic modem receivers-transmitters	8
TD-1234(P)/TTC	4

AN/TRC-174 AND AN/TRC-174A RADIO REPEATER SETS

NSN: 5820-01-161-9420 (AN/TRC-174)
5820-01-316-0880 (AN/TRC-174A)
References: TM 11-5820-864-12-1 (AN/TRC-174)
TN 11-5820-1089-12 (AN/TRC-174A)

General Information

D-62. The AN/TRC-174 and AN/TRC-174A operate as radio repeaters or split radio terminals and can terminate up to three 18l/36 digital multichannel LOS systems. They will deploy in hybrid (analog/digital) integrated tactical communications system nodes and extension systems during the transitional period. In split terminal operations, they connect to the communication nodal control element by CX-11230 or SRWBR. The AN/TRC-174 replaces the AN/TRC-110 and AN/TRC-152.

Major Components

D-63. Table D-18 lists the major components of AN/TRC-174 and AN/TRC-174A.

Table D-18. Major Components of the AN/TRC-174 and AN/TRC-174A

Components	Quantity
AN/GRC-103(V)4 radio sets	3
AB-577 masts	3
MD-1023( )/G low speed cable driver modems	3
CY-4507 mast extension kits	3
LS-147F/FI intercommunication station	1
MD-1026( )(P)/G group modems (up to four modems per case)	1
DA-437/GRC-103 dummy loads	3
TA-312/PT telephone	1
H-182/PT headset	1
TSEC/KG-84 dedicated loop encryption devices	2
AN/MJQ-19 power unit, ancillary components, and spares	1
C-10716 orderwire control unit (OCU-1)	1
KY-68 DSVT	1
KYK-13 electronic transfer device	1
TSEC/KY-58 VINSON	1

Table D-18. Major Components of the AN/TRC-174 and AN/TRC-174A (Continued)

Components	Quantity
Fill cable	1
Power supply 28 volts direct current (VDC)	1
KOI-18 tape reader	1
AS-3047/GRC-103 antennas	3
SINCGARS radio	1

Technical Characteristics

D-64. Table D-19 list the technical characteristics of the AN/TRC-173B.

Table D-19. Technical Characteristics of the AN/TRC-173B

Characteristic	Description
Frequency range	Range 1.35 to 1.85 GHz (Band IV)
Power output	15 watts (Band IV)
Range	48 kilometers (30 miles)
Power requirement	115 VAC, single phase
Weight	2,134 kilograms (4,700 pounds)
Shelter	S-590

AN/TRC-174B RADIO REPEATER SET

NSN: 5820-01-387-4520
References: TM 11-5820-1137-12
TM 11-5820-1137-24P
TM 11-5820-1137-34

General Information

D-65. The AN/TRC-174B radio repeater set is used in extension links, up to 48 kilometers (30 miles), to provide users that are in the vicinity of the node entry into the area communications systems. It is used as a split terminal at major areas and extension nodes to provide radio termination of up to three eight- to 36- multichannel systems at 32 Kbps per channel. It is also used as a radio repeater to extend the range of extension links. The AN/TRC-174 will fit into a smaller shelter. By using two HMMWVs rather than one 5-ton truck for tactical transport, this HMDA can then be driven right onto the aircraft and right off into the area where needed. Figure D-13 depicts the AN/TRC-174B.

Figure D-13. AN/TRC-174B

Major Components

D-66. Table D-20 lists the major components of the AN/TRC-174B.

Table D-20. Major Components of the AN/TRC-174B

Components	Quantity
S-590B/TRC-174B (modified S-805/G) shelter	1
AN/GRC-103(V)4 radio sets	3
DA-437/GRC-103 dummy loads, electric	2
C-10716/TRC control orderwire (OCU-1)	1
ID-2324(V)2/TRC alarm status indicator	1
MD-1026(P)/G group modems	2
MD-1272/G fiber optic modem receivers-transmitters	8
CV-2500/GR waveform converter	1

TIME DIVISION MULTIPLEXER AN/FCC-100

LIN: M85055 (AN/FCC-100(V)1X)
(AN/FCC-100(V)2X)
(AN/FCC-100(V)3X)
M84987 (AN/FCC-100(V)1)
(AN/FCC-100(V)2)
(AN/FCC-100(V)4)
(AN/FCC-100(V)4X)
(AN/FCC-100(V)5X)
(AN/FCC-100(V)6)
(AN/FCC-100(V)8)
NSN: 5820-01-121-1991 (AN/FCC-100(V)1)
5820-01-121-7079 (AN/FCC-100(V)1X)
5895-01-226-4034 (AN/FCC-100(V)2)
5820-01-226-4035 (AN/FCC-100(V)2X)
5820-01-330-2671 (AN/FCC-100(V)3X)
5895-01-335-9365 (AN/FCC-100(V)4)
5820-01-342-3210 (AN/FCC-100(V)4X)
5820-01-368-9112 (AN/FCC-100(V)5X)
5820-01-368-9111 (AN/FCC-100(V)6)
5895-01-415-8663 (AN/FCC-100(V)8)
Reference: TM 11-5805-732-series (AN/FCC-100(V)1, 1X, 2, 2X, 4, 4X)
TM 11-5805-784-series (AN/FCC-100(V)3X, 5X, 6)

General Information

D-67. The AN/FCC-100 is a rack-mountable, stand-alone unit used to perform multiplexing, demultiplexing, timing, synchronizing, framing, monitoring, and alarm reporting. This multiplexer normally supports remote spokes and JTF extensions and uses AN/TSC-93C or TROPO/LOS radios as a transmission medium. Figure D-14 shows an FCC-100.

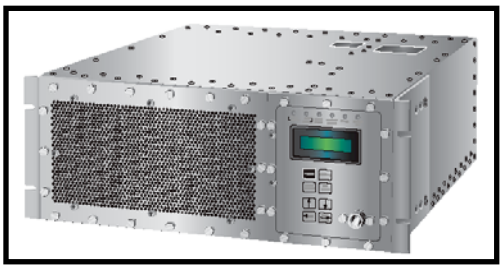


Figure D-14. FCC-100

Technical Characteristics

D-68. The AN/FCC-100 terminates up to 16 full-duplex circuits and supports digital port operations (synchronous NRZ, conditioned diphase, and TRI-TAC conditioned diphase, asynchronous, and isochronous) and analog port modulation encoding/decoding (PCM and continuous variable slope delta).

Appendix E

Illustrations

This appendix contains figures that help illustrate information contained within the manual. Due to the detail of each illustration, the figures are provided in foldout format, and can only be printed on 11 x 17 size paper.

TRI-TAC DGM EQUIPMENT

E-1. Figure E-1 (shown as E-1a and E-1b) depicts a typical TRI-TAC DGM equipment deployment. The focus of this figure is equipment employment; it does not represent any particular organization or scenario.

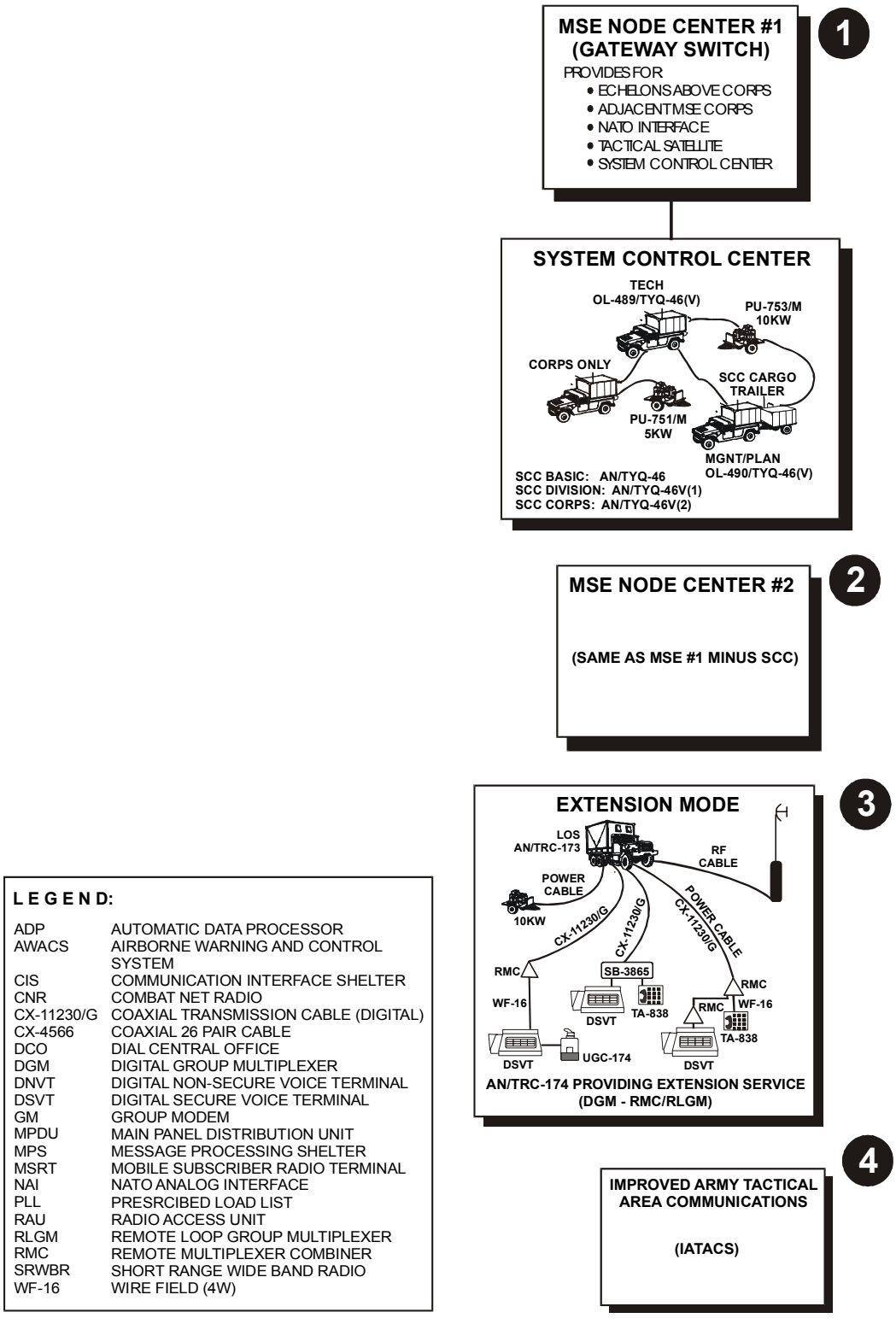
ITSB

E-2. Figure E-2 depicts a typical ITSB deployment and is an example of what a typical network might resemble.

STRATEGIC/FIXED STATION ORGANIZATIONAL STRUCTURES

E-3. Figures E-3 through E-6 depict the following:

- Strategic/Fixed station theater tactical organizational structure of the active components (Figure E-3).
- Strategic/Fixed station theater tactical organizational structure after the conversion to ITSB for the active components (Figure E-4).
- Strategic/Fixed station theater tactical organizational structure of the reserve components (Figure E-5).
- Strategic/Fixed station theater tactical organizational structure after the conversion to ITSB for the reserve components (Figure E-6).



L E G E N D:

ADP	AUTOMATIC DATA PROCESSOR
AWACS	AIRBORNE WARNING AND CONTROL SYSTEM
CIS	COMMUNICATION INTERFACE SHELTER
CNR	COMBAT NET RADIO
CX-11230/G	COAXIAL TRANSMISSION CABLE (DIGITAL)
CX-4566	COAXIAL 26 PAIR CABLE
DCO	DIAL CENTRAL OFFICE
DGM	DIGITAL GROUP MULTIPLEXER
DNVT	DIGITAL NON-SECURE VOICE TERMINAL
DSVT	DIGITAL SECURE VOICE TERMINAL
GM	GROUP MODEM
MPDU	MAIN PANEL DISTRIBUTION UNIT
MPS	MESSAGE PROCESSING SHELTER
MSRT	MOBILE SUBSCRIBER RADIO TERMINAL
NAI	NATO ANALOG INTERFACE
PLL	PRESRCIBED LOAD LIST
RAU	RADIO ACCESS UNIT
RLGM	REMOTE LOOP GROUP MULTIPLEXER
RMC	REMOTE MULTIPLEXER COMBINER
SRWBR	SHORT RANGE WIDE BAND RADIO
WF-16	WIRE FIELD (4W)

Figure E-1a. Typical TRI-TAC DGM Equipment Deployment

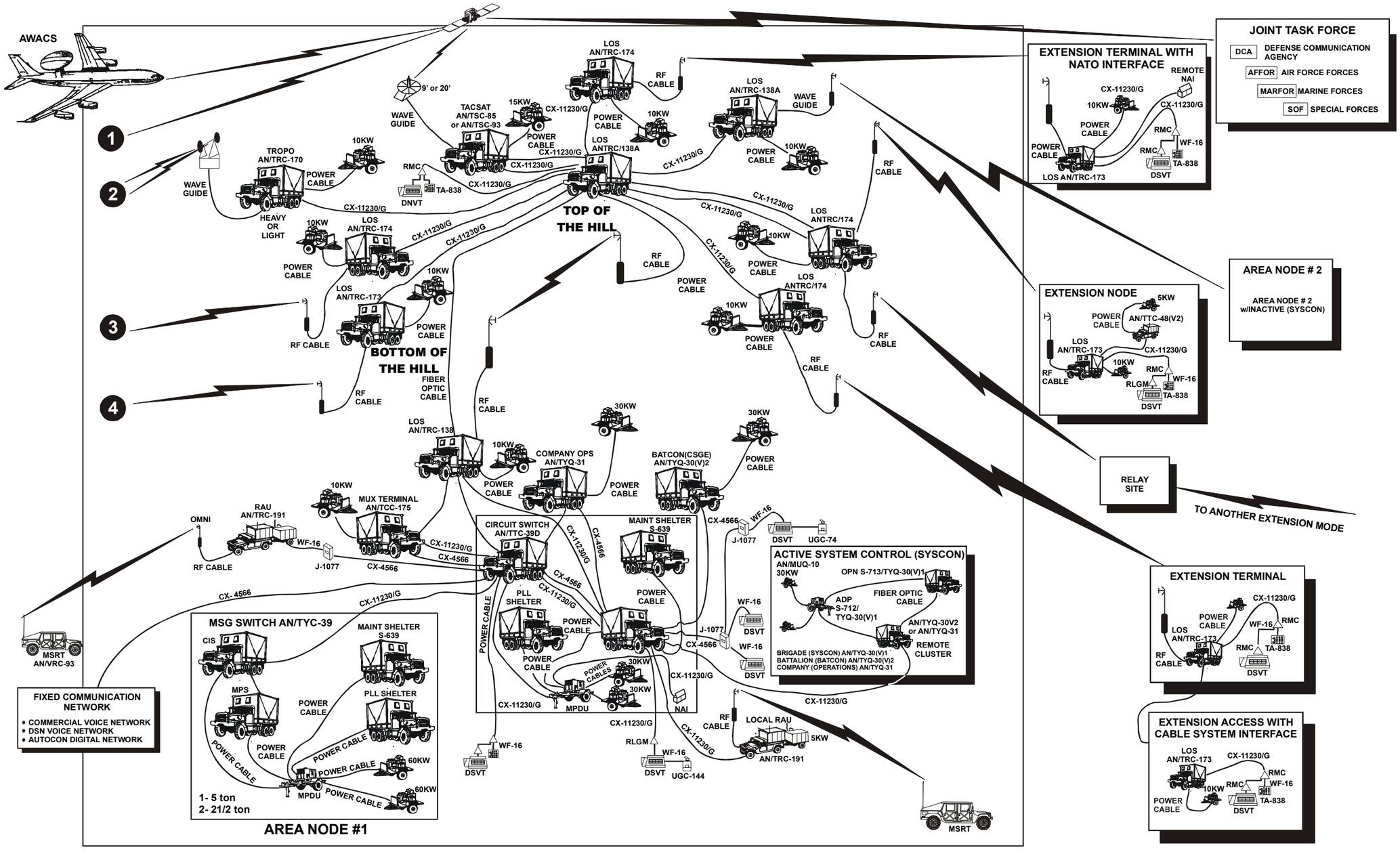


Figure E-1b. Typical TRI-TAC DGM Equipment Deployment

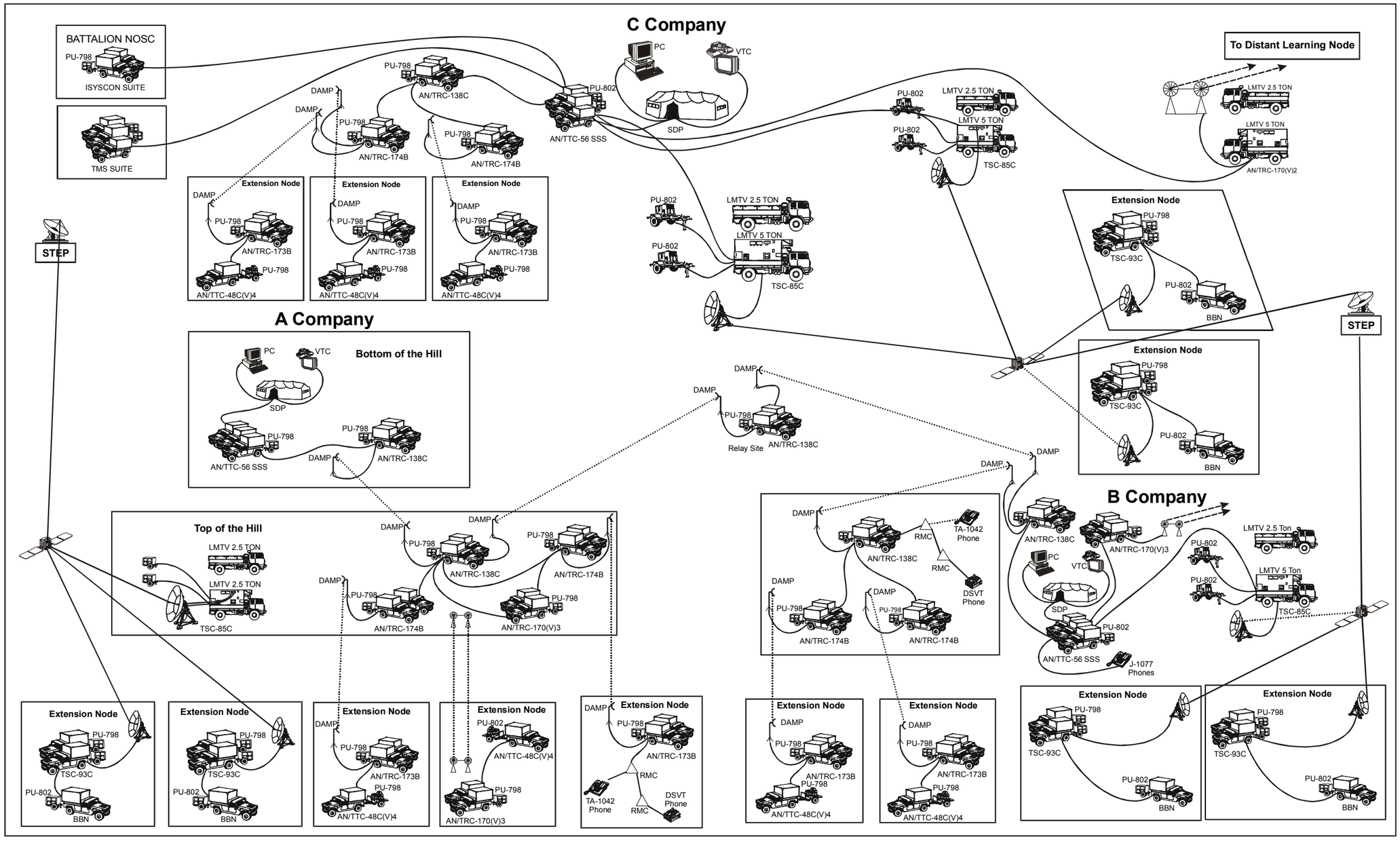


Figure E-2. Typical ITSB Deployment

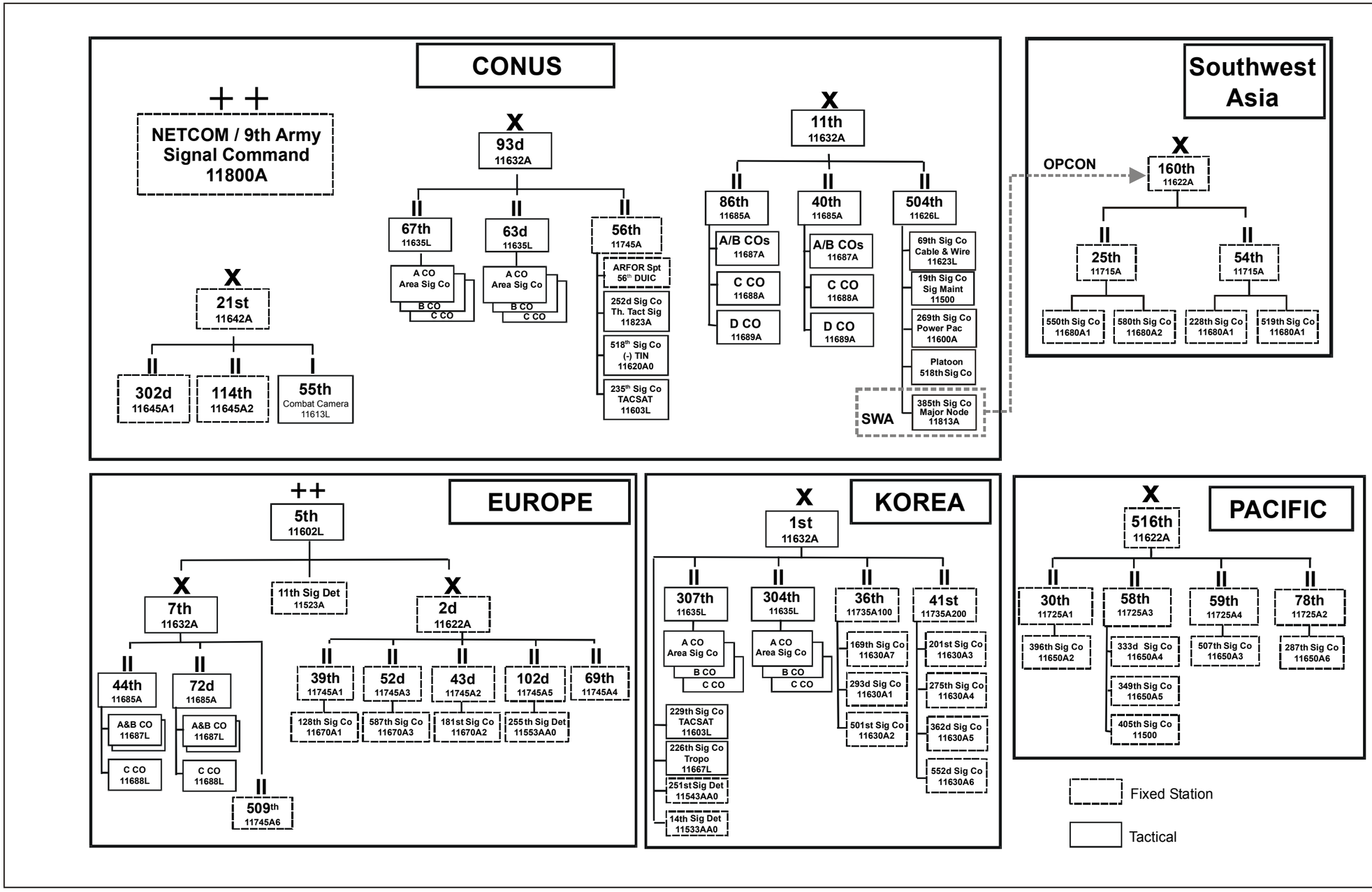


Figure E-3. Strategic/Fixed Station Theater Tactical Organizational Structure of the Active Components

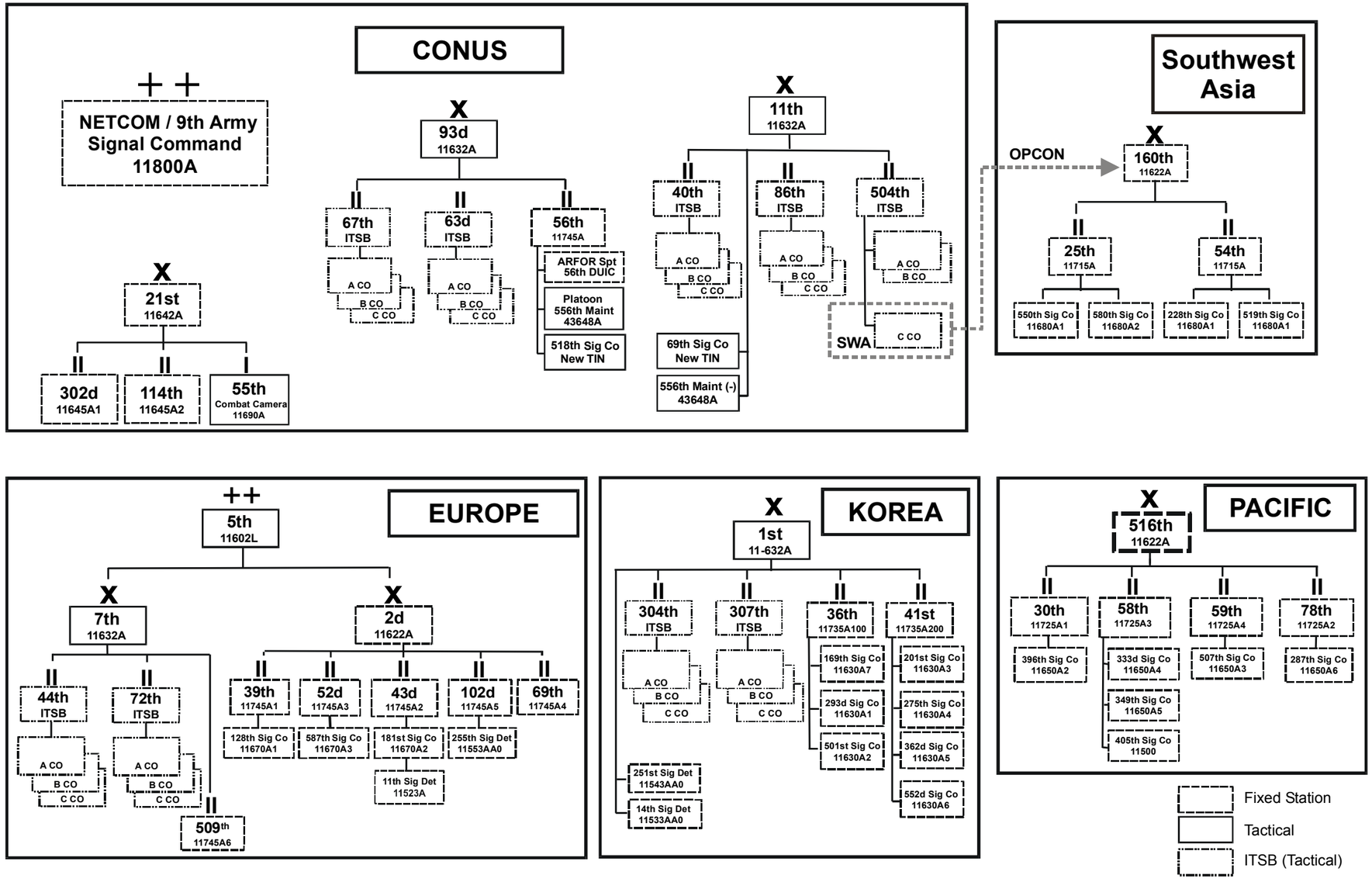


Figure E-4. Strategic/Fixed Station Theater Tactical Organizational Structure After the Conversion to ITSB for the Active Components

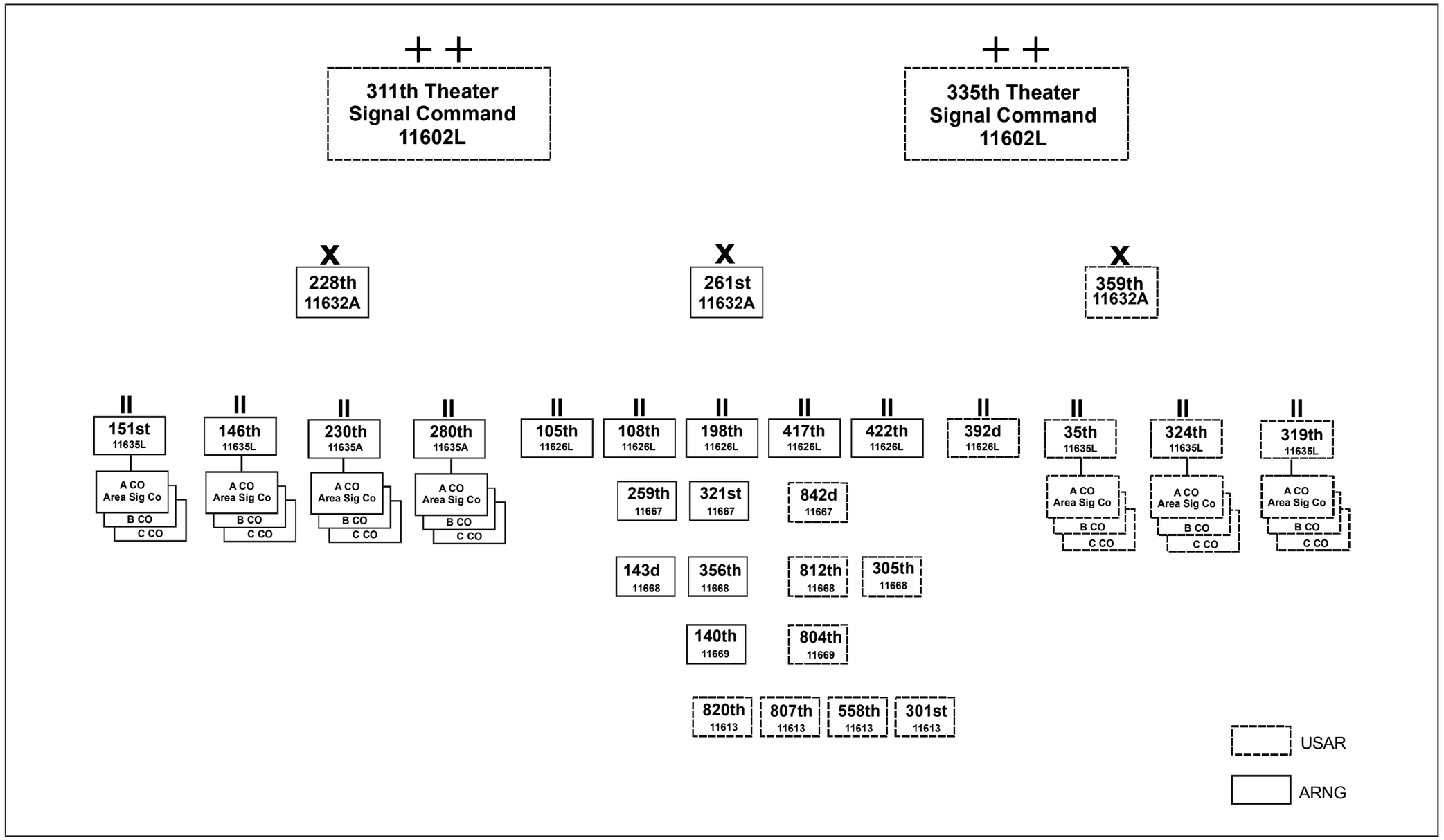


Figure E-5. Strategic/Fixed Station Theater Tactical Organizational Structure of the Reserve Components

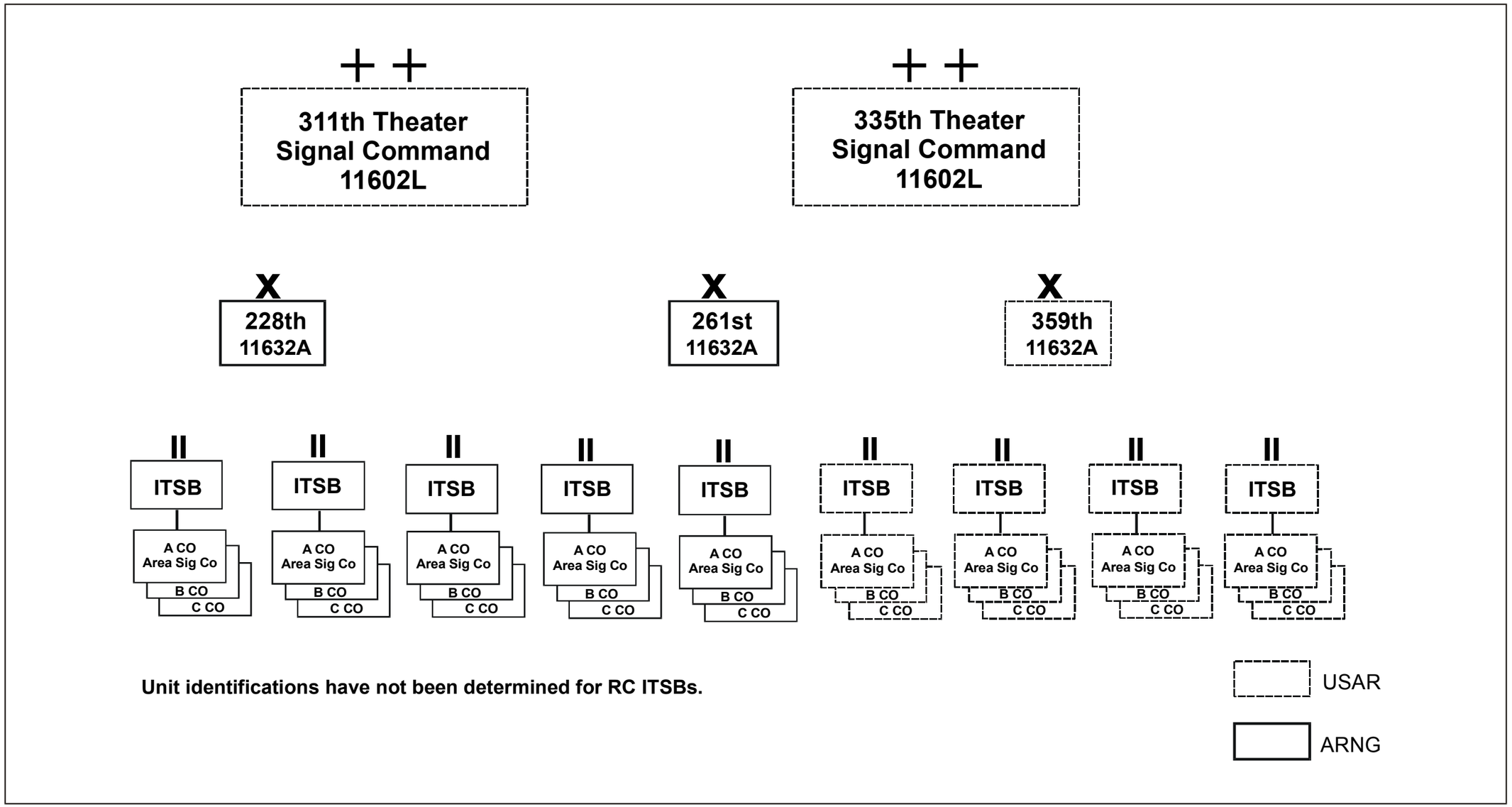


Figure E-6. Strategic/Fixed Station Theater Tactical Organizational Structure after the Conversion to ITSB for the Reserve Components

Glossary

AAMDC	Army Air Missile Defense Command
ABCS	Army Battle Command System
ABN	airborne
AC	Active Component
ACA	Army Contracting Agency
ACC	Army Component Command
ACCOR	Army COMSEC Central Office of Record
ACERT	Army Computer Emergency Response Team
ACL	access control list
ACP	Allied Communications Publication
ACSIM	Army Chief of Staff for Installation Management
ACUS	Area Common User System
ADA	air defense artillery
ADC	analog to digital converter
ADP	automated data processing
ADPE	automated data processing equipment
AEI	Army Enterprise Infostructure
AEIMSG	Army Enterprise Infostructure Management Steering Group
AEIT	Army Enterprise Infostructure Technology
AF	Air Force
AFCERT	Air Force Computer Emergency Response Team
AFFOR	Air Force Forces
AG	Adjutant General
AGMS	automated gateway message switch
AHRS	Army Human Resource System
AIS	automated information system
AKDC	Automatic Key Distribution Center
AKM	Army Knowledge Management
AKO	Army Knowledge Online
AMC	US Army Materiel Command

AMMO	ammunition
ANOSC	Army Network Operations and Security Center
ANSOC	Army Network and Systems Operations Center
AO	area of operations
AOR	area of responsibility
APOD	aerial port of debarkation
ARCENT	US Army Forces, US Central Command
ARFOR	Army Forces
ARM	asset and resource management
ARNG	Army National Guard
ARSOF	Army Special Operations Forces
ASA-INSCOM	US Army Signal Activity-Intelligence and Security Command
ASAS	all source analysis system
ASC	Army Signal Command
ASCC	Army Service Component Command
ASD	Assistant Secretary of Defense
ASG	area support groups
ASIOE	associated support items of equipment
ATE	automated test equipment
ATM	asynchronous transfer mode
ATO	Army Telecommunications Office
ATRRS	Army Training requirements and Resource Training System
ATS	air traffic services
ATTN	attention
AUI	attachment unit interface
AUTODIN	automated digital network
B/P/C/S	base, post, camp, or station
B/W	bandwidth
Banyan VINES	Banyan Virtual Integrated Network Service
BATCOM	battalion control center
BBN	base band node
BDE	brigade
BGP (IP)	Border Gateway Protocol

BIS	battlefield information system
BLDG	building
BLOS	beyond line-of-sight
BLUF	bottom line up front
BN	battalion
BOH	bottom of the hill
BOM	bill of materials
BPSK	biphase shift keying
BSM	battlefield spectrum management
C&W	cable and wire
C/P/S	camp/post/station
C2	command and control
C3	command, control, and communications
C3I	command, control, communications, and intelligence
C4	command, control, communications, and computers
C4I	command, control, communications, computers, and intelligence
C4IM	command, control, communications, computers, and information management
C4IS	command, control, communications, computers, and information systems
C4IT	command, control, communications, computers, and information technology
CA	Civil Affairs
CAC	common access card
CACOM	civil affairs command
CAP	crisis action procedures
CAW	certification authorization workstation
CBE	command budget estimate
CBR	chemical, biological, radiological
CBT	combat
CCB	Configuration Control Board
CCI	controlled cryptographic items
CCP	Configuration Change Proposal
CDI	conditioned diphase
CDR	commander

CE	communications-electronics
CENTCOM	Central Command
centers of gravity	Those characteristics, capabilities, or localities from which a military force derives its freedom of action, physical strength, or will to fight.
CFC	Combined Forces Command
CFLCC	Commander Forces Land Component Command
CG	commanding general
CHEM	chemical
CIA	Central Intelligence Agency
CID	Criminal Investigation Division
CINC	Commander in Chief
CIO	chief information officer
CIO/G6	chief information officer/G6
CJCS	Chairman, Joint Chiefs of Staff
CJCSI	Chairman, Joint Chiefs of Staff Instruction
CJCSM	Chairman, Joint Chiefs of Staff Manual
CJTF	Combined Joint Task Force
C-LAN	coalition local area network
CLSU	COMSEC logistics support unit
CM	configuration management
CMD	command
CMDSA	COMSEC material direct support activity
CMDT	commandant
CMST	Communication Management Support Board
CND	computer network defense
CNN	cable news network
CNR	combat network radio
Co	company
coalition	An ad hoc arrangement between two or more nations for common action.
COE	contemporary operational environment
CofS	Chief of Staff
COMCAM	Combat Camera
Comm	communications

COMMCEN	communications center
COMMZ	communications zone
COMPUSEC	computer security
COMSEC	communications security
CON	Certification of Notifications
CONOPS	continuity of operations
CONUS	continental United States
COOP	continuity of operations plan—assists each core business process, application manager, or facility business manager in completing Y2K contingency plans (i.e., risk assessment and continuity of operations plan).
COTS	commercial off-the-shelf
coup de main	An offensive operation that capitalizes on surprise and simultaneous execution of supporting operations to achieve success in one swift stroke.
CP	command post
CPT	captain
CROP	common relevant operational picture
CS	combat support
CSCE	communications system control element
CSP	call service position
CSPE	communications systems planning element
CSS	combat service support
CTO	Certificate to Operate
CUDP	common user data package
C-WAN	coalition wide area network
DA	Department of the Army
DCA	Defense Communications Agency
DCE	distributed computing environment
DCO-A	Defense Certification Office-Army
DCofS	Deputy Chief of Staff
DCP	deployed command post
DCS	Defense Communications System
DCSC4	Deputy Chief of Staff for command, control, communications, and computers
DCSENG	Deputy Chief of Staff Engineer

DCSIM	Deputy Chief of Staff, Information Management
DCSIM	Deputy Chief of Staff for Information Management
DCSINT	Deputy Chief of Staff for Intelligence
DCSLOG	Deputy Chief of Staff for Logistics
DCSMED	Deputy Chief of Staff Medical
DCSOPS	Deputy Chief of Staff for Operations and Plans
DCSPER	Deputy Chief of Staff for Personnel
DCSPM	Deputy Chief of Staff Provost Marshall
DCSRM	Deputy Chief of Staff Resource Management
DCW	data cable and wiring
DDN	digital data network
DECnet	Digital Equipment Corporation
DGM	digital group multiplex
DID	defense in depth
DII	defense information infrastructure
DISA	Defense Information System Agency
DISN	Defense Information Systems Network
DISNET	defense integrated secure network
DIVTAC	division TAC
DKET	Deployable Ku-band Earth Terminal
DLA	Defense Logistics Agency
DMS	Defense Message System
DMZ	demilitarized zone
DNOSC	Deployed Network Operation and Security Center
DNS	domain name service
DNVT	digital nonsecure voice terminal
DoD	Department of Defense
DOI	defense operating instructions
DOIM	Directorate of Information Management
DOMSAT	Domestic Satellite Organization
DPAS	digital patch and access
DREAR	division rear
DRSN	Defense Red Switch Network
DRU	direct reporting unit

DS	direct support
DSB	direct broadcast satellite
DSC	DMS Service Center
DSCS	Defense Satellite Communications System
DSED	Direct Support Engineering Directorate
DSN	defense switched network
DSSCS	Defense Special Security Communications System
DSTE	digital subscriber terminal equipment
DSVT	Digital Secure voice Terminal
DTE	data terminal equipment
DTG	digital trunk group
DUA	directory user agents
DVM	digital voice modem
ea	each
EAC	echelons above corps
EAM	emergency action message
ECB	echelons corps and below
ECV	enhanced combat vehicle
EGP (IP)	Exterior Gateway Protocol
EHF	extremely high frequency
EIA	Electronic Industries Alliance
EIOM	engineer, install, operate, and maintain
Elec	electronic
e-mail	electronic mail
EMSEC	emission security
ENCOM	engineer command
ENG	engineer
ENL	enlisted
EOD	explosive ordinance disposal
EPW	enemy prisoner of war
EQ	equipment
ES-IS (OSI CLNS)	element structure information set
ESM	enterprise systems management

ESO	Engineering Support Organizations
ESS	electronic switching system
ESTA	Enterprise Systems Technology Activity
ETSSP	enhanced tactical satellite signal processor
ETUT	enhanced tactical user terminal
EUSA	Eight US Army
EUTELSAT	European Telecommunications Satellite Organization
EW	electronic warfare
EXS	extended expansion shelf
FAX	facsimile
FCO	Facility Control Office
FCS	future combat system
FDU	force design update
FEC	forward error correction
FEP	FLTSATCOM EHF package
FIN	finance
FLTSATCOM	fleet satellite communications
FM	frequency modulated; field manual
FOIA	Freedom of Information Act
FORSCOM	US Army Forces Command
FOT	fiber-optic terminal
FOTS	fiber-optic transmission systems
FPC	Functional Processing Center
FSEN	future small extension node
FTP	file transfer protocol
FTS	file transfer service
FTSAT	Flyaway Triband Satellite Terminal
FWD	forward
G1	Assistant Chief of Staff, Personnel
G2	Assistant Chief of Staff, Intelligence
G3	Assistant Chief of Staff, Operations
G4	Assistant Chief of Staff, Logistics
G5	Assistant Chief of Staff, Civil Affairs
G6	Assistant Chief of Staff, Communications

G8	Assistant Chief of Staff, Resource Management
GATES	Global Air Transportation Execution System
GBS	Global Broadcast System
GCCS	Global Command and Control System
GCCS-A	Global Command and Control System Army
GCS	ground control station
GENSER	general service
GIG	Global Information Grid
GMF	ground mobile forces
GNOSC	Global Network Operations and Security Center
GOTS	government off-the-shelf
GP	group
GPS	global positioning system
GS	general support
GSE	ground support equipment
GWS	groupware server
HDLC	high level data link control
HF	high frequency
HHC	headquarters and headquarters company
HHD	headquarters and headquarters detachment
HHMMWV	heavy high mobility multipurpose wheeled vehicle
HLS	Homeland security
HMDA	high mobility DGM assembly
HMMWV	high mobility multipurpose wheeled vehicle
HN	host nation
HNA	host nation agreement
HOSP	hospital
HQ	headquarters
HQ,NETCOM/ 9TH ASC	Headquarters, Network Enterprise Technology Command/9th Army Signal Command
HQASC	Headquarters Army Signal Command
HQDA	Headquarters, Department of the Army
HSS	high speed shelf

humanitarian assistance	Programs conducted to relieve or reduce the results of natural or man-made disasters or other endemic conditions such as human pain, disease, hunger, or privation that might present a serious threat to life or that can result in great damage to or loss of property. Humanitarian assistance provided by US forces is limited in scope and duration. The assistance provided is designed to supplement or complement the efforts of the host nation civil authorities or agencies that may have the primary responsibility for providing humanitarian assistance.
IA	information assurance
IAVA	information assurance vulnerability alert
IAW	in accordance with
IDM	information dissemination management
IDNX	Integrated Digital Network Exchange
IDS	intrusion detection system
IEEE	Institute of Electrical and Electronics Engineers
IFD	immediate file delivery
IG	Inspector General
IGAR	Inspector General Action Request
IGRP	Interior Gateway Routing Protocol
IHFR	improved high frequency radio
IMA	Individualization Augumentee
IMCEN	Information Management Support Center
IMINT	imagery intelligence
IMO	Information Management Office
IMP	Information Management Plan
Info	information
information system	The organized collection, processing, transmission, and dissemination of information, IAW defined procedures, whether automated or manual. In information warfare, this includes the entire infrastructure, organization, and components that collect, process, store, transmit, display, disseminate, and act on information.
INFOSEC	information security
INSCOM	Intelligence and Security Command
INTACS	integrated tactical communications system
INTELL	intelligence
IO	information operations

IOC	initial operational capability
IP	Internet Protocol
IPX	Internetwork Packet Exchange
IRR	Individual Ready Reserve
ISC	Information Systems Command
ISDN	integrated service digital network
ISDN BRI	Integrated Services Digital Network Basic Rate Interface
ISM	installation support modules
ISP	Internet Service Provider
ISR	intelligence, surveillance, reconnaissance
ISS	information system security
ISSO	Information Services Support Office
IST	interswitch trunk
ISYSCON	integrated system control
IT	information technology
ITID	Information Technology Integration Directorate
ITOE	intermediate table of organizations and equipment
ITSB	integrated tactical signal battalion
ITW&A	integrated tactical warning and assessment
IW	information warfare—actions taken to achieve information superiority by affecting adversary information, information-based processes, information systems, and computer-based networks while leveraging and defending one's own information, information-based processes, information systems, and computer-based networks.
JAG	Judge Advocate General
JANAP	Joint Army-Navy-Air Force Publication
JC4P	joint command, control, communications, and computer package
JCCC	Joint Communication Control Center
JCMT	joint collection management tool
JCS	Joint Chief of Staff
JCSE	Joint Communications Support Element
JFACC	Joint Force Air Component Commander
JFC	joint force command(er)
JFLCC	Joint Force Land Component Commander

JFMCC	Joint Force Maritime Component Commander
JFSOCC	Joint Force Special Operations Component Commander
JIEO	Joint Interoperability Emergency Organization
JOA	joint operations area
JRMC	joint remote multiplexer combiner
JROC	Joint Requirements Oversight Council
JSOTF	Joint Special Operations Task Force
JSTARS	Joint Surveillance Target Attack Radar System
JTF	joint task force
JTT	joint tactical terminal
JWICS	Joint Worldwide Intelligence Communications System
km	kilometer(s)
LAN	local area network
LEN	large extension node
LEO	low earth orbit
lines of operation	Lines that define the directional orientation of the force in time and space in relation to the enemy. They connect the force with its base of operations and its objectives.
LIWA	Land Information Warfare Activity-1st Information Operations (LAND)
LKG	Loop Key Generator
LLC2	logical link control type 2
LNO	liaison officer
LNOSST	liaison officer signal support teams
LOC	lines of communication
LOS	line-of-sight
LPI/lPD	low probability of intercept/low probability of direction
MACOM	Major Command
Maint	maintenance
MARFOR	Marine Forces
MARS	Military Affiliate Radio System
MC4	medical communications for combat casualty care
MCA	Movement Control Agency
MCO	Major Combat Operations
MCS	Maneuver Control System

MCSP	mobile command support platoon
MED	medical
MEDCOM	Medical Command
METL	Mission essential task lists
METT-TC	mission, enemy, terrain, troops, time, and civil consideration
Mgt	management
MGV	mobile gateway van
MI	military intelligence
MILNET	military network
MILSATCOM	military satellite communications
MIL-SPEC	military specifications
MILSTAR	military strategic and tactical relay
MITT	mobile integrated tactical terminal
MLPP	multilevel precedence and preemption
MLS	multilevel security
MMC	Materiel Management Center
MOA	memorandum of agreement
MOOTW	military operations other than war
MOS	military occupational specialty
MP	military police
MRC	major regional conflict
MSC	major subordinate command
MSE	mobile subscriber equipment
MSG	message
MSRT	mobile subscriber radio terminal
MTA	message transfer agent
MTMC	Military Traffic Agreement Command
MTOE	Modified Table of Organizations And Equipment
MTSA	military specific training allocation
MTW	major theater war
MUX	multiplexer
MWR	morale, welfare, and recreation
NATO	North Atlantic Treaty Organization

NAVCIRT	Naval Computer Incident Response Team
NAVFOR	Navy Forces
NBC	nuclear, biological, chemical
NCA	National Command Authority
NCO	noncommissioned officer
NCR	National Capital Region
NCS	national communications system
NEO	noncombatant evacuation operation
NETCOM/9TH ASC	Network Enterprise Technology Command/9th Army Signal Command
NETCOP	network common operating picture
NETCROP	network common relevant operational picture
NETOPS	network operations
NGB	National Guard Bureau
NIPR	Unclassified but Sensitive Internet Protocol
NIPRNET	Unclassified but Sensitive Internet Protocol Router Network
NOC	Network Operations Center
NOSC	Network Operations and Security Center
NRI	net radio interface
NRZ	nonreturn to zero
NRZI	nonreturn to zero inverted
NSA	National Security Agency
NSC	network service center
NSM	network and systems management
NSN	national stock number
O&M	operation and maintenance
OCONUS	outside the continental United States
ODCSOPS	Office of The Deputy Chief of Staff for Operations
OFF	Officer
OIU	operator interface unit
OOTW	operations other than war
op	operations
OPCON	operational control

operational art	The deployment of military forces to attain strategic and/or operational objectives through the design, organization, integration, and conduct of strategies, campaigns, major operations, and battles. Operational art translates the joint force commander's strategy into operational design and, ultimately, tactical action by integrating the key activities at all levels of war.
OPLAN	operation plan
OPM	Office of Personnel Management
OPNS	operations
OPORD	operations order
OPS	operations
OPSEC	operations security
OSF	Office of Secretary of Defense
OSI	open systems interconnect
OSI CLNS	Open System Interconnection Connectionless Network Service
OSI CMNS	Open System Interconnection Connection Mode Network Service
OSPF (IP)	open shortest path first
OTOE	objective table of organizations and equipment
PA	Public affairs
PAC	personnel actions center
PACOM	Pacific Command
PANAMSAT	Pan American Satellite Organization
PAO	Public Affairs Office
PBX	private branch exchange
PC	personal computer
PCD	personal communications devices
PCM	pulse code modulation
peace operations	A broad term that encompasses peacekeeping operations and peace enforcement operations conducted in support of diplomatic efforts to establish and maintain peace.
PEO EIS	Program Executive Office for Enterprise Information Systems
PERSCOM	personnel command
PIP	primary injection point
PKI	Public Key Infrastructure
PLGR	Precision Lightweight GPS Receiver
PLT	platoon

PMCS	preventive maintenance checks and services
POC	point of contact
POL	petroleum, oils, and lubricants
POP	point of presence
POW	prisoner of war
POWER PAC3	POWER Projection for Army Command, Control and Communications
PPP	Point-to-Point Protocol
PROP CONT	property control
PSN	packet switch network
PSYOP	psychological operations
QPSK	Quadrature Phase Shift Keying
RAU	radio access unit
RC	reserve component
RCC	Regional Control Center
RCERT	Regional Computer Emergency Response Team
RCIO	Regional Chief Information Officer
RD	regional director
RF	radio frequency
RIP (IP)	Routing Information Protocol.
RNOSC	Regional Network Operations and Security Center
RSSC	Regional Space Support Center
S&S	supply and services
S&NM	systems and network management
S1	Personnel Staff Office
S2	Intelligence Staff Office
S3	Operations and Training Staff Office
S4	Logistics Staff Office
SAMS	Standard Army maintenance system
SARSS-O	standard Army retail supply system-objective
SAT	satellite
SATB	semiannual training brief
SATCOM	satellite communications
SCARS	Status Control Alerting and Reporting System

SCI	sensitive compartmented information
SCS	special communications system
SDC	signal data converter
SDLC	synchronous data link control
SDLLC	synchronous data logical link control
SDP	standard data package
SECDEF	Secretary of Defense
SEN	small extension node
SEP	single entry panel
SERE	survival, escape, resistance and evasion
SES	standard expansion shelf
SF	special forces
SGS	Secretary of the General Staff
SHF	super high frequency
SIDPERS	standard installation/division personnel system
SIGINT	signal intelligence
SINCGARS	Single-Channel Ground and Airborne Radio System
SIPR	Secret Internet Protocol
SIPRNET	Secret Internet Protocol Router Network
SJA	Staff Judge Advocate
SLA	service level agreement
SLM	service level management
SMDS	Switched Multimegabit Data Service
SMTP	standard mail transfer protocol
SMU	switch multiplexer unit
SNA/LU	systems network architecture/logical unit
SOC	special operations command
SOFA	Status of Forces Agreement
SOFFOR	Special Operations Force
SOI	signal operation instructions
SONET	synchronous optical network
SOP	standing operating procedure
SOUTHCOM	Southern Command
SPEC	special

SPIRIT	Special Purpose Intelligence Remote Integrated Terminal
SPOD	seaport of debarkation
SPT	support
SRA	specialized repair activity
SRC	standard requirements code
SRWBR	short range wideband radio
SSC	smaller-scale contingencies
SSG	standard systems group
SSP-S	Single Source Processor-Signal Intelligence
SSS	single shelter switch
SST	signal support team
Sta	station
STAMIS	standard information management system
STARC	State Army Resource Center
STAR-T	Super High Frequency Tri-band Advanced Range Extension Terminal
STE	secure telephone equipment
STEP	strategic tactical entry point
STRATCOM	US Army Strategic Command
STU	secure telephone unit
SWA	Southwest Asia
SYSCON	systems control
Syslog	system log
TA	theater army
TAACOM	theater army area command
TAC	tactical command post
TACCS	Tactical Army CSS Computer System
TACON	tactical control
TACSAT	tactical satellite
TADLP	Total Army Distance Learning Program
TAMCA	Theater Army Movement Control Agency
TAMMC	Theater Army Materiel Management Center
TAPDB	Total Army Personnel Database
TBD	to be determined

TCC	technical control center
TCCOR	Theater COMSEC Central Office of Record
TCCS	Theater Communications Control Center
TCF	technical control facility
TCLSC	Theater COMSEC Logistics Support Center
TCP/IP	Transmission Control Protocol/Internet Protocol
TCS	theater communications system
TDA	tables of distribution and allowances
TDN	Trojan data network
TECHCON	technical control
TED	trunk encryption device
telecomm	telecommunications
TELNET	telecommunications network
Term	terminal
TF	task force
TFC	theater finance command
TFOCA	tactical fiber optic cable assemblage
THSDN	Tactical High Speed Data Network
TI	Tactical Internet
TIG	theater information grid
TIM	transformation installation management
TIN	tactical installation and networking
TIP	theater injection point
TIS	Transportation Information System
TMDE	test, measurement, and diagnostic equipment
TMS	Tactical Message System
TNOSC	Theater Network Operations and Security Center
TOC	tactical operations center
TOE	Tables of Organization and Equipment
TOH	top of hill
TPFDD	time-phased force and deployment data—the Joint Operation Planning and Execution System database portion of an operation plan; it contains time-phased force data, non-unit related cargo and personnel data, and movement data for the operation plan.
TPN	tactical packet network

TRANS	transportation
TRANSCOM	transportation command
TRANSEC	transmission security
TRI-TAC	tri-service tactical communications
TROPO	troposcatter communications
TS	Top Secret
TS/SCI	Top Secret/Secret Compartmented Information
TSACS	Terminal Server Access Controller System
TSB	theater signal battalion
TSBM	Theater Satellite Broadcast Manager
TSC	theater support command
TSC(A)	theater signal command-army
TSC/C	Top Secret/Collateral
TSMC	theater signal maintenance company
TSO	theater signal officer
TSRT	typewriter subscriber terminals
TSSC	theater strategic signal company
TSSP	Tactical Satellite Signal Processor
TSSP	tactical satellite signal processor
TSSR	Tropo Satellite Support Radio
TSSS	Top Secret Support System
TT	teletype
TTP	tactics, techniques, and procedures
TTSB	theater tactical signal battalion
TTSC (SEP)	theater tactical signal company (separate)
UA	unit of action
UAV	unmanned aerial vehicle
UCMJ	Uniform Code of Military Justice
UE	unit of employment
UHF	ultra high frequency
UMT	unit ministry team
UN	United Nations
UNC	United Nations Command
UPS	uninterruptible power source

URL	Universal Resource Locator
URS	unit reference sheet
US	United States
USAF	US Air Force
USAISC	US Army Information Systems Command
USANETA	United States Army Network Engineering Telecommunications Activity
USAR	US Army Reserve
USARC	US Army Reserve Command
USARCENT	US Army Forces, Central Command
USAREUR	US Army, Europe
USARPAC	US Army, Pacific
USARSO	US Army, South
USASC	US Army Signal Command
USCINCEUR	US Commander in Chief, Europe
USEUCOM	US European Command
USFK	US Forces, Korea
USMC	US Marine Corps
USMTF	US message text format
USR	unit status reports
USSPACECOM	US Space Command
USTRANSCOM	US Transportation Command
V	version
V.35	An ITU standard for high-speed synchronous data exchange. In the U.S., V.35 is the interface standard used by most routers and DSUs that connect to T-1 carriers
VAC	volts alternating current
VDC	volts direct current
VI	visual information
VLAN	virtual LAN
VSWR	vertical standing wave ratio
VTC	video teleconferencing
WAN	wide area network
WCF	working capitol fund
WIN	Warfighter Information Network

WIN-T	Warfighter Information Network-Tactical
WMD	weapons of mass destruction—in arms control usage, weapons that are capable of a high order of destruction and/or of being used in such a manner as to destroy large numbers of people. Can be nuclear, chemical, biological, or radiological weapons, but excludes the means of transporting or propelling the weapon where such means is a separable and divisible part of the weapon.
WO	warrant officer
WSV	weapons system video
WWMCCS	Worldwide Military Command and Control System
XNS	Extensible Name Service

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Index

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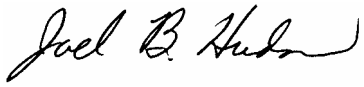

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